

TECHNICAL DOCUMENTATION

Example 12.7

Project	Example 12.7
Designer	
Application	example_12_7_simulation.stu
Software Version	ControlExpert V15.0-SP1
Creation Date	6/16/2023 1:30:14 PM
Last Modification Date	6/16/2023 1:41:08 PM
Target PLC	BMX P34 1000 02.00CPU 340-10 Modbus

MAST

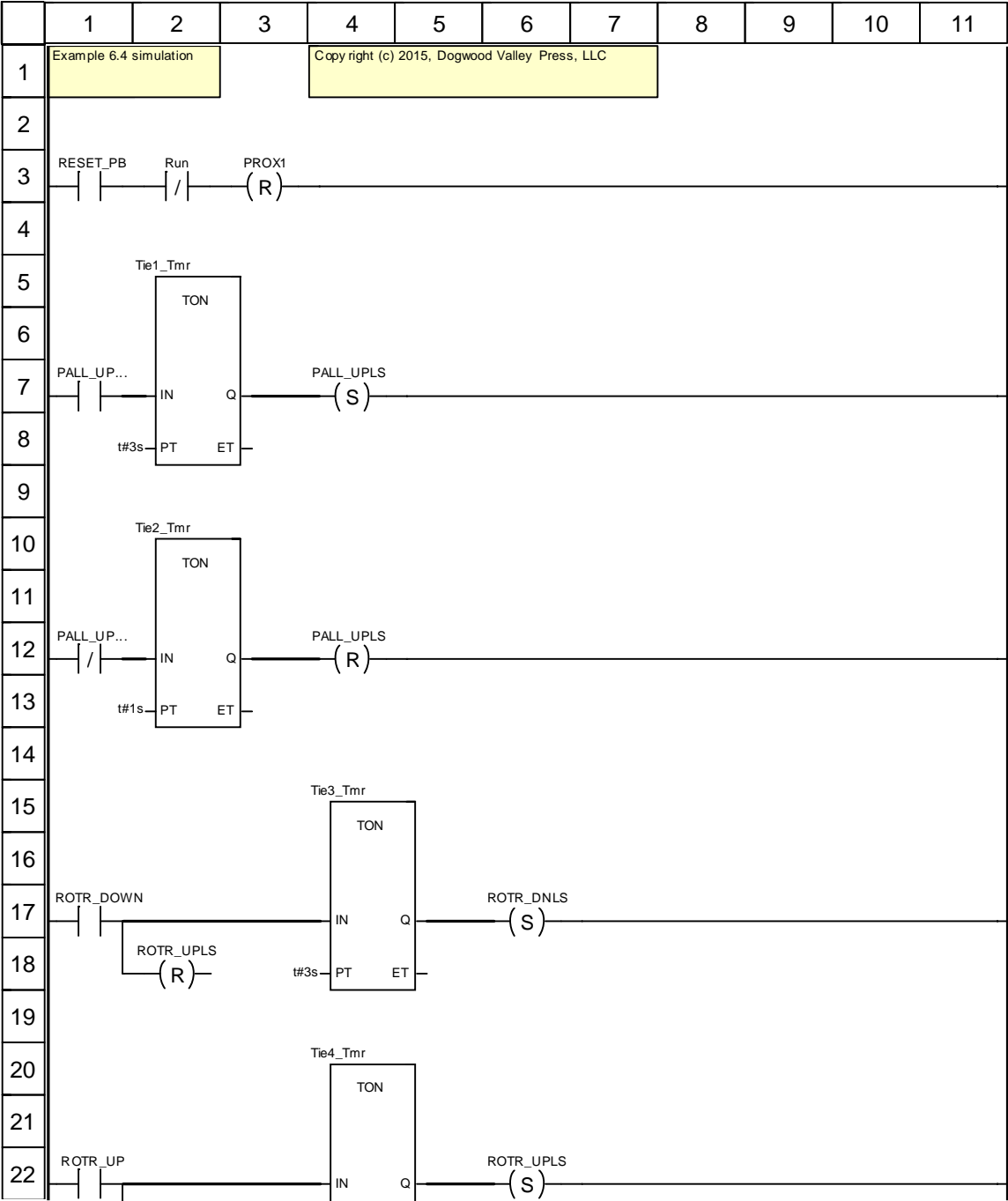
Specific properties

