

## Main\_Program [OB1]

### Main\_Program Properties

#### General

<b>Name</b>	Main_Program	<b>Number</b>	1	<b>Type</b>	OB
<b>Language</b>	LAD	<b>Numbering</b>	Manual		

#### Information

<b>Title</b>	"Main Program Sweep (Cycle)"	<b>Author</b>		<b>Comment</b>	
<b>Family</b>		<b>Version</b>	0.1	<b>User-defined ID</b>	

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	
Constant		

### Network 1: SP14-4

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#### SP14-4 Valve Leak Check Station Control Using S7-GRAPH with Simulation

Additional internal memory:

Tag Address

Int\_Reset M5.1 BOOL Internal reset

TmpDI MD120 DINT Temporary double integer

TmpR MD124 REAL Temporary real

Ret\_Val MW12 WORD Return value from SCALE block

Always\_Off M10.0 BOOL Always off bit for SCALE block

Run\_Trans M61.0 BOOL Run has changed

Run\_PTrans M61.1 BOOL Bit for Run neg transition

Run\_NTrans M61.2 BOOL Bit for Run pos transition

OP\_Zeroed M61.3 BOOL Operation paused

Reset\_Trans M61.4 BOOL Reset\_PB transition to start-kick

SFC

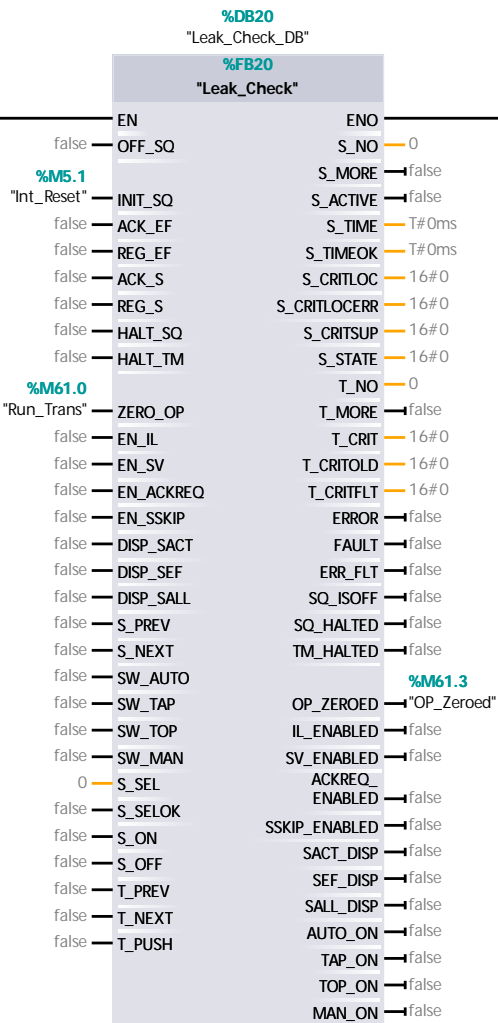
ResetPB\_PTrans M61.5 BOOL Bit for Reset\_PB pos trans

Conversion formulas:

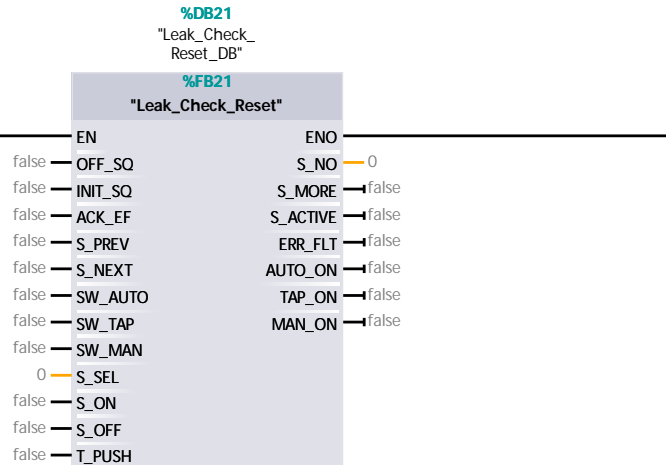
$HD\_HGT = (HGT\_MEAS - 5530) / 22118.0 * (150.0 - 75.0) + 75.0$

$VLV\_PRES = (PRES - 5530) / 22118.0 * (100.0)$

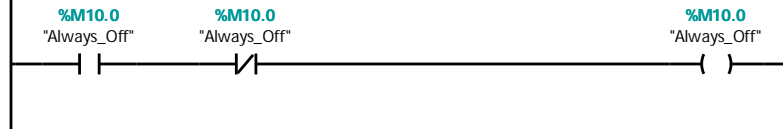




Network 5: Leak Check Reset S7-GRAPH

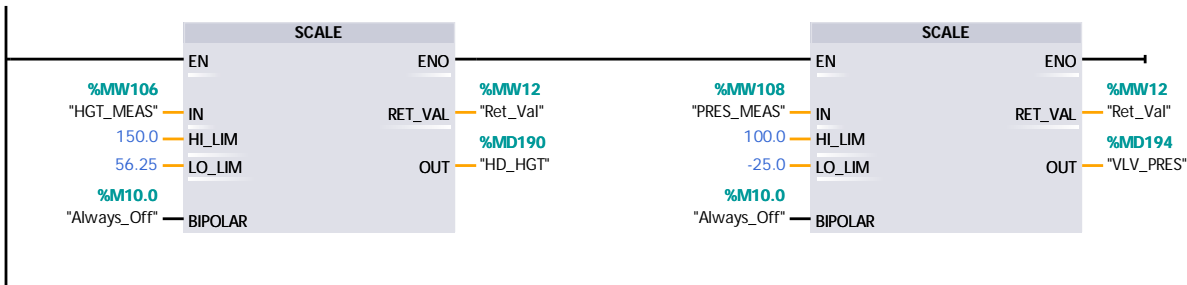


**Network 6: Always Off**



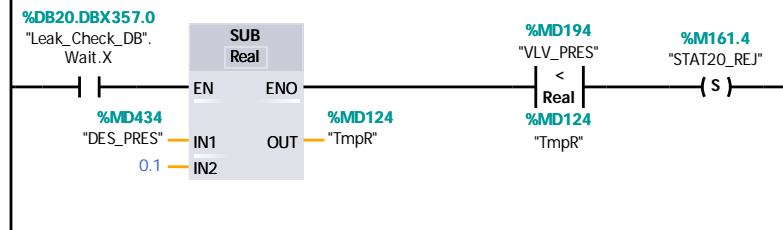
**Network 7: Convert height measurement to mm and pressure measurement to psi.**

Uses SCALE block. Note that the lo\_lim input is 25% lower than zero weight to account for this block assuming the minimum value of the analog in is zero rather than the 5530 (which corresponds to 4 mA).



