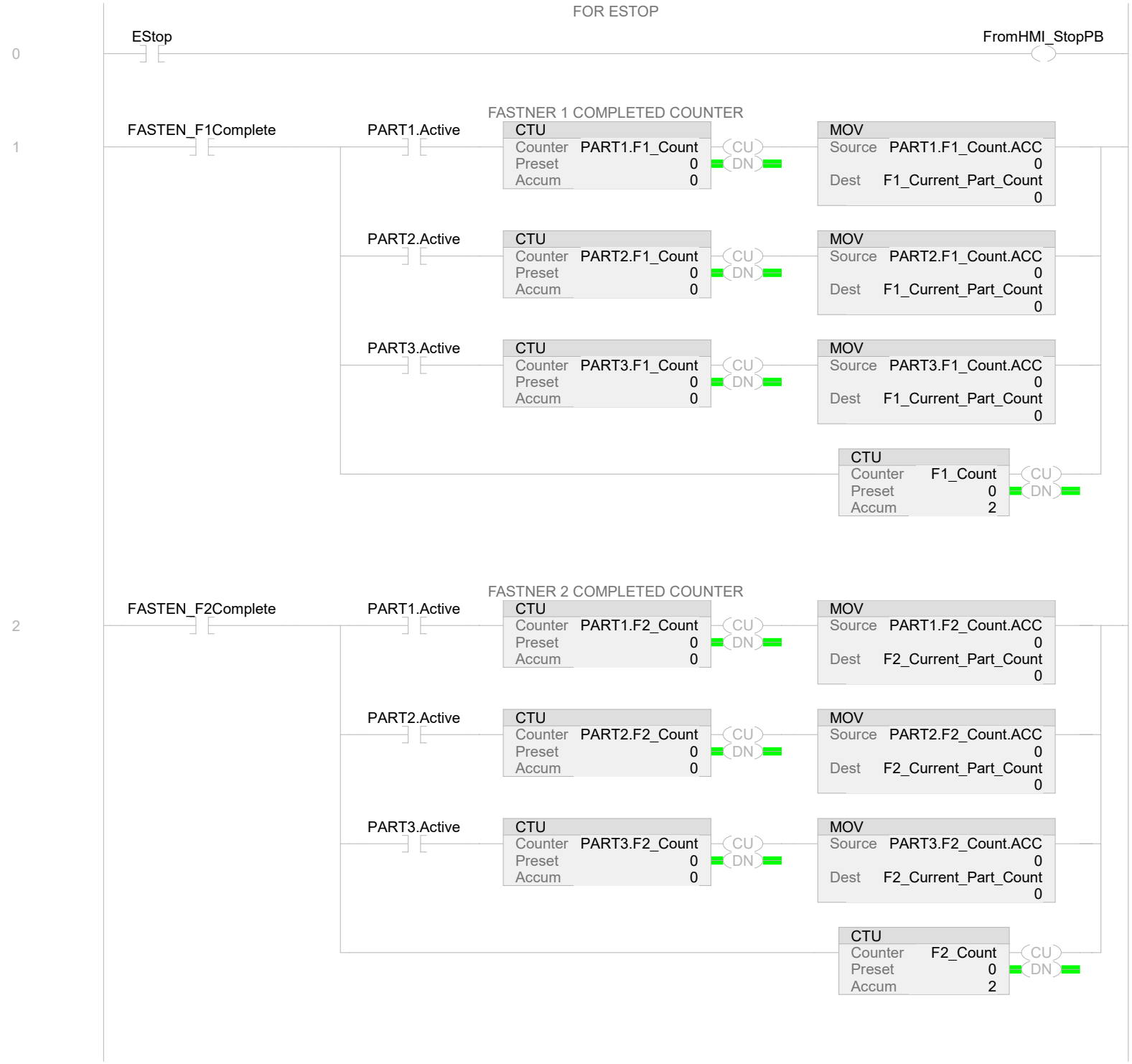

FOR ESTOP
EStop
FromHMI_StopPB
0
FASTNER 1 COMPLETED COUNTER
FASTEN_F1Complete
PART1.Active
CTU
Counter PART1.F1_Count
Preset 0
Accum 0
CU
DN
MOV
Source PART1.F1_Count.ACC
0
Dest F1_Current_Part_Count
0
PART2.Active
CTU
Counter PART2.F1_Count
Preset 0
Accum 0
MOV
Source PART2.F1_Count.ACC
0
Dest F1_Current_Part_Count
0
PART3.Active
CTU
Counter PART3.F1_Count
Preset 0
Accum 0
MOV
Source PART3.F1_Count.ACC
0
Dest F1_Current_Part_Count
0
CTU
Counter F1_Count
Preset 0
Accum 2
CU
DN
FASTNER 2 COMPLETED COUNTER
FASTEN_F2Complete
PART1.Active
CTU
Counter PART1.F2_Count
Preset 0
Accum 0
MOV
Source PART1.F2_Count.ACC
0
Dest F2_Current_Part_Count
0
PART2.Active
CTU
Counter PART2.F2_Count
Preset 0
Accum 0
MOV
Source PART2.F2_Count.ACC
0
Dest F2_Current_Part_Count
0
PART3.Active
CTU
Counter PART3.F2_Count
Preset 0
Accum 0
MOV
Source PART3.F2_Count.ACC
0
Dest F2_Current_Part_Count
0
CTU
Counter F2_Count
Preset 0
Accum 2
CU
DN

3

FASTNER 3 COMPLETED COUNTER

FASTEN_F3Complete

PART1.Active

CTU	
Counter	PART1.F3_Count
Preset	0
Accum	0

CU DN

MOV	
Source	PART1.F3_Count.ACC
	0
Dest	F3_Current_Part_Count
	0

PART2.Active

CTU	
Counter	PART2.F3_Count
Preset	0
Accum	0

CU DN

MOV	
Source	PART2.F3_Count.ACC
	0
Dest	F3_Current_Part_Count
	0

PART3.Active

CTU	
Counter	PART3.F3_Count
Preset	0
Accum	0

CU DN

MOV	
Source	PART3.F3_Count.ACC
	0
Dest	F3_Current_Part_Count
	0

CTU	
Counter	F3_Count
Preset	0
Accum	2

CU DN

4

FASTNER 4 COMPLETED COUNTER

FASTEN_F4Complete

PART1.Active

CTU	
Counter	PART1.F4_Count
Preset	0
Accum	0

CU DN

MOV	
Source	PART1.F4_Count.ACC
	0
Dest	F4_Current_Part_Count
	0

PART2.Active

CTU	
Counter	PART2.F4_Count
Preset	0
Accum	0

CU DN

MOV	
Source	PART2.F3_Count.ACC
	0
Dest	F4_Current_Part_Count
	0

PART3.Active

CTU	
Counter	PART3.F4_Count
Preset	0
Accum	0

CU DN

MOV	
Source	PART3.F4_Count.ACC
	0
Dest	F4_Current_Part_Count
	0

CTU	
Counter	F4_Count
Preset	0
Accum	2

CU DN

5

TOTAL COMPLETED COUNTER

ADD	
Source A	F1_Count.ACC
	2
Source B	F2_Count.ACC
	2
Dest	ADD12
	4

6

ADD	
Source A	ADD12
	4
Source B	F3_Count.ACC
	2
Dest	ADD123
	6

7 PART1.Active

CPT
Dest CURRENT_TOTAL_COUNT 0
Expression PART1.F1_Count.ACC + PART1.F2_Count.ACC + PART1.F3_Count.ACC + PART1.F4_Count.ACC

8 PART2.Active

CPT
Dest CURRENT_TOTAL_COUNT 0
Expression PART2.F1_Count.ACC + PART2.F2_Count.ACC + PART2.F3_Count.ACC + PART2.F4_Count.ACC

9 PART3.Active

CPT
Dest CURRENT_TOTAL_COUNT 0
Expression PART3.F1_Count.ACC + PART3.F2_Count.ACC + PART3.F3_Count.ACC + PART3.F4_Count.ACC

10

ADD
Source A ADD1236
Source B F4_Count.ACC 2
Dest CURRENT_SHIFT.COMPLETED 8

TOTAL PASSED PART COUNTER

11

ADD
Source A F1_PASS.ACC 1
Source B F2_PASS.ACC 1
Dest ADD12PASS 2

12

ADD
Source A ADD12PASS 2
Source B F3_PASS.ACC 1
Dest ADD123PASS 3

13

ADD
Source A ADD123PASS 3
Source B F4_PASS.ACC 2
Dest CURRENT_SHIFT.PASSED 5

WHEN TOTAL TESTED PARTS REACH AT CERTAIN NUMBER, IT WILL SHOW POPUP SCREEN FOR CHANGING THE VALVE AND IF THE SHIFT TIME IS OVER THEN ALSO IT WILL SHOW THE POPUP SCREEN

14 FromHMI_StartPB

CTU
Counter VALVECTR
Preset 0
Accum 10
CU
DN

15

EQU
Source A VALVECTR.ACC 10
Source B 15

TOHMI_CHANGEVALVE

16
TOHMI_CHANGEVALVE
SHIFT_TIMER.DN
MOV
Source 9
Dest TOHMI_SCREENREQ
0

17
EQU
Source A TOHMI_SCREENREQ
0
Source B 9
TON
Timer SCREENREQTMR
Preset 1000
Accum 0
EN
DN

18
SCREENREQTMR.DN
MOV
Source 0
Dest TOHMI_SCREENREQ
0
MOV
Source 0
Dest SCREENREQTMR.ACC
0

19
CHANGED
CLR
Dest VALVECTR.ACC
10

FASTNER 1 FAIL COUNTER

20
FASTEN_F1Complete
GRT
Source A FASTEN_F1Torque
0.0
Source B FromHMI_F1UppLim
95.0
LES
Source A FASTEN_F1Torque
0.0
Source B FromHMI_F1LowLim
50.0
FASTEN_F1TorqueFail
CTU
Counter F1_FAIL
Preset 0
Accum 1
CU
DN

FASTNER 2 FAIL COUNTER

21
FASTEN_F2Complete
GRT
Source A FASTEN_F2Torque
0.0
Source B FromHMI_F2UppLim
85.0
LES
Source A FASTEN_F2Torque
0.0
Source B FromHMI_F2LowLim
65.0
FASTEN_F2TorqueFail
CTU
Counter F2_FAIL
Preset 0
Accum 1
CU
DN

