

Totally Integrated Automation Portal

Main [OB1]

Main Properties

General

| | | | | | |
|----------|------|-----------|--------|------|----|
| Name | Main | Number | 1 | Type | OB |
| Language | LAD | Numbering | Manual | | |

Information

| | | | | | |
|--------|------------------------------|---------|-----|-----------------|---|
| Title | "Main Program Sweep (Cycle)" | Author | | Comment | Example 12.7 - Engine Inverter with Structured Text (SCL) Copyright (c) 2022 Dogwood Valley Press, LLC |
| Family | | Version | 0.1 | User-defined ID | |

| Name | Data type | Default value |
|----------------|---------------|---------------|
| ▼ Temp | | |
| OB1_EV_CLASS | Byte | |
| OB1_SCAN_1 | Byte | |
| OB1_PRIORITY | Byte | |
| OB1_OB_NUMBR | Byte | |
| OB1_RESERVED_1 | Byte | |
| OB1_RESERVED_2 | Byte | |
| OB1_PREV_CYCLE | Int | |
| OB1_MIN_CYCLE | Int | |
| OB1_MAX_CYCLE | Int | |
| OB1_DATE_TIME | Date_And_Time | |
| Temp1 | Bool | |
| Temp2 | Bool | |
| Constant | | |

Network 1: Overall start/stop/pause

%DB1
"Engine_Invert_DB"

%FB1
"Engine_Invert"

EN

ENO

Network 2:

| | | |
|---|--|--|
| Totally Integrated Automation Portal | | |
| <div><div></div><div><div><div>%DB30</div><div>"Simulation_DB"</div></div><div><div>%FB2</div><div>"Simulation"</div></div><div>EN</div><div>ENO</div><div></div></div></div> | | |
| | | |

Engine_Invert [FB1]

Engine_Invert Properties

General

| | | | | | |
|----------|---------------|-----------|-----------|------|----|
| Name | Engine_Invert | Number | 1 | Type | FB |
| Language | SCL | Numbering | Automatic | | |

Information

| | | | | | |
|--------|--|---------|-----|-----------------|--|
| Title | | Author | | Comment | |
| Family | | Version | 0.1 | User-defined ID | |

| Name | Data type | Default value | Retain |
|-------------|-----------|---------------|------------|
| Input | | | |
| Output | | | |
| InOut | | | |
| ▼ Static | | | |
| IStep | Int | 0 | Non-retain |
| RStep | Int | 0 | Non-retain |
| Eng1_Tmr | TON_TIME | | Non-retain |
| Clmp_Tmr | TON_TIME | | Non-retain |
| UnClmp_Tmr | TON_TIME | | Non-retain |
| Eng2_Tmr | TON_TIME | | Non-retain |
| RUnClmp_Tmr | TON_TIME | | Non-retain |
| Temp | | | |
| Constant | | | |

```
0001 // Engine Inverter in ST
0002 //
0003 // Start/stop of operation
0004 IF ("START_PB" AND NOT "Int_Reset") THEN
0005     "Run" := 1;
0006 END_IF;
0007 IF ("Run" AND NOT "STOP_PB") THEN
0008     "Run" := 0;
0009 END_IF;
0010 //
0011 // Normal operation transition out of initial step
0012 IF "Run" AND (#IStep = 0) THEN
0013     #IStep := 1;
0014 END_IF;
0015 //
0016 // Transitions for normal operation
0017 CASE #IStep OF
0018     1:
0019         IF "PROX1" AND "Run" THEN
0020             #IStep := 2;
0021         END_IF;
0022     2:
0023         #Eng1_Tmr(IN:=True, PT:=T#2s);
0024         IF #Eng1_Tmr.Q THEN
0025             #Eng1_Tmr(IN:=False, PT:=T#2s); // Must run timer again to reset
0026             #IStep := 3;
```