**Network 8: Set if valve is to be rejected because it will not hold pressure**

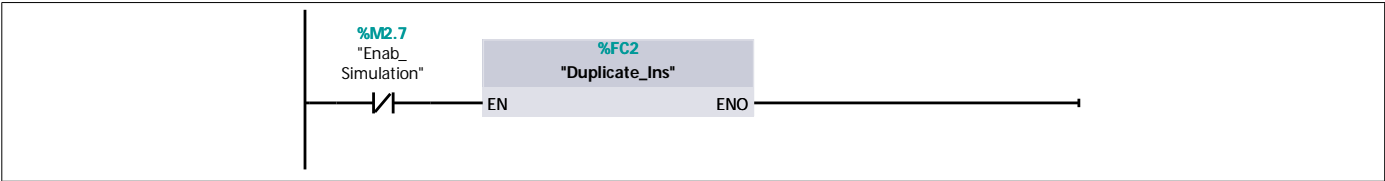
Check valve pressure during 30 sec wait. If failing, set reject bit.



Network 9: Simulation



Network 10: Copy real inputs to input image if not simulating



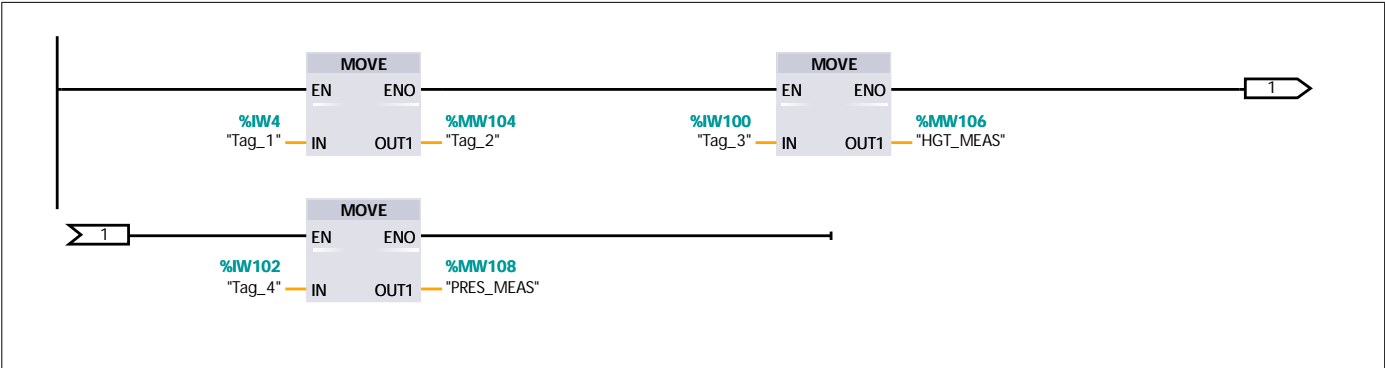
# Duplicate\_Ins [FC2]

## Duplicate\_Ins Properties

General					
Name	Duplicate_Ins	Number	2	Type	FC
Language	LAD	Numbering	Manual		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

Name	Data type	Default value
Input		
Output		
InOut		
Temp		
Constant		
▼ Return		
Duplicate_Ins	Void	

## Network 1:



## Leak\_Check [FB20]

### Leak\_Check Properties

#### General

<b>Name</b>	Leak_Check	<b>Number</b>	20	<b>Type</b>	FB
<b>Language</b>	GRAPH	<b>Numbering</b>	Manual	<b>Network language</b>	LAD

#### Information

<b>Title</b>	S7GRAPH V5.0 FB -- SP14_04\SIMATIC 400 Station\CPU 417-4\S7 Program(2)\Sources\Leak_Check	<b>Author</b>		<b>Comment</b>	Valve Leak Check Normal Operation  Copyright (c) 2011, 2015 Dogwood Valley Press, LLC ----- -----
<b>Family</b>		<b>Version</b>	0.1	<b>User-defined ID</b>	

Name	Data type	Default value
▼ Input		
OFF_SQ	Bool	false
INIT_SQ	Bool	false
ACK_EF	Bool	false
REG_EF	Bool	false
ACK_S	Bool	false
REG_S	Bool	false
HALT_SQ	Bool	false
HALT_TM	Bool	false
ZERO_OP	Bool	false
EN_IL	Bool	false
EN_SV	Bool	false
EN_ACKREQ	Bool	false
EN_SSKIP	Bool	false
DISP_SACT	Bool	false
DISP_SEF	Bool	false
DISP_SALL	Bool	false
S_PREV	Bool	false
S_NEXT	Bool	false
SW_AUTO	Bool	false
SW_TAP	Bool	false
SW_TOP	Bool	false
SW_MAN	Bool	false
S_SEL	Int	0
S_SELOK	Bool	false
S_ON	Bool	false
S_OFF	Bool	false
T_PREV	Bool	false
T_NEXT	Bool	false
T_PUSH	Bool	false