22 FASTNER 3 FAIL COUNTER

FASTEN_F3Complete

GRT
Source A FASTEN_F3Torque 0.0
Source B FromHMI_F3UppLim 85.0

LES
Source A FASTEN_F3Torque 0.0
Source B FromHMI_F3LowLim 60.0

FASTEN_F3TorqueFail

CTU
Counter F3_FAIL
Preset 0
Accum 1
CU
DN

23 FASTNER 4 FAIL COUNTER

FASTEN_F4Complete

GRT
Source A FASTEN_F4Torque 0.0
Source B FromHMI_F4UppLim 95.0

LES
Source A FASTEN_F4Torque 0.0
Source B FromHMI_F4LowLim 66.0

FASTEN_F4TorqueFail

CTU
Counter F4_FAIL
Preset 0
Accum 0
CU
DN

24 TOTAL FAIL COUNTER

ADD
Source A F1_FAIL.ACC 1
Source B F2_FAIL.ACC 1
Dest ADD12FAIL 2

25

ADD
Source A ADD12FAIL 2
Source B F3_FAIL.ACC 1
Dest ADD123FAIL 3

26

ADD
Source A ADD123FAIL 3
Source B F4_FAIL.ACC 0
Dest CURRENT_SHIFT.FAILED 3

27 EFFICIENCY COUNTER FOR THE CURRENT SHIFT

CPT
Dest CURRENT_SHIFT.EFFICIENT 62.5
Expression (CURRENT_SHIFT.PASSED) / (CURRENT_SHIFT.COMPLETED)*100

IT WILL RESET ALL THE STATS

28 RESET_STATS

F1_Count (RES)
F2_Count (RES)
F3_Count (RES)
F4_Count (RES)
F1_PASS (RES)
F2_PASS (RES)
F3_PASS (RES)
F4_PASS (RES)
F1_FAIL (RES)
F2_FAIL (RES)
F3_FAIL (RES)
F4_FAIL (RES)

ONE HOUR SHIFT

29 ONEHR

MOV
Source 120000
Dest SHIFT_TIMER.PRE
120000

TWO HOUR SHIFT

30 TWOHR

MOV
Source 240000
Dest SHIFT_TIMER.PRE
120000

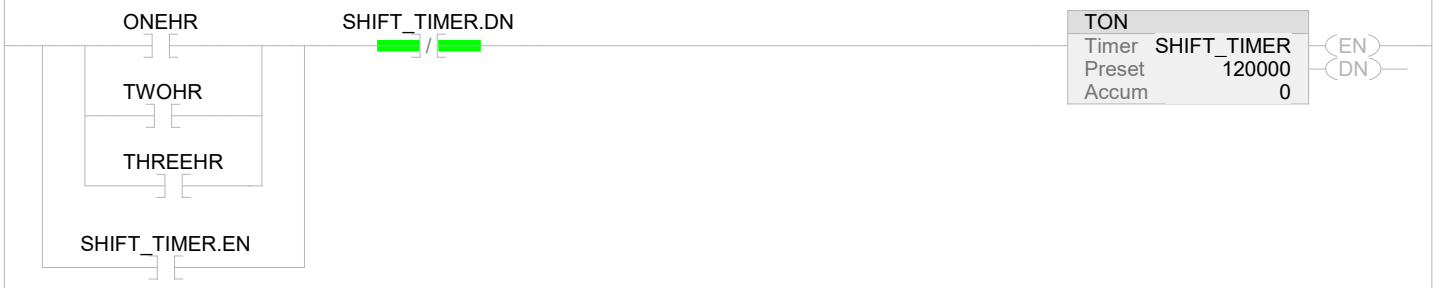
THREE HOUR SHIFT

31 THREEHR

MOV
Source 360000
Dest SHIFT_TIMER.PRE
120000

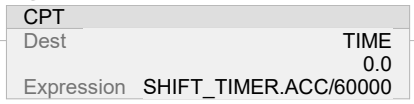
SHIFT TIMER

32



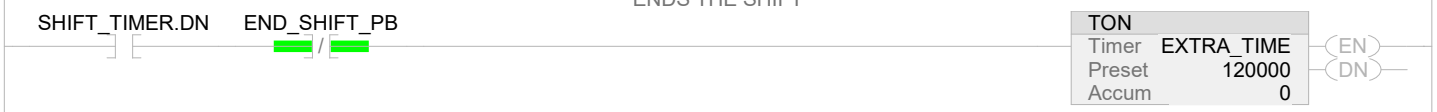
I HAVE CONVERTED MILISECONDS INTO MINUTES TO SHOW ON HMI

33

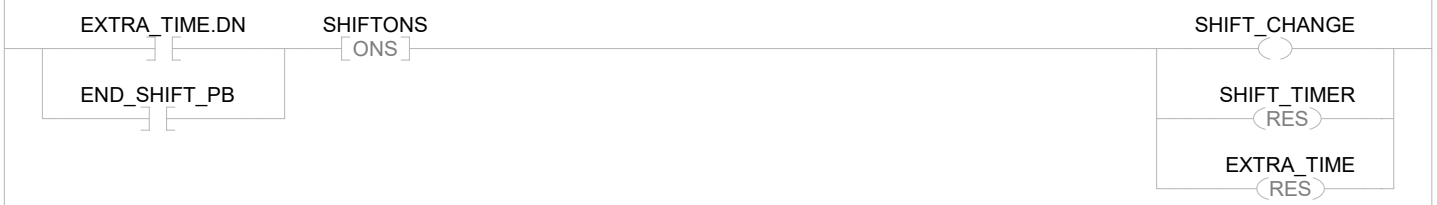


EXTRA TIME, AFTER THE SHIFT ENDS IF NO ONE PRESSES THE END SHIFT PB, THEN AFTER CERTAIN TIME, IT WILL AUTOMATICALLY ENDS THE SHIFT

34



35



5 PAST SHIFT DATA , IT IS CONTINUOUS SO WE CAN CHECK THE HISTORY FOR LAST 5 SHIFTS

36

SHIFT_CHANGE DATASHIFT ONS

COP		COP	
Source	SHIFTHISTORY[3].COMPLETED	Source	SHIFTHISTORY[3].PASSED
Dest	SHIFTHISTORY[4].COMPLETED	Dest	SHIFTHISTORY[4].PASSED
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[3].FAILED	Source	SHIFTHISTORY[3].EFFICIENT
Dest	SHIFTHISTORY[4].FAILED	Dest	SHIFTHISTORY[4].EFFICIENT
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[2].COMPLETED	Source	SHIFTHISTORY[2].PASSED
Dest	SHIFTHISTORY[3].COMPLETED	Dest	SHIFTHISTORY[3].PASSED
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[2].FAILED	Source	SHIFTHISTORY[2].EFFICIENT
Dest	SHIFTHISTORY[3].FAILED	Dest	SHIFTHISTORY[3].EFFICIENT
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[1].COMPLETED	Source	SHIFTHISTORY[1].PASSED
Dest	SHIFTHISTORY[2].COMPLETED	Dest	SHIFTHISTORY[2].PASSED
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[1].FAILED	Source	SHIFTHISTORY[1].EFFICIENT
Dest	SHIFTHISTORY[2].FAILED	Dest	SHIFTHISTORY[2].EFFICIENT
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[0].COMPLETED	Source	SHIFTHISTORY[0].PASSED
Dest	SHIFTHISTORY[1].COMPLETED	Dest	SHIFTHISTORY[1].PASSED
Length	1	Length	1

COP		COP	
Source	SHIFTHISTORY[0].FAILED	Source	SHIFTHISTORY[0].EFFICIENT
Dest	SHIFTHISTORY[1].FAILED	Dest	SHIFTHISTORY[1].EFFICIENT
Length	1	Length	1

COP		COP	
Source	CURRENT_SHIFT.COMPLETED	Source	CURRENT_SHIFT.PASSED
Dest	SHIFTHISTORY[0].COMPLETED	Dest	SHIFTHISTORY[0].PASSED
Length	1	Length	1

COP		COP	
Source	CURRENT_SHIFT.FAILED	Source	CURRENT_SHIFT.EFFICIENT
Dest	SHIFTHISTORY[0].FAILED	Dest	SHIFTHISTORY[0].EFFICIENT
Length	1	Length	1

RESET_STATS

Last 5 part torque

37 FASTEN_AllComplete ONS_TH ONS

COP		COP	
Source	F1_Torque_History[3]	Source	F2_Torque_History[3]
Dest	F1_Torque_History[4]	Dest	F2_Torque_History[4]
Length	1	Length	1

COP		COP	
Source	F3_Torque_History[3]	Source	F4_Torque_History[3]
Dest	F3_Torque_History[4]	Dest	F4_Torque_History[4]
Length	1	Length	1

COP		COP	
Source	F1_Torque_History[2]	Source	F2_Torque_History[2]
Dest	F1_Torque_History[3]	Dest	F2_Torque_History[3]
Length	1	Length	1

COP		COP	
Source	F3_Torque_History[2]	Source	F4_Torque_History[2]
Dest	F3_Torque_History[3]	Dest	F4_Torque_History[3]
Length	1	Length	1

COP		COP	
Source	F1_Torque_History[1]	Source	F2_Torque_History[1]
Dest	F1_Torque_History[2]	Dest	F2_Torque_History[2]
Length	1	Length	1

COP		COP	
Source	F3_Torque_History[1]	Source	F4_Torque_History[1]
Dest	F3_Torque_History[2]	Dest	F4_Torque_History[2]
Length	1	Length	1

COP		COP	
Source	F1_Torque_History[0]	Source	F2_Torque_History[0]
Dest	F1_Torque_History[1]	Dest	F2_Torque_History[1]
Length	1	Length	1

COP		COP	
Source	F3_Torque_History[0]	Source	F4_Torque_History[0]
Dest	F3_Torque_History[1]	Dest	F4_Torque_History[1]
Length	1	Length	1

COP		COP	
Source	FASTEN_F1Torque	Source	FASTEN_F2Torque
Dest	F1_Torque_History[0]	Dest	F2_Torque_History[0]
Length	1	Length	1

COP		COP	
Source	FASTEN_F3Torque	Source	FASTEN_F4Torque
Dest	F3_Torque_History[0]	Dest	F4_Torque_History[0]
Length	1	Length	1

38

CPT
Dest F1_AVERAGE 44.42104
Expression (F1_Torque_History[0] + F1_Torque_History[1] + F1_Torque_History[2] + F1_Torque_History[3] + F1_Torque_History[4]) / 5

CPT
Dest F2_AVERAGE 44.143196
Expression (F2_Torque_History[0] + F2_Torque_History[1] + F2_Torque_History[2] + F2_Torque_History[3] + F2_Torque_History[4]) / 5

CPT
Dest F3_AVERAGE 44.513844
Expression (F3_Torque_History[0] + F3_Torque_History[1] + F3_Torque_History[2] + F3_Torque_History[3] + F3_Torque_History[4]) / 5

CPT
Dest F4_AVERAGE 46.54192
Expression (F4_Torque_History[0] + F4_Torque_History[1] + F4_Torque_History[2] + F4_Torque_History[3] + F4_Torque_History[4]) / 5