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| Totally Integrated Automation Portal | | |
| <pre> 0027 END_IF; 0028 3: 0029 IF "PALL_UPLS" AND "Run" THEN 0030 #IStep := 4; 0031 END_IF; 0032 4: 0033 IF "ROTR_DNLS" AND "Run" THEN 0034 #IStep := 5; 0035 END_IF; 0036 5: 0037 #Clmp_Tmr(IN:=True, PT:=T#1s500ms); 0038 IF #Clmp_Tmr.Q THEN 0039 // #Clmp_Tmr(IN:=False, PT:=T#1s); 0040 RESET_TIMER(TIMER := #Clmp_Tmr); // Alternative to re-invoking timer 0041 #IStep := 6; 0042 END_IF; 0043 6: 0044 IF "ROTR_UPLS" AND "Run" THEN 0045 #IStep := 7; 0046 END_IF; 0047 7: 0048 IF "ROTR_CWLS" AND "Run" THEN 0049 #IStep := 8; 0050 END_IF; 0051 8: 0052 IF "ROTR_DNLS" AND "Run" THEN 0053 #IStep := 9; 0054 END_IF; 0055 9: 0056 #UnClmp_Tmr(IN := True, PT := T#1s); 0057 IF #UnClmp_Tmr.Q THEN 0058 #UnClmp_Tmr(IN := FALSE, PT := T#1s); 0059 #IStep := 10; 0060 END_IF; 0061 10: 0062 IF "ROTR_UPLS" AND "Run" THEN 0063 #IStep := 11; 0064 END_IF; 0065 11: 0066 IF "ROTR_CCWLS" AND "Run" THEN 0067 #IStep := 12; 0068 END_IF; 0069 12: 0070 IF (NOT "PALL_UPLS") AND "Run" THEN 0071 #IStep := 13; 0072 END_IF; 0073 13: 0074 #Eng2_Tmr(IN := True, PT := T#3s); 0075 IF #Eng2_Tmr.Q THEN 0076 #Eng2_Tmr(IN := False, PT := T#3s);; 0077 #IStep := 1; 0078 END_IF; 0079 ELSE 0080 #IStep := 0; 0081 END_CASE; </pre> | | |
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| Totally Integrated Automation Portal | | |
| <pre> 0082 // 0083 // Start/stop for reset operation 0084 IF ("RESET_PB" AND NOT "Run") THEN 0085 "Int_Reset" := 1; 0086 END_IF; 0087 IF ("Int_Reset" AND #RStep = 4) THEN 0088 "Int_Reset" := 0; 0089 END_IF; 0090 // 0091 // Reset initial transition and clear normal step number 0092 IF "Int_Reset" AND #RStep = 0 THEN 0093 #RStep := 1; 0094 #IStep := 0; 0095 END_IF; 0096 // 0097 // Reset operation transitions 0098 CASE #RStep OF 0099 1: 0100 #RUnClmp_Tmr(IN := True, PT := T#1s); 0101 IF #RUnClmp_Tmr.Q THEN 0102 #RUnClmp_Tmr(IN := False, PT := T#1s); 0103 #RStep := 2; 0104 END_IF; 0105 2: 0106 IF "ROTR_UPLS" THEN 0107 #RStep := 3; 0108 END_IF; 0109 3: 0110 IF "ROTR_CCWLS" THEN 0111 #RStep := 4; 0112 END_IF; 0113 4: 0114 IF (NOT "Int_Reset") THEN 0115 #RStep := 0; 0116 END_IF; 0117 ELSE 0118 #RStep := 0; 0119 END_CASE; 0120 // 0121 // Control of outputs; 0122 IF (#IStep = 2) THEN 0123 "ENG1_RET" := 1; 0124 ELSE 0125 "ENG1_RET" := 0; 0126 END_IF; 0127 IF (#IStep = 13) THEN 0128 "ENG2_RET" := 1; 0129 ELSE 0130 "ENG2_RET" := 0; 0131 END_IF; 0132 IF ((#IStep = 6) OR (#IStep = 10) AND "Run") OR (#RStep = 2) THEN 0133 "ROTR_UP" := 1; 0134 ELSE 0135 "ROTR_UP" := 0; 0136 END_IF; </pre> | | |
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| <pre> 0137 IF ((#IStep = 4) OR (#IStep = 8) AND "Run") THEN 0138 "ROTR_DOWN" := 1; 0139 ELSE 0140 "ROTR_DOWN" := 0; 0141 END_IF; 0142 IF ((#IStep = 7) AND "Run") THEN 0143 "ROTAT_CW" := 1; 0144 ELSE 0145 "ROTAT_CW" := 0; 0146 END_IF; 0147 IF ((#IStep = 11) AND "Run") OR (#RStep = 3) THEN 0148 "ROTAT_CCW" := 1; 0149 ELSE 0150 "ROTAT_CCW" := 0; 0151 END_IF; 0152 IF (#IStep >= 5) AND (#IStep <= 8) THEN 0153 "GRIP_CLOS" := 1; 0154 ELSE 0155 "GRIP_CLOS" := 0; 0156 END_IF; 0157 IF (#IStep >= 3) AND (#IStep <= 11) THEN 0158 "PALL_UPCTL" := 1; 0159 ELSE 0160 "PALL_UPCTL" := 0; 0161 END_IF; </pre> | | |
| | | |

Simulation [FB2]

Simulation Properties

General

| | | | | | |
|------|------------|--------|---|------|----|
| Name | Simulation | Number | 2 | Type | FB |
|------|------------|--------|---|------|----|

| | | | | | |
|----------|-----|-----------|--------|--|--|
| Language | LAD | Numbering | Manual | | |
|----------|-----|-----------|--------|--|--|