Totally Integrated Automation Portal		
Name	Data type	Default value
▼ Output		
S_NO	Int	0
S_MORE	Bool	false
S_ACTIVE	Bool	false
S_TIME	Time	T#0ms
S_TIMEOK	Time	T#0ms
S_CRITLOC	DWord	16#0
S_CRITLOCERR	DWord	16#0
S_CRITSUP	DWord	16#0
S_STATE	Word	16#0
T_NO	Int	0
T_MORE	Bool	false
T_CRIT	DWord	16#0
T_CRITOLD	DWord	16#0
T_CRITFLT	DWord	16#0
ERROR	Bool	false
FAULT	Bool	false
ERR_FLT	Bool	false
SQ_ISOFF	Bool	false
SQ_HALTED	Bool	false
TM_HALTED	Bool	false
OP_ZEROED	Bool	false
IL_ENABLED	Bool	false
SV_ENABLED	Bool	false
ACKREQ_ENABLED	Bool	false
SSKIP_ENABLED	Bool	false
SACT_DISP	Bool	false
SEF_DISP	Bool	false
SALL_DISP	Bool	false
AUTO_ON	Bool	false
TAP_ON	Bool	false
TOP_ON	Bool	false
MAN_ON	Bool	false
InOut		
▼ Static		
Trans1	GraphTransition	
Trans2	GraphTransition	
Trans3	GraphTransition	
Trans4	GraphTransition	
Trans5	GraphTransition	
Trans6	GraphTransition	
Trans7	GraphTransition	
Initial	GraphStep	
Wait_For_Valve	GraphStep	
Head_Down	GraphStep	
Pressurize	GraphStep	
Wait	GraphStep	
Head_Up	GraphStep	



Totally Integrated Automation Portal		
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Name	Data type	Default value
Move_Out	GraphStep	
S_DISPLAY	Int	0
S_SEL_OLD	Int	0
S_DISPIDX	Byte	16#0
T_DISPIDX	Byte	16#0
MOP	Struct	
TICKS	Struct	
SQ_FLAGS	Struct	
Temp		
Constant		

Alarms

Enable alarms	False
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Category	Category enabler	Display class
Error		0
Warning		0
Info		0
Category 4		0
Category 5		0
Category 6		0
Category 7		0
Category 8		0

Category for interlocks	Error	Subcategory 1 for interlocks		Subcategory 2 for interlocks	
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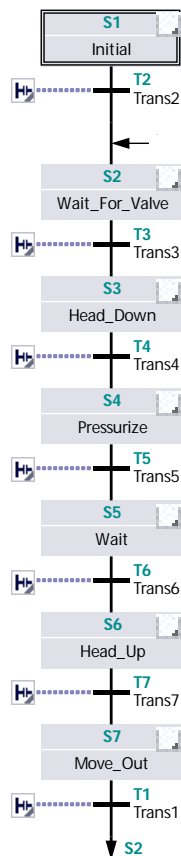
Category for supervisions	Error	Subcategory 1 for supervisions		Subcategory 2 for supervisions	
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Permanent pre-instructions

Sequences (1)

1:Sequencer 1

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S1 - [Initial step]:Initial

Step comment

Interlock -(c)-:

Interlock alarm	
Alarm text	Initial

Interlock  
( c )

Supervision -(v)-:

Supervision alarm	
Alarm text	Initial

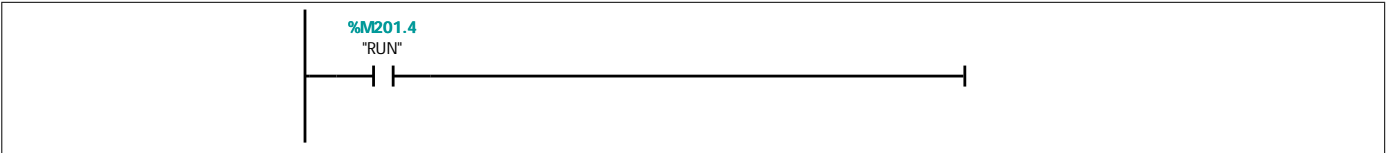
Supervision  
( v )

**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action

**T2:Trans2**



**S2:Wait\_For\_Valve**

Step comment

**Interlock -(c)-:**

**Interlock alarm**

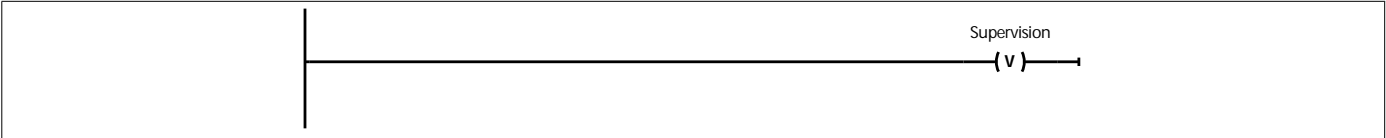
Alarm text	Wait_For_Valve
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**Supervision -(v)-:**