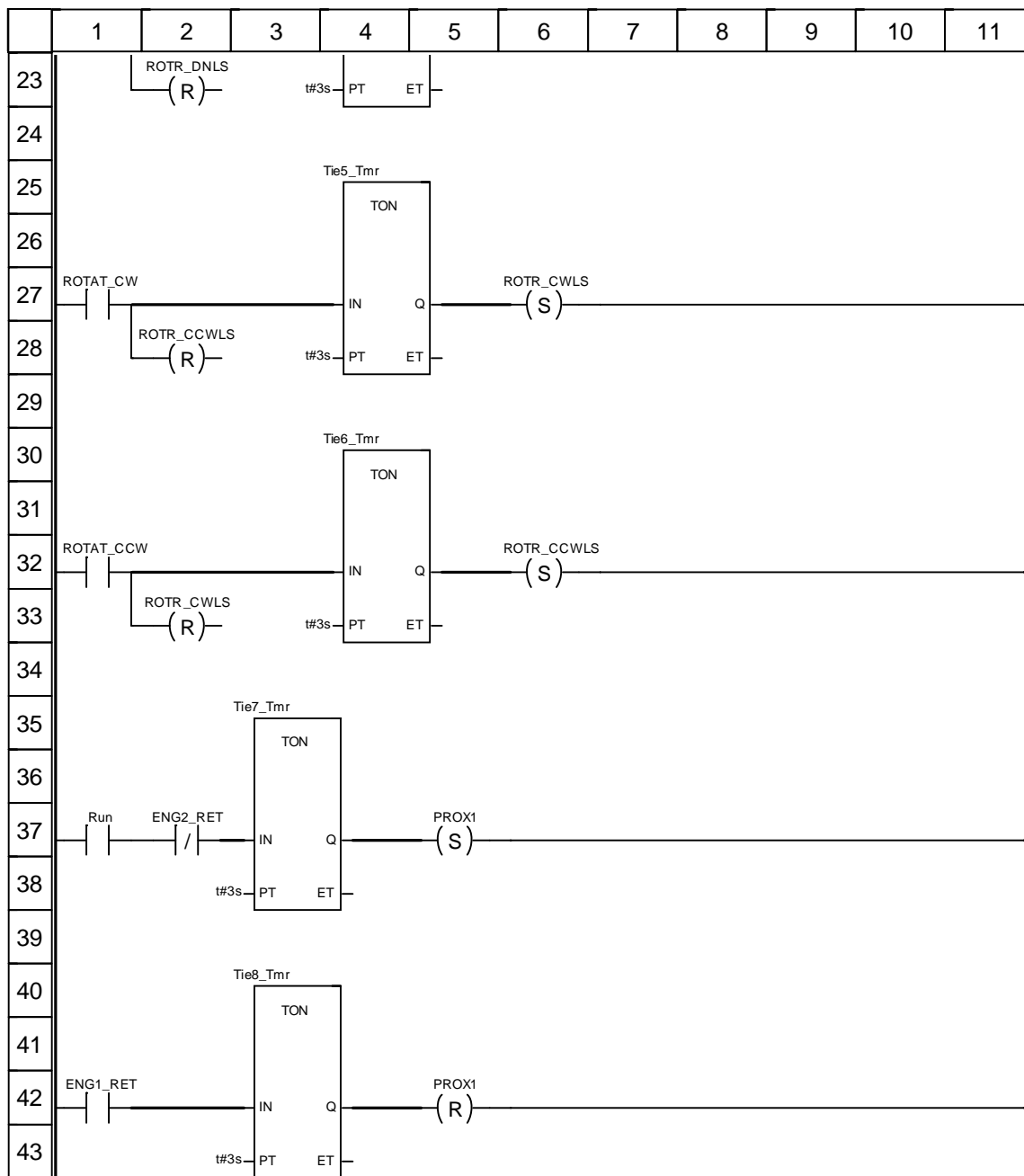
Configuration	Cyclic
Task period configuration	0
Watchdog time configuration	250

Simulation : [MAST]

Specific properties

Condition name	Simulation_Enable
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Truncated labels:

Label	Position(s)
PALL_UPCTL	(1, 7) (1, 12)

Main : [MAST]

