

## Part Height Sorter Control with Parallel Branches

Copyright (c) 2013 Dogwood Valley Press, LLC

Additional internal memory:

Symbol	Address	
STEP_1 to STEP_11	B20/1 to B20/11	Step-in-progress bits
DOWN_TMR	T4:1	Times lowering of measuring ram
BIN1_TMR	T4:2	Times eject pulse for bin 1
BIN2_TMR	T4:3	Times eject pulse for bin 2
BIN3_TMR	T4:4	Times eject pulse for bin 3
BIN4_TMR	T4:5	Times eject pulse for bin 4
LVDT_VAL	F8:1	LVDT measurement in mm
TMP_INT	N7:1	Needed to convert height into BCD
TMP_BCD	N9:1	BCD conversion result
HEIGHT_60	B3/21	Height in range of 56 - 64
HEIGHT_75	B3/22	Height in range of 71 - 79
HEIGHT_90	B3/23	Height in range of 86 - 94
HEIGHT_OTHER	B3/24	Height in range not covered above

Conversion formulas

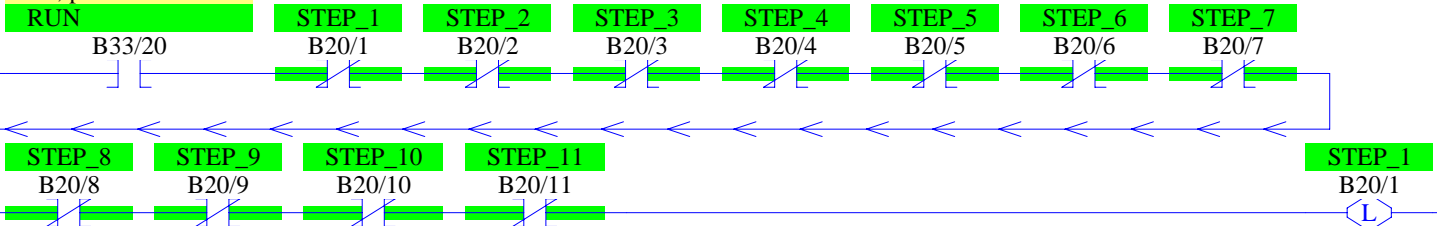
$$UX1\_VAL = ((UX1\_MEAS - 3277) / 13107) * (100 - 15) + 15$$

$$LVDT\_VAL = ((HGT\_MEAS - 3277) / 13107) * 100$$

$$HGT\_VAL = 150 - LVDT\_VAL \quad (\text{calculated on transition from Step\_2 to Step\_3})$$

Initial start.

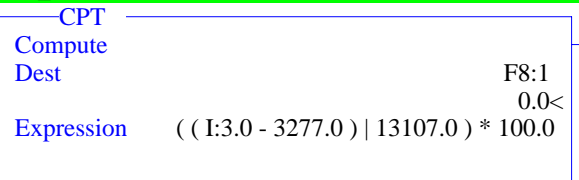
When on, allow  
station to run. When  
off, pause.



Conversion of LVDT reading to height in mm.

LVDT value converted  
to 0 - 100 mm

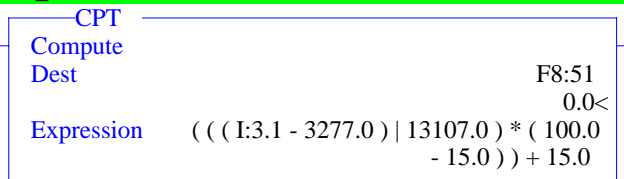
LVDT\_VAL



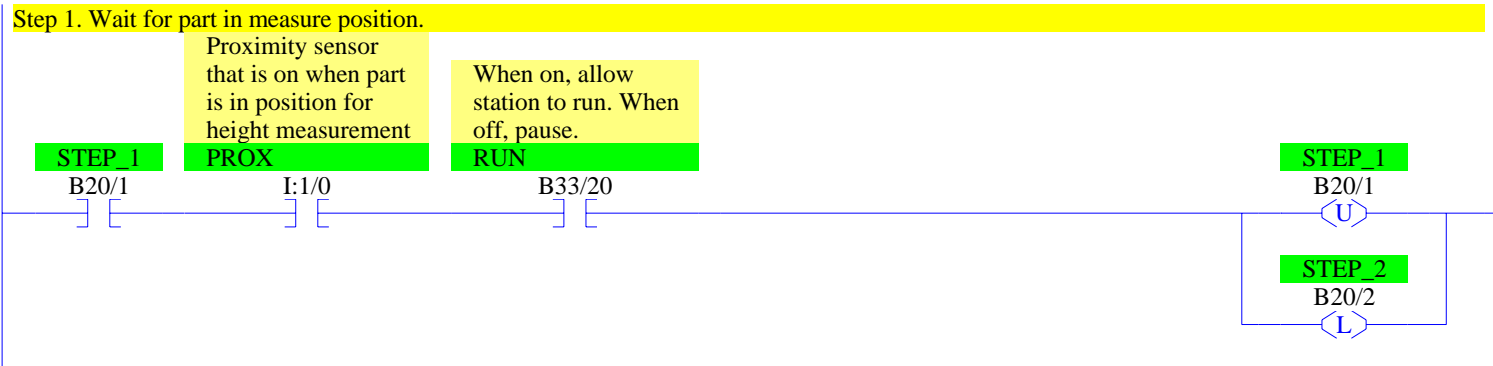
Conversion of distance reading to distance in cm.