**Supervision alarm**

Alarm text	Wait_For_Valve
------------	----------------

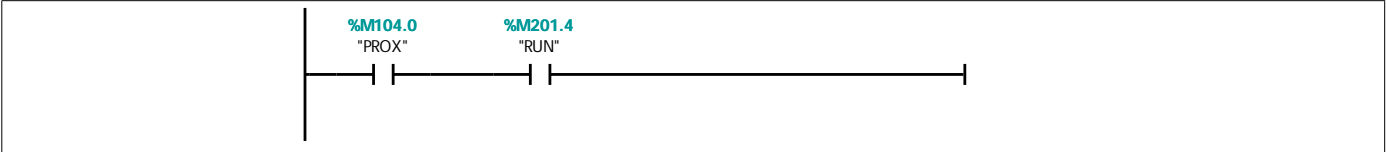


**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action

**T3:Trans3**



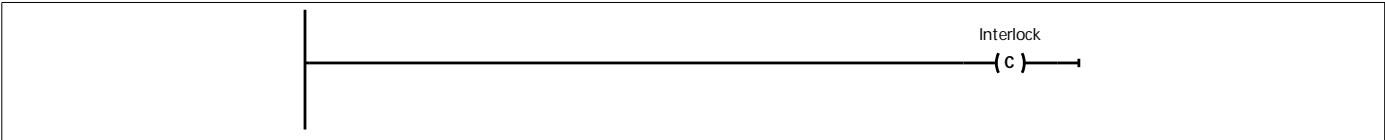
**S3:Head\_Down**

Step comment

**Interlock -(c)-:**

**Interlock alarm**

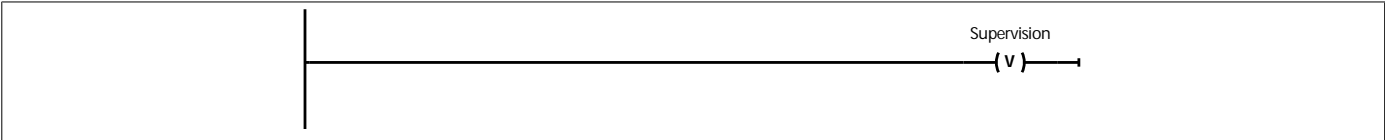
Alarm text Head\_Down



**Supervision -(v)-:**

**Supervision alarm**

Alarm text Head\_Down



**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action
		S	"LIFT_SOL"
		N	"HD_DOWN"

**T4:Trans4**



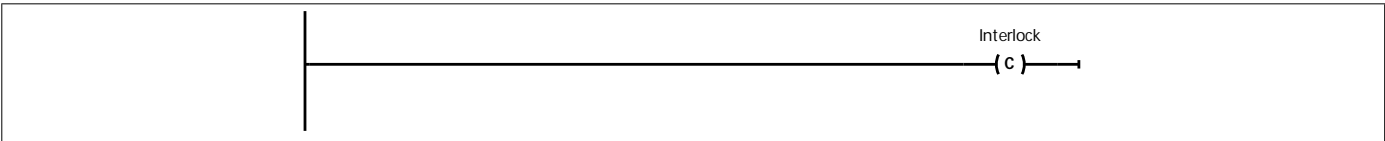
**S4:Pressurize**

Step comment

**Interlock -(c)-:**

**Interlock alarm**

Alarm text Pressurize



**Supervision -(v)-:**

**Supervision alarm**

Alarm text Pressurize

Supervision

( v )

**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action
		N	"AIR_VLV"

**T5:Trans5**

%MD194

"VLV\_PRES"

>=

Real

%MD434

"DES\_PRES"

%M201.4

"RUN"

**S5:Wait**

Step comment

**Interlock -(c)-:**

**Interlock alarm**

Alarm text Wait

Interlock

( c )

**Supervision -(v)-:**

**Supervision alarm**

Alarm text Wait

Supervision

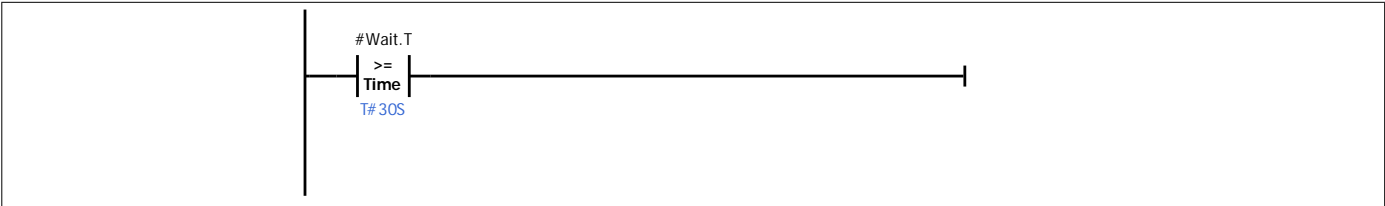
( v )

**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action

**T6:Trans6**



**S6:Head\_Up**

Step comment

**Interlock -(c)-:**

**Interlock alarm**

Alarm text	Head_Up
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**Supervision -(v)-:**

**Supervision alarm**

Alarm text	Head_Up
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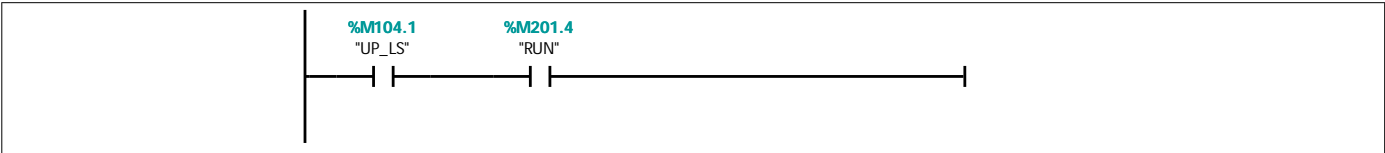