Information

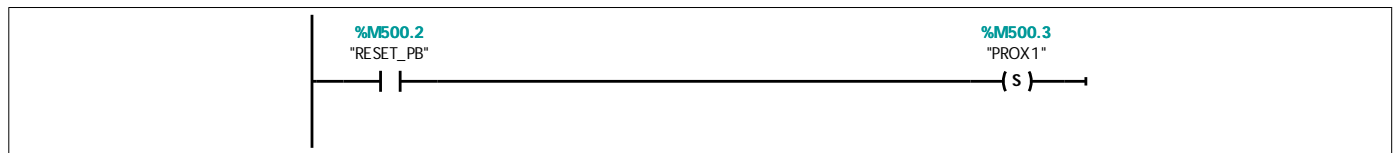
| | | | | | |
|-------|------------|--------|--|---------|--|
| Title | Simulation | Author | | Comment | |
|-------|------------|--------|--|---------|--|

| | | | | | |
|--------|--|---------|-----|-----------------|--|
| Family | | Version | 0.1 | User-defined ID | |
|--------|--|---------|-----|-----------------|--|

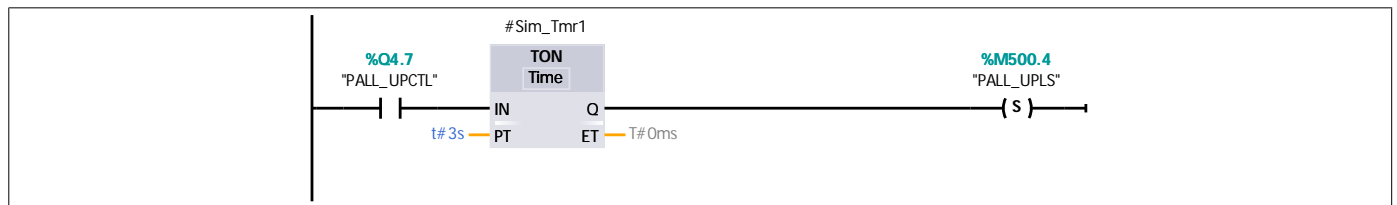
| Name | Data type | Default value | Retain |
|-----------|-----------|---------------|------------|
| Input | | | |
| Output | | | |
| InOut | | | |
| ▼ Static | | | |
| Sim_Tmr1 | TON_TIME | | Non-retain |
| SimTmr2 | TON_TIME | | Non-retain |
| SimTmr3 | TON_TIME | | Non-retain |
| SimTmr4 | TON_TIME | | Non-retain |
| SimTmr5 | TON_TIME | | Non-retain |
| SimTmr6 | TON_TIME | | Non-retain |
| SimTmr7 | TON_TIME | | Non-retain |
| SimTmr7_Q | Bool | false | Non-retain |
| SimTmr8 | TON_TIME | | Non-retain |
| Temp | | | |
| Constant | | | |

Network 1: Reset

When reset, put engine at hook 1

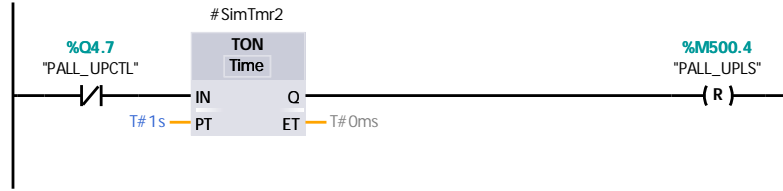


Network 2: Pallet up LS



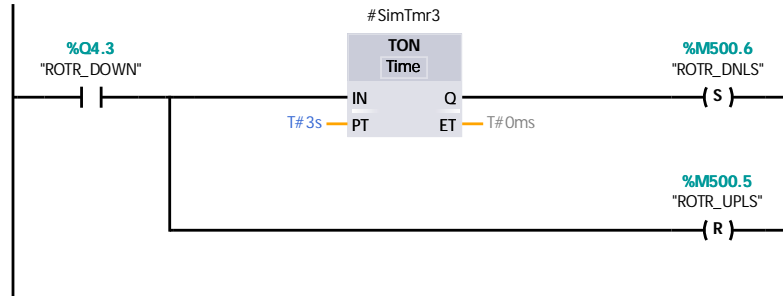
Network 3:

Delay reset when pallet dropped



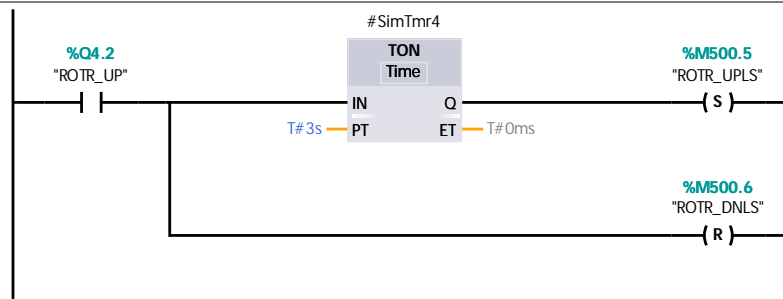
Network 4: Rotor down/up control.