39

ToRbt_Fasten1Start FASTEN_F1Complete /
Cycle_Time_Calc.EN

RTO
Timer Cycle_Time_Calc
Preset 9999999
Accum 0
EN
DN

40

ToRbt_Fasten2Start FASTEN_F2Complete /
F2_TMR.EN

RTO
Timer F2_TMR
Preset 9999999
Accum 0
EN
DN

41

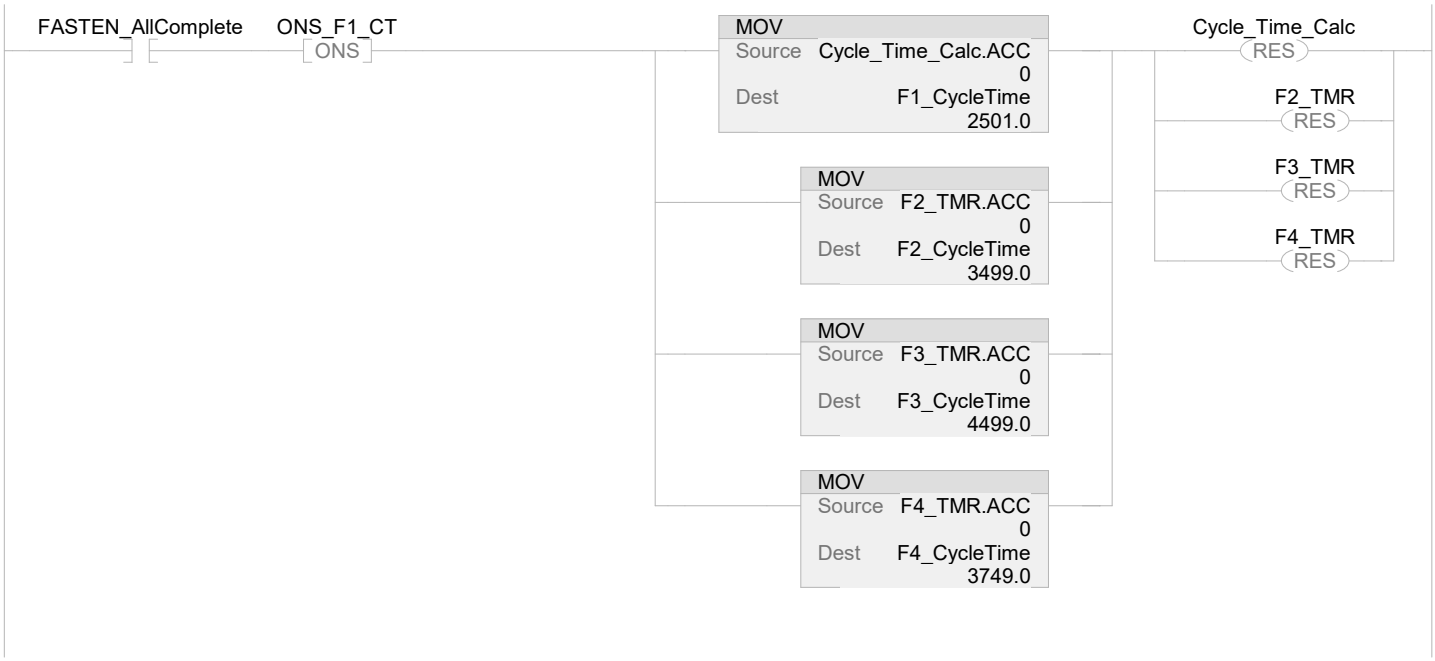
ToRbt_Fasten3Start FASTEN_F3Complete /
F3_TMR.EN

RTO
Timer F3_TMR
Preset 9999999
Accum 0
EN
DN

42

ToRbt_Fasten4Start FASTEN_F4Complete /
F4_TMR.EN

RTO
Timer F4_TMR
Preset 9999999
Accum 0
EN
DN


43
FASTEN_AllComplete
ONS_F1_CT
ONS
MOV
Source Cycle_Time_Calc.ACC
0
Dest F1_CycleTime
2501.0
MOV
Source F2_TMR.ACC
0
Dest F2_CycleTime
3499.0
MOV
Source F3_TMR.ACC
0
Dest F3_CycleTime
4499.0
MOV
Source F4_TMR.ACC
0
Dest F4_CycleTime
3749.0
Cycle_Time_Calc
RES
F2_TMR
RES
F3_TMR
RES
F4_TMR
RES

Last 5 part torque

44 FASTEN_AllComplete ONS_CTH ONS

COP		COP	
Source	F1_CT_History[3]	Source	F2_CT_History[3]
Dest	F1_CT_History[4]	Dest	F2_CT_History[4]
Length	1	Length	1
COP		COP	
Source	F3_CT_History[3]	Source	F4_CT_History[3]
Dest	F3_CT_History[4]	Dest	F4_CT_History[4]
Length	1	Length	1
COP		COP	
Source	F1_CT_History[2]	Source	F2_CT_History[2]
Dest	F1_CT_History[3]	Dest	F2_CT_History[3]
Length	1	Length	1
COP		COP	
Source	F3_CT_History[2]	Source	F4_CT_History[2]
Dest	F3_CT_History[3]	Dest	F4_CT_History[3]
Length	1	Length	1
COP		COP	
Source	F1_CT_History[1]	Source	F2_CT_History[1]
Dest	F1_CT_History[2]	Dest	F2_CT_History[2]
Length	1	Length	1
COP		COP	
Source	F3_CT_History[1]	Source	F4_CT_History[1]
Dest	F3_CT_History[2]	Dest	F4_CT_History[2]
Length	1	Length	1
COP		COP	
Source	F1_CT_History[0]	Source	F2_CT_History[0]
Dest	F1_CT_History[1]	Dest	F2_CT_History[1]
Length	1	Length	1
COP		COP	
Source	F3_CT_History[0]	Source	F4_CT_History[0]
Dest	F3_CT_History[1]	Dest	F4_CT_History[1]
Length	1	Length	1
COP		COP	
Source	F1_CycleTime	Source	F2_CycleTime
Dest	F1_CT_History[0]	Dest	F2_CT_History[0]
Length	1	Length	1
COP		COP	
Source	F3_CycleTime	Source	F4_CycleTime
Dest	F3_CT_History[0]	Dest	F4_CT_History[0]
Length	1	Length	1

45

CPT
Dest F1_CT_AVERAGE 1000.2
Expression (F1_CT_History[0] + F1_CT_History[1] + F1_CT_History[2] + F1_CT_History[3] + F1_CT_History[4]) / 5

CPT
Dest F2_CT_AVERAGE 3399.4
Expression (F2_CT_History[0] + F2_CT_History[1] + F2_CT_History[2] + F2_CT_History[3] + F2_CT_History[4]) / 5

CPT
Dest F3_CT_AVERAGE 3799.8
Expression (F3_CT_History[0] + F3_CT_History[1] + F3_CT_History[2] + F3_CT_History[3] + F3_CT_History[4]) / 5

CPT
Dest F4_CT_AVERAGE 3499.6
Expression (F4_CT_History[0] + F4_CT_History[1] + F4_CT_History[2] + F4_CT_History[3] + F4_CT_History[4]) / 5

46

EQU
Source A Part_Number 3
Source B 1

Load_PB

CO
Sou
Des
Len

MOV
Source FromHMI_F1LowLim 50.0
Dest PART1.F1_LL 75.0

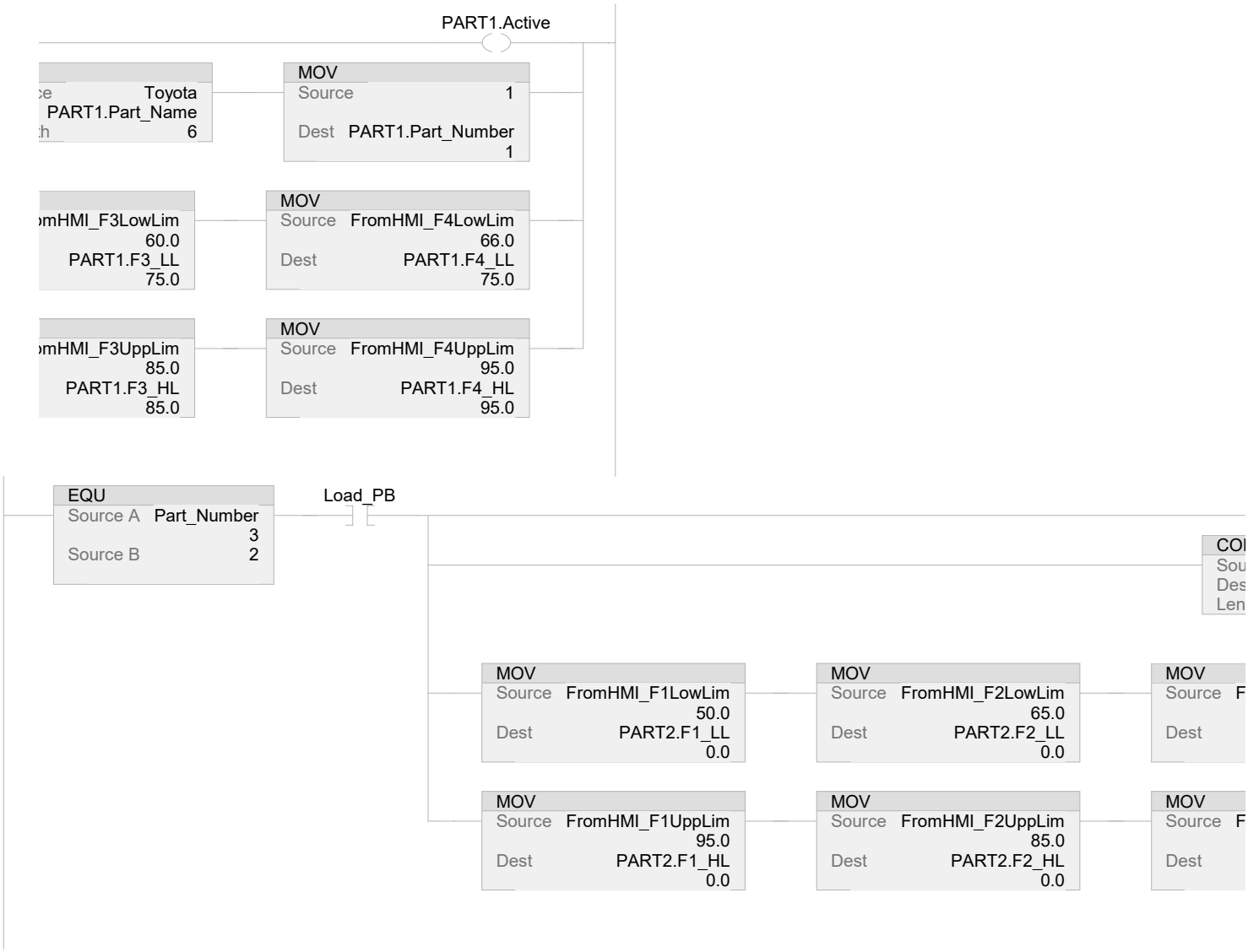
MOV
Source FromHMI_F2LowLim 65.0
Dest PART1.F2_LL 75.0

MOV
Source F
Dest

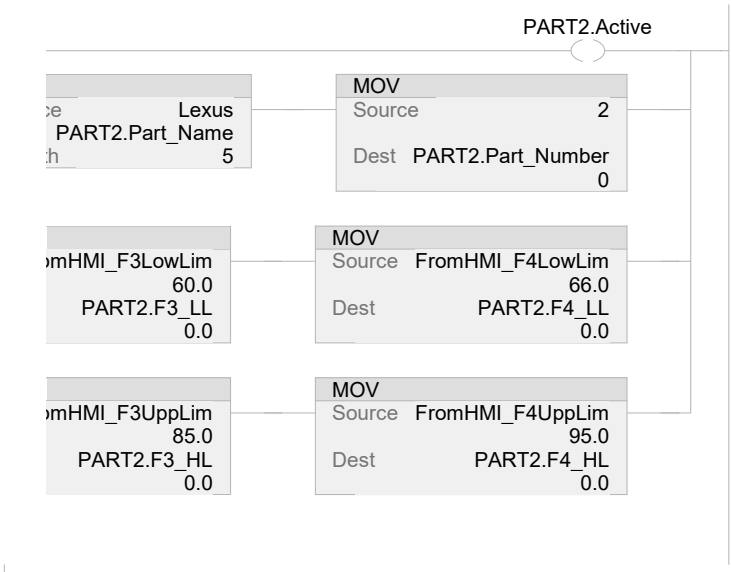
MOV
Source FromHMI_F1UppLim 95.0
Dest PART1.F1_HL 95.0

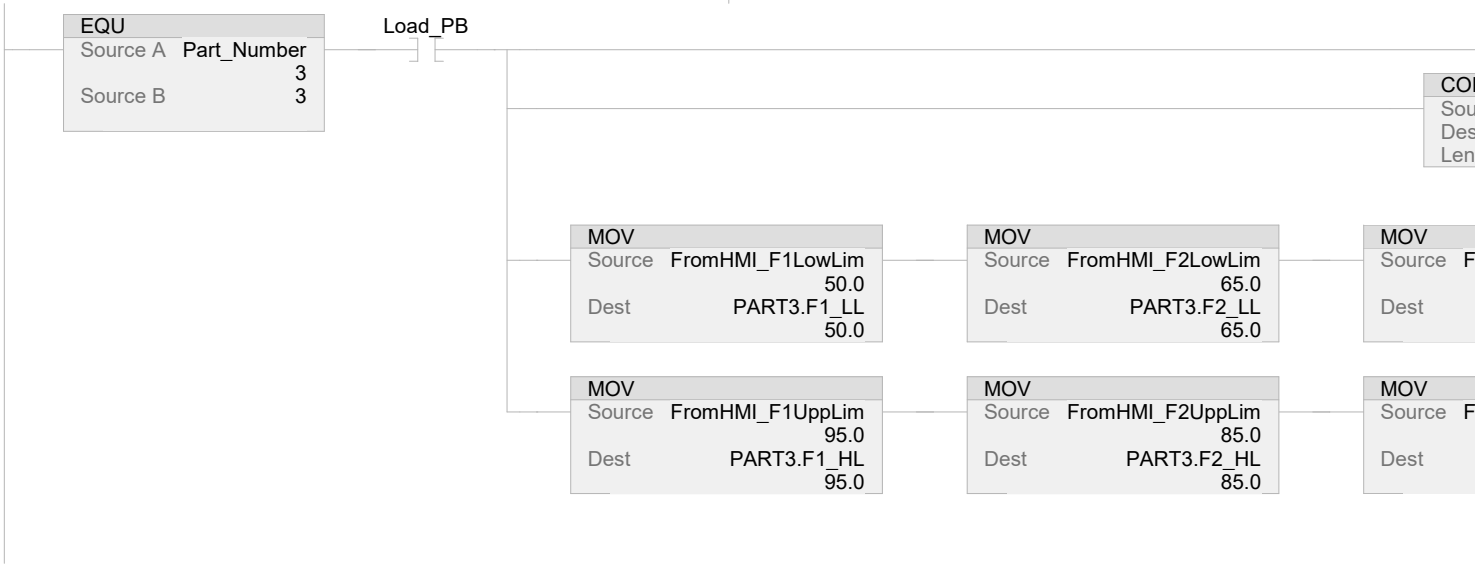
MOV
Source FromHMI_F2UppLim 85.0
Dest PART1.F2_HL 85.0

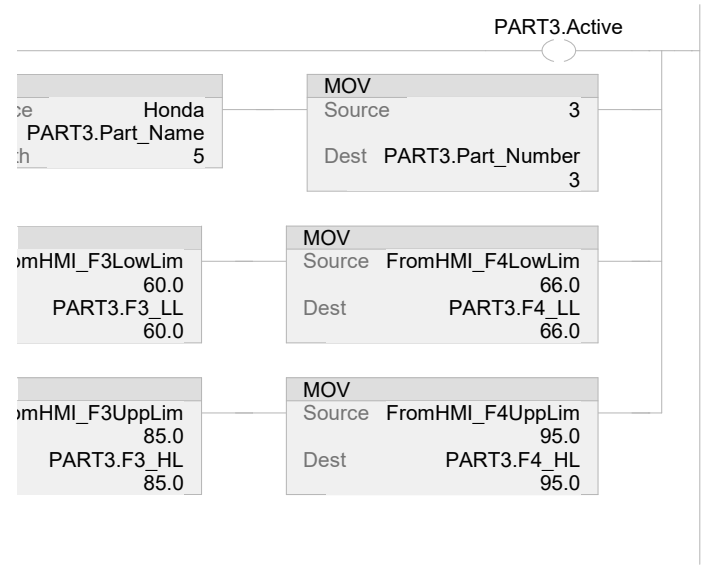
MOV
Source F
Dest


PART1.Active
ce Toyota
PART1.Part_Name
:h 6
MOV
Source 1
Dest PART1.Part_Number
1
mHMI_F3LowLim
60.0
PART1.F3_LL
75.0
MOV
Source FromHMI_F4LowLim
66.0
Dest PART1.F4_LL
75.0
mHMI_F3UppLim
85.0
PART1.F3_HL
85.0
MOV
Source FromHMI_F4UppLim
95.0
Dest PART1.F4_HL
95.0

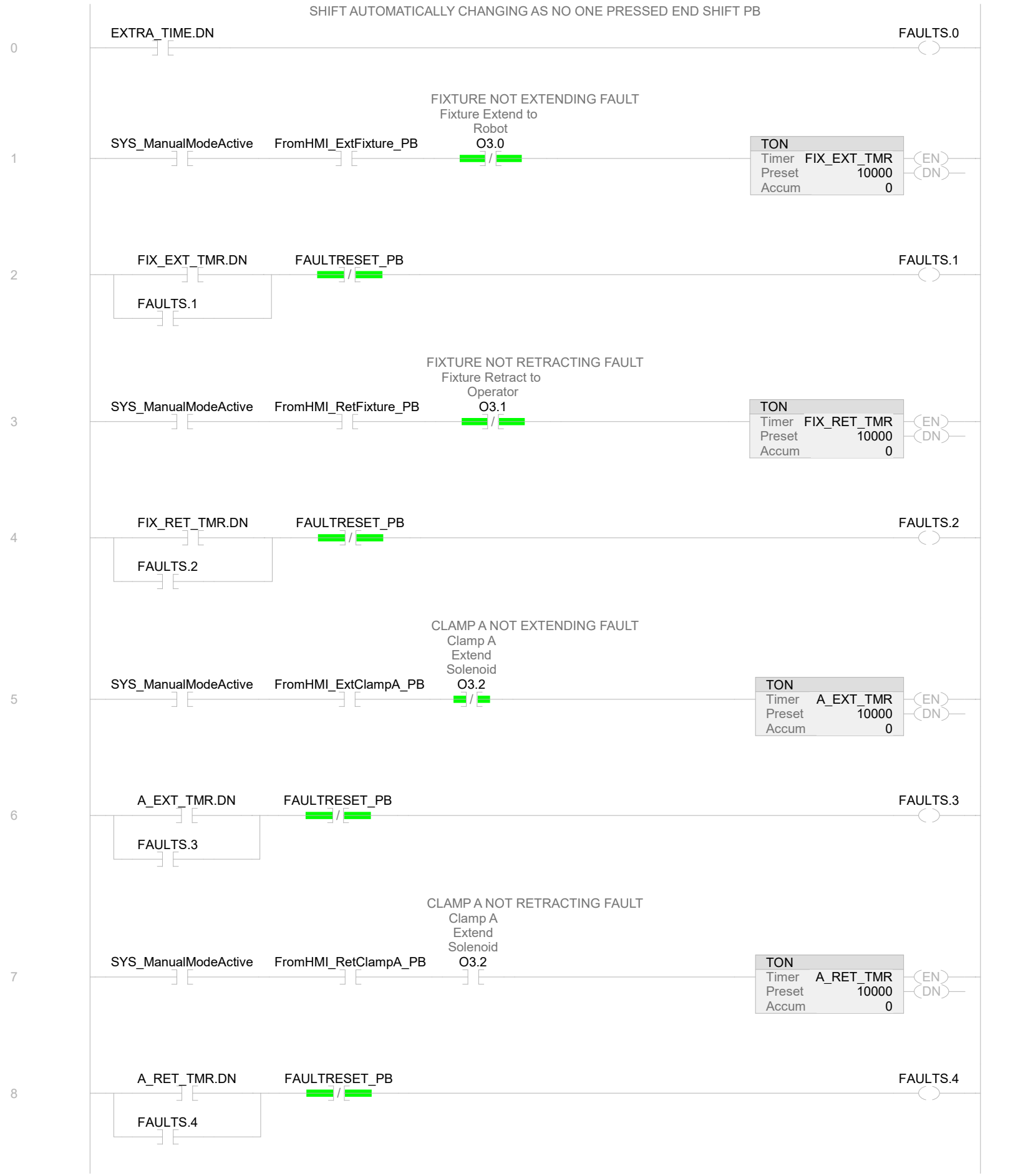
47
EQU
Source A Part_Number
3
Source B 2
Load_PB
CO
Sou
Des
Len
MOV
Source FromHMI_F1LowLim
50.0
Dest PART2.F1_LL
0.0
MOV
Source FromHMI_F2LowLim
65.0
Dest PART2.F2_LL
0.0
MOV
Source F
Dest
MOV
Source FromHMI_F1UppLim
95.0
Dest PART2.F1_HL
0.0
MOV
Source FromHMI_F2UppLim
85.0
Dest PART2.F2_HL
0.0
MOV
Source F
Dest

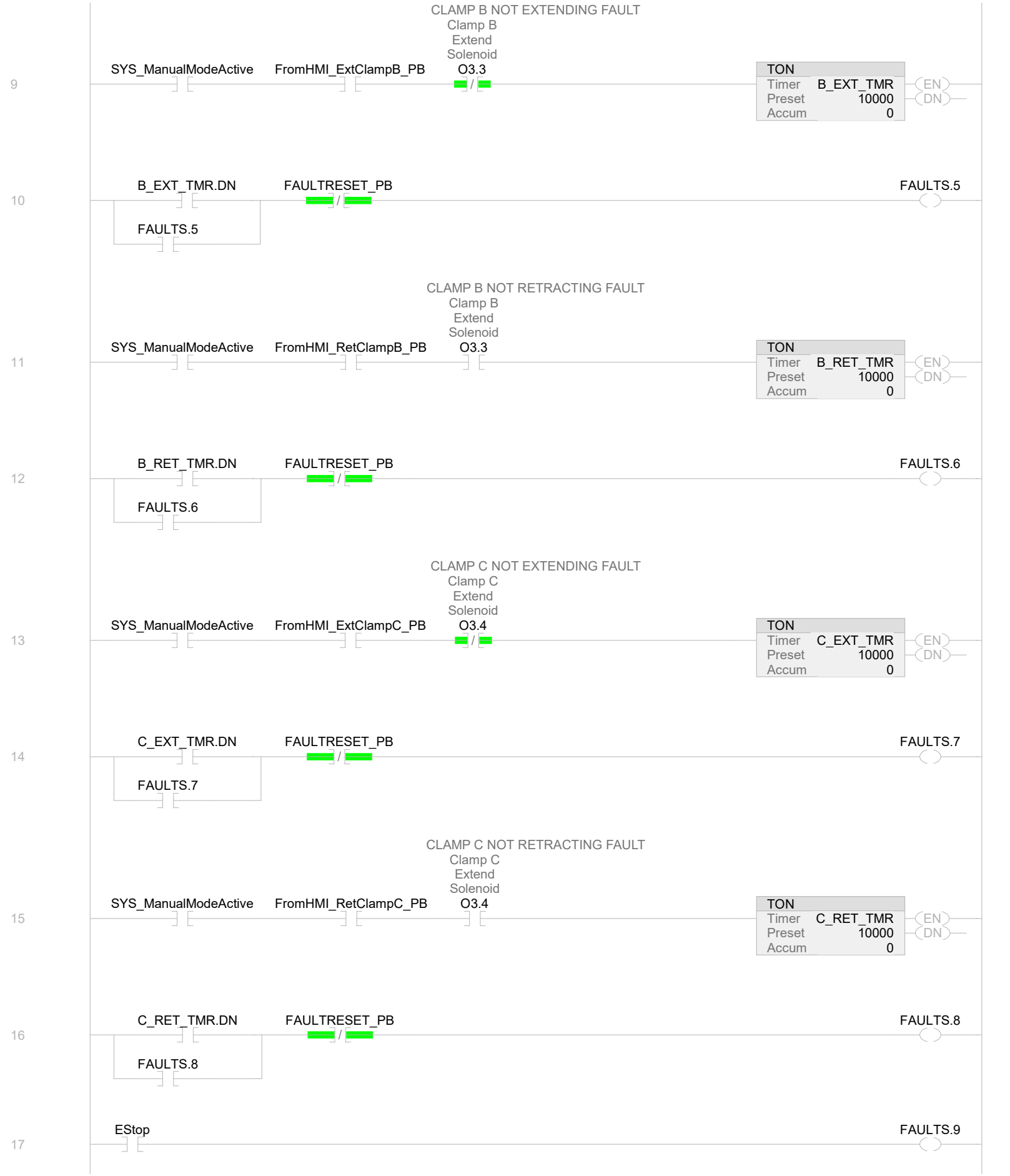

PART2.Active
Lexus
PART2.Part_Name
5
MOV
Source 2
Dest PART2.Part_Number
0
mHMI_F3LowLim
60.0
PART2.F3_LL
0.0
MOV
Source FromHMI_F4LowLim
66.0
Dest PART2.F4_LL
0.0
mHMI_F3UppLim
85.0
PART2.F3_HL
0.0
MOV
Source FromHMI_F4UppLim
95.0
Dest PART2.F4_HL
0.0


48
EQU
Source A Part_Number
3
Source B 3
Load_PB
MOV
Source FromHMI_F1LowLim
50.0
Dest PART3.F1_LL
50.0
MOV
Source FromHMI_F2LowLim
65.0
Dest PART3.F2_LL
65.0
MOV
Source FromHMI_F1UppLim
95.0
Dest PART3.F1_HL
95.0
MOV
Source FromHMI_F2UppLim
85.0
Dest PART3.F2_HL
85.0

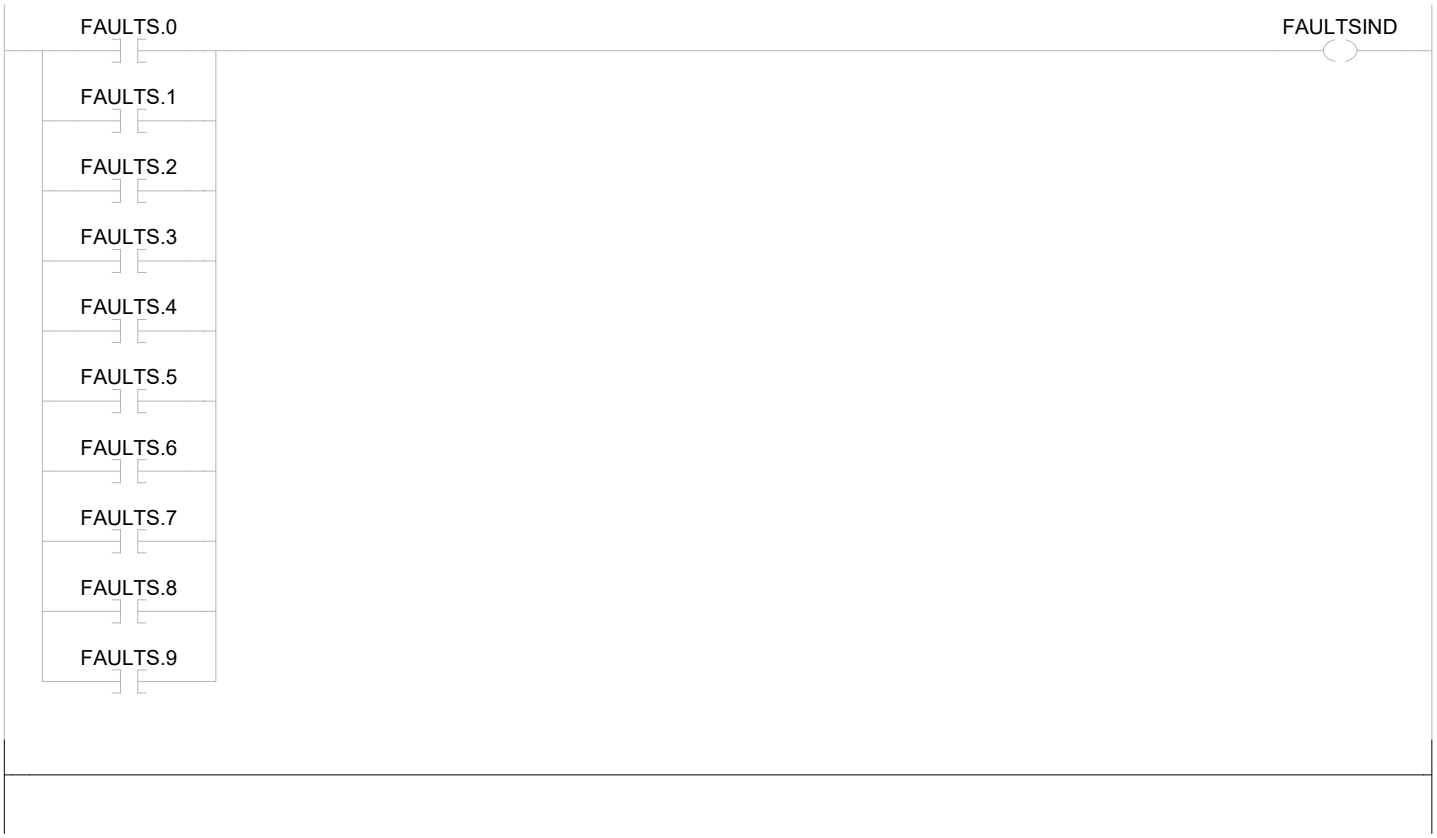

PART3.Active
ce Honda
PART3.Part_Name
:h 5
MOV
Source 3
Dest PART3.Part_Number
3
mHMI_F3LowLim
60.0
PART3.F3_LL
60.0
MOV
Source FromHMI_F4LowLim
66.0
Dest PART3.F4_LL
66.0
mHMI_F3UppLim
85.0
PART3.F3_HL
85.0
MOV
Source FromHMI_F4UppLim
95.0
Dest PART3.F4_HL
95.0

(End)

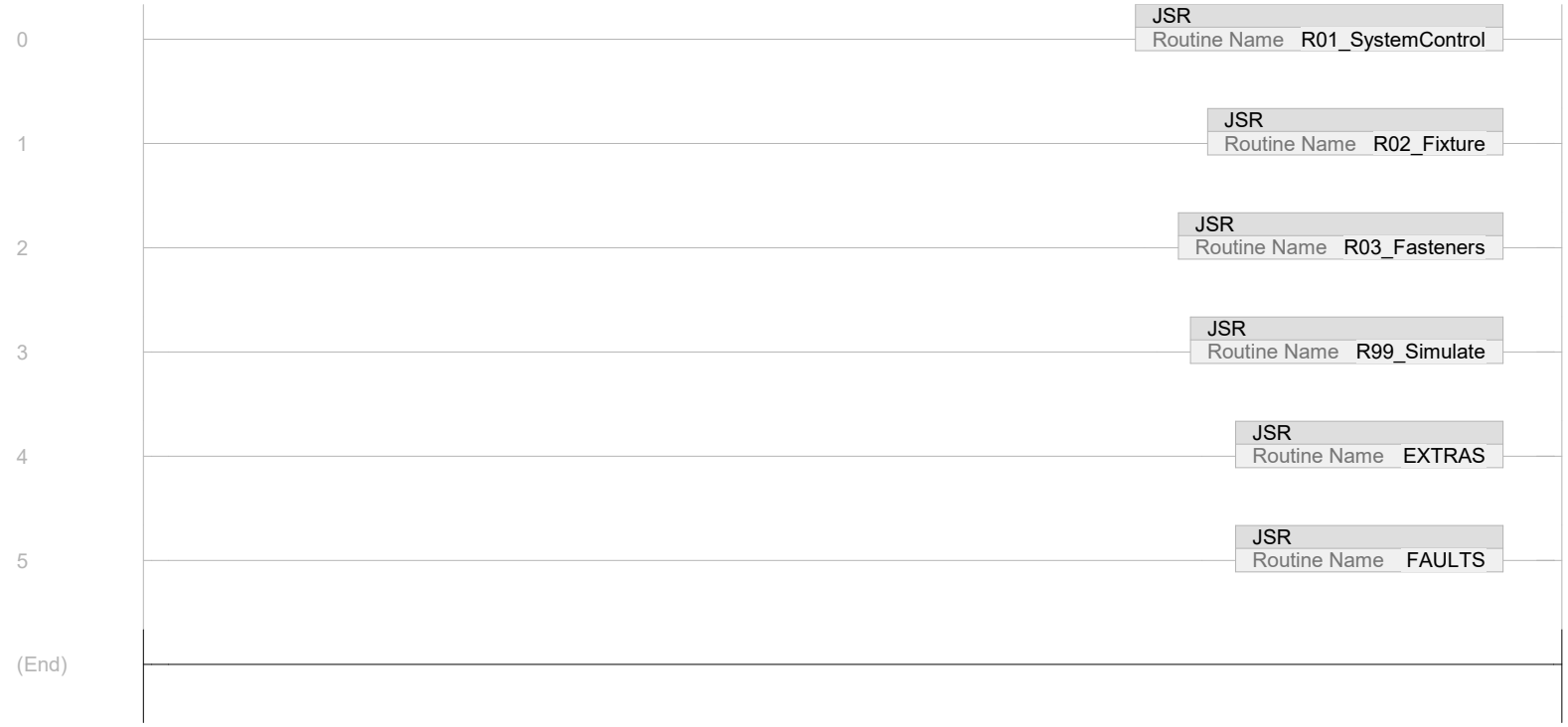

SHIFT AUTOMATICALLY CHANGING AS NO ONE PRESSED END SHIFT PB
EXTRA_TIME.DN
FAULTS.0
FIXTURE NOT EXTENDING FAULT
Fixture Extend to Robot
SYS_ManualModeActive
FromHMI_ExtFixture_PB
O3.0
TON
Timer FIX_EXT_TMR
Preset 10000
Accum 0
EN
DN
FIX_EXT_TMR.DN
FAULTRESET_PB
FAULTS.1
FAULTS.1
FIXTURE NOT RETRACTING FAULT
Fixture Retract to Operator
SYS_ManualModeActive
FromHMI_RetFixture_PB
O3.1
TON
Timer FIX_RET_TMR
Preset 10000
Accum 0
EN
DN
FIX_RET_TMR.DN
FAULTRESET_PB
FAULTS.2
FAULTS.2
CLAMP A NOT EXTENDING FAULT
Clamp A Extend Solenoid
SYS_ManualModeActive
FromHMI_ExtClampA_PB
O3.2
TON
Timer A_EXT_TMR
Preset 10000
Accum 0
EN
DN
A_EXT_TMR.DN
FAULTRESET_PB
FAULTS.3
FAULTS.3
CLAMP A NOT RETRACTING FAULT
Clamp A Extend Solenoid
SYS_ManualModeActive
FromHMI_RetClampA_PB
O3.2
TON
Timer A_RET_TMR
Preset 10000
Accum 0
EN
DN
A_RET_TMR.DN
FAULTRESET_PB
FAULTS.4
FAULTS.4


CLAMP B NOT EXTENDING FAULT
Clamp B Extend Solenoid
9
SYS_ManualModeActive
FromHMI_ExtClampB_PB
O3.3
TON
Timer B_EXT_TMR
Preset 10000
Accum 0
EN
DN
10
B_EXT_TMR.DN
FAULTS.5
FAULTRESET_PB
FAULTS.5
CLAMP B NOT RETRACTING FAULT
Clamp B Extend Solenoid
11
SYS_ManualModeActive
FromHMI_RetClampB_PB
O3.3
TON
Timer B_RET_TMR
Preset 10000
Accum 0
12
B_RET_TMR.DN
FAULTS.6
FAULTRESET_PB
FAULTS.6
CLAMP C NOT EXTENDING FAULT
Clamp C Extend Solenoid
13
SYS_ManualModeActive
FromHMI_ExtClampC_PB
O3.4
TON
Timer C_EXT_TMR
Preset 10000
Accum 0
14
C_EXT_TMR.DN
FAULTS.7
FAULTRESET_PB
FAULTS.7
CLAMP C NOT RETRACTING FAULT
Clamp C Extend Solenoid
15
SYS_ManualModeActive
FromHMI_RetClampC_PB
O3.4
TON
Timer C_RET_TMR
Preset 10000
Accum 0
16
C_RET_TMR.DN
FAULTS.8
FAULTRESET_PB
FAULTS.8
17
EStop
FAULTS.9

18


FAULTS.0
FAULTSIND
FAULTS.1
FAULTS.2
FAULTS.3
FAULTS.4
FAULTS.5
FAULTS.6
FAULTS.7
FAULTS.8
FAULTS.9

(End)


0
JSR
Routine Name R01_SystemControl
1
JSR
Routine Name R02_Fixture
2
JSR
Routine Name R03_Fasteners
3
JSR
Routine Name R99_Simulate
4
JSR
Routine Name EXTRAS
5
JSR
Routine Name FAULTS
(End)

Anti-Tiedown Timer for the Start PB
Ensures the start PB is not held for repeated cycles

0

FromHMI_StartPB

TON		
Timer	SYS_StartPBPulseTmr	EN
Preset	200	DN
Accum	0	

Enable the Cycle when the operator first presses the Start PB on the HMI as long as the system is in Auto Mode, the Fixture is in the Home position, all parts are present and the Fasteners have not all been completed. The cycle will stop if the light curtain is impeded at any time.

1

SYS_AutoModeActive
SYS_StartPBPulseTmr.TT
Light Curtain Safety Circuit
I1.14
FromHMI_StopPB
SYS_CycleActive
FASTEN_AllComplete
FIXTURE_AtHomePos
SYS_CycleActive

(End)

Fixture is at HOME Position when it is retracted by the operator, the clamps are all retracted and the robot is clear of the fixture.

0

FromRbt_ClearOfFixture | Clamp A Retracted Limit Switch I1.2 | Clamp B Retracted Limit Switch I1.3 | Clamp C Retracted Limit Switch I1.4 | Fixture at Operator Limit Switch I1.1 | FIXTURE_AtHomePos

All parts are present when all four sensors detect parts.

1

Part Present A Sensor I1.8 | Part Present B Sensor I1.9 | Part Present C Sensor I1.10 | Part Present D Sensor I1.11 | FIXTURE_AllPartsPresent

The fixture is empty when all sensors are off.

2

Part Present A Sensor I1.8 | Part Present B Sensor I1.9 | Part Present C Sensor I1.10 | Part Present D Sensor I1.11 | FIXTURE_Empty

Activate Parts Secured 0.5 seconds after all the clamps are no longer retracted. This allows for the clamps to travel to the clamped position.

3

FIXTURE_AllPartsPresent | Clamp C Retracted Limit Switch I1.4 | Clamp B Retracted Limit Switch I1.3 | Clamp A Retracted Limit Switch I1.2

TON
Timer FIXTURE_PartsSecuredTmr
Preset 500
Accum 0
EN
DN

FIXTURE_PartsSecuredTmr.DN | FIXTURE_PartsSecured

Extend the Fixture to the Robot once the parts are secured as long as the Fasteners are not complete and the robot is clear of the fixture.

4

SYS_CycleActive | FIXTURE_PartsSecured | FASTEN_AllComplete | FromRbt_ClearOfFixture | Fixture Extend to Robot O3.0

SYS_ManualModeActive | FromHMI_ExtFixture_PB | Fixture Extend to Robot O3.0 | FromHMI_RetFixture_PB | HomePB

Retract the Fixture to the Operator once Fasteners installation is complete and the robot is clear of the fixture.

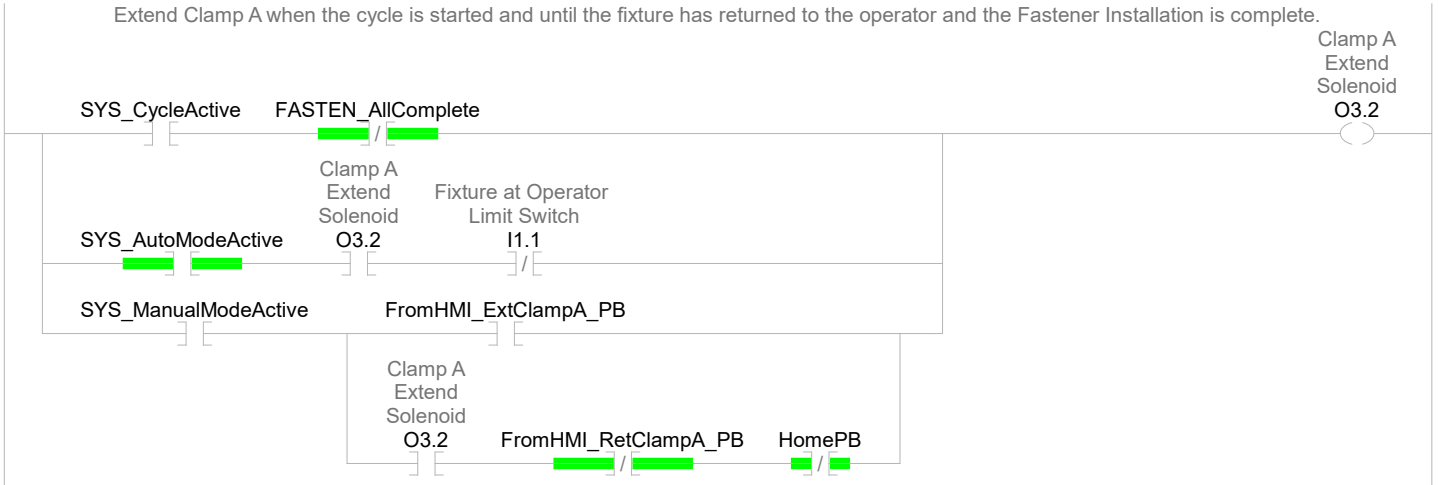
5

SYS_CycleActive | FASTEN_AllComplete | FromRbt_ClearOfFixture | Fixture Retract to Operator O3.1

SYS_ManualModeActive | FromHMI_RetFixture_PB | HomePB | Fixture Retract to Operator O3.1 | FromHMI_ExtFixture_PB

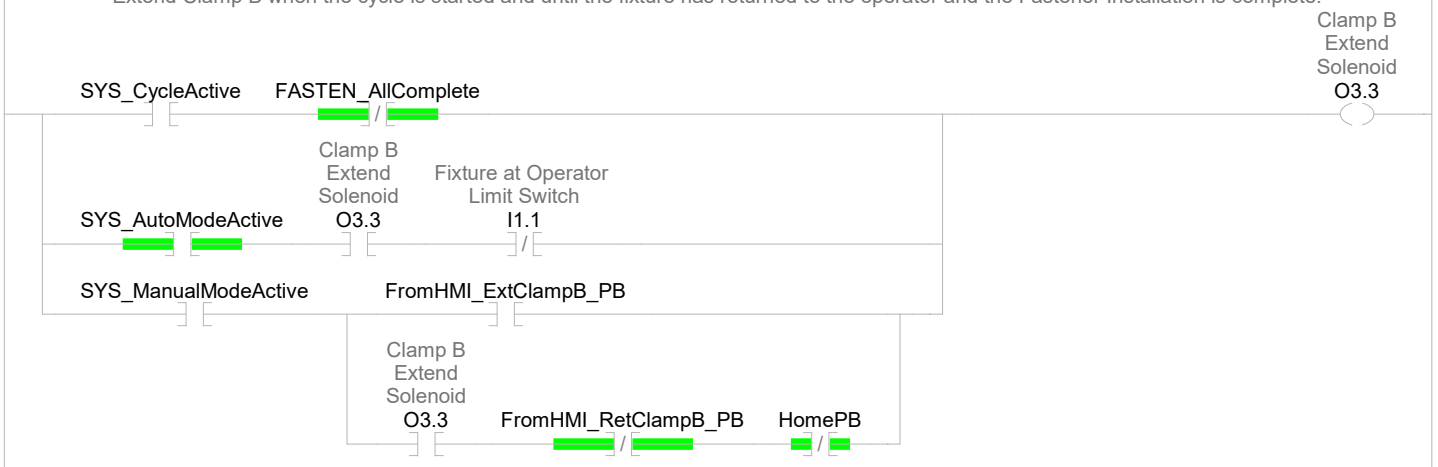
Extend Clamp A when the cycle is started and until the fixture has returned to the operator and the Fastener Installation is complete.

6



Extend Clamp B when the cycle is started and until the fixture has returned to the operator and the Fastener Installation is complete.

7



Extend Clamp C when the cycle is started and until the fixture has returned to the operator and the Fastener Installation is complete.

8

(End)

Convert the 4-20mA analog signal into Torque ranging from 20-120Nm.

0

CPT
Dest FASTEN_TorqueFeedback 20.050001
Expression (I2_CHA-4)/16*80+20

All Fastener Installations Complete

1

SYS_CycleActive FASTEN_F1Complete FASTEN_F2Complete FASTEN_F3Complete FASTEN_F4Complete FASTEN_AllComplete

All Fastener Installations have Acceptable Torques

2

FASTEN_F1TorquePass FASTEN_F2TorquePass FASTEN_F3TorquePass FASTEN_F4TorquePass FASTEN_AllTorquesPass

All Fastener Installations have Acceptable Torques

3

FASTEN_F1TorqueFail FASTEN_F2TorqueFail FASTEN_F3TorqueFail FASTEN_F4TorqueFail FASTEN_AllTorquesFail

Clear the Torque values when the part is removed from the station.

4

FIXTURE_Empty

CLR
Dest FASTEN_F1Torque 0.0

CLR
Dest FASTEN_F2Torque 0.0

CLR
Dest FASTEN_F3Torque 0.0

CLR
Dest FASTEN_F4Torque 0.0

Fastener Operation #1

Trigger the robot to start once the Fixture is at the Robot and the Parts are secured.

Fixture at Robot
Limit Switch

5

SYS_CycleActive FIXTURE_PartsSecured I1.0 FASTEN_F1Complete / ToRbt_Fasten1Start

6

FromRbt_Fasten1Complete FASTEN_F1Complete_ONS ONS

MOV
Source FASTEN_TorqueFeedback 20.050001
Dest FASTEN_F1Torque 0.0

Turn on Fastener complete when the signal from the robot is recieved and keep it on while the parts are present in the fixture.

7

FromRbt_Fasten1Complete FIXTURE_AllPartsPresent FASTEN_F1Complete

FASTEN_F1Complete

Turn on Pass signal if the detected Torque is within the specified limits.

8

FASTEN_F1Complete

LIM
Low Limit FromHMI_F1LowLim 50.0
Test FASTEN_F1Torque 0.0
High Limit FromHMI_F1UppLim 95.0

FASTEN_F1TorquePass

CTU
Counter F1_PASS
Preset 0
Accum 1
CU
DN

Fastener Operation #2

Trigger the robot to start while the Fixture is at the Robot, the Parts are secured and the previous Fasterner has been installed..

9

SYS_CycleActive | FIXTURE_PartsSecured | I1.0 (Fixture at Robot Limit Switch) | FASTEN_F1Complete | FASTEN_F2Complete (/) | ToRbt_Fasten2Start

Find the maximum torque while the second fastener is being installed.

10

FromRbt_Fasten2Complete | FASTEN_F2Complete_ONS (ONS)

MOV
Source: FASTEN_TorqueFeedback 20.050001
Dest: FASTEN_F2Torque 0.0

Turn on Fastener complete when the signal from the robot is recieved and keep it on while the parts are present in the fixture.

11

FromRbt_Fasten2Complete | FIXTURE_AllPartsPresent | FASTEN_F2Complete

FASTEN_F2Complete

Turn on Pass signal if the detected Torque is within the specified limits.

12

LIM
Low Limit: FromHMI_F2LowLim 65.0
Test: FASTEN_F2Torque 0.0
High Limit: FromHMI_F2UppLim 85.0

FASTEN_F2TorquePass

CTU
Counter: F2_PASS
Preset: 0
Accum: 1
CU, DN

Fastener Operation #3

Trigger the robot to start while the Fixture is at the Robot, the Parts are secured and the previous Fasterner has been installed..

13

SYS_CycleActive | FIXTURE_PartsSecured | I1.0 (Fixture at Robot Limit Switch) | FASTEN_F2Complete | FASTEN_F3Complete (/) | ToRbt_Fasten3Start

Find the maximum torque while the third fastener is being installed.

14

FromRbt_Fasten3Complete | FASTEN_F3Complete_ONS (ONS)

MOV
Source: FASTEN_TorqueFeedback 20.050001
Dest: FASTEN_F3Torque 0.0

Turn on Fastener complete when the signal from the robot is recieved and keep it on while the parts are present in the fixture.

15

FromRbt_Fasten3Complete | FIXTURE_AllPartsPresent | FASTEN_F3Complete

FASTEN_F3Complete

Turn on Pass signal if the detected Torque is within the specified limits.

16

LIM
Low Limit: FromHMI_F3LowLim 60.0
Test: FASTEN_F3Torque 0.0
High Limit: FromHMI_F3UppLim 85.0

FASTEN_F3TorquePass

CTU
Counter: F3_PASS
Preset: 0
Accum: 1
CU, DN

Fastener Operation #4

Trigger the robot to start while the Fixture is at the Robot, the Parts are secured and the previous Fasterner has been installed..

17

SYS_CycleActive	FIXTURE_PartsSecured	Fixture at Robot Limit Switch I1.0	FASTEN_F3Complete	FASTEN_F4Complete	ToRbt_Fasten4Start
				/	

Find the maximum torque while the fourth fastener is being installed.

18

FromRbt_Fasten4Complete	FASTEN_F4Complete_ONS
	ONS

MOV

Source	FASTEN_TorqueFeedback 20.050001
Dest	FASTEN_F4Torque 0.0

Turn on Fastener complete when the signal from the robot is recieved and keep it on while the parts are present in the fixture.

19

FromRbt_Fasten4Complete	FIXTURE_AllPartsPresent	FASTEN_F4Complete
FASTEN_F4Complete		

Turn on Pass signal if the detected Torque is within the specified limits.

20

LIM

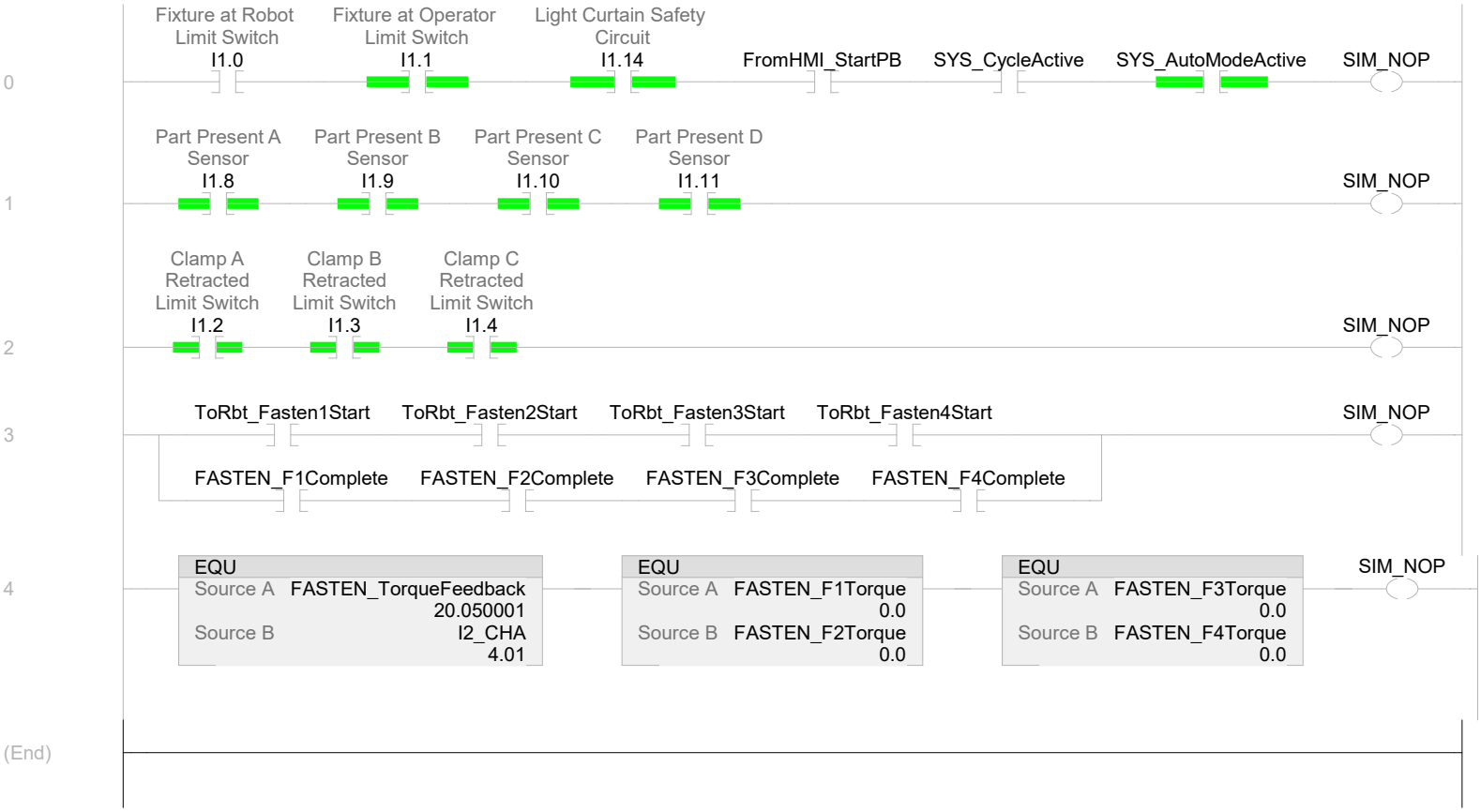
Low Limit	FromHMI_F4LowLim 66.0
Test	FASTEN_F4Torque 0.0
High Limit	FromHMI_F4UppLim 95.0

FASTEN_F4TorquePass

CTU

Counter	F4_PASS	CU
Preset	0	DN
Accum	2	

(End)


Fixture at Robot Limit Switch
I1.0
Fixture at Operator Limit Switch
I1.1
Light Curtain Safety Circuit
I1.14
FromHMI_StartPB
SYS_CycleActive
SYS_AutoModeActive
SIM_NOP
0
Part Present A Sensor
I1.8
Part Present B Sensor
I1.9
Part Present C Sensor
I1.10
Part Present D Sensor
I1.11
SIM_NOP
1
Clamp A Retracted Limit Switch
I1.2
Clamp B Retracted Limit Switch
I1.3
Clamp C Retracted Limit Switch
I1.4
SIM_NOP
2
ToRbt_Fasten1Start
ToRbt_Fasten2Start
ToRbt_Fasten3Start
ToRbt_Fasten4Start
SIM_NOP
3
FASTEN_F1Complete
FASTEN_F2Complete
FASTEN_F3Complete
FASTEN_F4Complete
EQU
Source A FASTEN_TorqueFeedback
20.050001
Source B I2_CHA
4.01
EQU
Source A FASTEN_F1Torque
0.0
Source B FASTEN_F2Torque
0.0
EQU
Source A FASTEN_F3Torque
0.0
Source B FASTEN_F4Torque
0.0
SIM_NOP
4
(End)

Fixture Movement Simulation

0

AOI_SIM_2PosCyl_ExtRet

AOI_SIM_2PosCyl_ExtRe...	SIM_Fixture ...
Animation	0
TravelTime	2000
Extend_Output	O3.0
	0
Retract_Output	O3.1
	0
Extend_Sensor	I1.0
	0
Retract_Sensor	I1.1
	1
MCR	I1.14
	1
SingleSolenoidExtend	0
SingleSolenoidRetract	0

Clamp A Movement Simulation

1

AOI_SIM_2PosCyl_ExtRet

AOI_SIM_2PosCyl_ExtRe...	SIM_ClampA ...
Animation	0
TravelTime	1000
Extend_Output	O3.2
	0
Retract_Output	SIM_NOP
	0
Extend_Sensor	SIM_NOP
	0
Retract_Sensor	I1.2
	1
MCR	1
SingleSolenoidExtend	1
SingleSolenoidRetract	0

Clamp B Movement Simulation

2

AOI_SIM_2PosCyl_ExtRet

AOI_SIM_2PosCyl_ExtRe...	SIM_ClampB ...
Animation	0
TravelTime	1250
Extend_Output	O3.3
	0
Retract_Output	SIM_NOP
	0
Extend_Sensor	SIM_NOP
	0
Retract_Sensor	I1.3
	1
MCR	1
SingleSolenoidExtend	1
SingleSolenoidRetract	0

Clamp C Movement Simulation

3

AOI_SIM_2PosCyl_ExtRet

AOI_SIM_2PosCyl_ExtRe...	SIM_ClampC ...
Animation	0
TravelTime	1250
Extend_Output	O3.4
	0
Retract_Output	SIM_NOP
	0
Extend_Sensor	SIM_NOP
	0
Retract_Sensor	I1.4
	1
MCR	1
SingleSolenoidExtend	1
SingleSolenoidRetract	0

Simulation of Torque Sensor

4

SIM_Fasten1.TimingLastHalf
SIM_Fasten2.TimingLastHalf
SIM_Fasten3.TimingLastHalf
SIM_Fasten4.TimingLastHalf

SIM_Torque.Activate

5

AOI_SIMAnalogSensor

AOI_SIMAnalogSensor	SIM_Torque ...
Sensor	I2_CHA
RampUpTime	500
RampDwnTime	50
Min	4.01
Max	19.99
Target	15
Tolerance	2
Fluctuation	0.04

Simulation of Robot Complete Signals

6

ToRbt_Fasten1Start

SIM_Fasten1.Activate

7

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_Fasten1 ...
Target 2500
Tolerance 750
PulseOutputTime 0
DN FromRbt_Fasten1Complete 0

8 ToRbt_Fasten2Start — SIM_Fasten2.Activate

9

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_Fasten2 ...
Target 3500
Tolerance 450
PulseOutputTime 0
DN FromRbt_Fasten2Complete 0

10 ToRbt_Fasten3Start — SIM_Fasten3.Activate

11

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_Fasten3 ...
Target 4500
Tolerance 250
PulseOutputTime 0
DN FromRbt_Fasten3Complete 0

12 ToRbt_Fasten4Start — SIM_Fasten4.Activate

13

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_Fasten4 ...
Target 3750
Tolerance 500
PulseOutputTime 0
DN FromRbt_Fasten4Complete 0

Simulation of Robot Clear Signal
---

14 FASTEN_AllComplete — SIM_RobotClear.Activate

15

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_RobotClear ...
Target 1200
Tolerance 250
PulseOutputTime 50
DN SIM_NOP 0

16
SIM_RobotClear.DN
FromRbt_ClearOfFixture
L
FromRbt_ClearOfFixture
/
SIM_EmptyFixture.DN
SIM_Oneshots.4
ONS

17
ToRbt_Fasten1Start
FromRbt_ClearOfFixture
U

Simulation of Light Curtain

18
FIXTURE_AtHomePos
FIXTURE_AllPartsPresent
FASTEN_AllComplete
SIM_LightCurtainPartRem.Activate

19
AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_LightCurtainPartRem
Target 5000
Tolerance 1000
PulseOutputTime 50
DN SIM_NOP 0

20
SIM_LightCurtainPartRem.DN
SIM_OperatorWorking.Activate

21
AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_OperatorWorking
Target 4000
Tolerance 2000
PulseOutputTime 50
DN SIM_NOP 0

22
Part Present A Sensor I1.8
/
Part Present B Sensor I1.9
/
Part Present C Sensor I1.10
/
Part Present D Sensor I1.11
/
TON
Timer SIM_EmptyFixture
Preset 15000
Accum 0
EN
DN

23
SIM_OperatorWorking.DN
SIM_EmptyFixture.DN
SIM_LightCurtainPartPlace.Activate

24
AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_LightCurtainPartPlace
Target 6000
Tolerance 1500
PulseOutputTime 50
DN SIM_NOP 0

25
SIM_LightCurtainPartPlace.TT
/
SIM_LightCurtainPartRem.TT
/
SIM_Oneshots.0
ONS
Light Curtain Safety Circuit I1.14
L

26

SIM_LightCurtainPartPlace.TT
SIM_Oneshots.1
ONS
SIM_LightCurtainPartRem.TT
SIM_Oneshots.2
ONS
Light Curtain Safety Circuit
I1.14
U

Simulation of Part Present Sensors

27

SIM_LightCurtainPartPlace.TT
SIM_PPA_ON.Activate
SIM_PPB_ON.Activate
SIM_PPC_ON.Activate
SIM_PPD_ON.Activate

28

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_PPA_ON
Target 1500
Tolerance 500
PulseOutputTime 50
DN SIM_NOP 0

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_PPB_ON
Target 2000
Tolerance 1000
PulseOutputTime 50
DN SIM_NOP 0

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_PPC_ON
Target 2500
Tolerance 1000
PulseOutputTime 50
DN SIM_NOP 0

AOI_SIM_RandomDelay
AOI_SIM_RandomDelay SIM_PPD_ON
Target 3000
Tolerance 500
PulseOutputTime 50
DN SIM_NOP 0

29

SIM_PPA_ON.DN
Part Present A Sensor
I1.8
L
SIM_PPB_ON.DN
Part Present B Sensor
I1.9
L
SIM_PPC_ON.DN
Part Present C Sensor
I1.10
L
SIM_PPD_ON.DN
Part Present D Sensor
I1.11
L

30

SIM_LightCurtainPartRem.TT
SIM_PP_OFF.Activate

31

AOI_SIM_RandomDelay

AOI_SIM_RandomDelay	SIM_PP_OFF ...
Target	2500
Tolerance	1000
PulseOutputTime	50
DN	SIM_NOP 0

32

SIM_PP_OFF.DN

Part Present A Sensor I1.8 (U)

Part Present B Sensor I1.9 (U)

Part Present C Sensor I1.10 (U)

Part Present D Sensor I1.11 (U)

(End)

Data type Name: Part_Type

Description:

Size: 176 byte(s)

Name	Value	Data Type	Style
Part_Name		STRING	NullType
External Access:	Read/Write		
Part_Number		INT	Decimal
External Access:	Read/Write		
F1_HL		REAL	Float
External Access:	Read/Write		
F1_LL		REAL	Float
External Access:	Read/Write		
F2_HL		REAL	Float
External Access:	Read/Write		
F2_LL		REAL	Float
External Access:	Read/Write		
F3_HL		REAL	Float
External Access:	Read/Write		
F3_LL		REAL	Float
External Access:	Read/Write		
F4_HL		REAL	Float
External Access:	Read/Write		
F4_LL		REAL	Float
External Access:	Read/Write		
Active		BOOL	Decimal
External Access:	Read/Write		
F1_Count		COUNTER	NullType
External Access:	Read/Write		
F2_Count		COUNTER	NullType
External Access:	Read/Write		
F3_Count		COUNTER	NullType
External Access:	Read/Write		
F4_Count		COUNTER	NullType
External Access:	Read/Write		

Data type Name: SHIFT_DATA

Description:

Size: 16 byte(s)

Name	Value	Data Type	Style
COMPLETED		DINT	Decimal
External Access:	Read/Write		
PASSED		DINT	Decimal
External Access:	Read/Write		
FAILED		DINT	Decimal
External Access:	Read/Write		
EFFICIENT		REAL	Float
External Access:	Read/Write		