**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action
		N	"HD_UP"

**T7:Trans7**



**S7:Move\_Out**

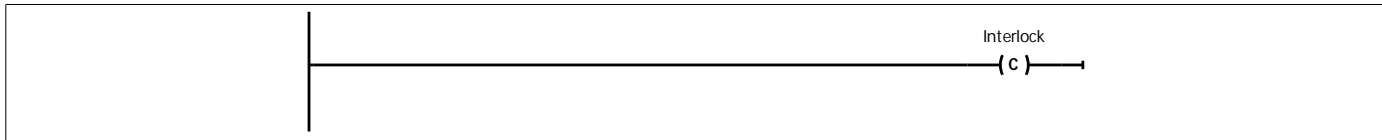
Step comment

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**Interlock -(c)-:**

**Interlock alarm**

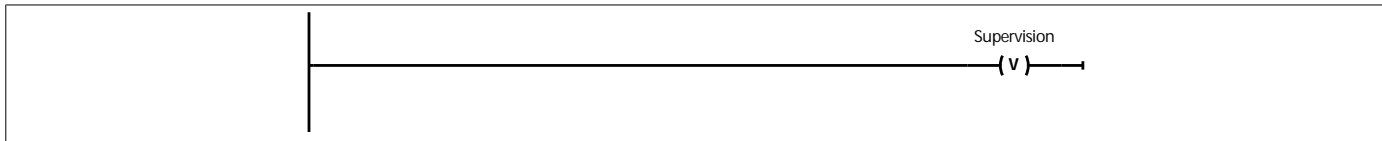
Alarm text Move\_Out



**Supervision -(v)-:**

**Supervision alarm**

Alarm text Move\_Out

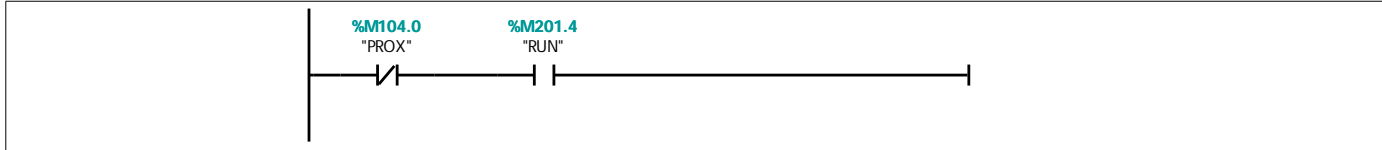


**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action

**T1:Trans1**



**Permanent post-instructions**

## Leak\_Check\_Reset [FB21]

### Leak\_Check\_Reset Properties

#### General

<b>Name</b>	Leak_Check_Reset	<b>Number</b>	21	<b>Type</b>	FB
<b>Language</b>	GRAPH	<b>Numbering</b>	Manual	<b>Network language</b>	LAD

#### Information

<b>Title</b>	S7GRAPH V4 FB -- SP14_04\SIMATIC 400 Station\CPU 417-4\S7 Program(2)\Sources\Leak_Check_Reset	<b>Author</b>		<b>Comment</b>	Valve Leak Check Reset Operation  Copyright (c) 2011, 2015 Dogwood Valley Press, LLC ----- -----
<b>Family</b>		<b>Version</b>	0.1	<b>User-defined ID</b>	

Name	Data type	Default value
▼ Input		
OFF_SQ	Bool	false
INIT_SQ	Bool	false
ACK_EF	Bool	false
S_PREV	Bool	false
S_NEXT	Bool	false
SW_AUTO	Bool	false
SW_TAP	Bool	false
SW_MAN	Bool	false
S_SEL	Int	0
S_ON	Bool	false
S_OFF	Bool	false
T_PUSH	Bool	false
▼ Output		
S_NO	Int	0
S_MORE	Bool	false
S_ACTIVE	Bool	false
ERR_FLT	Bool	false
AUTO_ON	Bool	false
TAP_ON	Bool	false
MAN_ON	Bool	false
InOut		
▼ Static		
Trans1	GraphTransition	
Trans2	GraphTransition	
Trans3	GraphTransition	
Reset_Initial	GraphStep	
Reset_Head_Up	GraphStep	
Reset_Unlatch	GraphStep	
S_DISPLAY	Int	0

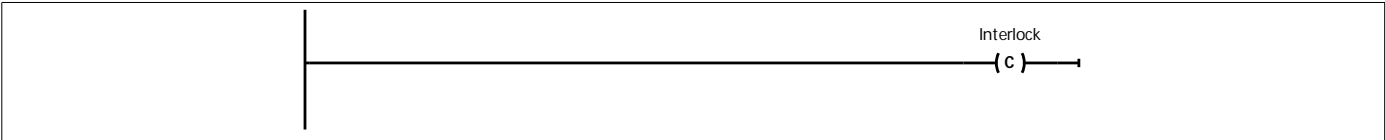


Totally Integrated Automation Portal																													
<table><thead><tr><th>Name</th><th>Data type</th><th>Default value</th></tr></thead><tbody><tr><td>S_SEL_OLD</td><td>Int</td><td>0</td></tr><tr><td>S_DISPIDX</td><td>Byte</td><td>16#0</td></tr><tr><td>T_DISPIDX</td><td>Byte</td><td>16#0</td></tr><tr><td>MOP</td><td>Struct</td><td></td></tr><tr><td>TICKS</td><td>Struct</td><td></td></tr><tr><td>SQ_FLAGS</td><td>Struct</td><td></td></tr><tr><td>Temp</td><td></td><td></td></tr><tr><td>Constant</td><td></td><td></td></tr></tbody></table>			Name	Data type	Default value	S_SEL_OLD	Int	0	S_DISPIDX	Byte	16#0	T_DISPIDX	Byte	16#0	MOP	Struct		TICKS	Struct		SQ_FLAGS	Struct		Temp			Constant		
Name	Data type	Default value																											
S_SEL_OLD	Int	0																											
S_DISPIDX	Byte	16#0																											
T_DISPIDX	Byte	16#0																											
MOP	Struct																												
TICKS	Struct																												
SQ_FLAGS	Struct																												
Temp																													
Constant																													
<b>Alarms</b>																													
Enable alarms		False																											
<table><thead><tr><th>Category</th><th>Category enabler</th><th>Display class</th></tr></thead><tbody><tr><td>Error</td><td></td><td>0</td></tr><tr><td>Warning</td><td></td><td>0</td></tr><tr><td>Info</td><td></td><td>0</td></tr><tr><td>Category 4</td><td></td><td>0</td></tr><tr><td>Category 5</td><td></td><td>0</td></tr><tr><td>Category 6</td><td></td><td>0</td></tr><tr><td>Category 7</td><td></td><td>0</td></tr><tr><td>Category 8</td><td></td><td>0</td></tr></tbody></table>			Category	Category enabler	Display class	Error		0	Warning		0	Info		0	Category 4		0	Category 5		0	Category 6		0	Category 7		0	Category 8		0
Category	Category enabler	Display class																											
Error		0																											
Warning		0																											
Info		0																											
Category 4		0																											
Category 5		0																											
Category 6		0																											
Category 7		0																											
Category 8		0																											
Category for interlocks	Error	Subcategory 1 for interlocks		Subcategory 2 for interlocks																									
Category for supervisions	Error	Subcategory 1 for supervisions		Subcategory 2 for supervisions																									
<b>Permanent pre-instructions</b>																													
<b>Sequences (1)</b>																													
<b>1:Sequencer 1</b>																													
<div></div>																													
<b>S1 - [Initial step]:Reset_Initial</b>																													
Step comment																													