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120| 1|      10|      20|      30|      40|      50|      60|      70|      80|      90|      100|      110|
      134|
1  (* Example 12.7 Engine Inverter in ST *)
2  (* Copyright (c) 2023, Dogwood Valley Press, LLC *)
3
4  (* Start/stop of operation *)
5  IF (START_PB and NOT Int_Reset) THEN Run := 1; END_IF;
6  IF (Run AND NOT STOP_PB) THEN Run := 0; END_IF;
7
8  (* Normal operation transition out of initial step *)
9  IF Run and (IStep = 0 ) THEN IStep := 1; END_IF;
10
11 (* Transitions for normal operation *)
12 CASE IStep of
13   1: IF PROX1 and Run THEN IStep := 2; END_IF;
14     Eng1_Tmr(IN:=True, PT:=T#2s);
15     IF Eng1_Tmr.Q THEN
16       Eng1_Tmr(IN:=False, PT:=T#2s); (*Run timer to reset *)
17       IStep := 3;
18     END_IF;
19   3: IF PALL_UPLS and Run THEN IStep := 4; END_IF;
20   4: IF ROTR_DNLS and Run THEN IStep := 5; END_IF;
21   5: Clmp_Tmr(IN:=True, PT:=T#1s500ms);
22     IF Clmp_Tmr.Q THEN
23       Clmp_Tmr(IN:=False, PT:=T#1s500ms);
24       IStep := 6;
25     END_IF;
26   6: IF ROTR_UPLS and Run THEN IStep := 7; END_IF;
27   7: IF ROTR_CWLS and Run THEN IStep := 8; END_IF;
28   8: IF ROTR_DNLS and Run THEN IStep := 9; END_IF;
29   9: UnClmp_Tmr(IN:=True, PT:=T#1s);
30     IF UnClmp_Tmr.Q THEN
31       UnClmp_Tmr(IN:=False, PT:=T#1s);
32       IStep := 10;
33     END_IF;
34   10: IF ROTR_UPLS and Run THEN IStep := 11; END_IF;
35   11: IF ROTR_CCWLS and Run THEN IStep := 12; END_IF;
36   12: IF (NOT PALL_UPLS) and Run THEN IStep := 13; END_IF;
37   13: Eng2_Tmr(IN:=True, PT:=T#3s);
38     IF Eng2_Tmr.Q THEN
39       Eng2_Tmr(IN:=False, PT:=T#3s);
```

Main

```
120| 1|      10|      20|      30|      40|      50|      60|      70|      80|      90|      100|      110|
      134|
40          IStep := 1;
41      END_IF;
42      ELSE
43          IStep := 0;
44  END_CASE;
45
46  (* Start/stop for reset operation *)
47  IF (RESET_PB and NOT Run) THEN Int_Reset := 1; END_IF;
48  IF (Int_Reset and RStep = 4) THEN Int_Reset := 0; END_IF;
49
50  (* Reset initial transition and clear normal step number *)
51  IF Int_Reset and RStep = 0 THEN RStep := 1; IStep := 0; END_IF;
52
53  (* Reset operation transitions *)
54  CASE RStep of
55      1: RUnClmp_Tmr(IN:=True, PT:=T#1s);
56          IF RUnClmp_Tmr.Q THEN
57              RUnClmp_Tmr(IN:=False, PT:=T#1s);
58              RStep := 2;
59          END_IF;
60      2: IF ROTR_UPLS THEN RStep := 3; END_IF;
61      3: IF ROTR_CCWLS THEN RStep := 4; END_IF;
62      4: IF (NOT Int_Reset) THEN RStep := 0; END_IF;
63      ELSE
64          RStep := 0;
65  END_CASE;
66
67  (* Control of outputs; *)
68  IF (IStep = 2) THEN ENG1_RET := 1; ELSE ENG1_RET := 0; END_IF;
69  IF (IStep = 13) THEN ENG2_RET := 1; ELSE ENG2_RET := 0; END_IF;
70  IF ((IStep = 6) OR (IStep = 10) AND Run) OR (RStep = 2) THEN ROTR_UP := 1; ELSE ROTR_UP := 0; END_IF;
71  IF ((IStep = 4) OR (IStep = 8) AND Run) THEN ROTR_DOWN := 1; ELSE ROTR_DOWN := 0; END_IF;
72  IF ((IStep = 7) AND Run) THEN ROTAT_CW := 1; ELSE ROTAT_CW := 0; END_IF;
73  IF ((IStep = 11) AND Run) OR (RStep = 3) THEN ROTAT_CCW := 1; ELSE ROTAT_CCW := 0; END_IF;
74  IF (IStep >= 5) AND (IStep <=8) THEN GRIP_CLOS := 1; ELSE GRIP_CLOS := 0; END_IF;
75  IF (IStep >= 3) AND (IStep <=11) THEN PALL_UPCTL := 1; ELSE PALL_UPCTL := 0; END_IF;
76
77
```

FAST

Specific properties

Configuration	Periodic
Task period configuration	5
Watchdog time configuration	100

Cross References

Application:

Addresses

Object	Referred into	Location	Usage
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Variables or FB instances

Object	Referred into	Location	Usage
Clmp_Tmr	Main : [MAST]	(l: 21, c: 5)	FC
		(l: 22, c: 6)	R
		(l: 23, c: 5)	FC
ENG1_RET	Main : [MAST]	(l: 68, c: 21)	W
		(l: 68, c: 41)	W
	Simulation : [MAST]	(l: 42, c: 1)	R
	<Screen>Screen		R (x1)
Eng1_Tmr	Main : [MAST]	(l: 14, c: 5)	FC
		(l: 15, c: 6)	R
		(l: 16, c: 5)	FC
ENG2_RET	Main : [MAST]	(l: 69, c: 22)	W
		(l: 69, c: 42)	W
	Simulation : [MAST]	(l: 37, c: 2)	R
	<Screen>Screen		R (x1)
Eng2_Tmr	Main : [MAST]	(l: 37, c: 6)	FC
		(l: 38, c: 6)	R
		(l: 39, c: 5)	FC
GRIP_CLOS	Main : [MAST]	(l: 74, c: 38)	W
		(l: 74, c: 59)	W
	<Screen>Screen		R (x1)
Int_Reset	Main : [MAST]	(l: 5, c: 22)	R
		(l: 47, c: 32)	W
		(l: 48, c: 35)	W
		(l: 62, c: 13)	R
		(l: 48, c: 5)	R
		(l: 51, c: 4)	R
IStep	Main : [MAST]	(l: 9, c: 13)	R
		(l: 17, c: 5)	W
		(l: 43, c: 3)	W
		(l: 36, c: 38)	W
		(l: 35, c: 33)	W
		(l: 34, c: 32)	W
		(l: 28, c: 31)	W
		(l: 27, c: 31)	W
		(l: 26, c: 31)	W
		(l: 75, c: 5)	R
		(l: 75, c: 22)	R
		(l: 74, c: 5)	R
		(l: 74, c: 22)	R
		(l: 72, c: 6)	R
		(l: 71, c: 6)	R
		(l: 71, c: 21)	R
		(l: 69, c: 5)	R
		(l: 68, c: 5)	R
		(l: 51, c: 45)	W

Cross References

Object	Referred into	Location	Usage
		(l 13, c: 27)	W
		(l 12, c: 6)	R
		(l 9, c: 30)	W