When moved down, the up LS is immediately reset off. After 3 seconds, the down LS is set on



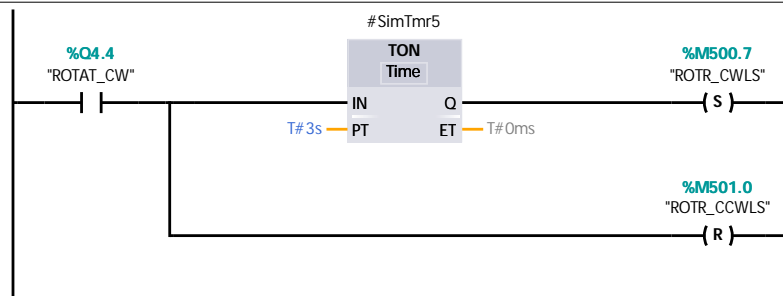
Network 5:

When moved up, the down LS is immediately reset off. After 3 seconds, the up LS is set on



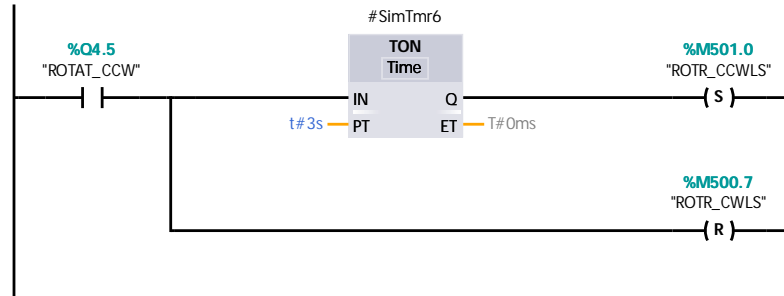
Network 6: Rotor rotating control.

When rotated CW, the CCW LS is immediately reset off. After 3 seconds, CW LS is set on



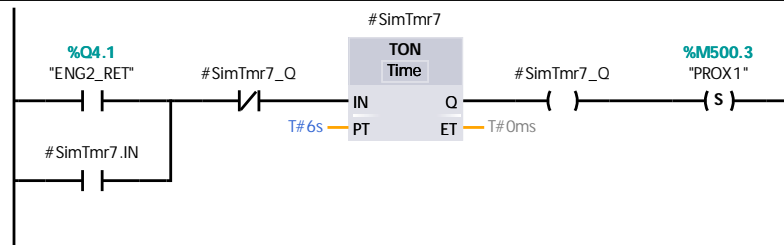
Network 7:

When rotated CCW, the CW LS is immediately reset off. After 3 seconds, CCW LS is set on

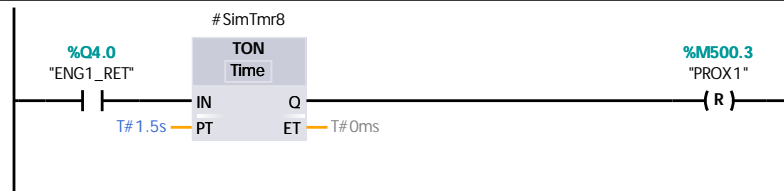


Network 8: Pallet Prox

Set it 6 seconds after one has left the station. Reset it 1.5 seconds after a new one let in.



Network 9:



Engine_Invert_DB [DB1]

| Engine_Invert_DB Properties | | | | | |
|-----------------------------|------------------|-----------|-----------|-----------------|----|
| General | | | | | |
| Name | Engine_Invert_DB | Number | 1 | Type | DB |
| Language | DB | Numbering | Automatic | | |
| Information | | | | | |
| Title | | Author | | Comment | |
| Family | | Version | 0.1 | User-defined ID | |

| Name | Data type | Start value | Retain |
|-------------|-----------|-------------|--------|
| Input | | | |
| Output | | | |
| InOut | | | |
| ▼ Static | | | |
| IStep | Int | 0 | False |
| RStep | Int | 0 | False |
| Eng1_Tmr | TON_TIME | | False |
| Clmp_Tmr | TON_TIME | | False |
| UnClmp_Tmr | TON_TIME | | False |
| Eng2_Tmr | TON_TIME | | False |
| RUnClmp_Tmr | TON_TIME | | False |