**Interlock -(c)-:**

**Interlock alarm**

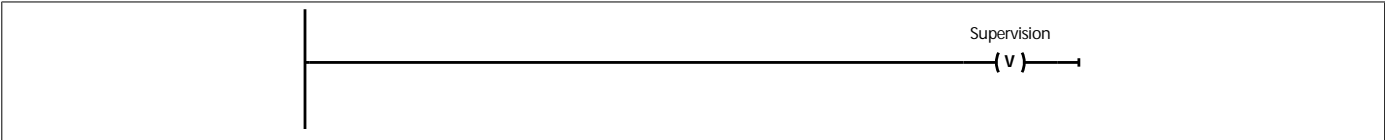
Alarm text Reset\_Initial



**Supervision -(v)-:**

**Supervision alarm**

Alarm text Reset\_Initial

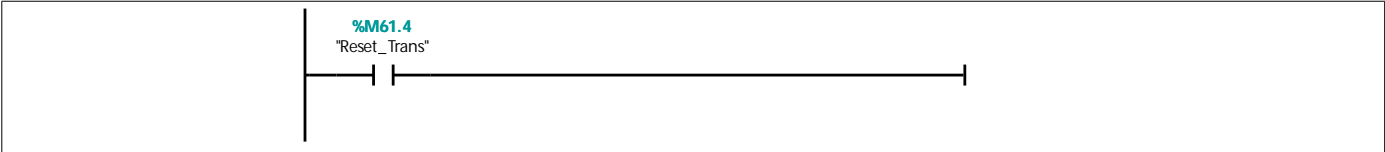


**Actions:**

**Actions:**

Interlock	Event	Qualifier	Action

**T2:Trans2**



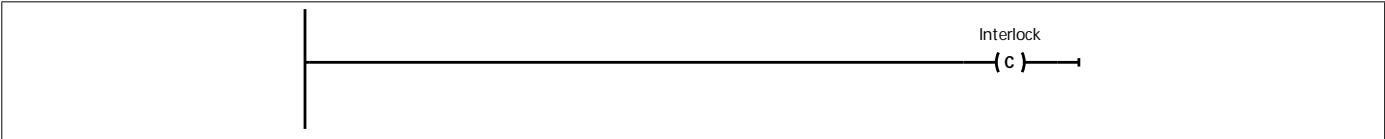
**S2:Reset\_Head\_Up**

Step comment

**Interlock -(c)-:**

**Interlock alarm**

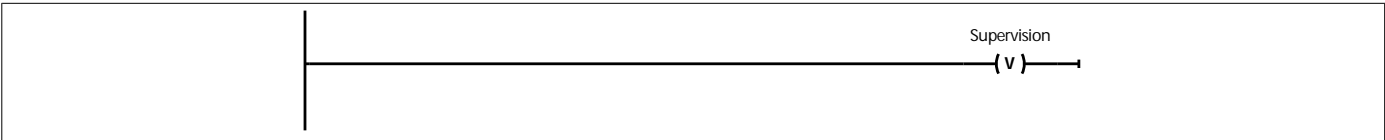
Alarm text Reset\_Head\_Up



**Supervision -(v)-:**

**Supervision alarm**

Alarm text Reset\_Head\_Up



**Actions:**

Actions:			
Interlock	Event	Qualifier	Action
		S	"Int_Reset"
		N	"HD_UP"

**T3:Trans3**



**S3:Reset\_Unlatch**

Step comment

**Interlock -(c)-:**

Interlock alarm	
Alarm text	Reset_Unlatch



**Supervision -(v)-:**

Supervision alarm	
Alarm text	Reset_Unlatch



**Actions:**

Actions:			
Interlock	Event	Qualifier	Action
		R	"Int_Reset"

**T1:Trans1**



Totally Integrated Automation Portal		
<b>Permanent post-instructions</b>		

## Simulation [FB10]

## Simulation Properties

## General

Name	Simulation	Number	10	Type	FB
Language	LAD	Numbering	Manual		

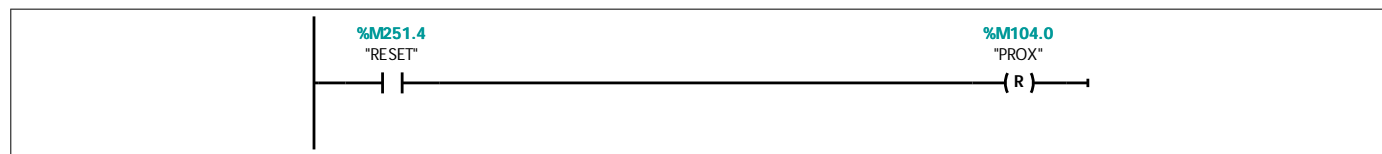
## Information

Title		Author		Comment	Copyright (c) 2011 Dogwood Valley Press, LLC SIMULATION LOGIC
Family		Version	0.1	User-defined ID	

Name	Data type	Default value
Input		
Output		
InOut		
▼ Static		
Sim_Tmr0	TON	
Sim_Tmr1	TON	
Sim_Tmr2	TON	
Sim_Tmr3	TON	
Sim_Tmr4	TON	
Sim_Tmr5	TON	
Sim_Tmr6	TON	
Sim_Tmr7	TON	
Sim_Tmr1_IN	Bool	false
HD_Up_NTrans	Bool	false
Sim_TmpInt	Int	0
Temp		
Constant		

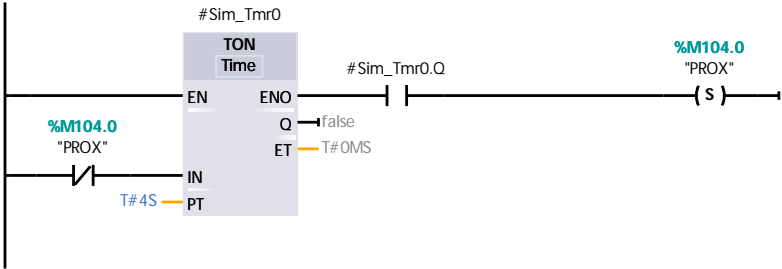
## Network 1:

On reset, reset PROX

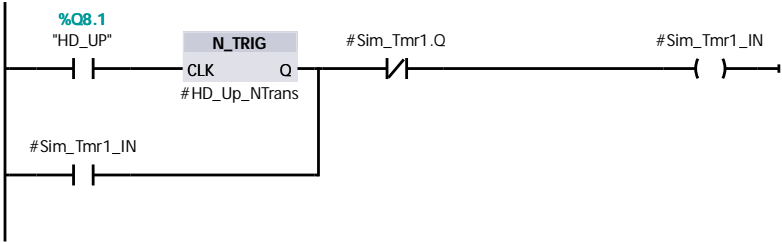


## Network 2:

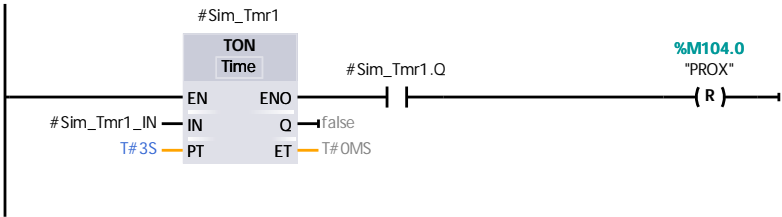
PROX simulation: Set when PROX off for 4 secs.  
Reset 3 secs after HD\_UP transitions off



**Network 3:**

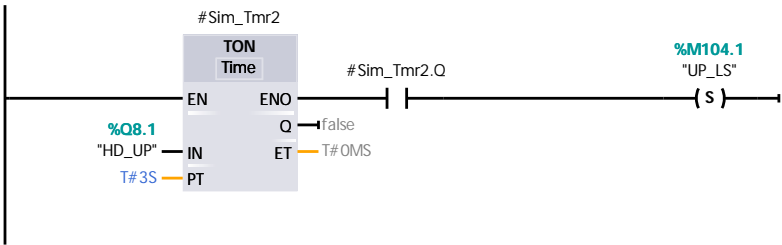


**Network 4:**

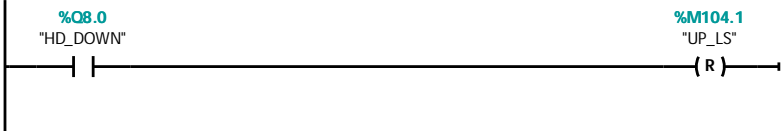


**Network 5: Limit switch that closes (on) when pressurizing head is fully up**

UP\_LS simulation: Latch when HD\_UP on for 3 sec. Unlatch when HD\_DOWN

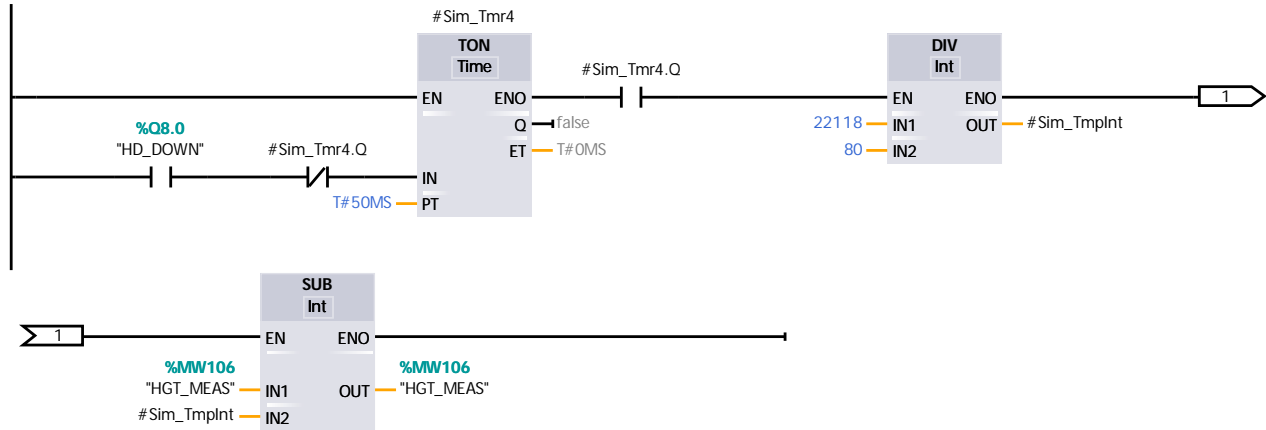


**Network 6: Limit switch that closes (on) when pressurizing head is fully up**

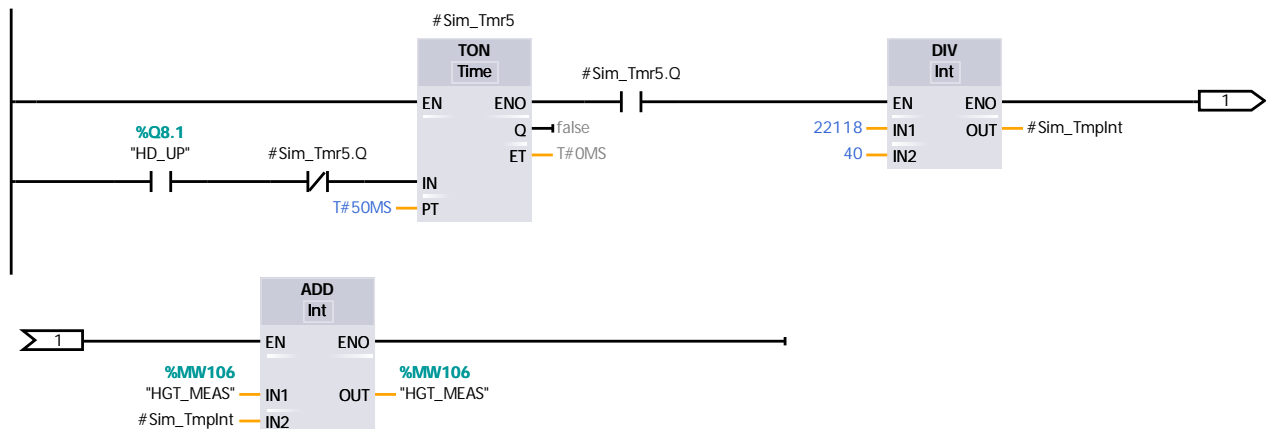


### Network 7:

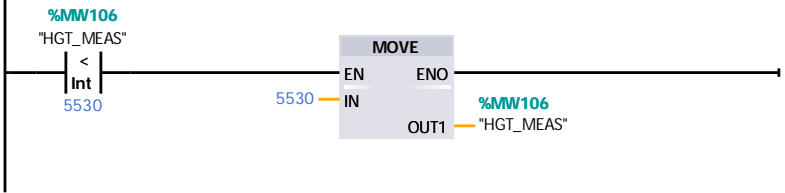
HGT\_MEAS Simulation: When HD\_DOWN, decrement every 50 ms by 22118/80, meaning it goes from high to low in 4 sec. Also make sure no less than 5530. When HD\_UP increment every 50 ms by 22118/40 meaning it goes to high in at most 2 sec, and then make sure not larger than 27648