		(l 73, c: 6)	R
		(l 70, c: 6)	R
		(l 70, c: 21)	R
		(l 19, c: 31)	W
		(l 20, c: 31)	W
		(l 24, c: 5)	W
		(l 40, c: 5)	W
		(l 32, c: 5)	W
PALL_UPCTL	Main : [MAST]	(l 75, c: 39)	W
		(l 75, c: 61)	W
	Simulation : [MAST]	(l 7, c: 1)	R
		(l 12, c: 1)	R
	<Screen>Screen		R (x1)
PALL_UPLS	Simulation : [MAST]	(l 7, c: 4)	W
		(l 12, c: 4)	W
	Main : [MAST]	(l 36, c: 14)	R
		(l 19, c: 8)	R
	<Screen>Screen		R (x1)
PROX1	Simulation : [MAST]	(l 3, c: 3)	W
		(l 37, c: 5)	W
		(l 42, c: 5)	W
	Main : [MAST]	(l 13, c: 8)	R
	<Screen>Screen		R (x1)
RESET_PB	Main : [MAST]	(l 47, c: 5)	R
	Simulation : [MAST]	(l 3, c: 1)	R
ROTAT_CCW	Main : [MAST]	(l 73, c: 47)	W
		(l 73, c: 68)	W
	Simulation : [MAST]	(l 32, c: 1)	R
	<Screen>Screen		R (x1)
ROTAT_CW	Main : [MAST]	(l 72, c: 31)	W
		(l 72, c: 51)	W
	Simulation : [MAST]	(l 27, c: 1)	R
	<Screen>Screen		R (x1)
ROTR_CCWLS	Main : [MAST]	(l 61, c: 8)	R
		(l 35, c: 9)	R
	Simulation : [MAST]	(l 28, c: 2)	W
		(l 32, c: 6)	W
	<Screen>Screen		R (x1)
ROTR_CWLS	Main : [MAST]	(l 27, c: 8)	R
	Simulation : [MAST]	(l 27, c: 6)	W
		(l 33, c: 2)	W
	<Screen>Screen		R (x1)
ROTR_DNLS	Main : [MAST]	(l 28, c: 8)	R
		(l 20, c: 8)	R
	Simulation : [MAST]	(l 17, c: 6)	W
		(l 23, c: 2)	W
	<Screen>Screen		R (x1)
ROTR_DOWN	Main : [MAST]	(l 71, c: 46)	W
		(l 71, c: 67)	W
	Simulation : [MAST]	(l 17, c: 1)	R
	<Screen>Screen		R (x1)
ROTR_UP	Main : [MAST]	(l 70, c: 62)	W

Cross References

Object	Referred into	Location	Usage
		(l 70, c: 81)	W
	Simulation : [MAST]	(l 22, c: 1)	R
	<Screen>Screen		R (x1)
ROTR_UPLS	Main : [MAST]	(l 60, c: 8)	R
		(l 26, c: 8)	R
		(l 34, c: 9)	R
	Simulation : [MAST]	(l 18, c: 2)	W
		(l 22, c: 6)	W
	<Screen>Screen		R (x1)
RStep	Main : [MAST]	(l 48, c: 19)	R
		(l 51, c: 18)	R
		(l 54, c: 6)	R
		(l 60, c: 23)	W
		(l 61, c: 24)	W
		(l 62, c: 29)	W
		(l 64, c: 3)	W
		(l 73, c: 31)	R
		(l 70, c: 46)	R
		(l 51, c: 33)	W
		(l 58, c: 5)	W
Run	Main : [MAST]	(l 5, c: 38)	W
		(l 6, c: 5)	R
		(l 6, c: 31)	W
		(l 13, c: 18)	R
		(l 26, c: 22)	R
		(l 27, c: 22)	R
		(l 28, c: 22)	R
		(l 34, c: 23)	R
		(l 35, c: 24)	R
		(l 36, c: 29)	R
		(l 47, c: 22)	R
		(l 9, c: 4)	R
		(l 72, c: 21)	R
		(l 71, c: 36)	R
		(l 73, c: 22)	R
		(l 70, c: 37)	R
		(l 19, c: 22)	R
		(l 20, c: 22)	R
	Simulation : [MAST]	(l 3, c: 2)	R
		(l 37, c: 1)	R
	<Screen>Screen		R (x1)
RUnClmp_Tmr	Main : [MAST]	(l 55, c: 5)	FC
		(l 56, c: 6)	R
		(l 57, c: 5)	FC
Simulation_Enable	Simulation : [MAST]	Activation condition: Simulation_Enable	R
START_PB	Main : [MAST]	(l 5, c: 5)	R
STOP_PB	Main : [MAST]	(l 6, c: 17)	R
Tie1_Tmr	Simulation : [MAST]	(l 5, c: 2)	FC
Tie2_Tmr	Simulation : [MAST]	(l 10, c: 2)	FC
Tie3_Tmr	Simulation : [MAST]	(l 15, c: 4)	FC
Tie4_Tmr	Simulation : [MAST]	(l 20, c: 4)	FC
Tie5_Tmr	Simulation : [MAST]	(l 25, c: 4)	FC
Tie6_Tmr	Simulation : [MAST]	(l 30, c: 4)	FC
Tie7_Tmr	Simulation : [MAST]	(l 35, c: 3)	FC

Cross References

Object	Referred into	Location	Usage
Tie8_Tmr	Simulation : [MAST]	(l: 40, c: 3)	FC
Unclmp_Tmr	Main : [MAST]	(l: 29, c: 5)	FC
		(l: 30, c: 6)	R
		(l: 31, c: 5)	FC

Cross References

New_DFB:

Variables or FB instances

Object	Referred into	Location	Usage
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