Distance, in cm

UX1\_VAL

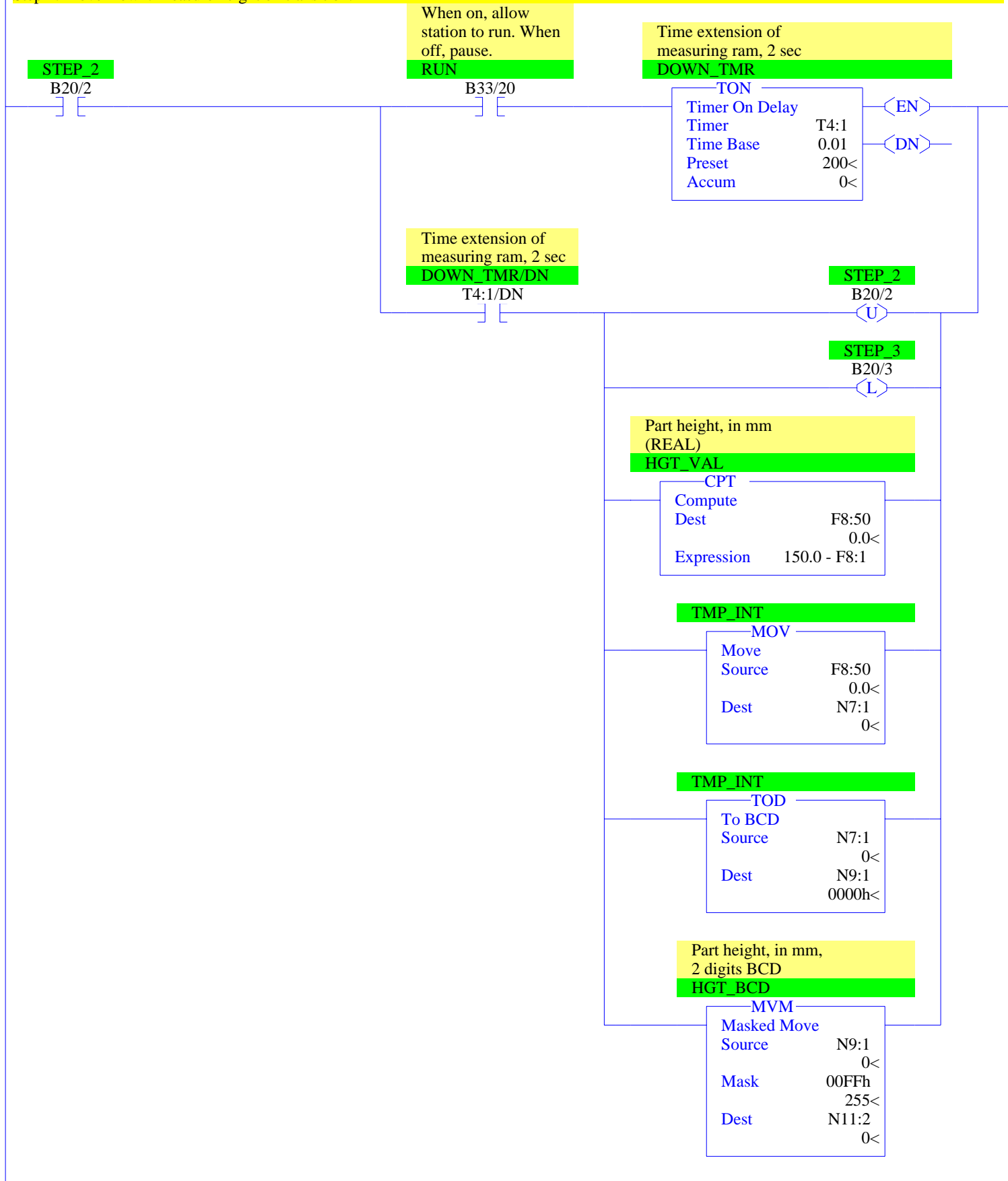


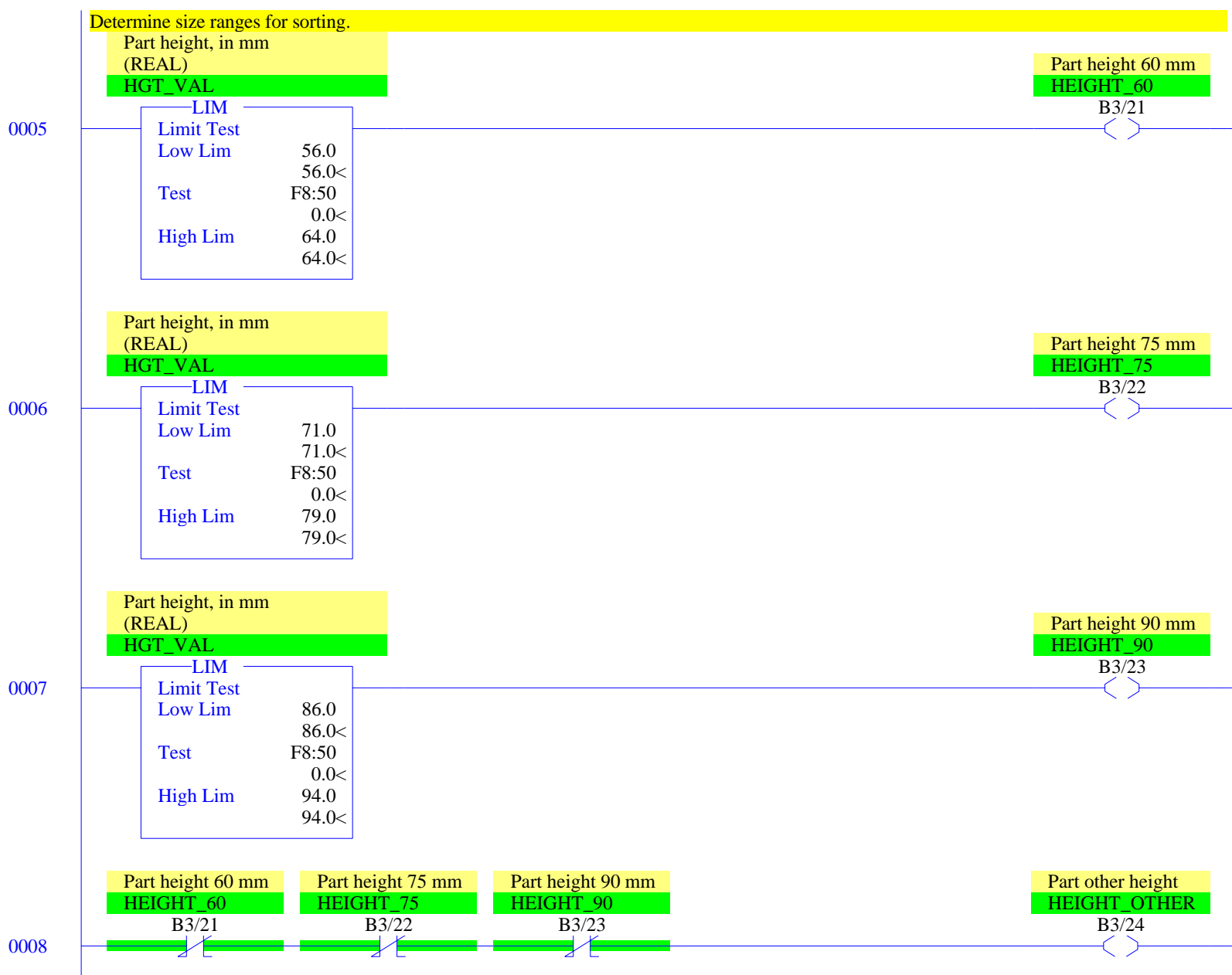
0003



Step 2. Move Down. Measure height on transition.

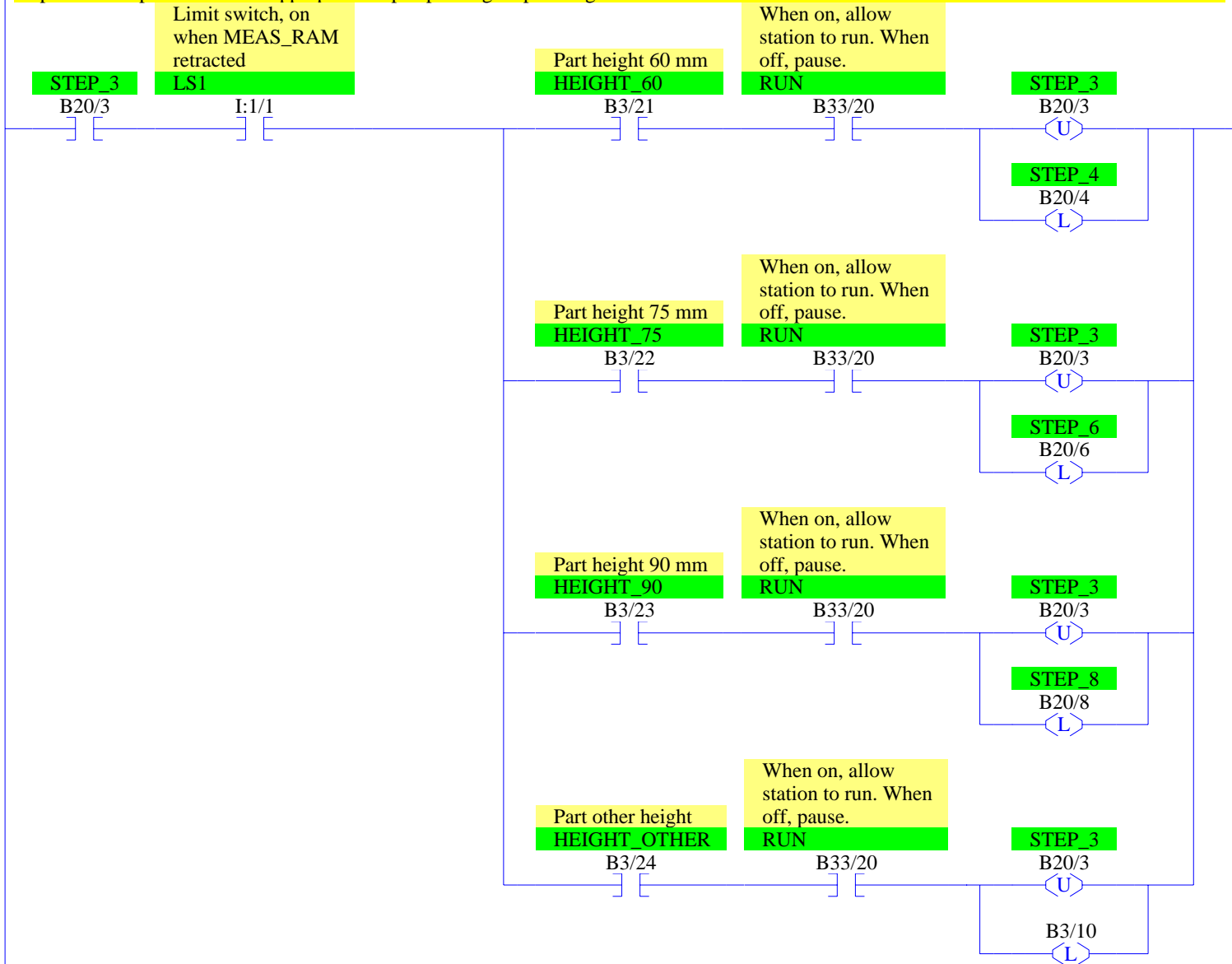
0004





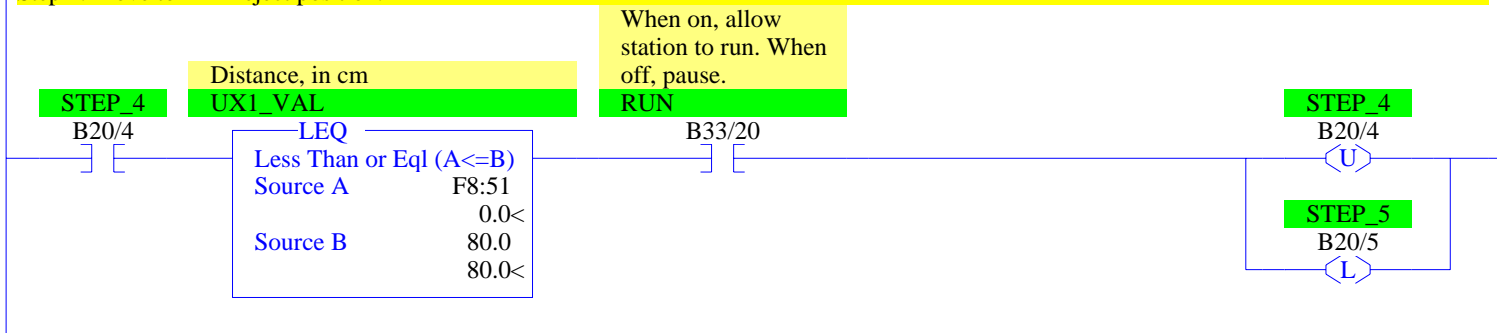
0009

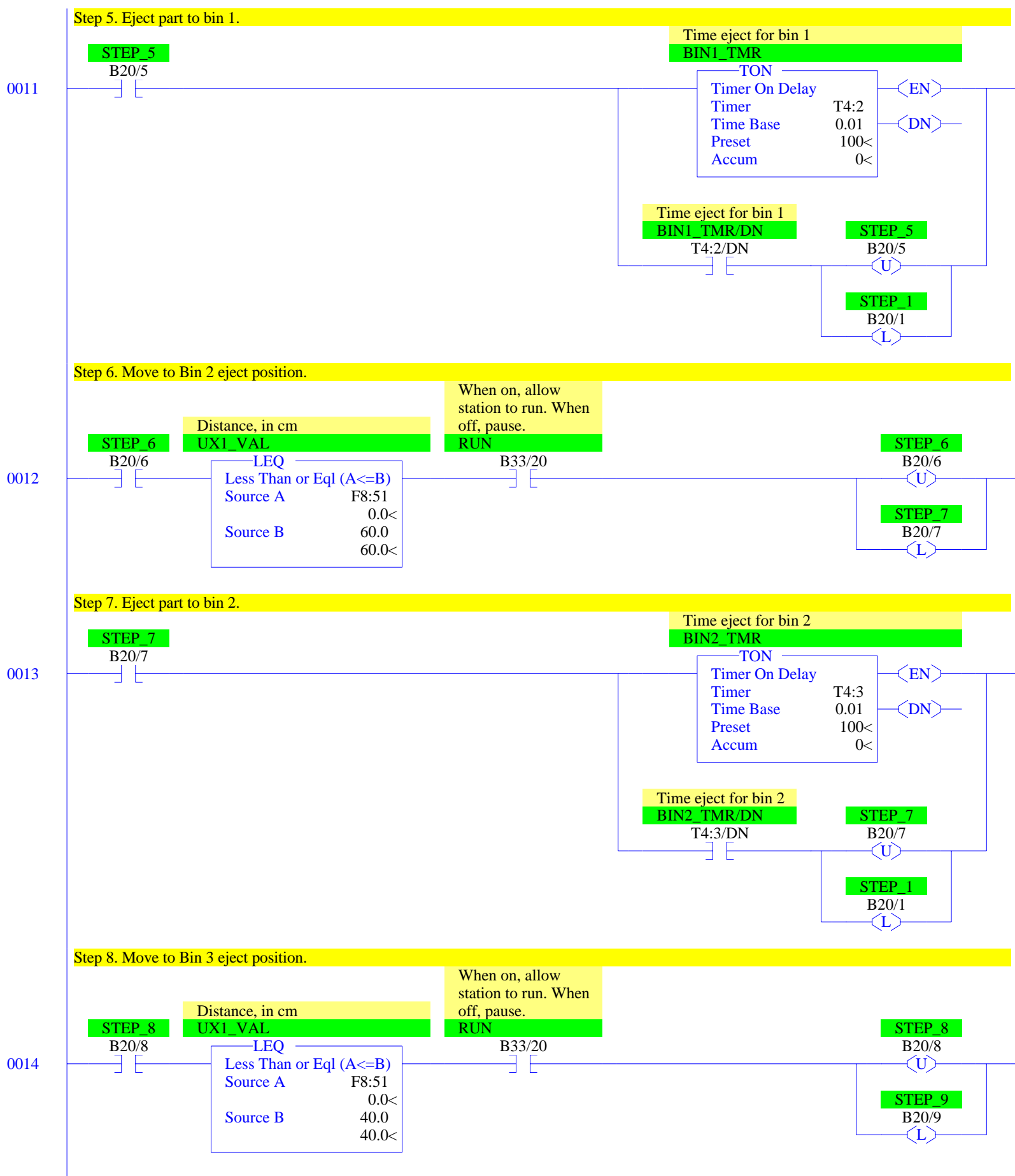
Step 3. Move up. Transition to appropriate step depending on part height.

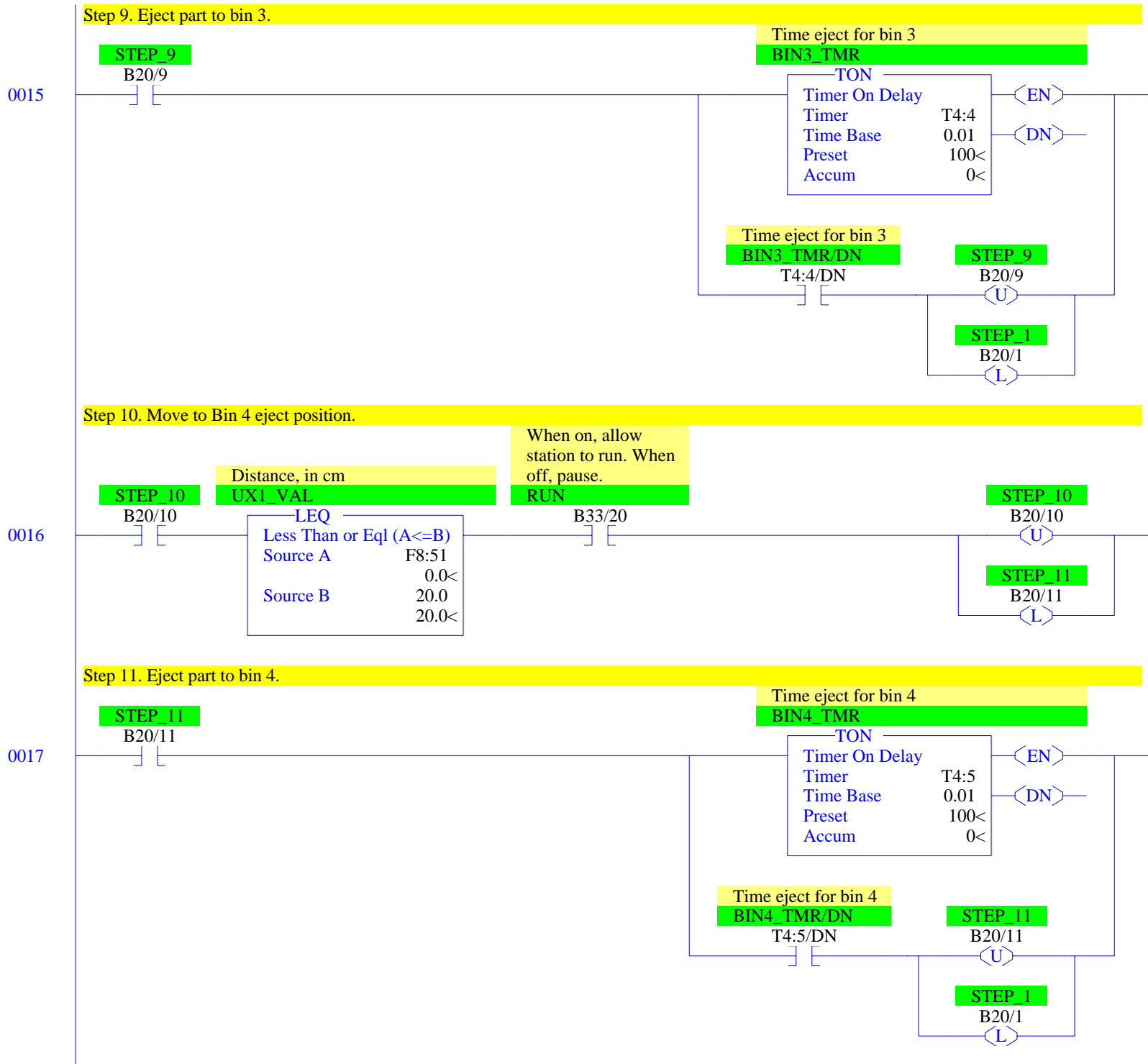


0010

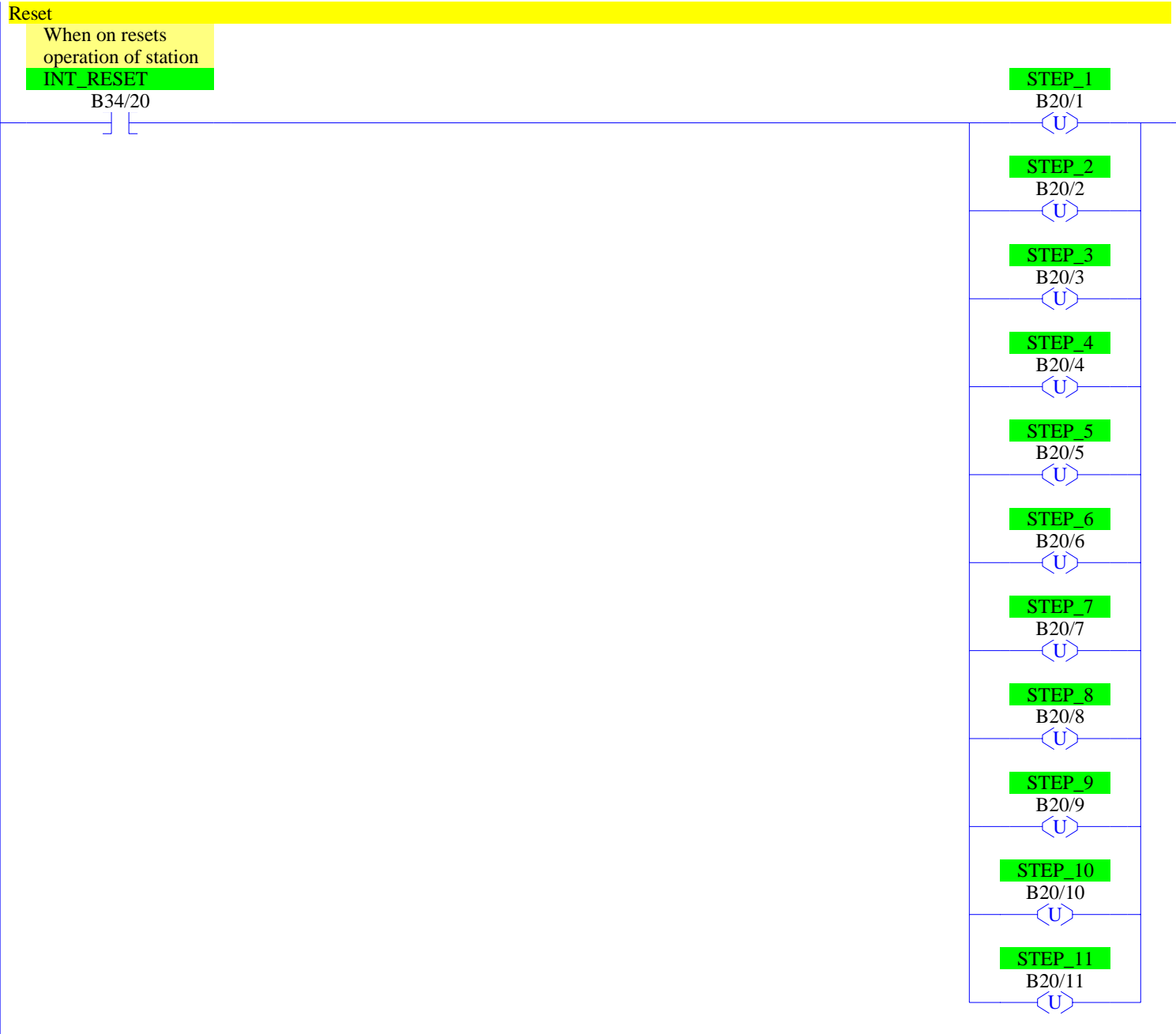
Step 4. Move to Bin 1 eject position.







0018





Outputs.

Gate - Do not turn off when paused.

Gate ram control, on  
to extend ram, off  
retracts ram

GATE

O:2/0

STEP\_2

B20/2

STEP\_3

B20/3

STEP\_4

B20/4

STEP\_5

B20/5

STEP\_6

B20/6

STEP\_7

B20/7

STEP\_8

B20/8

STEP\_9

B20/9

STEP\_10

B20/10

STEP\_11

B20/11



Measuring Ram - when paused it is off. This is no problem because when paused, timer is reset, so when step is resumed, timing starts over.

When on, allow  
station to run. When  
off, pause.

RUN

Measuring ram  
control, on to  
extend ram, off  
retracts ram

MEAS\_RAM

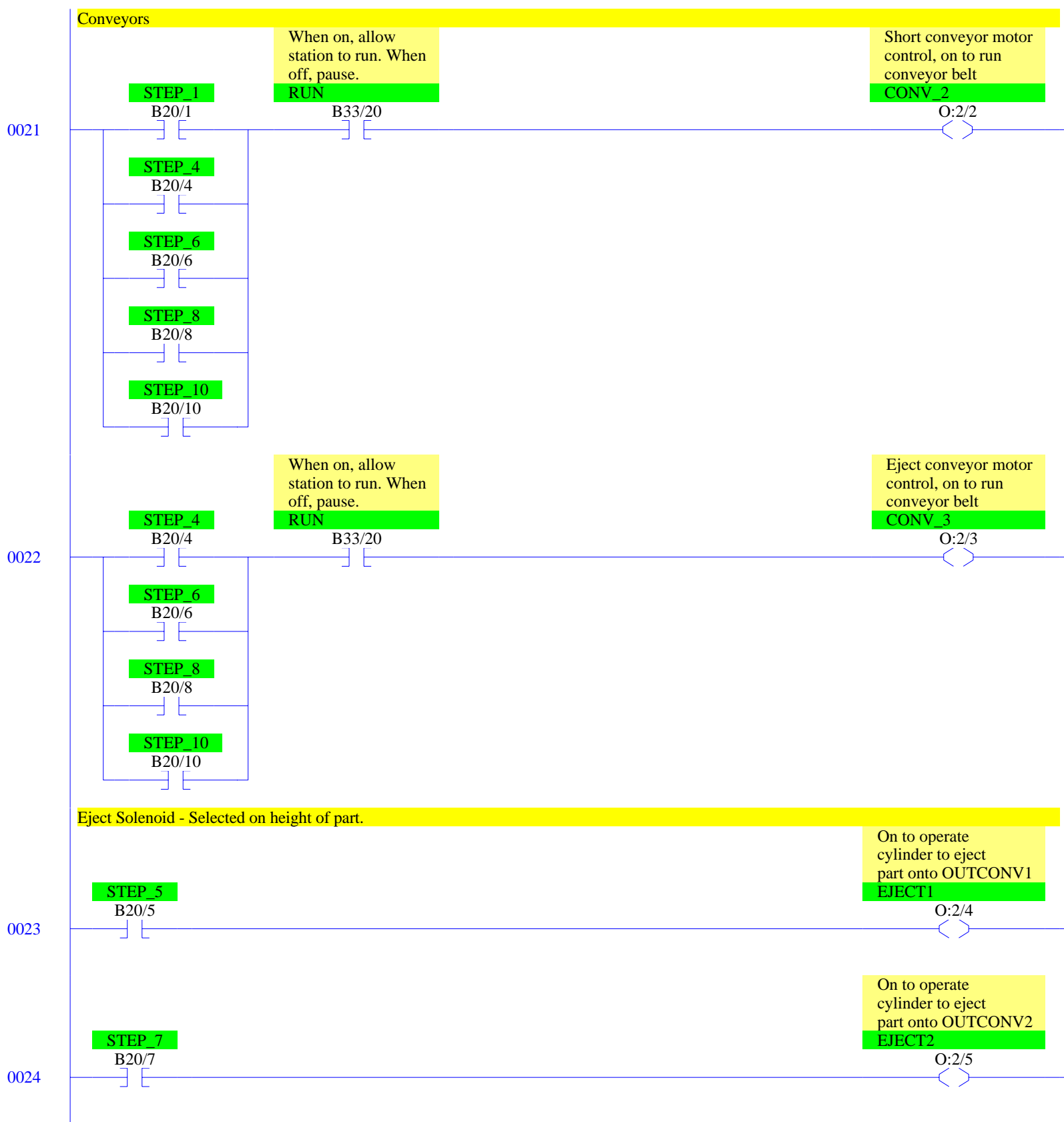
O:2/1

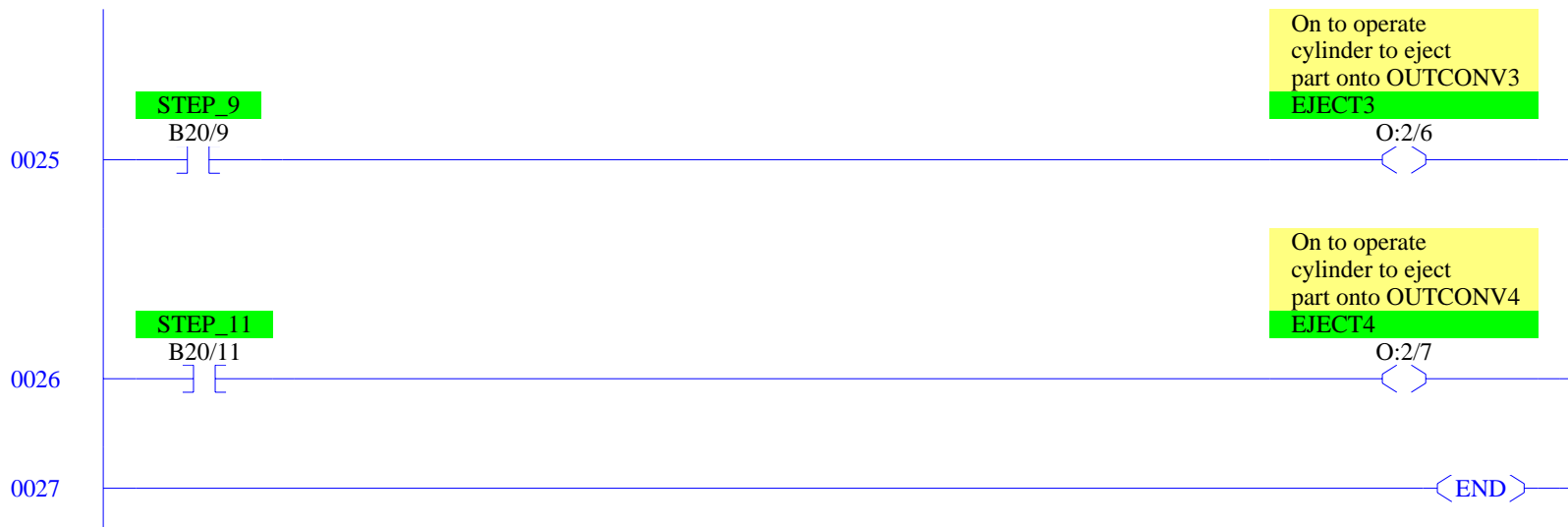
STEP\_2

B20/2

B33/20







## RSLogix 500 Cross Reference Report - Sorted by Address

O:2/0	- {GATE} Gate ram control, on to extend ram, off retracts ram OTE - File #2 - 19
O:2/1	- {MEAS_RAM} Measuring ram control, on to extend ram, off retracts ram OTE - File #2 - 20
O:2/2	- {CONV_2} Short conveyor motor control, on to run conveyor belt OTE - File #2 - 21
O:2/3	- {CONV_3} Eject conveyor motor control, on to run conveyor belt OTE - File #2 - 22
O:2/4	- {EJECT1} On to operate cylinder to eject part onto OUTCONV1 OTE - File #2 - 23
O:2/5	- {EJECT2} On to operate cylinder to eject part onto OUTCONV2 OTE - File #2 - 24
O:2/6	- {EJECT3} On to operate cylinder to eject part onto OUTCONV3 OTE - File #2 - 25
O:2/7	- {EJECT4} On to operate cylinder to eject part onto OUTCONV4 OTE - File #2 - 26
I:1/0	- {PROX} Proximity sensor that is on when part is in position for height measurement XIC - File #2 - 3
I:1/1	- {LS1} Limit switch, on when MEAS_RAM retracted XIC - File #2 - 9
I:3.0	- {HGT_MEAS} LVDT length measurement, represents 0-100 mm CPT - File #2 - 1
I:3.1	- {UX1_MEAS} Distance sensor raw measurement, represents 15 - 100 cm CPT - File #2 - 2
B3/10	- OTL - File #2 - 9
B3/21	- {HEIGHT_60} Part height 60 mm OTE - File #2 - 5 XIC - File #2 - 9 XIO - File #2 - 8
B3/22	- {HEIGHT_75} Part height 75 mm OTE - File #2 - 6 XIC - File #2 - 9 XIO - File #2 - 8
B3/23	- {HEIGHT_90} Part height 90 mm OTE - File #2 - 7 XIC - File #2 - 9 XIO - File #2 - 8
B3/24	- {HEIGHT_OTHER} Part other height OTE - File #2 - 8 XIC - File #2 - 9
T4:1	- {DOWN_TMR} Time extension of measuring ram, 2 sec TON - File #2 - 4
T4:1/DN	- XIC - File #2 - 4
T4:2	- {BIN1_TMR} Time eject for bin 1 TON - File #2 - 11
T4:2/DN	- XIC - File #2 - 11
T4:3	- {BIN2_TMR} Time eject for bin 2 TON - File #2 - 13
T4:3/DN	- XIC - File #2 - 13
T4:4	- {BIN3_TMR} Time eject for bin 3 TON - File #2 - 15
T4:4/DN	- XIC - File #2 - 15
T4:5	- {BIN4_TMR} Time eject for bin 4 TON - File #2 - 17
T4:5/DN	- XIC - File #2 - 17
N7:1	- {TMP_INT} TOD - File #2 - 4 MOV - File #2 - 4
F8:1	- {LVDT_VAL} LVDT value converted to 0 - 100 mm CPT - File #2 - 1, 4
F8:50	- {HGT_VAL} Part height, in mm (REAL) MOV - File #2 - 4 CPT - File #2 - 4 LIM - File #2 - 5, 6, 7
F8:51	- {UX1_VAL} Distance, in cm CPT - File #2 - 2

## RSLogix 500 Cross Reference Report - Sorted by Address

```

N9:1      LEQ - File #2 - 10, 12, 14, 16
          - {TMP_BCD}
          TOD - File #2 - 4
          MVM - File #2 - 4
N11:2     - {HGT_BCD} Part height, in mm, 2 digits BCD
          MVM - File #2 - 4
B20/1     - {STEP_1}
          OTL - File #2 - 0, 11, 13, 15, 17
          OTU - File #2 - 3, 18
          XIC - File #2 - 3, 21
          XIO - File #2 - 0
B20/2     - {STEP_2}
          OTL - File #2 - 3
          OTU - File #2 - 4, 18
          XIC - File #2 - 4, 19, 20
          XIO - File #2 - 0
B20/3     - {STEP_3}
          OTL - File #2 - 4
          OTU - File #2 - 9, 18
          XIC - File #2 - 9, 19
          XIO - File #2 - 0
B20/4     - {STEP_4}
          OTL - File #2 - 9
          OTU - File #2 - 10, 18
          XIC - File #2 - 10, 19, 21, 22
          XIO - File #2 - 0
B20/5     - {STEP_5}
          OTL - File #2 - 10
          OTU - File #2 - 11, 18
          XIC - File #2 - 11, 19, 23
          XIO - File #2 - 0
B20/6     - {STEP_6}
          OTL - File #2 - 9
          OTU - File #2 - 12, 18
          XIC - File #2 - 12, 19, 21, 22
          XIO - File #2 - 0
B20/7     - {STEP_7}
          OTL - File #2 - 12
          OTU - File #2 - 13, 18
          XIC - File #2 - 13, 19, 24
          XIO - File #2 - 0
B20/8     - {STEP_8}
          OTL - File #2 - 9
          OTU - File #2 - 14, 18
          XIC - File #2 - 14, 19, 21, 22
          XIO - File #2 - 0
B20/9     - {STEP_9}
          OTL - File #2 - 14
          OTU - File #2 - 15, 18
          XIC - File #2 - 15, 19, 25
          XIO - File #2 - 0
B20/10    - {STEP_10}
          OTU - File #2 - 16, 18
          XIC - File #2 - 16, 19, 21, 22
          XIO - File #2 - 0
B20/11    - {STEP_11}
          OTL - File #2 - 16
          OTU - File #2 - 17, 18
          XIC - File #2 - 17, 19, 26
          XIO - File #2 - 0
B33/20    - {RUN} When on, allow station to run. When off, pause.
          XIC - File #2 - 0, 3, 4, 9, 10, 12, 14, 16, 20, 21, 22
B34/20    - {INT_RESET} When on resets operation of station
          XIC - File #2 - 18

```