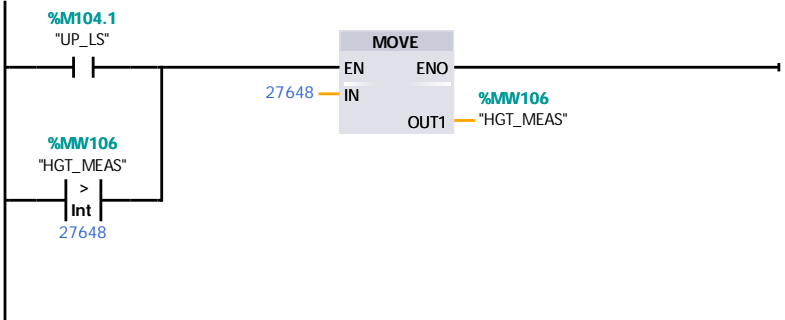
### Network 8:



### Network 9:

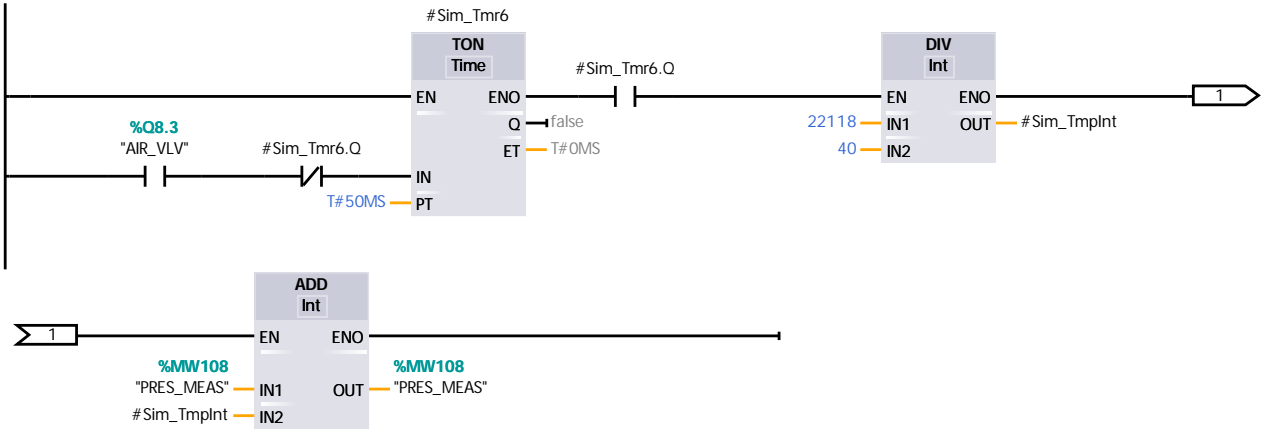


**Network 10:**



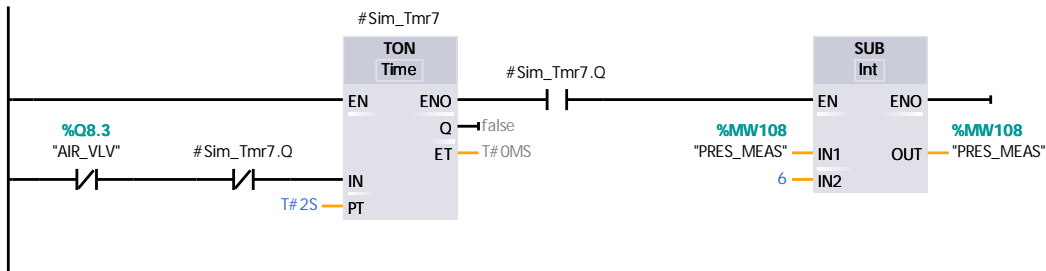
**Network 11:**

PRESS\_MEAS Simulation: When AIR\_VLV, increment every 50 ms by 22118/40, meaning it goes from low to high in 4 sec.  
When AIR\_VLV off,decrement every 2 sec by 6 meaning a slow leak, and then make sure not less than zero. HD\_UP also resets it.

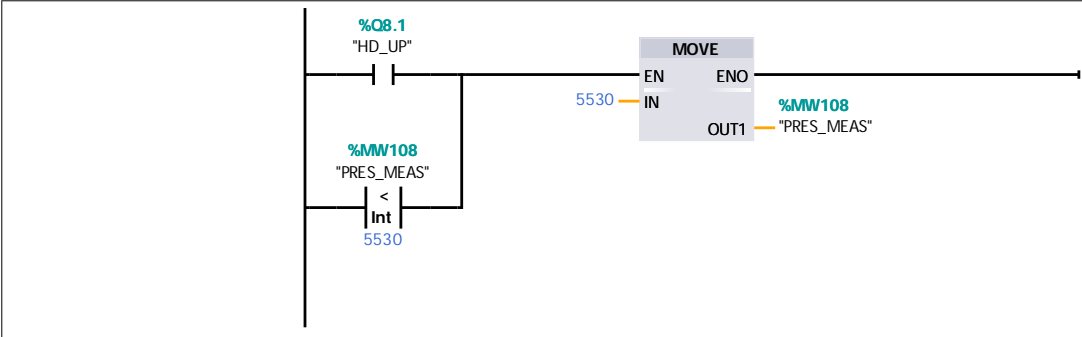


**Network 12:**





Network 13:



Network 14:

