

Part Height Sorter Control with Parallel Branches

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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

$$UX1_VAL = ((UX1_MEAS - 6241) / 24965) * (100 - 15) + 15$$

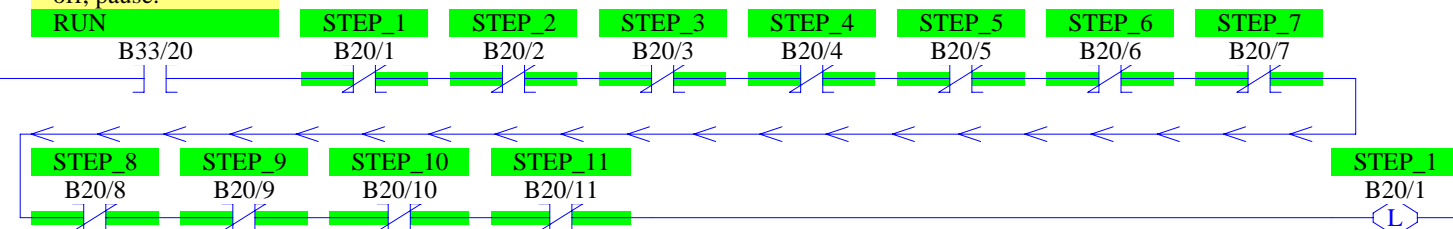
$$LVDT_VAL = ((HGT_MEAS - 6241) / 24965) * 100$$

$$HGT_VAL = 150 - LVDT_VAL \quad (\text{calculated on transition from Step_2 to Step_3})$$

Initial start.

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

0000



Conversion of LVDT reading to height in mm.

SUB

Subtract
Source A

I:1.0

0<

Source B

6241.0

6241.0<

Dest

F8:0

0.0<

DIV

Divide

Source A

F8:0

0.0<

Source B

24965.0

24965.0<

Dest

F8:0

0.0<

LVDT value converted
to 0 - 100 mm

LVDT_VAL

MUL

Multiply
Source A

F8:0

0.0<

Source B

100.0

100.0<

Dest

F8:1

0.0<

0001

Conversion of distance reading to distance in cm.

SUB
Subtract
Source A I:1.1
0<
Source B 6241.0
6241.0<
Dest F8:0
0.0<

DIV
Divide
Source A F8:0
0.0<
Source B 24965.0
24965.0<
Dest F8:0
0.0<

MUL
Multiply
Source A F8:0
0.0<
Source B 85.0
85.0<
Dest F8:0
0.0<

Distance, in cm
UX1_VAL

ADD
Add
Source A F8:0
0.0<
Source B 15.0
15.0<
Dest F8:51
0.0<

Step 1. Wait for part in measure position.

STEP_1

B20/1

Proximity sensor
that is on when part
is in position for
height measurement

PROX

I:0/0

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

RUN

B33/20

STEP_1

B20/1

(U)

STEP_2

B20/2

(L)

Step 2. Move Down. Measure height on transition.

STEP_2

B20/2

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

RUN

B33/20

Time extension of
measuring ram, 2 sec

DOWN_TMR

TON
Timer On Delay
Timer
Time Base
Preset
Accum

T4:1

0.01

200<

0<

EN

DN

Time extension of
measuring ram, 2 sec

DOWN_TMR/DN

T4:1/DN

STEP_2

B20/2

U

STEP_3

B20/3

L

Part height, in mm
(REAL)

HGT_VAL

SUB

Subtract

Source A

150.0

150.0<

Source B

F8:1

0.0<

Dest

F8:50

0.0<

TMP_INT

MOV

Move

Source

F8:50

0.0<

Dest

N7:1

0<

TMP_INT

TOD

To BCD

Source

N7:1

0<

Dest

N9:1

0000h<

Part height, in mm,
2 digits BCD

HGT_BCD

MVM

Masked Move

Source

N9:1

0<

Mask

00FFh

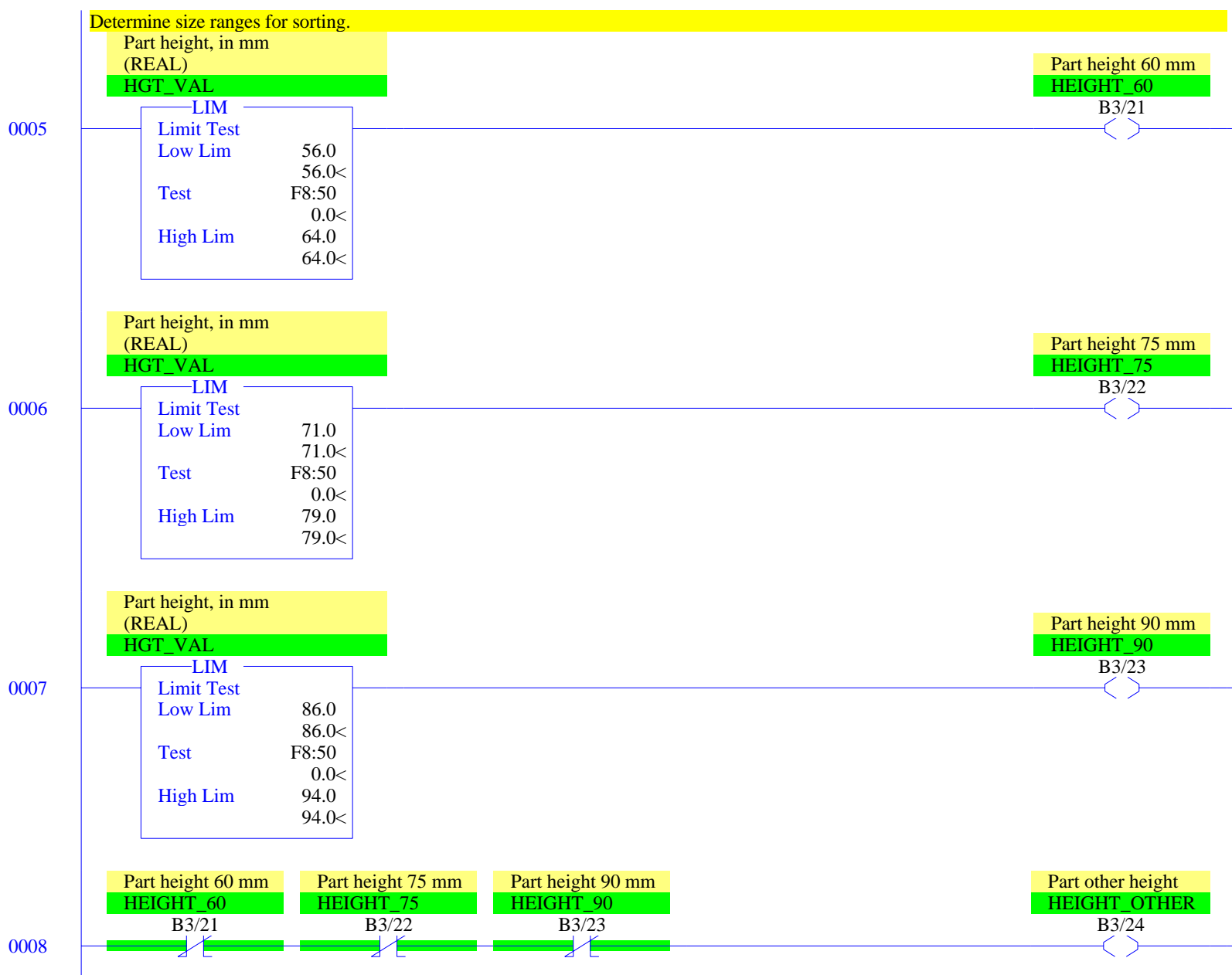
255<

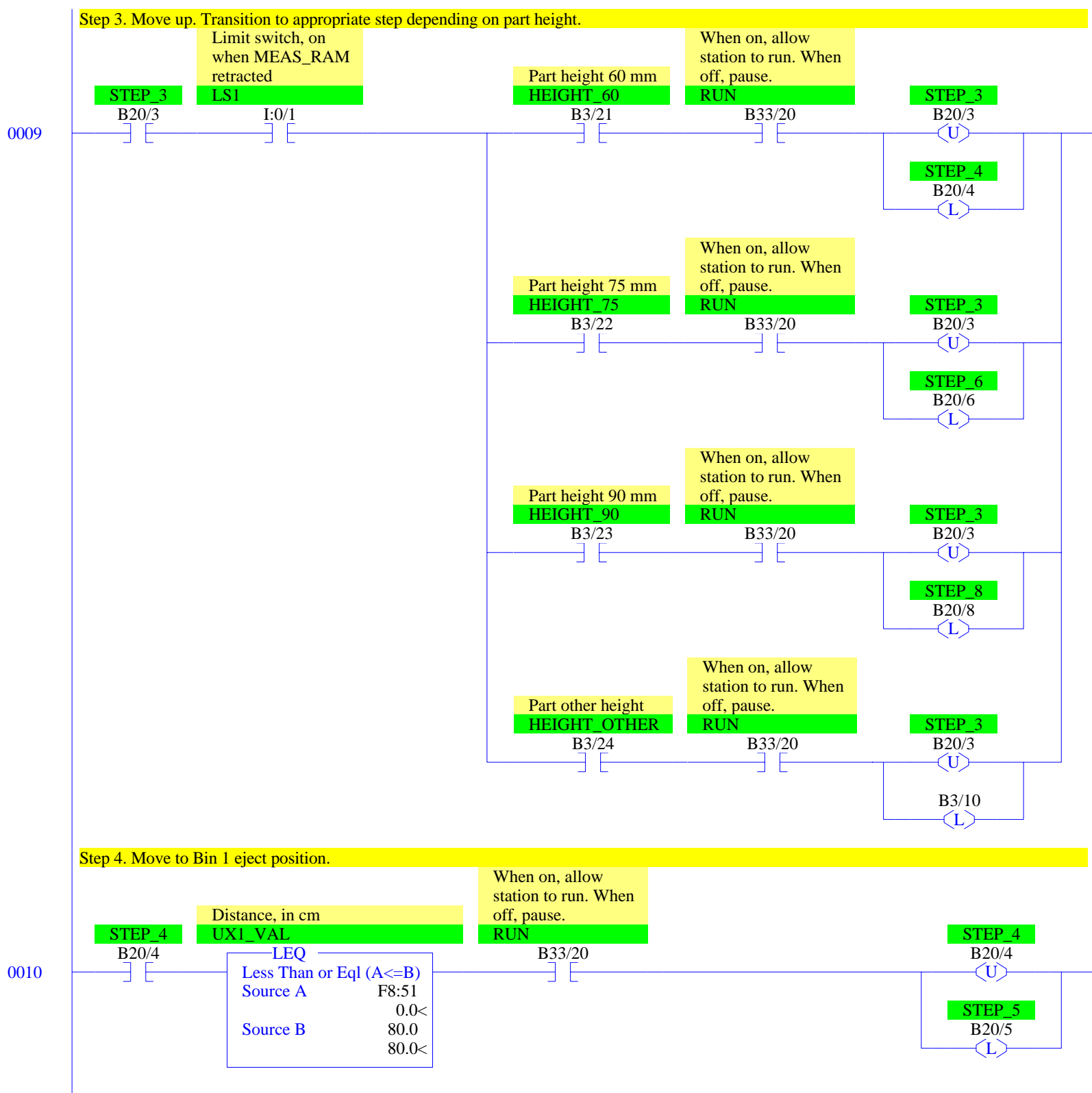
Dest

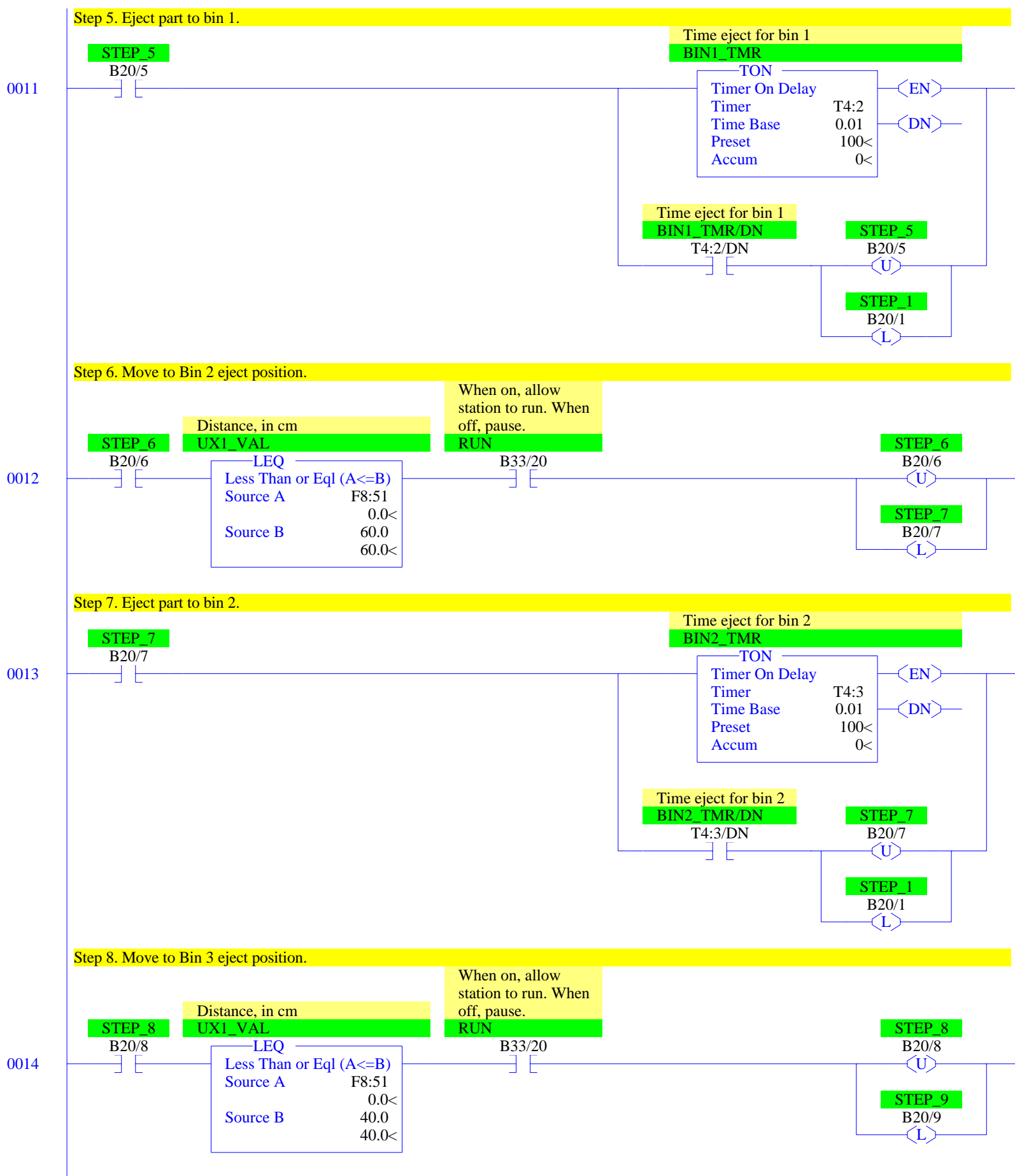
N11:2

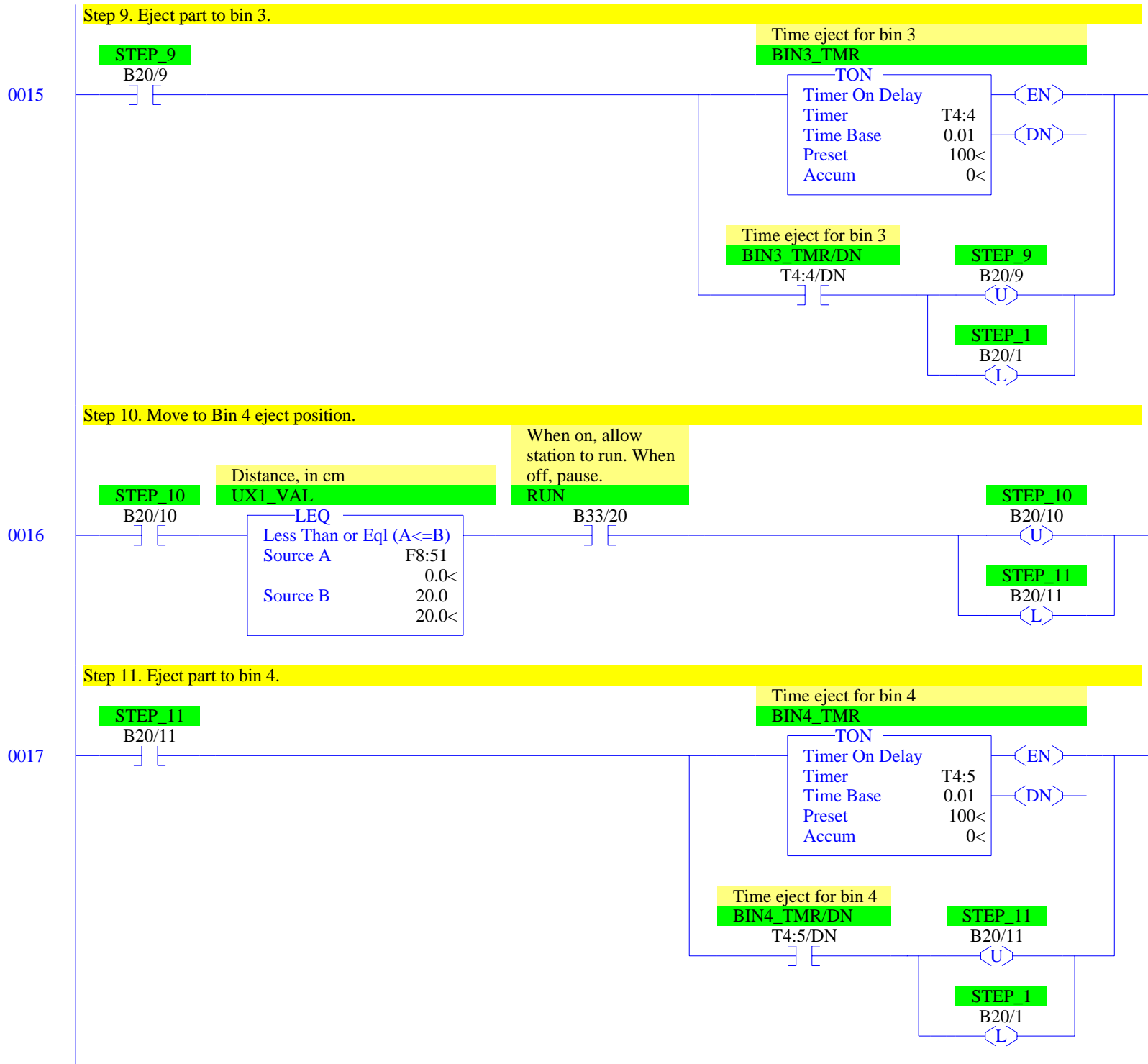
0<

0004









Outputs.

Gate - Do not turn off when paused.

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

GATE

O:0/0

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 beause 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

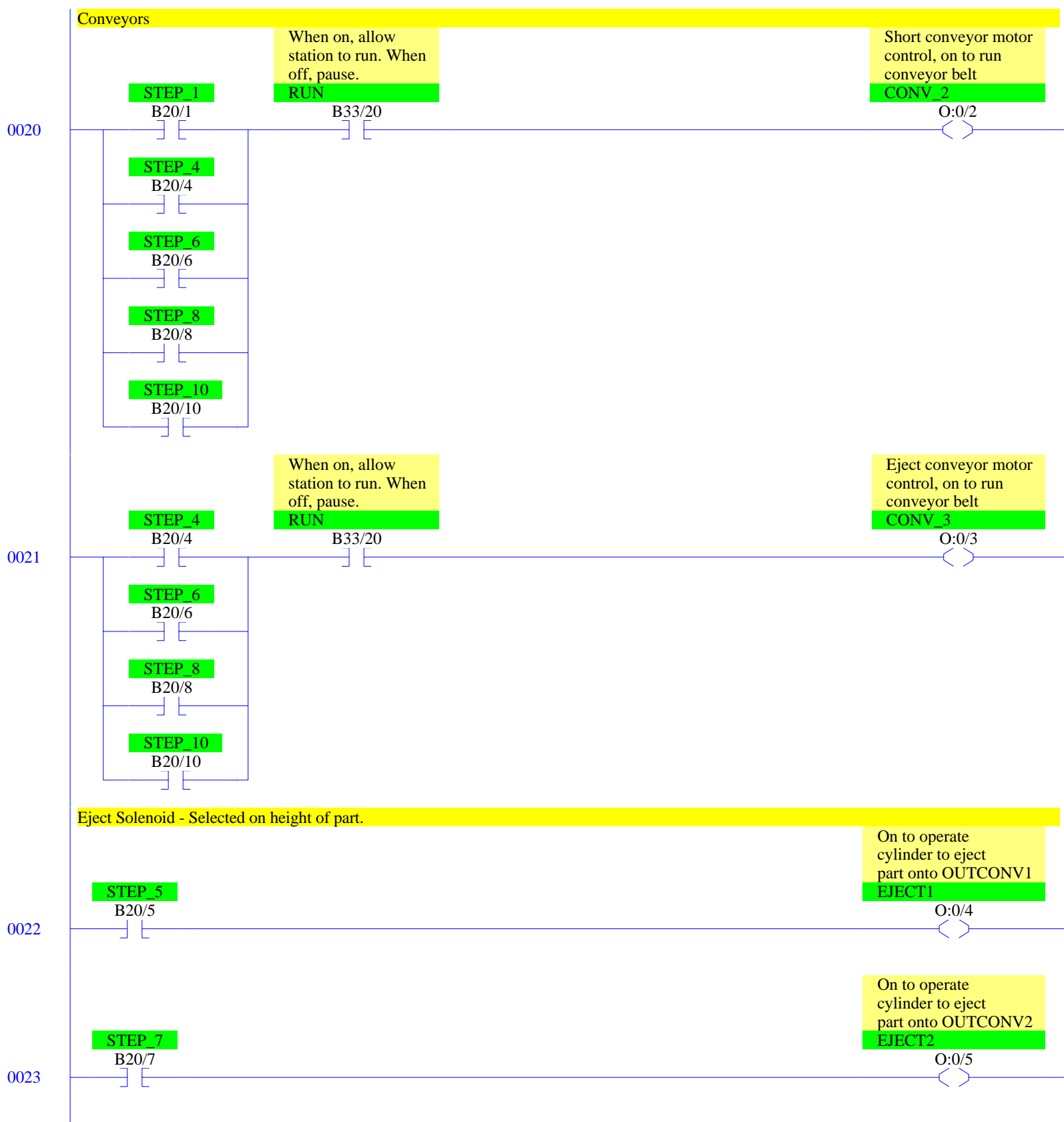
O:0/1

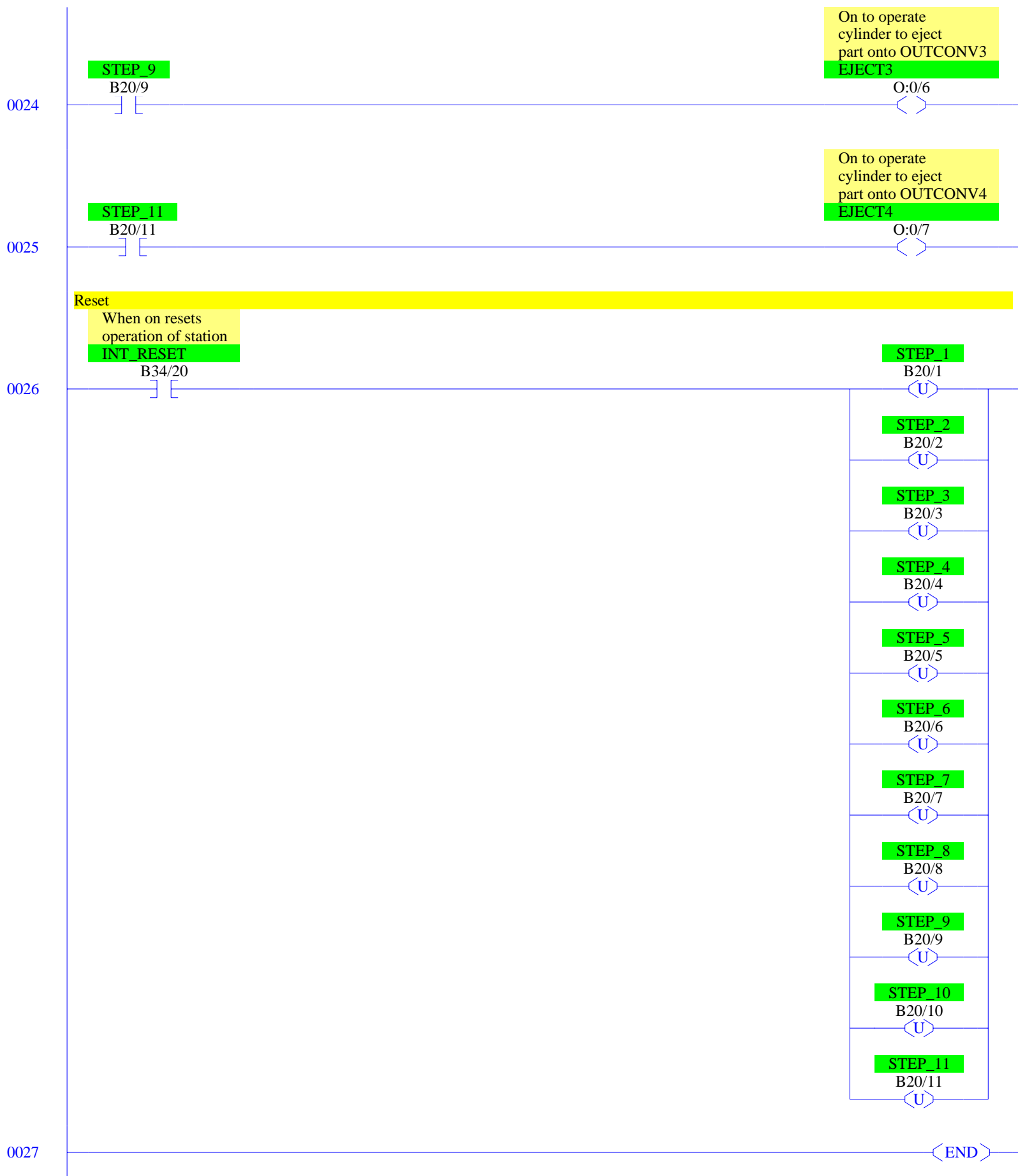
STEP_2

B20/2

B33/20







RSLogix 500 Cross Reference Report - Sorted by Address

O:0/0	- {GATE} Gate ram control, on to extend ram, off retracts ram OTE - File #2 - 18
O:0/1	- {MEAS_RAM} Measuring ram control, on to extend ram, off retracts ram OTE - File #2 - 19
O:0/2	- {CONV_2} Short conveyor motor control, on to run conveyor belt OTE - File #2 - 20
O:0/3	- {CONV_3} Eject conveyor motor control, on to run conveyor belt OTE - File #2 - 21
O:0/4	- {EJECT1} On to operate cylinder to eject part onto OUTCONV1 OTE - File #2 - 22
O:0/5	- {EJECT2} On to operate cylinder to eject part onto OUTCONV2 OTE - File #2 - 23
O:0/6	- {EJECT3} On to operate cylinder to eject part onto OUTCONV3 OTE - File #2 - 24
O:0/7	- {EJECT4} On to operate cylinder to eject part onto OUTCONV4 OTE - File #2 - 25
I:0/0	- {PROX} Proximity sensor that is on when part is in position for height measurement XIC - File #2 - 3
I:0/1	- {LS1} Limit switch, on when MEAS_RAM retracted XIC - File #2 - 9
I:1.0	- {HGT_MEAS} LVDT length measurement, represents 0-100 mm SUB - File #2 - 1
I:1.1	- {UX1_MEAS} Distance sensor raw measurement, represents 15 - 100 cm SUB - 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
F8:0	- ADD - File #2 - 2 SUB - File #2 - 1, 2 MUL - File #2 - 1, 2 DIV - File #2 - 1, 2
F8:1	- {LVDT_VAL} LVDT value converted to 0 - 100 mm SUB - File #2 - 4 MUL - File #2 - 1
F8:50	- {HGT_VAL} Part height, in mm (REAL)

RSLogix 500 Cross Reference Report - Sorted by Address

	MOV - File #2 - 4
	SUB - File #2 - 4
	LIM - File #2 - 5, 6, 7
F8:51	- {UX1_VAL} Distance, in cm
	ADD - File #2 - 2
	LEQ - File #2 - 10, 12, 14, 16
N9:1	- {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, 26
	XIC - File #2 - 3, 20
	XIO - File #2 - 0
B20/2	- {STEP_2}
	OTL - File #2 - 3
	OTU - File #2 - 4, 26
	XIC - File #2 - 4, 18, 19
	XIO - File #2 - 0
B20/3	- {STEP_3}
	OTL - File #2 - 4
	OTU - File #2 - 9, 26
	XIC - File #2 - 9, 18
	XIO - File #2 - 0
B20/4	- {STEP_4}
	OTL - File #2 - 9
	OTU - File #2 - 10, 26
	XIC - File #2 - 10, 18, 20, 21
	XIO - File #2 - 0
B20/5	- {STEP_5}
	OTL - File #2 - 10
	OTU - File #2 - 11, 26
	XIC - File #2 - 11, 18, 22
	XIO - File #2 - 0
B20/6	- {STEP_6}
	OTL - File #2 - 9
	OTU - File #2 - 12, 26
	XIC - File #2 - 12, 18, 20, 21
	XIO - File #2 - 0
B20/7	- {STEP_7}
	OTL - File #2 - 12
	OTU - File #2 - 13, 26
	XIC - File #2 - 13, 18, 23
	XIO - File #2 - 0
B20/8	- {STEP_8}
	OTL - File #2 - 9
	OTU - File #2 - 14, 26
	XIC - File #2 - 14, 18, 20, 21
	XIO - File #2 - 0
B20/9	- {STEP_9}
	OTL - File #2 - 14
	OTU - File #2 - 15, 26
	XIC - File #2 - 15, 18, 24
	XIO - File #2 - 0
B20/10	- {STEP_10}
	OTU - File #2 - 16, 26
	XIC - File #2 - 16, 18, 20, 21
	XIO - File #2 - 0
B20/11	- {STEP_11}
	OTL - File #2 - 16
	OTU - File #2 - 17, 26
	XIC - File #2 - 17, 18, 25
	XIO - File #2 - 0
B33/20	- {RUN} When on, allow station to run. When off, pause.

RSLogix 500 Cross Reference Report - Sorted by Address

B34/20	XIC - File #2 - 0, 3, 4, 9, 10, 12, 14, 16, 19, 20, 21
	- {INT_RESET} When on resets operation of station
	XIC - File #2 - 26