Controller CRS_PLC
Controller Fault Handler
Power-Up Handler

Tasks

- **T01_MainTask**
  - **MainProgram**
    - **MainRoutine**
- **T02_System**
  - **ST00_System**
    - **Main**
    - **Alarm**
    - **AlarmLightsLamps**
    - **CD_Collets**
    - **CD_IndxCV**
    - **CD_LocCyls**
    - **CD_SpindelAirSeal**
    - **CD_SpindelVac**
    - **CD_SpindleChiller**
    - **Map_HMI**
    - **Map_Inputs**
    - **Map_InputsAnlg**
    - **Map_Outputs**
    - **Map_OutputsAnlg**
    - **R04_Utility**
    - **R05_StartStop**
    - **R10_Recipe**
    - **R20_DrillBackups**
    - **Seq_Ctrl**
    - **Seq_Master**
  - **ST01_Infeed**
    - **Main**
    - **CD_BowlFeeder**
    - **CD_PinStopCyl**
    - **CD_SeparationCyl**
    - **CD_XfrArm**
    - **R20_SeparatePart**
    - **Seq_Ctrl**
    - **Seq_Infeed**
  - **ST02_Drill1**
    - **R00_Main**
    - **CD_Blowoff**
    - **CD_Servo**
      Festo Servo Control
    - **CD_Spindle**
    - **R20_G83**
    - **Seq_Ctrl**
    - **Seq_Drill**
  - **ST03_Drill2**
    - **R00_Main**
    - **CD_Blowoff**
    - **CD_Servo**
      Festo Servo Control
    - **CD_Spindle**
    - **R20_G83**
    - **Seq_Ctrl**
    - **Seq_Drill**
  - **ST04_Drill3**
    - **R00_Main**

- **CD_Blowoff**
- **CD_Servo**
  Festo Servo Control
- **CD_Spindle**
- **R20_G83**
- **Seq_Ctrl**
- **Seq_Drill**

ST05_Drill4
- **R00_Main**
- **CD_Blowoff**
- **CD_Servo**
  Festo Servo Control
- **CD_Spindle**
- **R20_G83**
- **R21_BrokenBitDetect**
- **R22_HoleCleanout**
- **Seq_Ctrl**
- **Seq_Drill**

ST06_Outfeed
- **Main**
- **CD_Blowoff**
- **CD_ChuteArm**
- **CD_Vis_Height**
- **CD_Vis_ODID**
- **CD_XfrArm**
- **R20_InspectPart**
- **R21_CollectPart**
- **Seq_Ctrl**
- **Seq_Outfeed**

ST07_Reject
- **Main**
- **CD_RejectBlowoff**
- **R10_Reject**

Unscheduled

Motion Groups

Ungrouped Axes

Add-On Instructions

Air
- **Logic**

Collet
- **Logic**

Cyl
- **Logic**

FestoServoMoves
- **Logic**

FHPP_CTRL
FHPP control (AOI)
- **Logic**
- **Prescan**
  First Scan

FML_READ
read the input data (AOI)
- **Logic**

FML_WRITE
write the output data (AOI)
- **Logic**

FPC_DIRMP
read/write direct mode positioning parameters (AOI)

Logic
Prescan
FPC_PNU
read/write single parameter (AOI)
Logic
Prescan
PresentDetect
Logic
VFD_Control
Logic
VFD_HighSpeed_Control
Logic
Prescan

Data Types

User-Defined
DT_CCON
structure for CCON data (control byte 1)
DT_CPOS
structure for CPOS data (control byte 2)
DT_FHPP
data structure for FHPP data
DT_FHPPplus
DT_FHPP_DATA_IN
structure for FHPP input data
DT_FHPP_DATA_OUT
structure for FHPP output data
DT_FML_FPC_FILE_TRANSFER
structure for file transfer
DT_FML_PRM_DESCRIPTION
structure for discription of the parameter
DT_FML_REF
structure for FHPP Data reference
DT_FML_STATUS
structure for status output of the function block
DT_FPC
data structure for FPC data
DT_FPC_DATA
data structure for FPC input and output data
DT_SCON
data structure for SCON data (status byte 1)
DT_SPOS
data structure for SPOS data (status byte 2)
E_FML_DEVICE_TYPE
enumeration for FML device type of different motor controller
E_FML_DIAG_EVENT
enumeration for FML diagnosis event of motor controller
E_FML_FPC_FILE_TRANSFER_CONTROL
enumeration of FML file transfer control
E_FML_FPC_MODE
enumeration for FML FPC modus
E_FML_FPC_REQ_ID
enumeration for FML FPC request number
E_FML_FPC_RESP_ID
enumeration for FML FPC response number
E_FML_FPC_STATUS_CATEGORY
enumeration of FML status category of the function block
E_FML_FPC_STATUS_ID_FILE_TRANSFER
enumeration for FML error ID of file transfer

- **E_FML_FPC_STATUS_ID_FUNCTION_BLOCK**
  enumeration for FML status ID of function block
- **E_FML_OPM**
  enumeration for FML operation mode of the controller
- **HMI**
- **Recipe**
- **RecipeCtrl**
- **SICK_AFX60_WS_DATA**
  Data structure for AFS60 / AFM60 WebServer
- **System**
- **UDT_Cognex_Vision**
- **UDT_Ferrule**
- **UDT_G83_IJK**
- **UDT_Intlk**
- **UDT_Part**
- **UDT_Perm**
- **UDT_Recipe**
- **UDT_Recipe_Drill**
  One for each station
- **UDT_Recipe_G83_IJK**
- **UDT_ServoMoves**
- **UDT_Station**
- **UDT_StationCfg**
- **UDT_VisionInspection**
- **uIOModule16**
- **VFD**
- **VFD_Cmd**
- **VFD_Stat**

Strings

Add-On-Defined

- **Air**
- **Collet**
- **Cyl**
- **FestoServoMoves**
- **FHPP_CTRL**
  FHPP control (AOI)
- **FML_READ**
  read the input data (AOI)
- **FML_WRITE**
  write the output data (AOI)
- **FPC_DIRMP**
  read/write direct mode positioning parameters (AOI)
- **FPC_PNU**
  read/write single parameter (AOI)
- **PresentDetect**
- **VFD_Control**
- **VFD_HighSpeed_Control**

Module-Defined

- **AB:1769_DI16:I:0**
- **AB:1769_DI32:I:0**
- **AB:1769_DO16:C:0**
- **AB:1769_DO16:I:0**
- **AB:1769_DO16:O:0**
- **AB:1769_IF4:C:0**
- **AB:1769_IF4:I:0**
- **AB:1769_OF4:C:0**
- **AB:1769_OF4:I:0**
- **AB:1769_OF4:O:0**

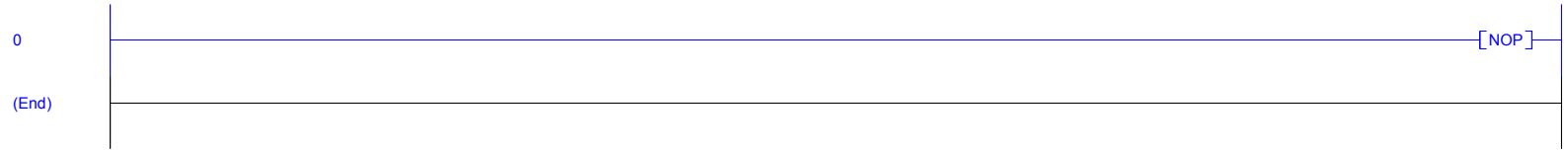
- **AB:ETHERNET_MODULE:C:0**
- **AB:ETHERNET_MODULE_DINT_12Bytes:I:0**
- **AB:ETHERNET_MODULE_DINT_4Bytes:O:0**
- **AB:ETHERNET_MODULE_INT_12Bytes:O:0**
- **AB:ETHERNET_MODULE_INT_2Bytes:I:0**
- **AB:ETHERNET_MODULE_INT_4Bytes:I:0**
- **AB:ETHERNET_MODULE_INT_6Bytes:I:0**
- **AB:ETHERNET_MODULE_INT_6Bytes:O:0**
- **AB:ETHERNET_MODULE_INT_8Bytes:I:0**
- **AB:ETHERNET_MODULE_INT_8Bytes:O:0**
- **AB:ETHERNET_MODULE_SINT_2Bytes:I:0**
- **AB:ETHERNET_MODULE_SINT_3Bytes:I:0**
- **AB:ETHERNET_MODULE_SINT_3Bytes:O:0**
- **AB:ETHERNET_MODULE_SINT_6Bytes:O:0**
- **CC:InSight11_Control:O:0**
- **CC:InSight11_REAL32:I:0**
- **CC:InSight11_REAL32:O:0**
- **CC:InSight11_Status:I:0**
- **_001A:CMMP_AS_C2_3A_M3_12F7A967:I:0**
- **_001A:CMMP_AS_C2_3A_M3_3CA28EF6:I:0**
- **_001A:CMMP_AS_C2_3A_M3_C5D4DDB1:O:0**
- **_001A:CMMP_AS_C2_3A_M3_DD7B81FB:O:0**
- **_001A:CPX_FB36_85D36DB4:I:0**
- **_001A:CPX_FB36_98D65D0C:I:0**
- **_001A:CPX_FB36_AAB94180:O:0**
- **_001A:CPX_FB36_B7BC7138:O:0**
- **_001A:CTEU_EP_4137039D:C:0**
- **_001A:CTEU_EP_DD7B81FB:O:0**
- **_001A:CTEU_EP_F211ADCF:I:0**
- **_0328:AFM60A_EthIP_BEF003F5:C:0**
- **_0328:AFM60A_EthIP_F211ADCF:I:0**

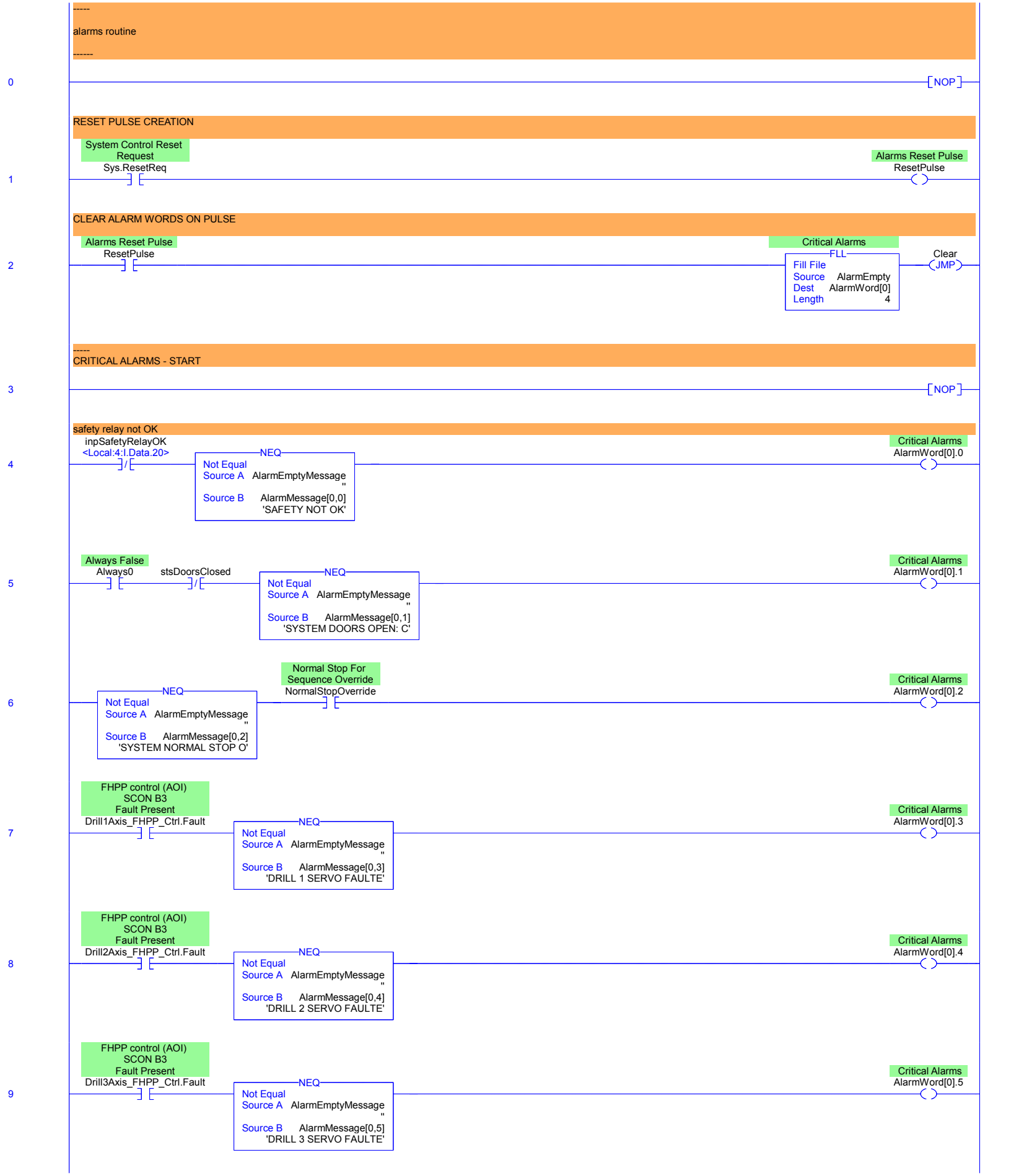
Trends

I/O Configuration

- **1769 Bus**
  - **[0] 1769-L30ER CRS_PLC**
  - **[1] 1769-IQ16/A I101**
  - **[2] 1769-IQ16/A I102**
  - **[3] 1769-IQ16/A I103**
  - **[4] 1769-IQ32/A I104_05**
  - **[5] 1769-OW16/A O106**
  - **[6] 1769-OW16/A O107**
  - **[7] 1769-IF4/B AI108**
  - **[8] 1769-OF4/A AO109**
- **Ethernet**
  - **1769-L30ER CRS_PLC**
  - **CMMP-AS-C2-3A-M3 Drill1Axis**
    Servo Axis at Filler
  - **CMMP-AS-C2-3A-M3 Drill2Axis**
    Servo Axis at Filler
  - **CMMP-AS-C2-3A-M3 Drill3Axis**
    Servo Axis at Filler
  - **CMMP-AS-C2-3A-M3 Drill4Axis**
    Servo Axis at Filler
  - **ETHERNET-MODULE IndexCV**
  - **ETHERNET-MODULE VB1**
  - **ETHERNET-MODULE VB2**
  - **AFM60A-Eth/IP Enc**
  - **In-Sight 7900-7500 Series Vis_ODIDCam**

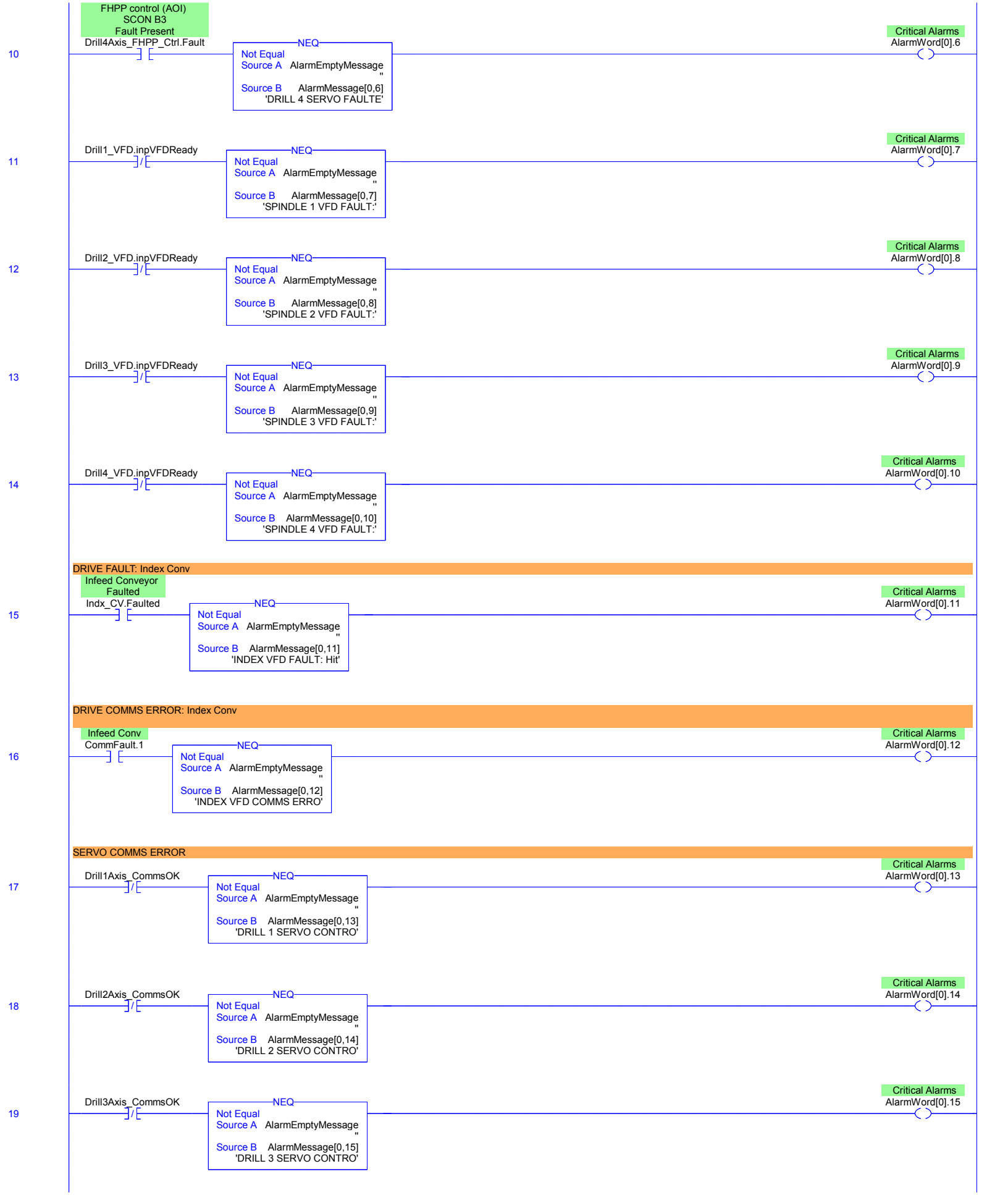
In-Sight 7900-7500 Series Vis_HeightCam

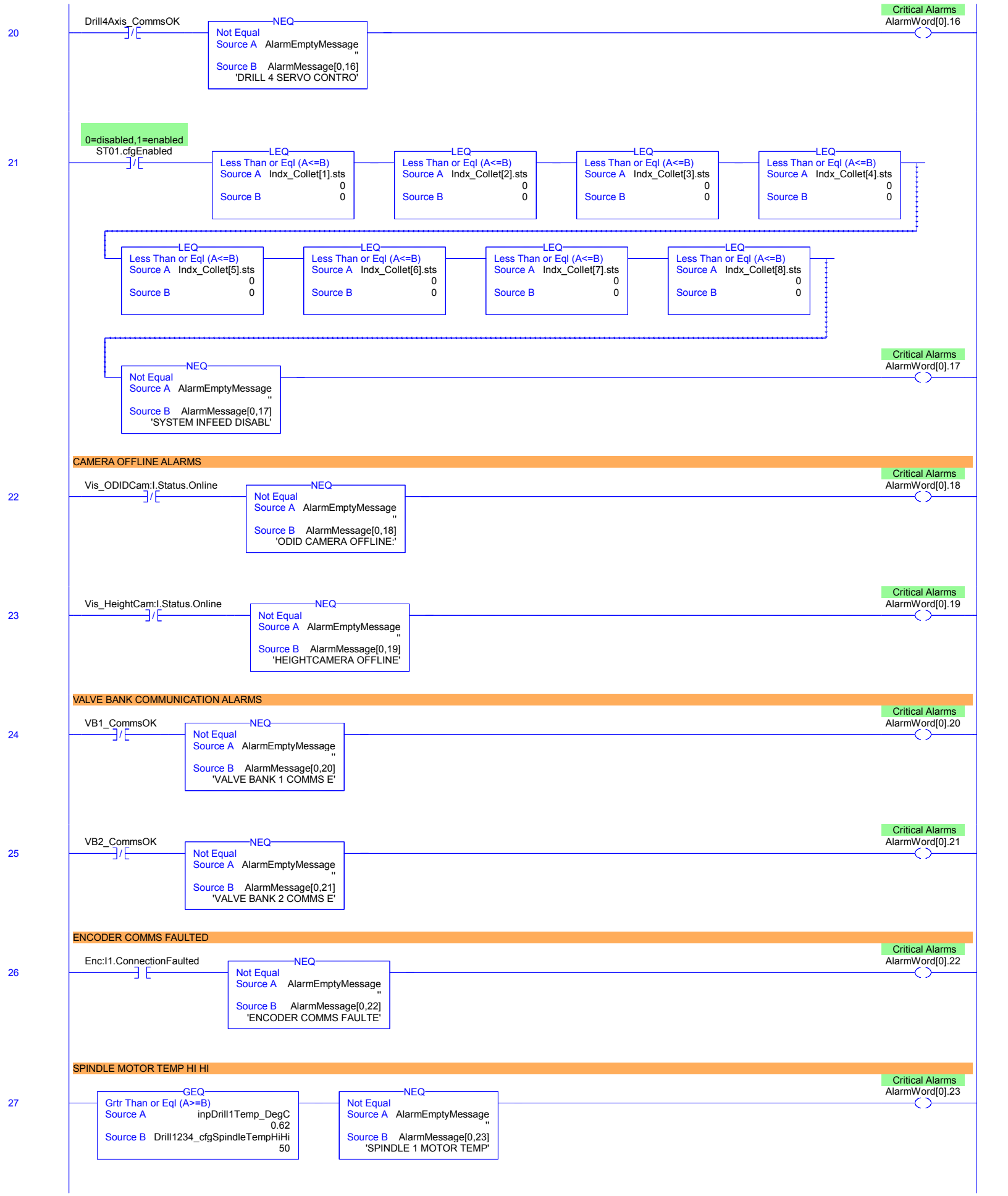

0
NOP
(End)


-----
alarms routine

0
NOP
RESET PULSE CREATION
System Control Reset Request
Sys.ResetReq
Alarms Reset Pulse
ResetPulse
1
CLEAR ALARM WORDS ON PULSE
Alarms Reset Pulse
ResetPulse
Critical Alarms
FLL
Fill File
Source AlarmEmpty
Dest AlarmWord[0]
Length 4
Clear
JMP
2

CRITICAL ALARMS - START
3
NOP
safety relay not OK
inpSafetyRelayOK
<Local:4:I.Data.20>
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,0]
'SAFETY NOT OK'
Critical Alarms
AlarmWord[0].0
4
Always False
Always0
stsDoorsClosed
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,1]
'SYSTEM DOORS OPEN: C'
Critical Alarms
AlarmWord[0].1
5
Normal Stop For Sequence Override
NormalStopOverride
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,2]
'SYSTEM NORMAL STOP O'
Critical Alarms
AlarmWord[0].2
6
FHPP control (AOI)
SCON B3
Fault Present
Drill1Axis_FHPP_Ctrl.Fault
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,3]
'DRILL 1 SERVO FAULTE'
Critical Alarms
AlarmWord[0].3
7
FHPP control (AOI)
SCON B3
Fault Present
Drill2Axis_FHPP_Ctrl.Fault
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,4]
'DRILL 2 SERVO FAULTE'
Critical Alarms
AlarmWord[0].4
8
FHPP control (AOI)
SCON B3
Fault Present
Drill3Axis_FHPP_Ctrl.Fault
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,5]
'DRILL 3 SERVO FAULTE'
Critical Alarms
AlarmWord[0].5
9


FHPP control (AOI)
SCON B3
Fault Present
Drill4Axis_FHPP_Ctrl.Fault
10
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,6]
'DRILL 4 SERVO FAULTE'
Critical Alarms
AlarmWord[0].6
Drill1_VFD.inpVFDReady
11
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,7]
'SPINDLE 1 VFD FAULT:'
Critical Alarms
AlarmWord[0].7
Drill2_VFD.inpVFDReady
12
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,8]
'SPINDLE 2 VFD FAULT:'
Critical Alarms
AlarmWord[0].8
Drill3_VFD.inpVFDReady
13
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,9]
'SPINDLE 3 VFD FAULT:'
Critical Alarms
AlarmWord[0].9
Drill4_VFD.inpVFDReady
14
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,10]
'SPINDLE 4 VFD FAULT:'
Critical Alarms
AlarmWord[0].10
DRIVE FAULT: Index Conv
Infeed Conveyor
Faulted
Indx_CV.Faulted
15
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,11]
'INDEX VFD FAULT: Hit'
Critical Alarms
AlarmWord[0].11
DRIVE COMMS ERROR: Index Conv
Infeed Conv
CommFault.1
16
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,12]
'INDEX VFD COMMS ERRO'
Critical Alarms
AlarmWord[0].12
SERVO COMMS ERROR
Drill1Axis_CommsOK
17
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,13]
'DRILL 1 SERVO CONTRO'
Critical Alarms
AlarmWord[0].13
Drill2Axis_CommsOK
18
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,14]
'DRILL 2 SERVO CONTRO'
Critical Alarms
AlarmWord[0].14
Drill3Axis_CommsOK
19
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,15]
'DRILL 3 SERVO CONTRO'
Critical Alarms
AlarmWord[0].15


20
Drill4Axis_CommsOK
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,16]
'DRILL 4 SERVO CONTRO'
Critical Alarms
AlarmWord[0].16
0=disabled,1=enabled
ST01.cfgEnabled
21
LEQ
Less Than or Eql (A<=B)
Source A Indx_Collet[1].sts
0
Source B 0
Indx_Collet[2].sts
Indx_Collet[3].sts
Indx_Collet[4].sts
Indx_Collet[5].sts
Indx_Collet[6].sts
Indx_Collet[7].sts
Indx_Collet[8].sts
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,17]
'SYSTEM INFEED DISABL'
Critical Alarms
AlarmWord[0].17
CAMERA OFFLINE ALARMS
22
Vis_ODIDCam:I.Status.Online
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,18]
'ODID CAMERA OFFLINE:'
Critical Alarms
AlarmWord[0].18
23
Vis_HeightCam:I.Status.Online
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,19]
'HEIGHTCAMERA OFFLINE'
Critical Alarms
AlarmWord[0].19
VALVE BANK COMMUNICATION ALARMS
24
VB1_CommsOK
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,20]
'VALVE BANK 1 COMMS E'
Critical Alarms
AlarmWord[0].20
25
VB2_CommsOK
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,21]
'VALVE BANK 2 COMMS E'
Critical Alarms
AlarmWord[0].21
ENCODER COMMS FAULTED
26
Enc:I1.ConnectionFaulted
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,22]
'ENCODER COMMS FAULTE'
Critical Alarms
AlarmWord[0].22
SPINDLE MOTOR TEMP HI HI
27
GEQ
Grtr Than or Eql (A>=B)
Source A inpDrill1Temp_DegC
0.62
Source B Drill1234_cfgSpindleTempHiHi
50
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,23]
'SPINDLE 1 MOTOR TEMP'
Critical Alarms
AlarmWord[0].23

28
GEQ
Grtr Than or Eql (A>=B)
Source A inpDrill2Temp_DegC
0.71999997
Source B Drill1234_cfgSpindleTempHiHi
50
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,24]
'SPINDLE 2 MOTOR TEMP'
Critical Alarms
AlarmWord[0].24

29
GEQ
Grtr Than or Eql (A>=B)
Source A inpDrill3Temp_DegC
0.58
Source B Drill1234_cfgSpindleTempHiHi
50
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,25]
'SPINDLE 3 MOTOR TEMP'
Critical Alarms
AlarmWord[0].25

30
GEQ
Grtr Than or Eql (A>=B)
Source A inpDrill4Temp_DegC
0.58
Source B Drill1234_cfgSpindleTempHiHi
50
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,26]
'SPINDLE 4 MOTOR TEMP'
Critical Alarms
AlarmWord[0].26

BIN VERIFICATION OF PARTS

31
Outfd_cfgWrongBinAlmEnable
Outfd_almBadPartGoodBin
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,27]
'INSPECT BAD PART DET'
Critical Alarms
AlarmWord[0].27
L
Outfd_almBadPartGoodBin
U

32
Outfd_cfgWrongBinAlmEnable
Outfd_almReworkPartGoodBin
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,28]
'INSPECT BAD PART DET'
Critical Alarms
AlarmWord[0].28
L
Outfd_almReworkPartGoodBin
U

33
Outfd_cfgWrongBinAlmEnable
Outfd_almBadPartReworkBin
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,29]
'INSPECT REWORK PART '
Critical Alarms
AlarmWord[0].29
L
Outfd_almBadPartReworkBin
U

PIN STOP CYL MOVE FAILURE

34
cyl did not reach
extend pos in time
Infd_PinStopCyl.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,30]
'INFEED PIN STOP CYL '
Critical Alarms
AlarmWord[0].30
L

35
cyl did not reach
retract pos in time
Infd_PinStopCyl.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[0,31]
'INFEED PIN STOP CYL '
Critical Alarms
AlarmWord[0].31
L

ALARM WORD 1

36
NOP

all collets disabled

37
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[1].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[2].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[3].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[4].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[5].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[6].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[7].sts 0 Source B -1
LEQ Less Than or Eql (A<=B) Source A Indx_Collet[8].sts 0 Source B -1
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,0] 'INDEX ALL COLLETS DI'
Critical Alarms AlarmWord[1].0

38
spindel chiller ok
outDrill1234ChillerRun <Local:6:O.Data.14>
Drill1_tmrIntlkDelay.DN
inpDrill1FlowSw <Local:4:I.Data.21>
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,2] 'CHILLER NO FLOW: Che'
Critical Alarms AlarmWord[1].2

39
spindel chiller ok
outDrill1234ChillerRun <Local:6:O.Data.14>
Drill2_tmrIntlkDelay.DN
inpDrill2FlowSw <Local:4:I.Data.22>
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,3] 'DRILL 2 NO CHILLED W'
Critical Alarms AlarmWord[1].3

40
spindel chiller ok
outDrill1234ChillerRun <Local:6:O.Data.14>
Drill3_tmrIntlkDelay.DN
inpDrill3FlowSw <Local:4:I.Data.23>
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,4] 'DRILL 3 NO CHILLED W'
Critical Alarms AlarmWord[1].4

41
spindel chiller ok
outDrill1234ChillerRun <Local:6:O.Data.14>
Drill4_tmrIntlkDelay.DN
inpDrill4FlowSw <Local:4:I.Data.24>
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,5] 'DRILL 4 NO CHILLED W'
Critical Alarms AlarmWord[1].5

42
cyl did not reach extend pos in time
Infd_SepCyl.stsExtFail
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,6] 'INFEED SEPARATION FA'
Critical Alarms AlarmWord[1].6

43
cyl did not reach retract pos in time
Infd_SepCyl.stsRetFail
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,7] 'INFEED SEPARATION FA'
Critical Alarms AlarmWord[1].7

44
cyl did not reach extend pos in time
LocCyl[1].stsExtFail
NEQ Not Equal Source A AlarmEmptyMessage '' Source B AlarmMessage[1,8] 'INFEED LOC CYL FAIL '
Critical Alarms AlarmWord[1].8

45
cyl did not reach retract pos in time
LocCyl[1].stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,9]
'INFEED LOC CYL FAIL '
Critical Alarms
AlarmWord[1].9
(L)

46
cyl did not reach extend pos in time
Infd_PickCyl.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,10]
'INFEED PICK CYL FAIL'
Critical Alarms
AlarmWord[1].10
(L)

47
cyl did not reach retract pos in time
Infd_PickCyl.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,11]
'INFEED PICK CYL FAIL'
Critical Alarms
AlarmWord[1].11
(L)

48
cyl did not reach extend pos in time
Infd_XfrCyl.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,12]
'INFEED XFR CYL FAIL '
Critical Alarms
AlarmWord[1].12
(L)

49
cyl did not reach retract pos in time
Infd_XfrCyl.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,13]
'INFEED XFR CYL FAIL '
Critical Alarms
AlarmWord[1].13
(L)

50
cyl did not reach extend pos in time
LocCyl[2].stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,14]
'DRILL 1 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].14
(L)

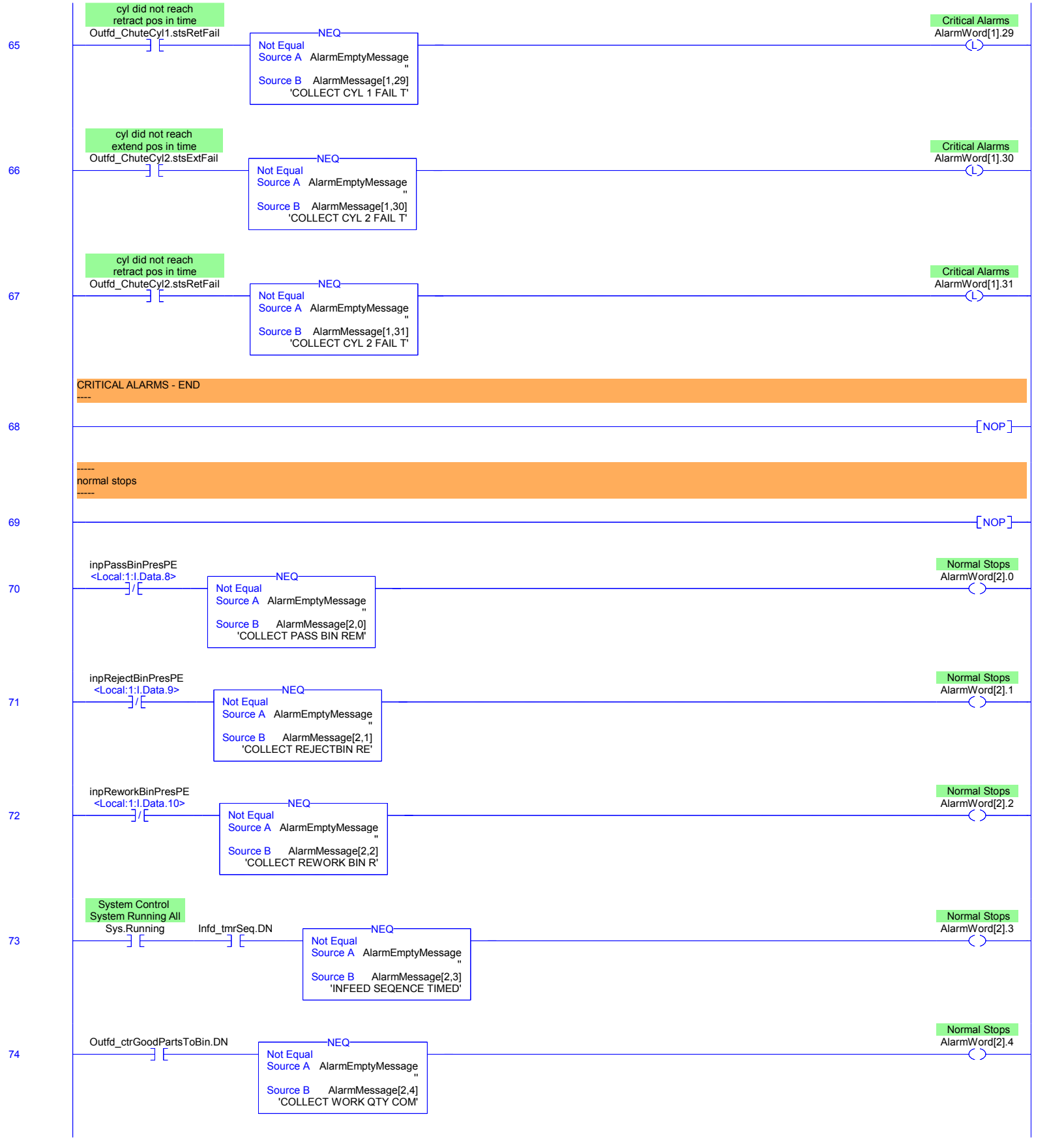
51
cyl did not reach retract pos in time
LocCyl[2].stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,15]
'DRILL 1 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].15
(L)

52
cyl did not reach extend pos in time
LocCyl[3].stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,16]
'DRILL 2 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].16
(L)

53
cyl did not reach retract pos in time
LocCyl[3].stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,17]
'DRILL 2 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].17
(L)

54
cyl did not reach extend pos in time
LocCyl[4].stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,18]
'DRILL 3 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].18
(L)


55
cyl did not reach retract pos in time
LocCyl[4].stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,19]
'DRILL 3 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].19
L
56
cyl did not reach extend pos in time
LocCyl[5].stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,20]
'DRILL 4 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].20
L
57
cyl did not reach retract pos in time
LocCyl[5].stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,21]
'DRILL 4 LOC CYL FAIL'
Critical Alarms
AlarmWord[1].21
L
58
cyl did not reach extend pos in time
LocCyl[6].stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,22]
'OUTFEED LOC CYL FAIL'
Critical Alarms
AlarmWord[1].22
L
59
cyl did not reach retract pos in time
LocCyl[6].stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,23]
'OUTFEED LOC CYL FAIL'
Critical Alarms
AlarmWord[1].23
L
60
cyl did not reach extend pos in time
Outfd_PickCyl.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,24]
'OUTFEED PICK CYL FAI'
Critical Alarms
AlarmWord[1].24
L
61
cyl did not reach retract pos in time
Outfd_PickCyl.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,25]
'OUTFEED PICK CYL FAI'
Critical Alarms
AlarmWord[1].25
L
62
cyl did not reach extend pos in time
Outfd_XfrCyl.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,26]
'OUTFEED XFR CYL FAIL'
Critical Alarms
AlarmWord[1].26
L
63
cyl did not reach retract pos in time
Outfd_XfrCyl.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,27]
'OUTFEED XFR CYL FAIL'
Critical Alarms
AlarmWord[1].27
L
64
cyl did not reach extend pos in time
Outfd_ChuteCyl1.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,28]
'COLLECT CYL 1 FAIL T'
Critical Alarms
AlarmWord[1].28
L


cyl did not reach retract pos in time
Outfd_ChuteCyl1.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,29]
'COLLECT CYL 1 FAIL T'
Critical Alarms
AlarmWord[1].29
65
cyl did not reach extend pos in time
Outfd_ChuteCyl2.stsExtFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,30]
'COLLECT CYL 2 FAIL T'
Critical Alarms
AlarmWord[1].30
66
cyl did not reach retract pos in time
Outfd_ChuteCyl2.stsRetFail
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[1,31]
'COLLECT CYL 2 FAIL T'
Critical Alarms
AlarmWord[1].31
67
CRITICAL ALARMS - END

68
NOP
---
normal stops

69
NOP
inpPassBinPresPE
<Local:1:I.Data.8>
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[2,0]
'COLLECT PASS BIN REM'
Normal Stops
AlarmWord[2].0
70
inpRejectBinPresPE
<Local:1:I.Data.9>
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[2,1]
'COLLECT REJECTBIN RE'
Normal Stops
AlarmWord[2].1
71
inpReworkBinPresPE
<Local:1:I.Data.10>
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[2,2]
'COLLECT REWORK BIN R'
Normal Stops
AlarmWord[2].2
72
System Control
System Running All
Sys.Running
Infd_tmrSeq.DN
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[2,3]
'INFEED SEQENCE TIMED'
Normal Stops
AlarmWord[2].3
73
Outfd_ctrGoodPartsToBin.DN
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[2,4]
'COLLECT WORK QTY COM'
Normal Stops
AlarmWord[2].4
74

PART NOT SEEN AT COLLECTION

75 Collect_cfgPEAlmEnable Insp_NoPart Outfd_stsPartCollectTimedOut Sys_ONS.3 [ONS]
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[2,5] 'COLLECT PE DID NOT S'
ADD: Add, Source A 1, Source B zzdint 206, Dest zzdint 206
Always False Always0
Normal Stops AlarmWord[2].5 (L)

76 Collect_cfgPEAlmEnable Collect_tmrPEStuckOn.DN
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[2,6] 'COLLECT PE BLOCKED T'
Normal Stops AlarmWord[2].6 (L)

77 Insp_pcmdNormalStopForOccl
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[2,7] 'INSPECT OCCLUSION AV'
Normal Stops AlarmWord[2].7 (L)
Insp_OcclHiHi_Avg (U)

78 Insp_pcmdNormalStopForNoHole
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[2,9] 'INSPECT TOO MANY PAR'
Normal Stops AlarmWord[2].9 (L)
Insp_ctrConsecNoHole (RES)

79 Indx_almTableStopBad
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[2,10] 'INDEX TABLE STOP BAD'
Normal Stops AlarmWord[2].10 (L)

---
warnings
---

80 [NOP]

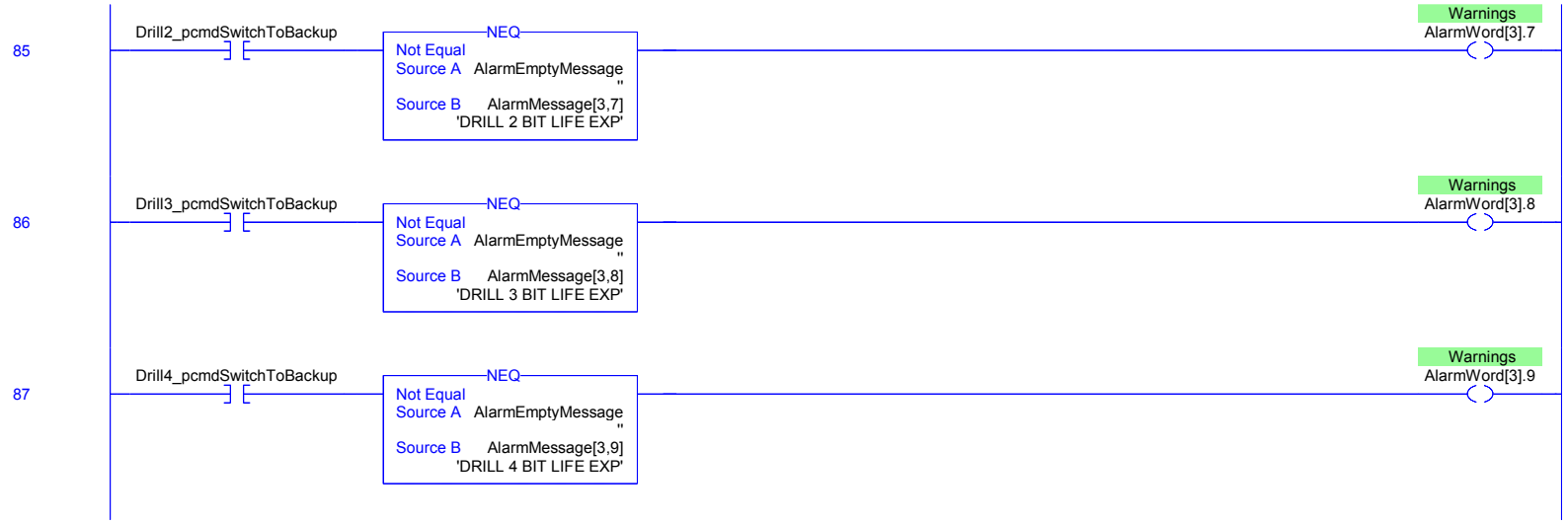
81 Insp_ctrConsecNoHole.DN
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[3,0] 'INSPECT TOO MANY CON'
Warnings AlarmWord[3].0 ( )

82 Insp_OcclHiHi_Avg
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[3,1] 'INSPECT OCCLUSION HI'
Warnings AlarmWord[3].1 ( )

83 Drill4_almBrokenBitWarning
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[3,5] 'OUTFEED BROKEN BIT D'
Warnings AlarmWord[3].5 ( )

DRILL BIT LIFE EXPIRED

84 Drill1_pcmdSwitchToBackup
NEQ: Not Equal, Source A AlarmEmptyMessage, Source B AlarmMessage[3,6] 'DRILL 1 BIT LIFE EXP'
Warnings AlarmWord[3].6 ( )


85
Drill2_pcmdSwitchToBackup
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,7]
'DRILL 2 BIT LIFE EXP'
Warnings
AlarmWord[3].7
86
Drill3_pcmdSwitchToBackup
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,8]
'DRILL 3 BIT LIFE EXP'
Warnings
AlarmWord[3].8
87
Drill4_pcmdSwitchToBackup
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,9]
'DRILL 4 BIT LIFE EXP'
Warnings
AlarmWord[3].9

88

Insp_CurColletConcHi_Avg

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 1 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,10] 'COLLET 1 CONCENTRICI' — Warnings AlarmWord[3].10 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 2 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,11] 'COLLET 2 CONCENTRICI' — Warnings AlarmWord[3].11 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 3 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,12] 'COLLET 3 CONCENTRICI' — Warnings AlarmWord[3].12 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 4 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,13] 'COLLET 4 CONCENTRICI' — Warnings AlarmWord[3].13 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 5 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,14] 'COLLET 5 CONCENTRICI' — Warnings AlarmWord[3].14 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 6 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,15] 'COLLET 6 CONCENTRICI' — Warnings AlarmWord[3].15 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 7 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,16] 'COLLET 7 CONCENTRICI' — Warnings AlarmWord[3].16 (L)

current collet number — EQU: Equal, Source A ST06.stsCurColletNum 3, Source B 8 — NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,17] 'COLLET 8 CONCENTRICI' — Warnings AlarmWord[3].17 (L)

SERVO WARNING

89

FHPP control (AOI) SCON B2 Warning Present Drill1Axis_FHPP_Ctrl.Warning

NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,20] 'DRILL 1 SERVO WARNIN'

Warnings AlarmWord[3].20

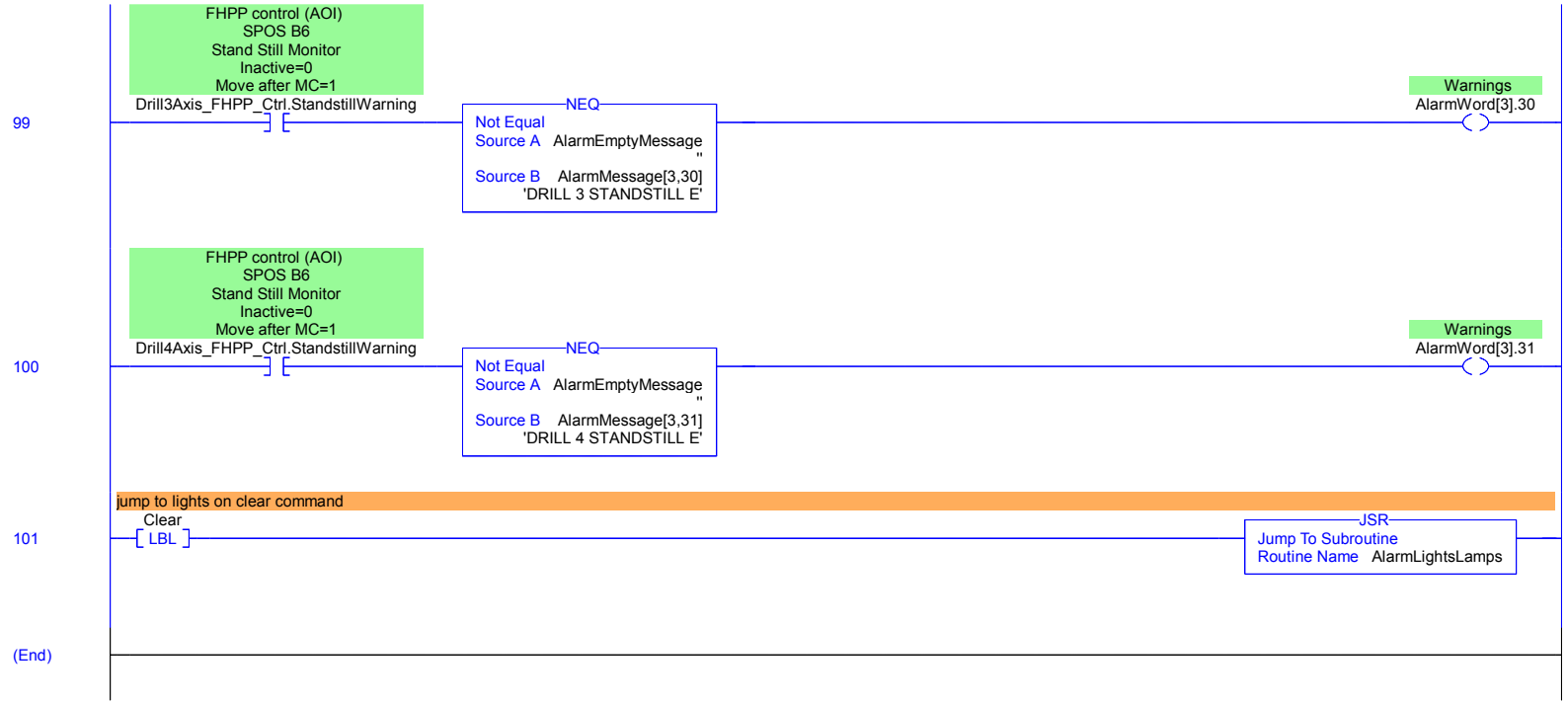
90

FHPP control (AOI) SCON B2 Warning Present Drill2Axis_FHPP_Ctrl.Warning

NEQ: Not Equal, Source A AlarmEmptyMessage '', Source B AlarmMessage[3,21] 'DRILL 2 SERVO WARNIN'

Warnings AlarmWord[3].21


91
FHPP control (AOI)
SCON B2
Warning Present
Drill2Axis_FHPP_Ctrl.Warning
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,22]
'DRILL 3 SERVO WARNIN'
Warnings
AlarmWord[3].22
92
FHPP control (AOI)
SCON B2
Warning Present
Drill2Axis_FHPP_Ctrl.Warning
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,23]
'DRILL 4 SERVO WARNIN'
Warnings
AlarmWord[3].23
SERVO FOLLOWING ERROR
93
FHPP control (AOI)
SPOS B5
Following Error
Present
Drill1Axis_FHPP_Ctrl.FollowingError
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,24]
'DRILL 1 FOLLOWING WA'
Warnings
AlarmWord[3].24
94
FHPP control (AOI)
SPOS B5
Following Error
Present
Drill2Axis_FHPP_Ctrl.FollowingError
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,25]
'DRILL 2 FOLLOWING WA'
Warnings
AlarmWord[3].25
95
FHPP control (AOI)
SPOS B5
Following Error
Present
Drill3Axis_FHPP_Ctrl.FollowingError
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,26]
'DRILL 3 FOLLOWING WA'
Warnings
AlarmWord[3].26
96
FHPP control (AOI)
SPOS B5
Following Error
Present
Drill4Axis_FHPP_Ctrl.FollowingError
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,27]
'DRILL 4 FOLLOWING WA'
Warnings
AlarmWord[3].24
SERVO STANDSTILL WARNING
97
FHPP control (AOI)
SPOS B6
Stand Still Monitor
Inactive=0
Move after MC=1
Drill1Axis_FHPP_Ctrl.StandstillWarning
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,28]
'DRILL 1 STANDSTILL E'
Warnings
AlarmWord[3].28
98
FHPP control (AOI)
SPOS B6
Stand Still Monitor
Inactive=0
Move after MC=1
Drill2Axis_FHPP_Ctrl.StandstillWarning
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,29]
'DRILL 2 STANDSTILL E'
Warnings
AlarmWord[3].29


FHPP control (AOI)
SPOS B6
Stand Still Monitor
Inactive=0
Move after MC=1
Drill3Axis_FHPP_Ctrl.StandstillWarning
99
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,30]
'DRILL 3 STANDSTILL E'
Warnings
AlarmWord[3].30
FHPP control (AOI)
SPOS B6
Stand Still Monitor
Inactive=0
Move after MC=1
Drill4Axis_FHPP_Ctrl.StandstillWarning
100
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B AlarmMessage[3,31]
'DRILL 4 STANDSTILL E'
Warnings
AlarmWord[3].31
jump to lights on clear command
Clear
101
LBL
JSR
Jump To Subroutine
Routine Name AlarmLightsLamps
(End)

---

alarm lights and lamps routine

0

NOP

Solid - machine is running in full auto
flashing - machine is ready and in one step mode
off - machine is not ready

1

System Control Manual Operating Mode
Sys.ManualMode

System Control System Running All
Sys.Running

System Control Manual Operating Mode
Sys.ManualMode

System Control one step request
Sys.OneStepMode

1.0 Sec Flasher
Flasher.1

outStartPBLT_Local
<Local:5:O.Data.0>

outStartPBLT_Rem
<Local:5:O.Data.3>

outStacklightGrn
<Local:5:O.Data.7>

IF NOT STARTED THEN RED STOP LIGHT

2

System Control System Start Enabled
Sys.StartEnable

outStopPBLT_Local
<Local:5:O.Data.1>

outStopPBLT_Rem
<Local:5:O.Data.4>

IF CRITICAL ALARM THEN FLASH RED STACK LIGHT
IF NOT CRITICAL ALARM AND SYSTEM STOPPED THEN SOLID STACK

3

System Control Immediate Stop Trigger
Sys.CriticalStop

1.0 Sec Flasher
Flasher.1

System Control Immediate Stop Trigger
Sys.CriticalStop

System Control System Start Enabled
Sys.StartEnable

outStacklightRed
<Local:5:O.Data.8>

IF CRITICAL ALARM THEN SOLID YELLOW STACK LIGHT
IF NON-CRITICAL ALARM THEN FLASH YELLOW STACK LIGHT

4

Critical Alarms

NEQ
Not Equal
Source A AlarmWord[1]
0
Source B 0
0

Normal Stops

NEQ
Not Equal
Source A AlarmWord[2]
0
Source B 0
0

1.0 Sec Flasher
Flasher.1

outStacklightYel
<Local:5:O.Data.9>

IF ALARM ACTIVE THEN FLASH RESET LAMP

5

System Control Immediate Stop Trigger
Sys.CriticalStop

1.0 Sec Flasher
Flasher.1

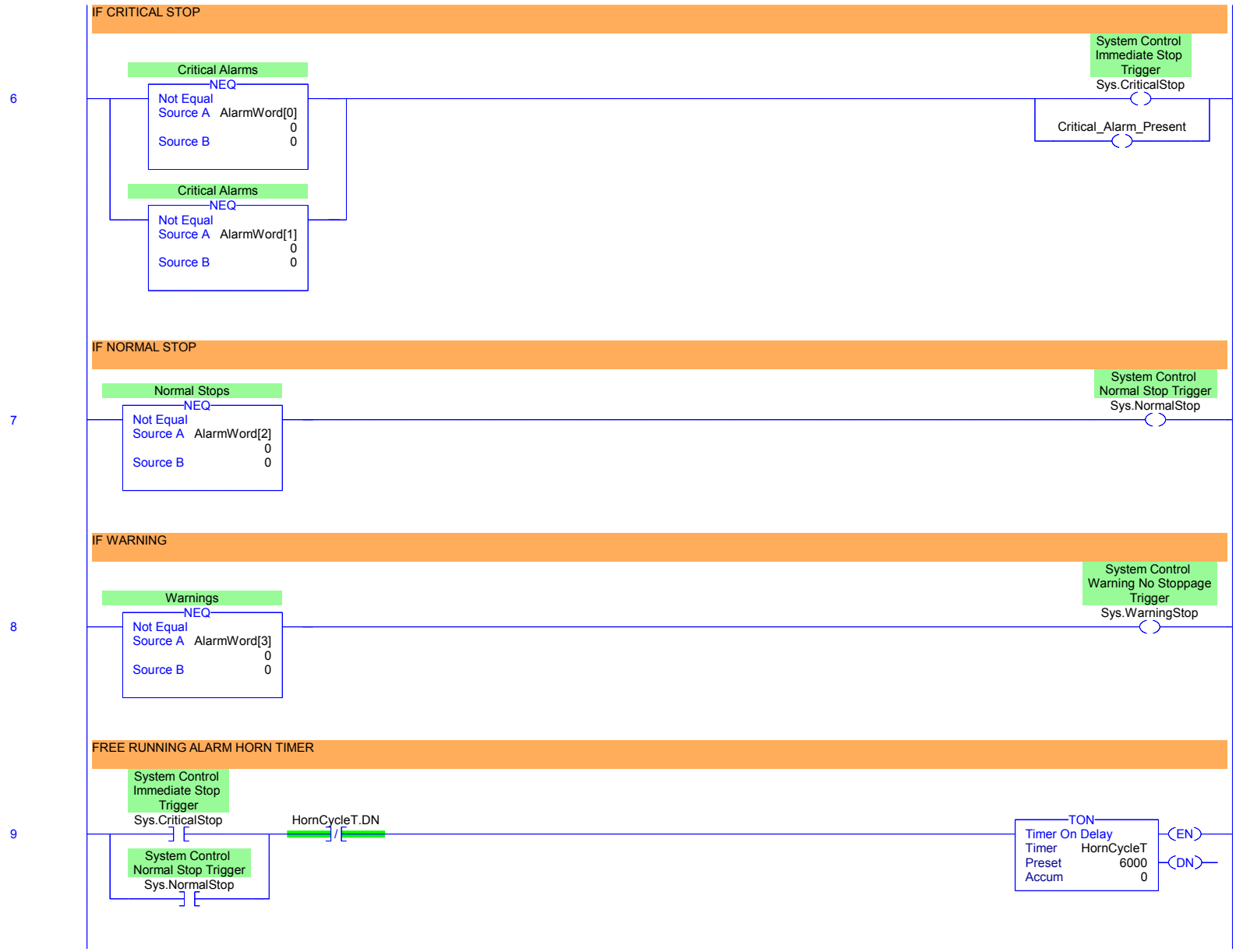
System Control Normal Stop Trigger
Sys.NormalStop

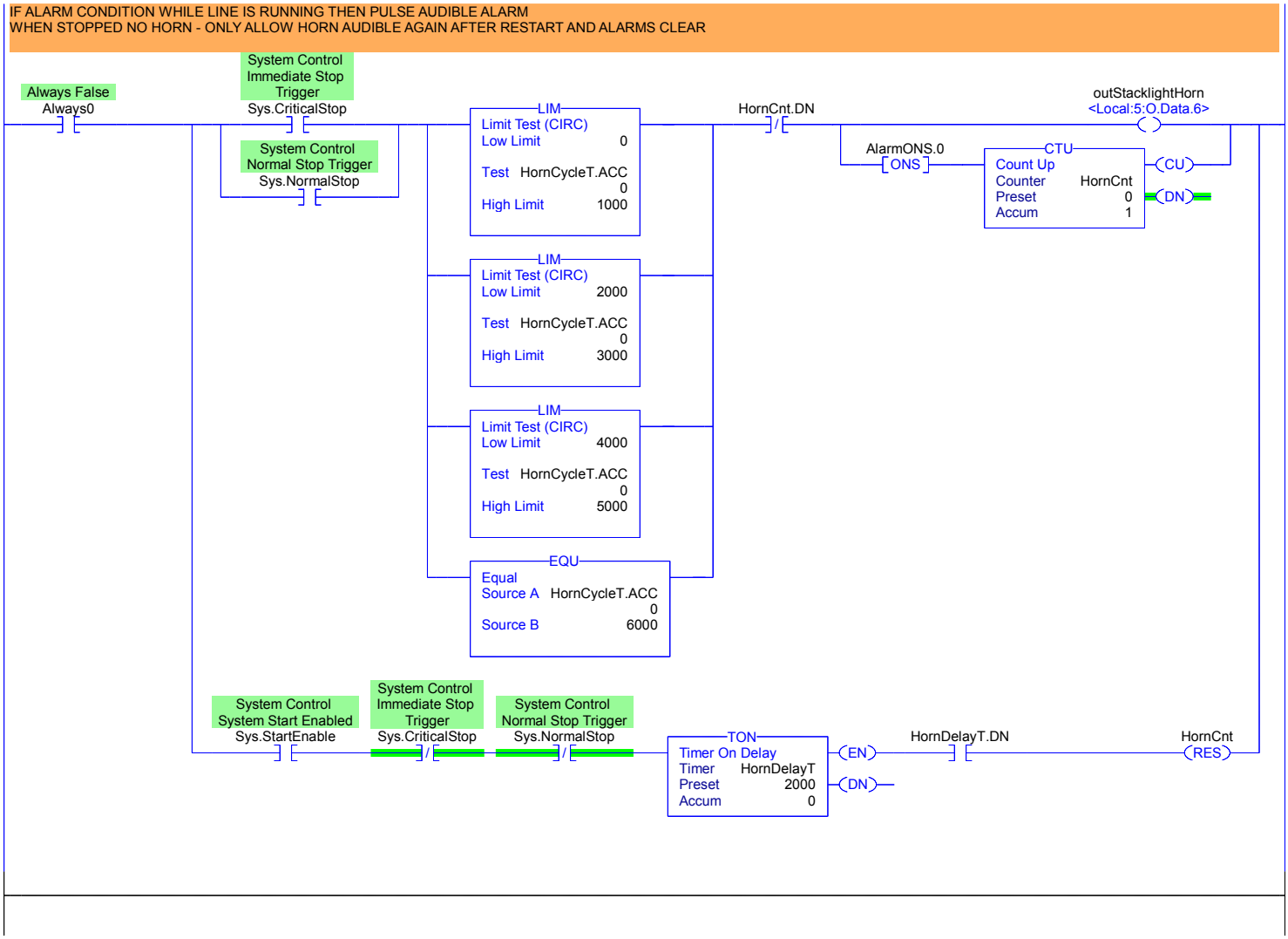
System Control Warning No Stoppage Trigger
Sys.WarningStop

outResetPBLT_Local
<Local:5:O.Data.2>

outResetPBLT_Rem
<Local:5:O.Data.5>

outStacklightBlu
<Local:5:O.Data.10>


IF CRITICAL STOP
Critical Alarms
NEQ
Not Equal
Source A AlarmWord[0]
0
Source B 0
Critical Alarms
NEQ
Not Equal
Source A AlarmWord[1]
0
Source B 0
System Control Immediate Stop Trigger
Sys.CriticalStop
Critical_Alarm_Present
6
IF NORMAL STOP
Normal Stops
NEQ
Not Equal
Source A AlarmWord[2]
0
Source B 0
System Control Normal Stop Trigger
Sys.NormalStop
7
IF WARNING
Warnings
NEQ
Not Equal
Source A AlarmWord[3]
0
Source B 0
System Control Warning No Stoppage Trigger
Sys.WarningStop
8
FREE RUNNING ALARM HORN TIMER
System Control Immediate Stop Trigger
Sys.CriticalStop
System Control Normal Stop Trigger
Sys.NormalStop
HornCycleT.DN
TON
Timer On Delay
Timer HornCycleT
Preset 6000
Accum 0
EN
DN
9


IF ALARM CONDITION WHILE LINE IS RUNNING THEN PULSE AUDIBLE ALARM
WHEN STOPPED NO HORN - ONLY ALLOW HORN AUDIBLE AGAIN AFTER RESTART AND ALARMS CLEAR
10
Always False
Always0
System Control Immediate Stop Trigger
Sys.CriticalStop
System Control Normal Stop Trigger
Sys.NormalStop
LIM
Limit Test (CIRC)
Low Limit 0
Test HornCycleT.ACC 0
High Limit 1000
LIM
Limit Test (CIRC)
Low Limit 2000
Test HornCycleT.ACC 0
High Limit 3000
LIM
Limit Test (CIRC)
Low Limit 4000
Test HornCycleT.ACC 0
High Limit 5000
EQU
Equal
Source A HornCycleT.ACC 0
Source B 6000
HornCnt.DN
outStacklightHorn
<Local:5:O.Data.6>
AlarmONS.0
ONS
CTU
Count Up
Counter HornCnt
Preset 0
Accum 1
CU
DN
System Control System Start Enabled
Sys.StartEnable
System Control Immediate Stop Trigger
Sys.CriticalStop
System Control Normal Stop Trigger
Sys.NormalStop
TON
Timer On Delay
Timer HornDelayT
Preset 2000
Accum 0
EN
DN
HornDelayT.DN
HornCnt
RES
(End)

0 NOP

COLLET TRACKING - BEGIN

1 NOP

2

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 1

current collet number
MOV
Move
Source 1
Dest ST01.stsCurColletNum 8

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 2

current collet number
MOV
Move
Source 2
Dest ST01.stsCurColletNum 8

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 3

current collet number
MOV
Move
Source 3
Dest ST01.stsCurColletNum 8

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 4

current collet number
MOV
Move
Source 4
Dest ST01.stsCurColletNum 8

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 5

current collet number
MOV
Move
Source 5
Dest ST01.stsCurColletNum 8

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 6

current collet number
MOV
Move
Source 6
Dest ST01.stsCurColletNum 8

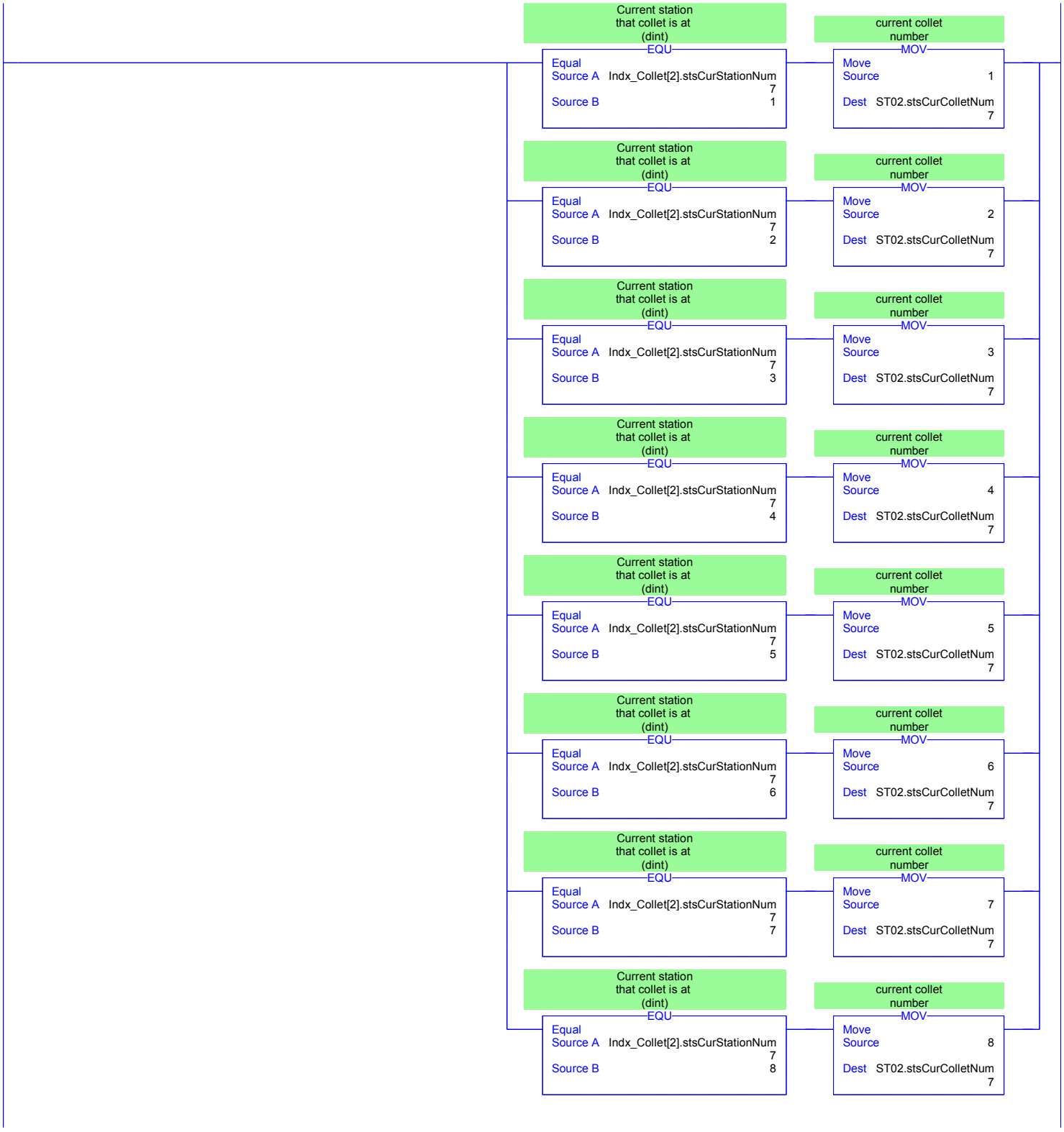
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 7

current collet number
MOV
Move
Source 7
Dest ST01.stsCurColletNum 8

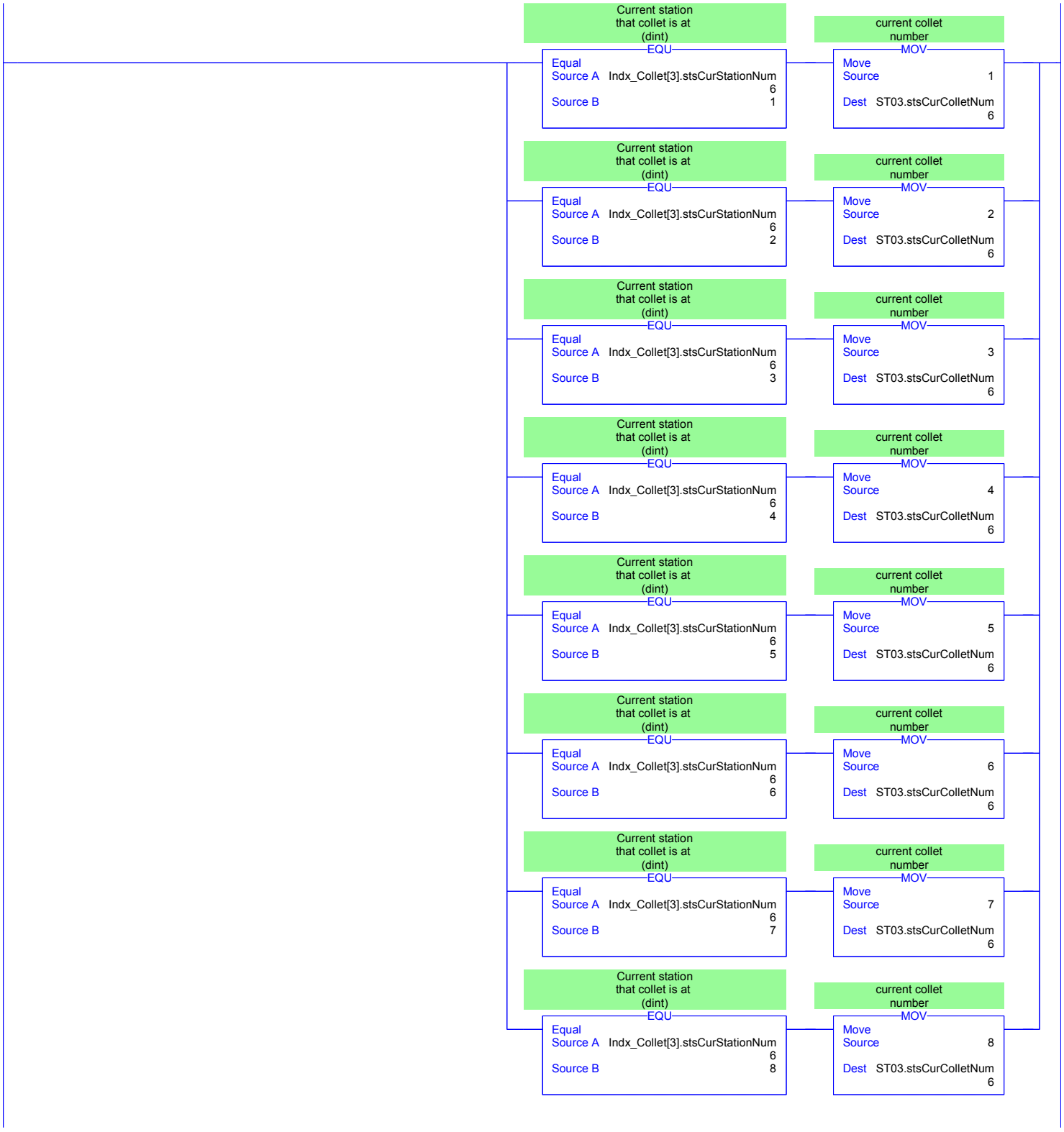
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[1].stsCurStationNum 8
Source B 8

current collet number
MOV
Move
Source 8
Dest ST01.stsCurColletNum 8

3


Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 1
current collet number
MOV
Move
Source 1
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 2
current collet number
MOV
Move
Source 2
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 3
current collet number
MOV
Move
Source 3
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 4
current collet number
MOV
Move
Source 4
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 5
current collet number
MOV
Move
Source 5
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 6
current collet number
MOV
Move
Source 6
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 7
current collet number
MOV
Move
Source 7
Dest ST02.stsCurColletNum 7
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[2].stsCurStationNum 7
Source B 8
current collet number
MOV
Move
Source 8
Dest ST02.stsCurColletNum 7

4


Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 1
current collet number
MOV
Move
Source 1
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 2
current collet number
MOV
Move
Source 2
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 3
current collet number
MOV
Move
Source 3
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 4
current collet number
MOV
Move
Source 4
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 5
current collet number
MOV
Move
Source 5
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 6
current collet number
MOV
Move
Source 6
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 7
current collet number
MOV
Move
Source 7
Dest ST03.stsCurColletNum 6
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[3].stsCurStationNum 6
Source B 8
current collet number
MOV
Move
Source 8
Dest ST03.stsCurColletNum 6

5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 1

current collet number
MOV
Move
Source 1
Dest ST04.stsCurColletNum 5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 2

current collet number
MOV
Move
Source 2
Dest ST04.stsCurColletNum 5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 3

current collet number
MOV
Move
Source 3
Dest ST04.stsCurColletNum 5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 4

current collet number
MOV
Move
Source 4
Dest ST04.stsCurColletNum 5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 5

current collet number
MOV
Move
Source 5
Dest ST04.stsCurColletNum 5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 6

current collet number
MOV
Move
Source 6
Dest ST04.stsCurColletNum 5

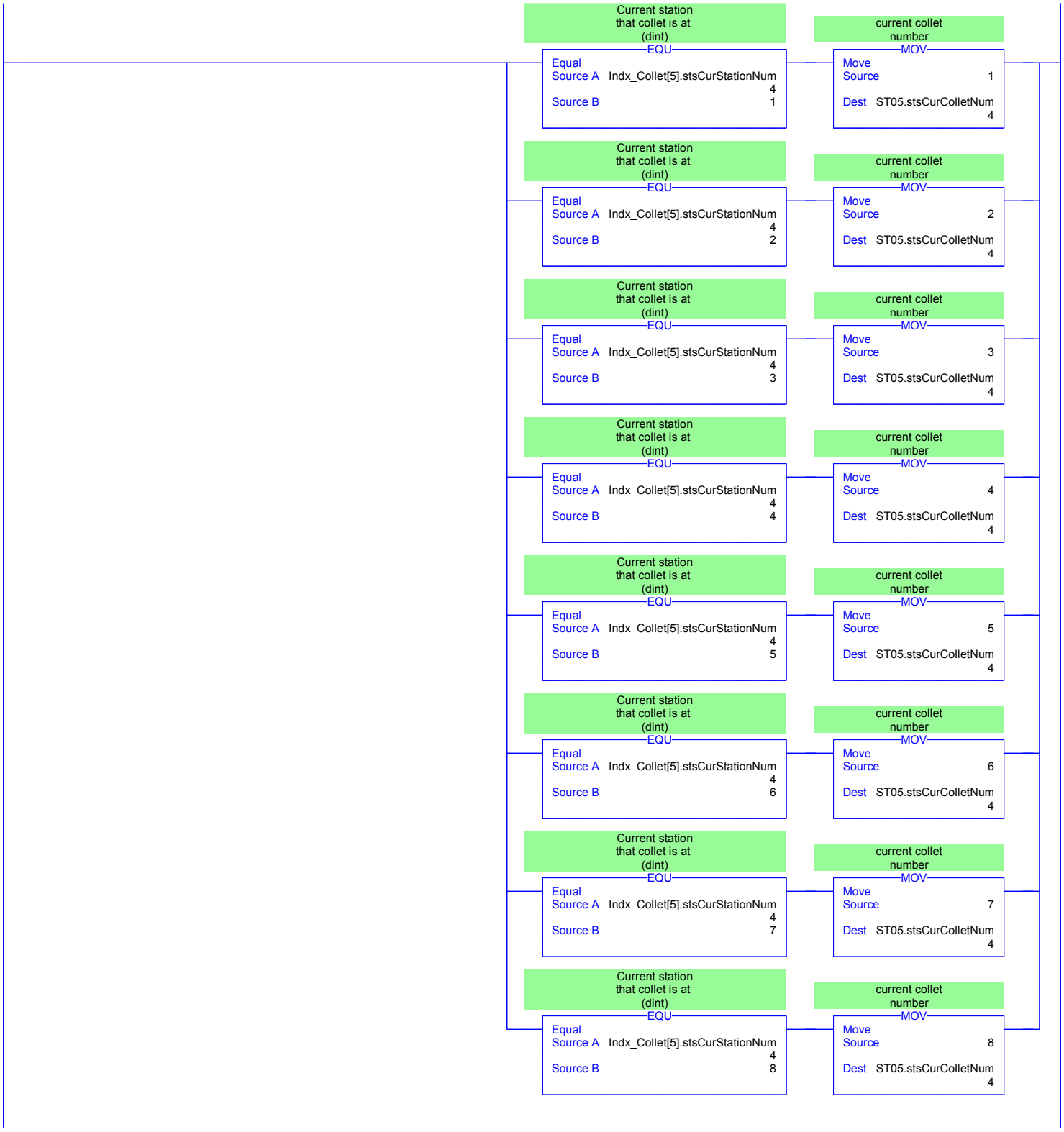
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 7

current collet number
MOV
Move
Source 7
Dest ST04.stsCurColletNum 5

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[4].stsCurStationNum 5
Source B 8

current collet number
MOV
Move
Source 8
Dest ST04.stsCurColletNum 5

6


Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 1
current collet number
MOV
Move
Source 1
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 2
current collet number
MOV
Move
Source 2
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 3
current collet number
MOV
Move
Source 3
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 4
current collet number
MOV
Move
Source 4
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 5
current collet number
MOV
Move
Source 5
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 6
current collet number
MOV
Move
Source 6
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 7
current collet number
MOV
Move
Source 7
Dest ST05.stsCurColletNum 4
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[5].stsCurStationNum 4
Source B 8
current collet number
MOV
Move
Source 8
Dest ST05.stsCurColletNum 4

7

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 1

current collet number
MOV
Move
Source 1
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 2

current collet number
MOV
Move
Source 2
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 3

current collet number
MOV
Move
Source 3
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 4

current collet number
MOV
Move
Source 4
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 5

current collet number
MOV
Move
Source 5
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 6

current collet number
MOV
Move
Source 6
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 7

current collet number
MOV
Move
Source 7
Dest ST06.stsCurColletNum 3

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[6].stsCurStationNum 3
Source B 8

current collet number
MOV
Move
Source 8
Dest ST06.stsCurColletNum 3

8

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 1

current collet number
MOV
Move
Source 1
Dest ST07.stsCurColletNum 2

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 2

current collet number
MOV
Move
Source 2
Dest ST07.stsCurColletNum 2

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 3

current collet number
MOV
Move
Source 3
Dest ST07.stsCurColletNum 2

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 4

current collet number
MOV
Move
Source 4
Dest ST07.stsCurColletNum 2

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 5

current collet number
MOV
Move
Source 5
Dest ST07.stsCurColletNum 2

Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 6

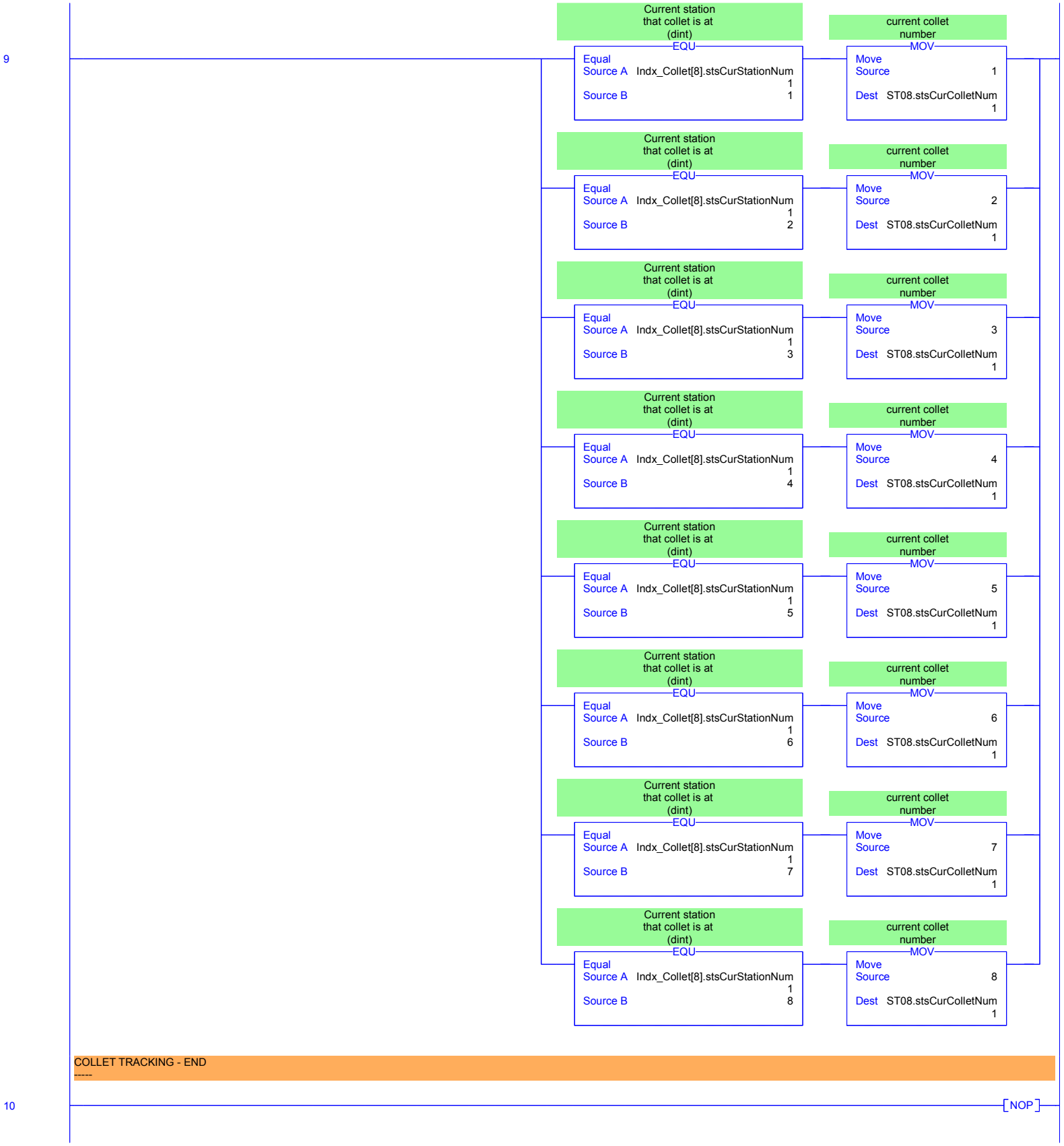
current collet number
MOV
Move
Source 6
Dest ST07.stsCurColletNum 2

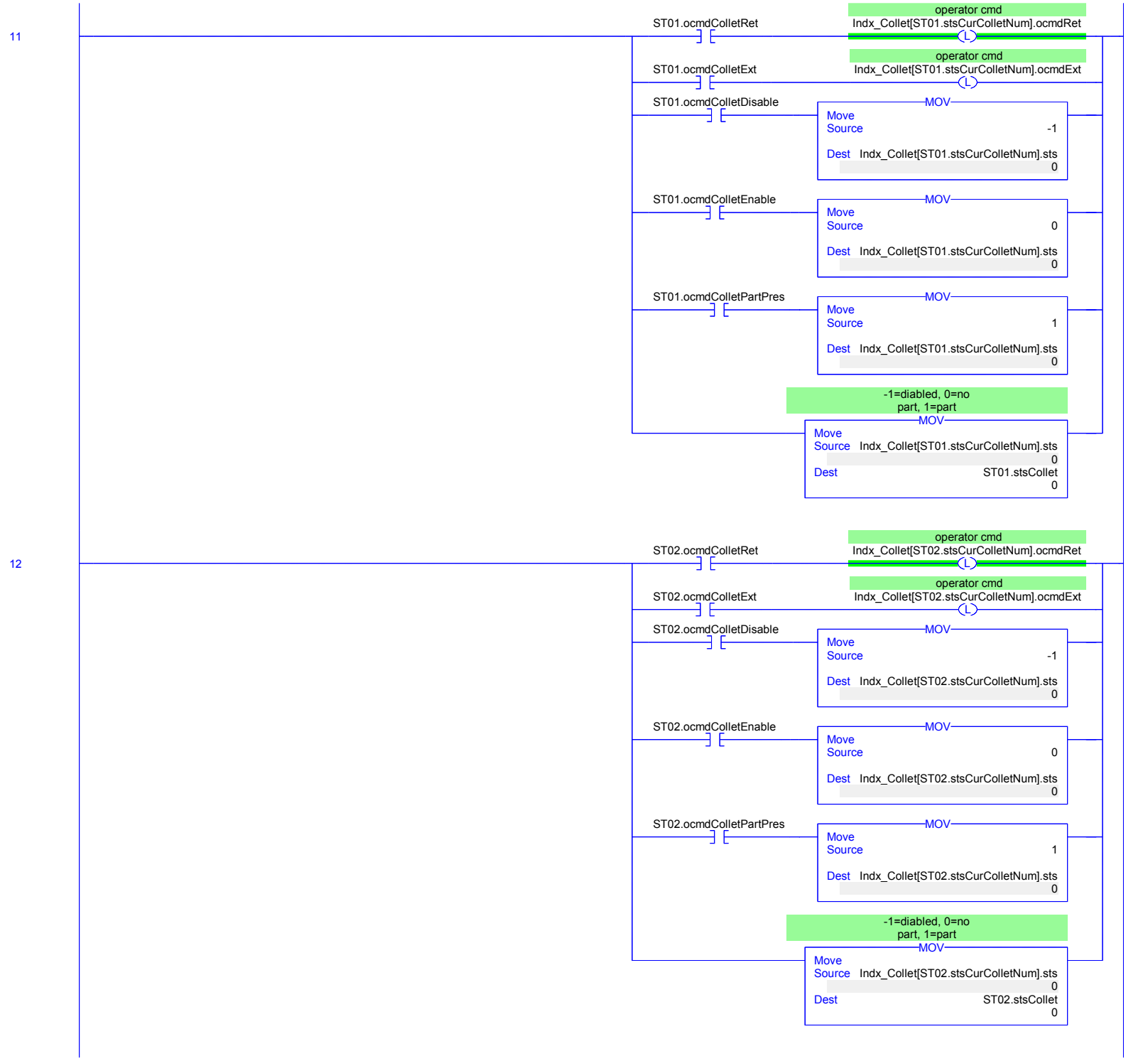
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 7

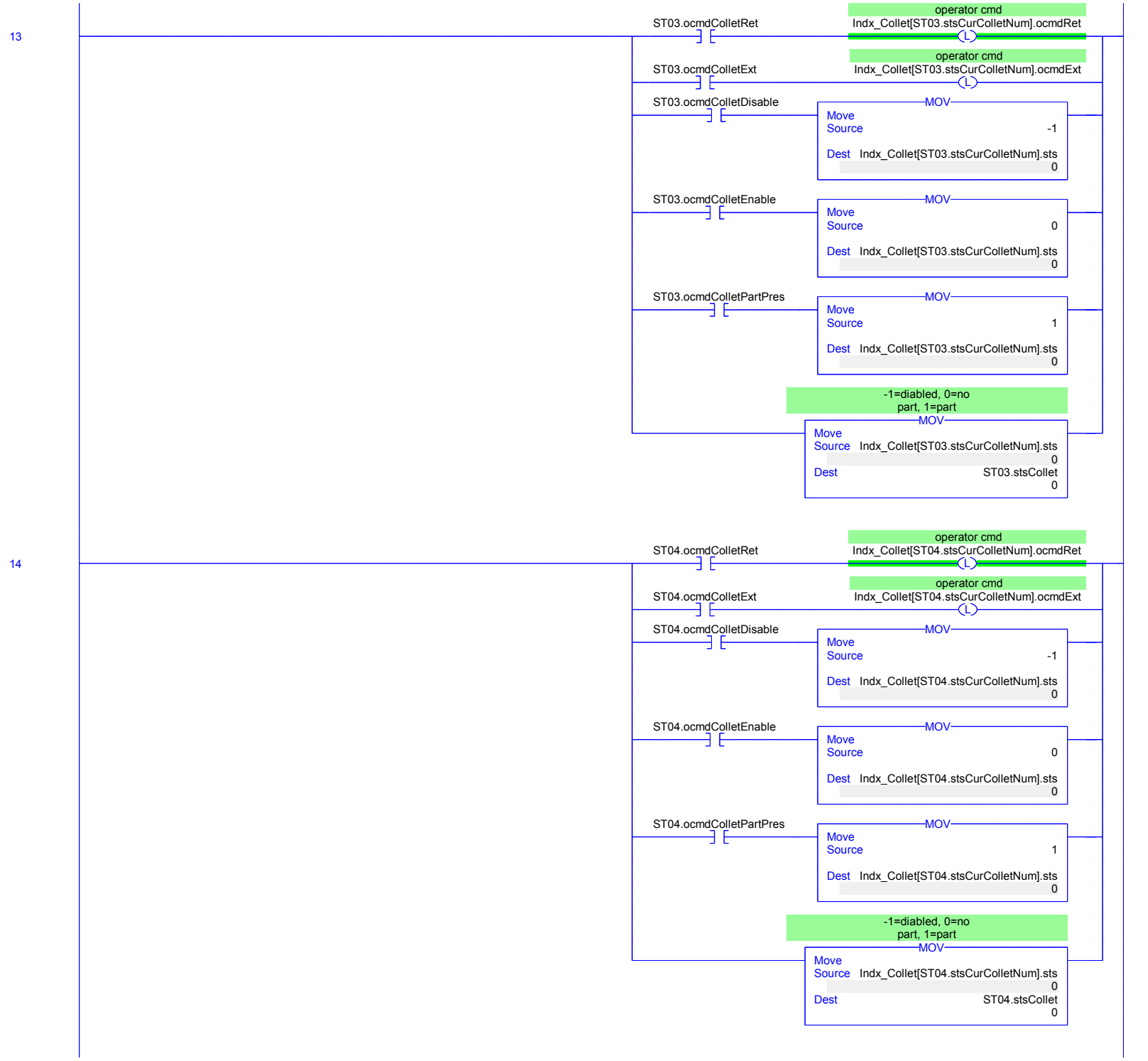
current collet number
MOV
Move
Source 7
Dest ST07.stsCurColletNum 2

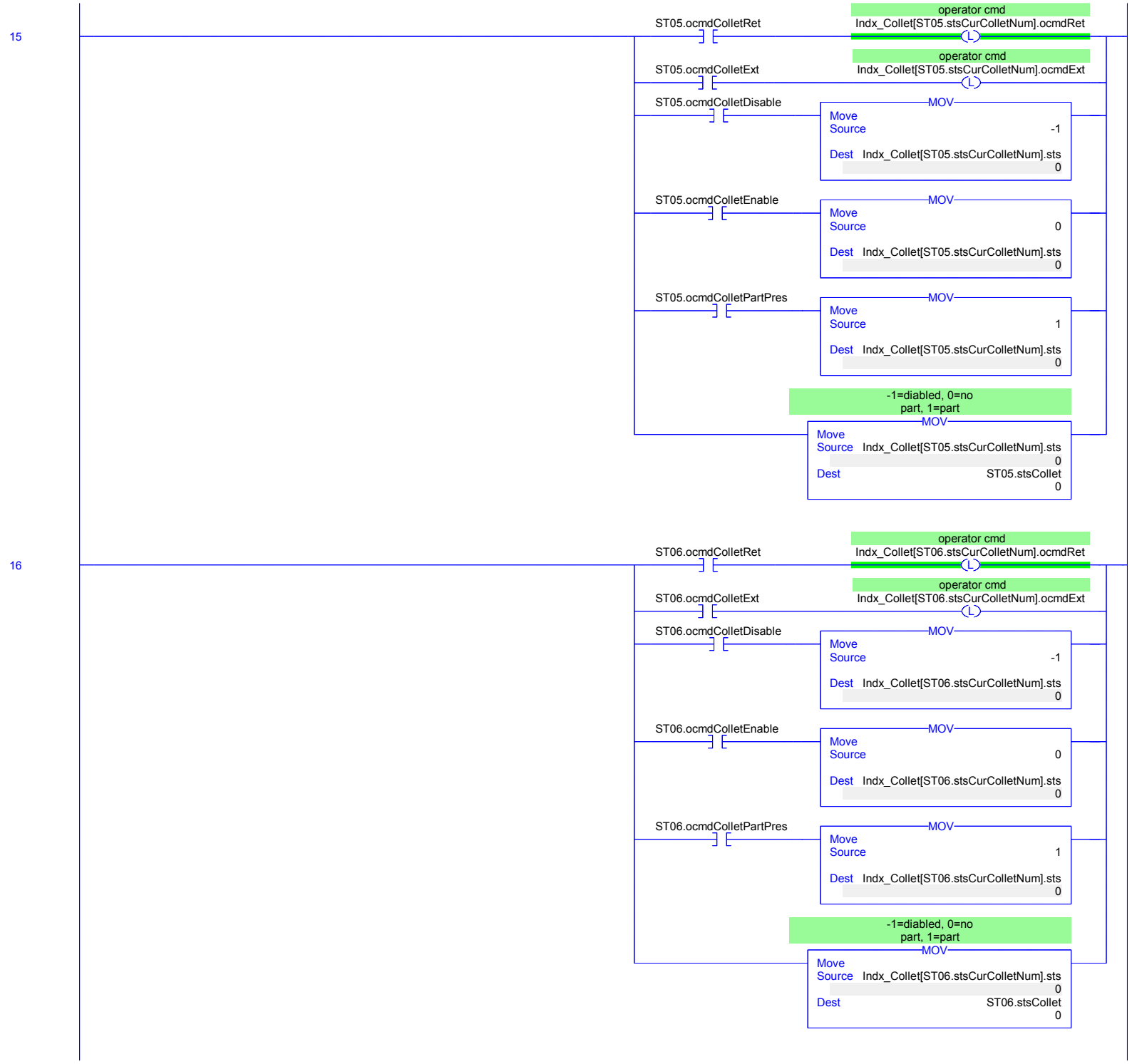
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[7].stsCurStationNum 2
Source B 8

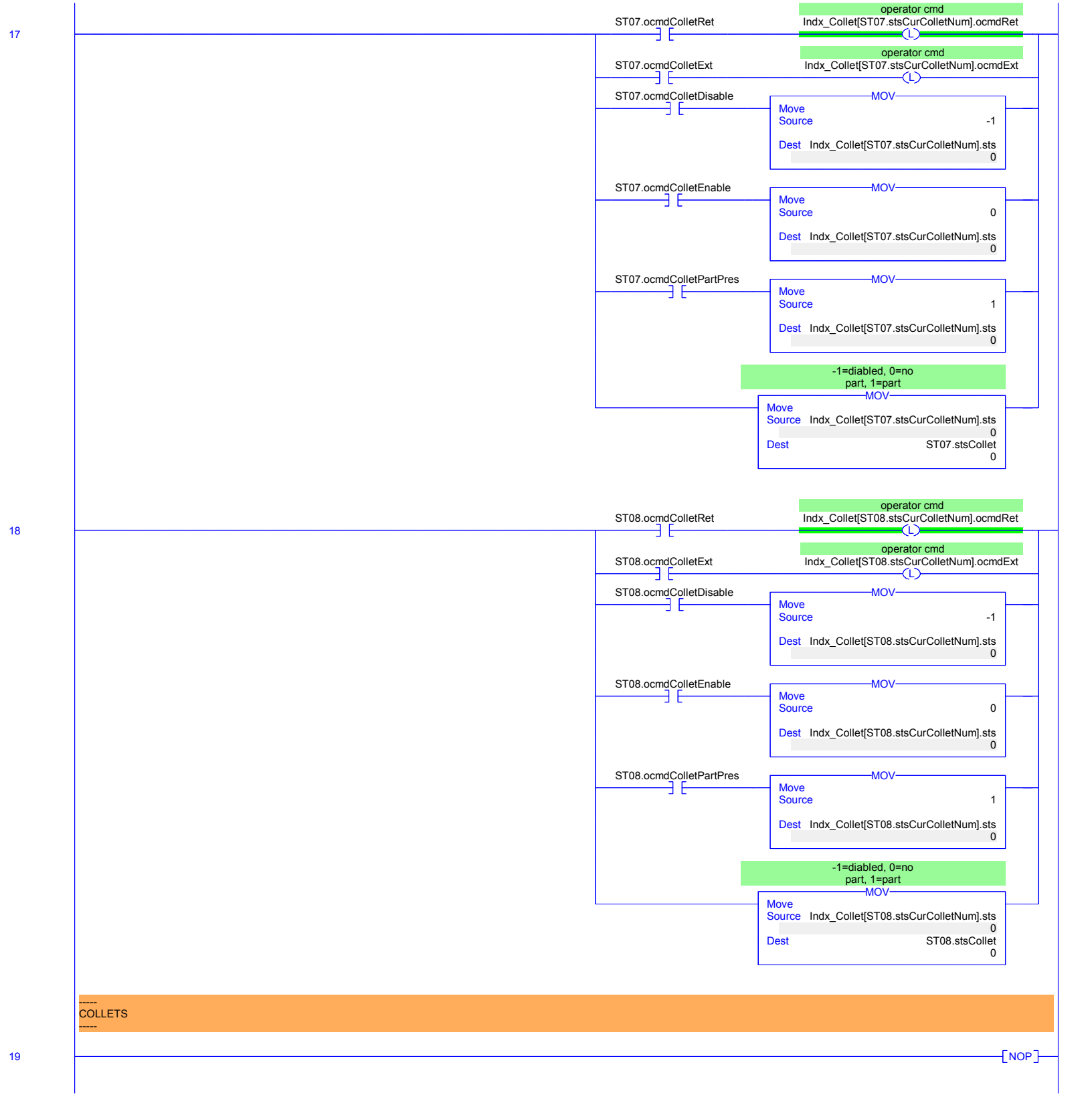
current collet number
MOV
Move
Source 8
Dest ST07.stsCurColletNum 2


9
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 1
current collet number
MOV
Move
Source 1
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 2
current collet number
MOV
Move
Source 2
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 3
current collet number
MOV
Move
Source 3
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 4
current collet number
MOV
Move
Source 4
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 5
current collet number
MOV
Move
Source 5
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 6
current collet number
MOV
Move
Source 6
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 7
current collet number
MOV
Move
Source 7
Dest ST08.stsCurColletNum 1
Current station that collet is at (dint)
EQU
Equal
Source A Indx_Collet[8].stsCurStationNum 1
Source B 8
current collet number
MOV
Move
Source 8
Dest ST08.stsCurColletNum 1
COLLET TRACKING - END
10
NOP


11
ST01.ocmdColletRet
operator cmd
Indx_Collet[ST01.stsCurColletNum].ocmdRet
L
ST01.ocmdColletExt
operator cmd
Indx_Collet[ST01.stsCurColletNum].ocmdExt
L
ST01.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST01.stsCurColletNum].sts 0
ST01.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST01.stsCurColletNum].sts 0
ST01.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST01.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST01.stsCurColletNum].sts 0
Dest ST01.stsCollet 0
12
ST02.ocmdColletRet
operator cmd
Indx_Collet[ST02.stsCurColletNum].ocmdRet
L
ST02.ocmdColletExt
operator cmd
Indx_Collet[ST02.stsCurColletNum].ocmdExt
L
ST02.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST02.stsCurColletNum].sts 0
ST02.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST02.stsCurColletNum].sts 0
ST02.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST02.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST02.stsCurColletNum].sts 0
Dest ST02.stsCollet 0


13
ST03.ocmdColletRet
operator cmd
Indx_Collet[ST03.stsCurColletNum].ocmdRet
L
ST03.ocmdColletExt
operator cmd
Indx_Collet[ST03.stsCurColletNum].ocmdExt
L
ST03.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST03.stsCurColletNum].sts 0
ST03.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST03.stsCurColletNum].sts 0
ST03.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST03.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST03.stsCurColletNum].sts 0
Dest ST03.stsCollet 0
14
ST04.ocmdColletRet
operator cmd
Indx_Collet[ST04.stsCurColletNum].ocmdRet
L
ST04.ocmdColletExt
operator cmd
Indx_Collet[ST04.stsCurColletNum].ocmdExt
L
ST04.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST04.stsCurColletNum].sts 0
ST04.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST04.stsCurColletNum].sts 0
ST04.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST04.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST04.stsCurColletNum].sts 0
Dest ST04.stsCollet 0


15
ST05.ocmdColletRet
operator cmd
Indx_Collet[ST05.stsCurColletNum].ocmdRet
L
ST05.ocmdColletExt
operator cmd
Indx_Collet[ST05.stsCurColletNum].ocmdExt
L
ST05.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST05.stsCurColletNum].sts 0
ST05.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST05.stsCurColletNum].sts 0
ST05.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST05.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST05.stsCurColletNum].sts 0
Dest ST05.stsCollet 0
16
ST06.ocmdColletRet
operator cmd
Indx_Collet[ST06.stsCurColletNum].ocmdRet
L
ST06.ocmdColletExt
operator cmd
Indx_Collet[ST06.stsCurColletNum].ocmdExt
L
ST06.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST06.stsCurColletNum].sts 0
ST06.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST06.stsCurColletNum].sts 0
ST06.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST06.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST06.stsCurColletNum].sts 0
Dest ST06.stsCollet 0


17
ST07.ocmdColletRet
operator cmd
Indx_Collet[ST07.stsCurColletNum].ocmdRet
L
ST07.ocmdColletExt
operator cmd
Indx_Collet[ST07.stsCurColletNum].ocmdExt
L
ST07.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST07.stsCurColletNum].sts 0
ST07.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST07.stsCurColletNum].sts 0
ST07.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST07.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST07.stsCurColletNum].sts 0
Dest ST07.stsCollet 0
18
ST08.ocmdColletRet
operator cmd
Indx_Collet[ST08.stsCurColletNum].ocmdRet
L
ST08.ocmdColletExt
operator cmd
Indx_Collet[ST08.stsCurColletNum].ocmdExt
L
ST08.ocmdColletDisable
MOV
Move
Source -1
Dest Indx_Collet[ST08.stsCurColletNum].sts 0
ST08.ocmdColletEnable
MOV
Move
Source 0
Dest Indx_Collet[ST08.stsCurColletNum].sts 0
ST08.ocmdColletPartPres
MOV
Move
Source 1
Dest Indx_Collet[ST08.stsCurColletNum].sts 0
-1=diabled, 0=no part, 1=part
MOV
Move
Source Indx_Collet[ST08.stsCurColletNum].sts 0
Dest ST08.stsCollet 0

COLLETS

19
NOP

20

Collet

Collet	Indx_Collet[1]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	1
cfgColletPos_Deg	0
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet1Close
	<VB2:O.Data[3].4>
	0
stsCurStationNum	8
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

21

Collet

Collet	Indx_Collet[2]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	2
cfgColletPos_Deg	-45
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet2Close
	<VB2:O.Data[3].6>
	0
stsCurStationNum	7
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

22

Collet

Collet	Indx_Collet[3]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	3
cfgColletPos_Deg	-90
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet3Close
	<VB2:O.Data[4].0>
	0
stsCurStationNum	6
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

23

Collet

Collet	Indx_Collet[4]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	4
cfgColletPos_Deg	-135
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet4Close
	<VB2:O.Data[4].2>
	0
stsCurStationNum	5
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

24

Collet

Collet	Indx_Collet[5]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	5
cfgColletPos_Deg	-180
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet5Close
	<VB2:O.Data[4].4>
	0
stsCurStationNum	4
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

25

Collet

Collet	Indx_Collet[6]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	6
cfgColletPos_Deg	-225
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet6Close
	<VB2:O.Data[4].6>
	0
stsCurStationNum	3
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

26

Collet

Collet	Indx_Collet[7]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	7
cfgColletPos_Deg	-270
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet7Close
	<VB2:O.Data[5].0>
	0
stsCurStationNum	2
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

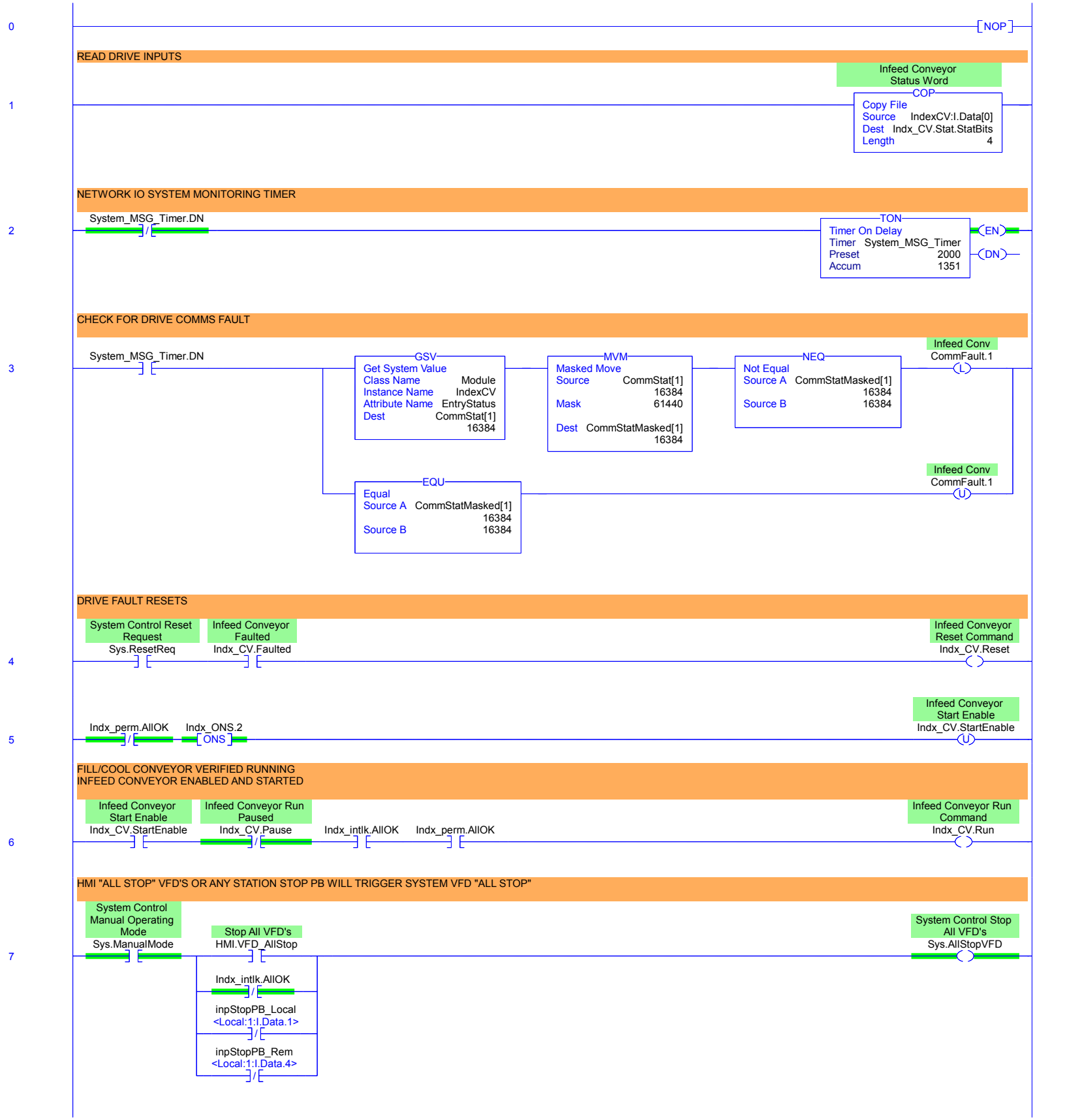
27

Collet

Collet	Indx_Collet[8]
permExt	Always1
	1
permRet	Always1
	1
cfgColletNum	8
cfgColletPos_Deg	-315
cfgCloseTime	500
cmdManEnable	Sys.ManualMode
	1
pcmdExt	0
pcmdRet	0
ocmdExt	0
ocmdRet	1
C_o_l_l_e_t_I_O	0
inpWheelPos_deg	Indx_TablePos_Deg
	323.99
sts	0
inpColletDisabled	0
outExtSOL	outCollet8Close
	<VB2:O.Data[5].2>
	0
stsCurStationNum	1
stsCurStationNum_Real	7.1997776
A_l_a_r_m	0

stsExt
stsRet
alm

(End)


0
NOP
READ DRIVE INPUTS
Infeed Conveyor Status Word
1
COP
Copy File
Source IndexCV:I.Data[0]
Dest Indx_CV.Stat.StatBits
Length 4
NETWORK IO SYSTEM MONITORING TIMER
System_MSG_Timer.DN
2
TON
Timer On Delay
Timer System_MSG_Timer
Preset 2000
Accum 1351
EN
DN
CHECK FOR DRIVE COMMS FAULT
Infeed Conv CommFault.1
System_MSG_Timer.DN
3
GSV
Get System Value
Class Name Module
Instance Name IndexCV
Attribute Name EntryStatus
Dest CommStat[1] 16384
MVM
Masked Move
Source CommStat[1] 16384
Mask 61440
Dest CommStatMasked[1] 16384
NEQ
Not Equal
Source A CommStatMasked[1] 16384
Source B 16384
L
EQU
Equal
Source A CommStatMasked[1] 16384
Source B 16384
Infeed Conv CommFault.1
U
DRIVE FAULT RESETS
System Control Reset Request
Sys.ResetReq
Infeed Conveyor Faulted
Indx_CV.Faulted
4
Infeed Conveyor Reset Command
Indx_CV.Reset
Infeed Conveyor Start Enable
Indx_perm.AllOK
Indx_ONS.2
5
ONS
Indx_CV.StartEnable
U
FILL/COOL CONVEYOR VERIFIED RUNNING
INFEED CONVEYOR ENABLED AND STARTED
Infeed Conveyor Start Enable
Indx_CV.StartEnable
Infeed Conveyor Run Paused
Indx_CV.Pause
Indx_intlk.AllOK
Indx_perm.AllOK
6
Infeed Conveyor Run Command
Indx_CV.Run
HMI "ALL STOP" VFD'S OR ANY STATION STOP PB WILL TRIGGER SYSTEM VFD "ALL STOP"
System Control Manual Operating Mode
Sys.ManualMode
Stop All VFD's
HMI.VFD_AllStop
7
Indx_intlk.AllOK
inpStopPB_Local
<Local:1:I.Data.1>
inpStopPB_Rem
<Local:1:I.Data.4>
System Control Stop All VFD's
Sys.AllStopVFD

8

System Control Manual Operating Mode
Sys.ManualMode

Indx_CVManualStatus

Infeed Conveyor Speed Setpoint
MOV
Move Source 20
Dest Indx_CV.SpdSP 20.0

9

System Control Manual Operating Mode
Sys.ManualMode

Indx_intlk.AllOK

HMI_Indx_JogFwd

Indx_stsLSOn

Indx_ONS.12
ONS

Indx_stsLSOff
U

Indx_stsLSOn
U

Infeed Conveyor Speed Setpoint
MOV
Move Source Indx_cfgConvJogSpd 20
Dest Indx_CV.SpdSP 20.0

Infeed Conveyor Manual Start PB
Indx_CV.ManStart

inpIndxTableHomeLS
<Local:3:I.Data.10>

Indx_stsLSOff
L

Indx_stsLSOff

inpIndxTableHomeLS
<Local:3:I.Data.10>

Indx_stsLSOn
L

10

Infeed Conveyor Manual Start PB
Indx_CV.ManStart

Infeed Conveyor Manual Stop PB
Indx_CV.ManStop

INFEED CONVEYOR CONTROL

11

Indexing Wheel Control AOI
VFD_Control

VFD_Control	Indx_Conv	Faulted
CONFIG_RMS	230.0	
CONFIG_HP	0.5	Ready
CONFIG_FLA	1.8	
CONFIG_RPM	1725.0	Running
CONFIG_SF	1.0	
CONFIG_PF	0.69	Manual
CMD_Ready	Sys.EstopOK 1	AtReference
CMD_AutoRun	Indx_CV.Run 0	
CMD_SpdHz	Indx_CV.SpdSP 20.0	
CMD_GearRatio	Indx_CV.Gear 1.0	
CMD_FltReset	Indx_CV.Reset 0	
CMD_ManEnable	Indx_CVManualStatus 1	
CMD_ManStartPB	Indx_CV.ManStart 0	
CMD_ManAllStart	HMI.VFD_AllStart 0	
CMD_ManStopPB	Indx_CV.ManStop 1	
CMD_ManAllStop	Sys.AllStopVFD 1	
Control	Indx_CV.Cmd	
Status	Indx_CV.Stat	
STAT_RunFwd	Indx_CV.RunningFwd 0	
STAT_ManEnabled	Indx_CV.ManEnable 0	
STAT_Ready	Indx_CV.Ready 1	
STAT_Fault	Indx_CV.Faulted 0	
STAT_AtRef	Indx_CV.AtRef 0	
STAT_ActSpdHz	Indx_CV.SpdAct 0.0	
STAT_ActCurrent	Indx_CV.CurrAct 0.0	

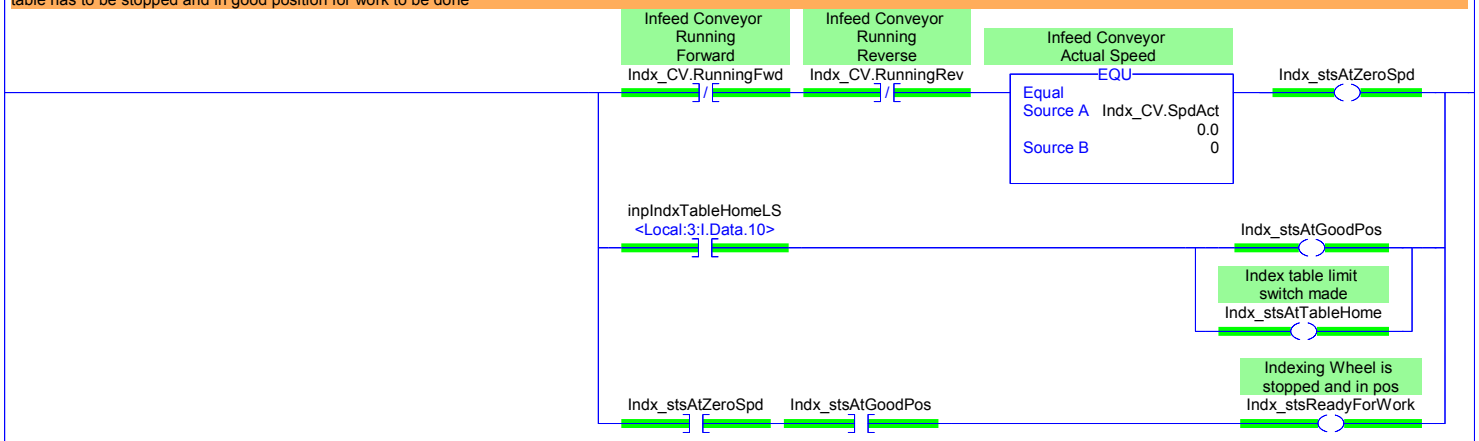
FEEDBACK - START

12

NOP

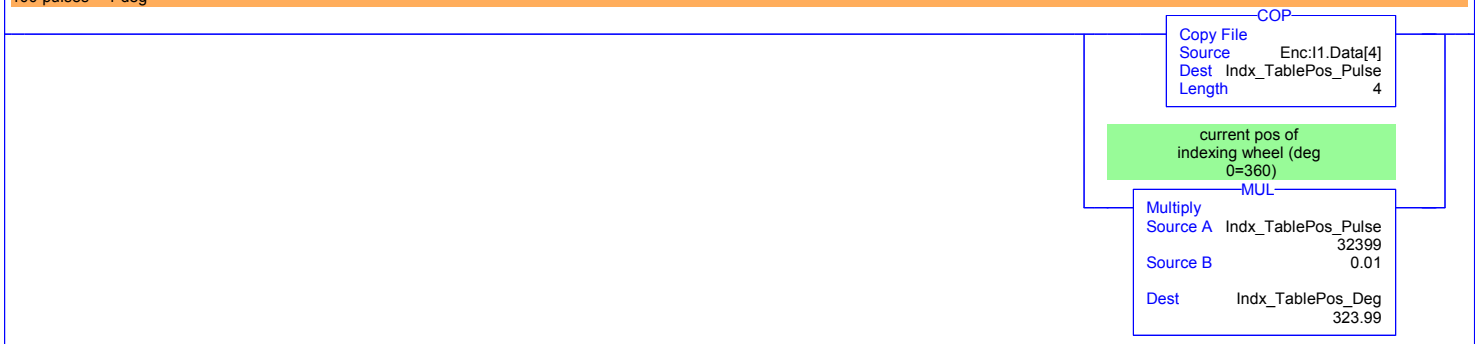
limit switch feedback (Is id made when table is a a good position (ie. stopped correctly on a collet)
table has to be stopped and in good position for work to be done

13



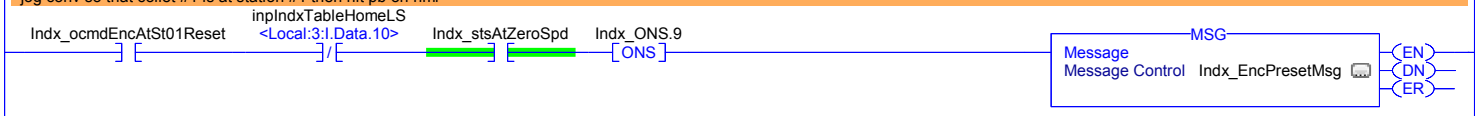
encoder feedback
encoder preset to 3600 pulses per 1 rev of the table (1 table rev=8 enc rev)
100 pulses = 1 deg

14



encoder reset
- should only be used if encoder is replaced or loses position for some reason
- jog conv so that collet #1 is at station #1 then hit pb on hmi

15

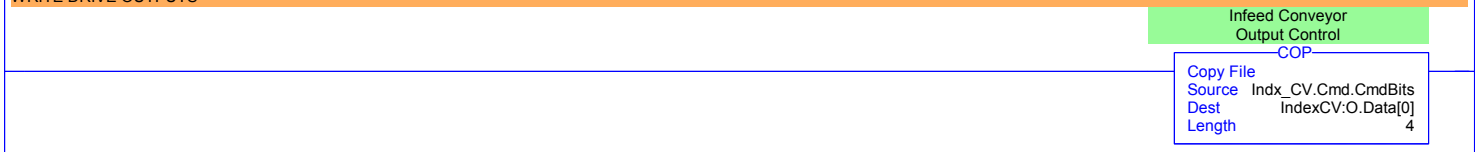


FEEDBACK - END

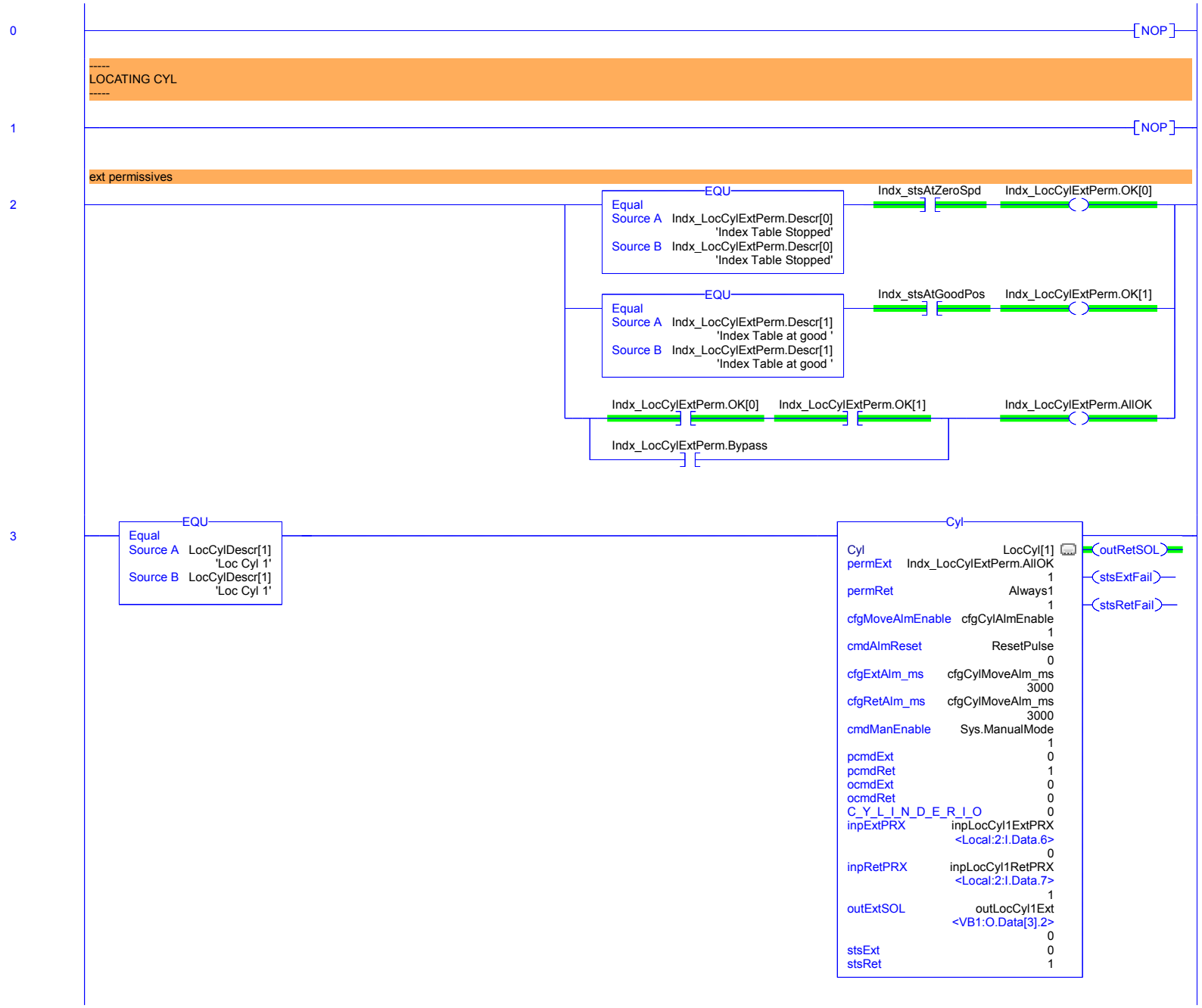
16

WRITE DRIVE OUTPUTS

17



(End)


0
NOP

LOCATING CYL

1
NOP
ext permissives
2
EQU
Equal
Source A Indx_LocCylExtPerm.Descr[0]
'Index Table Stopped'
Source B Indx_LocCylExtPerm.Descr[0]
'Index Table Stopped'
Indx_stsAtZeroSpd
Indx_LocCylExtPerm.OK[0]
EQU
Equal
Source A Indx_LocCylExtPerm.Descr[1]
'Index Table at good '
Source B Indx_LocCylExtPerm.Descr[1]
'Index Table at good '
Indx_stsAtGoodPos
Indx_LocCylExtPerm.OK[1]
Indx_LocCylExtPerm.OK[0]
Indx_LocCylExtPerm.OK[1]
Indx_LocCylExtPerm.AllOK
Indx_LocCylExtPerm.Bypass
3
EQU
Equal
Source A LocCylDescr[1]
'Loc Cyl 1'
Source B LocCylDescr[1]
'Loc Cyl 1'
Cyl
Cyl LocCyl[1]
permExt Indx_LocCylExtPerm.AllOK
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 1
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpLocCyl1ExtPRX
<Local:2:I.Data.6>
0
inpRetPRX inpLocCyl1RetPRX
<Local:2:I.Data.7>
1
outExtSOL outLocCyl1Ext
<VB1:O.Data[3].2>
0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail

4

EQU
Equal
Source A LocCylDescr[2] 'Loc Cyl 2'
Source B LocCylDescr[2] 'Loc Cyl 2'

Cyl
Cyl LocCyl[2]
permExt Indx_LocCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpLocCyl2ExtPRX <Local:2:I.Data.8> 0
inpRetPRX inpLocCyl2RetPRX <Local:2:I.Data.9> 1
outExtSOL outLocCyl2Ext <VB1:O.Data[3].4> 0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail

5

EQU
Equal
Source A LocCylDescr[3] 'Loc Cyl 3'
Source B LocCylDescr[3] 'Loc Cyl 3'

Cyl
Cyl LocCyl[3]
permExt Indx_LocCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpLocCyl3ExtPRX <Local:2:I.Data.10> 0
inpRetPRX inpLocCyl3RetPRX <Local:2:I.Data.11> 1
outExtSOL outLocCyl3Ext <VB1:O.Data[3].6> 0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail

6

EQU
Equal
Source A LocCylDescr[4] 'Loc Cyl 4'
Source B LocCylDescr[4] 'Loc Cyl 4'

Cyl
Cyl LocCyl[4]
permExt Indx_LocCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpLocCyl4ExtPRX <Local:2:I.Data.12> 0
inpRetPRX inpLocCyl4RetPRX <Local:2:I.Data.13> 1
outExtSOL outLocCyl4Ext <VB1:O.Data[4].0> 0
stsExt 0
stsRet 1

outRetSOL
stsExtFail
stsRetFail

7

EQU
Equal
Source A LocCylDescr[5] 'Loc Cyl 5'
Source B LocCylDescr[5] 'Loc Cyl 5'

Cyl
Cyl LocCyl[5]
permExt Indx_LocCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpLocCyl5ExtPRX <Local:2:I.Data.14> 1
inpRetPRX inpLocCyl5RetPRX <Local:2:I.Data.15> 0
outExtSOL outLocCyl5Ext <VB1:O.Data[4].2> 1
stsExt 1
stsRet 0

outRetSOL
stsExtFail
stsRetFail

8

EQU
Equal
Source A LocCylDescr[6] 'Loc Cyl 6'
Source B LocCylDescr[6] 'Loc Cyl 6'

Cyl
Cyl LocCyl[6]
permExt Indx_LocCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpLocCyl6ExtPRX <Local:3:I.Data.0> 0
inpRetPRX inpLocCyl6RetPRX <Local:3:I.Data.1> 1
outExtSOL outLocCyl6Ext <VB1:O.Data[4].4> 0
stsExt 0
stsRet 1

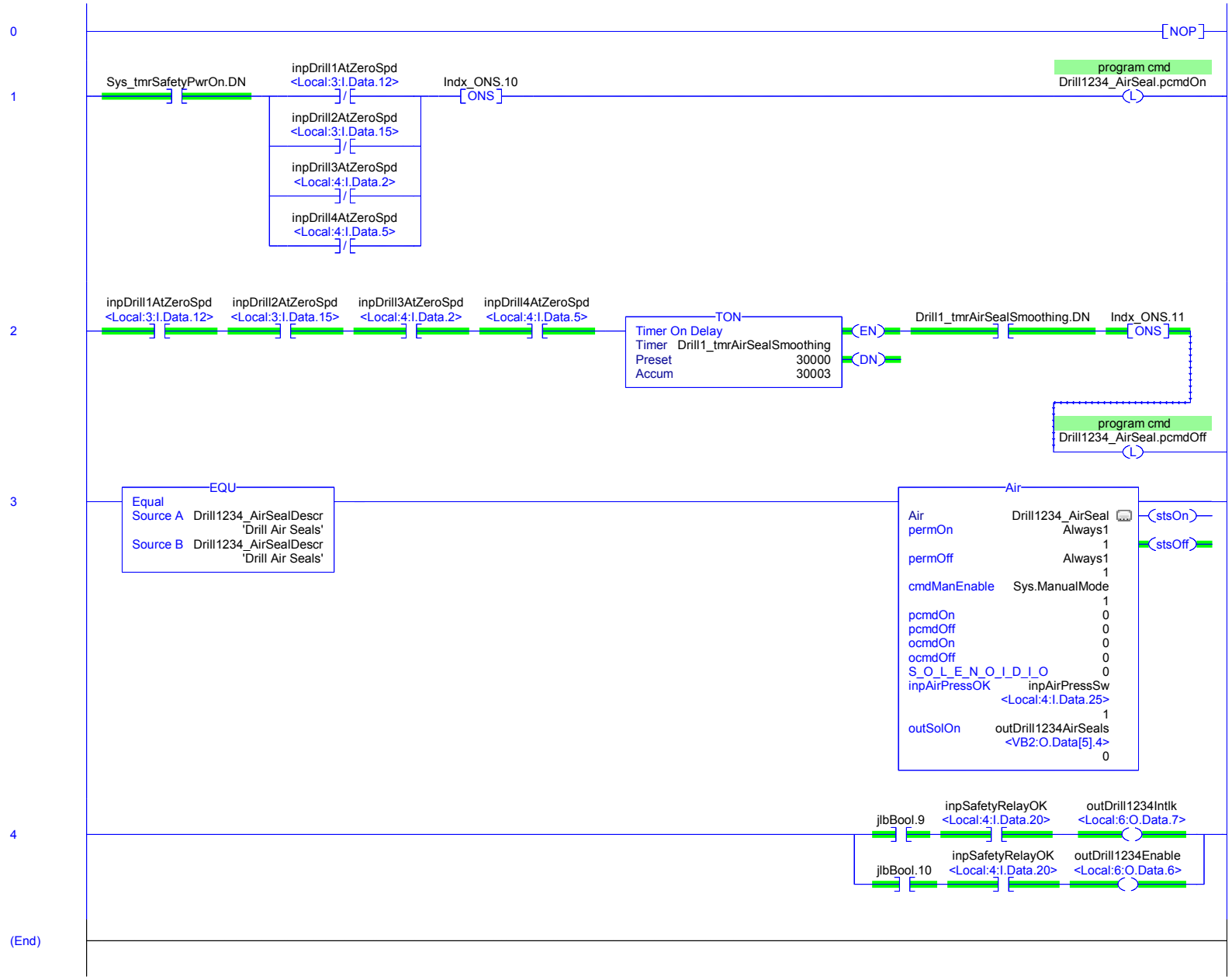
outRetSOL
stsExtFail
stsRetFail

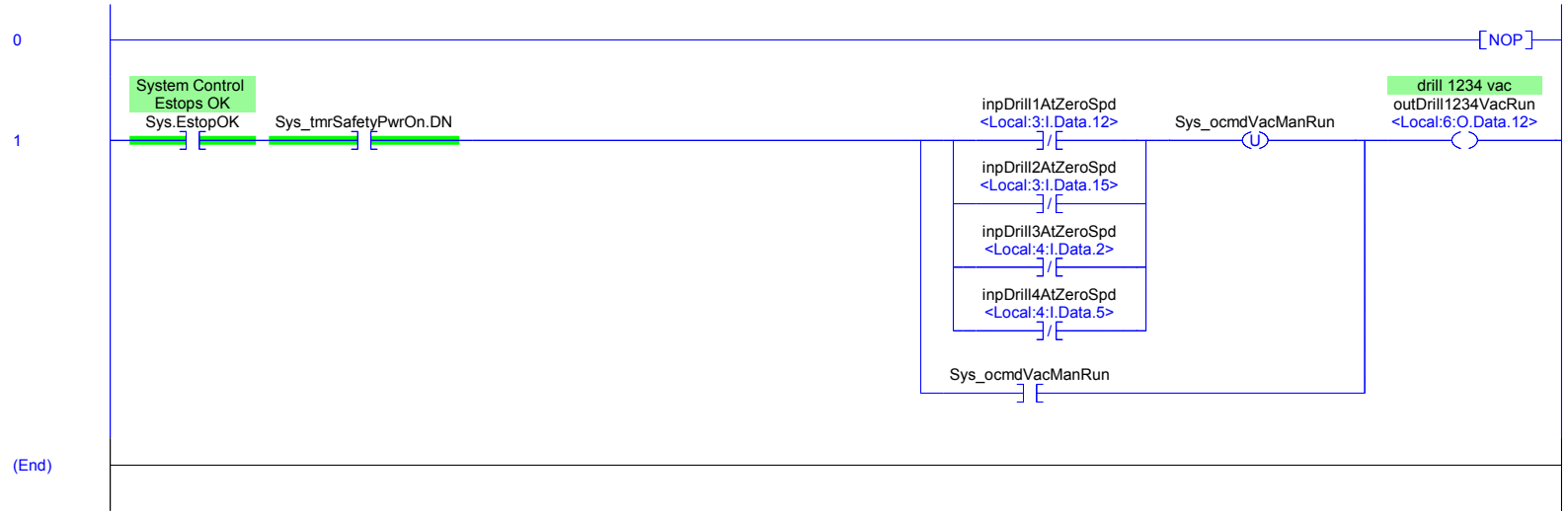
9

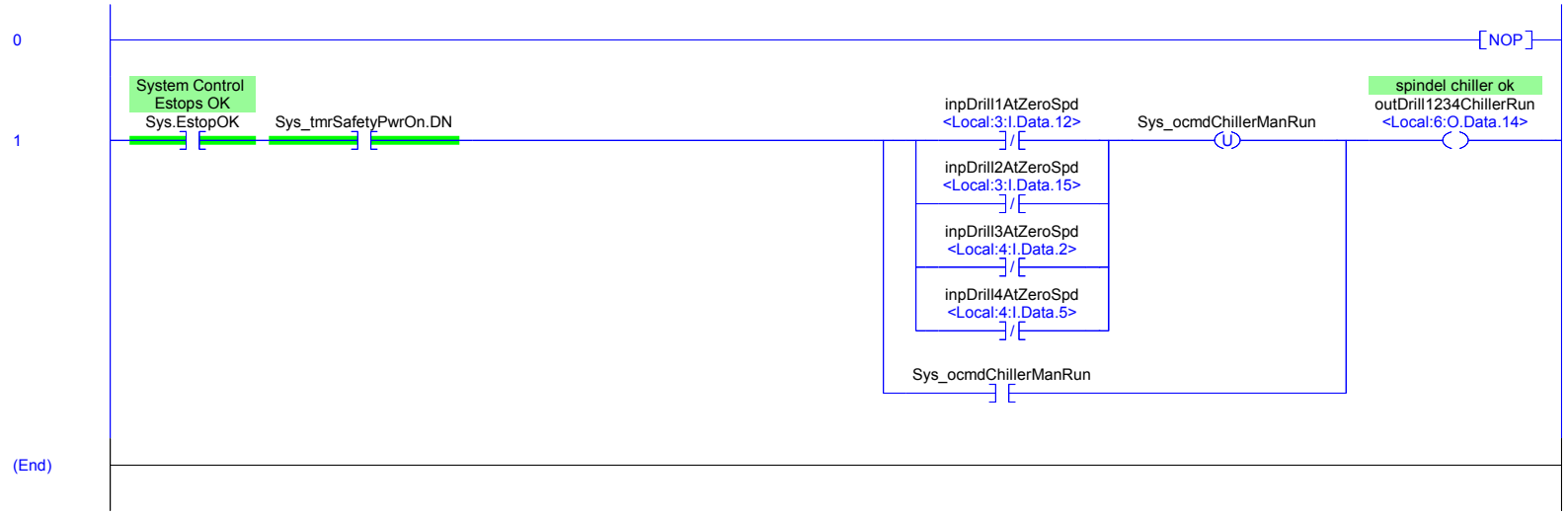
cyl retracted LocCyl[1].stsRet
cyl retracted LocCyl[2].stsRet
cyl retracted LocCyl[3].stsRet
cyl retracted LocCyl[4].stsRet
cyl retracted LocCyl[5].stsRet
cyl retracted LocCyl[6].stsRet

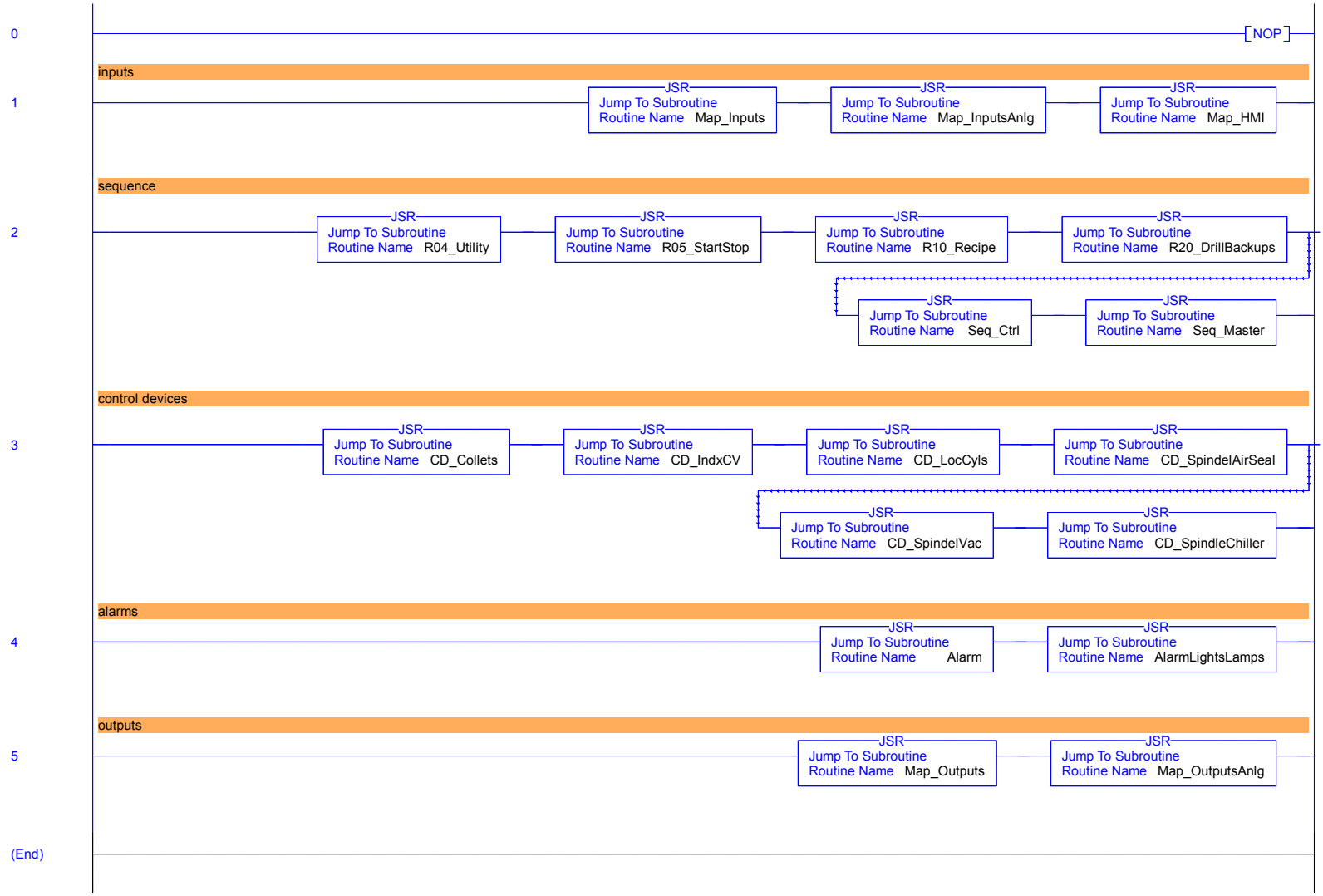
Indx_stsAllLocCylRet

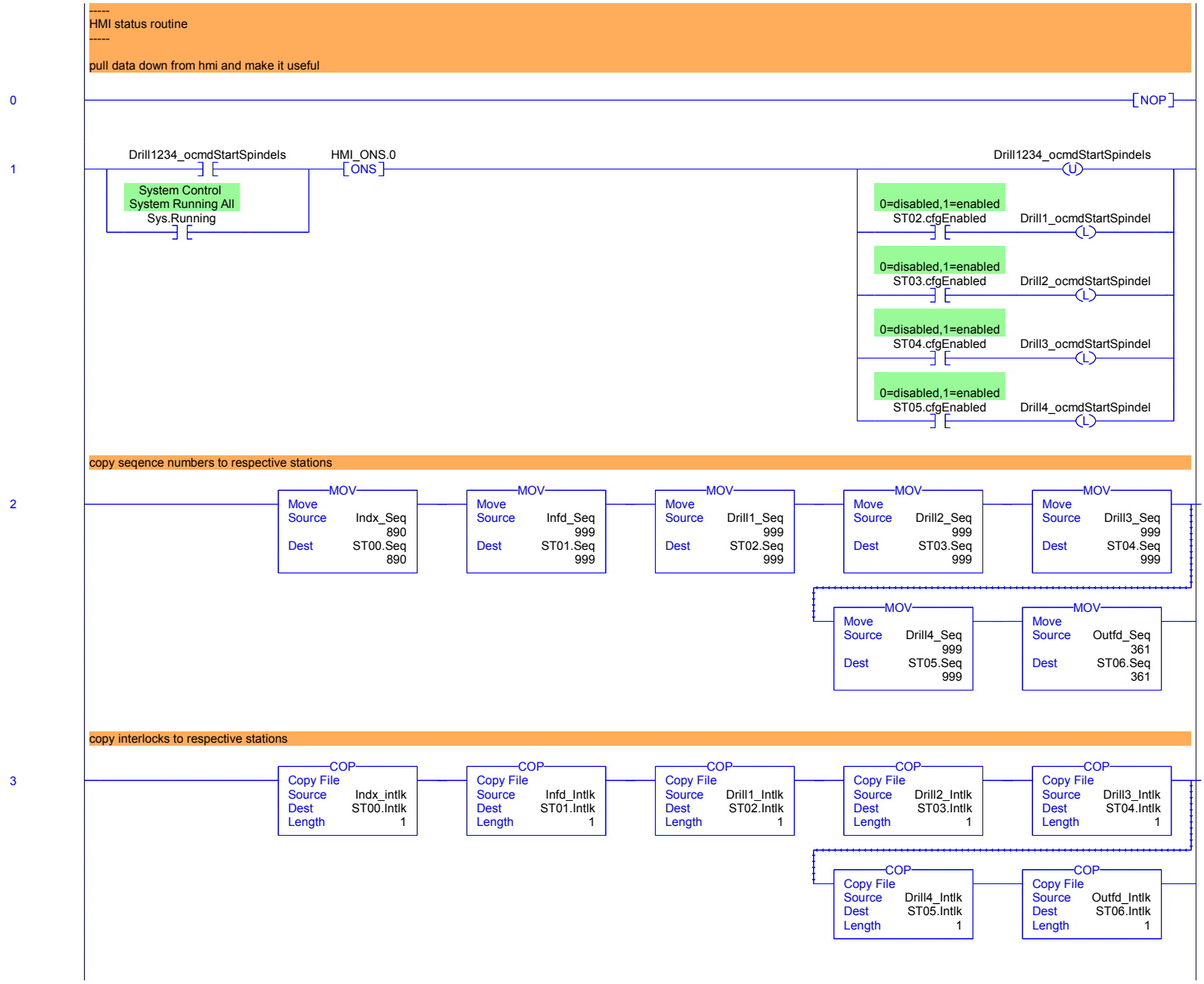
(End)

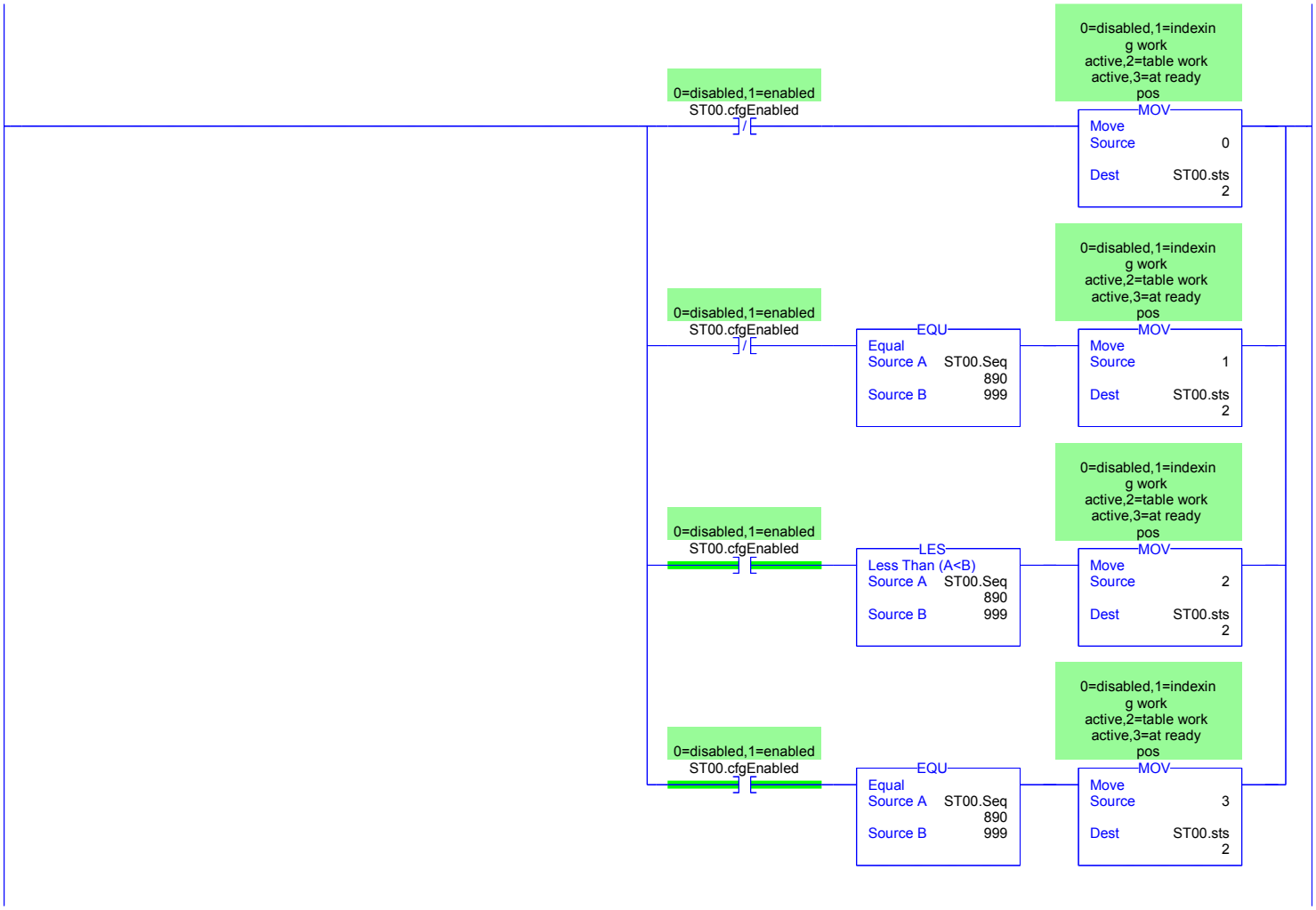

0
NOP
1
Sys_tmrSafetyPwrOn.DN
inpDrill1AtZeroSpd
<Local:3:I.Data.12>
inpDrill2AtZeroSpd
<Local:3:I.Data.15>
inpDrill3AtZeroSpd
<Local:4:I.Data.2>
inpDrill4AtZeroSpd
<Local:4:I.Data.5>
Indx_ONS.10
ONS
program cmd
Drill1234_AirSeal.pcmdOn
L
2
inpDrill1AtZeroSpd
<Local:3:I.Data.12>
inpDrill2AtZeroSpd
<Local:3:I.Data.15>
inpDrill3AtZeroSpd
<Local:4:I.Data.2>
inpDrill4AtZeroSpd
<Local:4:I.Data.5>
TON
Timer On Delay
Timer Drill1_tmrAirSealSmoothing
Preset 30000
Accum 30003
EN
DN
Drill1_tmrAirSealSmoothing.DN
Indx_ONS.11
ONS
program cmd
Drill1234_AirSeal.pcmdOff
L
3
EQU
Equal
Source A Drill1234_AirSealDescr
'Drill Air Seals'
Source B Drill1234_AirSealDescr
'Drill Air Seals'
Air
Air Drill1234_AirSeal
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outDrill1234AirSeals
<VB2:O.Data[5].4>
0
stsOn
stsOff
4
jlbBool.9
inpSafetyRelayOK
<Local:4:I.Data.20>
outDrill1234Intlk
<Local:6:O.Data.7>
jlbBool.10
inpSafetyRelayOK
<Local:4:I.Data.20>
outDrill1234Enable
<Local:6:O.Data.6>
(End)

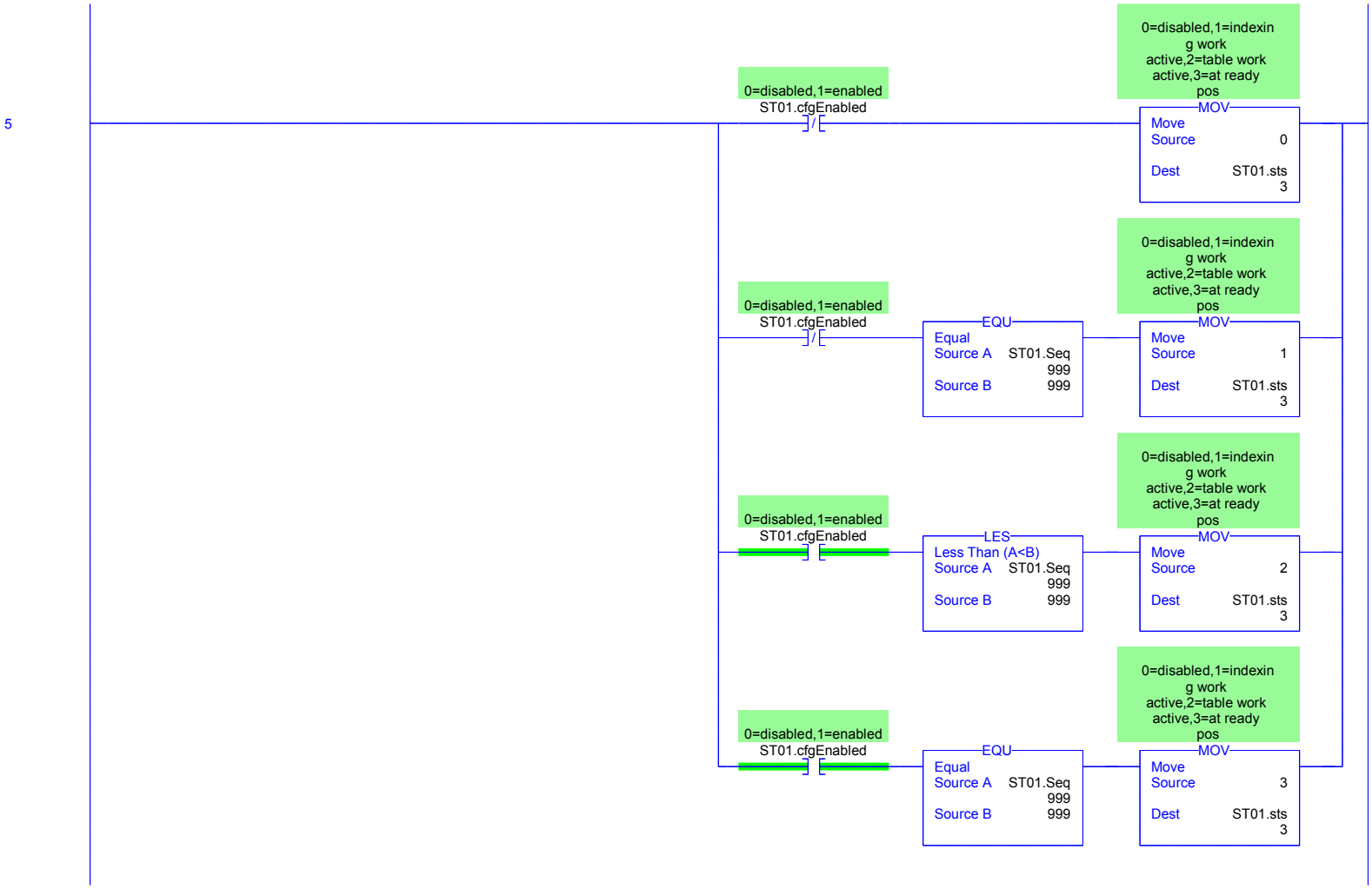

0
NOP
System Control Estops OK
Sys.EstopOK
Sys_tmrSafetyPwrOn.DN
1
inpDrill1AtZeroSpd
<Local:3:I.Data.12>
inpDrill2AtZeroSpd
<Local:3:I.Data.15>
inpDrill3AtZeroSpd
<Local:4:I.Data.2>
inpDrill4AtZeroSpd
<Local:4:I.Data.5>
Sys_ocmdVacManRun
Sys_ocmdVacManRun
drill 1234 vac
outDrill1234VacRun
<Local:6:O.Data.12>
(End)

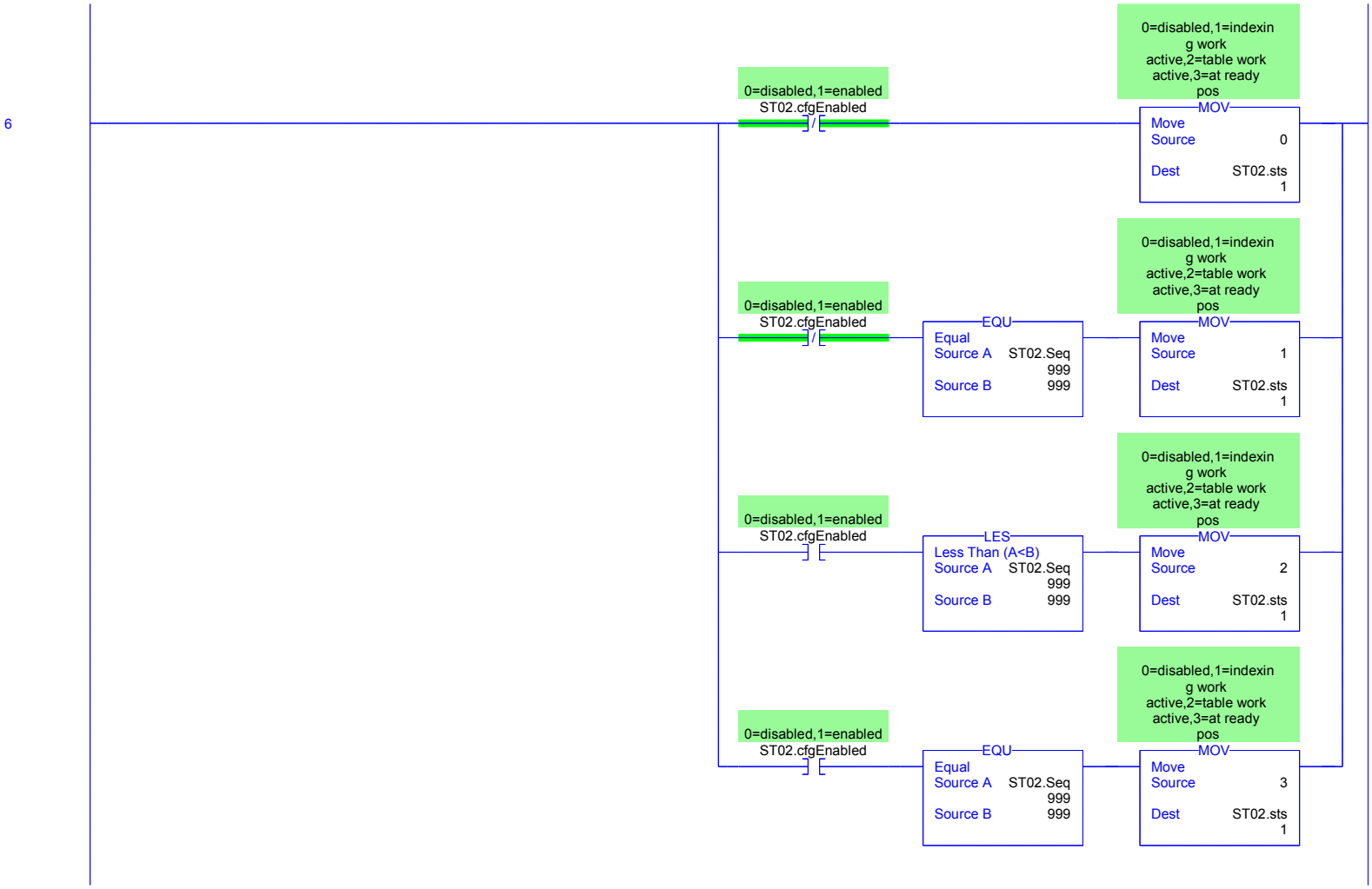

0
NOP
System Control Estops OK
Sys.EstopOK
Sys_tmrSafetyPwrOn.DN
1
inpDrill1AtZeroSpd
<Local:3:I.Data.12>
inpDrill2AtZeroSpd
<Local:3:I.Data.15>
inpDrill3AtZeroSpd
<Local:4:I.Data.2>
inpDrill4AtZeroSpd
<Local:4:I.Data.5>
Sys_ocmdChillerManRun
Sys_ocmdChillerManRun
spindel chiller ok
outDrill1234ChillerRun
<Local:6:O.Data.14>
(End)

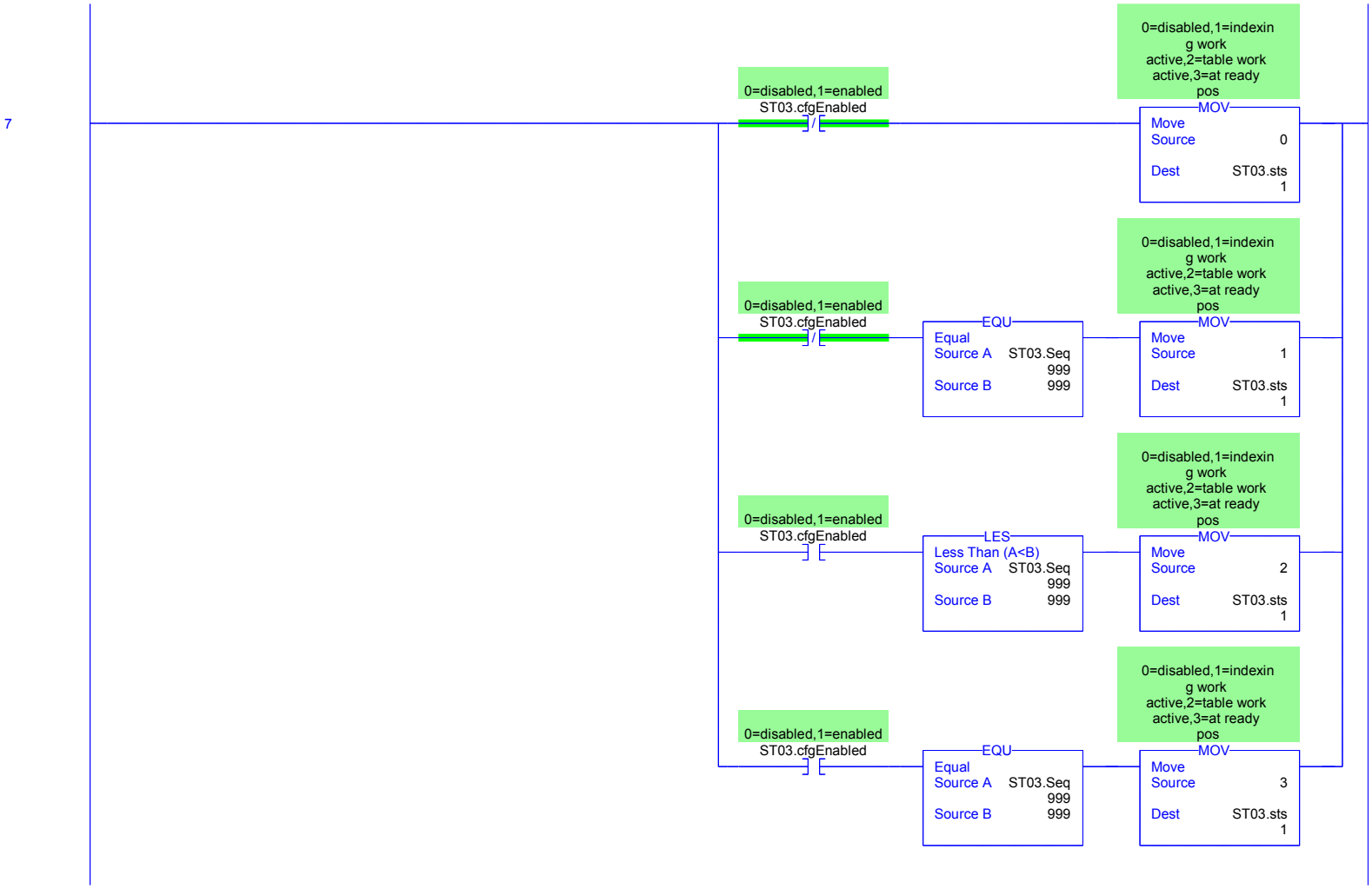

0
NOP
inputs
1
JSR
Jump To Subroutine
Routine Name Map_Inputs
JSR
Jump To Subroutine
Routine Name Map_InputsAnlg
JSR
Jump To Subroutine
Routine Name Map_HMI
sequence
2
JSR
Jump To Subroutine
Routine Name R04_Utility
JSR
Jump To Subroutine
Routine Name R05_StartStop
JSR
Jump To Subroutine
Routine Name R10_Recipe
JSR
Jump To Subroutine
Routine Name R20_DrillBackups
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Master
control devices
3
JSR
Jump To Subroutine
Routine Name CD_Collets
JSR
Jump To Subroutine
Routine Name CD_IndxCV
JSR
Jump To Subroutine
Routine Name CD_LocCyls
JSR
Jump To Subroutine
Routine Name CD_SpindelAirSeal
JSR
Jump To Subroutine
Routine Name CD_SpindelVac
JSR
Jump To Subroutine
Routine Name CD_SpindleChiller
alarms
4
JSR
Jump To Subroutine
Routine Name Alarm
JSR
Jump To Subroutine
Routine Name AlarmLightsLamps
outputs
5
JSR
Jump To Subroutine
Routine Name Map_Outputs
JSR
Jump To Subroutine
Routine Name Map_OutputsAnlg
(End)

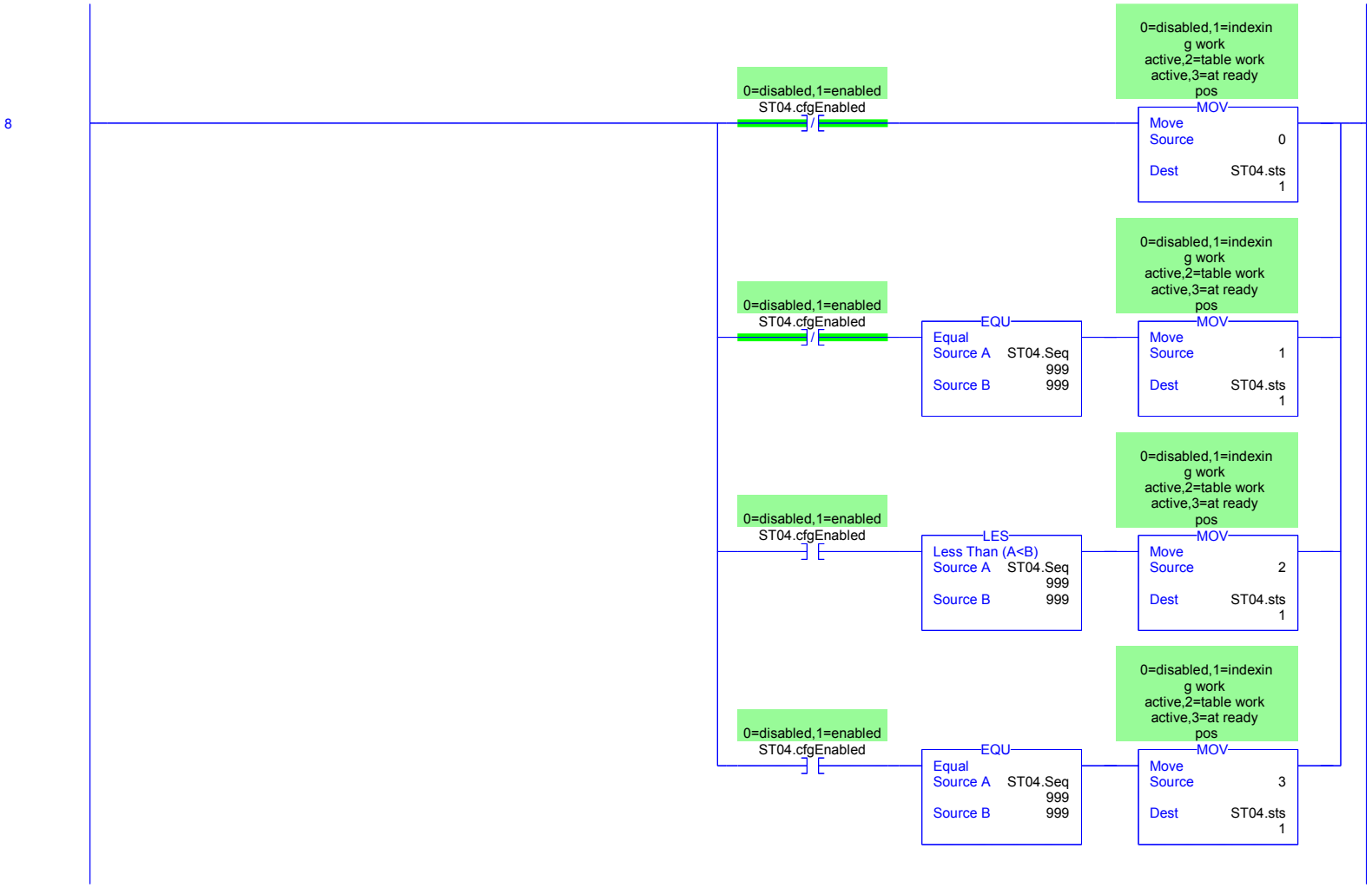

HMI status routine
pull data down from hmi and make it useful
0
NOP
1
Drill1234_ocmdStartSpindels
HMI_ONS.0
ONS
System Control
System Running All
Sys.Running
Drill1234_ocmdStartSpindels
U
0=disabled,1=enabled
ST02.cfgEnabled
Drill1_ocmdStartSpindel
L
0=disabled,1=enabled
ST03.cfgEnabled
Drill2_ocmdStartSpindel
L
0=disabled,1=enabled
ST04.cfgEnabled
Drill3_ocmdStartSpindel
L
0=disabled,1=enabled
ST05.cfgEnabled
Drill4_ocmdStartSpindel
L
copy seqence numbers to respective stations
2
MOV
Move
Source Indx_Seq 890
Dest ST00.Seq 890
MOV
Move
Source Infd_Seq 999
Dest ST01.Seq 999
MOV
Move
Source Drill1_Seq 999
Dest ST02.Seq 999
MOV
Move
Source Drill2_Seq 999
Dest ST03.Seq 999
MOV
Move
Source Drill3_Seq 999
Dest ST04.Seq 999
MOV
Move
Source Drill4_Seq 999
Dest ST05.Seq 999
MOV
Move
Source Outfd_Seq 361
Dest ST06.Seq 361
copy interlocks to respective stations
3
COP
Copy File
Source Indx_intlk
Dest ST00.Intlk
Length 1
COP
Copy File
Source Infd_Intlk
Dest ST01.Intlk
Length 1
COP
Copy File
Source Drill1_Intlk
Dest ST02.Intlk
Length 1
COP
Copy File
Source Drill2_Intlk
Dest ST03.Intlk
Length 1
COP
Copy File
Source Drill3_Intlk
Dest ST04.Intlk
Length 1
COP
Copy File
Source Drill4_Intlk
Dest ST05.Intlk
Length 1
COP
Copy File
Source Outfd_Intlk
Dest ST06.Intlk
Length 1

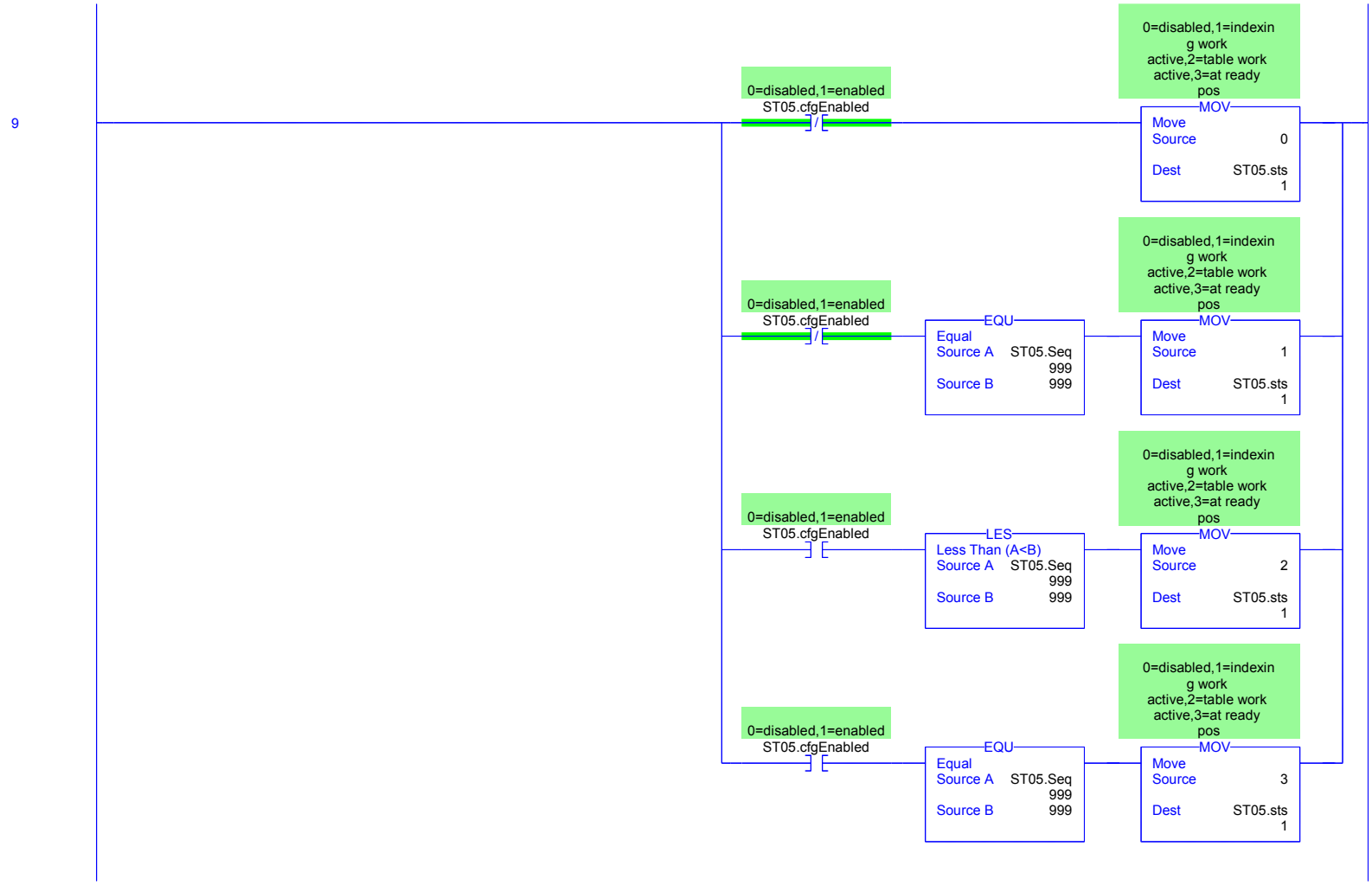

4
0=disabled,1=enabled
ST00.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST00.sts 2
0=disabled,1=enabled
ST00.cfgEnabled
EQU
Equal
Source A ST00.Seq 890
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST00.sts 2
0=disabled,1=enabled
ST00.cfgEnabled
LES
Less Than (A<B)
Source A ST00.Seq 890
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST00.sts 2
0=disabled,1=enabled
ST00.cfgEnabled
EQU
Equal
Source A ST00.Seq 890
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST00.sts 2

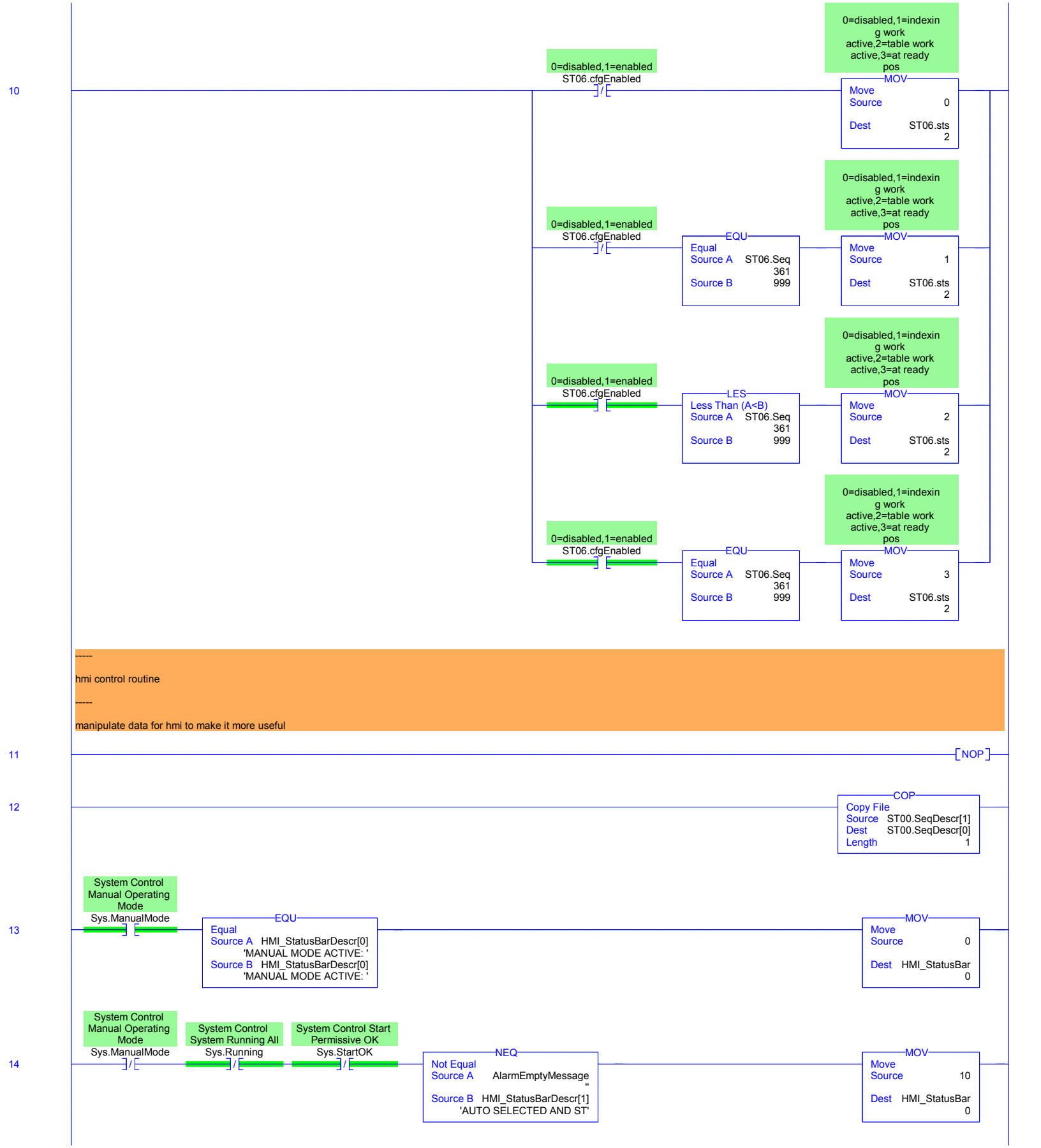

5
0=disabled,1=enabled
ST01.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST01.sts 3
0=disabled,1=enabled
ST01.cfgEnabled
EQU
Equal
Source A ST01.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST01.sts 3
0=disabled,1=enabled
ST01.cfgEnabled
LES
Less Than (A<B)
Source A ST01.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST01.sts 3
0=disabled,1=enabled
ST01.cfgEnabled
EQU
Equal
Source A ST01.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST01.sts 3

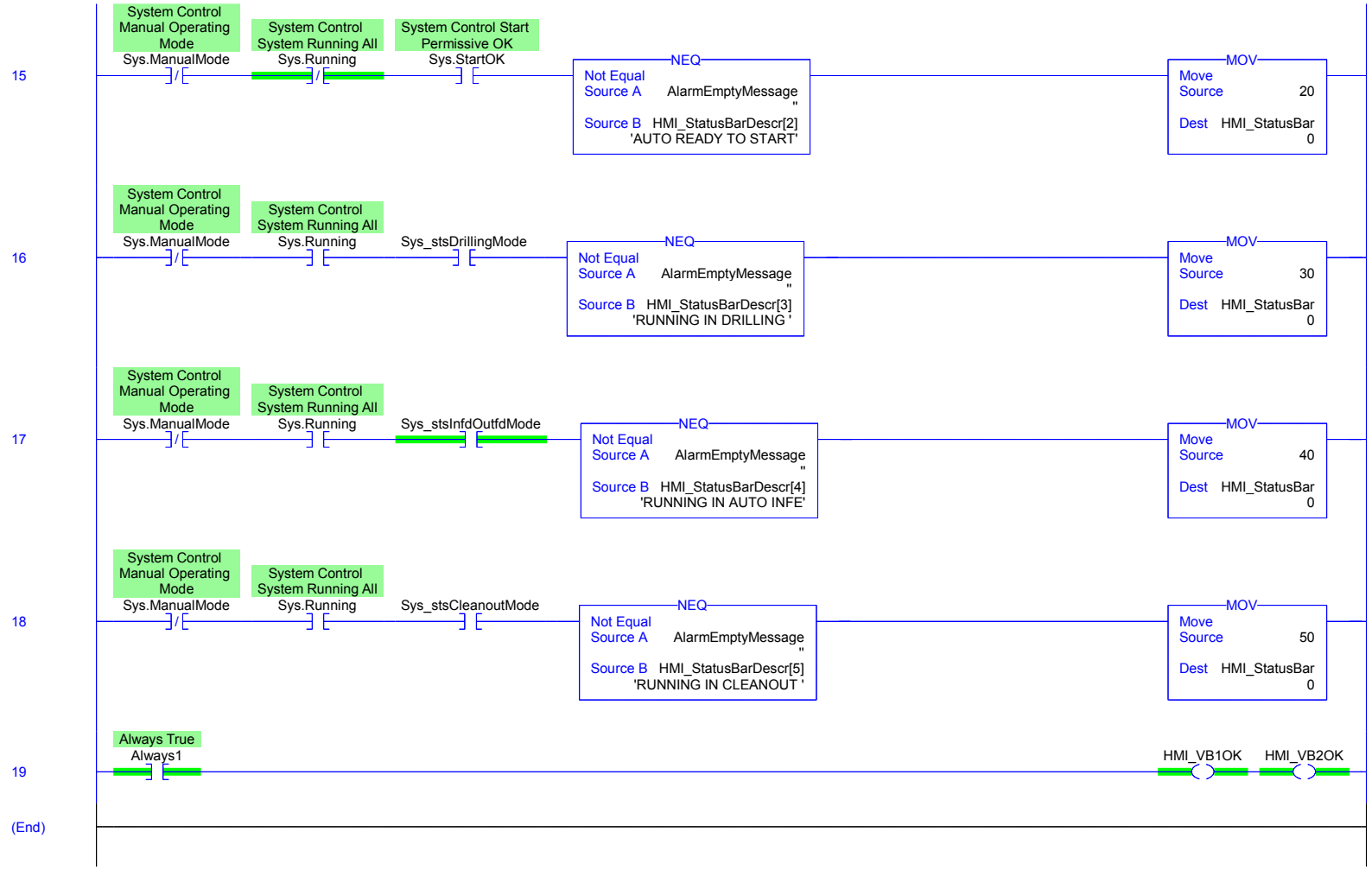

6
0=disabled,1=enabled
ST02.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST02.sts 1
0=disabled,1=enabled
ST02.cfgEnabled
EQU
Equal
Source A ST02.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST02.sts 1
0=disabled,1=enabled
ST02.cfgEnabled
LES
Less Than (A<B)
Source A ST02.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST02.sts 1
0=disabled,1=enabled
ST02.cfgEnabled
EQU
Equal
Source A ST02.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST02.sts 1

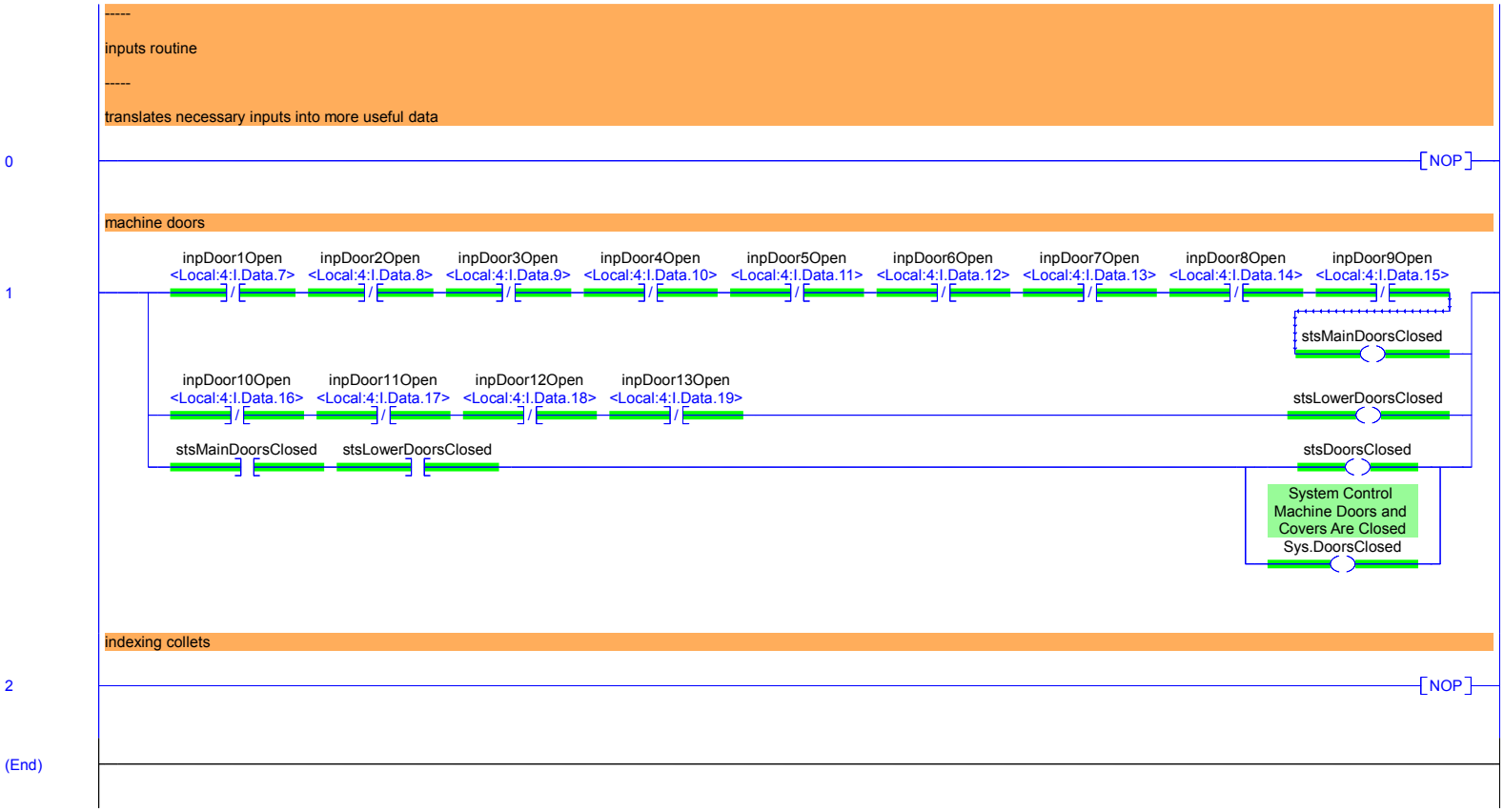

7
0=disabled,1=enabled
ST03.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST03.sts 1
0=disabled,1=enabled
ST03.cfgEnabled
EQU
Equal
Source A ST03.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST03.sts 1
0=disabled,1=enabled
ST03.cfgEnabled
LES
Less Than (A<B)
Source A ST03.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST03.sts 1
0=disabled,1=enabled
ST03.cfgEnabled
EQU
Equal
Source A ST03.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST03.sts 1

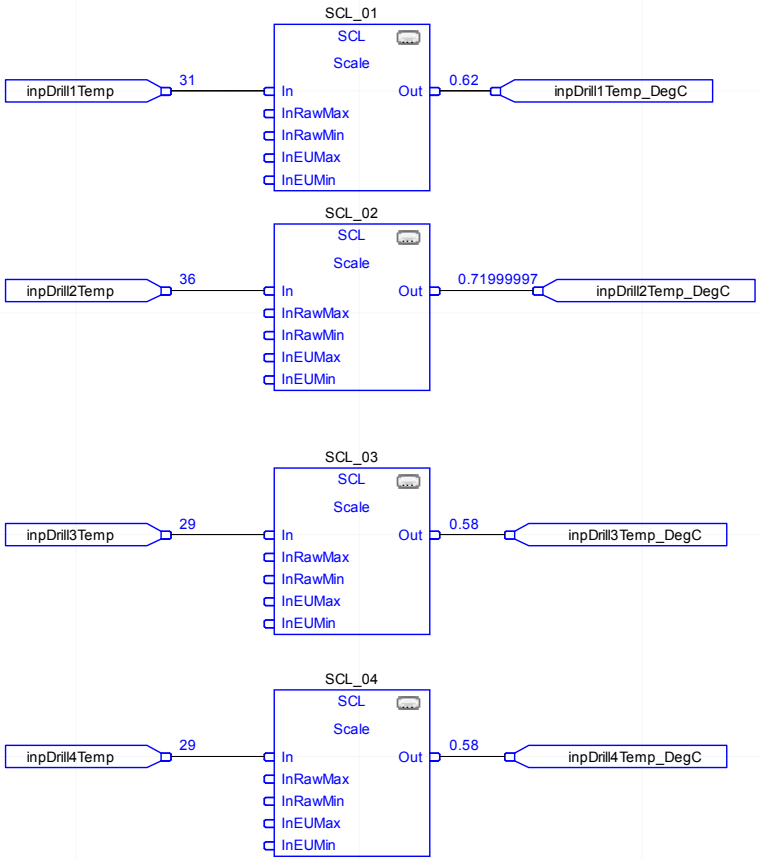

8
0=disabled,1=enabled
ST04.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST04.sts 1
0=disabled,1=enabled
ST04.cfgEnabled
EQU
Equal
Source A ST04.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST04.sts 1
0=disabled,1=enabled
ST04.cfgEnabled
LES
Less Than (A<B)
Source A ST04.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST04.sts 1
0=disabled,1=enabled
ST04.cfgEnabled
EQU
Equal
Source A ST04.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST04.sts 1

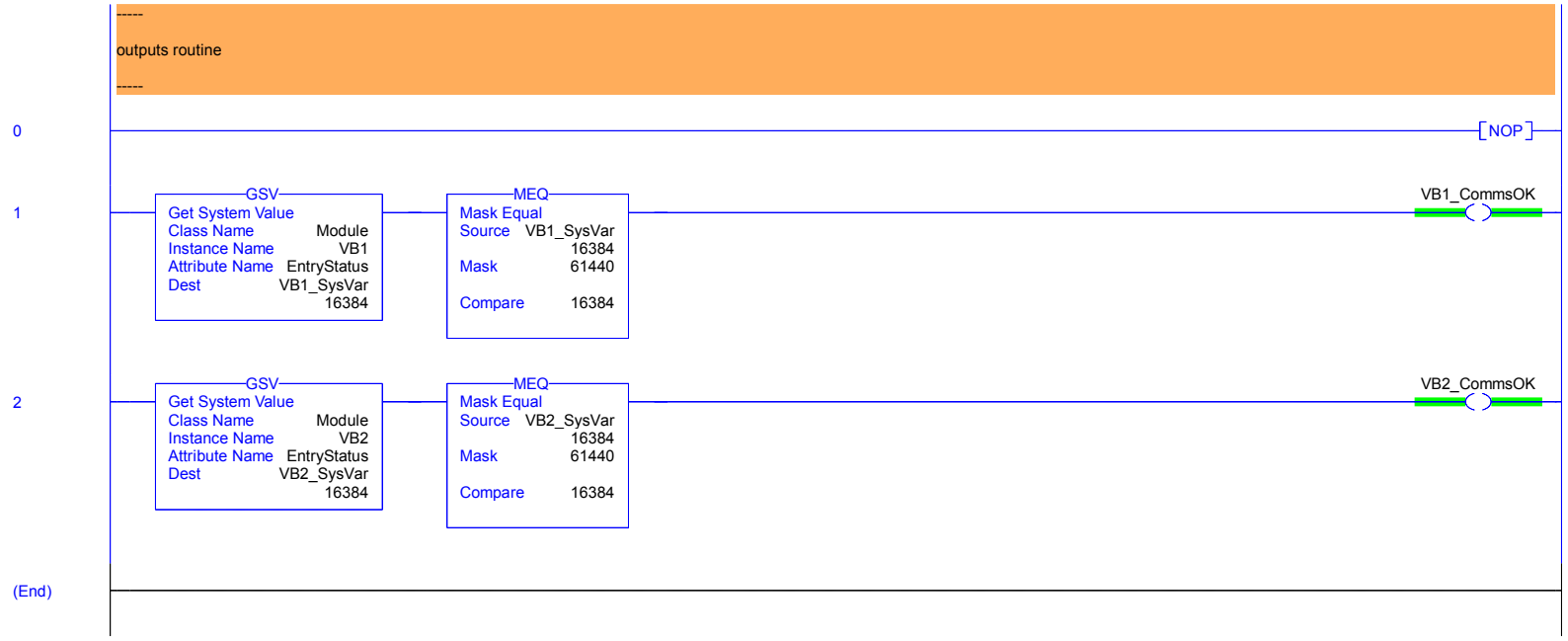

9
0=disabled,1=enabled
ST05.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST05.sts 1
0=disabled,1=enabled
ST05.cfgEnabled
EQU
Equal
Source A ST05.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST05.sts 1
0=disabled,1=enabled
ST05.cfgEnabled
LES
Less Than (A<B)
Source A ST05.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST05.sts 1
0=disabled,1=enabled
ST05.cfgEnabled
EQU
Equal
Source A ST05.Seq 999
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST05.sts 1


10
0=disabled,1=enabled
ST06.cfgEnabled
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 0
Dest ST06.sts 2
0=disabled,1=enabled
ST06.cfgEnabled
EQU
Equal
Source A ST06.Seq 361
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 1
Dest ST06.sts 2
0=disabled,1=enabled
ST06.cfgEnabled
LES
Less Than (A<B)
Source A ST06.Seq 361
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 2
Dest ST06.sts 2
0=disabled,1=enabled
ST06.cfgEnabled
EQU
Equal
Source A ST06.Seq 361
Source B 999
0=disabled,1=indexing work active,2=table work active,3=at ready pos
MOV
Move
Source 3
Dest ST06.sts 2
---
hmi control routine
---
manipulate data for hmi to make it more useful
11
NOP
12
COP
Copy File
Source ST00.SeqDescr[1]
Dest ST00.SeqDescr[0]
Length 1
System Control Manual Operating Mode
Sys.ManualMode
13
EQU
Equal
Source A HMI_StatusBarDescr[0] 'MANUAL MODE ACTIVE: '
Source B HMI_StatusBarDescr[0] 'MANUAL MODE ACTIVE: '
MOV
Move
Source 0
Dest HMI_StatusBar 0
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
System Control Start Permissive OK
Sys.StartOK
14
NEQ
Not Equal
Source A AlarmEmptyMessage ''
Source B HMI_StatusBarDescr[1] 'AUTO SELECTED AND ST'
MOV
Move
Source 10
Dest HMI_StatusBar 0

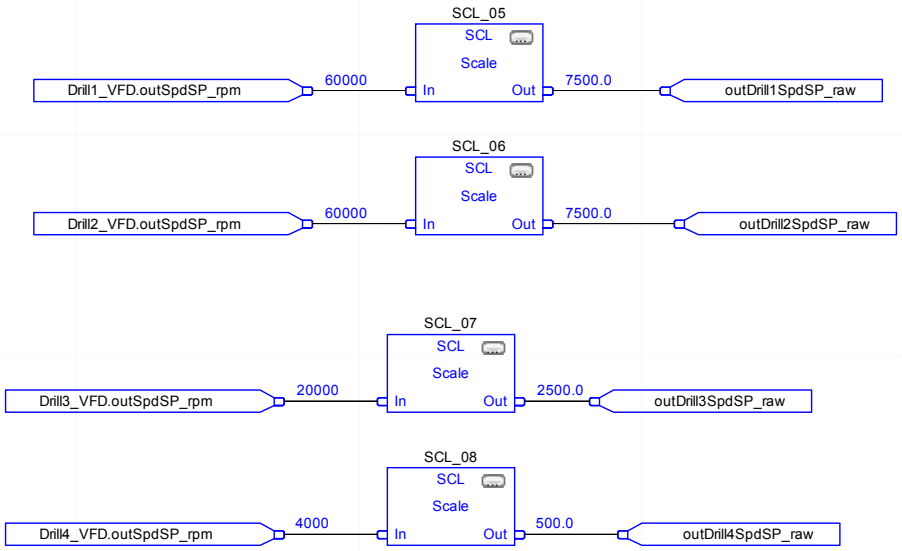

15
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
System Control Start Permissive OK
Sys.StartOK
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B HMI_StatusBarDescr[2]
'AUTO READY TO START'
MOV
Move
Source 20
Dest HMI_StatusBar
0
16
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
Sys_stsDrillingMode
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B HMI_StatusBarDescr[3]
'RUNNING IN DRILLING '
MOV
Move
Source 30
Dest HMI_StatusBar
0
17
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
Sys_stsInfdOutfdMode
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B HMI_StatusBarDescr[4]
'RUNNING IN AUTO INFE'
MOV
Move
Source 40
Dest HMI_StatusBar
0
18
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
Sys_stsCleanoutMode
NEQ
Not Equal
Source A AlarmEmptyMessage
''
Source B HMI_StatusBarDescr[5]
'RUNNING IN CLEANOUT '
MOV
Move
Source 50
Dest HMI_StatusBar
0
19
Always True
Always1
HMI_VB1OK
HMI_VB2OK
(End)


---
inputs routine
---
translates necessary inputs into more useful data
0
NOP
machine doors
1
inpDoor1Open
<Local:4:I.Data.7>
inpDoor2Open
<Local:4:I.Data.8>
inpDoor3Open
<Local:4:I.Data.9>
inpDoor4Open
<Local:4:I.Data.10>
inpDoor5Open
<Local:4:I.Data.11>
inpDoor6Open
<Local:4:I.Data.12>
inpDoor7Open
<Local:4:I.Data.13>
inpDoor8Open
<Local:4:I.Data.14>
inpDoor9Open
<Local:4:I.Data.15>
stsMainDoorsClosed
inpDoor10Open
<Local:4:I.Data.16>
inpDoor11Open
<Local:4:I.Data.17>
inpDoor12Open
<Local:4:I.Data.18>
inpDoor13Open
<Local:4:I.Data.19>
stsLowerDoorsClosed
stsMainDoorsClosed
stsLowerDoorsClosed
stsDoorsClosed
System Control
Machine Doors and
Covers Are Closed
Sys.DoorsClosed
indexing collets
2
NOP
(End)


SCL_01
SCL
Scale
inpDrill1Temp
31
In
Out
0.62
inpDrill1Temp_DegC
InRawMax
InRawMin
InEUMax
InEUMin
SCL_02
SCL
Scale
inpDrill2Temp
36
In
Out
0.71999997
inpDrill2Temp_DegC
InRawMax
InRawMin
InEUMax
InEUMin
SCL_03
SCL
Scale
inpDrill3Temp
29
In
Out
0.58
inpDrill3Temp_DegC
InRawMax
InRawMin
InEUMax
InEUMin
SCL_04
SCL
Scale
inpDrill4Temp
29
In
Out
0.58
inpDrill4Temp_DegC
InRawMax
InRawMin
InEUMax
InEUMin


---
outputs routine

0
NOP
1
GSV
Get System Value
Class Name Module
Instance Name VB1
Attribute Name EntryStatus
Dest VB1_SysVar
16384
MEQ
Mask Equal
Source VB1_SysVar
16384
Mask 61440
Compare 16384
VB1_CommsOK
2
GSV
Get System Value
Class Name Module
Instance Name VB2
Attribute Name EntryStatus
Dest VB2_SysVar
16384
MEQ
Mask Equal
Source VB2_SysVar
16384
Mask 61440
Compare 16384
VB2_CommsOK
(End)


SCL_05
SCL
Scale
Drill1_VFD.outSpdSP_rpm
60000
In
Out
7500.0
outDrill1SpdSP_raw
SCL_06
SCL
Scale
Drill2_VFD.outSpdSP_rpm
60000
In
Out
7500.0
outDrill2SpdSP_raw
SCL_07
SCL
Scale
Drill3_VFD.outSpdSP_rpm
20000
In
Out
2500.0
outDrill3SpdSP_raw
SCL_08
SCL
Scale
Drill4_VFD.outSpdSP_rpm
4000
In
Out
500.0
outDrill4SpdSP_raw

0

NOP

1

TON
Timer On Delay
Timer Sys_tmrPwrOn
Preset 5000
Accum 5000
EN
DN

CONTROL BITS

2

Always True
Always1
L

Always False
Always0
U

3

HMIAlways1
L

HMIAlways0
U

SAFETY POWER ON/OFF
used to make sure that inputs are good from ibag drives before reading them

4

inpSafetyRelayOK
<Local:4:I.Data.20>

TON
Timer On Delay
Timer Sys_tmrSafetyPwrOn
Preset 10000
Accum 10010
EN
DN

inpSafetyRelayOK
<Local:4:I.Data.20>
/

TON
Timer On Delay
Timer Sys_tmrSafetyPwrOff
Preset 5000
Accum 0
EN
DN

0.5 SECOND FLASHER

5

Flash Timers
FlashTimer[0].DN
/

Flash Timers
TON
Timer On Delay
Timer FlashTimer[0]
Preset 1000
Accum 749
EN
DN

Flash Timers
LIM
Limit Test (CIRC)
Low Limit 0
Test FlashTimer[0].ACC 749
High Limit 500

0.5 Sec Flasher
Flasher.0

1.0 SECOND FLASHER

6

Flash Timers
FlashTimer[1].DN
/

Flash Timers
TON
Timer On Delay
Timer FlashTimer[1]
Preset 2000
Accum 50
EN
DN

Flash Timers
LIM
Limit Test (CIRC)
Low Limit 0
Test FlashTimer[1].ACC 50
High Limit 1000

1.0 Sec Flasher
Flasher.1

2.0 SECOND FLASHER

7

Flash Timers
FlashTimer[2].DN

Flash Timers
TON
Timer On Delay
Timer FlashTimer[2]
Preset 4000
Accum 3089
EN
DN

Flash Timers
LIM
Limit Test (CIRC)
Low Limit 0
Test FlashTimer[2].ACC 3089
High Limit 2000

2.0 Sec Flasher
Flasher.2

RECIPE LOADING ANIMATION

8

Recipe Control
HMI.RECP_Ctrl.Load

OneShots
UtilityONS.0
ONS

Recipe Loading Timer
TOF
Timer Off Delay
Timer RecipeLoadingT
Preset 1500
Accum 1500
EN
DN

Recipe Loading Timer
RecipeLoadingT.TT

Recipe Control
HMI.RECP_Ctrl.Loading

RECIPE SAVING ANIMATION

9

Recipe Control
HMI.RECP_Ctrl.Save

OneShots
UtilityONS.1
ONS

Recipe Saving Timer
TOF
Timer Off Delay
Timer RecipeSavingT
Preset 1500
Accum 1500
EN
DN

Recipe Saving Timer
RecipeSavingT.TT

Recipe Control
HMI.RECP_Ctrl.Saving

RECIPE COPYING ANIMATION

10

Recipe Control
HMI.RECP_Ctrl.Copy

OneShots
UtilityONS.2
ONS

Recipe Copying Timer
TOF
Timer Off Delay
Timer RecipeCopyingT
Preset 1500
Accum 1500
EN
DN

Recipe Copying Timer
RecipeCopyingT.TT

Recipe Control
HMI.RECP_Ctrl.Copying

RECIPE CLEARING ANIMATION

11

Recipe Control
HMI.RECP_Ctrl.Clear

OneShots
UtilityONS.3
ONS

Recipe Clearing Timer
TOF
Timer Off Delay
Timer RecipeClearingT
Preset 1500
Accum 1500
EN
DN

Recipe Clearing Timer
RecipeClearingT.TT

Recipe Control
HMI.RECP_Ctrl.Clearing

OEM BASELINE RECIPE LOADING ANIMATION

12

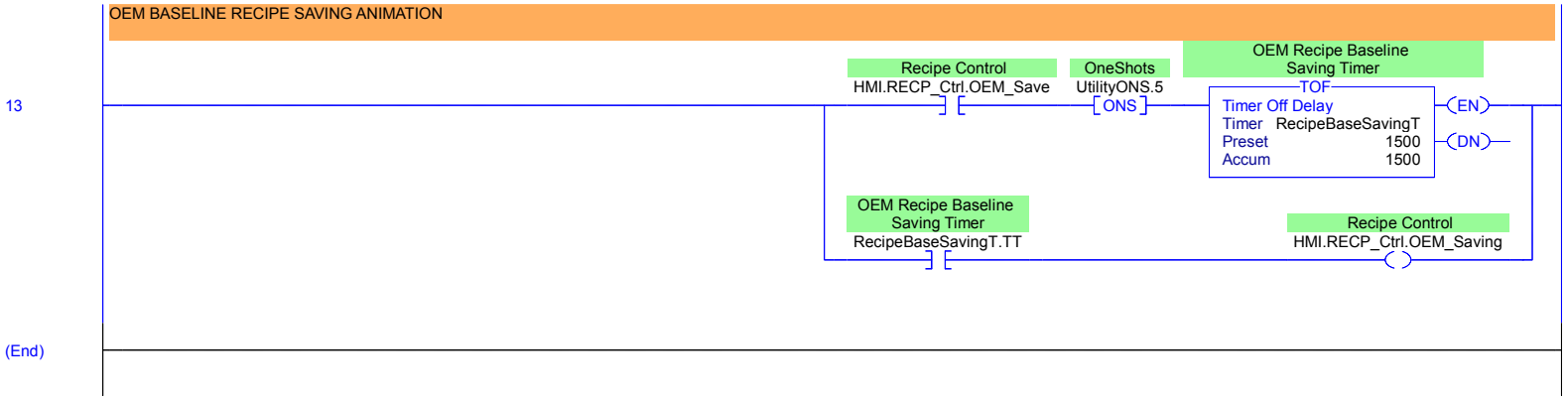
Recipe Control
HMI.RECP_Ctrl.OEM_Load

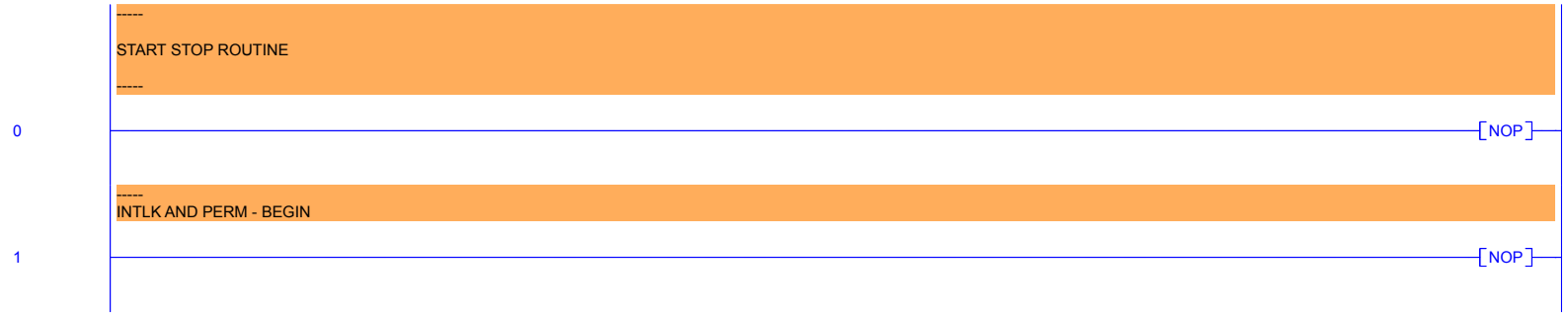
OneShots
UtilityONS.4
ONS

OEM Recipe Baseline Loading Timer
TOF
Timer Off Delay
Timer RecipeBaseLoadingT
Preset 1500
Accum 1500
EN
DN

OEM Recipe Baseline Loading Timer
RecipeBaseLoadingT.TT

Recipe Control
HMI.RECP_Ctrl.OEM_Loading


OEM BASELINE RECIPE SAVING ANIMATION
13
Recipe Control
HMI.RECP_Ctrl.OEM_Save
OneShots
UtilityONS.5
ONS
OEM Recipe Baseline
Saving Timer
TOF
Timer Off Delay
Timer RecipeBaseSavingT
Preset 1500
Accum 1500
EN
DN
OEM Recipe Baseline
Saving Timer
RecipeBaseSavingT.TT
Recipe Control
HMI.RECP_Ctrl.OEM_Saving
(End)


START STOP ROUTINE
0
NOP
INTLK AND PERM - BEGIN
1
NOP

Start permissives

2

NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[0] 'Safety Relay OK'
Sys_tmrSafetyPwrOn.DN
Sys_StartPerm.OK[0]
System Control Estops OK
Sys.EstopOK

NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[1] 'All doors closed and'
stsDoorsClosed
Sys_StartPerm.OK[1]

NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[2] 'Manual mode not requ'
Sys_HMI_ManModeReq
Sys_StartPerm.OK[2]

NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[3] 'All Seqences at Read'
10-99 - pre table work 100-899 - table work 900-999 - go to ready pos
EQU Equal Source A Indx_Seq 890 Source B 999
10-99 - pre table work 100-899 - table work 900-999 - go to ready pos
EQU Equal Source A Infd_Seq 999 Source B 999
EQU Equal Source A Drill1_Seq 999 Source B 999
10-99 - pre table work 100-899 - table work 900-999 - go to ready pos
EQU Equal Source A Outfd_Seq 361 Source B 999
10-99 - pre table work 100-899 - table work 900-999 - go to ready pos
EQU Equal Source A Collect_Seq 999 Source B 999
Sys_StartPerm.OK[3]
Sys_SeqAtReady

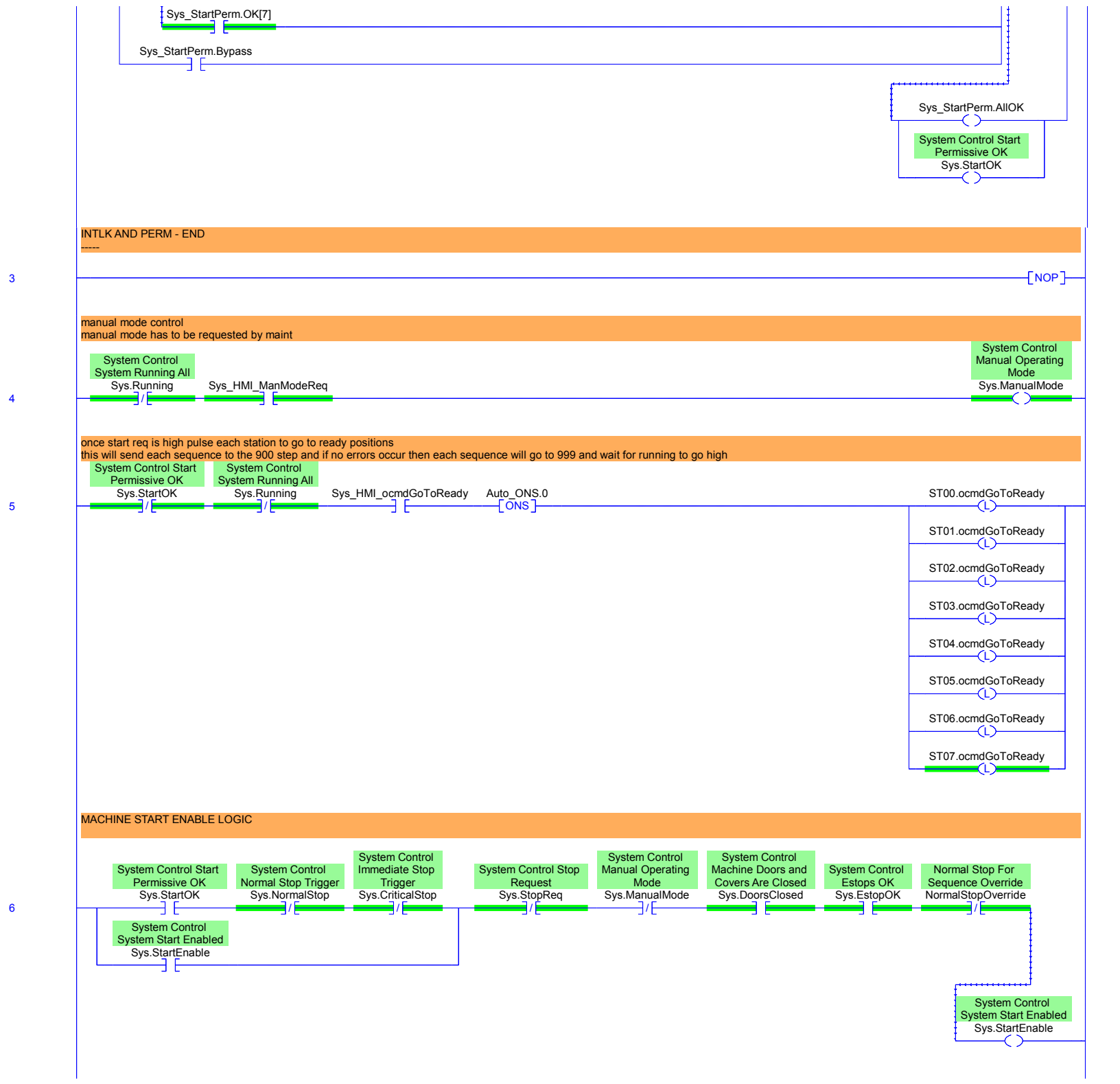
NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[4] 'All cylinders at rea'
inpAirPressSw <Local:4:I.Data.25>
outDumpValve <Local:6:O.Data.11>
cyl retracted Infd_PickCyl.stsRet
cyl retracted Infd_PinStopCyl.stsRet
cyl retracted Outfd_PickCyl.stsRet
cyl retracted LocCyl[1].stsRet
cyl retracted LocCyl[2].stsRet
cyl retracted LocCyl[3].stsRet
cyl retracted LocCyl[4].stsRet
cyl retracted LocCyl[5].stsRet
cyl retracted LocCyl[6].stsRet
Sys_StartPerm.OK[4]
System Control Cylinders Home
Sys.CylHome

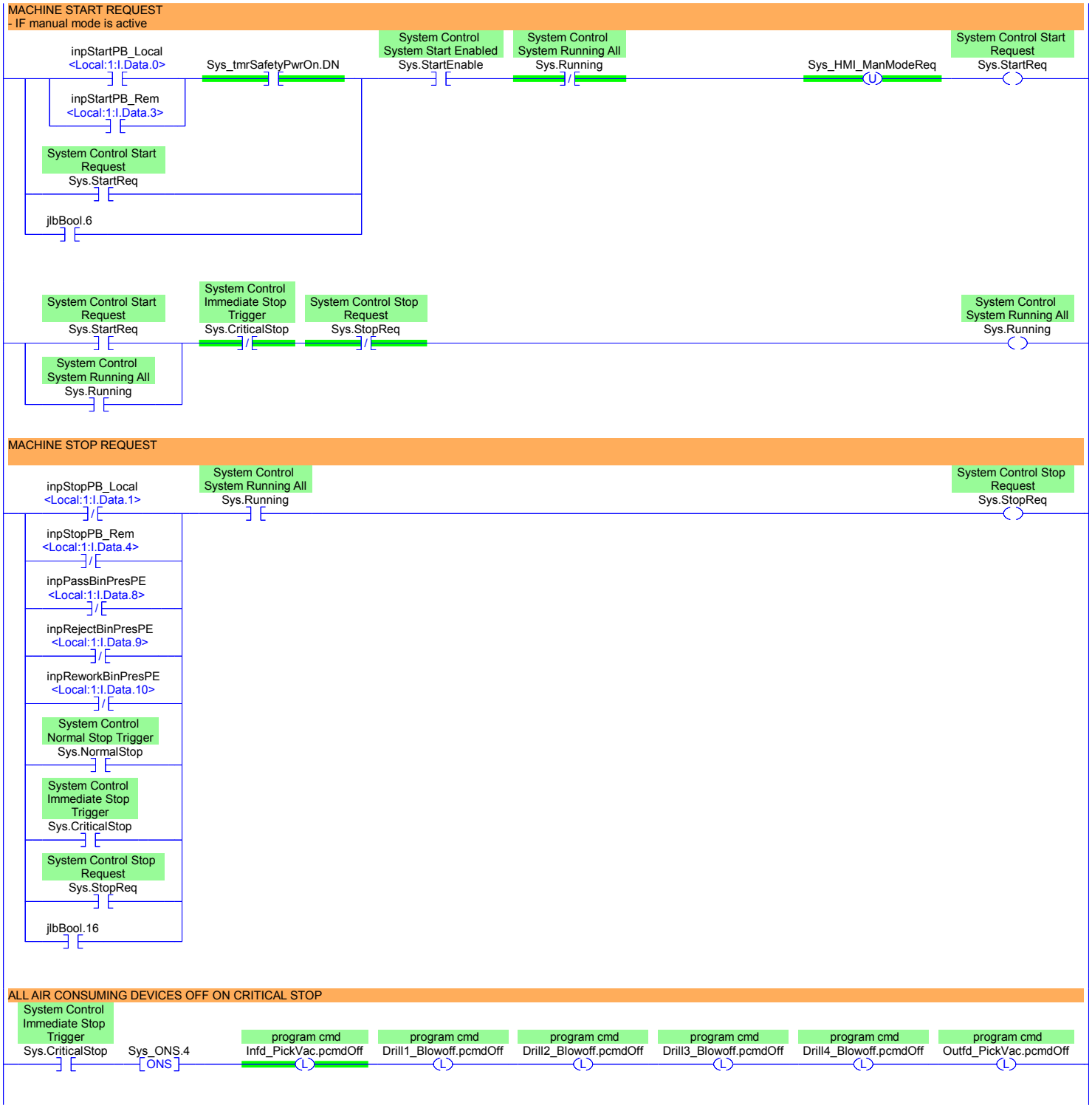
NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[5] 'All servos at ready '
not used not used
Drill1Axis_Moves[0].AtPos
Drill2Axis_Moves[0].AtPos
Drill3Axis_Moves[0].AtPos
Drill4Axis_Moves[0].AtPos
Sys_StartPerm.OK[5]

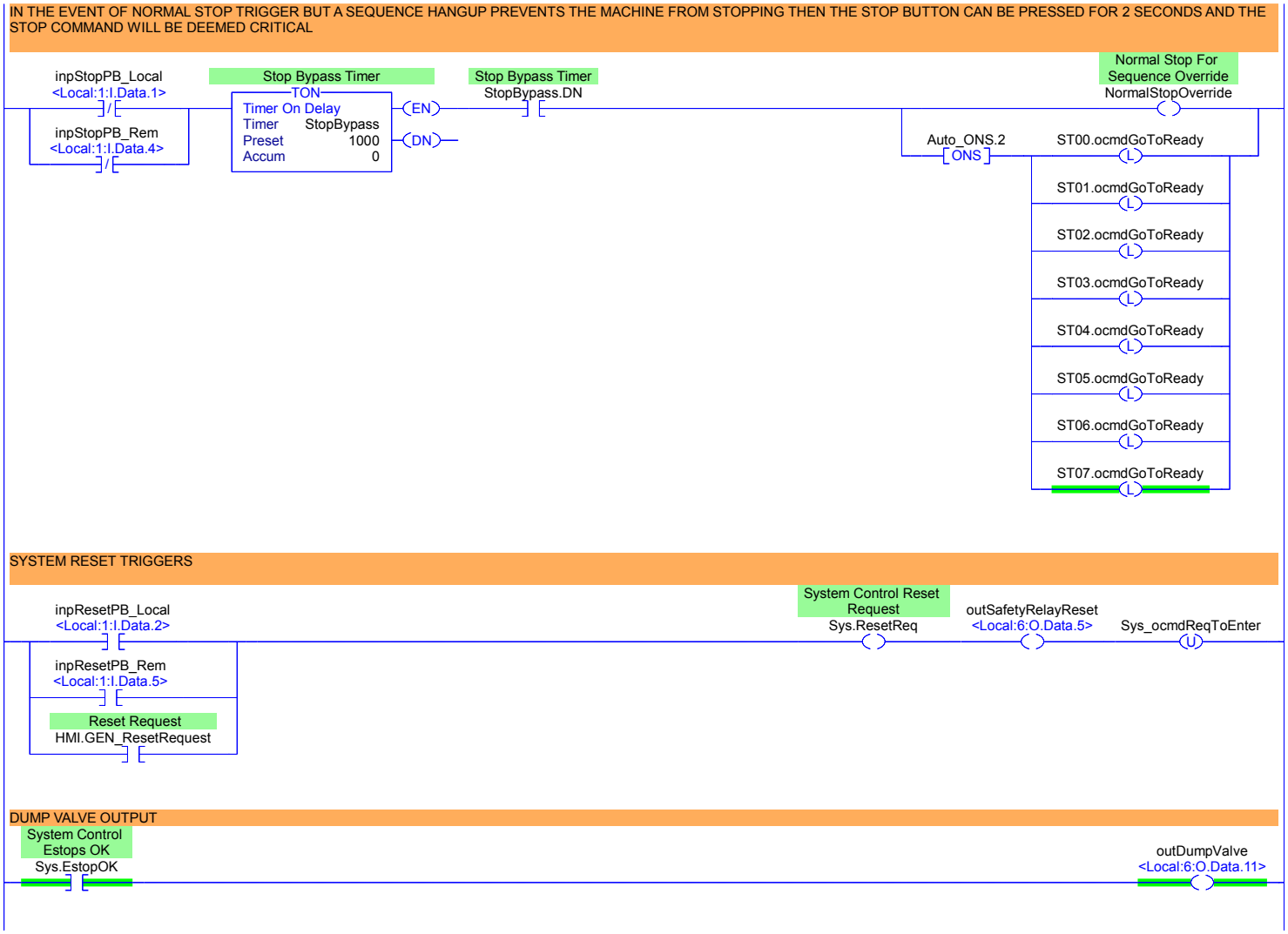
NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[6] 'All servos ready'
Infeed Conveyor Faulted
Indx_CV.Faulted
Enc:I1.ConnectionFaulted
Drill1_VFD.inpVFDReady
Drill2_VFD.inpVFDReady
Drill3_VFD.inpVFDReady
Drill4_VFD.inpVFDReady
Drill1Axis.stsAxisReady
Drill2Axis.stsAxisReady
Drill3Axis.stsAxisReady
Drill4Axis.stsAxisReady
Sys_StartPerm.OK[6]

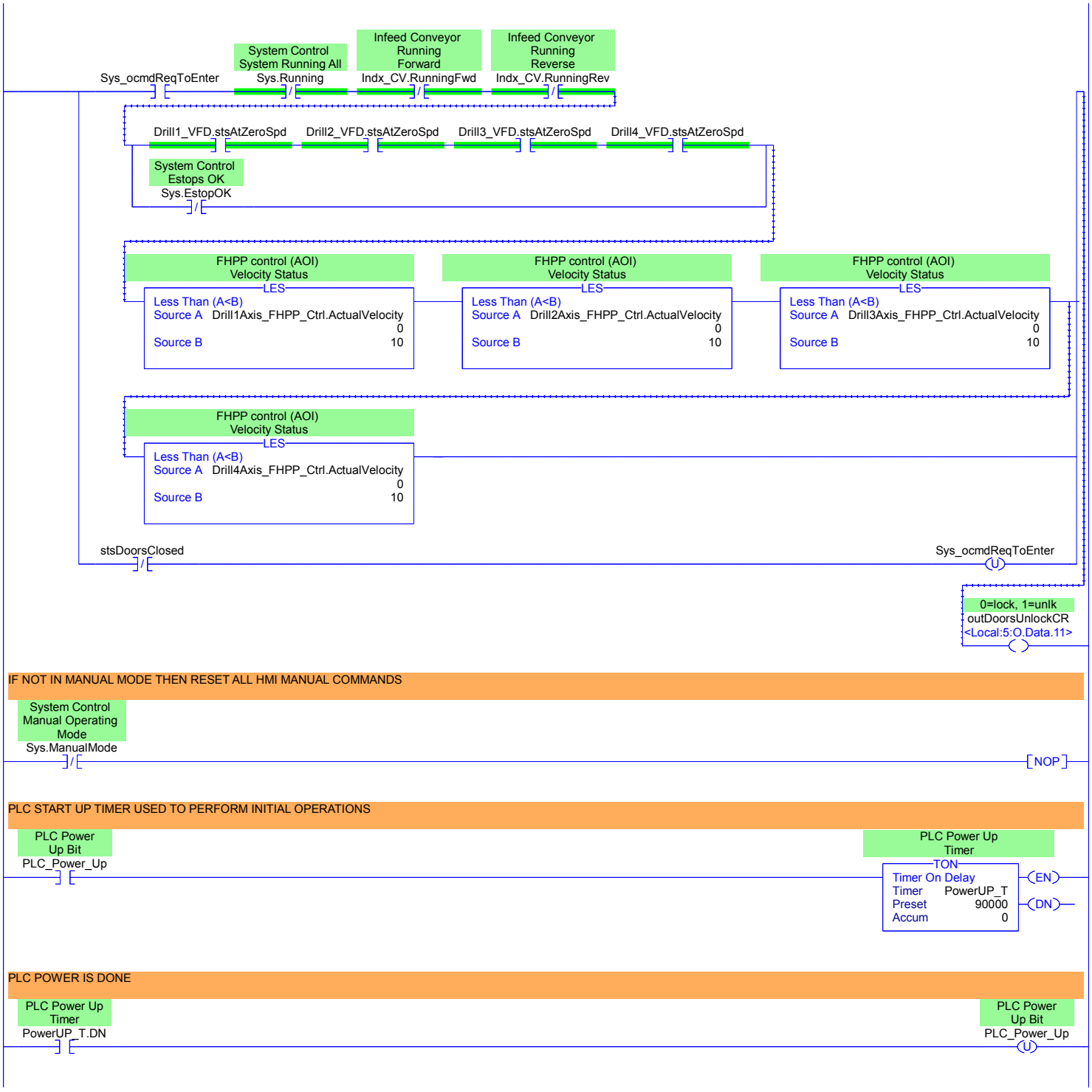
NEQ Not Equal Source A EmptyString "" Source B Sys_StartPerm.Descr[7] 'Camera Comms Ok'
Vis_HeightCam:I.Status.Online
Vis_ODIDCam:I.Status.Online
Sys_StartPerm.OK[7]

Sys_StartPerm.OK[0] Sys_StartPerm.OK[1] Sys_StartPerm.OK[2] Sys_StartPerm.OK[3] Sys_StartPerm.OK[4] Sys_StartPerm.OK[5] Sys_StartPerm.OK[6]

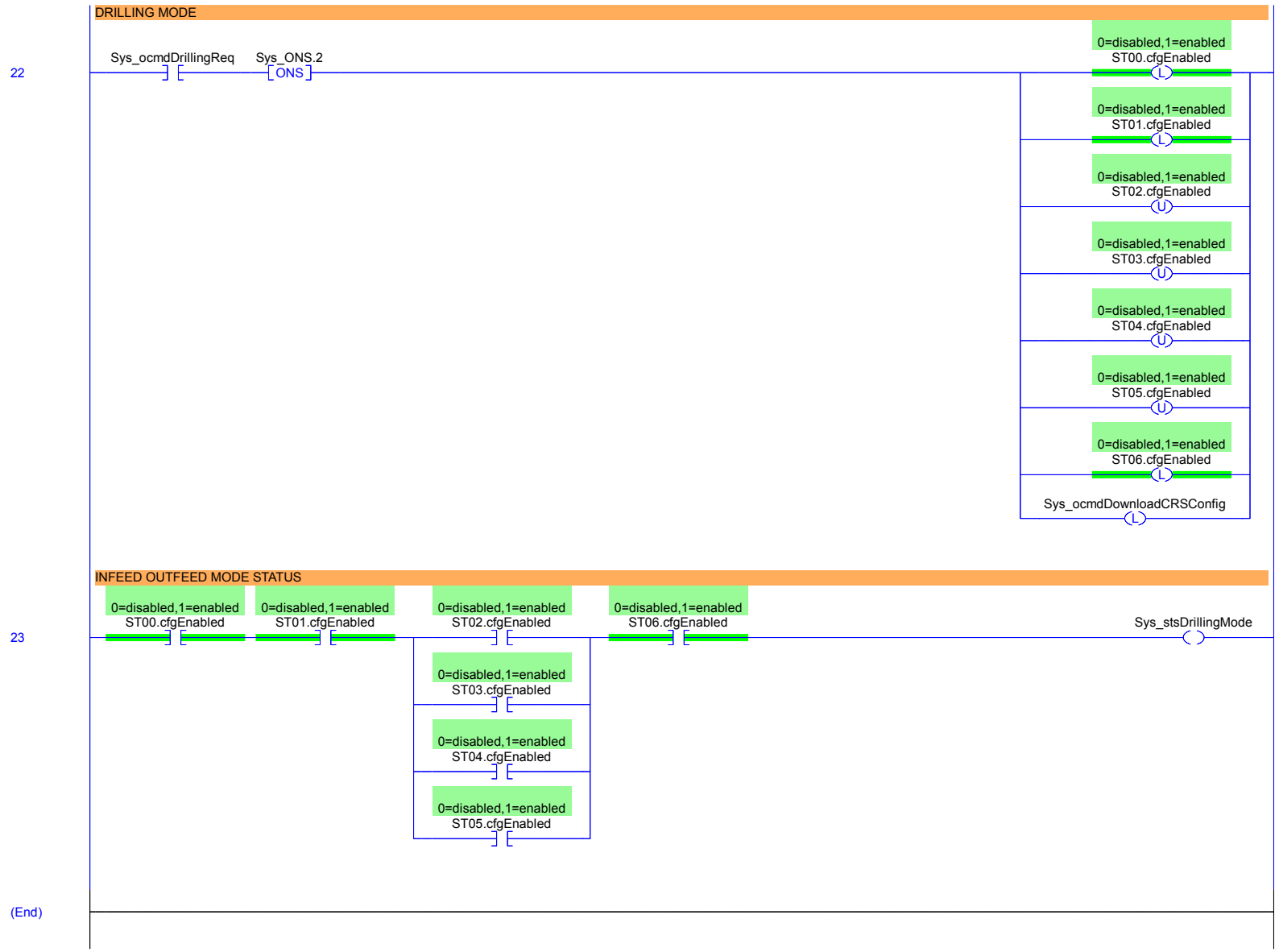

Sys_StartPerm.OK[7]
Sys_StartPerm.Bypass
Sys_StartPerm.AllOK
System Control Start Permissive OK
Sys.StartOK
INTLK AND PERM - END
3
NOP
manual mode control
manual mode has to be requested by maint
System Control System Running All
Sys.Running
Sys_HMI_ManModeReq
System Control Manual Operating Mode
Sys.ManualMode
4
once start req is high pulse each station to go to ready positions
this will send each sequence to the 900 step and if no errors occur then each sequence will go to 999 and wait for running to go high
System Control Start Permissive OK
Sys.StartOK
System Control System Running All
Sys.Running
Sys_HMI_ocmdGoToReady
Auto_ONS.0
ONS
5
ST00.ocmdGoToReady
ST01.ocmdGoToReady
ST02.ocmdGoToReady
ST03.ocmdGoToReady
ST04.ocmdGoToReady
ST05.ocmdGoToReady
ST06.ocmdGoToReady
ST07.ocmdGoToReady
MACHINE START ENABLE LOGIC
System Control Start Permissive OK
Sys.StartOK
System Control Normal Stop Trigger
Sys.NormalStop
System Control Immediate Stop Trigger
Sys.CriticalStop
System Control Stop Request
Sys.StopReq
System Control Manual Operating Mode
Sys.ManualMode
System Control Machine Doors and Covers Are Closed
Sys.DoorsClosed
System Control Estops OK
Sys.EstopOK
Normal Stop For Sequence Override
NormalStopOverride
System Control System Start Enabled
Sys.StartEnable
6
System Control System Start Enabled
Sys.StartEnable


MACHINE START REQUEST
- IF manual mode is active
7
inpStartPB_Local
<Local:1:I.Data.0>
Sys_tmrSafetyPwrOn.DN
System Control System Start Enabled
Sys.StartEnable
System Control System Running All
Sys.Running
Sys_HMI_ManModeReq
System Control Start Request
Sys.StartReq
inpStartPB_Rem
<Local:1:I.Data.3>
System Control Start Request
Sys.StartReq
jlbBool.6
8
System Control Start Request
Sys.StartReq
System Control Immediate Stop Trigger
Sys.CriticalStop
System Control Stop Request
Sys.StopReq
System Control System Running All
Sys.Running
System Control System Running All
Sys.Running
MACHINE STOP REQUEST
9
inpStopPB_Local
<Local:1:I.Data.1>
System Control System Running All
Sys.Running
System Control Stop Request
Sys.StopReq
inpStopPB_Rem
<Local:1:I.Data.4>
inpPassBinPresPE
<Local:1:I.Data.8>
inpRejectBinPresPE
<Local:1:I.Data.9>
inpReworkBinPresPE
<Local:1:I.Data.10>
System Control Normal Stop Trigger
Sys.NormalStop
System Control Immediate Stop Trigger
Sys.CriticalStop
System Control Stop Request
Sys.StopReq
jlbBool.16
ALL AIR CONSUMING DEVICES OFF ON CRITICAL STOP
10
System Control Immediate Stop Trigger
Sys.CriticalStop
Sys_ONS.4
ONS
program cmd
Infd_PickVac.pcmdOff
program cmd
Drill1_Blowoff.pcmdOff
program cmd
Drill2_Blowoff.pcmdOff
program cmd
Drill3_Blowoff.pcmdOff
program cmd
Drill4_Blowoff.pcmdOff
program cmd
Outfd_PickVac.pcmdOff


IN THE EVENT OF NORMAL STOP TRIGGER BUT A SEQUENCE HANGUP PREVENTS THE MACHINE FROM STOPPING THEN THE STOP BUTTON CAN BE PRESSED FOR 2 SECONDS AND THE STOP COMMAND WILL BE DEEMED CRITICAL
11
inpStopPB_Local
<Local:1:I.Data.1>
inpStopPB_Rem
<Local:1:I.Data.4>
Stop Bypass Timer
TON
Timer On Delay
Timer StopBypass
Preset 1000
Accum 0
EN
DN
Stop Bypass Timer
StopBypass.DN
Normal Stop For Sequence Override
NormalStopOverride
Auto_ONS.2
ONS
ST00.ocmdGoToReady
ST01.ocmdGoToReady
ST02.ocmdGoToReady
ST03.ocmdGoToReady
ST04.ocmdGoToReady
ST05.ocmdGoToReady
ST06.ocmdGoToReady
ST07.ocmdGoToReady
SYSTEM RESET TRIGGERS
12
inpResetPB_Local
<Local:1:I.Data.2>
inpResetPB_Rem
<Local:1:I.Data.5>
Reset Request
HMI.GEN_ResetRequest
System Control Reset Request
Sys.ResetReq
outSafetyRelayReset
<Local:6:O.Data.5>
Sys_ocmdReqToEnter
DUMP VALVE OUTPUT
13
System Control Estops OK
Sys.EstopOK
outDumpValve
<Local:6:O.Data.11>


14
Sys_ocmdReqToEnter
System Control System Running All
Sys.Running
Infeed Conveyor Running Forward
Indx_CV.RunningFwd
Infeed Conveyor Running Reverse
Indx_CV.RunningRev
Drill1_VFD.stsAtZeroSpd
Drill2_VFD.stsAtZeroSpd
Drill3_VFD.stsAtZeroSpd
Drill4_VFD.stsAtZeroSpd
System Control Estops OK
Sys.EstopOK
FHPP control (AOI) Velocity Status
LES
Less Than (A<B)
Source A Drill1Axis_FHPP_Ctrl.ActualVelocity
0
Source B 10
FHPP control (AOI) Velocity Status
LES
Less Than (A<B)
Source A Drill2Axis_FHPP_Ctrl.ActualVelocity
0
Source B 10
FHPP control (AOI) Velocity Status
LES
Less Than (A<B)
Source A Drill3Axis_FHPP_Ctrl.ActualVelocity
0
Source B 10
FHPP control (AOI) Velocity Status
LES
Less Than (A<B)
Source A Drill4Axis_FHPP_Ctrl.ActualVelocity
0
Source B 10
stsDoorsClosed
Sys_ocmdReqToEnter
U
0=lock, 1=unlk
outDoorsUnlockCR
<Local:5:O.Data.11>
IF NOT IN MANUAL MODE THEN RESET ALL HMI MANUAL COMMANDS
15
System Control Manual Operating Mode
Sys.ManualMode
NOP
PLC START UP TIMER USED TO PERFORM INITIAL OPERATIONS
16
PLC Power Up Bit
PLC_Power_Up
PLC Power Up Timer
TON
Timer On Delay
Timer PowerUP_T
Preset 90000
Accum 0
EN
DN
PLC POWER IS DONE
17
PLC Power Up Timer
PowerUP_T.DN
PLC Power Up Bit
PLC_Power_Up
U


CLEANOUT MODE
18
Sys_ocmdCleanoutReq
Sys_ONS.0
ONS
0=disabled,1=enabled
ST00.cfgEnabled
L
0=disabled,1=enabled
ST01.cfgEnabled
U
0=disabled,1=enabled
ST02.cfgEnabled
U
0=disabled,1=enabled
ST03.cfgEnabled
U
0=disabled,1=enabled
ST04.cfgEnabled
U
0=disabled,1=enabled
ST05.cfgEnabled
U
0=disabled,1=enabled
ST06.cfgEnabled
L
CLEANOUT MODE STATUS
19
0=disabled,1=enabled
ST00.cfgEnabled
0=disabled,1=enabled
ST01.cfgEnabled
0=disabled,1=enabled
ST02.cfgEnabled
0=disabled,1=enabled
ST03.cfgEnabled
0=disabled,1=enabled
ST04.cfgEnabled
0=disabled,1=enabled
ST05.cfgEnabled
0=disabled,1=enabled
ST06.cfgEnabled
Sys_stsCleanoutMode
INFEED OUTFEED MODE
20
Sys_ocmdInfdOutfdReq
Sys_ONS.1
ONS
0=disabled,1=enabled
ST00.cfgEnabled
L
0=disabled,1=enabled
ST01.cfgEnabled
L
0=disabled,1=enabled
ST02.cfgEnabled
U
0=disabled,1=enabled
ST03.cfgEnabled
U
0=disabled,1=enabled
ST04.cfgEnabled
U
0=disabled,1=enabled
ST05.cfgEnabled
U
0=disabled,1=enabled
ST06.cfgEnabled
L
INFEED OUTFEED MODE STATUS
21
0=disabled,1=enabled
ST00.cfgEnabled
0=disabled,1=enabled
ST01.cfgEnabled
0=disabled,1=enabled
ST02.cfgEnabled
0=disabled,1=enabled
ST03.cfgEnabled
0=disabled,1=enabled
ST04.cfgEnabled
0=disabled,1=enabled
ST05.cfgEnabled
0=disabled,1=enabled
ST06.cfgEnabled
Sys_stsInfdOutfdMode


DRILLING MODE
Sys_ocmdDrillingReq
Sys_ONS.2
ONS
22
0=disabled,1=enabled
ST00.cfgEnabled
L
0=disabled,1=enabled
ST01.cfgEnabled
L
0=disabled,1=enabled
ST02.cfgEnabled
U
0=disabled,1=enabled
ST03.cfgEnabled
U
0=disabled,1=enabled
ST04.cfgEnabled
U
0=disabled,1=enabled
ST05.cfgEnabled
U
0=disabled,1=enabled
ST06.cfgEnabled
L
Sys_ocmdDownloadCRSConfig
L
INFEED OUTFEED MODE STATUS
0=disabled,1=enabled
ST00.cfgEnabled
0=disabled,1=enabled
ST01.cfgEnabled
0=disabled,1=enabled
ST02.cfgEnabled
0=disabled,1=enabled
ST06.cfgEnabled
Sys_stsDrillingMode
23
0=disabled,1=enabled
ST03.cfgEnabled
0=disabled,1=enabled
ST04.cfgEnabled
0=disabled,1=enabled
ST05.cfgEnabled
(End)

AUTO DOWNLOAD CONFIGURATION
do this if you are not running and not in auto
* note this prevents a bad startup or startup where the system is not configured like the operator intended

0

System Control System Running All
Sys.Running

System Control Manual Operating Mode
Sys.ManualMode

Sys_stsCleanoutMode

Sys_stsInfdOutfdMode

TON
Timer On Delay
Timer Sys_tmrAutoDownloadConfig
Preset 500
Accum 0
EN
DN

Sys_tmrAutoDownloadConfig.DN

Sys_ocmdDownloadCRSConfig (L)

Sys_tmrAutoDownloadConfig (RES)

SET THE INITIAL DRILLING STATIONS
IF CRS has the drill enabled AND drill is NOT listed as a backup then it can be used initially

1

Sys_ocmdDownloadCRSConfig

0=disabled,1=enabled
ST02.cfgEnabled (U)

0=disabled,1=enabled
ST03.cfgEnabled (U)

0=disabled,1=enabled
ST04.cfgEnabled (U)

0=disabled,1=enabled
ST05.cfgEnabled (U)

Drill1_ctrBitUse.DN

station enable
Rec[0].D1.Enable

0=no backup,1=drill1,2=drill2,3=drill3
NEQ
Not Equal
Source A Rec[0].D2.BackupDrill
0
Source B 1

0=no backup,1=drill1,2=drill3
NEQ
Not Equal
Source A Rec[0].D3.BackupDrill
0
Source B 1

0=disabled,1=enabled
ST02.cfgEnabled (L)

Drill2_ctrBitUse.DN

0=no backup,1=drill1,2=drill3
NEQ
Not Equal
Source A Rec[0].D1.BackupDrill
0
Source B 2

station enable
Rec[0].D2.Enable

0=no backup,1=drill1,2=drill3
NEQ
Not Equal
Source A Rec[0].D3.BackupDrill
0
Source B 2

0=disabled,1=enabled
ST03.cfgEnabled (L)

Drill3_ctrBitUse.DN

0=no backup,1=drill1,2=drill3
NEQ
Not Equal
Source A Rec[0].D1.BackupDrill
0
Source B 3

0=no backup,1=drill1,2=drill3
NEQ
Not Equal
Source A Rec[0].D2.BackupDrill
0
Source B 3

station enable
Rec[0].D3.Enable

0=disabled,1=enabled
ST04.cfgEnabled (L)

station enable
Rec[0].D4.Enable

0=disabled,1=enabled
ST05.cfgEnabled (L)

WORK ORDER QUANTITY

2

Sys_ocmdDownloadCRSConfig

MOV
Move
Source Rec[0].WorkOrderQty
50
Dest Outfd_ctrGoodPartsToBin.PRE
50

MOV
Move
Source Rec[0].WorkOrderQty
50
Dest Outfd_ctrReworkPartsToBin.PRE
50

MOV
Move
Source Rec[0].WorkOrderQty
50
Dest Outfd_ctrBadPartsToBin.PRE
50

evaluate drilling positions

3

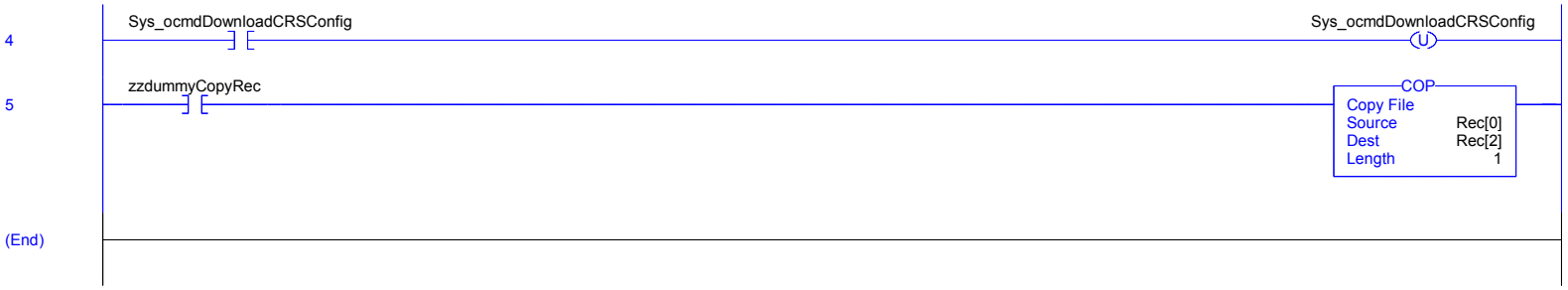
Sys_ocmdDownloadCRSConfig

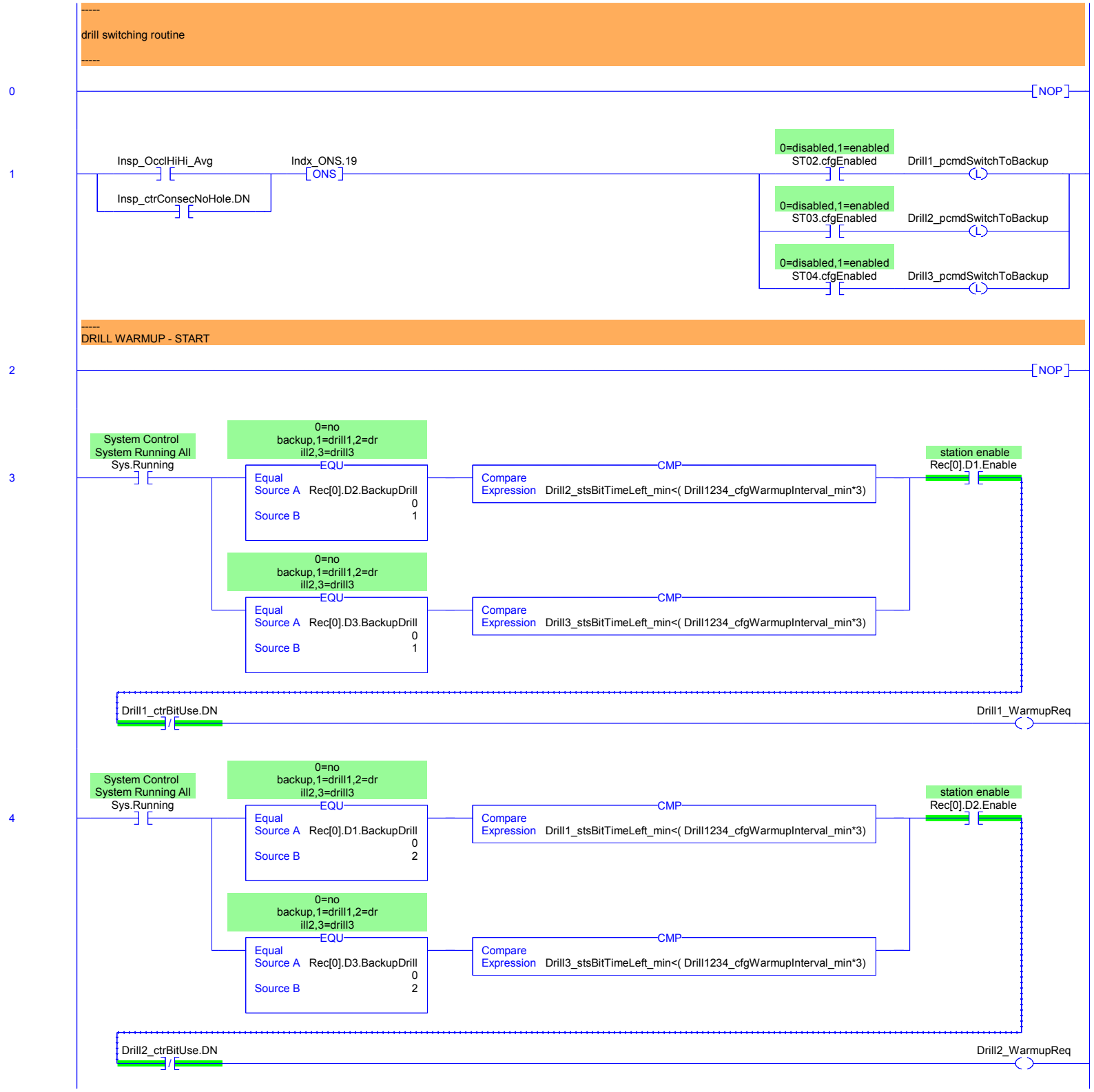
calculate positions command
Drill1_ocmdCalcPos (L)

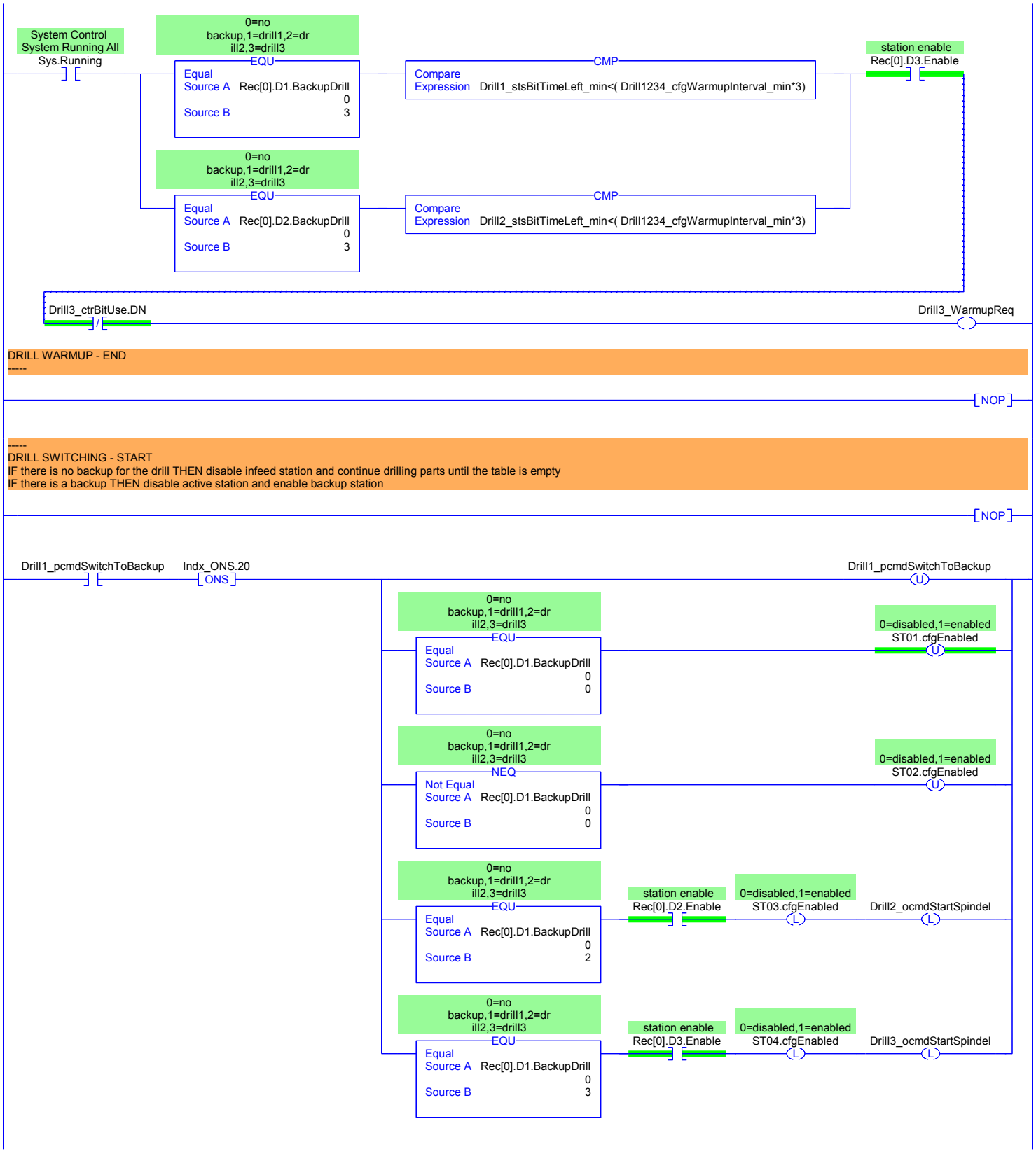
Drill2_ocmdCalcPos (L)

Drill3_ocmdCalcPos (L)

Drill4_ocmdCalcPos (L)


4
Sys_ocmdDownloadCRSConfig
Sys_ocmdDownloadCRSConfig
U
5
zzdummyCopyRec
COP
Copy File
Source Rec[0]
Dest Rec[2]
Length 1
(End)


drill switching routine
0
NOP
Insp_OcclHiHi_Avg
Indx_ONS.19
ONS
Insp_ctrConsecNoHole.DN
0=disabled,1=enabled
ST02.cfgEnabled
Drill1_pcmdSwitchToBackup
0=disabled,1=enabled
ST03.cfgEnabled
Drill2_pcmdSwitchToBackup
0=disabled,1=enabled
ST04.cfgEnabled
Drill3_pcmdSwitchToBackup
DRILL WARMUP - START
2
NOP
System Control
System Running All
Sys.Running
0=no backup,1=drill1,2=drill2,3=drill3
EQU
Equal
Source A Rec[0].D2.BackupDrill
0
Source B 1
CMP
Compare
Expression Drill2_stsBitTimeLeft_min<(Drill1234_cfgWarmupInterval_min*3)
station enable
Rec[0].D1.Enable
0=no backup,1=drill1,2=drill2,3=drill3
EQU
Equal
Source A Rec[0].D3.BackupDrill
0
Source B 1
CMP
Compare
Expression Drill3_stsBitTimeLeft_min<(Drill1234_cfgWarmupInterval_min*3)
Drill1_ctrBitUse.DN
Drill1_WarmupReq
4
System Control
System Running All
Sys.Running
0=no backup,1=drill1,2=drill2,3=drill3
EQU
Equal
Source A Rec[0].D1.BackupDrill
0
Source B 2
CMP
Compare
Expression Drill1_stsBitTimeLeft_min<(Drill1234_cfgWarmupInterval_min*3)
station enable
Rec[0].D2.Enable
0=no backup,1=drill1,2=drill2,3=drill3
EQU
Equal
Source A Rec[0].D3.BackupDrill
0
Source B 2
CMP
Compare
Expression Drill3_stsBitTimeLeft_min<(Drill1234_cfgWarmupInterval_min*3)
Drill2_ctrBitUse.DN
Drill2_WarmupReq


System Control
System Running All
Sys.Running
0=no backup,1=drill1,2=dr ill2,3=drill3
EQU
Equal
Source A Rec[0].D1.BackupDrill 0
Source B 3
CMP
Compare
Expression Drill1_stsBitTimeLeft_min<(Drill1234_cfgWarmupInterval_min*3)
0=no backup,1=drill1,2=dr ill2,3=drill3
EQU
Equal
Source A Rec[0].D2.BackupDrill 0
Source B 3
CMP
Compare
Expression Drill2_stsBitTimeLeft_min<(Drill1234_cfgWarmupInterval_min*3)
station enable
Rec[0].D3.Enable
Drill3_ctrBitUse.DN
Drill3_WarmupReq
DRILL WARMUP - END
5
6
NOP
DRILL SWITCHING - START
IF there is no backup for the drill THEN disable infeed station and continue drilling parts until the table is empty
IF there is a backup THEN disable active station and enable backup station
7
NOP
Drill1_pcmdSwitchToBackup
Indx_ONS.20
ONS
8
Drill1_pcmdSwitchToBackup
0=no backup,1=drill1,2=dr ill2,3=drill3
EQU
Equal
Source A Rec[0].D1.BackupDrill 0
Source B 0
0=disabled,1=enabled
ST01.cfgEnabled
NEQ
Not Equal
Source A Rec[0].D1.BackupDrill 0
Source B 0
0=disabled,1=enabled
ST02.cfgEnabled
Source B 2
station enable
Rec[0].D2.Enable
0=disabled,1=enabled
ST03.cfgEnabled
Drill2_ocmdStartSpindel
Source B 3
station enable
Rec[0].D3.Enable
0=disabled,1=enabled
ST04.cfgEnabled
Drill3_ocmdStartSpindel

9

Drill2_pcmdSwitchToBackup Indx_ONS.21 ONS

Drill2_pcmdSwitchToBackup U

0=no backup,1=drill1,2=dr ill2,3=drill3 EQU
Equal
Source A Rec[0].D2.BackupDrill 0
Source B 0
0=disabled,1=enabled ST01.cfgEnabled U

0=no backup,1=drill1,2=dr ill2,3=drill3 EQU
Equal
Source A Rec[0].D2.BackupDrill 0
Source B 1
station enable Rec[0].D1.Enable
0=disabled,1=enabled ST02.cfgEnabled L
Drill1_ocmdStartSpindel L

0=no backup,1=drill1,2=dr ill2,3=drill3 NEQ
Not Equal
Source A Rec[0].D2.BackupDrill 0
Source B 0
0=disabled,1=enabled ST03.cfgEnabled U

0=no backup,1=drill1,2=dr ill2,3=drill3 EQU
Equal
Source A Rec[0].D2.BackupDrill 0
Source B 3
station enable Rec[0].D3.Enable
0=disabled,1=enabled ST04.cfgEnabled L
Drill3_ocmdStartSpindel L

10

Drill3_pcmdSwitchToBackup Indx_ONS.22 ONS

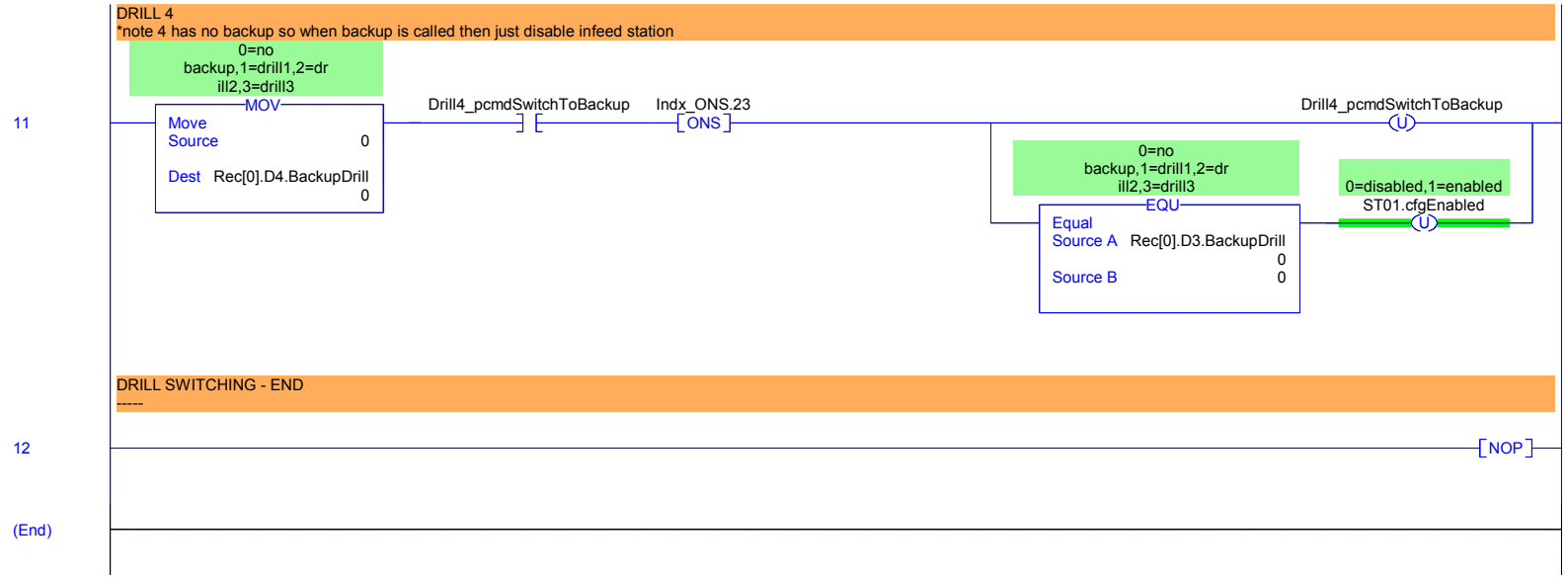
Drill3_pcmdSwitchToBackup U

0=no backup,1=drill1,2=dr ill2,3=drill3 EQU
Equal
Source A Rec[0].D3.BackupDrill 0
Source B 0
0=disabled,1=enabled ST01.cfgEnabled U

0=no backup,1=drill1,2=dr ill2,3=drill3 EQU
Equal
Source A Rec[0].D3.BackupDrill 0
Source B 1
station enable Rec[0].D1.Enable
0=disabled,1=enabled ST02.cfgEnabled L
Drill1_ocmdStartSpindel L

0=no backup,1=drill1,2=dr ill2,3=drill3 EQU
Equal
Source A Rec[0].D3.BackupDrill 0
Source B 2
station enable Rec[0].D2.Enable
0=disabled,1=enabled ST03.cfgEnabled L
Drill2_ocmdStartSpindel L

0=no backup,1=drill1,2=dr ill2,3=drill3 NEQ
Not Equal
Source A Rec[0].D3.BackupDrill 0
Source B 0
0=disabled,1=enabled ST04.cfgEnabled U


DRILL 4
*note 4 has no backup so when backup is called then just disable infeed station
0=no backup,1=drill1,2=dr ill2,3=drill3
11
MOV
Move
Source 0
Dest Rec[0].D4.BackupDrill 0
Drill4_pcmdSwitchToBackup
Indx_ONS.23
ONS
Drill4_pcmdSwitchToBackup
U
0=no backup,1=drill1,2=dr ill2,3=drill3
EQU
Equal
Source A Rec[0].D3.BackupDrill 0
Source B 0
0=disabled,1=enabled
ST01.cfgEnabled
U
DRILL SWITCHING - END
12
NOP
(End)

---
indexing routine
---

0 NOP

INTLK AND PERM - BEGIN

1 NOP

indexing interlocks

2
EQU Equal Source A Indx_intlk.Descr[0] 'Pin Stop Cyl Ret' Source B Indx_intlk.Descr[0] 'Pin Stop Cyl Ret'
cyl retracted Infd_PinStopCyl.stsRet → Indx_intlk.OK[0]

EQU Equal Source A Indx_intlk.Descr[1] 'Pick Cyls Ret' Source B Indx_intlk.Descr[1] 'Pick Cyls Ret'
cyl retracted Infd_PickCyl.stsRet, cyl extended Infd_PickCyl.stsExt, cyl retracted Outfd_PickCyl.stsRet, cyl extended Outfd_PickCyl.stsExt → Indx_intlk.OK[1]

EQU Equal Source A Indx_intlk.Descr[2] 'All Drills at Start ' Source B Indx_intlk.Descr[2] 'All Drills at Start '
not used not used Drill1Axis_Moves[0].AtPos, Drill2Axis_Moves[0].AtPos, Drill3Axis_Moves[0].AtPos, Drill4Axis_Moves[0].AtPos → Indx_intlk.OK[2]

EQU Equal Source A Indx_intlk.Descr[3] 'Loc Cyls Ret' Source B Indx_intlk.Descr[3] 'Loc Cyls Ret'
cyl retracted LocCyl[1].stsRet, cyl retracted LocCyl[2].stsRet, cyl retracted LocCyl[3].stsRet, cyl retracted LocCyl[4].stsRet, cyl retracted LocCyl[5].stsRet, cyl retracted LocCyl[6].stsRet → Indx_intlk.OK[3]

Indx_intlk.OK[0], Indx_intlk.OK[1], Indx_intlk.OK[2], Indx_intlk.OK[3] → Indx_intlk.AllOK
Indx_intlk.Bypass

permissives - these have to be true for auto mode to be started

3
NEQ Not Equal Source A EmptyString '' Source B Indx_perm.Descr[0] 'stop request not act'
System Control Stop Request Sys.StopReq → Indx_perm.OK[0]

NEQ Not Equal Source A EmptyString '' Source B Indx_perm.Descr[1] 'station enabled'
0=disabled,1=enabled ST00.cfgEnabled → Indx_perm.OK[1]

NEQ Not Equal Source A EmptyString '' Source B Indx_perm.Descr[2] 'Not in manual mode'
System Control Manual Operating Mode Sys.ManualMode → Indx_perm.OK[2]

Indx_perm.OK[0], Indx_perm.OK[1], Indx_perm.OK[2] → Indx_perm.AllOK
Indx_perm.Bypass

INTLK AND PERM - END
---

4 NOP

STATUS - BEGIN

5 NOP

6
EQU
Equal
Source A ST00.stsCycleTime[0] 6413
Source B ST01.stsCycleTime[0] 10

EQU
Equal
Source A ST02.stsCycleTime[0] 10
Source B ST03.stsCycleTime[0] 10

EQU
Equal
Source A ST04.stsCycleTime[0] 9
Source B ST05.stsCycleTime[0] 10

EQU
Equal
Source A ST06.stsCycleTime[0] 4821
Source B ST07.stsCycleTime[0] 0

NOP

7 ST01.stsOkToIndex ST02.stsOkToIndex ST03.stsOkToIndex ST04.stsOkToIndex ST05.stsOkToIndex ST06.stsOkToIndex ST07.stsOkToIndex ST00.stsOkToIndex
Always True
Always1

STATUS - END
---

8 NOP

CONV SPEED CONTROL - BEGIN

9 NOP

indexing cv slow speed timer

10 inpIndxTableHomeLS <Local:3:I.Data.10>

TON
Timer On Delay
Timer Indx_tmrSlowSpd
Preset 10000
Accum 0
EN
DN

GRT
Greater Than (A>B)
Source A Indx_tmrSlowSpd.ACC 0
Source B Indx_cfgSlowSpdDelay 375

Indx_EncCamAtSlowSpdPos

inpIndxTableHomeLS <Local:3:I.Data.10> Indx_ONS.18 ONS

MOV
Move
Source Indx_tmrSlowSpd.ACC 0
Dest Indx_IndexTime 0

CONV SPEED CONTROL - END
---

11 NOP

SEQUENCE CONTROL - BEGIN

12 NOP

CYCLE TIMER

System Control
System Running All
Sys.Running

13

cycle time

TON
Timer On Delay
Timer ST00.tmrC
Preset 99
Accum

Indx_Stop_999.X Indx_ONS.31
ONS

MOV
Move
Source ST00.tmrCycl
Dest ST00.stsCycleT

CPT
Compute
Dest Sys_stsCycleTimeA
Expression Sys_stsCycleTimeAvg_ms*0.9+(ST00.stsCycleTime[

LEQ
Less Than or Eql (A<=B)
Source A Sys_stsCycleTimeAvg_ms 9126
Source B 0

MOV
Move
Source
Dest Sys_stsCycleTimeA

DIV
Divide
Source A 1000
Source B Sys_stsCycleTimeAvg_ms 9126
Dest Sys_stsPartsPer_sec 0.10957703

DIV
Divide
Source A 60000
Source B Sys_stsCycleTimeAvg_ms 9126
Dest Sys_stsPartsPer_min 6.574622

DIV
Divide
Source A 36
Source B Sys_stsCycleTimeA
Dest Sys_stsParts 394

ST0

EN
DN

cle
99
0

.ACC
0
me[0]
6413

g_ms
9126
*0.1)

1

g_ms
9126

0000

g_ms
9126
er_hr
7733

cle timer
.tmrCycle
RES

Always False
Always0

14

Indx_perm.AllOK

SFR
SFC Reset
SFC Routine Name Seq_Master
Step Name Step_900

SFP
SFC Pause
SFC Routine Name Seq_Master
Target State Pause

RESET seq to ready pos logic IF
- interlocks are not met

15

ST00.ocmdGoToReady Indx_ONS.3 [ONS]

SFR
SFC Reset
SFC Routine Name Seq_Master
Step Name Step_900

SFP
SFC Pause
SFC Routine Name Seq_Master
Target State Execute

ST00.ocmdGoToReady (U) ST00.ocmdGoToReady

RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok

16

Indx_Stop_999.X Indx_intlk.AllOK Indx_perm.AllOK

System Control
System Running All
Sys.Running

Indx_ONS.4 [ONS]

SFR
SFC Reset
SFC Routine Name Seq_Master
Step Name Step_010

System Control
System Running All
Sys.Running

ST00.ocmdOneCycle

SFP
SFC Pause
SFC Routine Name Seq_Master
Target State Execute

ST00.ocmdOneCycle (U) ST00.ocmdOneCycle

SEQUENCE CONTROL - END

17

[NOP]

CONFIGURATION - START

18

[NOP]

configurations

19

ms to wait to start conv after ready signal

NEQ
Not Equal
Source A Indx_cfgStartConvDelay 50
Source B 0

ms to wait after LS is made to stop conv

NEQ
Not Equal
Source A Indx_cfgStopConvDelay 150
Source B 0

ms to wait after LS is 0 to trigger low spd

NEQ
Not Equal
Source A Indx_cfgSlowSpdDelay 375
Source B 0

normal indexing table spd

NEQ
Not Equal
Source A Indx_cfgNormalSpd_hz 90
Source B 0

slow indexing speed

NEQ
Not Equal
Source A Indx_cfgSlowSpd_hz 20
Source B 0

[NOP]

CONFIGURATION - END

20

[NOP]

DESCRIPTIONS - START

21

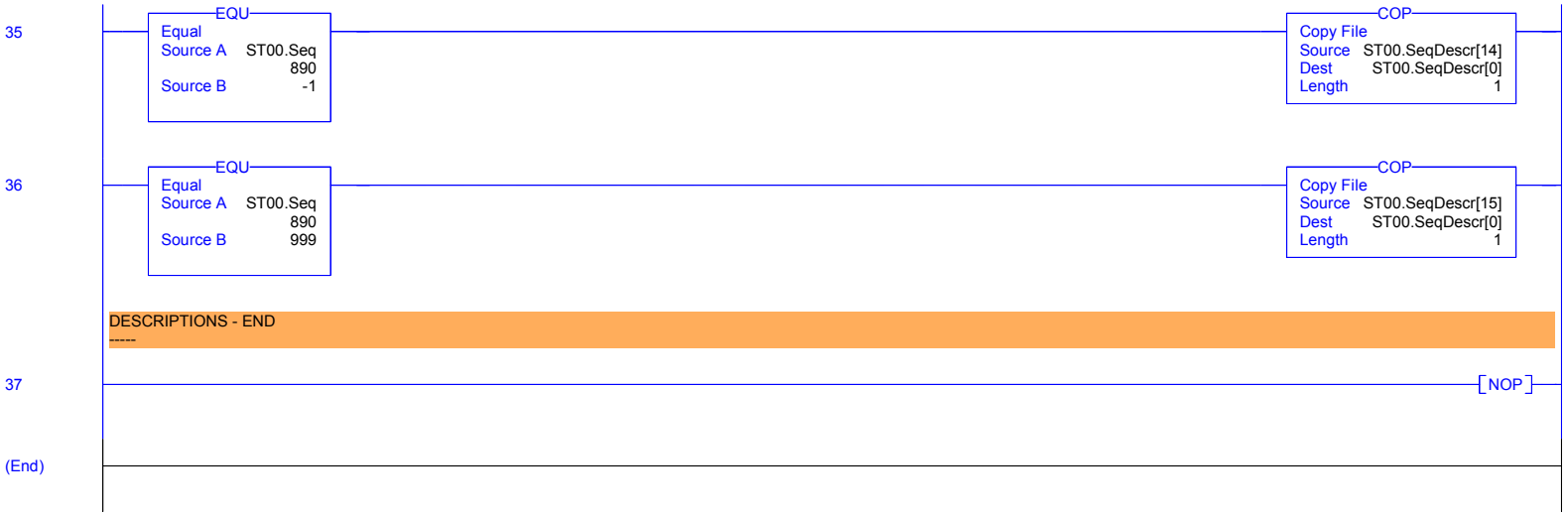
[NOP]

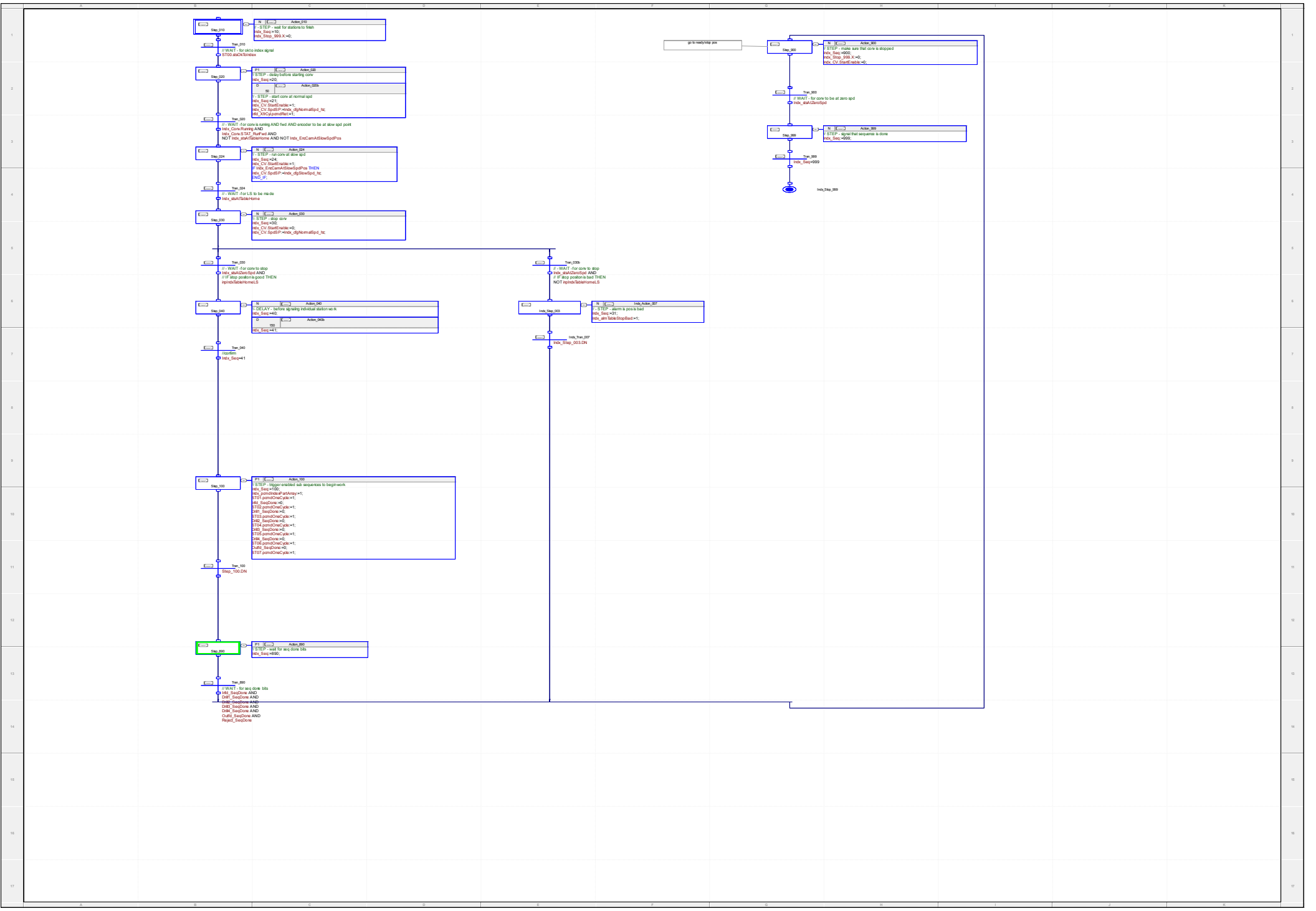
22

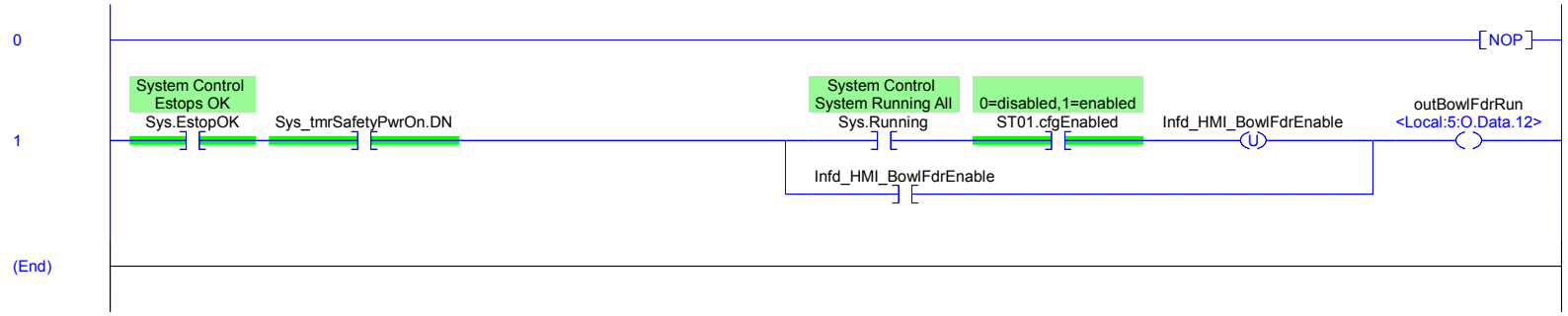
EQU
Equal
Source A ST00.Seq 890
Source B 10

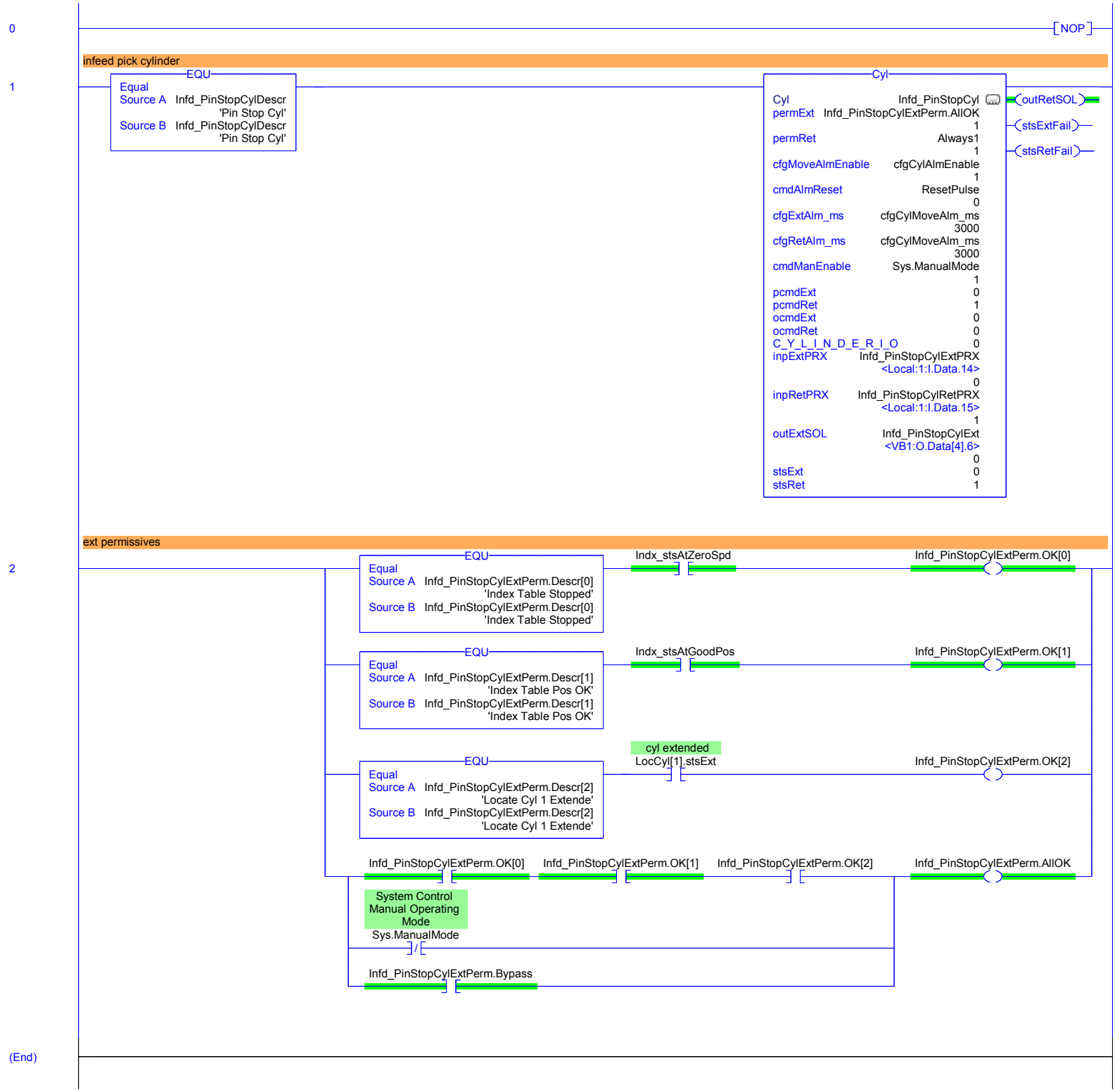
COP
Copy File
Source ST00.SeqDescr[1]
Dest ST00.SeqDescr[0]
Length 1

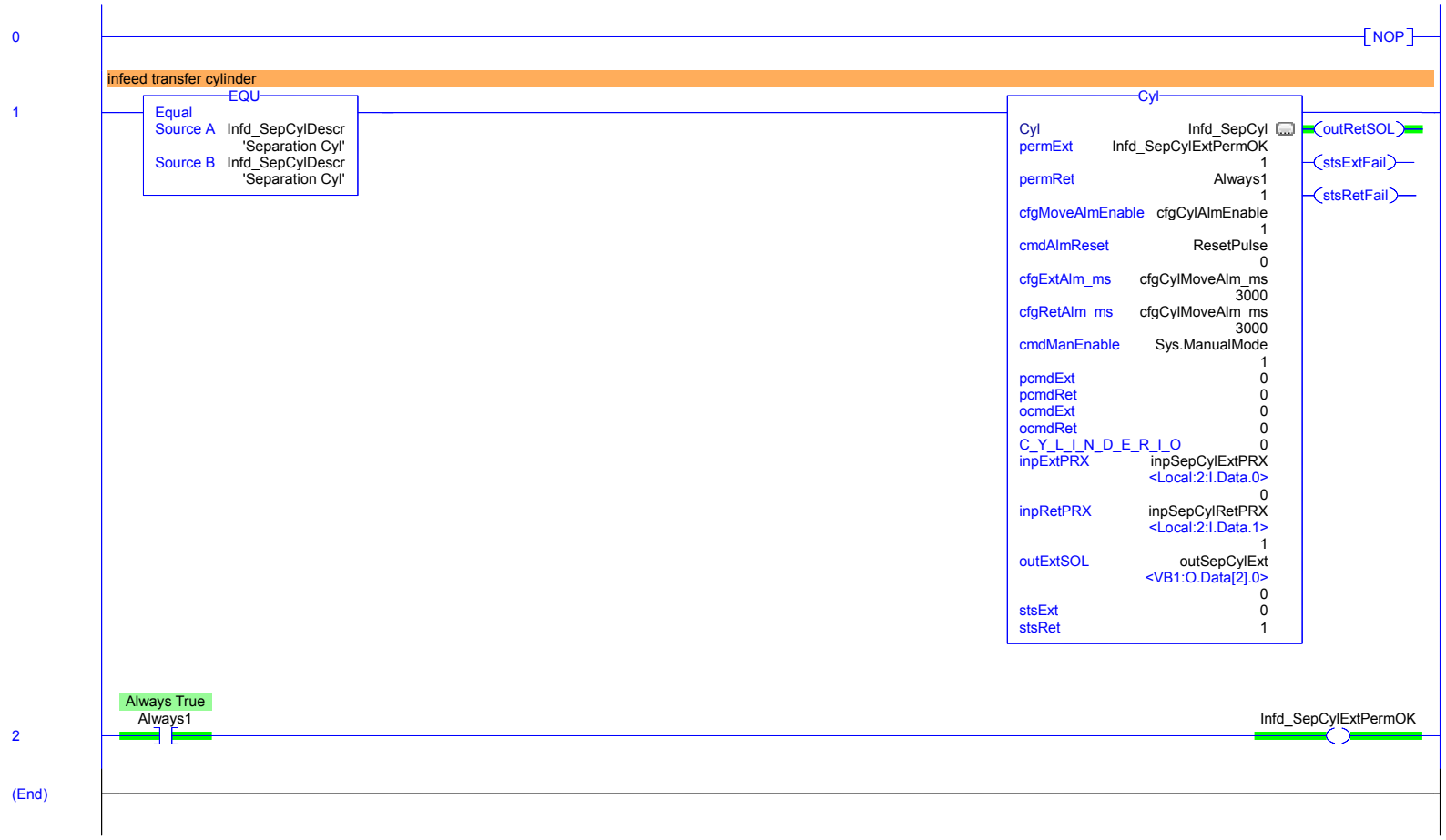

23
EQU
Equal
Source A ST00.Seq 890
Source B 20
COP
Copy File
Source ST00.SeqDescr[2]
Dest ST00.SeqDescr[0]
Length 1
24
EQU
Equal
Source A ST00.Seq 890
Source B 21
COP
Copy File
Source ST00.SeqDescr[3]
Dest ST00.SeqDescr[0]
Length 1
25
EQU
Equal
Source A ST00.Seq 890
Source B 24
COP
Copy File
Source ST00.SeqDescr[4]
Dest ST00.SeqDescr[0]
Length 1
26
EQU
Equal
Source A ST00.Seq 890
Source B 30
COP
Copy File
Source ST00.SeqDescr[5]
Dest ST00.SeqDescr[0]
Length 1
27
EQU
Equal
Source A ST00.Seq 890
Source B 40
COP
Copy File
Source ST00.SeqDescr[6]
Dest ST00.SeqDescr[0]
Length 1
28
EQU
Equal
Source A ST00.Seq 890
Source B 100
COP
Copy File
Source ST00.SeqDescr[7]
Dest ST00.SeqDescr[0]
Length 1
29
EQU
Equal
Source A ST00.Seq 890
Source B 890
COP
Copy File
Source ST00.SeqDescr[8]
Dest ST00.SeqDescr[0]
Length 1
30
EQU
Equal
Source A ST00.Seq 890
Source B 900
COP
Copy File
Source ST00.SeqDescr[9]
Dest ST00.SeqDescr[0]
Length 1
31
EQU
Equal
Source A ST00.Seq 890
Source B -1
COP
Copy File
Source ST00.SeqDescr[10]
Dest ST00.SeqDescr[0]
Length 1
32
EQU
Equal
Source A ST00.Seq 890
Source B -1
COP
Copy File
Source ST00.SeqDescr[11]
Dest ST00.SeqDescr[0]
Length 1
33
EQU
Equal
Source A ST00.Seq 890
Source B -1
COP
Copy File
Source ST00.SeqDescr[12]
Dest ST00.SeqDescr[0]
Length 1
34
EQU
Equal
Source A ST00.Seq 890
Source B -1
COP
Copy File
Source ST00.SeqDescr[13]
Dest ST00.SeqDescr[0]
Length 1

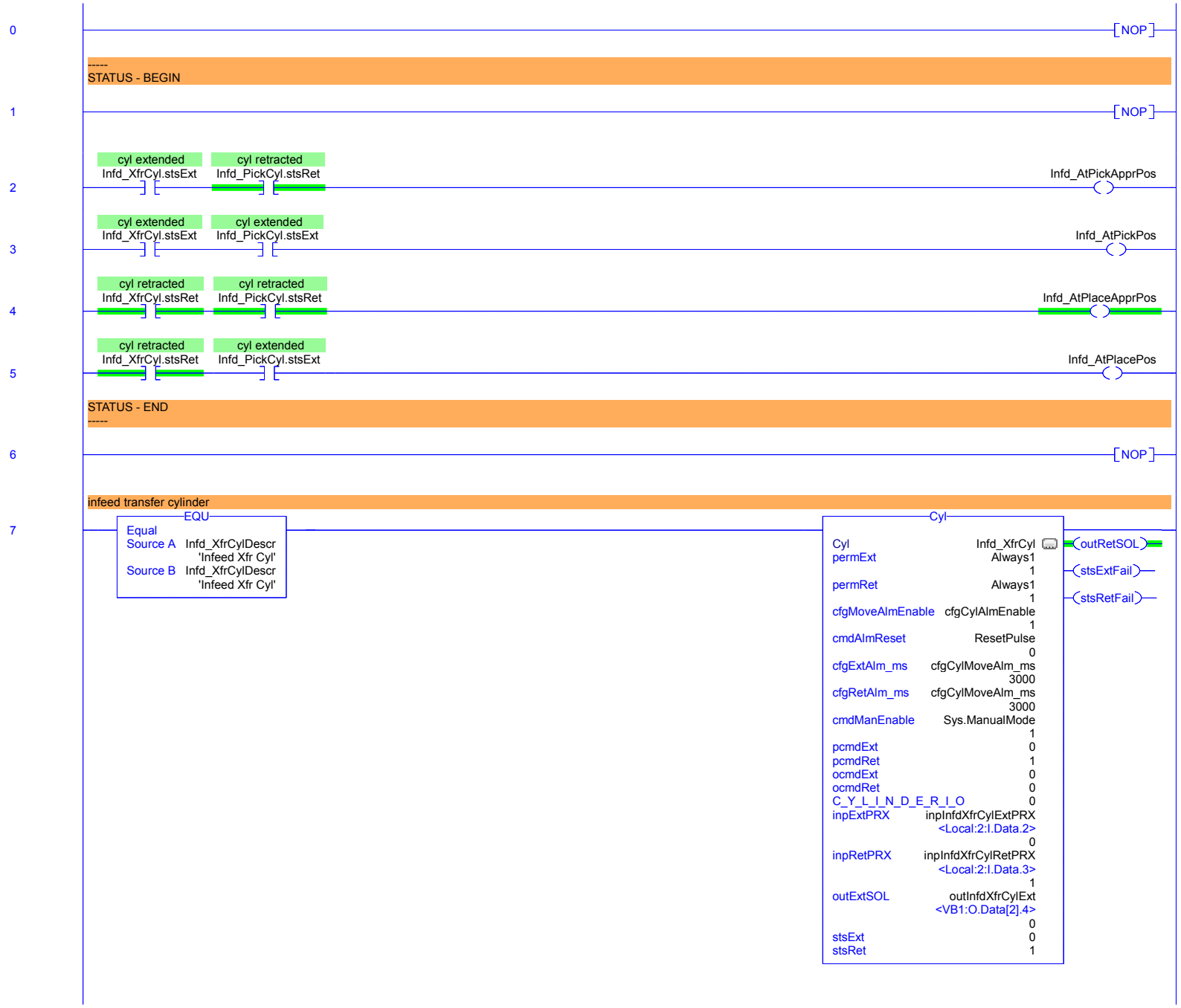

35
EQU
Equal
Source A ST00.Seq
890
Source B -1
COP
Copy File
Source ST00.SeqDescr[14]
Dest ST00.SeqDescr[0]
Length 1
36
EQU
Equal
Source A ST00.Seq
890
Source B 999
COP
Copy File
Source ST00.SeqDescr[15]
Dest ST00.SeqDescr[0]
Length 1
DESCRIPTIONS - END
37
NOP
(End)


Step_010
Action_010
Tran_010
Step_020
Action_020
Tran_020
Step_024
Action_024
Tran_024
Step_030
Action_030
Tran_030
Tran_030b
Step_040
Action_040
Tran_040
Step_100
Action_100
Tran_100
Step_890
Action_890
Tran_890
Indx_Step_003
Indx_Action_007
Indx_Tran_007
go to ready/stop pos
Step_900
Action_900
Tran_900
Step_999
Action_999
Tran_999
Indx_Step_999


0
NOP
System Control Estops OK
Sys.EstopOK
Sys_tmrSafetyPwrOn.DN
System Control System Running All
Sys.Running
0=disabled,1=enabled
ST01.cfgEnabled
Infd_HMI_BowlFdrEnable
outBowlFdrRun
<Local:5:O.Data.12>
1
Infd_HMI_BowlFdrEnable
(End)


0
NOP
infeed pick cylinder
1
EQU
Equal
Source A Infd_PinStopCylDescr
'Pin Stop Cyl'
Source B Infd_PinStopCylDescr
'Pin Stop Cyl'
Cyl
Cyl Infd_PinStopCyl
permExt Infd_PinStopCylExtPerm.AllOK
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 1
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX Infd_PinStopCylExtPRX
<Local:1:I.Data.14>
0
inpRetPRX Infd_PinStopCylRetPRX
<Local:1:I.Data.15>
1
outExtSOL Infd_PinStopCylExt
<VB1:O.Data[4].6>
0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail
ext permissives
2
EQU
Equal
Source A Infd_PinStopCylExtPerm.Descr[0]
'Index Table Stopped'
Source B Infd_PinStopCylExtPerm.Descr[0]
'Index Table Stopped'
Indx_stsAtZeroSpd
Infd_PinStopCylExtPerm.OK[0]
EQU
Equal
Source A Infd_PinStopCylExtPerm.Descr[1]
'Index Table Pos OK'
Source B Infd_PinStopCylExtPerm.Descr[1]
'Index Table Pos OK'
Indx_stsAtGoodPos
Infd_PinStopCylExtPerm.OK[1]
cyl extended
EQU
Equal
Source A Infd_PinStopCylExtPerm.Descr[2]
'Locate Cyl 1 Extende'
Source B Infd_PinStopCylExtPerm.Descr[2]
'Locate Cyl 1 Extende'
LocCyl[1].stsExt
Infd_PinStopCylExtPerm.OK[2]
Infd_PinStopCylExtPerm.OK[0]
Infd_PinStopCylExtPerm.OK[1]
Infd_PinStopCylExtPerm.OK[2]
Infd_PinStopCylExtPerm.AllOK
System Control
Manual Operating
Mode
Sys.ManualMode
Infd_PinStopCylExtPerm.Bypass
(End)


0
NOP
infeed transfer cylinder
1
EQU
Equal
Source A Infd_SepCylDescr
'Separation Cyl'
Source B Infd_SepCylDescr
'Separation Cyl'
Cyl
Cyl Infd_SepCyl
permExt Infd_SepCylExtPermOK
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpSepCylExtPRX
<Local:2:I.Data.0>
0
inpRetPRX inpSepCylRetPRX
<Local:2:I.Data.1>
1
outExtSOL outSepCylExt
<VB1:O.Data[2].0>
0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail
Always True
Always1
2
Infd_SepCylExtPermOK
(End)


0
NOP

STATUS - BEGIN
1
NOP
cyl extended
Infd_XfrCyl.stsExt
cyl retracted
Infd_PickCyl.stsRet
Infd_AtPickApprPos
2
cyl extended
Infd_XfrCyl.stsExt
cyl extended
Infd_PickCyl.stsExt
Infd_AtPickPos
3
cyl retracted
Infd_XfrCyl.stsRet
cyl retracted
Infd_PickCyl.stsRet
Infd_AtPlaceApprPos
4
cyl retracted
Infd_XfrCyl.stsRet
cyl extended
Infd_PickCyl.stsExt
Infd_AtPlacePos
5
STATUS - END

6
NOP
infeed transfer cylinder
7
EQU
Equal
Source A Infd_XfrCylDescr
'Infeed Xfr Cyl'
Source B Infd_XfrCylDescr
'Infeed Xfr Cyl'
Cyl
Cyl Infd_XfrCyl
permExt Always1
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 1
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpInfdXfrCylExtPRX
<Local:2:I.Data.2>
0
inpRetPRX inpInfdXfrCylRetPRX
<Local:2:I.Data.3>
1
outExtSOL outInfdXfrCylExt
<VB1:O.Data[2].4>
0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail

infeed pick cylinder

8

EQU
Equal
Source A Infd_PickCylDescr 'Infeed Pick Cyl'
Source B Infd_PickCylDescr 'Infeed Pick Cyl'

Cyl
Cyl Infd_PickCyl
permExt Infd_PickCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 1
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpInfdPickCylRetPRX <Local:2:I.Data.5> 0
inpRetPRX inpInfdPickCylExtPRX <Local:2:I.Data.4> 1
outExtSOL outInfdPickCylExt <VB1:O.Data[2].2> 0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail

ext permissives

9

EQU
Equal
Source A Infd_PickCylExtPerm.Descr[0] 'Index Table Stopped'
Source B Infd_PickCylExtPerm.Descr[0] 'Index Table Stopped'

Indx_stsAtZeroSpd Infd_PickCylExtPerm.OK[0]

EQU
Equal
Source A Infd_PickCylExtPerm.Descr[1] 'Index Table at good '
Source B Infd_PickCylExtPerm.Descr[1] 'Index Table at good '

Indx_stsAtGoodPos Infd_PickCylExtPerm.OK[1]

Infd_PickCylExtPerm.OK[0] Infd_PickCylExtPerm.OK[1] Infd_PickCylExtPerm.AllOK

System Control Manual Operating Mode
Sys.ManualMode
/

Infd_PickCylExtPerm.Bypass

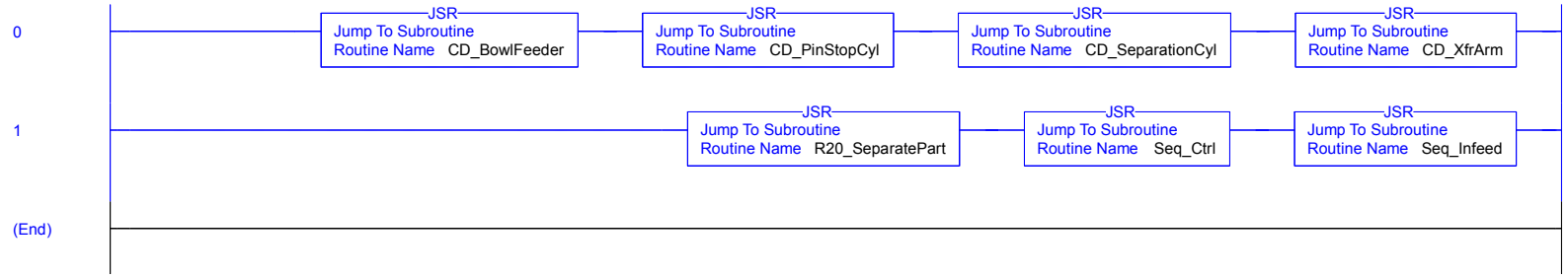
infeed pick vac

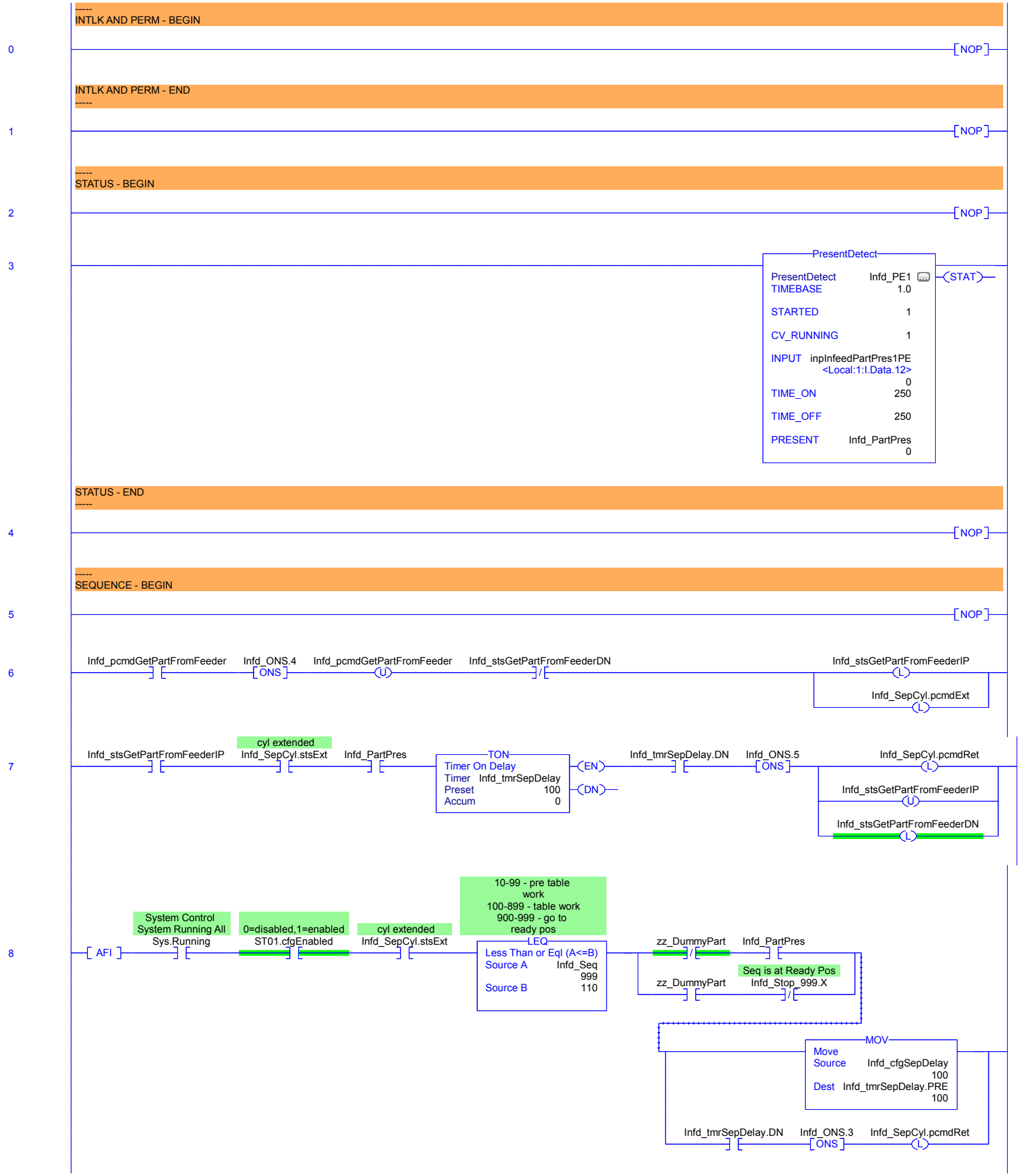
10

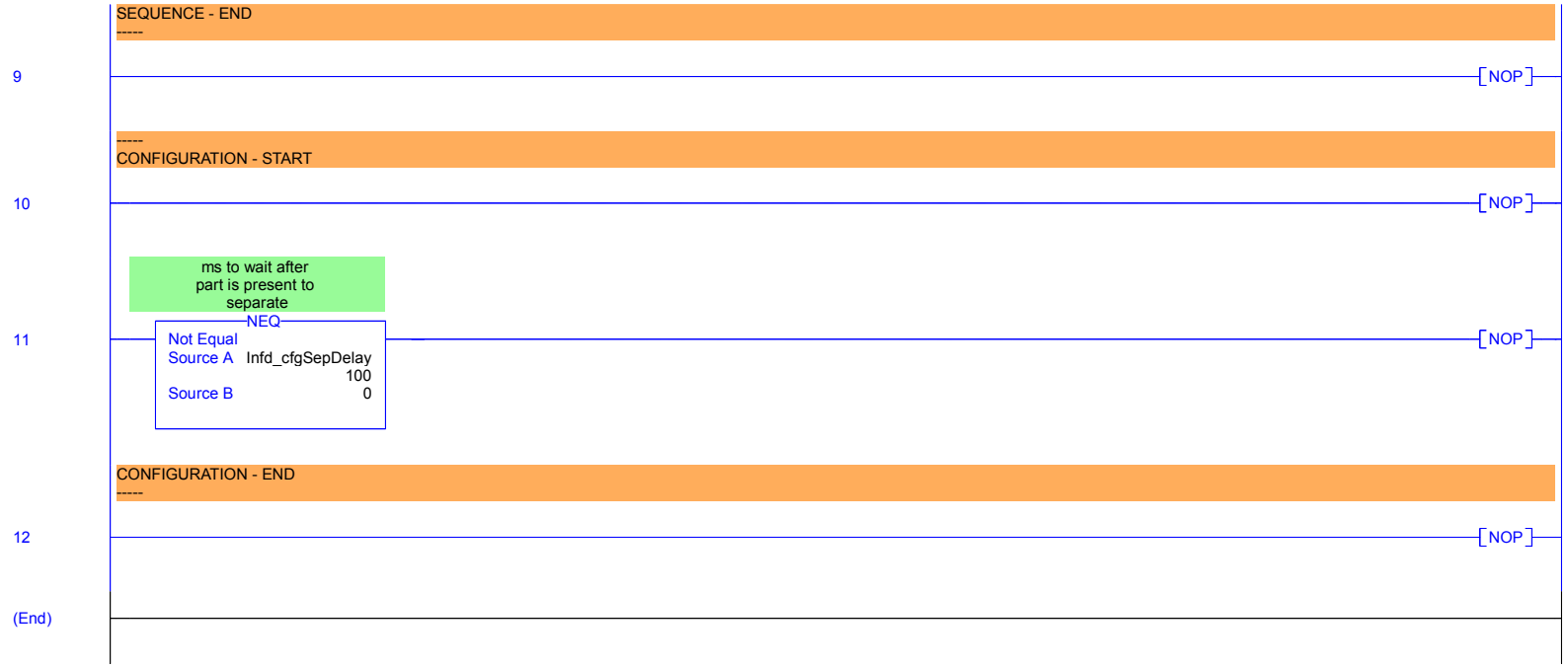
EQU
Equal
Source A Infd_PickVacDescr 'Infeed Vac'
Source B Infd_PickVacDescr 'Infeed Vac'

Air
Air Infd_PickVac
permOn Always1 1
permOff Always1 1
cmdManEnable Sys.ManualMode 1
pcmdOn 0
pcmdOff 1
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw <Local:4:I.Data.25> 1
outSolOn outInfdVacOn <Local:6:O.Data.8> 0
stsOn
stsOff

(End)


0
JSR
Jump To Subroutine
Routine Name CD_BowlFeeder
JSR
Jump To Subroutine
Routine Name CD_PinStopCyl
JSR
Jump To Subroutine
Routine Name CD_SeparationCyl
JSR
Jump To Subroutine
Routine Name CD_XfrArm
1
JSR
Jump To Subroutine
Routine Name R20_SeparatePart
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Infeed
(End)


INTLK AND PERM - BEGIN
0
NOP
INTLK AND PERM - END
1
NOP
STATUS - BEGIN
2
NOP
3
PresentDetect
PresentDetect Infd_PE1
TIMEBASE 1.0
STARTED 1
CV_RUNNING 1
INPUT inpInfeedPartPres1PE
<Local:1:I.Data.12>
0
TIME_ON 250
TIME_OFF 250
PRESENT Infd_PartPres
0
STAT
STATUS - END
4
NOP
SEQUENCE - BEGIN
5
NOP
6
Infd_pcmdGetPartFromFeeder
Infd_ONS.4
ONS
Infd_pcmdGetPartFromFeeder
U
Infd_stsGetPartFromFeederDN
/
Infd_stsGetPartFromFeederIP
L
Infd_SepCyl.pcmdExt
L
7
Infd_stsGetPartFromFeederIP
cyl extended
Infd_SepCyl.stsExt
Infd_PartPres
TON
Timer On Delay
Timer Infd_tmrSepDelay
Preset 100
Accum 0
EN
DN
Infd_tmrSepDelay.DN
Infd_ONS.5
ONS
Infd_SepCyl.pcmdRet
L
Infd_stsGetPartFromFeederIP
U
Infd_stsGetPartFromFeederDN
L
8
AFI
System Control
System Running All
Sys.Running
0=disabled,1=enabled
ST01.cfgEnabled
cyl extended
Infd_SepCyl.stsExt
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
LEQ
Less Than or Eql (A<=B)
Source A Infd_Seq
999
Source B 110
zz_DummyPart
/
Infd_PartPres
Seq is at Ready Pos
zz_DummyPart
Infd_Stop_999.X
/
MOV
Move
Source Infd_cfgSepDelay
100
Dest Infd_tmrSepDelay.PRE
100
Infd_tmrSepDelay.DN
Infd_ONS.3
ONS
Infd_SepCyl.pcmdRet
L


SEQUENCE - END
9
NOP
CONFIGURATION - START
10
NOP
ms to wait after part is present to separate
NEQ
Not Equal
Source A Infd_cfgSepDelay
100
Source B
0
11
NOP
CONFIGURATION - END
12
NOP
(End)

INFEED routine
---

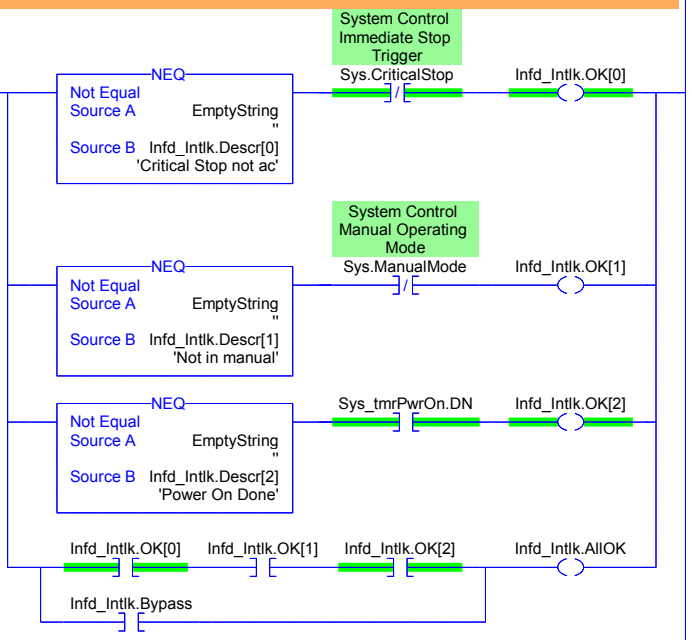
0 NOP

INTLK AND PERM - BEGIN

1 NOP

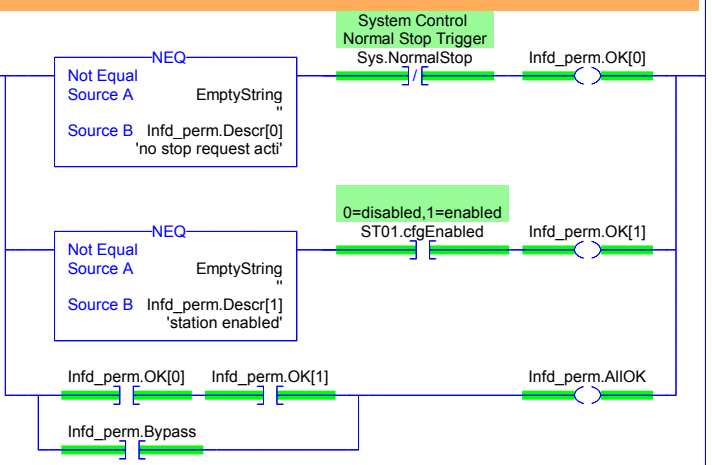
Auto interlocks - if one of these is lost then machine is stopped immediately

2



permissives - these have to be true for auto mode to be started

3

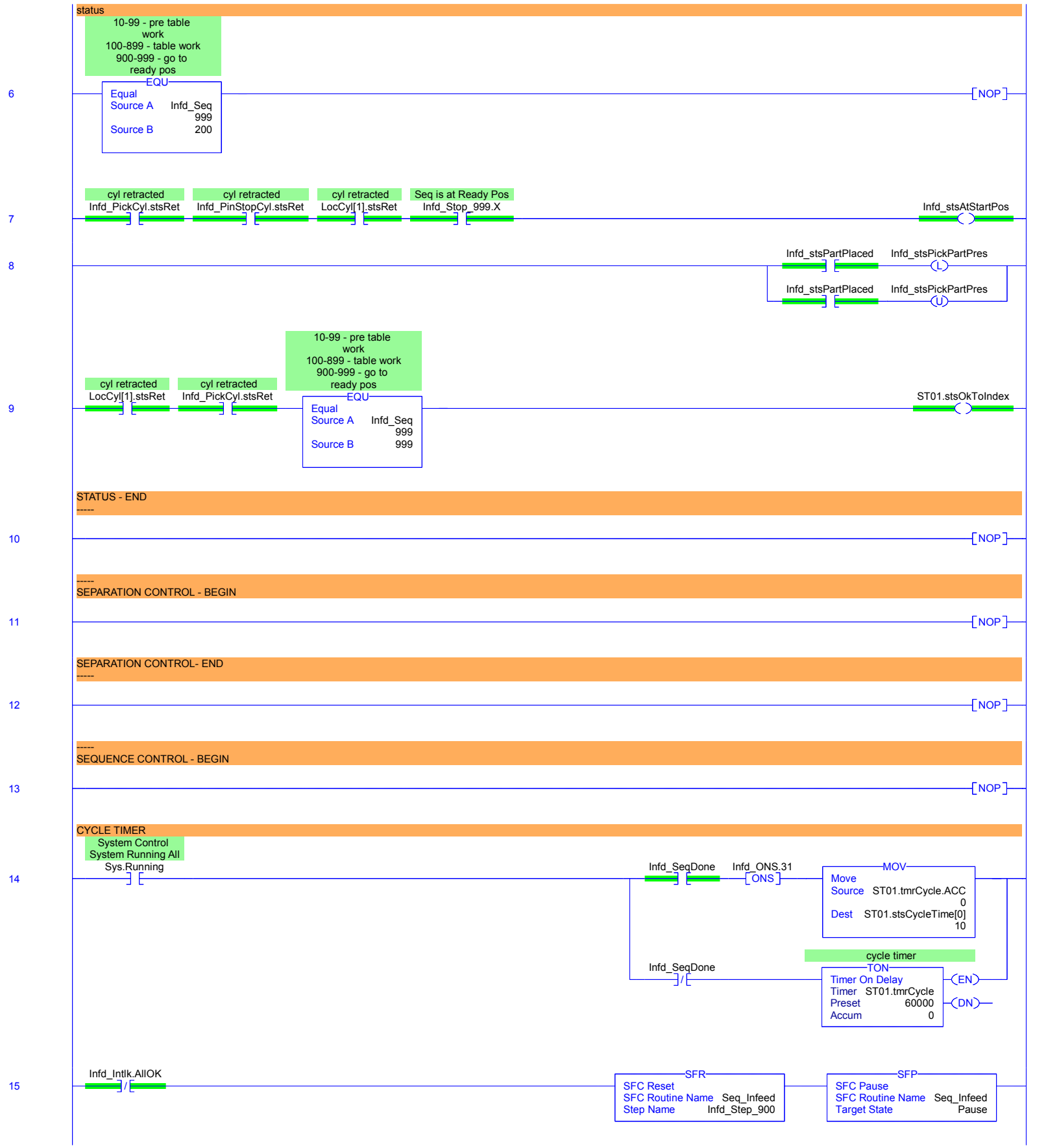


INTLK AND PERM - END
---

4 NOP

STATUS - BEGIN

5 NOP


status
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
EQU
Equal
Source A Infd_Seq 999
Source B 200
NOP
cyl retracted
Infd_PickCyl.stsRet
cyl retracted
Infd_PinStopCyl.stsRet
cyl retracted
LocCyl[1].stsRet
Seq is at Ready Pos
Infd_Stop_999.X
Infd_stsAtStartPos
Infd_stsPartPlaced
Infd_stsPickPartPres
L
Infd_stsPartPlaced
Infd_stsPickPartPres
U
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
cyl retracted
LocCyl[1].stsRet
cyl retracted
Infd_PickCyl.stsRet
EQU
Equal
Source A Infd_Seq 999
Source B 999
ST01.stsOkToIndex
STATUS - END
NOP
SEPARATION CONTROL - BEGIN
NOP
SEPARATION CONTROL- END
NOP
SEQUENCE CONTROL - BEGIN
NOP
CYCLE TIMER
System Control
System Running All
Sys.Running
Infd_SeqDone
Infd_ONS.31
ONS
MOV
Move
Source ST01.tmrCycle.ACC 0
Dest ST01.stsCycleTime[0] 10
cycle timer
Infd_SeqDone
TON
Timer On Delay
Timer ST01.tmrCycle
Preset 60000
Accum 0
EN
DN
Infd_Intlk.AllOK
SFR
SFC Reset
SFC Routine Name Seq_Infeed
Step Name Infd_Step_900
SFP
SFC Pause
SFC Routine Name Seq_Infeed
Target State Pause

RESET seq to ready pos logic IF
- interlocks are not met

16

ST01.ocmdGoToReady Infd_ONS.2 [ONS]

SFR
SFC Reset
SFC Routine Name Seq_Infeed
Step Name Infd_Step_900

SFP
SFC Pause
SFC Routine Name Seq_Infeed
Target State Execute

ST01.ocmdGoToReady

ST01.ocmdGoToReady (U)

RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok

17

Seq is at Ready Pos
Infd_Stop_999.X Infd_Intlk.AllOK Infd_perm.AllOK

System Control
System Running All
Sys.Running ST01.pcmdOneCycle Infd_ONS.1 [ONS]

SFR
SFC Reset
SFC Routine Name Seq_Infeed
Step Name Step_100

System Control
System Running All
Sys.Running /
ST01.ocmdOneCycle

SFP
SFC Pause
SFC Routine Name Seq_Infeed
Target State Execute

ST01.pcmdOneCycle

ST01.ocmdOneCycle

ST01.pcmdOneCycle (U) ST01.ocmdOneCycle (U)

TIMEOUT - if

18

Always False
Always0

Seq is at Ready Pos
Infd_Stop_999.X /

TON
Timer On Delay
Timer Infd_tmrSeq
Preset 60000
Accum 0
(EN)
(DN)

SEQUENCE CONTROL - END

19

[NOP]

CONFIGURATION - START

20

[NOP]

configurations

21

MOV
Move
Source Infd_cfgSeqTimeout 60000
Dest Infd_tmrSeq.PRE 60000

ms to wait after sep cyl is retracted before extending pick cyl
NEQ
Not Equal
Source A Infd_cfgSepToPickDelay 100
Source B 0

ms to wait after pick cyl is extended before retracting
NEQ
Not Equal
Source A Infd_cfgPickRetDelay 500
Source B 0

ms to wait after reaching place appr pos to ext pick cyl
NEQ
Not Equal
Source A Infd_cfgApprToPlacePosDelay 120
Source B 0

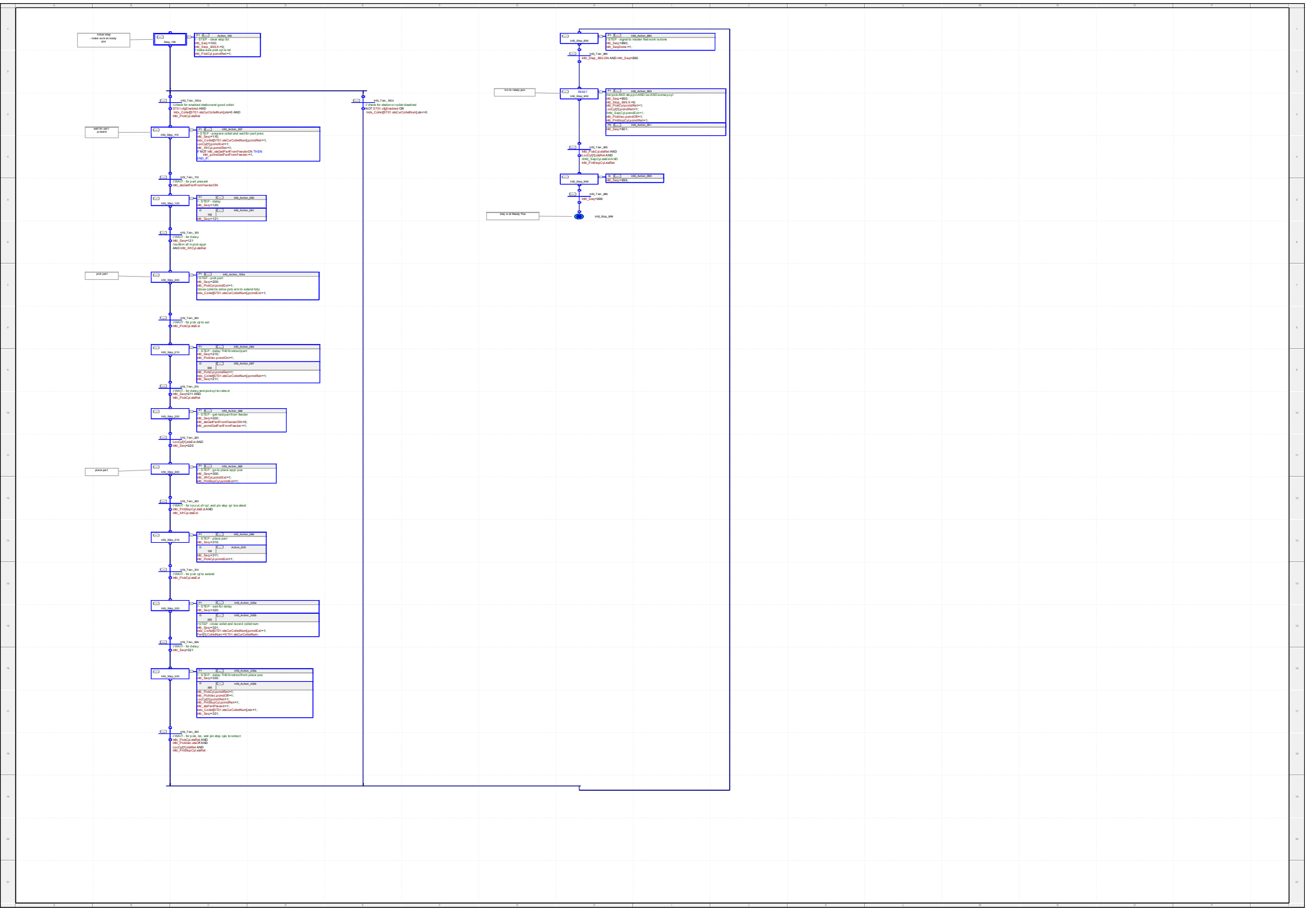
ms to wait after pick cyl is extended before closing collet
NEQ
Not Equal
Source A Infd_cfgColCloseDelay 250
Source B 0

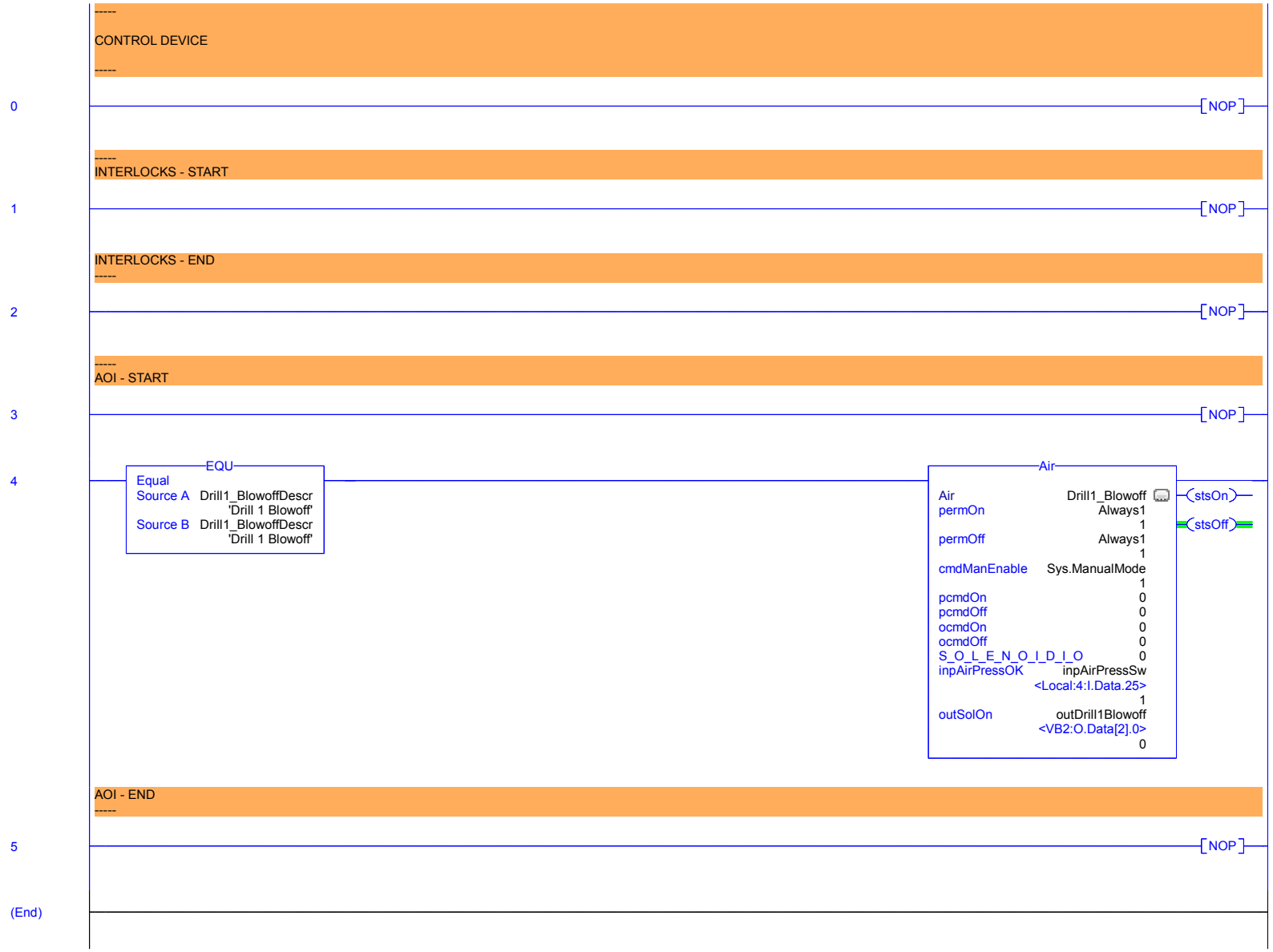
ms to wait after collet is closed before retracting pick cyl
NEQ
Not Equal
Source A Infd_cfgPlaceRetDelay 350
Source B 0

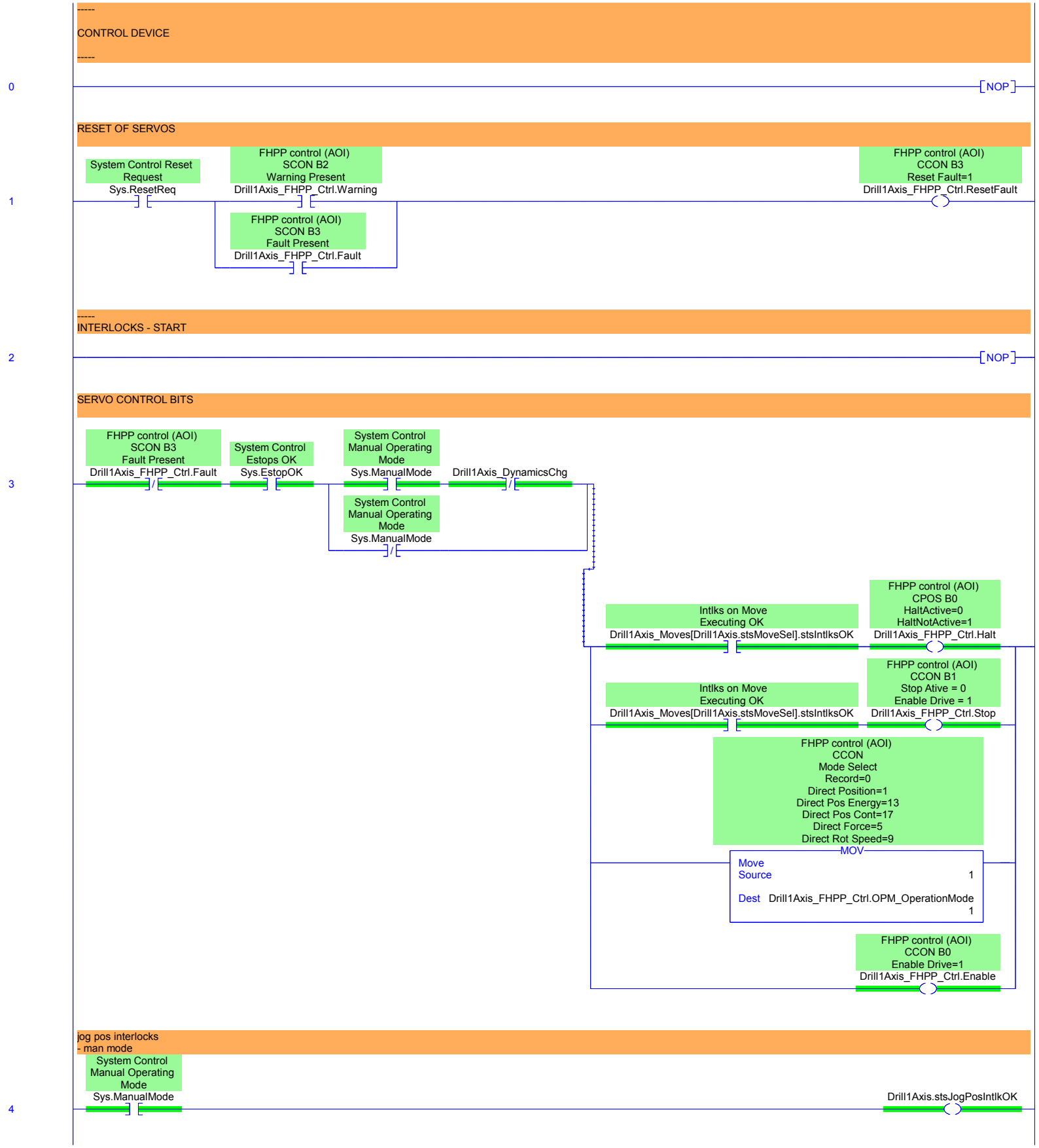
[NOP]


CONFIGURATION - END
22
NOP
DESCRIPTIONS - START
23
NOP
24
EQU Equal Source A ST01.Seq 999 Source B 10
COP Copy File Source ST01.SeqDescr[1] Dest ST01.SeqDescr[0] Length 1
25
EQU Equal Source A ST01.Seq 999 Source B 20
COP Copy File Source ST01.SeqDescr[2] Dest ST01.SeqDescr[0] Length 1
26
EQU Equal Source A ST01.Seq 999 Source B 21
COP Copy File Source ST01.SeqDescr[3] Dest ST01.SeqDescr[0] Length 1
27
EQU Equal Source A ST01.Seq 999 Source B 24
COP Copy File Source ST01.SeqDescr[4] Dest ST01.SeqDescr[0] Length 1
28
EQU Equal Source A ST01.Seq 999 Source B 30
COP Copy File Source ST01.SeqDescr[5] Dest ST01.SeqDescr[0] Length 1
29
EQU Equal Source A ST01.Seq 999 Source B 40
COP Copy File Source ST01.SeqDescr[6] Dest ST01.SeqDescr[0] Length 1
30
EQU Equal Source A ST01.Seq 999 Source B 100
COP Copy File Source ST01.SeqDescr[7] Dest ST01.SeqDescr[0] Length 1
31
EQU Equal Source A ST01.Seq 999 Source B 890
COP Copy File Source ST01.SeqDescr[8] Dest ST01.SeqDescr[0] Length 1
32
EQU Equal Source A ST01.Seq 999 Source B 900
COP Copy File Source ST01.SeqDescr[9] Dest ST01.SeqDescr[0] Length 1
33
EQU Equal Source A ST01.Seq 999 Source B -1
COP Copy File Source ST01.SeqDescr[10] Dest ST01.SeqDescr[0] Length 1


34
EQU
Equal
Source A ST01.Seq
999
Source B -1
COP
Copy File
Source ST01.SeqDescr[11]
Dest ST01.SeqDescr[0]
Length 1
35
EQU
Equal
Source A ST01.Seq
999
Source B -1
COP
Copy File
Source ST01.SeqDescr[12]
Dest ST01.SeqDescr[0]
Length 1
36
EQU
Equal
Source A ST01.Seq
999
Source B -1
COP
Copy File
Source ST01.SeqDescr[13]
Dest ST01.SeqDescr[0]
Length 1
37
EQU
Equal
Source A ST01.Seq
999
Source B -1
COP
Copy File
Source ST01.SeqDescr[14]
Dest ST01.SeqDescr[0]
Length 1
38
EQU
Equal
Source A ST01.Seq
999
Source B 999
COP
Copy File
Source ST01.SeqDescr[15]
Dest ST01.SeqDescr[0]
Length 1
DESCRIPTIONS - END
39
NOP
(End)




CONTROL DEVICE
0
NOP
INTERLOCKS - START
1
NOP
INTERLOCKS - END
2
NOP
AOI - START
3
NOP
4
EQU
Equal
Source A Drill1_BlowoffDescr
'Drill 1 Blowoff'
Source B Drill1_BlowoffDescr
'Drill 1 Blowoff'
Air
Air Drill1_Blowoff
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outDrill1Blowoff
<VB2:O.Data[2].0>
0
stsOn
stsOff
AOI - END
5
NOP
(End)



CONTROL DEVICE

0
NOP
RESET OF SERVOS
System Control Reset Request
Sys.ResetReq
FHPP control (AOI) SCON B2 Warning Present
Drill1Axis_FHPP_Ctrl.Warning
FHPP control (AOI) SCON B3 Fault Present
Drill1Axis_FHPP_Ctrl.Fault
FHPP control (AOI) CCON B3 Reset Fault=1
Drill1Axis_FHPP_Ctrl.ResetFault
1

INTERLOCKS - START
2
NOP
SERVO CONTROL BITS
FHPP control (AOI) SCON B3 Fault Present
Drill1Axis_FHPP_Ctrl.Fault
System Control Estops OK
Sys.EstopOK
System Control Manual Operating Mode
Sys.ManualMode
Drill1Axis_DynamicsChg
System Control Manual Operating Mode
Sys.ManualMode
3
Intlks on Move Executing OK
Drill1Axis_Moves[Drill1Axis.stsMoveSel].stsIntlksOK
FHPP control (AOI) CPOS B0 HaltActive=0 HaltNotActive=1
Drill1Axis_FHPP_Ctrl.Halt
Intlks on Move Executing OK
Drill1Axis_Moves[Drill1Axis.stsMoveSel].stsIntlksOK
FHPP control (AOI) CCON B1 Stop Ative = 0 Enable Drive = 1
Drill1Axis_FHPP_Ctrl.Stop
FHPP control (AOI) CCON Mode Select Record=0 Direct Position=1 Direct Pos Energy=13 Direct Pos Cont=17 Direct Force=5 Direct Rot Speed=9
MOV
Move
Source 1
Dest Drill1Axis_FHPP_Ctrl.OPM_OperationMode
1
FHPP control (AOI) CCON B0 Enable Drive=1
Drill1Axis_FHPP_Ctrl.Enable
jog pos interlocks - man mode
System Control Manual Operating Mode
Sys.ManualMode
Drill1Axis.stsJogPosIntlkOK
4

jog neg interlocks
- man mode
- conv stopped

5
System Control Manual Operating Mode: Sys.ManualMode
Indexing Wheel Control AOI Running Stat: Indx_Conv.Running
Drill1Axis.stsJogNegIntlkOK

INTERLOCKS - END

6
NOP

MOVES AOI - START

7
NOP

FestoServoMoves

IAS AOI
used to transfer position commands to FHPP CTRL AOI

8
Drill1Axis:I.RunMode
Drill1Axis:I.ConnectionFaulted

FestoServoMoves

FestoServoMoves	Drill1Axis
F_E_S_T_O_A_O_I	0
FHPP_CTRL	Drill1Axis_FHPP_Ctrl
Moves	Drill1Axis_Moves
cfgVelBase_mm_s	960
cfgPosMax_mm	103
cfgPosMin_mm	-3
cfgPosWindow_mm	0.1
cmdVelFactor_pct	100.0
cmdManualMode	Sys.ManualMode
	1
cmdAutoMoveSel	1
cmdManMoveSel	0
cmdJogPos	0
cmdJogNeg	0
stsMoveSel	1
cmdAutoGoToPos	0
ocmdGoToStartPos	0
stsSetPos_mm	90.0
stsActPos_mm	90.0
stsActPos_in	3.543307
stsSetVel_mm_s	50000.0
stsActVel_mm_s	0.0
stsActVel_pct	0.0
stsSeq	0
stsMoveTime_ms	0
stsJogPosIntlkOK	1
stsJogNegIntlkOK	1

stsAxisReady
stsMoveDone
stsMoveFail
stsHomeVerif

move 0

9
not used move description
EQU: Equal, Source A Drill1Axis_Moves[0].Descr 'Start Pos', Source B Drill1Axis_Moves[0].Descr 'Start Pos'

not used move position (mm)
MOV: Move, Source 90, Dest Drill1Axis_Moves[0].Pos_mm 90.0

not used move velocity (mm/s)
MOV: Move, Source Drill1234_cfgStartVel_mm_s 500, Dest Drill1Axis_Moves[0].Vel_mm_s 500.0

System Control Estops OK: Sys.EstopOK
not used Intlks on Move Executing OK: Drill1Axis_Moves[0].stsIntlksOK
not used Perms on Move Starting OK: Drill1Axis_Moves[0].stsPermsOK

move 1

10
move description
EQU: Equal, Source A Drill1Axis_Moves[1].Descr 'Retract Pos', Source B Drill1Axis_Moves[1].Descr 'Retract Pos'

move position (mm)
EQU: Equal, Source A Drill1Axis_Moves[1].Pos_mm 10.830001, Source B Drill1Axis_Moves[1].Pos_mm 10.830001

move velocity (mm/s)
MOV: Move, Source Drill1234_cfgRetractVel_mm_s 500, Dest Drill1Axis_Moves[1].Vel_mm_s 500.0

System Control Estops OK: Sys.EstopOK
Intlks on Move Executing OK: Drill1Axis_Moves[1].stsIntlksOK
Perms on Move Starting OK: Drill1Axis_Moves[1].stsPermsOK

move 2

11

move description
EQU
Equal
Source A Drill1Axis_Moves[2].Descr 'Pecking Pos'
Source B Drill1Axis_Moves[2].Descr 'Pecking Pos'

move position (mm)
EQU
Equal
Source A Drill1Axis_Moves[2].Pos_mm 1.46
Source B Drill1Axis_Moves[2].Pos_mm 1.46

move velocity (mm/s)
MOV
Move
Source Rec[0].D1.G1.F 1.0
Dest Drill1Axis_Moves[2].Vel_mm_s 1.0

System Control Estops OK
Sys.EstopOK

Intlks on Move Executing OK
Drill1Axis_Moves[2].stsIntlksOK

Perms on Move Starting OK
Drill1Axis_Moves[2].stsPermsOK

MOVES AOI - END
---

12 NOP

FESTO AOIS - BEGIN

13 NOP

FML_READ
READ the raw INPUT data from the Fieldbus and populate the data type DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS Control AOIs & the FPC AOIs

Device Type Setup
CMMO_ST=10
EMCA_EC=20
CMMP_AS=30
CMMS_AS=40
CMMS_ST=50

CMMP-AS-M0/M3
ModbusTCP Setup
Modbus = 1, HighByteFirst=1
EtherNet/IP Setup
Modbus = 0, HighByteFirst=0

FHPP_IN_ArrayStartAddr - Specify the first Array of the FHPP INPUT Data

cfgFPC: 1= The FPC is used. Parameter data will be prepared additionally.
0= Only control data will be prepared - no FPC data used

FPC_IN_ArrayStartAddr - Specify the first Array of the FPC INPUT Data

cfgFHPPplusIn 1= The FHPP+ is used, 0= not used
FHPPplus_IN_ArrayStartAddr - Specify the first Array of the FHPPplus INPUT Data

14 Drill1Axis:I.RunMode Drill1Axis:I.ConnectionFaulted

Servo Axis Read Data
FML_READ
read the input data (AOI)
FML_READ Drill1Axis_FML_Read
FML_REF Drill1Axis_FML_Ref
I_Data Drill1Axis:I.Data
DeviceType 30
Modbus 0
HighByteFirst 0
FHPP_IN_ArrayStartAddr 0
cfgFPC 1
FPC_IN_ArrayStartAddr 8
cfgFHPPplusIn 0
FHPPplus_IN_ArrayStartAddr 0
Status Drill1Axis_FML_ReadStat
Error

FHPP_CTRL

OPM_OperationMode:
Record=0
Direct Position=1
Direct Position Energy=13
Direct Position Continuous=17
Direct Force=5
Direct Rot Speed=9

15

Drill1Axis:I.RunMode Drill1Axis:I.ConnectionFaulted

FHPP control (AOI)

FHPP_CTRL

FHPP control (AOI)		
FHPP_CTRL	Drill1Axis_FHPP_Ctrl	DriveControlByFCT
FML_REF	Drill1Axis_FML_Ref	LoadVoltageApplied
C_o_n_t_r_o_l_A_r_e_a	0	Fault
HMIAccessLocked	0	Warning
BrakeRelease	0	FollowingError
ResetFault	0	HaltActive
OPM_OperationMode	1	DriveEnabled
Halt	1	Ready
Stop	1	HomingValid
Enable	1	AcknowledgeStart
StartHoming	0	AxisIsMoving
StartTask	1	StandstillWarning
JogPositive	0	MotionComplete
JogNegative	0	AcknowledgeTeach
ClearRemainingPosition	0	StrokeLimitReached
TeachActualValue	0	VelocityLimitReached
Relative	0	RecordChainActive
StrokeLimitDisable	0	RecordChainComplete
OPM_OperationState	1	
R_e_c_o_r_d_M_o_d_e_A_c_t_i_v_e	0	
RecordNumber	0	
ActualRecordNumber	0	
D_i_r_e_c_t_M_o_d_e_A_c_t_i_v_e	1	
SetValueVelocity	9	
SetValuePosition	90000	
ActualVelocity	0	
ActualPosition	90000	
SetValueForceRamp	0	
SetValueForce	0	
ActualForce	0	
SetValueRotRamp	0	
SetValueRotSpeed	0	
ActualRotRamp	0	
ActualRotSpeed	0	

FPC_DIRMP
Festo Direct Mode Parameters

Examples:
Velocity: 400000 = 400.00mm (Depends on scaling in FCT)
Acceleration: 4500000 = 4.500 m/s2
Deceleration: 5500000 = 5.500 m/s2

16

Drill1Axis:I.RunMode Drill1Axis:I.ConnectionFaulted

read/write direct mode positioning parameters (AOI)

FPC_DIRMP

read/write direct mode positioning param...		
FPC_DIRMP	Drill1Axis_FPC_DIRMP	Done
FML_REF	Drill1Axis_FML_Ref	Error
Execute	0	
Write	0	
Velocity	960	
Acceleration	7000000	
Deceleration	5000000	
ActVelocity	0	
ActAcceleration	0	
ActDeceleration	0	
Status	Dril1Axis_FPC_DIRMP_Stat	

FML_WRITE
WRITE the OUTPUT data in DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS & the FPC AOIs and populate the Raw OUTPUT data via the Fieldbus

17

Drill1Axis:I.RunMode Drill1Axis:I.ConnectionFaulted

Servo Axis Write Data

FML_WRITE

write the output data (AOI)		
FML_WRITE	Drill1Axis_FML_Write	Error
FML_REF	Drill1Axis_FML_Ref	
O_Data	Drill1Axis:O.Data	
FHPP_OUT_ArrayStartAddr	0	
FPC_OUT_ArrayStartAddr	8	
cfgFHPPplusOut	0	
FHPPplus_OUT_ArrayStartAddr	0	
Status	Drill1Axis_FML_WriteStat	

FPC_PNU
Festo Parameter Channel

Used to Read/Write a single parameter to or from the respective motor controller when FPC is configured as used.
PNU = 127 Subindex =2 Value = 1 for store command to Servo

18
Drill1Axis:I.RunMode Drill1Axis:I.ConnectionFaulted

read/write single parameter (AOI)
FPC_PNU
read/write single parameter (AOI)
FPC_PNU Drill1Axis_FPC_PNU
FML_REF Drill1Axis_FML_Ref
Execute 0
Write 1
PNU 127
Subindex 2
Value 1
ActPNU 0
ActSubindex 0
ActValue 0
Status Drill1Axis_FPC_PNU_STATUS
Done
Error

FESTO AOIS - END

19
NOP

PARAMETER STORE LOGIC - START

20
NOP

21
Drill1Axis:I.RunMode Drill1Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill1Axis_FHPP_Ctrl.DriveEnabled
Store Servo Parameter
HMI.SVO_ParamStore
read/write single parameter (AOI) perform data exchange
Drill1Axis_FPC_PNU.Execute

22
read/write single parameter (AOI) execution done
Drill1Axis_FPC_PNU.Done
read/write single parameter (AOI) fault occured
Drill1Axis_FPC_PNU.Error
read/write single parameter (AOI) actual number of the parameter
EQU
Equal
Source A Drill1Axis_FPC_PNU.ActPNU
0
Source B 127
read/write single parameter (AOI) actual subindex of the parameter
EQU
Equal
Source A Drill1Axis_FPC_PNU.ActSubindex
0
Source B 2
read/write single parameter (AOI) actual value of the parameter
EQU
Equal
Source A Drill1Axis_FPC_PNU.ActValue
0
Source B 0
Store Servo Parameter Done
HMI.SVO_ParamStoreDn

READ DYNAMIC PARAMETERS AT EACH RUN OF SERVO
WRITE DYNAMICS WITH EACH CHANGE IN DYNAMICS

23
Drill1Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill1Axis_FHPP_Ctrl.DriveEnabled
read/write direct mode positioning parameters (AOI) perform data exchange
Drill1Axis_FPC_DIRMP.Execute
Drill1Axis:I.RunMode ServoONS.3
ONS
Drill1Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) variable to read or write the parameter
Drill1Axis_DynamicsChg
Drill1Axis_FPC_DIRMP.Write

24

read/write direct mode positioning parameters (AOI) base velocity directmode positioning

MOV
Move
Source 960
Dest Drill1Axis_FPC_DIRMP.Velocity 960

read/write direct mode positioning parameters (AOI) base velocity directmode positioning

MOV
Move
Source Drill1Axis_FPC_DIRMP.Velocity 960
Dest Drill2Axis_FPC_DIRMP.Velocity 960

read/write direct mode positioning parameters (AOI) base velocity directmode positioning

MOV
Move
Source Drill2Axis_FPC_DIRMP.Velocity 960
Dest Drill3Axis_FPC_DIRMP.Velocity 960

read/write direct mode positioning parameters (AOI) base velocity directmode positioning

MOV
Move
Source Drill3Axis_FPC_DIRMP.Velocity 960
Dest Drill4Axis_FPC_DIRMP.Velocity 960

read/write direct mode positioning parameters (AOI) acceleration directmode positioning

MUL
Multiply
Source A Drill1234_cfgAccel 7000
Source B 1000
Dest Drill1Axis_FPC_DIRMP.Acceleration 7000000

read/write direct mode positioning parameters (AOI) acceleration directmode positioning

MOV
Move
Source Drill1Axis_FPC_DIRMP.Acceleration 7000000
Dest Drill2Axis_FPC_DIRMP.Acceleration 7000000

read/write direct mode positioning parameters (AOI) acceleration directmode positioning

MOV
Move
Source Drill2Axis_FPC_DIRMP.Acceleration 7000000
Dest Drill3Axis_FPC_DIRMP.Acceleration 7000000

read/write direct mode positioning parameters (AOI) acceleration directmode positioning

MOV
Move
Source Drill3Axis_FPC_DIRMP.Acceleration 7000000
Dest Drill4Axis_FPC_DIRMP.Acceleration 7000000

read/write direct mode positioning parameters (AOI) deceleration directmode positioning

MUL
Multiply
Source A Drill1234_cfgDecel 5000
Source B 1000
Dest Drill1Axis_FPC_DIRMP.Deceleration 5000000

read/write direct mode positioning parameters (AOI) deceleration directmode positioning

MOV
Move
Source Drill1Axis_FPC_DIRMP.Deceleration 5000000
Dest Drill2Axis_FPC_DIRMP.Deceleration 5000000

read/write direct mode positioning parameters (AOI) deceleration directmode positioning

MOV
Move
Source Drill2Axis_FPC_DIRMP.Deceleration 5000000
Dest Drill3Axis_FPC_DIRMP.Deceleration 5000000

read/write direct mode positioning parameters (AOI) deceleration directmode positioning

MOV
Move
Source Drill3Axis_FPC_DIRMP.Deceleration 5000000
Dest Drill4Axis_FPC_DIRMP.Deceleration 5000000

25
read/write direct mode positioning parameters (AOI) execution done
Drill1Axis_FPC_DIRMP.Done
read/write direct mode positioning parameters (AOI) transmission fault
Drill1Axis_FPC_DIRMP.Error
MOV
Move
Source Drill1Axis_FPC_DIRMP.ActVelocity
0
Dest Drill1Axis_BaseVel
960
MUL
Multiply
Source A Drill1Axis_FPC_DIRMP.ActAcceleration
0
Source B 0.001
Dest Drill1_stsActAccel
7000
MUL
Multiply
Source A Drill1Axis_FPC_DIRMP.ActDeceleration
0
Source B 0.001
Dest Drill1_stsActDecel
5000

PARAMETER STORE LOGIC - END

26
NOP

IF DYNAMIC PARAMETERS CHANGE THEN TRIGGER UPDATE AND RESET LAST VALUES

27
NEQ
Not Equal
Source A 960
Source B Drill1234Axis_Last[0]
960
mm/s^2
NEQ
Not Equal
Source A Drill1234_cfgAccel
7000
Source B Drill1234Axis_Last[1]
7000
mm/s^2
NEQ
Not Equal
Source A Drill1234_cfgDecel
5000
Source B Drill1234Axis_Last[2]
5000
Drill1Axis_DynamicsChg
L
Drill2Axis_DynamicsChg
L
Drill3Axis_DynamicsChg
L
Drill4Axis_DynamicsChg
L
MOV
Move
Source 960
Dest Drill1234Axis_Last[0]
960
MOV
Move
Source Drill1234_cfgAccel
7000
Dest Drill1234Axis_Last[1]
7000
MOV
Move
Source Drill1234_cfgDecel
5000
Dest Drill1234Axis_Last[2]
5000

28
read/write direct mode positioning parameters (AOI) execution done
Drill1Axis_FPC_DIRMP.Done
Drill1Axis_DynamicsChg
U
read/write direct mode positioning parameters (AOI) transmission fault
Drill1Axis_FPC_DIRMP.Error

29
read/write direct mode positioning parameters (AOI) execution done
Drill2Axis_FPC_DIRMP.Done
Drill2Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) transmission fault
Drill2Axis_FPC_DIRMP.Error

30
read/write direct mode positioning parameters (AOI) execution done
Drill3Axis_FPC_DIRMP.Done
Drill3Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) transmission fault
Drill3Axis_FPC_DIRMP.Error

31
read/write direct mode positioning parameters (AOI) execution done
Drill4Axis_FPC_DIRMP.Done
Drill4Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) transmission fault
Drill4Axis_FPC_DIRMP.Error

##
Servo Comm Diag
##

32
GSV
Get System Value
Class Name Module
Instance Name Drill1Axis
Attribute Name EntryStatus
Dest SVD1_SysVar 16384

MEQ
Mask Equal
Source SVD1_SysVar 16384
Mask 61440
Compare 16384

Drill1Axis_CommsOK

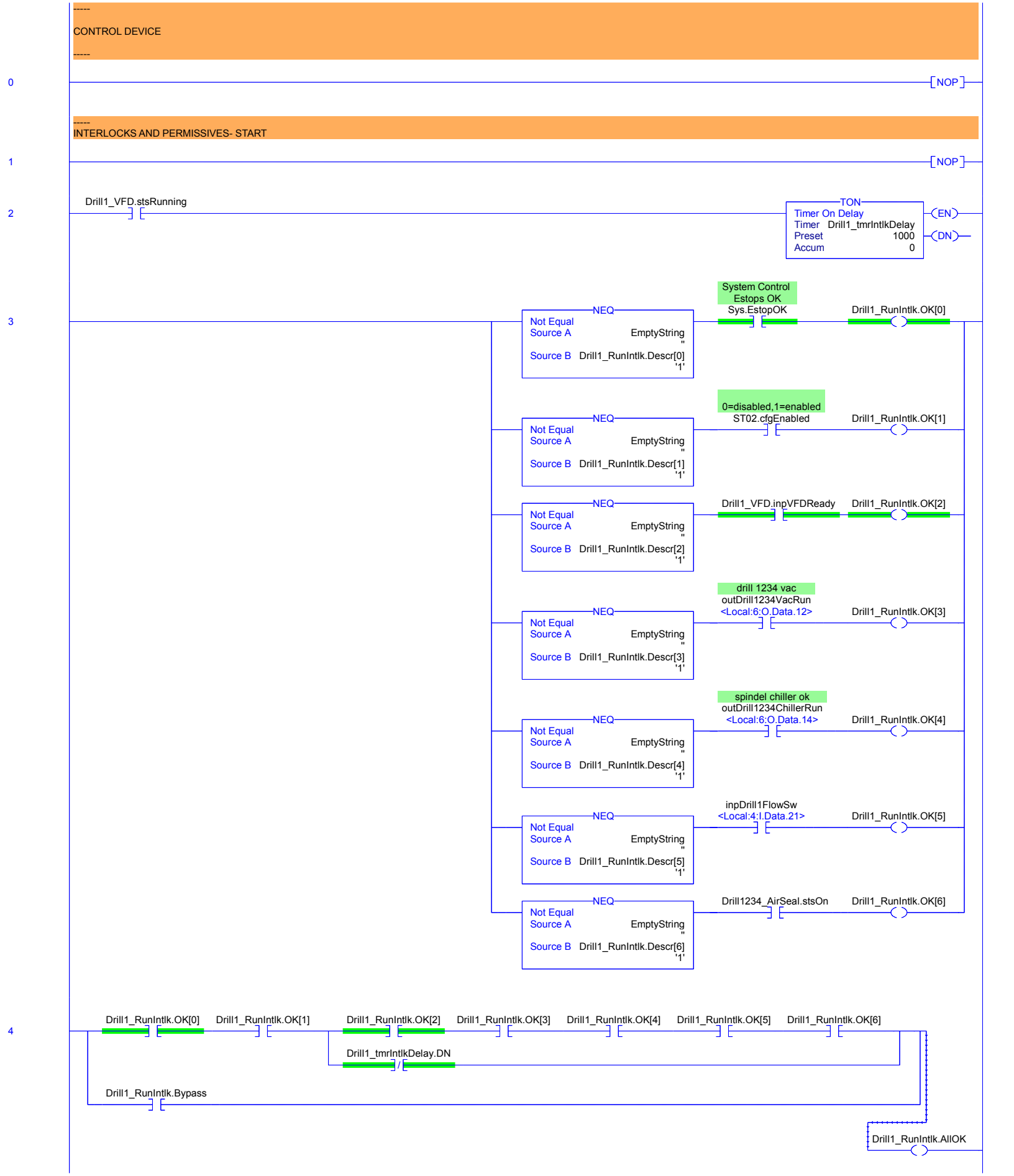
CONFIGURATION - START

33
NOP

CONFIGURATION - END

34
NOP

(End)



CONTROL DEVICE

0
NOP

INTERLOCKS AND PERMISSIVES- START
1
NOP
2
Drill1_VFD.stsRunning
TON
Timer On Delay
Timer Drill1_tmrIntlkDelay
Preset 1000
Accum 0
EN
DN
3
System Control
Estops OK
Sys.EstopOK
Drill1_RunIntlk.OK[0]
NEQ
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[0]
'1'
0=disabled,1=enabled
ST02.cfgEnabled
Drill1_RunIntlk.OK[1]
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[1]
'1'
Drill1_VFD.inpVFDReady
Drill1_RunIntlk.OK[2]
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[2]
'1'
drill 1234 vac
outDrill1234VacRun
<Local:6:O.Data.12>
Drill1_RunIntlk.OK[3]
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[3]
'1'
spindel chiller ok
outDrill1234ChillerRun
<Local:6:O.Data.14>
Drill1_RunIntlk.OK[4]
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[4]
'1'
inpDrill1FlowSw
<Local:4:I.Data.21>
Drill1_RunIntlk.OK[5]
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[5]
'1'
Drill1234_AirSeal.stsOn
Drill1_RunIntlk.OK[6]
Not Equal
Source A EmptyString
''
Source B Drill1_RunIntlk.Descr[6]
'1'
4
Drill1_RunIntlk.OK[0]
Drill1_RunIntlk.OK[1]
Drill1_RunIntlk.OK[2]
Drill1_RunIntlk.OK[3]
Drill1_RunIntlk.OK[4]
Drill1_RunIntlk.OK[5]
Drill1_RunIntlk.OK[6]
Drill1_tmrIntlkDelay.DN
Drill1_RunIntlk.Bypass
Drill1_RunIntlk.AllOK

INTERLOCKS AND PERMISSIVES- END
---

5 NOP

FAULT HANDLING - START

6 NOP

System Control Reset Request
Sys.ResetReq

7 outDrill1Reset
<Local:5:O.Data.14>

FAULT HANDLING - END
---

8 NOP

---
drill 1

9

EQU
Equal
Source A Drill1_VFD.cmdSpdSP_rpm 60000
Source B Drill1_VFD.cmdSpdSP_rpm 60000

VFD_HighSpeed_Control

VFD_HighSpeed_Control	Drill1_VFD	stsRunning
intlkRun	Drill1_RunIntlk.AllOK	
	0	stsAtZeroSpd
permStart	Drill1_RunIntlk.AllOK	
	0	stsWarmingUp
cfgIdleTimeForWarmup_min	Drill1234_cfgIdleTimeForWarmup_min	
	60	
cfgWarmupTime_min	Drill1234_cfgWarmupInterval_min	
	1	
cfgStopTime_sec	10	
cmdManEnable	Sys.ManualMode	
	1	
cmdAutoRun	0	
cmdManStart	0	
cmdManStop	0	
cmdSpdSP_rpm	60000	
stsIdleTime_min	262	
stsDecelFactor_Real	1.0008	
stsAccelFactor_Real	1.0	
D_R_I_V_E_I_O	0	
outReset	outDrill1Reset	
	<Local:5:O.Data.14>	
	0	
inpAtSpd	inpDrill1AtSpd	
	<Local:3:I.Data.11>	
	0	
inpAtZeroSpd	inpDrill1AtZeroSpd	
	<Local:3:I.Data.12>	
	1	
inpTemp_DegF	inpDrill1Temp_DegC	
	0.62	
inpVFDReady	inpDrill1Ready	
	<Local:3:I.Data.13>	
	1	
outRun	outDrill1Start	
	<Local:5:O.Data.13>	
	0	
outSpdSP_rpm	60000	

10

Drill1_ocmdStartSpindel Drill1_ocmdStartSpindel (U)

Drill1_WarmupReq

auto run command to aoi
Drill1_VFD.cmdAutoRun

0=disabled,1=enabled
ST02.cfgEnabled

Drill1_WarmupReq

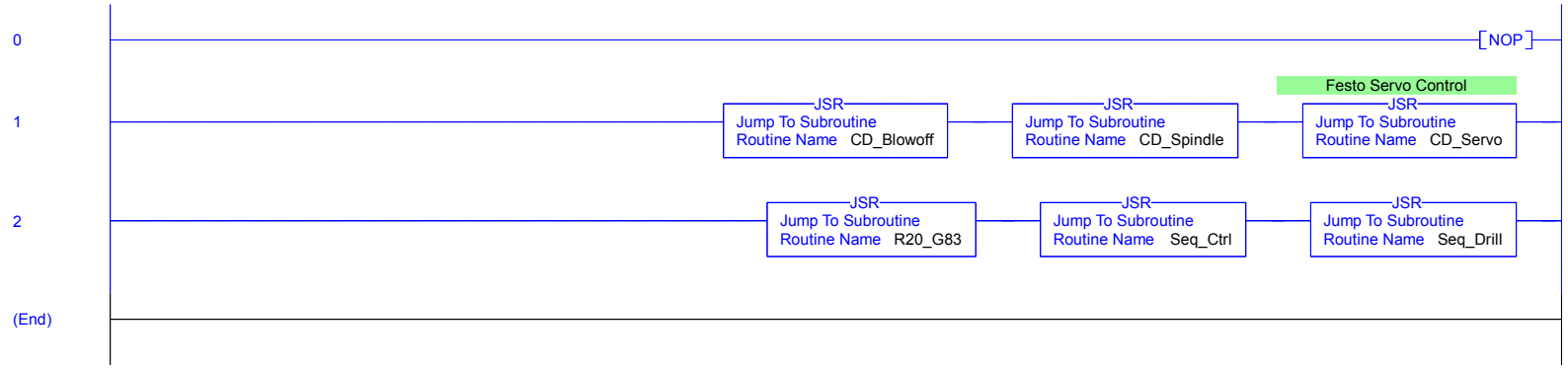
System Control Immediate Stop Trigger
Sys.CriticalStop

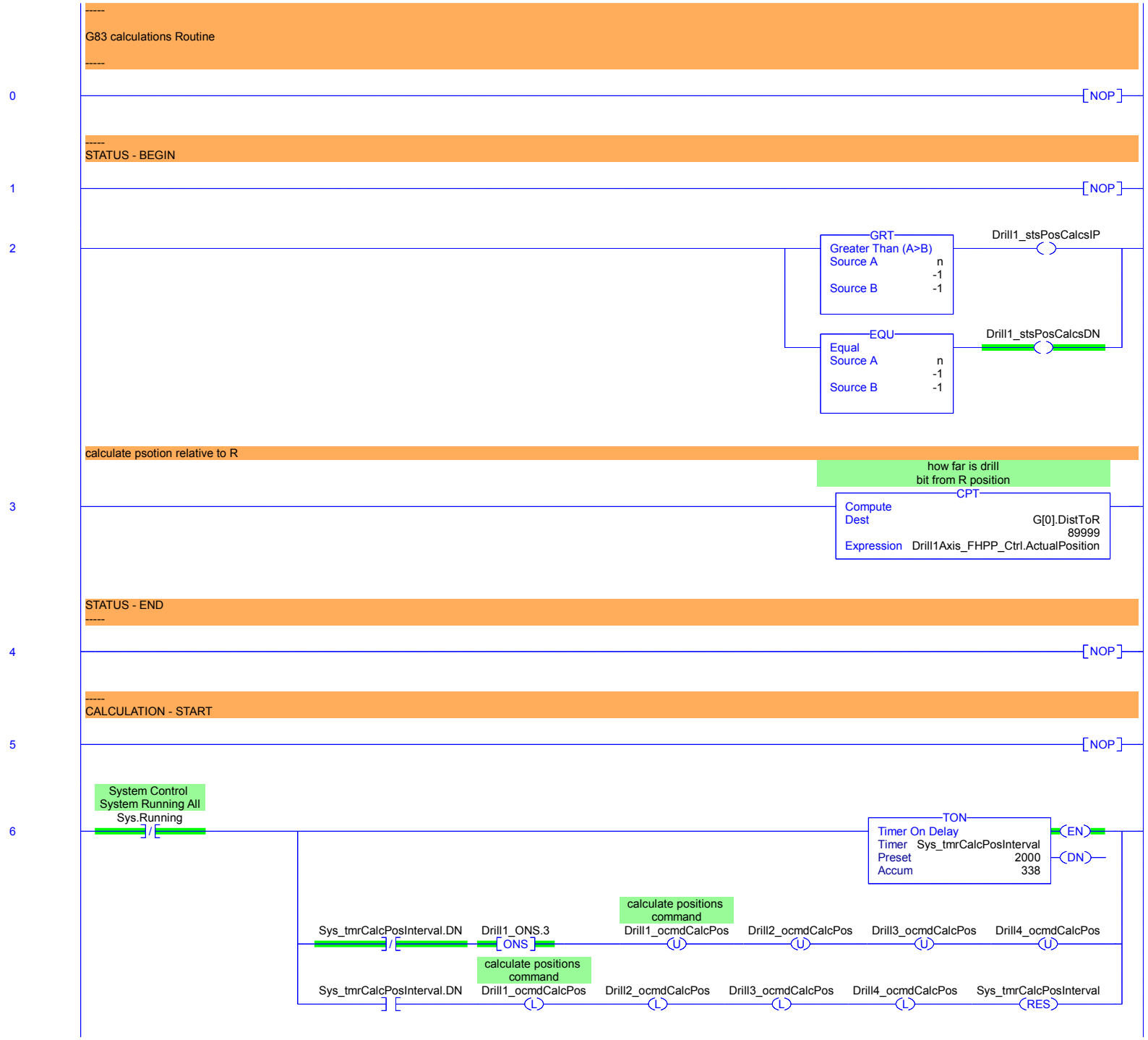
Drill1_RunIntlk.AllOK

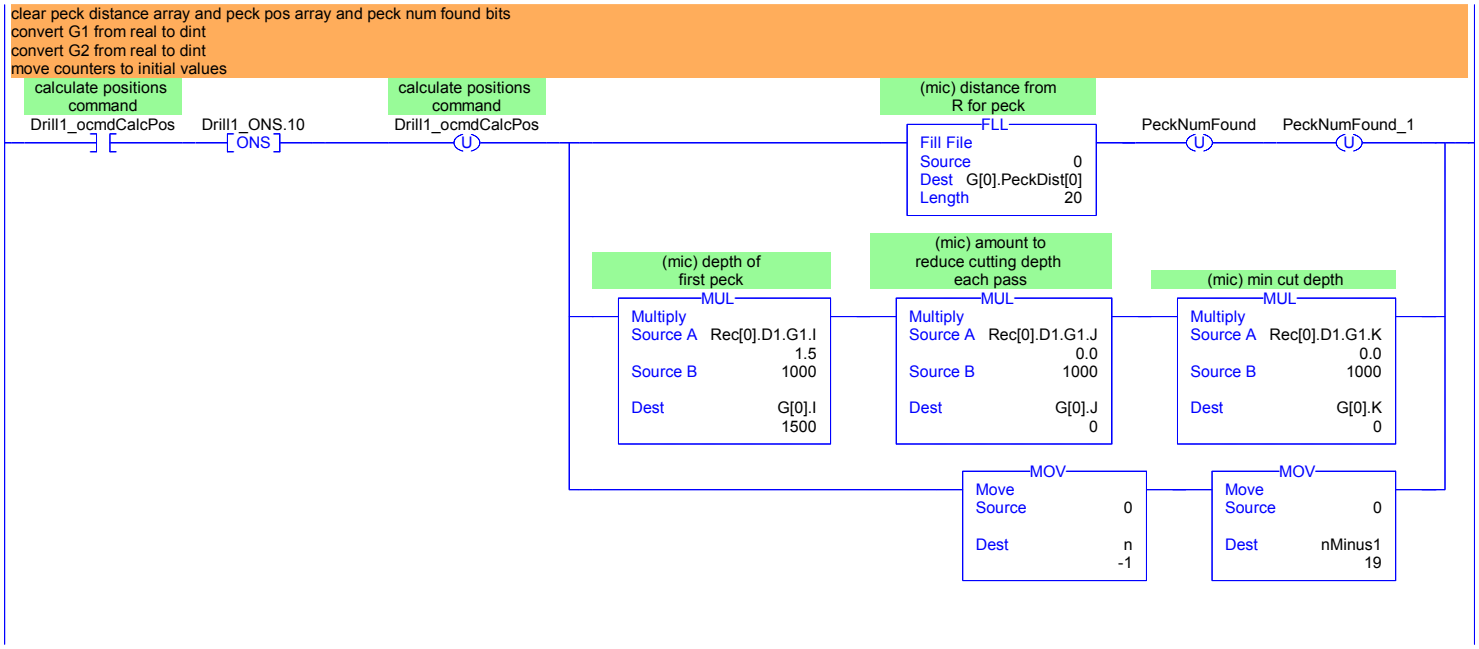
MOV
Move
Source Rec[0].D1.Spd 60000
Dest Drill1_VFD.cmdSpdSP_rpm 60000

auto run command to aoi
Drill1_VFD.cmdAutoRun

(End)


0
NOP
Festo Servo Control
1
JSR
Jump To Subroutine
Routine Name CD_Blowoff
JSR
Jump To Subroutine
Routine Name CD_Spindle
JSR
Jump To Subroutine
Routine Name CD_Servo
2
JSR
Jump To Subroutine
Routine Name R20_G83
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Drill
(End)


G83 calculations Routine
0
NOP
STATUS - BEGIN
1
NOP
2
GRT
Greater Than (A>B)
Source A n
-1
Source B -1
Drill1_stsPosCalcsIP
EQU
Equal
Source A n
-1
Source B -1
Drill1_stsPosCalcsDN
calculate psotion relative to R
how far is drill
bit from R position
3
CPT
Compute
Dest G[0].DistToR
89999
Expression Drill1Axis_FHPP_Ctrl.ActualPosition
STATUS - END
4
NOP
CALCULATION - START
5
NOP
System Control
System Running All
Sys.Running
6
TON
Timer On Delay
Timer Sys_tmrCalcPosInterval
Preset 2000
Accum 338
EN
DN
calculate positions
command
Sys_tmrCalcPosInterval.DN
Drill1_ONS.3
ONS
Drill1_ocmdCalcPos
Drill2_ocmdCalcPos
Drill3_ocmdCalcPos
Drill4_ocmdCalcPos
calculate positions
command
Sys_tmrCalcPosInterval.DN
Drill1_ocmdCalcPos
Drill2_ocmdCalcPos
Drill3_ocmdCalcPos
Drill4_ocmdCalcPos
Sys_tmrCalcPosInterval
RES


clear peck distance array and peck pos array and peck num found bits
convert G1 from real to dint
convert G2 from real to dint
move counters to initial values
7
calculate positions command
Drill1_ocmdCalcPos
Drill1_ONS.10
ONS
calculate positions command
Drill1_ocmdCalcPos
(mic) distance from R for peck
FLL
Fill File
Source 0
Dest G[0].PeckDist[0]
Length 20
PeckNumFound
PeckNumFound_1
(mic) depth of first peck
MUL
Multiply
Source A Rec[0].D1.G1.I 1.5
Source B 1000
Dest G[0].I 1500
(mic) amount to reduce cutting depth each pass
MUL
Multiply
Source A Rec[0].D1.G1.J 0.0
Source B 1000
Dest G[0].J 0
(mic) min cut depth
MUL
Multiply
Source A Rec[0].D1.G1.K 0.0
Source B 1000
Dest G[0].K 0
MOV
Move
Source 0
Dest n -1
MOV
Move
Source 0
Dest nMinus1 19

calculate R (retract) position (in servo axis position)
calculate Z (final peck pos) value
first PeckDist is (I)
first PeckPos is RetractPos (R) + PeckDist (I) (peck pos cannot be less than z pos)

8

EQU
Equal
Source A 0
Source B n -1

Drill1_ONS.11
ONS

(mic) servo retract pos
CPT
Compute
Dest G[0].R 10830
Expression (Drill1Axis_Moves[0].Pos_mm- Rec[0].D1.ColletDist+ Rec[0].D1.BitLength+ Rec[0].PartPertrusionD123+ Rec[0].D1.PartClearance)*1000

(mic) servo retract pos
LEQ
Less Than or Eql (A<=B)
Source A G[0].R 10830
Source B 0

(mic) servo retract pos
MOV
Move
Source Drill1Axis_Moves[0].Pos_mm 90.0
Dest G[0].R 10830

pos where the bit touches the part
CPT
Compute
Dest G[0].FerrTopPos 10630
Expression G[0].R-(Rec[0].D1.PartClearance*1000)

move position (mm)
CPT
Compute
Dest Drill1Axis_Moves[1].Pos_mm 10.830001
Expression G[0].R*0.001

0=rough, 1=final, 2=mill
LES
Less Than (A<B)
Source A Rec[0].D1.Type 0
Source B 2

(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 1460
Expression G[0].R-(Rec[0].D1.PartClearance*1000)-(Rec[0].PartHeight*1000)-(Rec[0].D1.PartBreakThrough*1000)

0=rough, 1=final, 2=mill
EQU
Equal
Source A Rec[0].D1.Type 0
Source B 2

(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 1460
Expression G[0].R-(Rec[0].D1.PartClearance*1000)-(Rec[0].D1.PartBreakThrough*1000)

(mic) servo max pecking depth
LEQ
Less Than or Eql (A<=B)
Source A G[0].Z 1460
Source B 0

(mic) servo max pecking depth
MOV
Move
Source 0
Dest G[0].Z 1460

pos where the bit breaks through the part
CPT
Compute
Dest G[0].FerrBotPos 3460
Expression G[0].Z+(Rec[0].D1.PartBreakThrough*1000)

(mic) distance from R for peck
CPT
Compute
Dest G[0].PeckDist[0] 1500
Expression G[0].I

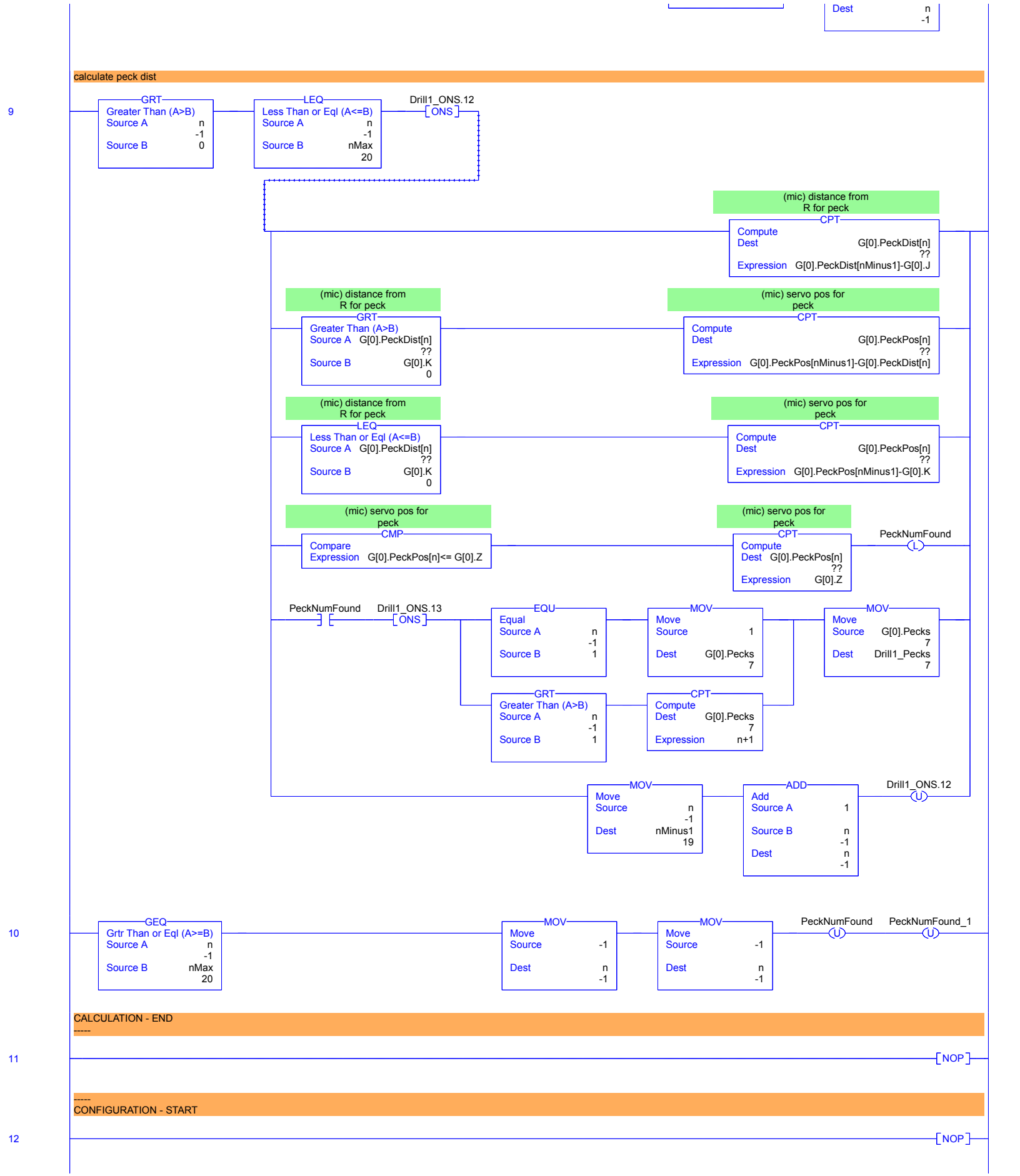
(mic) servo pos for peck
CPT
Compute
Dest G[0].PeckPos[0] 9130
Expression G[0].R-(Rec[0].D1.PartClearance*1000)-G[0].PeckDist[0]

(mic) servo pos for peck
LES
Less Than (A<B)
Source A G[0].PeckPos[0] 9130
Source B G[0].Z 1460

(mic) servo pos for peck
MOV
Move
Source G[0].Z 1460
Dest G[0].PeckPos[0] 9130

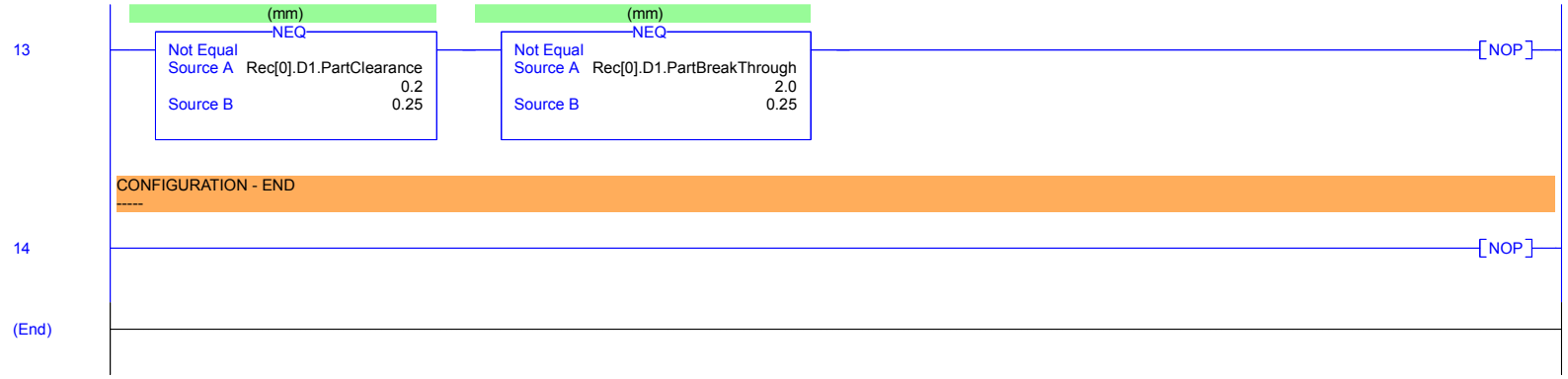
MOV
Move
Source n -1
Dest nMinus1 19

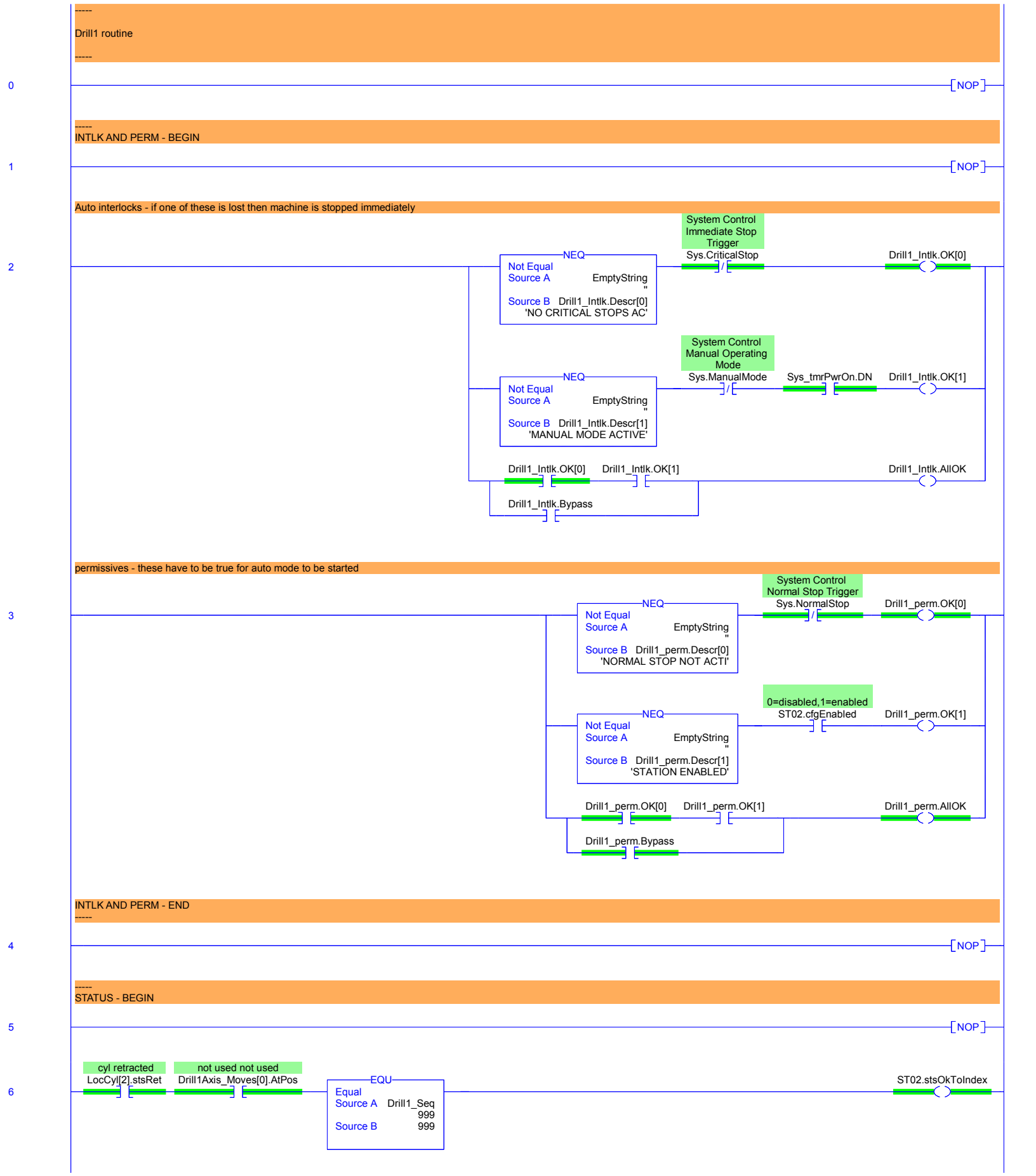
ADD
Add
Source A 1
Source B n -1


Dest n -1
calculate peck dist
9
GRT Greater Than (A>B) Source A n -1 Source B 0
LEQ Less Than or Eql (A<=B) Source A n -1 Source B nMax 20
Drill1_ONS.12 ONS
(mic) distance from R for peck
CPT Compute Dest G[0].PeckDist[n] ?? Expression G[0].PeckDist[nMinus1]-G[0].J
(mic) distance from R for peck
GRT Greater Than (A>B) Source A G[0].PeckDist[n] ?? Source B G[0].K 0
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].PeckPos[nMinus1]-G[0].PeckDist[n]
(mic) distance from R for peck
LEQ Less Than or Eql (A<=B) Source A G[0].PeckDist[n] ?? Source B G[0].K 0
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].PeckPos[nMinus1]-G[0].K
(mic) servo pos for peck
CMP Compare Expression G[0].PeckPos[n]<= G[0].Z
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].Z
PeckNumFound L
PeckNumFound Drill1_ONS.13 ONS
EQU Equal Source A n -1 Source B 1
MOV Move Source 1 Dest G[0].Pecks 7
MOV Move Source G[0].Pecks 7 Dest Drill1_Pecks 7
GRT Greater Than (A>B) Source A n -1 Source B 1
CPT Compute Dest G[0].Pecks 7 Expression n+1
MOV Move Source n -1 Dest nMinus1 19
ADD Add Source A 1 Source B n -1 Dest n -1
Drill1_ONS.12 U
10
GEQ Grtr Than or Eql (A>=B) Source A n -1 Source B nMax 20
MOV Move Source -1 Dest n -1
MOV Move Source -1 Dest n -1
PeckNumFound U
PeckNumFound_1 U
CALCULATION - END

11
NOP

CONFIGURATION - START
12
NOP


13
(mm)
NEQ
Not Equal
Source A Rec[0].D1.PartClearance
0.2
Source B 0.25
(mm)
NEQ
Not Equal
Source A Rec[0].D1.PartBreakThrough
2.0
Source B 0.25
NOP
CONFIGURATION - END
14
NOP
(End)


Drill1 routine
0
NOP
INTLK AND PERM - BEGIN
1
NOP
Auto interlocks - if one of these is lost then machine is stopped immediately
System Control Immediate Stop Trigger
2
NEQ
Not Equal
Source A EmptyString
Source B Drill1_Intlk.Descr[0] 'NO CRITICAL STOPS AC'
Sys.CriticalStop
Drill1_Intlk.OK[0]
System Control Manual Operating Mode
NEQ
Not Equal
Source A EmptyString
Source B Drill1_Intlk.Descr[1] 'MANUAL MODE ACTIVE'
Sys.ManualMode
Sys_tmrPwrOn.DN
Drill1_Intlk.OK[1]
Drill1_Intlk.OK[0]
Drill1_Intlk.OK[1]
Drill1_Intlk.AllOK
Drill1_Intlk.Bypass
permissives - these have to be true for auto mode to be started
System Control Normal Stop Trigger
3
NEQ
Not Equal
Source A EmptyString
Source B Drill1_perm.Descr[0] 'NORMAL STOP NOT ACTI'
Sys.NormalStop
Drill1_perm.OK[0]
0=disabled,1=enabled
NEQ
Not Equal
Source A EmptyString
Source B Drill1_perm.Descr[1] 'STATION ENABLED'
ST02.cfgEnabled
Drill1_perm.OK[1]
Drill1_perm.OK[0]
Drill1_perm.OK[1]
Drill1_perm.AllOK
Drill1_perm.Bypass
INTLK AND PERM - END
4
NOP
STATUS - BEGIN
5
NOP
cyl retracted
LocCyl[2].stsRet
not used not used
Drill1Axis_Moves[0].AtPos
6
EQU
Equal
Source A Drill1_Seq 999
Source B 999
ST02.stsOkToIndex

BIT USE COUNT

7

System Control
System Running All
Sys.Running

0=disabled,1=enabled
ST02.cfgEnabled

Drill1_Stop_999.X

MOV
Move
Source Rec[0].D1.MaxParts 1000
Dest Drill1_ctrBitUse.PRE 1000

CTU
Count Up
Counter Drill1_ctrBitUse
Preset 1000
Accum 830
CU
DN

GRT
Greater Than (A>B)
Source A Drill1_ctrBitUse.PRE 1000
Source B 0

DIV
Divide
Source A Drill1_ctrBitUse.ACC 830
Source B Drill1_ctrBitUse.PRE 1000
Dest Drill1_stsBitUse_pct 0

CPT
Compute
Dest Drill1_stsBitTimeLeft_min 25
Expression ((Drill1_ctrBitUse.PRE- Drill1_ctrBitUse.ACC)* Sys_stsCycleTimeAvg_ms)/60000

Drill1_ocmdResetBitUse Drill1_ONS.20 ONS

Drill1_ocmdResetBitUse U
Drill1_ctrBitUse RES

STATUS - END

8

NOP

SEQUENCE CONTROL - BEGIN

9

NOP

CYCLE TIMER

10

System Control
System Running All
Sys.Running

Drill1_SegDone Drill1_ONS.31 ONS

MOV
Move
Source ST02.tmrCycle.ACC 0
Dest ST02.stsCycleTime[0] 10

cycle timer
Drill1_SegDone /

TON
Timer On Delay
Timer ST02.tmrCycle
Preset 60000
Accum 0
EN
DN

SWITCH TO BACKUP DRILL

11

Drill1_ctrBitUse.DN Drill1_ONS.21 ONS

Drill1_pcmdSwitchToBackup L

12

Drill1_IntIk.AllOK /
S:FS
Drill1_ONS.0 ONS

SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900

SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Pause

RESET seq to ready pos logic IF
- interlocks are not met

13

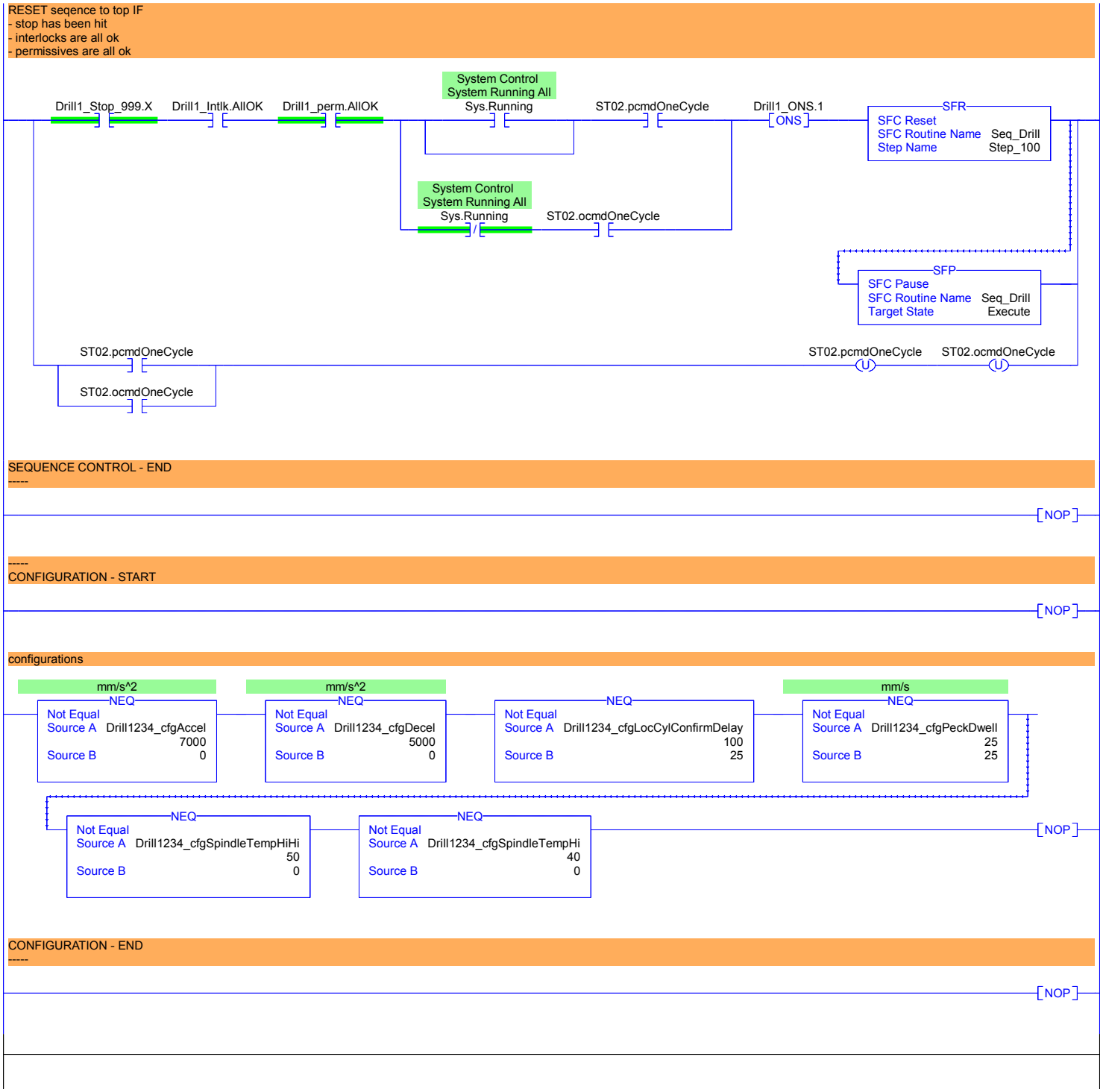
ST02.ocmdGoToReady Drill1_ONS.2 ONS

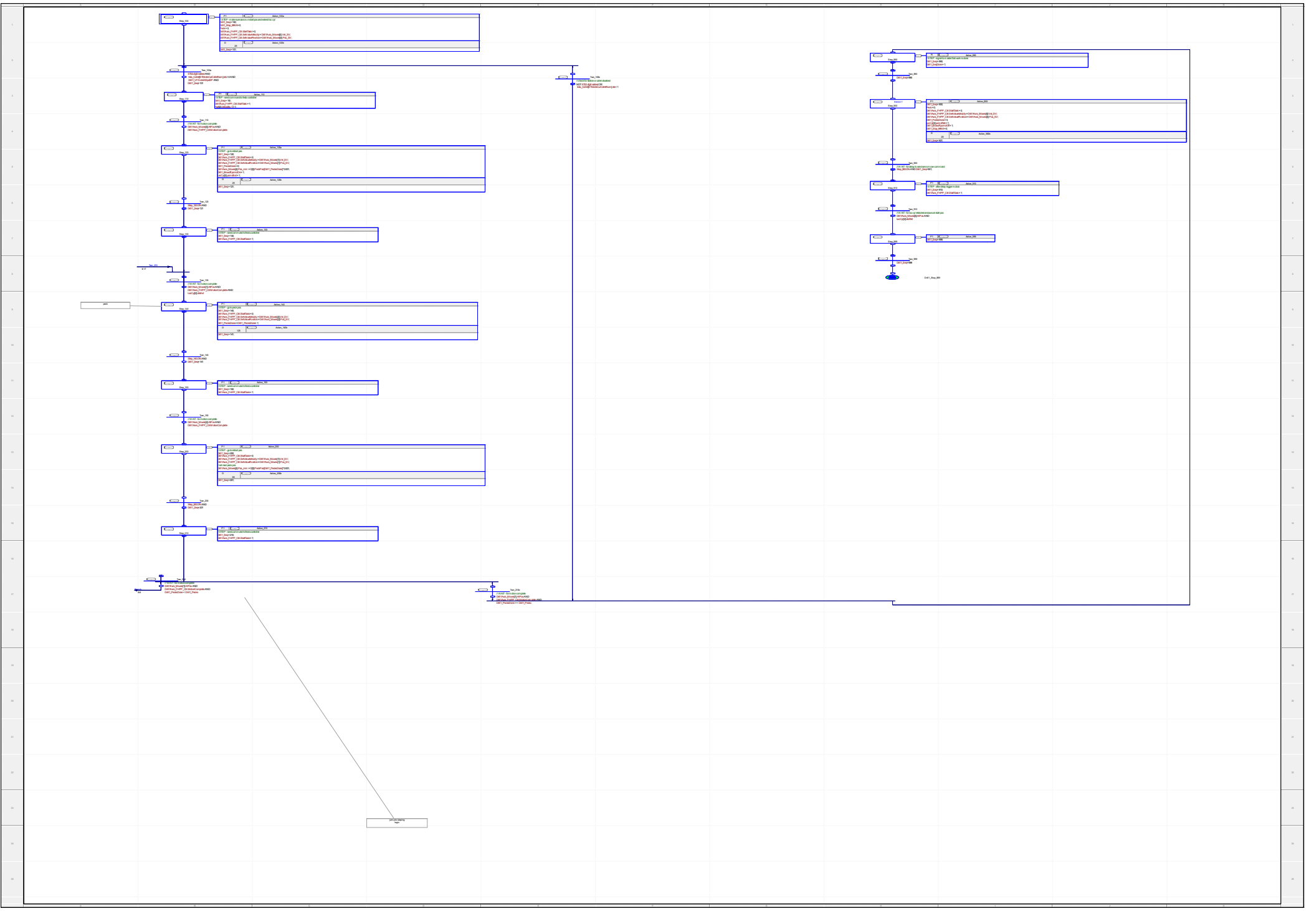
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900

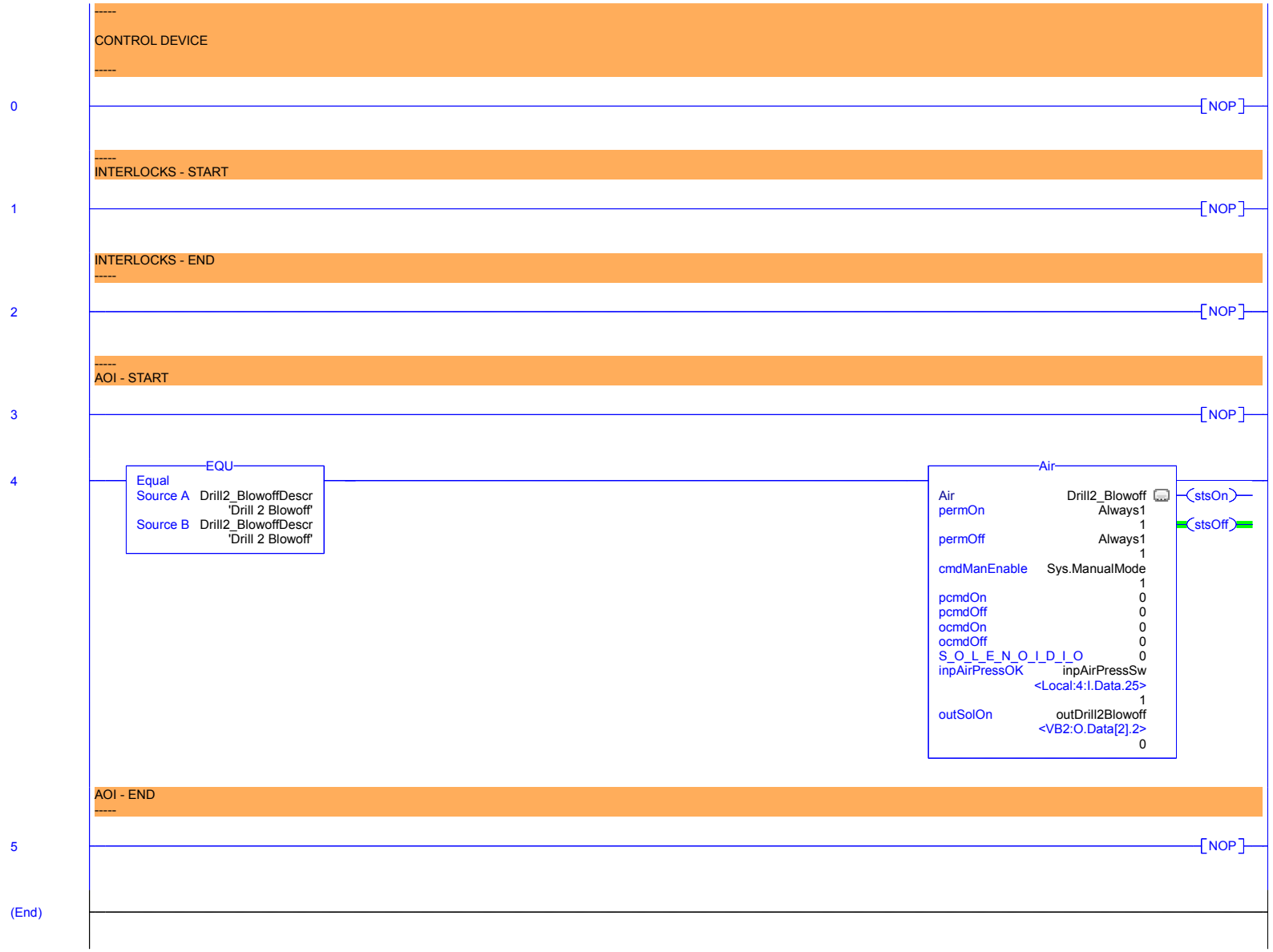
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute

ST02.ocmdGoToReady

ST02.ocmdGoToReady U


RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok
14
Drill1_Stop_999.X
Drill1_Intlk.AllOK
Drill1_perm.AllOK
System Control
System Running All
Sys.Running
ST02.pcmdOneCycle
Drill1_ONS.1
ONS
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_100
System Control
System Running All
Sys.Running
ST02.ocmdOneCycle
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute
ST02.pcmdOneCycle
ST02.ocmdOneCycle
ST02.pcmdOneCycle
ST02.ocmdOneCycle
SEQUENCE CONTROL - END
15
NOP
CONFIGURATION - START
16
NOP
configurations
17
mm/s^2
NEQ
Not Equal
Source A Drill1234_cfgAccel
7000
Source B 0
mm/s^2
NEQ
Not Equal
Source A Drill1234_cfgDecel
5000
Source B 0
NEQ
Not Equal
Source A Drill1234_cfgLocCylConfirmDelay
100
Source B 25
mm/s
NEQ
Not Equal
Source A Drill1234_cfgPeckDwell
25
Source B 25
NEQ
Not Equal
Source A Drill1234_cfgSpindleTempHiHi
50
Source B 0
NEQ
Not Equal
Source A Drill1234_cfgSpindleTempHi
40
Source B 0
NOP
CONFIGURATION - END
18
NOP
(End)




CONTROL DEVICE
0
NOP
INTERLOCKS - START
1
NOP
INTERLOCKS - END
2
NOP
AOI - START
3
NOP
4
EQU
Equal
Source A Drill2_BlowoffDescr
'Drill 2 Blowoff'
Source B Drill2_BlowoffDescr
'Drill 2 Blowoff'
Air
Air Drill2_Blowoff
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outDrill2Blowoff
<VB2:O.Data[2].2>
0
stsOn
stsOff
AOI - END
5
NOP
(End)

CONTROL DEVICE

0
NOP

1
System Control Reset Request
Sys.ResetReq
FHPP control (AOI) SCON B2 Warning Present
Drill2Axis_FHPP_Ctrl.Warning
FHPP control (AOI) SCON B3 Fault Present
Drill2Axis_FHPP_Ctrl.Fault
FHPP control (AOI) CCON B3 Reset Fault=1
Drill2Axis_FHPP_Ctrl.ResetFault

INTERLOCKS - START

2
NOP

SERVO CONTROL BITS

3
FHPP control (AOI) SCON B3 Fault Present
Drill2Axis_FHPP_Ctrl.Fault
System Control Estops OK
Sys.EstopOK
System Control Manual Operating Mode
Sys.ManualMode
Drill2Axis_DynamicsChg
System Control Manual Operating Mode
Sys.ManualMode
Intlks on Move Executing OK
Drill2Axis_Moves[Drill2Axis.stsMoveSel].stsIntlksOK
FHPP control (AOI) CPOS B0 HaltActive=0 HaltNotActive=1
Drill2Axis_FHPP_Ctrl.Halt
Intlks on Move Executing OK
Drill2Axis_Moves[Drill2Axis.stsMoveSel].stsIntlksOK
FHPP control (AOI) CCON B1 Stop Ative = 0 Enable Drive = 1
Drill2Axis_FHPP_Ctrl.Stop
FHPP control (AOI) CCON Mode Select Record=0 Direct Position=1 Direct Pos Energy=13 Direct Pos Cont=17 Direct Force=5 Direct Rot Speed=9
MOV
Move Source 1
Dest Drill2Axis_FHPP_Ctrl.OPM_OperationMode 1
FHPP control (AOI) CCON B0 Enable Drive=1
Drill2Axis_FHPP_Ctrl.Enable

jog pos interlocks
- man mode

4
System Control Manual Operating Mode
Sys.ManualMode
Drill2Axis.stsJogPosIntlkOK

jog neg interlocks
- man mode
- conv stopped

5
System Control Manual Operating Mode
Sys.ManualMode
Indexing Wheel Control AOI Running Stat
Indx_Conv.Running
Drill2Axis.stsJogNegIntlkOK

INTERLOCKS - END
---

6 NOP

MOVES AOI - START

7 NOP

FestoServoMoves

IAS AOI
used to transfer position commands to FHPP CTRL AOI

8 Drill2Axis:I.RunMode Drill2Axis:I.ConnectionFaulted

FestoServoMoves

FestoServoMoves	Drill2Axis
F_E_S_T_O_A_O_I	0
FHPP_CTRL	Drill2Axis_FHPP_Ctrl
Moves	Drill2Axis_Moves
cfgVelBase_mm_s	960
cfgPosMax_mm	103
cfgPosMin_mm	-3
cfgPosWindow_mm	0.1
cmdVelFactor_pct	100.0
cmdManualMode	Sys.ManualMode
	1
cmdAutoMoveSel	0
cmdManMoveSel	1
cmdJogPos	0
cmdJogNeg	0
stsMoveSel	0
cmdAutoGoToPos	0
ocmdGoToStartPos	0
stsSetPos_mm	90.0
stsActPos_mm	90.001
stsActPos_in	3.5433464
stsSetVel_mm_s	50000.0
stsActVel_mm_s	0.0
stsActVel_pct	0.0
stsSeq	0
stsMoveTime_ms	0
stsJogPosIntlkOK	1
stsJogNegIntlkOK	1

stsAxisReady
stsMoveDone
stsMoveFail
stsHomeVerif

move 0

9 move description — EQU
Equal
Source A Drill2Axis_Moves[0].Descr 'Start Pos'
Source B Drill2Axis_Moves[0].Descr 'Start Pos'

move position (mm) — MOV
Move
Source 90
Dest Drill2Axis_Moves[0].Pos_mm 90.0

move velocity (mm/s) — MOV
Move
Source Drill1234_cfgStartVel_mm_s 500
Dest Drill2Axis_Moves[0].Vel_mm_s 500.0

NOP

System Control Estops OK
Sys.EstopOK

Intlks on Move Executing OK
Drill2Axis_Moves[0].stsIntlksOK

Perms on Move Starting OK
Drill2Axis_Moves[0].stsPermsOK

move 1

10 move description — EQU
Equal
Source A Drill2Axis_Moves[1].Descr 'Retract Pos'
Source B Drill2Axis_Moves[1].Descr 'Retract Pos'

move position (mm) — EQU
Equal
Source A Drill2Axis_Moves[1].Pos_mm 10.830001
Source B Drill2Axis_Moves[1].Pos_mm 10.830001

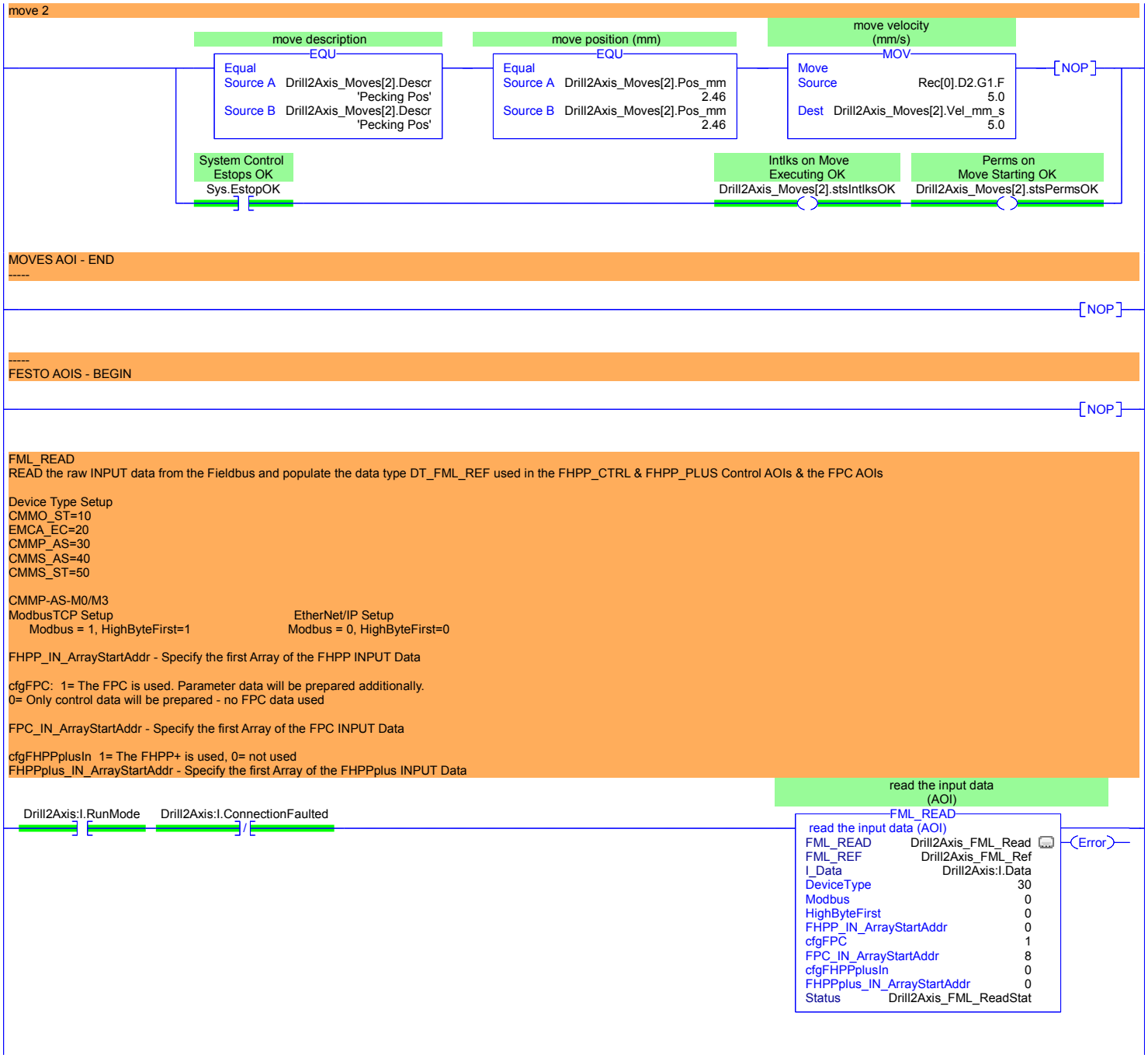
move velocity (mm/s) — MOV
Move
Source Drill1234_cfgRetractVel_mm_s 500
Dest Drill2Axis_Moves[1].Vel_mm_s 500.0

NOP

System Control Estops OK
Sys.EstopOK

Intlks on Move Executing OK
Drill2Axis_Moves[1].stsIntlksOK

Perms on Move Starting OK
Drill2Axis_Moves[1].stsPermsOK


move 2
move description
EQU
Equal
Source A Drill2Axis_Moves[2].Descr 'Pecking Pos'
Source B Drill2Axis_Moves[2].Descr 'Pecking Pos'
move position (mm)
EQU
Equal
Source A Drill2Axis_Moves[2].Pos_mm 2.46
Source B Drill2Axis_Moves[2].Pos_mm 2.46
move velocity (mm/s)
MOV
Move
Source Rec[0].D2.G1.F 5.0
Dest Drill2Axis_Moves[2].Vel_mm_s 5.0
NOP
System Control Estops OK
Sys.EstopOK
Intlks on Move Executing OK
Drill2Axis_Moves[2].stsIntlksOK
Perms on Move Starting OK
Drill2Axis_Moves[2].stsPermsOK
MOVES AOI - END
11
12
NOP
FESTO AOIS - BEGIN
13
FML_READ
READ the raw INPUT data from the Fieldbus and populate the data type DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS Control AOIs & the FPC AOIs
Device Type Setup
CMMO_ST=10
EMCA_EC=20
CMMP_AS=30
CMMS_AS=40
CMMS_ST=50
CMMP-AS-M0/M3
ModbusTCP Setup
Modbus = 1, HighByteFirst=1
EtherNet/IP Setup
Modbus = 0, HighByteFirst=0
FHPP_IN_ArrayStartAddr - Specify the first Array of the FHPP INPUT Data
cfgFPC: 1= The FPC is used. Parameter data will be prepared additionally.
0= Only control data will be prepared - no FPC data used
FPC_IN_ArrayStartAddr - Specify the first Array of the FPC INPUT Data
cfgFHPPplusIn 1= The FHPP+ is used, 0= not used
FHPPplus_IN_ArrayStartAddr - Specify the first Array of the FHPPplus INPUT Data
read the input data (AOI)
FML_READ
read the input data (AOI)
FML_READ Drill2Axis_FML_Read
FML_REF Drill2Axis_FML_Ref
I_Data Drill2Axis:I.Data
DeviceType 30
Modbus 0
HighByteFirst 0
FHPP_IN_ArrayStartAddr 0
cfgFPC 1
FPC_IN_ArrayStartAddr 8
cfgFHPPplusIn 0
FHPPplus_IN_ArrayStartAddr 0
Status Drill2Axis_FML_ReadStat
Error
14
Drill2Axis:I.RunMode
Drill2Axis:I.ConnectionFaulted

FHPP_CTRL

OPM_OperationMode:
Record=0
Direct Position=1
Direct Position Energy=13
Direct Position Continuous=17
Direct Force=5
Direct Rot Speed=9

15

Drill2Axis:I.RunMode Drill2Axis:I.ConnectionFaulted

FHPP control (AOI)

FHPP_CTRL

FHPP control (AOI)		
FHPP_CTRL	Drill2Axis_FHPP_Ctrl	DriveControlByFCT
FML_REF	Drill2Axis_FML_Ref	LoadVoltageApplied
C_o_n_t_r_o_l_A_r_e_a	0	Fault
HMIAccessLocked	0	Warning
BrakeRelease	0	FollowingError
ResetFault	0	HaltActive
OPM_OperationMode	1	DriveEnabled
Halt	1	Ready
Stop	1	HomingValid
Enable	1	AcknowledgeStart
StartHoming	0	AxisIsMoving
StartTask	1	StandstillWarning
JogPositive	0	MotionComplete
JogNegative	0	AcknowledgeTeach
ClearRemainingPosition	0	StrokeLimitReached
TeachActualValue	0	VelocityLimitReached
Relative	0	RecordChainActive
StrokeLimitDisable	0	RecordChainComplete
OPM_OperationState	1	
R_e_c_o_r_d_M_o_d_e_A_c_t_i_v_e	0	
RecordNumber	0	
ActualRecordNumber	0	
D_i_r_e_c_t_M_o_d_e_A_c_t_i_v_e	1	
SetValueVelocity	9	
SetValuePosition	90000	
ActualVelocity	0	
ActualPosition	90001	
SetValueForceRamp	0	
SetValueForce	0	
ActualForce	0	
SetValueRotRamp	0	
SetValueRotSpeed	0	
ActualRotRamp	0	
ActualRotSpeed	0	

FPC_DIRMP
Festo Direct Mode Parameters

Examples:
Velocity: 400000 = 400.00mm (Depends on scaling in FCT)
Acceleration: 4500000 = 4.500 m/s2
Deceleration: 5500000 = 5.500 m/s2

16

Drill2Axis:I.RunMode Drill2Axis:I.ConnectionFaulted

read/write direct mode positioning parameters (AOI)

FPC_DIRMP

read/write direct mode positioning param...		
FPC_DIRMP	Drill2Axis_FPC_DIRMP	Done
FML_REF	Drill2Axis_FML_Ref	Error
Execute	0	
Write	0	
Velocity	960	
Acceleration	7000000	
Deceleration	5000000	
ActVelocity	0	
ActAcceleration	0	
ActDeceleration	0	
Status	Drill2Axis_FPC_DIRMP_Stat	

FML_WRITE
WRITE the OUTPUT data in DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS & the FPC AOIs and populate the Raw OUTPUT data via the Fieldbus

17

Drill2Axis:I.RunMode Drill2Axis:I.ConnectionFaulted

write the output data (AOI)

FML_WRITE

write the output data (AOI)		
FML_WRITE	Drill2Axis_FML_Write	Error
FML_REF	Drill2Axis_FML_Ref	
O_Data	Drill2Axis:O.Data	
FHPP_OUT_ArrayStartAddr	0	
FPC_OUT_ArrayStartAddr	8	
cfgFHPPplusOut	0	
FHPPplus_OUT_ArrayStartAddr	0	
Status	Drill2Axis_FML_WriteStat	

FPC_PNU
Festo Parameter Channel

Used to Read/Write a single parameter to or from the respective motor controller when FPC is configured as used.
PNU = 127 Subindex =2 Value = 1 for store command to Servo

18
Drill2Axis:I.RunMode Drill2Axis:I.ConnectionFaulted
read/write single parameter (AOI)
FPC_PNU
read/write single parameter (AOI)
FPC_PNU Drill2Axis_FPC_PNU
FML_REF Drill2Axis_FML_Ref
Execute 0
Write 1
PNU 127
Subindex 2
Value 1
ActPNU 0
ActSubindex 0
ActValue 0
Status Drill2Axis_FPC_PNU_STATUS
Done
Error

FESTO AOIS - END

19
NOP

PARAMETER STORE LOGIC - START

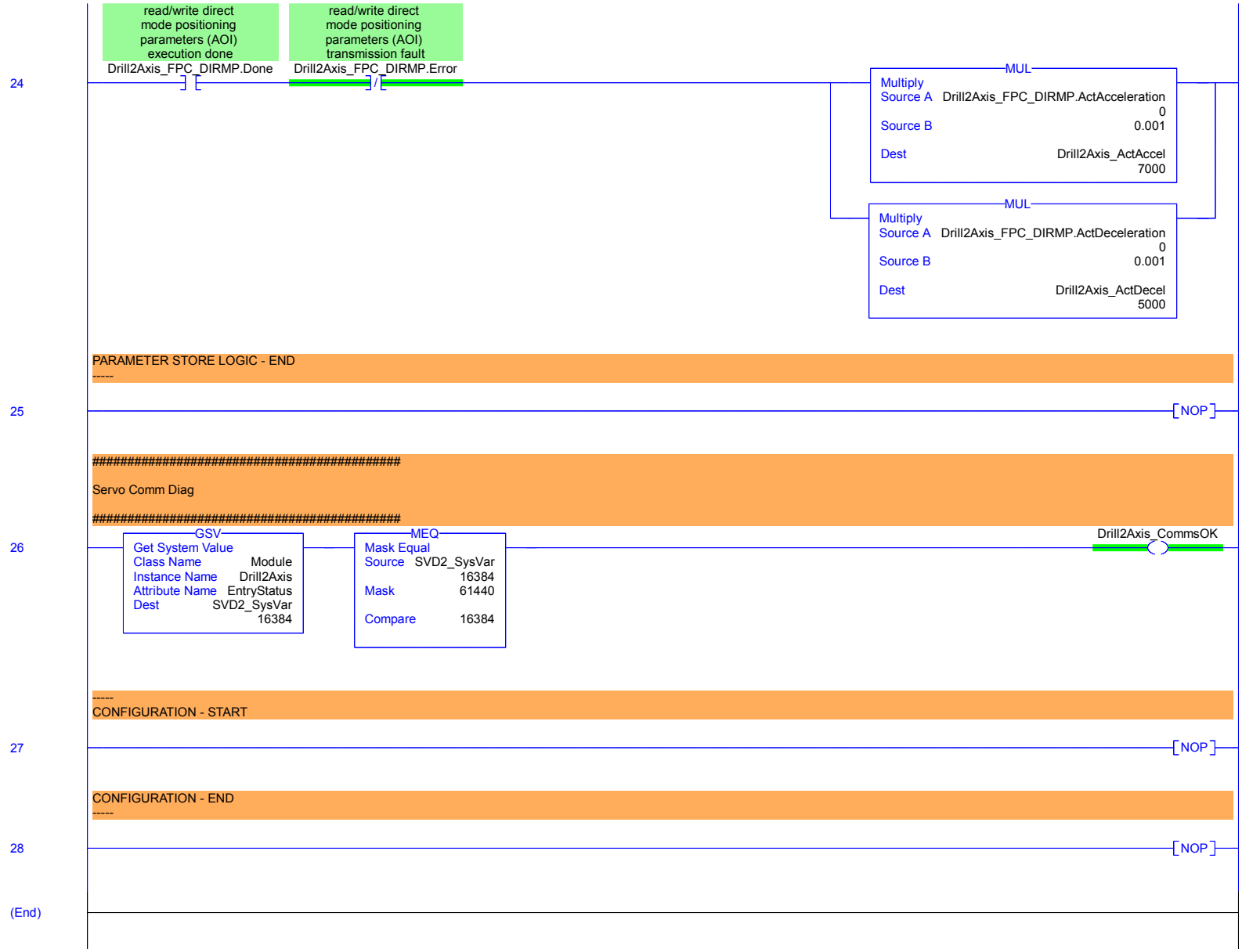
20
NOP

21
Drill2Axis:I.RunMode Drill2Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill2Axis_FHPP_Ctrl.DriveEnabled
Store Servo Parameter
HMI.SVO_ParamStore
read/write single parameter (AOI) perform data exchange
Drill2Axis_FPC_PNU.Execute

22
read/write single parameter (AOI) execution done
Drill2Axis_FPC_PNU.Done
read/write single parameter (AOI) fault occured
Drill2Axis_FPC_PNU.Error
read/write single parameter (AOI) actual number of the parameter
EQU
Equal
Source A Drill2Axis_FPC_PNU.ActPNU
0
Source B 127
read/write single parameter (AOI) actual subindex of the parameter
EQU
Equal
Source A Drill2Axis_FPC_PNU.ActSubindex
0
Source B 2
read/write single parameter (AOI) actual value of the parameter
EQU
Equal
Source A Drill2Axis_FPC_PNU.ActValue
0
Source B 0
Store Servo Parameter Done
HMI.SVO_ParamStoreDn

READ DYNAMIC PARAMETERS AT EACH RUN OF SERVO
WRITE DYNAMICS WITH EACH CHANGE IN DYNAMICS

23
Drill2Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill2Axis_FHPP_Ctrl.DriveEnabled
read/write direct mode positioning parameters (AOI) perform data exchange
Drill2Axis_FPC_DIRMP.Execute
Drill2Axis:I.RunMode ServoONS.3
ONS
Drill2Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) variable to read or write the parameter
Drill2Axis_DynamicsChg
Drill2Axis_FPC_DIRMP.Write


read/write direct mode positioning parameters (AOI) execution done
Drill2Axis_FPC_DIRMP.Done
read/write direct mode positioning parameters (AOI) transmission fault
Drill2Axis_FPC_DIRMP.Error
24
MUL
Multiply
Source A Drill2Axis_FPC_DIRMP.ActAcceleration
0
Source B 0.001
Dest Drill2Axis_ActAccel
7000
MUL
Multiply
Source A Drill2Axis_FPC_DIRMP.ActDeceleration
0
Source B 0.001
Dest Drill2Axis_ActDecel
5000
PARAMETER STORE LOGIC - END

25
NOP
##########
Servo Comm Diag
##########
26
GSV
Get System Value
Class Name Module
Instance Name Drill2Axis
Attribute Name EntryStatus
Dest SVD2_SysVar
16384
MEQ
Mask Equal
Source SVD2_SysVar
16384
Mask 61440
Compare 16384
Drill2Axis_CommsOK

CONFIGURATION - START
27
NOP
CONFIGURATION - END

28
NOP
(End)

CONTROL DEVICE
---

0 NOP

INTERLOCKS AND PERMISSIVES- START

1 NOP

2 Drill2_VFD.stsRunning

TON
Timer On Delay
Timer Drill2_tmrIntlkDelay
Preset 1000
Accum 0
EN
DN

3

System Control Estops OK
Sys.EstopOK — Drill2_RunIntlk.OK[0]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[0] '1'

0=disabled,1=enabled
ST03.cfgEnabled — Drill2_RunIntlk.OK[1]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[1] '1'

Drill2_VFD.inpVFDReady — Drill2_RunIntlk.OK[2]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[2] '1'

drill 1234 vac
outDrill1234VacRun
<Local:6:O.Data.12> — Drill2_RunIntlk.OK[3]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[3] '1'

spindel chiller ok
outDrill1234ChillerRun
<Local:6:O.Data.14> — Drill2_RunIntlk.OK[4]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[4] '1'

inpDrill2FlowSw
<Local:4:I.Data.22> — Drill2_RunIntlk.OK[5]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[5] '1'

Drill1234_AirSeal.stsOn — Drill2_RunIntlk.OK[6]

NEQ Not Equal Source A "" Source B Drill2_RunIntlk.Descr[6] '1'

4 Drill2_RunIntlk.OK[0] Drill2_RunIntlk.OK[1] Drill2_RunIntlk.OK[2] Drill2_RunIntlk.OK[3] Drill2_RunIntlk.OK[4] Drill2_RunIntlk.OK[5] Drill2_RunIntlk.OK[6]

Drill2_tmrIntlkDelay.DN

Drill2_RunIntlk.Bypass

Drill2_RunIntlk.AllOK

INTERLOCKS AND PERMISSIVES- END
---

5 NOP

FAULT HANDLING - START

6 NOP

System Control Reset Request
Sys.ResetReq

7 outDrill2Reset
<Local:6:O.Data.0>

FAULT HANDLING - END
---

8 NOP

---
drill 1

9

EQU
Equal
Source A Drill2_VFD.cmdSpdSP_rpm 60000
Source B Drill2_VFD.cmdSpdSP_rpm 60000

VFD_HighSpeed_Control

VFD_HighSpeed_Control	Drill2_VFD	stsRunning
intlkRun	Drill2_RunIntlk.AllOK	
	0	stsAtZeroSpd
permStart	Drill2_RunIntlk.AllOK	
	0	stsWarmingUp
cfgIdleTimeForWarmup_min	Drill1234_cfgIdleTimeForWarmup_min	
	60	
cfgWarmupTime_min	Drill1234_cfgWarmupInterval_min	
	1	
cfgStopTime_sec	10	
cmdManEnable	Sys.ManualMode	
	1	
cmdAutoRun	0	
cmdManStart	0	
cmdManStop	0	
cmdSpdSP_rpm	60000	
stsIdleTime_min	262	
stsDecelFactor_Real	1.0007	
stsAccelFactor_Real	1.0	
D_R_I_V_E_I_O	0	
outReset	outDrill2Reset	
	<Local:6:O.Data.0>	
	0	
inpAtSpd	inpDrill2AtSpd	
	<Local:3:I.Data.14>	
	0	
inpAtZeroSpd	inpDrill2AtZeroSpd	
	<Local:3:I.Data.15>	
	1	
inpTemp_DegF	inpDrill2Temp_DegC	
	0.71999997	
inpVFDReady	inpDrill2Ready	
	<Local:4:I.Data.0>	
	1	
outRun	outDrill2Start	
	<Local:5:O.Data.15>	
	0	
outSpdSP_rpm	60000	

10

Drill2_ocmdStartSpindel Drill2_ocmdStartSpindel (U)

Drill2_WarmupReq

auto run command to aoi
Drill2_VFD.cmdAutoRun

0=disabled,1=enabled
ST03.cfgEnabled

Drill2_WarmupReq

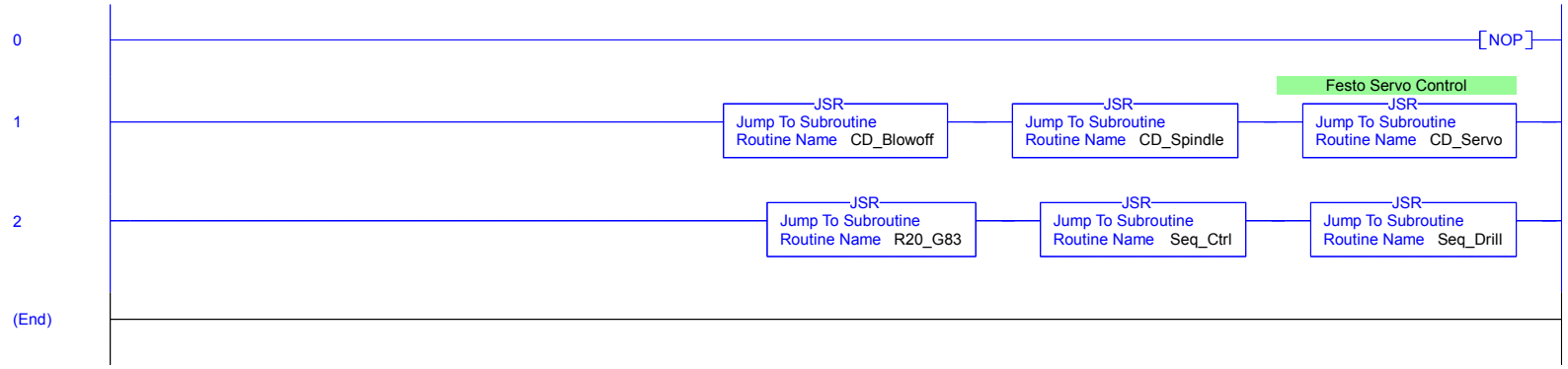
System Control Immediate Stop Trigger
Sys.CriticalStop (/)

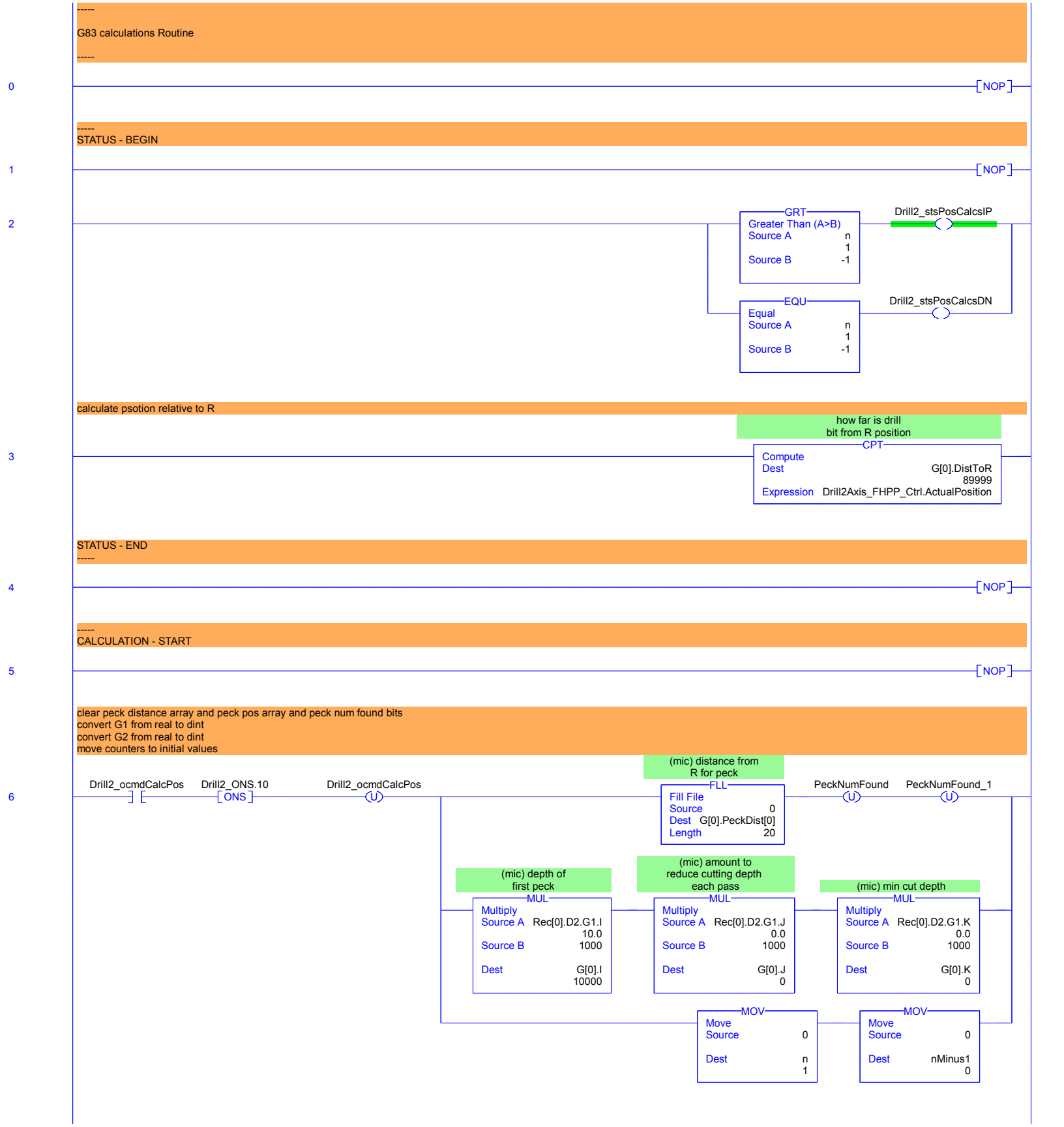
Drill2_RunIntlk.AllOK

MOV
Move
Source Rec[0].D2.Spd 60000
Dest Drill2_VFD.cmdSpdSP_rpm 60000

auto run command to aoi
Drill2_VFD.cmdAutoRun (OTE)

(End)


0
NOP
Festo Servo Control
1
JSR
Jump To Subroutine
Routine Name CD_Blowoff
JSR
Jump To Subroutine
Routine Name CD_Spindle
JSR
Jump To Subroutine
Routine Name CD_Servo
2
JSR
Jump To Subroutine
Routine Name R20_G83
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Drill
(End)



G83 calculations Routine

0
NOP

STATUS - BEGIN
1
NOP
2
GRT
Greater Than (A>B)
Source A n 1
Source B -1
Drill2_stsPosCalcsIP
EQU
Equal
Source A n 1
Source B -1
Drill2_stsPosCalcsDN
calculate psotion relative to R
how far is drill bit from R position
3
CPT
Compute
Dest G[0].DistToR 89999
Expression Drill2Axis_FHPP_Ctrl.ActualPosition
STATUS - END

4
NOP

CALCULATION - START

5
NOP
clear peck distance array and peck pos array and peck num found bits
convert G1 from real to dint
convert G2 from real to dint
move counters to initial values
6
Drill2_ocmdCalcPos
Drill2_ONS.10
ONS
Drill2_ocmdCalcPos
(mic) distance from R for peck
FLL
Fill File
Source 0
Dest G[0].PeckDist[0]
Length 20
PeckNumFound
PeckNumFound_1
(mic) depth of first peck
MUL
Multiply
Source A Rec[0].D2.G1.I 10.0
Source B 1000
Dest G[0].I 10000
(mic) amount to reduce cutting depth each pass
MUL
Multiply
Source A Rec[0].D2.G1.J 0.0
Source B 1000
Dest G[0].J 0
(mic) min cut depth
MUL
Multiply
Source A Rec[0].D2.G1.K 0.0
Source B 1000
Dest G[0].K 0
MOV
Move
Source 0
Dest n 1
MOV
Move
Source 0
Dest nMinus1 0

calculate R (retract) position (in servo axis position)
calculate Z (final peck pos) value
first PeckDist is (I)
first PeckPos is RetractPos (R) + PeckDist (I) (peck pos cannot be less than z pos)

7

EQU
Equal
Source A 0
Source B n 1

Drill2_ONS.11
ONS

(mic) servo retract pos
CPT
Compute
Dest G[0].R 10830
Expression (Drill2Axis_Moves[0].Pos_mm- Rec[0].D2.ColletDist+ Rec[0].D2.BitLength+ Rec[0].PartPertrusionD123+ Rec[0].D2.PartClearance)*1000

(mic) servo retract pos
LEQ
Less Than or Eql (A<=B)
Source A G[0].R 10830
Source B 0

(mic) servo retract pos
MOV
Move
Source Drill2Axis_Moves[0].Pos_mm 90.0
Dest G[0].R 10830

move position (mm)
CPT
Compute
Dest Drill2Axis_Moves[1].Pos_mm 10.830001
Expression G[0].R*0.001

pos where the bit touches the part
CPT
Compute
Dest G[0].FerrTopPos 10630
Expression G[0].R-(Rec[0].D2.PartClearance*1000)

0=rough, 1=final, 2=mill
LES
Less Than (A<B)
Source A Rec[0].D2.Type 0
Source B 2

(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 2460
Expression G[0].R-(Rec[0].D2.PartClearance*1000)-(Rec[0].PartHeight*1000)-(Rec[0].D2.PartBreakThrough*1000)

0=rough, 1=final, 2=mill
EQU
Equal
Source A Rec[0].D2.Type 0
Source B 2

(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 2460
Expression G[0].R-(Rec[0].D2.PartClearance*1000)-(Rec[0].D2.PartBreakThrough*1000)

(mic) servo max pecking depth
LEQ
Less Than or Eql (A<=B)
Source A G[0].Z 2460
Source B 0

(mic) servo max pecking depth
MOV
Move
Source 0
Dest G[0].Z 2460

pos where the bit breaks through the part
CPT
Compute
Dest G[0].FerrBotPos 3460
Expression G[0].Z+(Rec[0].D2.PartBreakThrough*1000)

(mic) distance from R for peck
CPT
Compute
Dest G[0].PeckDist[0] 10000
Expression G[0].I

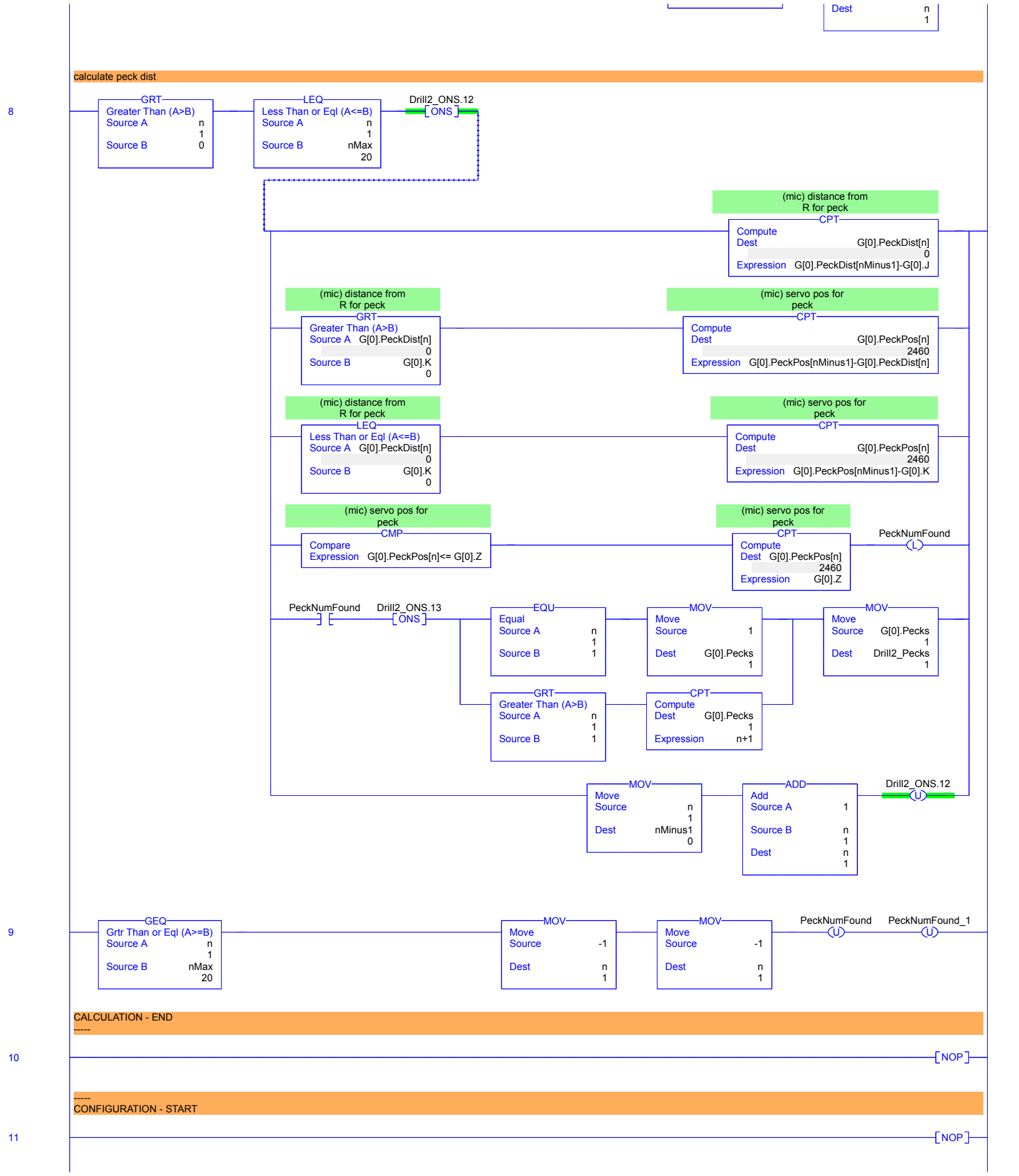
(mic) servo pos for peck
CPT
Compute
Dest G[0].PeckPos[0] 2460
Expression G[0].R-(Rec[0].D2.PartClearance*1000)-G[0].PeckDist[0]

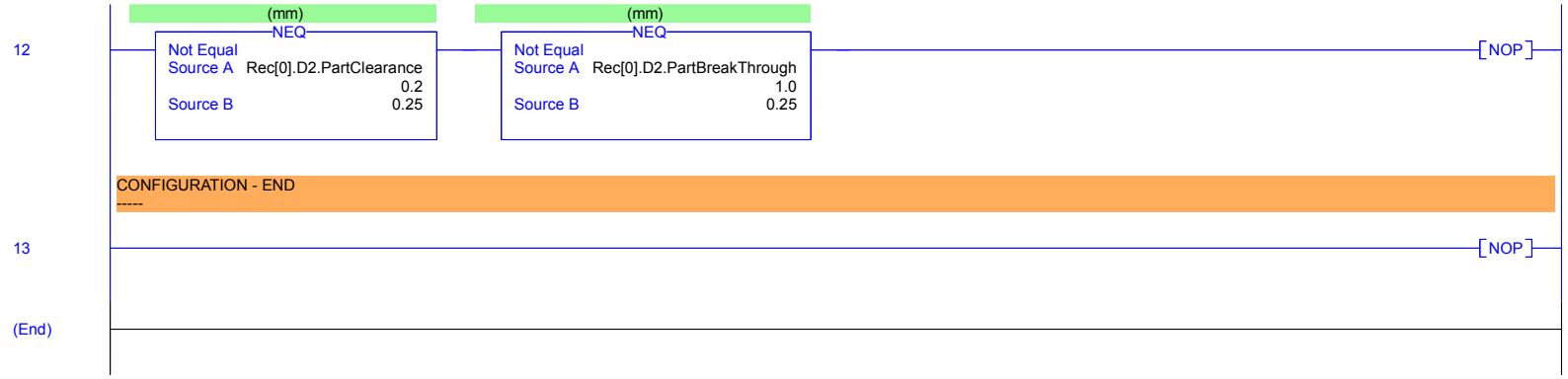
(mic) servo pos for peck
LES
Less Than (A<B)
Source A G[0].PeckPos[0] 2460
Source B G[0].Z 2460

(mic) servo pos for peck
MOV
Move
Source G[0].Z 2460
Dest G[0].PeckPos[0] 2460

MOV
Move
Source n 1
Dest nMinus1 0

ADD
Add
Source A 1
Source B n 1


Dest n 1
calculate peck dist
8
GRT Greater Than (A>B) Source A n 1 Source B 0
LEQ Less Than or Eql (A<=B) Source A n 1 Source B nMax 20
Drill2_ONS.12 ONS
(mic) distance from R for peck
CPT Compute Dest G[0].PeckDist[n] 0 Expression G[0].PeckDist[nMinus1]-G[0].J
(mic) distance from R for peck
GRT Greater Than (A>B) Source A G[0].PeckDist[n] 0 Source B G[0].K 0
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] 2460 Expression G[0].PeckPos[nMinus1]-G[0].PeckDist[n]
(mic) distance from R for peck
LEQ Less Than or Eql (A<=B) Source A G[0].PeckDist[n] 0 Source B G[0].K 0
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] 2460 Expression G[0].PeckPos[nMinus1]-G[0].K
(mic) servo pos for peck
CMP Compare Expression G[0].PeckPos[n]<= G[0].Z
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] 2460 Expression G[0].Z
PeckNumFound L
PeckNumFound Drill2_ONS.13 ONS
EQU Equal Source A n 1 Source B 1
MOV Move Source 1 Dest G[0].Pecks 1
MOV Move Source G[0].Pecks 1 Dest Drill2_Pecks 1
GRT Greater Than (A>B) Source A n 1 Source B 1
CPT Compute Dest G[0].Pecks 1 Expression n+1
MOV Move Source n 1 Dest nMinus1 0
ADD Add Source A 1 Source B n 1 Dest n 1
Drill2_ONS.12 U
9
GEQ Grtr Than or Eql (A>=B) Source A n 1 Source B nMax 20
MOV Move Source -1 Dest n 1
MOV Move Source -1 Dest n 1
PeckNumFound U
PeckNumFound_1 U
CALCULATION - END
10
NOP
CONFIGURATION - START
11
NOP


12
(mm)
NEQ
Not Equal
Source A Rec[0].D2.PartClearance
0.2
Source B 0.25
(mm)
NEQ
Not Equal
Source A Rec[0].D2.PartBreakThrough
1.0
Source B 0.25
NOP
CONFIGURATION - END
13
NOP
(End)

Drill2 routine
---

0 [NOP]

INTLK AND PERM - BEGIN

1 [NOP]

Auto interlocks - if one of these is lost then machine is stopped immediately

2
System Control Immediate Stop Trigger
Sys.CriticalStop
NEQ Not Equal Source A EmptyString '' Source B Drill2_Intlk.Descr[0] 'a'
Drill2_Intlk.OK[0]

System Control Manual Operating Mode
Sys.ManualMode
NEQ Not Equal Source A EmptyString '' Source B Drill2_Intlk.Descr[1] 'b'
Sys_tmrPwrOn.DN
Drill2_Intlk.OK[1]

Drill2_Intlk.OK[0] Drill2_Intlk.OK[1] Drill2_Intlk.AllOK
Drill2_Intlk.Bypass

permissives - these have to be true for auto mode to be started

3
System Control Normal Stop Trigger
Sys.NormalStop
NEQ Not Equal Source A EmptyString '' Source B Drill2_perm.Descr[0] 'a'
Drill2_perm.OK[0]

0=disabled,1=enabled
ST03.cfgEnabled
NEQ Not Equal Source A EmptyString '' Source B Drill2_perm.Descr[1] 'b'
Drill2_perm.OK[1]

Drill2_perm.OK[0] Drill2_perm.OK[1] Drill2_perm.AllOK
Drill2_perm.Bypass

INTLK AND PERM - END
---

4 [NOP]

STATUS - BEGIN

5 [NOP]

6
cyl retracted
LocCyl[3].stsRet
Drill2Axis_Moves[0].AtPos
EQU Equal Source A Drill2_Seq 999 Source B 999
ST03.stsOkToIndex

BIT USE COUNT

7

System Control
System Running All
Sys.Running

0=disabled,1=enabled
ST03.cfgEnabled

Drill2_Stop_999.X

MOV
Move
Source Rec[0].D2.MaxParts
1000
Dest Drill2_ctrBitUse.PRE
1000

CTU
Count Up
Counter Drill2_ctrBitUse
Preset 1000
Accum 583
CU
DN

GRT
Greater Than (A>B)
Source A Drill2_ctrBitUse.PRE
1000
Source B 0

DIV
Divide
Source A Drill2_ctrBitUse.ACC
583
Source B Drill2_ctrBitUse.PRE
1000
Dest Drill2_stsBitUse_pct
0

CPT
Compute
Dest Drill2_stsBitTimeLeft_min
63
Expression ((Drill2_ctrBitUse.PRE- Drill2_ctrBitUse.ACC)* Sys_stsCycleTimeAvg_ms)/60000

Drill2_ocmdResetBitUse Drill2_ONS.20
ONS

Drill2_ocmdResetBitUse
U

Drill2_ctrBitUse
RES

STATUS - END

8

NOP

SEQUENCE CONTROL - BEGIN

9

NOP

CYCLE TIMER

10

System Control
System Running All
Sys.Running

Drill2_SegDone Drill2_ONS.31
ONS

MOV
Move
Source ST03.tmrCycle.ACC
0
Dest ST03.stsCycleTime[0]
10

cycle timer

Drill2_SegDone
/

TON
Timer On Delay
Timer ST03.tmrCycle
Preset 60000
Accum 0
EN
DN

SWITCH TO BACKUP DRILL

11

Drill2_ctrBitUse.DN Drill2_ONS.21
ONS

Drill2_pcmdSwitchToBackup
L

12

Drill2_IntIk.AllOK
/

Drill2_ONS.0
ONS

S:FS

SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900

SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Pause

RESET seq to ready pos logic IF
- interlocks are not met

13

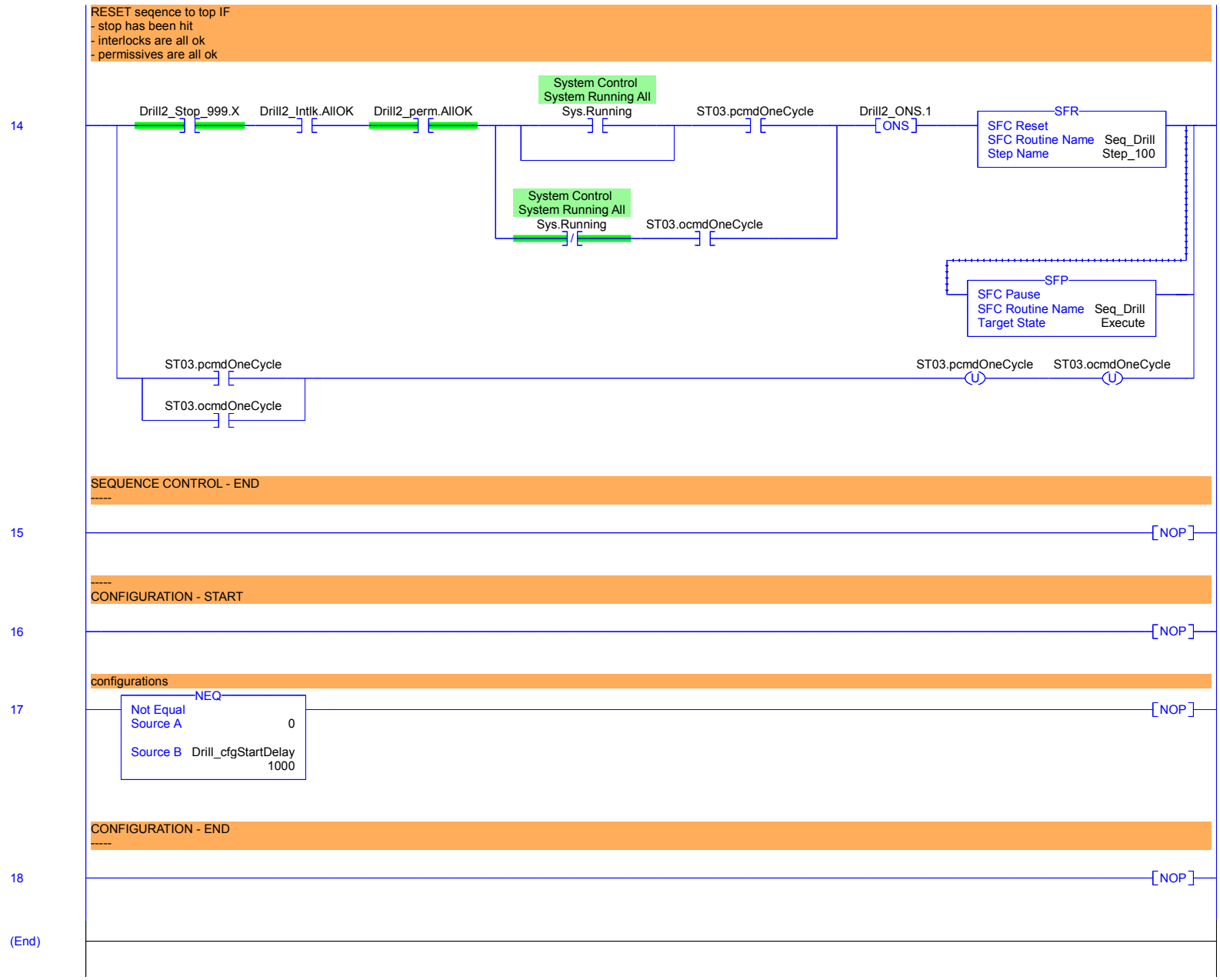
ST03.ocmdGoToReady Drill2_ONS.2
ONS

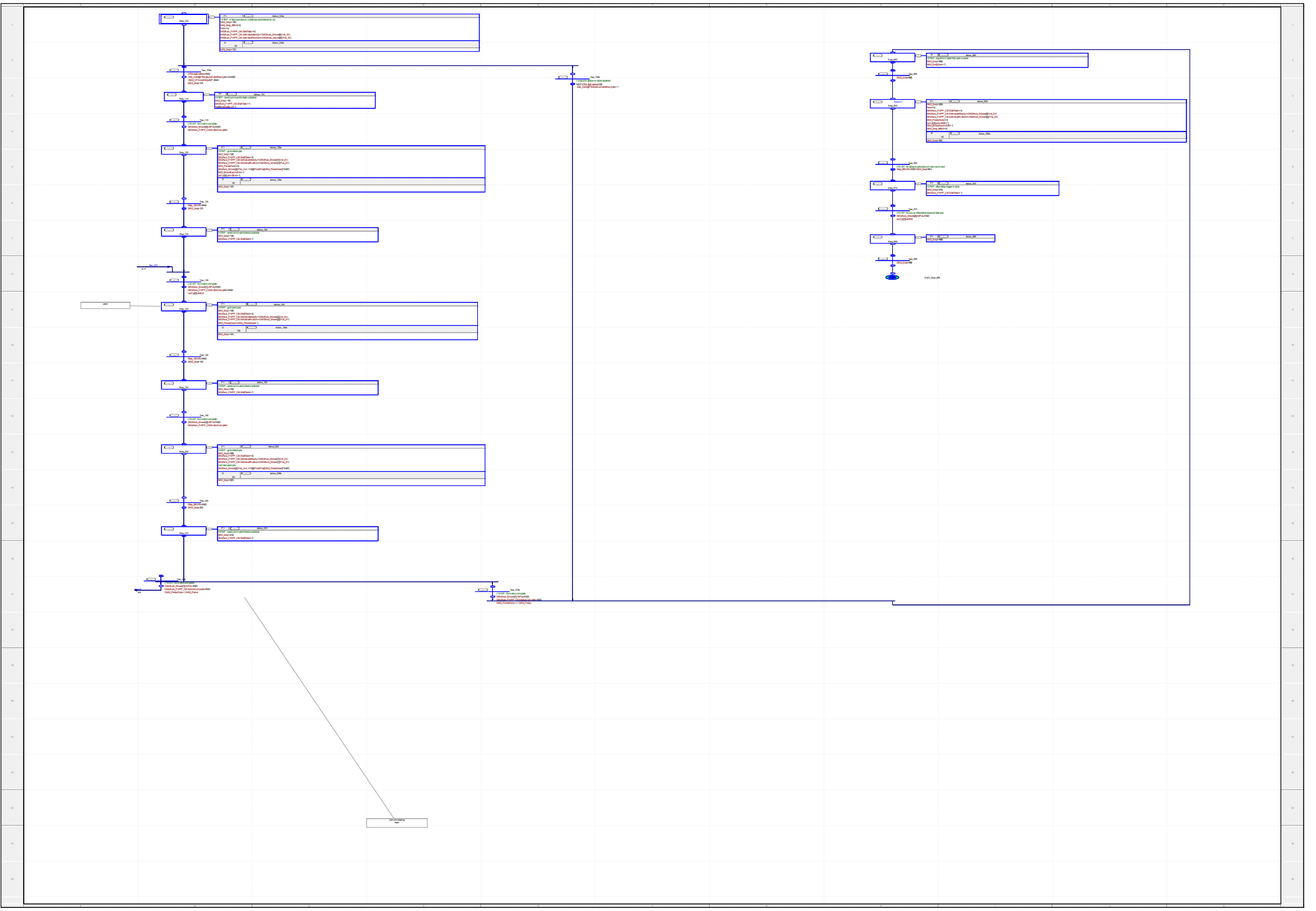
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900

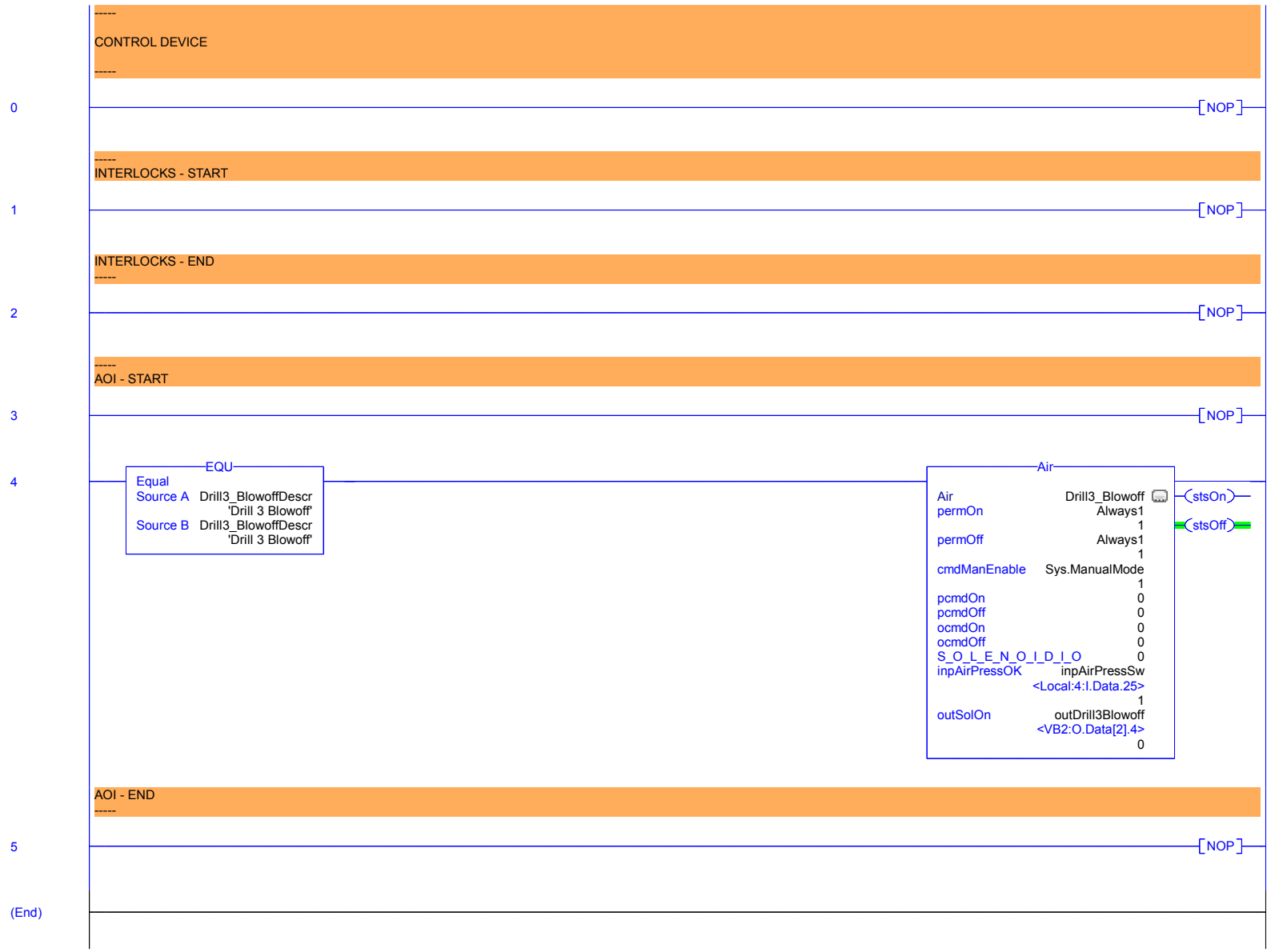
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute

ST03.ocmdGoToReady
U

ST03.ocmdGoToReady


RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok
14
Drill2_Stop_999.X
Drill2_Intlk.AllOK
Drill2_perm.AllOK
System Control
System Running All
Sys.Running
ST03.pcmdOneCycle
Drill2_ONS.1
ONS
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_100
System Control
System Running All
Sys.Running
ST03.ocmdOneCycle
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute
ST03.pcmdOneCycle
ST03.ocmdOneCycle
ST03.pcmdOneCycle
ST03.ocmdOneCycle
U
U
SEQUENCE CONTROL - END
15
NOP
CONFIGURATION - START
16
NOP
configurations
17
NEQ
Not Equal
Source A 0
Source B Drill_cfgStartDelay
1000
NOP
CONFIGURATION - END
18
NOP
(End)




CONTROL DEVICE
0
NOP
INTERLOCKS - START
1
NOP
INTERLOCKS - END
2
NOP
AOI - START
3
NOP
4
EQU
Equal
Source A Drill3_BlowoffDescr
'Drill 3 Blowoff'
Source B Drill3_BlowoffDescr
'Drill 3 Blowoff'
Air
Air Drill3_Blowoff
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outDrill3Blowoff
<VB2:O.Data[2].4>
0
stsOn
stsOff
AOI - END
5
NOP
(End)

CONTROL DEVICE

0

NOP

1

System Control Reset Request
Sys.ResetReq

FHPP control (AOI) SCON B2 Warning Present
Drill3Axis_FHPP_Ctrl.Warning

FHPP control (AOI) SCON B3 Fault Present
Drill3Axis_FHPP_Ctrl.Fault

FHPP control (AOI) CCON B3 Reset Fault=1
Drill3Axis_FHPP_Ctrl.ResetFault

INTERLOCKS - START

2

NOP

SERVO CONTROL BITS

3

FHPP control (AOI) SCON B3 Fault Present
Drill3Axis_FHPP_Ctrl.Fault

System Control Estops OK
Sys.EstopOK

System Control Manual Operating Mode
Sys.ManualMode

Drill3Axis_DynamicsChg

System Control Manual Operating Mode
Sys.ManualMode

Intlks on Move Executing OK
Drill3Axis_Moves[Drill3Axis.stsMoveSel].stsIntlksOK

FHPP control (AOI) CPOS B0 HaltActive=0 HaltNotActive=1
Drill3Axis_FHPP_Ctrl.Halt

Intlks on Move Executing OK
Drill3Axis_Moves[Drill3Axis.stsMoveSel].stsIntlksOK

FHPP control (AOI) CCON B1 Stop Ative = 0 Enable Drive = 1
Drill3Axis_FHPP_Ctrl.Stop

FHPP control (AOI) CCON Mode Select Record=0 Direct Position=1 Direct Pos Energy=13 Direct Pos Cont=17 Direct Force=5 Direct Rot Speed=9

MOV
Move Source 1
Dest Drill3Axis_FHPP_Ctrl.OPM_OperationMode 1

FHPP control (AOI) CCON B0 Enable Drive=1
Drill3Axis_FHPP_Ctrl.Enable

---
jog pos interlocks
- man mode

4

System Control Manual Operating Mode
Sys.ManualMode

Drill3Axis.stsJogPosIntlkOK

---
jog neg interlocks
- man mode
- conv stopped

5

System Control Manual Operating Mode
Sys.ManualMode

Indexing Wheel Control AOI Running Stat
Indx_Conv.Running

Drill3Axis.stsJogNegIntlkOK

INTERLOCKS - END
---

6 NOP

MOVES AOI - START

7 NOP

FestoServoMoves

IAS AOI
used to transfer position commands to FHPP CTRL AOI

8 Drill3Axis:I.RunMode Drill3Axis:I.ConnectionFaulted

FestoServoMoves

FestoServoMoves	Drill3Axis	stsAxisReady
F_E_S_T_O_A_O_I	0	
FHPP_CTRL	Drill3Axis_FHPP_Ctrl	stsMoveDone
Moves	Drill3Axis_Moves	
cfgVelBase_mm_s	960	stsMoveFail
cfgPosMax_mm	103	stsHomeVerif
cfgPosMin_mm	-3	
cfgPosWindow_mm	0.1	
cmdVelFactor_pct	100.0	
cmdManualMode	Sys.ManualMode	
	1	
cmdAutoMoveSel	0	
cmdManMoveSel	1	
cmdJogPos	0	
cmdJogNeg	0	
stsMoveSel	0	
cmdAutoGoToPos	0	
ocmdGoToStartPos	0	
stsSetPos_mm	90.0	
stsActPos_mm	89.999	
stsActPos_in	3.5432677	
stsSetVel_mm_s	50000.0	
stsActVel_mm_s	0.0	
stsActVel_pct	0.0	
stsSeq	0	
stsMoveTime_ms	0	
stsJogPosIntlkOK	1	
stsJogNegIntlkOK	1	

move 0

9 move description — EQU: Equal, Source A Drill3Axis_Moves[0].Descr 'Start', Source B Drill3Axis_Moves[0].Descr 'Start'

move position (mm) — MOV: Move, Source 90, Dest Drill3Axis_Moves[0].Pos_mm 90.0

move velocity (mm/s) — MOV: Move, Source Drill1234_cfgStartVel_mm_s 500, Dest Drill3Axis_Moves[0].Vel_mm_s 500.0

NOP

System Control Estops OK: Sys.EstopOK

Intlks on Move Executing OK: Drill3Axis_Moves[0].stsIntlksOK

Perms on Move Starting OK: Drill3Axis_Moves[0].stsPermsOK

move 1

10 move description — EQU: Equal, Source A Drill3Axis_Moves[1].Descr 'Retract', Source B Drill3Axis_Moves[1].Descr 'Retract'

move position (mm) — EQU: Equal, Source A Drill3Axis_Moves[1].Pos_mm 23.35, Source B Drill3Axis_Moves[1].Pos_mm 23.35

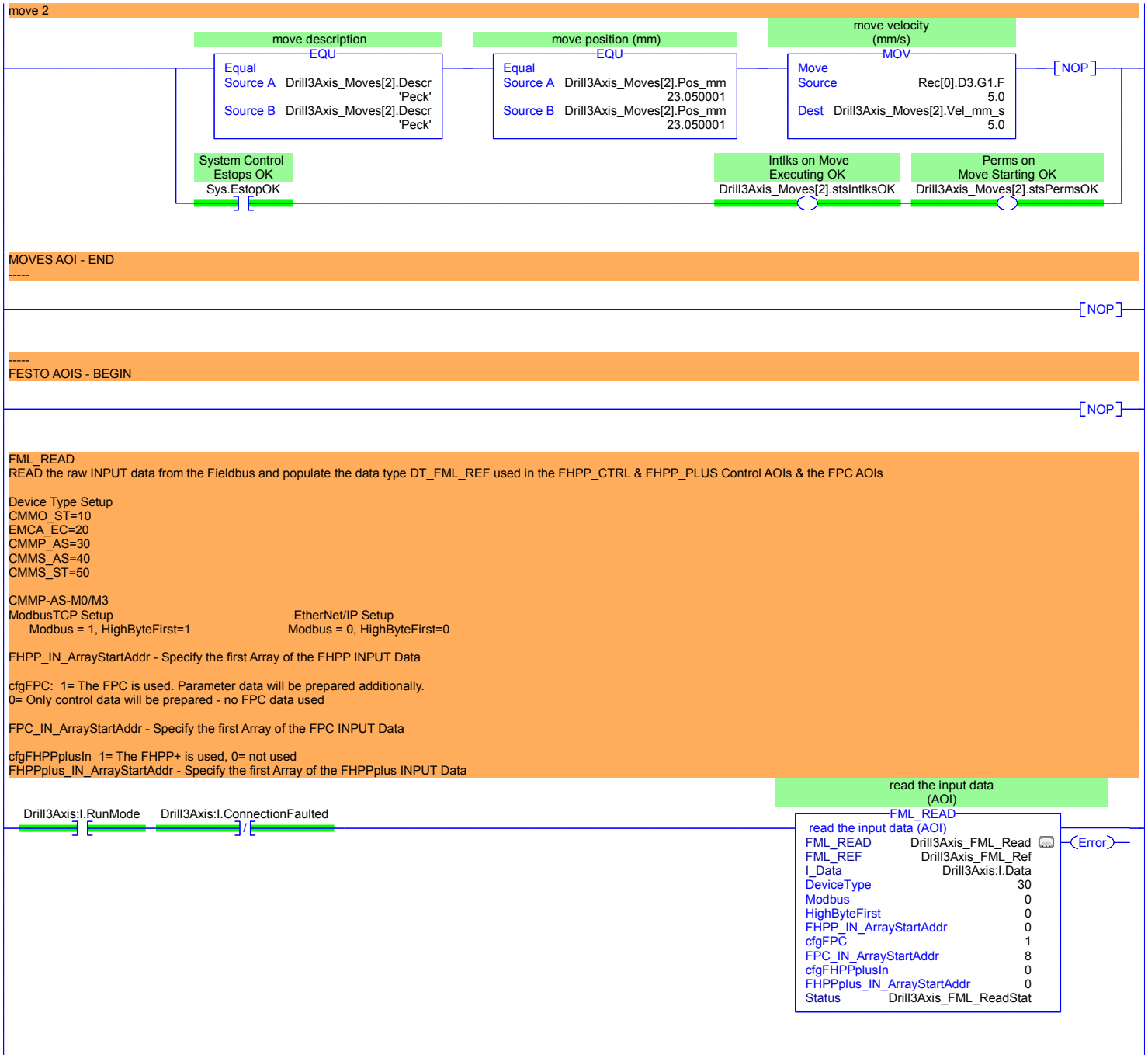
move velocity (mm/s) — MOV: Move, Source Drill1234_cfgRetractVel_mm_s 500, Dest Drill3Axis_Moves[1].Vel_mm_s 500.0

NOP

System Control Estops OK: Sys.EstopOK

Intlks on Move Executing OK: Drill3Axis_Moves[1].stsIntlksOK

Perms on Move Starting OK: Drill3Axis_Moves[1].stsPermsOK


move 2
move description
EQU
Equal
Source A Drill3Axis_Moves[2].Descr 'Peck'
Source B Drill3Axis_Moves[2].Descr 'Peck'
move position (mm)
EQU
Equal
Source A Drill3Axis_Moves[2].Pos_mm 23.050001
Source B Drill3Axis_Moves[2].Pos_mm 23.050001
move velocity (mm/s)
MOV
Move
Source Rec[0].D3.G1.F 5.0
Dest Drill3Axis_Moves[2].Vel_mm_s 5.0
NOP
System Control Estops OK
Sys.EstopOK
Intlks on Move Executing OK
Drill3Axis_Moves[2].stsIntlksOK
Perms on Move Starting OK
Drill3Axis_Moves[2].stsPermsOK
MOVES AOI - END
11
12
NOP
FESTO AOIS - BEGIN
13
FML_READ
READ the raw INPUT data from the Fieldbus and populate the data type DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS Control AOIs & the FPC AOIs
Device Type Setup
CMMO_ST=10
EMCA_EC=20
CMMP_AS=30
CMMS_AS=40
CMMS_ST=50
CMMP-AS-M0/M3
ModbusTCP Setup
Modbus = 1, HighByteFirst=1
EtherNet/IP Setup
Modbus = 0, HighByteFirst=0
FHPP_IN_ArrayStartAddr - Specify the first Array of the FHPP INPUT Data
cfgFPC: 1= The FPC is used. Parameter data will be prepared additionally.
0= Only control data will be prepared - no FPC data used
FPC_IN_ArrayStartAddr - Specify the first Array of the FPC INPUT Data
cfgFHPPplusIn 1= The FHPP+ is used, 0= not used
FHPPplus_IN_ArrayStartAddr - Specify the first Array of the FHPPplus INPUT Data
read the input data (AOI)
FML_READ
read the input data (AOI)
FML_READ Drill3Axis_FML_Read
FML_REF Drill3Axis_FML_Ref
I_Data Drill3Axis:I.Data
DeviceType 30
Modbus 0
HighByteFirst 0
FHPP_IN_ArrayStartAddr 0
cfgFPC 1
FPC_IN_ArrayStartAddr 8
cfgFHPPplusIn 0
FHPPplus_IN_ArrayStartAddr 0
Status Drill3Axis_FML_ReadStat
Error
Drill3Axis:I.RunMode
Drill3Axis:I.ConnectionFaulted
14

FHPP_CTRL

OPM_OperationMode:
Record=0
Direct Position=1
Direct Position Energy=13
Direct Position Continuous=17
Direct Force=5
Direct Rot Speed=9

15

Drill3Axis:I.RunMode Drill3Axis:I.ConnectionFaulted

FHPP control (AOI)

FHPP_CTRL

FHPP control (AOI)		
FHPP_CTRL	Drill3Axis_FHPP_Ctrl	DriveControlByFCT
FML_REF	Drill3Axis_FML_Ref	LoadVoltageApplied
C_o_n_t_r_o_l_A_r_e_a	0	Fault
HMIAccessLocked	0	Warning
BrakeRelease	0	FollowingError
ResetFault	0	HaltActive
OPM_OperationMode	1	DriveEnabled
Halt	1	Ready
Stop	1	HomingValid
Enable	1	AcknowledgeStart
StartHoming	0	AxisIsMoving
StartTask	1	StandstillWarning
JogPositive	0	MotionComplete
JogNegative	0	AcknowledgeTeach
ClearRemainingPosition	0	StrokeLimitReached
TeachActualValue	0	VelocityLimitReached
Relative	0	RecordChainActive
StrokeLimitDisable	0	RecordChainComplete
OPM_OperationState	1	
R_e_c_o_r_d_M_o_d_e_A_c_t_i_v_e	0	
RecordNumber	0	
ActualRecordNumber	0	
D_i_r_e_c_t_M_o_d_e_A_c_t_i_v_e	1	
SetValueVelocity	9	
SetValuePosition	90000	
ActualVelocity	0	
ActualPosition	89998	
SetValueForceRamp	0	
SetValueForce	0	
ActualForce	0	
SetValueRotRamp	0	
SetValueRotSpeed	0	
ActualRotRamp	0	
ActualRotSpeed	0	

FPC_DIRMP
Festo Direct Mode Parameters

Examples:
Velocity: 400000 = 400.00mm (Depends on scaling in FCT)
Acceleration: 4500000 = 4.500 m/s2
Deceleration: 5500000 = 5.500 m/s2

16

Drill3Axis:I.RunMode Drill3Axis:I.ConnectionFaulted

read/write direct mode positioning parameters (AOI)

FPC_DIRMP

read/write direct mode positioning param...		
FPC_DIRMP	Drill3Axis_FPC_DIRMP	Done
FML_REF	Drill3Axis_FML_Ref	Error
Execute	0	
Write	0	
Velocity	960	
Acceleration	7000000	
Deceleration	5000000	
ActVelocity	0	
ActAcceleration	0	
ActDeceleration	0	
Status	Drill3Axis_FPC_DIRMP_Stat	

FML_WRITE
WRITE the OUTPUT data in DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS & the FPC AOIs and populate the Raw OUTPUT data via the Fieldbus

17

Drill3Axis:I.RunMode Drill3Axis:I.ConnectionFaulted

write the output data (AOI)

FML_WRITE

write the output data (AOI)		
FML_WRITE	Drill3Axis_FML_Write	Error
FML_REF	Drill3Axis_FML_Ref	
O_Data	Drill3Axis:O.Data	
FHPP_OUT_ArrayStartAddr	0	
FPC_OUT_ArrayStartAddr	8	
cfgFHPPplusOut	0	
FHPPplus_OUT_ArrayStartAddr	0	
Status	Drill3Axis_FML_WriteStat	

FPC_PNU
Festo Parameter Channel

Used to Read/Write a single parameter to or from the respective motor controller when FPC is configured as used.
PNU = 127 Subindex =2 Value = 1 for store command to Servo

18
Drill3Axis:I.RunMode Drill3Axis:I.ConnectionFaulted
read/write single parameter (AOI)
FPC_PNU
read/write single parameter (AOI)
FPC_PNU Drill3Axis_FPC_PNU
FML_REF Drill3Axis_FML_Ref
Execute 0
Write 1
PNU 127
Subindex 2
Value 1
ActPNU 0
ActSubindex 0
ActValue 0
Status Drill3Axis_FPC_PNU_STATUS
Done
Error

FESTO AOIS - END

19
NOP

PARAMETER STORE LOGIC - START

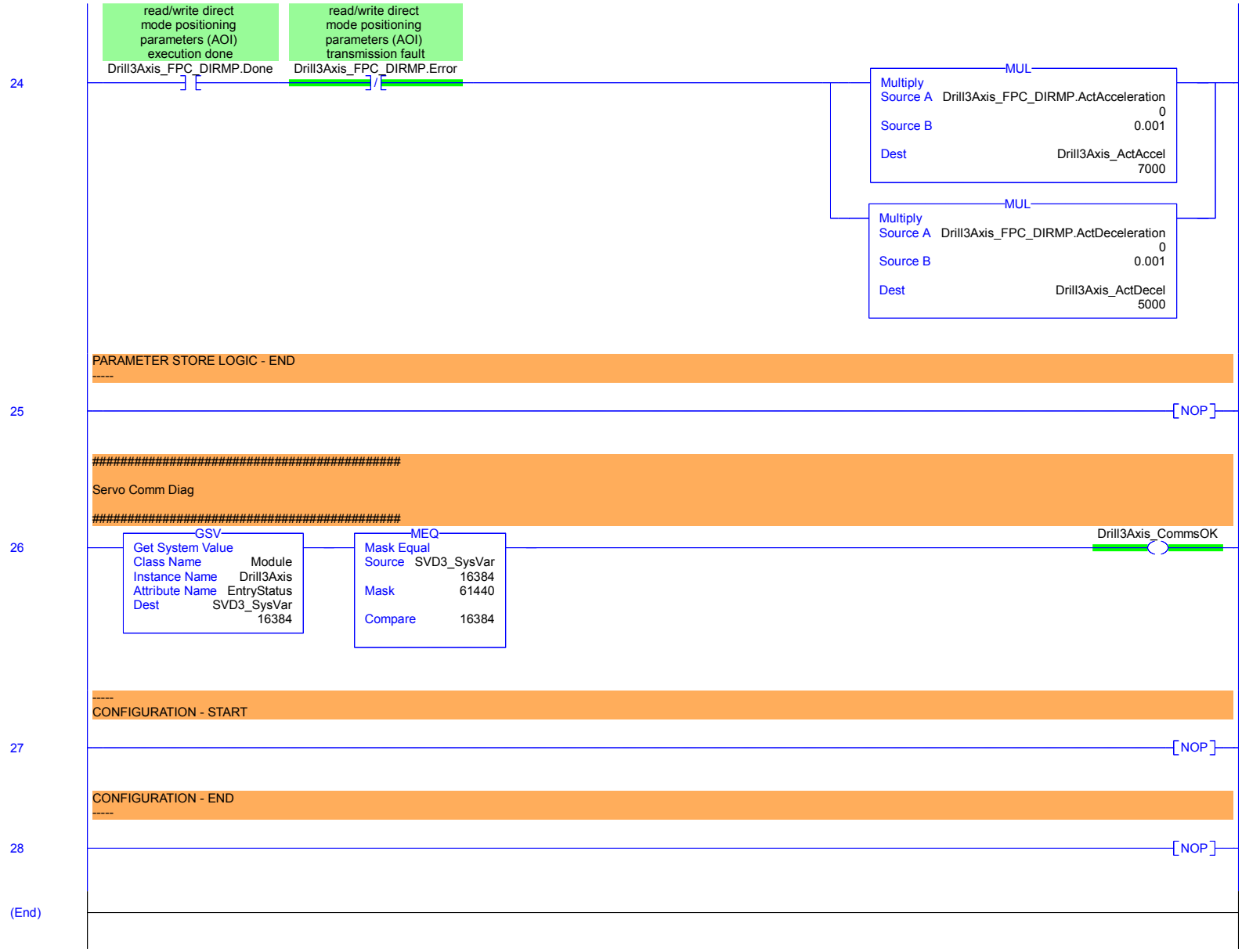
20
NOP

21
Drill3Axis:I.RunMode Drill3Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill3Axis_FHPP_Ctrl.DriveEnabled
Store Servo Parameter
HMI.SVO_ParamStore
read/write single parameter (AOI) perform data exchange
Drill3Axis_FPC_PNU.Execute

22
read/write single parameter (AOI) execution done
Drill3Axis_FPC_PNU.Done
read/write single parameter (AOI) fault occured
Drill3Axis_FPC_PNU.Error
read/write single parameter (AOI) actual number of the parameter
EQU
Equal
Source A Drill3Axis_FPC_PNU.ActPNU
0
Source B 127
read/write single parameter (AOI) actual subindex of the parameter
EQU
Equal
Source A Drill3Axis_FPC_PNU.ActSubindex
0
Source B 2
read/write single parameter (AOI) actual value of the parameter
EQU
Equal
Source A Drill3Axis_FPC_PNU.ActValue
0
Source B 0
Store Servo Parameter Done
HMI.SVO_ParamStoreDn

READ DYNAMIC PARAMETERS AT EACH RUN OF SERVO
WRITE DYNAMICS WITH EACH CHANGE IN DYNAMICS

23
Drill3Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill3Axis_FHPP_Ctrl.DriveEnabled
read/write direct mode positioning parameters (AOI) perform data exchange
Drill3Axis_FPC_DIRMP.Execute
Drill3Axis:I.RunMode ServoONS.3
ONS
Drill3Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) variable to read or write the parameter
Drill3Axis_DynamicsChg
Drill3Axis_FPC_DIRMP.Write


read/write direct mode positioning parameters (AOI) execution done
Drill3Axis_FPC_DIRMP.Done
read/write direct mode positioning parameters (AOI) transmission fault
Drill3Axis_FPC_DIRMP.Error
24
MUL
Multiply
Source A Drill3Axis_FPC_DIRMP.ActAcceleration
0
Source B 0.001
Dest Drill3Axis_ActAccel
7000
MUL
Multiply
Source A Drill3Axis_FPC_DIRMP.ActDeceleration
0
Source B 0.001
Dest Drill3Axis_ActDecel
5000
PARAMETER STORE LOGIC - END
25
NOP
Servo Comm Diag
26
GSV
Get System Value
Class Name Module
Instance Name Drill3Axis
Attribute Name EntryStatus
Dest SVD3_SysVar
16384
MEQ
Mask Equal
Source SVD3_SysVar
16384
Mask 61440
Compare 16384
Drill3Axis_CommsOK
CONFIGURATION - START
27
NOP
CONFIGURATION - END
28
NOP
(End)

CONTROL DEVICE
---

0 NOP

INTERLOCKS AND PERMISSIVES- START

1 NOP

2 Drill3_VFD.stsRunning

TON
Timer On Delay
Timer Drill3_tmrIntlkDelay
Preset 1000
Accum 0
EN
DN

3

System Control Estops OK
Sys.EstopOK
Drill3_RunIntlk.OK[0]

NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[0] '1'

0=disabled,1=enabled
ST04.cfgEnabled
Drill3_RunIntlk.OK[1]

NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[1] '1'

Drill3_VFD.inpVFDReady
Drill3_RunIntlk.OK[2]

NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[2] '1'

drill 1234 vac
outDrill1234VacRun
<Local:6:O.Data.12>
Drill3_RunIntlk.OK[3]

NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[3] '1'

spindel chiller ok
outDrill1234ChillerRun
<Local:6:O.Data.14>
Drill3_RunIntlk.OK[4]

NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[4] '1'

inpDrill3FlowSw
<Local:4:I.Data.23>
Drill3_RunIntlk.OK[5]

NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[5] '1'

Drill1234_AirSeal.stsOn
Drill3_RunIntlk.OK[6]

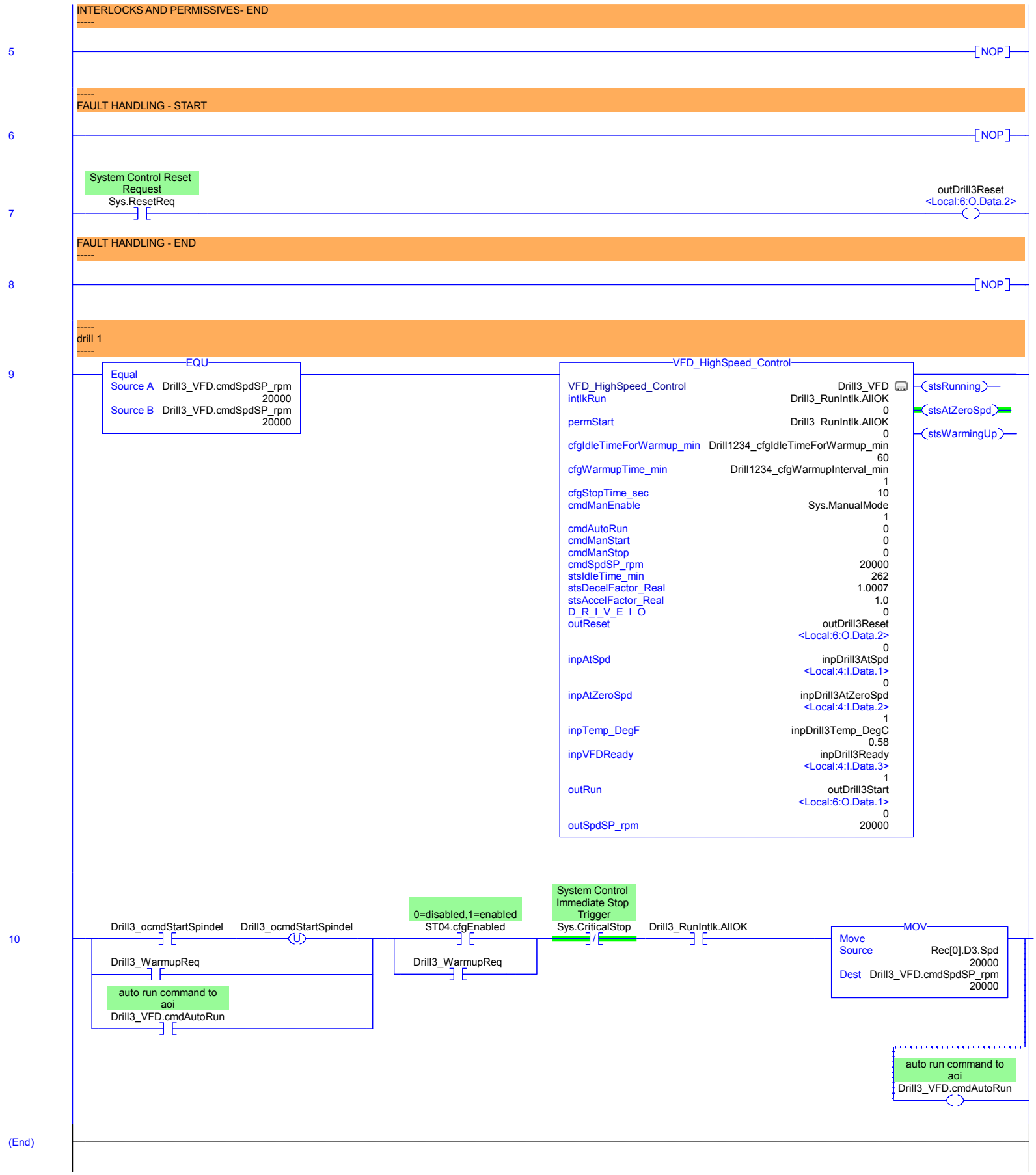
NEQ
Not Equal
Source A EmptyString ""
Source B Drill3_RunIntlk.Descr[6] '1'

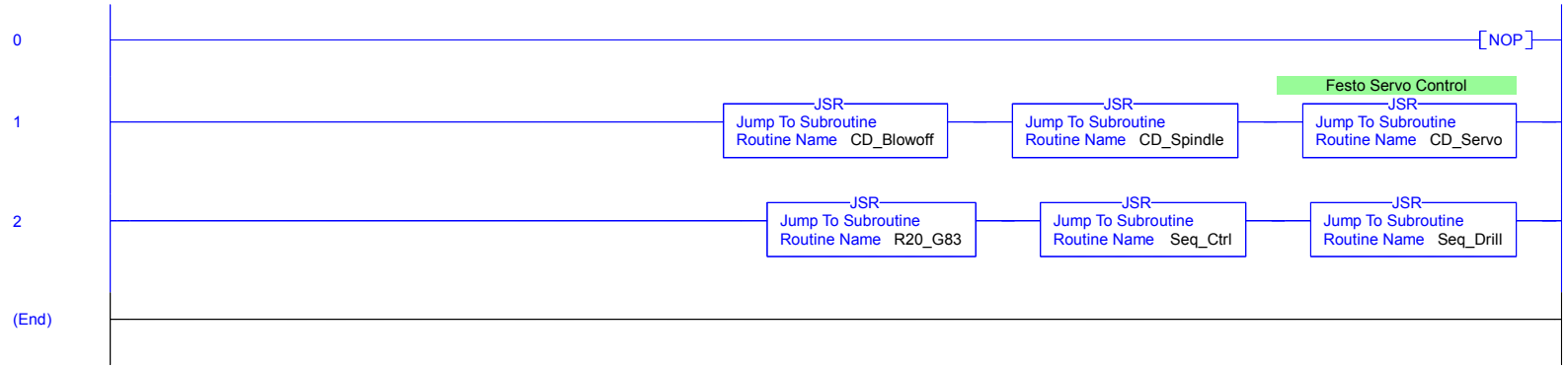
4 Drill3_RunIntlk.OK[0] Drill3_RunIntlk.OK[1] Drill3_RunIntlk.OK[2] Drill3_RunIntlk.OK[3] Drill3_RunIntlk.OK[4] Drill3_RunIntlk.OK[5] Drill3_RunIntlk.OK[6]

Drill3_tmrIntlkDelay.DN

Drill3_RunIntlk.Bypass

Drill3_RunIntlk.AllOK


INTERLOCKS AND PERMISSIVES- END
5
NOP
FAULT HANDLING - START
6
NOP
System Control Reset Request
Sys.ResetReq
outDrill3Reset
<Local:6:O.Data.2>
7
FAULT HANDLING - END
8
NOP
drill 1
9
EQU
Equal
Source A Drill3_VFD.cmdSpdSP_rpm 20000
Source B Drill3_VFD.cmdSpdSP_rpm 20000
VFD_HighSpeed_Control
VFD_HighSpeed_Control Drill3_VFD
intlkRun Drill3_RunIntlk.AllOK 0
permStart Drill3_RunIntlk.AllOK 0
cfgIdleTimeForWarmup_min Drill1234_cfgIdleTimeForWarmup_min 60
cfgWarmupTime_min Drill1234_cfgWarmupInterval_min 1
cfgStopTime_sec 10
cmdManEnable Sys.ManualMode 1
cmdAutoRun 0
cmdManStart 0
cmdManStop 0
cmdSpdSP_rpm 20000
stsIdleTime_min 262
stsDecelFactor_Real 1.0007
stsAccelFactor_Real 1.0
D_R_I_V_E_I_O 0
outReset outDrill3Reset <Local:6:O.Data.2> 0
inpAtSpd inpDrill3AtSpd <Local:4:I.Data.1> 0
inpAtZeroSpd inpDrill3AtZeroSpd <Local:4:I.Data.2> 1
inpTemp_DegF inpDrill3Temp_DegC 0.58
inpVFDReady inpDrill3Ready <Local:4:I.Data.3> 1
outRun outDrill3Start <Local:6:O.Data.1> 0
outSpdSP_rpm 20000
stsRunning
stsAtZeroSpd
stsWarmingUp
10
Drill3_ocmdStartSpindel
Drill3_ocmdStartSpindel
U
Drill3_WarmupReq
auto run command to aoi
Drill3_VFD.cmdAutoRun
0=disabled,1=enabled
ST04.cfgEnabled
Drill3_WarmupReq
System Control Immediate Stop Trigger
Sys.CriticalStop
Drill3_RunIntlk.AllOK
MOV
Move
Source Rec[0].D3.Spd 20000
Dest Drill3_VFD.cmdSpdSP_rpm 20000
auto run command to aoi
Drill3_VFD.cmdAutoRun
(End)


0
NOP
Festo Servo Control
1
JSR
Jump To Subroutine
Routine Name CD_Blowoff
JSR
Jump To Subroutine
Routine Name CD_Spindle
JSR
Jump To Subroutine
Routine Name CD_Servo
2
JSR
Jump To Subroutine
Routine Name R20_G83
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Drill
(End)

G83 calculations Routine
---

0 NOP

STATUS - BEGIN

1 NOP

2
GRT Greater Than (A>B) Source A n -1 Source B -1 → Drill3_stsPosCalcsIP
EQU Equal Source A n -1 Source B -1 → Drill3_stsPosCalcsDN

calculate psotion relative to R

3
how far is drill bit from R position
CPT Compute Dest G[0].DistToR 89998 Expression Drill3Axis_FHPP_Ctrl.ActualPosition

STATUS - END
---

4 NOP

CALCULATION - START

5 NOP

clear peck distance array and peck pos array and peck num found bits
convert G1 from real to dint
convert G2 from real to dint
move counters to initial values

6
Drill3_ocmdCalcPos | Drill3_ONS.10 (ONS) | Drill3_ocmdCalcPos (U)

(mic) distance from R for peck
FLL Fill File Source 0 Dest G[0].PeckDist[0] Length 20

PeckNumFound (U)

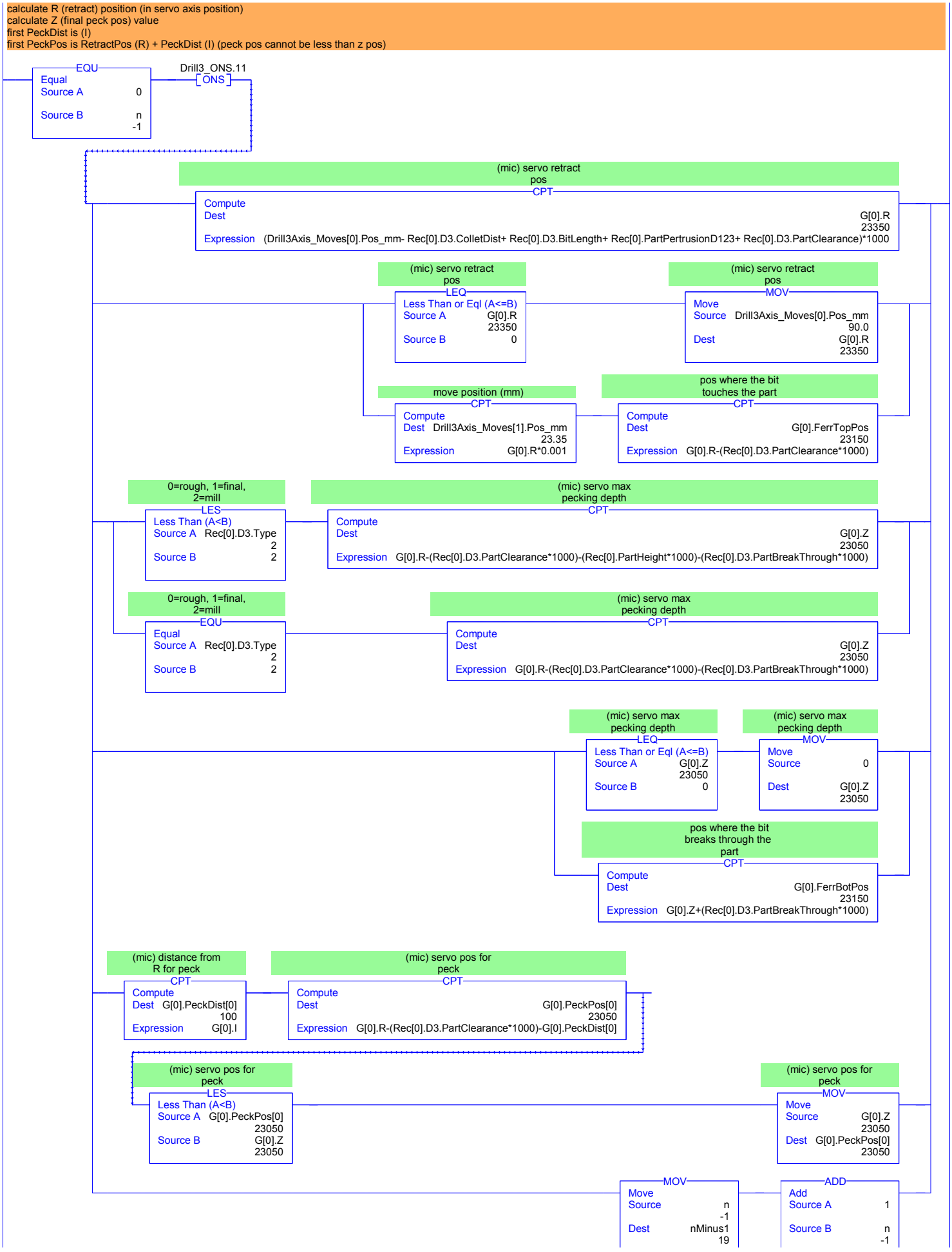
(mic) depth of first peck
MUL Multiply Source A Rec[0].D3.G1.I 0.1 Source B 1000 Dest G[0].I 100

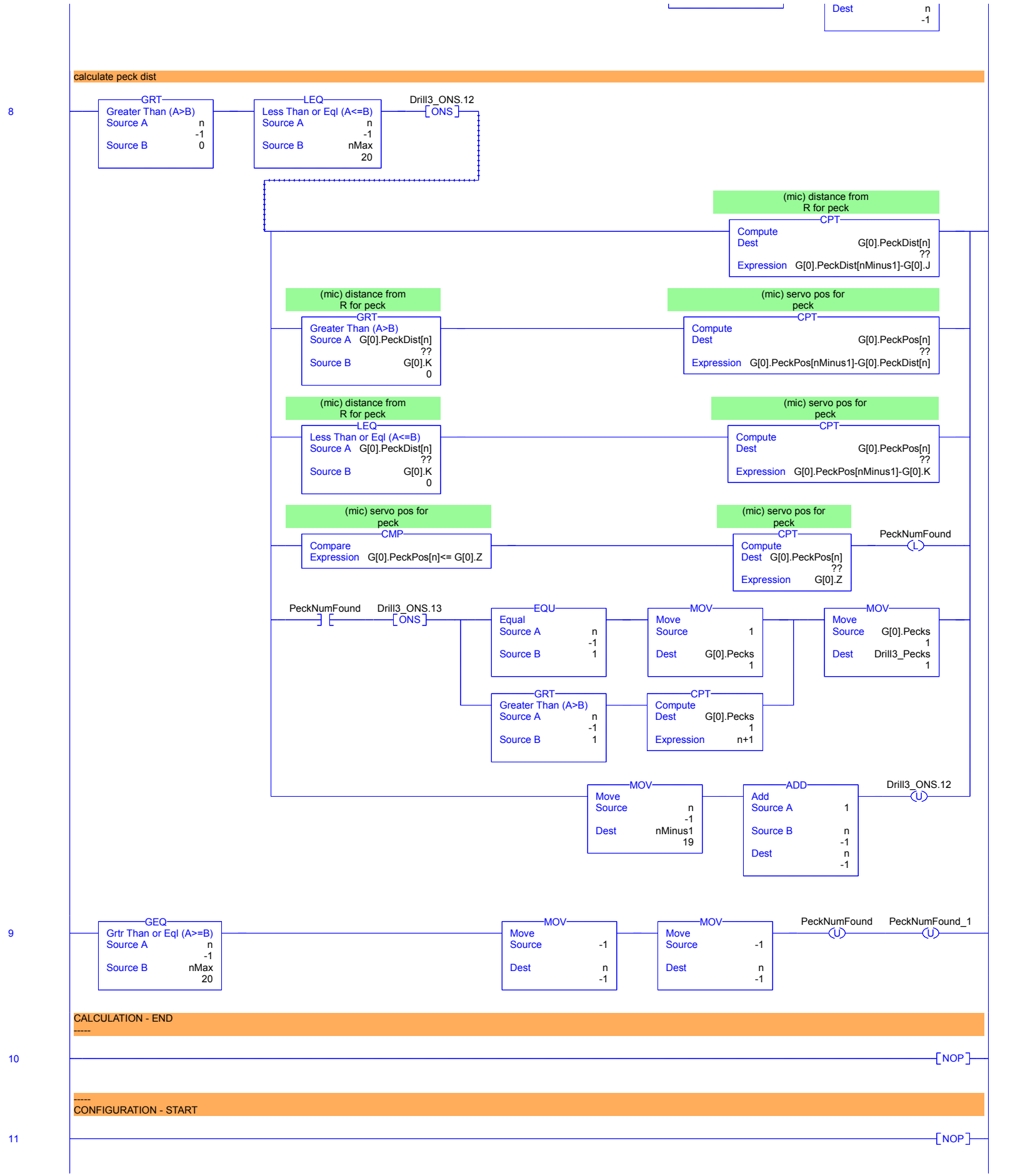
(mic) amount to reduce cutting depth each pass
MUL Multiply Source A Rec[0].D3.G1.J 0.0 Source B 1000 Dest G[0].J 0

(mic) min cut depth
MUL Multiply Source A Rec[0].D3.G1.K 0.0 Source B 1000 Dest G[0].K 0

MOV Move Source 0 Dest n -1

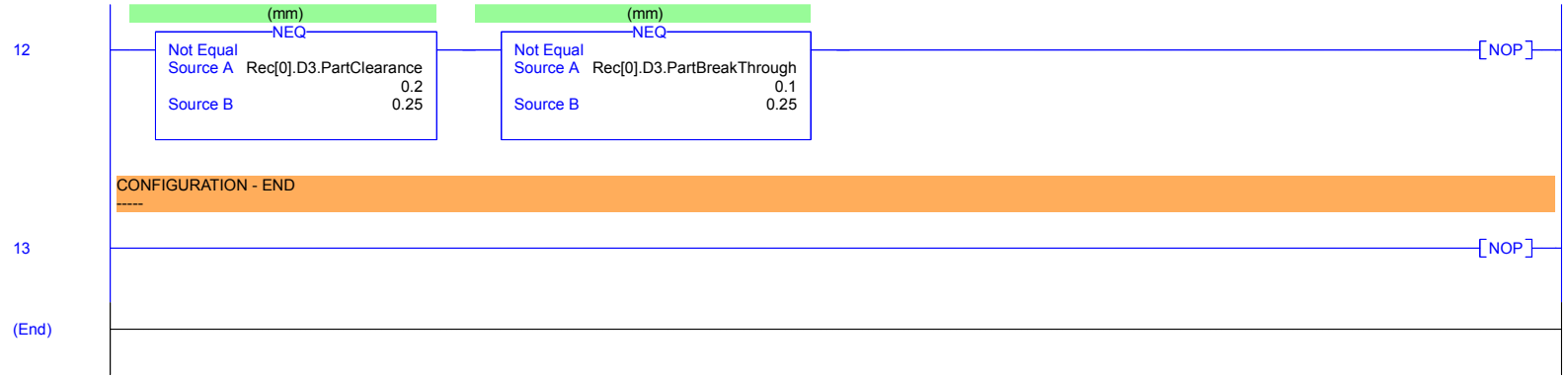
MOV Move Source 0 Dest nMinus1 19


calculate R (retract) position (in servo axis position)
calculate Z (final peck pos) value
first PeckDist is (I)
first PeckPos is RetractPos (R) + PeckDist (I) (peck pos cannot be less than z pos)
7
EQU
Equal
Source A 0
Source B n -1
Drill3_ONS.11
ONS
(mic) servo retract pos
CPT
Compute
Dest G[0].R 23350
Expression (Drill3Axis_Moves[0].Pos_mm- Rec[0].D3.ColletDist+ Rec[0].D3.BitLength+ Rec[0].PartPertrusionD123+ Rec[0].D3.PartClearance)*1000
(mic) servo retract pos
LEQ
Less Than or Eql (A<=B)
Source A G[0].R 23350
Source B 0
(mic) servo retract pos
MOV
Move
Source Drill3Axis_Moves[0].Pos_mm 90.0
Dest G[0].R 23350
move position (mm)
CPT
Compute
Dest Drill3Axis_Moves[1].Pos_mm 23.35
Expression G[0].R*0.001
pos where the bit touches the part
CPT
Compute
Dest G[0].FerrTopPos 23150
Expression G[0].R-(Rec[0].D3.PartClearance*1000)
0=rough, 1=final, 2=mill
LES
Less Than (A<B)
Source A Rec[0].D3.Type 2
Source B 2
(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 23050
Expression G[0].R-(Rec[0].D3.PartClearance*1000)-(Rec[0].PartHeight*1000)-(Rec[0].D3.PartBreakThrough*1000)
0=rough, 1=final, 2=mill
EQU
Equal
Source A Rec[0].D3.Type 2
Source B 2
(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 23050
Expression G[0].R-(Rec[0].D3.PartClearance*1000)-(Rec[0].D3.PartBreakThrough*1000)
(mic) servo max pecking depth
LEQ
Less Than or Eql (A<=B)
Source A G[0].Z 23050
Source B 0
(mic) servo max pecking depth
MOV
Move
Source 0
Dest G[0].Z 23050
pos where the bit breaks through the part
CPT
Compute
Dest G[0].FerrBotPos 23150
Expression G[0].Z+(Rec[0].D3.PartBreakThrough*1000)
(mic) distance from R for peck
CPT
Compute
Dest G[0].PeckDist[0] 100
Expression G[0].I
(mic) servo pos for peck
CPT
Compute
Dest G[0].PeckPos[0] 23050
Expression G[0].R-(Rec[0].D3.PartClearance*1000)-G[0].PeckDist[0]
(mic) servo pos for peck
LES
Less Than (A<B)
Source A G[0].PeckPos[0] 23050
Source B G[0].Z 23050
(mic) servo pos for peck
MOV
Move
Source G[0].Z 23050
Dest G[0].PeckPos[0] 23050
MOV
Move
Source n -1
Dest nMinus1 19
ADD
Add
Source A 1
Source B n -1


Dest n -1
calculate peck dist
8
GRT Greater Than (A>B) Source A n -1 Source B 0
LEQ Less Than or Eql (A<=B) Source A n -1 Source B nMax 20
Drill3_ONS.12 ONS
(mic) distance from R for peck
CPT Compute Dest G[0].PeckDist[n] ?? Expression G[0].PeckDist[nMinus1]-G[0].J
(mic) distance from R for peck
GRT Greater Than (A>B) Source A G[0].PeckDist[n] ?? Source B G[0].K 0
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].PeckPos[nMinus1]-G[0].PeckDist[n]
(mic) distance from R for peck
LEQ Less Than or Eql (A<=B) Source A G[0].PeckDist[n] ?? Source B G[0].K 0
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].PeckPos[nMinus1]-G[0].K
(mic) servo pos for peck
CMP Compare Expression G[0].PeckPos[n]<= G[0].Z
(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].Z
PeckNumFound L
PeckNumFound Drill3_ONS.13 ONS
EQU Equal Source A n -1 Source B 1
MOV Move Source 1 Dest G[0].Pecks 1
MOV Move Source G[0].Pecks 1 Dest Drill3_Pecks 1
GRT Greater Than (A>B) Source A n -1 Source B 1
CPT Compute Dest G[0].Pecks 1 Expression n+1
MOV Move Source n -1 Dest nMinus1 19
ADD Add Source A 1 Source B n -1 Dest n -1
Drill3_ONS.12 U
9
GEQ Grtr Than or Eql (A>=B) Source A n -1 Source B nMax 20
MOV Move Source -1 Dest n -1
MOV Move Source -1 Dest n -1
PeckNumFound U
PeckNumFound_1 U
CALCULATION - END

10
NOP

CONFIGURATION - START
11
NOP


12
(mm)
NEQ
Not Equal
Source A Rec[0].D3.PartClearance
0.2
Source B 0.25
(mm)
NEQ
Not Equal
Source A Rec[0].D3.PartBreakThrough
0.1
Source B 0.25
NOP
CONFIGURATION - END
13
NOP
(End)

Drill3 routine
---

0 NOP

INTLK AND PERM - BEGIN

1 NOP

Auto interlocks - if one of these is lost then machine is stopped immediately

2
NEQ Not Equal Source A EmptyString "" Source B Drill3_Intlk.Descr[0] 'a'
System Control Immediate Stop Trigger Sys.CriticalStop
Drill3_Intlk.OK[0]
NEQ Not Equal Source A EmptyString "" Source B Drill3_Intlk.Descr[1] 'b'
System Control Manual Operating Mode Sys.ManualMode Sys_tmrPwrOn.DN Drill3_Intlk.OK[1]
Drill3_Intlk.OK[0] Drill3_Intlk.OK[1] Drill3_Intlk.AllOK
Drill3_Intlk.Bypass

permissives - these have to be true for auto mode to be started

3
NEQ Not Equal Source A EmptyString "" Source B Drill3_perm.Descr[0] 'a'
System Control Normal Stop Trigger Sys.NormalStop
Drill3_perm.OK[0]
NEQ Not Equal Source A EmptyString "" Source B Drill3_perm.Descr[1] 'b'
0=disabled,1=enabled ST04.cfgEnabled
Drill3_perm.OK[1]
Drill3_perm.OK[0] Drill3_perm.OK[1] Drill3_perm.AllOK
Drill3_perm.Bypass

INTLK AND PERM - END
---

4 NOP

STATUS - BEGIN

5 NOP

6
cyl retracted LocCyl[4].stsRet Drill3Axis_Moves[0].AtPos
EQU Equal Source A Drill3_Seq 999 Source B 999
ST04.stsOkToIndex

BIT USE COUNT

7

System Control
System Running All
Sys.Running

0=disabled,1=enabled
ST04.cfgEnabled

Drill3_Stop_999.X

MOV
Move
Source Rec[0].D3.MaxParts
1000
Dest Drill3_ctrBitUse.PRE
1000

CTU
Count Up
Counter Drill3_ctrBitUse
Preset 1000
Accum 774
CU
DN

GRT
Greater Than (A>B)
Source A Drill3_ctrBitUse.PRE
1000
Source B 0

DIV
Divide
Source A Drill3_ctrBitUse.ACC
774
Source B Drill3_ctrBitUse.PRE
1000
Dest Drill3_stsBitUse_pct
0

CPT
Compute
Dest Drill3_stsBitTimeLeft_min
34
Expression ((Drill3_ctrBitUse.PRE- Drill3_ctrBitUse.ACC)* Sys_stsCycleTimeAvg_ms)/60000

Drill3_ocmdResetBitUse Drill3_ONS.20 ONS

Drill3_ocmdResetBitUse U

Drill3_ctrBitUse RES

STATUS - END

8

NOP

SEQUENCE CONTROL - BEGIN

9

NOP

CYCLE TIMER

10

System Control
System Running All
Sys.Running

Drill3_SegDone Drill3_ONS.31 ONS

MOV
Move
Source ST04.tmrCycle.ACC
0
Dest ST04.stsCycleTime[0]
9

Drill3_SegDone /

cycle timer
TON
Timer On Delay
Timer ST04.tmrCycle
Preset 60000
Accum 0
EN
DN

SWITCH TO BACKUP DRILL

11

Drill3_ctrBitUse.DN Drill3_ONS.21 ONS

Drill3_pcmdSwitchToBackup L

12

Drill3_Intlk.AllOK /

S:FS

Drill3_ONS.0 ONS

SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900

SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Pause

RESET seq to ready pos logic IF
- interlocks are not met

13

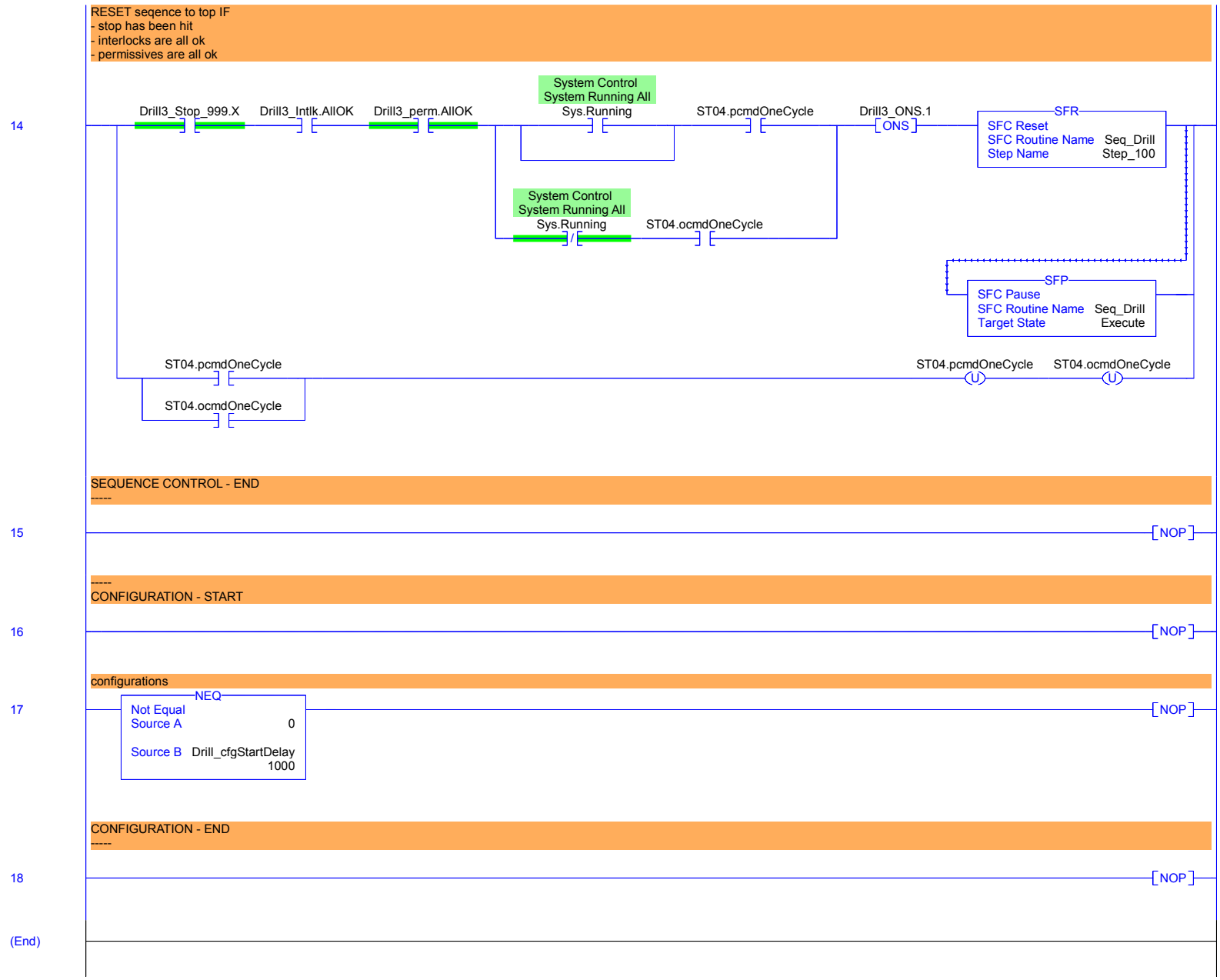
ST04.ocmdGoToReady Drill3_ONS.2 ONS

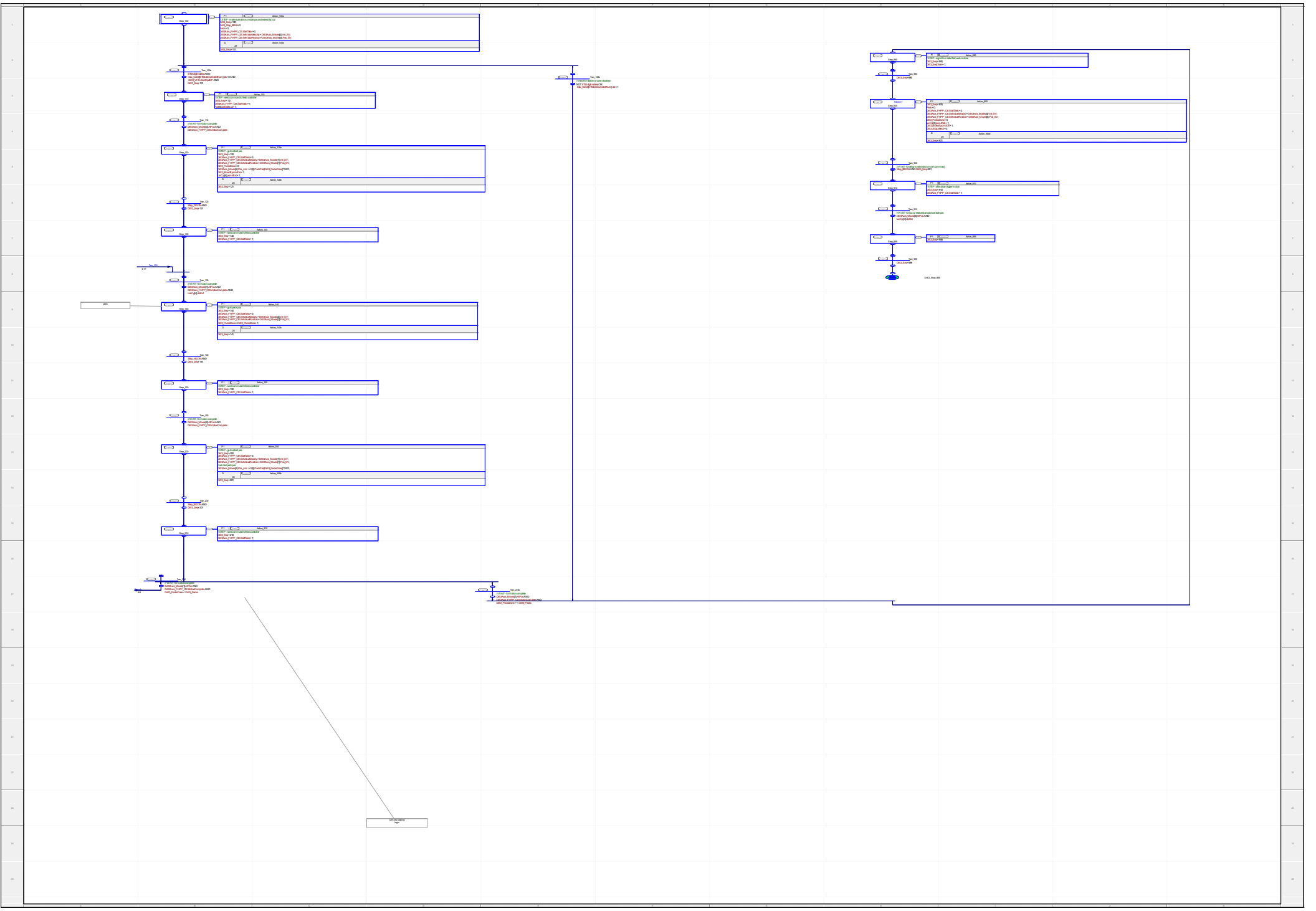
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900

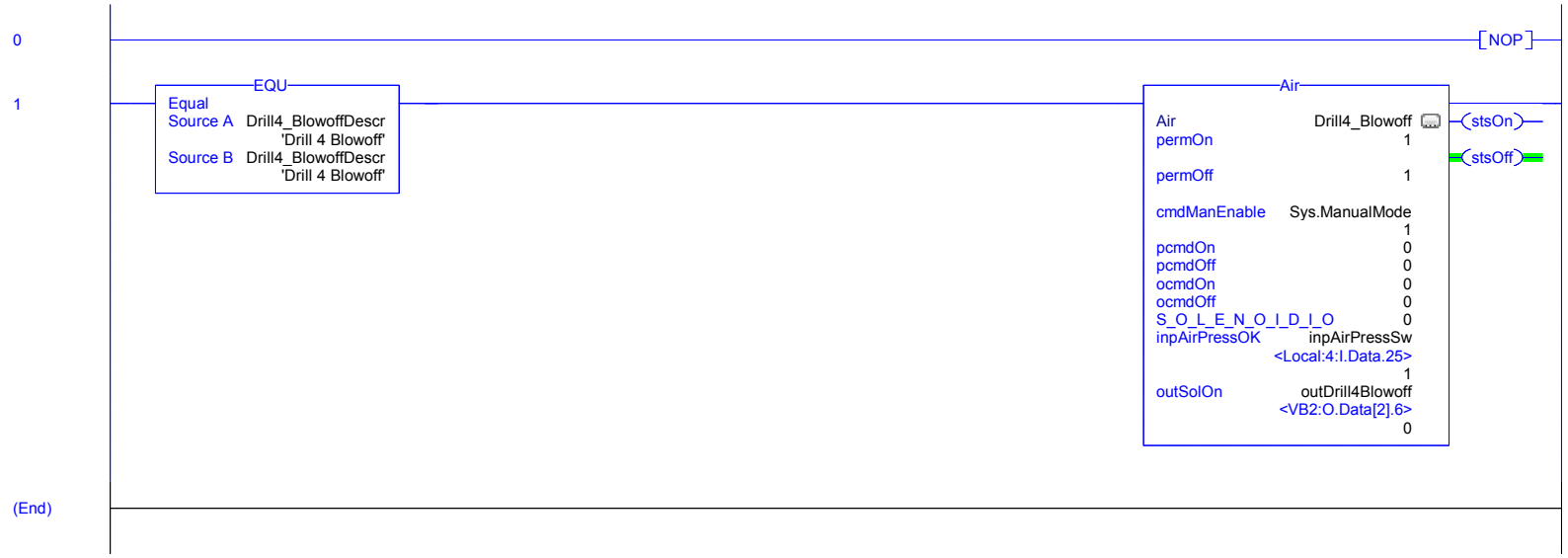
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute

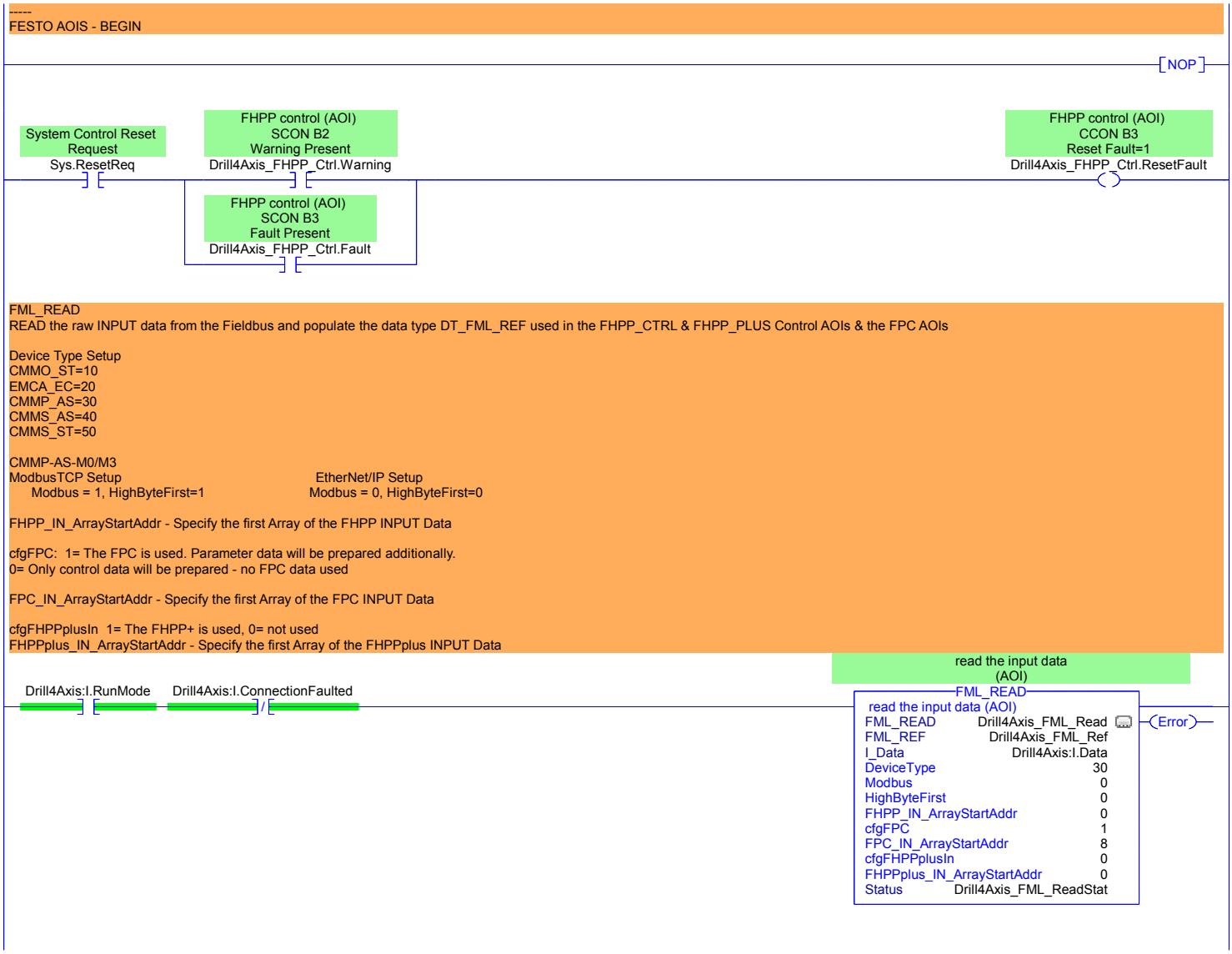
ST04.ocmdGoToReady

ST04.ocmdGoToReady U


RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok
14
Drill3_Stop_999.X
Drill3_Intlk.AllOK
Drill3_perm.AllOK
System Control
System Running All
Sys.Running
ST04.pcmdOneCycle
Drill3_ONS.1
ONS
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_100
System Control
System Running All
Sys.Running
ST04.ocmdOneCycle
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute
ST04.pcmdOneCycle
ST04.ocmdOneCycle
ST04.pcmdOneCycle
ST04.ocmdOneCycle
U
U
SEQUENCE CONTROL - END
15
NOP
CONFIGURATION - START
16
NOP
configurations
17
NEQ
Not Equal
Source A 0
Source B Drill_cfgStartDelay
1000
NOP
CONFIGURATION - END
18
NOP
(End)




0
NOP
1
EQU
Equal
Source A Drill4_BlowoffDescr
'Drill 4 Blowoff'
Source B Drill4_BlowoffDescr
'Drill 4 Blowoff'
Air
Air Drill4_Blowoff
permOn 1
permOff 1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outDrill4Blowoff
<VB2:O.Data[2].6>
0
stsOn
stsOff
(End)


FESTO AOIS - BEGIN
0
NOP
System Control Reset Request
Sys.ResetReq
FHPP control (AOI) SCON B2 Warning Present
Drill4Axis_FHPP_Ctrl.Warning
FHPP control (AOI) SCON B3 Fault Present
Drill4Axis_FHPP_Ctrl.Fault
FHPP control (AOI) CCON B3 Reset Fault=1
Drill4Axis_FHPP_Ctrl.ResetFault
1
FML_READ
READ the raw INPUT data from the Fieldbus and populate the data type DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS Control AOIs & the FPC AOIs
Device Type Setup
CMMO_ST=10
EMCA_EC=20
CMMP_AS=30
CMMS_AS=40
CMMS_ST=50
CMMP-AS-M0/M3
ModbusTCP Setup
Modbus = 1, HighByteFirst=1
EtherNet/IP Setup
Modbus = 0, HighByteFirst=0
FHPP_IN_ArrayStartAddr - Specify the first Array of the FHPP INPUT Data
cfgFPC: 1= The FPC is used. Parameter data will be prepared additionally.
0= Only control data will be prepared - no FPC data used
FPC_IN_ArrayStartAddr - Specify the first Array of the FPC INPUT Data
cfgFHPPplusIn 1= The FHPP+ is used, 0= not used
FHPPplus_IN_ArrayStartAddr - Specify the first Array of the FHPPplus INPUT Data
2
Drill4Axis:I.RunMode
Drill4Axis:I.ConnectionFaulted
read the input data (AOI)
FML_READ
read the input data (AOI)
FML_READ Drill4Axis_FML_Read
FML_REF Drill4Axis_FML_Ref
I_Data Drill4Axis:I.Data
DeviceType 30
Modbus 0
HighByteFirst 0
FHPP_IN_ArrayStartAddr 0
cfgFPC 1
FPC_IN_ArrayStartAddr 8
cfgFHPPplusIn 0
FHPPplus_IN_ArrayStartAddr 0
Status Drill4Axis_FML_ReadStat
Error

FHPP_CTRL

OPM_OperationMode:
Record=0
Direct Position=1
Direct Position Energy=13
Direct Position Continuous=17
Direct Force=5
Direct Rot Speed=9

3

Drill4Axis:I.RunMode Drill4Axis:I.ConnectionFaulted

FHPP control (AOI)

FHPP_CTRL

FHPP control (AOI)		
FHPP_CTRL	Drill4Axis_FHPP_Ctrl	DriveControlByFCT
FML_REF	Drill4Axis_FML_Ref	LoadVoltageApplied
C_o_n_t_r_o_l_A_r_e_a	0	Fault
HMIAccessLocked	0	Warning
BrakeRelease	0	FollowingError
ResetFault	0	HaltActive
OPM_OperationMode	1	DriveEnabled
Halt	1	Ready
Stop	1	HomingValid
Enable	1	AcknowledgeStart
StartHoming	0	AxisIsMoving
StartTask	1	StandstillWarning
JogPositive	0	MotionComplete
JogNegative	0	AcknowledgeTeach
ClearRemainingPosition	0	StrokeLimitReached
TeachActualValue	0	VelocityLimitReached
Relative	0	RecordChainActive
StrokeLimitDisable	0	RecordChainComplete
OPM_OperationState	1	
R_e_c_o_r_d_M_o_d_e_A_c_t_i_v_e	0	
RecordNumber	0	
ActualRecordNumber	0	
D_i_r_e_c_t_M_o_d_e_A_c_t_i_v_e	1	
SetValueVelocity	88	
SetValuePosition	90000	
ActualVelocity	0	
ActualPosition	90001	
SetValueForceRamp	0	
SetValueForce	0	
ActualForce	0	
SetValueRotRamp	0	
SetValueRotSpeed	0	
ActualRotRamp	0	
ActualRotSpeed	0	

FestoServoMoves

IAS AOI
used to transfer position commands to FHPP CTRL AOI

4

Drill4Axis:I.RunMode Drill4Axis:I.ConnectionFaulted

FestoServoMoves

FestoServoMoves	Drill4Axis	stsAxisReady
F_E_S_T_O_A_O_I	0	
FHPP_CTRL	Drill4Axis_FHPP_Ctrl	stsMoveDone
Moves	Drill4Axis_Moves	
cfgVelBase_mm_s	960	stsMoveFail
cfgPosMax_mm	101	stsHomeVerif
cfgPosMin_mm	-1	
cfgPosWindow_mm	0.1	
cmdVelFactor_pct	100.0	
cmdManualMode	Sys.ManualMode	
	1	
cmdAutoMoveSel	0	
cmdManMoveSel	1	
cmdJogPos	0	
cmdJogNeg	0	
stsMoveSel	0	
cmdAutoGoToPos	0	
ocmdGoToStartPos	0	
stsSetPos_mm	90.0	
stsActPos_mm	90.001	
stsActPos_in	3.5433464	
stsSetVel_mm_s	50000.0	
stsActVel_mm_s	0.0	
stsActVel_pct	0.0	
stsSeq	0	
stsMoveTime_ms	0	
stsJogPosIntlkOK	0	
stsJogNegIntlkOK	0	

SERVO CONTROL BITS

5

FHPP control (AOI) SCON B3 Fault Present — Drill4Axis_FHPP_Ctrl.Fault
System Control Estops OK — Sys.EstopOK
System Control Manual Operating Mode — Sys.ManualMode
Drill4Axis_DynamicsChg
System Control Manual Operating Mode — Sys.ManualMode
FHPP control (AOI) CPOS B0 HaltActive=0 HaltNotActive=1 — Drill4Axis_FHPP_Ctrl.Halt
FHPP control (AOI) CCON B1 Stop Ative = 0 Enable Drive = 1 — Drill4Axis_FHPP_Ctrl.Stop
FHPP control (AOI) CCON Mode Select Record=0 Direct Position=1 Direct Pos Energy=13 Direct Pos Cont=17 Direct Force=5 Direct Rot Speed=9

MOV
Move Source 1
Dest Drill4Axis_FHPP_Ctrl.OPM_OperationMode 1

FHPP control (AOI) CCON B0 Enable Drive=1 — Drill4Axis_FHPP_Ctrl.Enable

FPC_DIRMP
Festo Direct Mode Parameters

Examples:
Velocity: 400000 = 400.00mm (Depends on scaling in FCT)
Acceleration: 4500000 = 4.500 m/s2
Deceleration: 5500000 = 5.500 m/s2

6

Drill4Axis:I.RunMode
Drill4Axis:I.ConnectionFaulted

read/write direct mode positioning parameters (AOI)

FPC_DIRMP
read/write direct mode positioning param...
FPC_DIRMP Drill4Axis_FPC_DIRMP
FML_REF Drill4Axis_FML_Ref
Execute 0
Write 0
Velocity 960
Acceleration 7000000
Deceleration 5000000
ActVelocity 0
ActAcceleration 0
ActDeceleration 0
Status Dril1Axis_FPC_DIRMP_Stat
(Done)
(Error)

FML_WRITE
WRITE the OUTPUT data in DT_FML_REF used in the FHPP_CTRL & FHPP_PLUS & the FPC AOIs and populate the Raw OUTPUT data via the Fieldbus

7

Drill4Axis:I.RunMode
Drill4Axis:I.ConnectionFaulted

write the output data (AOI)

FML_WRITE
write the output data (AOI)
FML_WRITE Drill4Axis_FML_Write
FML_REF Drill4Axis_FML_Ref
O_Data Drill4Axis:O.Data
FHPP_OUT_ArrayStartAddr 0
FPC_OUT_ArrayStartAddr 8
cfgFHPPplusOut 0
FHPPplus_OUT_ArrayStartAddr 0
Status Drill4Axis_FML_WriteStat
(Error)

FPC_PNU
Festo Parameter Channel

Used to Read/Write a single parameter to or from the respective motor controller when FPC is configured as used.
PNU = 127 Subindex =2 Value = 1 for store command to Servo

8
Drill4Axis:I.RunMode Drill4Axis:I.ConnectionFaulted
read/write single parameter (AOI)
FPC_PNU
read/write single parameter (AOI)
FPC_PNU Drill4Axis_FPC_PNU
FML_REF Drill4Axis_FML_Ref
Execute 0
Write 1
PNU 127
Subindex 2
Value 1
ActPNU 0
ActSubindex 0
ActValue 0
Status Drill4Axis_FPC_PNU_STATUS
Done
Error

9
Drill4Axis:I.RunMode Drill4Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill4Axis_FHPP_Ctrl.DriveEnabled
Store Servo Parameter
HMI.SVO_ParamStore
read/write single parameter (AOI) perform data exchange
Drill4Axis_FPC_PNU.Execute

10
read/write single parameter (AOI) execution done
Drill4Axis_FPC_PNU.Done
read/write single parameter (AOI) fault occured
Drill4Axis_FPC_PNU.Error
read/write single parameter (AOI) actual number of the parameter
EQU
Equal
Source A Drill4Axis_FPC_PNU.ActPNU
0
Source B 127
read/write single parameter (AOI) actual subindex of the parameter
EQU
Equal
Source A Drill4Axis_FPC_PNU.ActSubindex
0
Source B 2
read/write single parameter (AOI) actual value of the parameter
EQU
Equal
Source A Drill4Axis_FPC_PNU.ActValue
0
Source B 0
Store Servo Parameter Done
HMI.SVO_ParamStoreDn

READ DYNAMIC PARAMETERS AT EACH RUN OF SERVO
WRITE DYNAMICS WITH EACH CHANGE IN DYNAMICS

11
Drill4Axis:I.ConnectionFaulted
FHPP control (AOI) SCON B0 Drive Enabled=1
Drill4Axis_FHPP_Ctrl.DriveEnabled
read/write direct mode positioning parameters (AOI) perform data exchange
Drill4Axis_FPC_DIRMP.Execute
Drill4Axis:I.RunMode ServoONS.1
ONS
Drill4Axis_DynamicsChg
read/write direct mode positioning parameters (AOI) variable to read or write the parameter
Drill4Axis_FPC_DIRMP.Write
Drill4Axis_DynamicsChg

12
read/write direct mode positioning parameters (AOI) execution done
Drill4Axis_FPC_DIRMP.Done
read/write direct mode positioning parameters (AOI) transmission fault
Drill4Axis_FPC_DIRMP.Error
MUL
Multiply
Source A Drill4Axis_FPC_DIRMP.ActAcceleration
0
Source B 0.001
Dest Drill4Axis_ActAccel
7000
MUL
Multiply
Source A Drill4Axis_FPC_DIRMP.ActDeceleration
0
Source B 0.001
Dest Drill4Axis_ActDecel
5000

SERVO IS READY FOR OPERATIONS

13
FHPP control (AOI) SPOS B2 Motion Complete: Drill4Axis_FHPP_Ctrl.MotionComplete
FHPP control (AOI) SPOS B7 Drive is Referenced/Homed: Drill4Axis_FHPP_Ctrl.HomingValid
FHPP control (AOI) SCON B0 Drive Enabled=1: Drill4Axis_FHPP_Ctrl.DriveEnabled
FHPP control (AOI) SCON B1 Ready=1 Not Ready=0: Drill4Axis_FHPP_Ctrl.Ready
SERVO4_Ready

FESTO AOIS - END

14
NOP

##
Servo Comm Diag
##

15
GSV
Get System Value
Class Name: Module
Instance Name: Drill4Axis
Attribute Name: EntryStatus
Dest: SVD4_SysVar 16384

MEQ
Mask Equal
Source: SVD4_SysVar 16384
Mask: 61440
Compare: 16384

Drill4Axis_CommsOK

CONFIGURATION - START

16
NOP

---
manual moves

17
NOP

move 0

18
move description
EQU
Equal
Source A: Drill4Axis_Moves[0].Descr 'Start'
Source B: Drill4Axis_Moves[0].Descr 'Start'

move position (mm)
MOV
Move
Source: 90
Dest: Drill4Axis_Moves[0].Pos_mm 90.0

move velocity (mm/s)
MOV
Move
Source: Drill1234_cfgStartVel_mm_s 500
Dest: Drill4Axis_Moves[0].Vel_mm_s 500.0

NOP

System Control Estops OK: Sys.EstopOK
Intlks on Move Executing OK: Drill4Axis_Moves[0].stsIntlksOK
Perms on Move Starting OK: Drill4Axis_Moves[0].stsPermsOK

move 1

19
move description
EQU
Equal
Source A: Drill4Axis_Moves[1].Descr 'Retract'
Source B: Drill4Axis_Moves[1].Descr 'Retract'

move position (mm)
EQU
Equal
Source A: Drill4Axis_Moves[1].Pos_mm 18.660002
Source B: Drill4Axis_Moves[1].Pos_mm 18.660002

move velocity (mm/s)
MOV
Move
Source: Drill1234_cfgRetractVel_mm_s 500
Dest: Drill4Axis_Moves[1].Vel_mm_s 500.0

System Control Estops OK: Sys.EstopOK
Intlks on Move Executing OK: Drill4Axis_Moves[1].stsIntlksOK
Perms on Move Starting OK: Drill4Axis_Moves[1].stsPermsOK

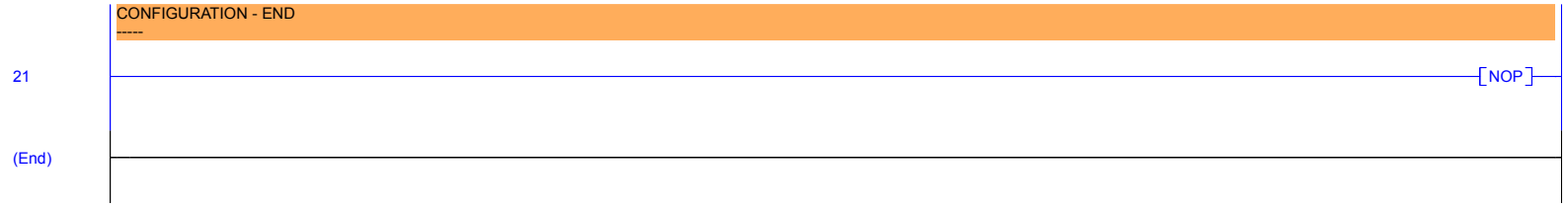
move 2

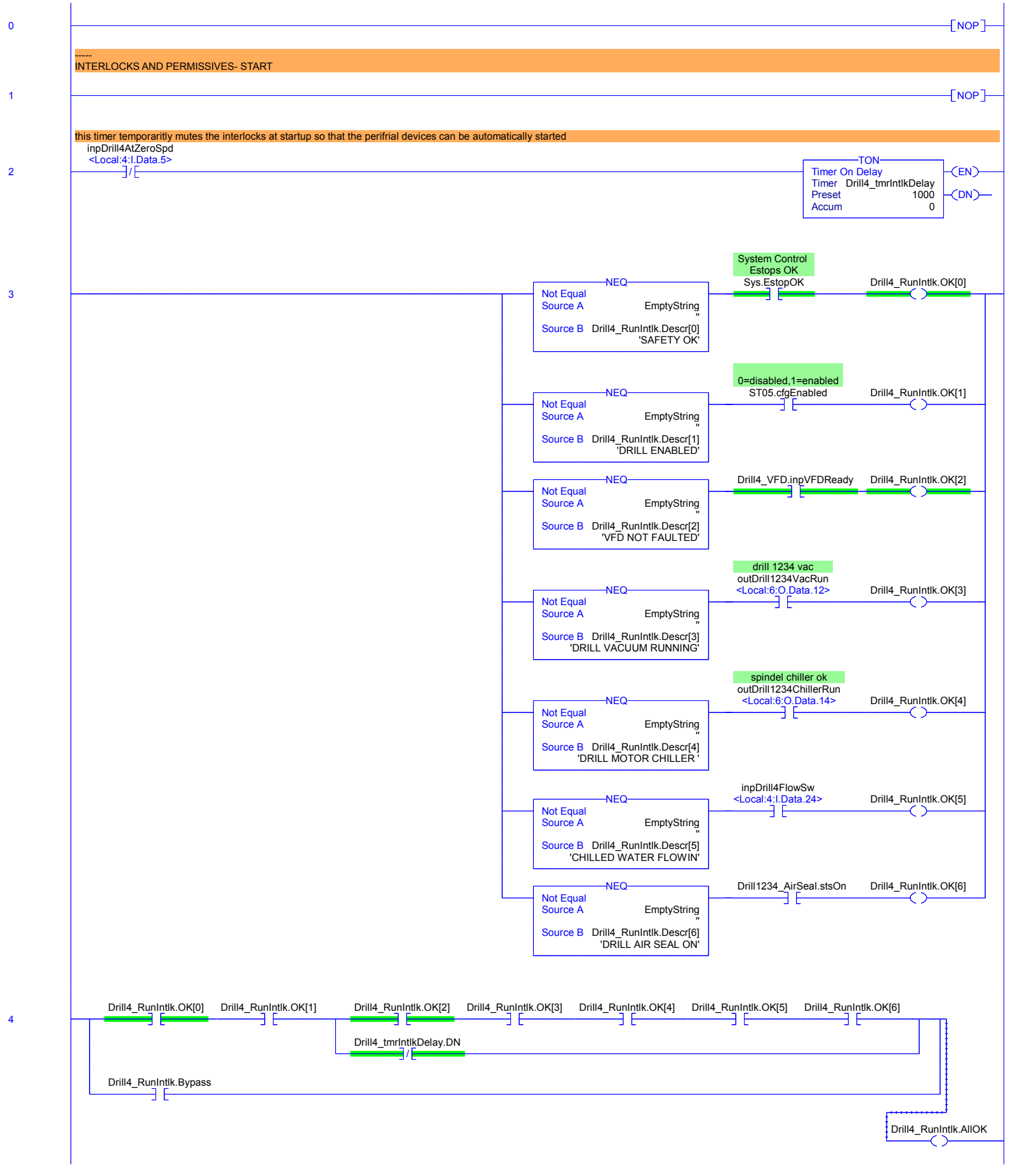
20
move description
EQU
Equal
Source A: Drill4Axis_Moves[2].Descr 'Peck'
Source B: Drill4Axis_Moves[2].Descr 'Peck'

move position (mm)
EQU
Equal
Source A: Drill4Axis_Moves[2].Pos_mm 7.34
Source B: Drill4Axis_Moves[2].Pos_mm 7.34

move velocity (mm/s)
MOV
Move
Source: Rec[0].D4.G1.F 5.0
Dest: Drill4Axis_Moves[2].Vel_mm_s 5.0

System Control Estops OK: Sys.EstopOK
Intlks on Move Executing OK: Drill4Axis_Moves[2].stsIntlksOK
Perms on Move Starting OK: Drill4Axis_Moves[2].stsPermsOK


CONFIGURATION - END
21
NOP
(End)


0
NOP

INTERLOCKS AND PERMISSIVES- START
1
NOP
this timer temporaritly mutes the interlocks at startup so that the perifrial devices can be automatically started
inpDrill4AtZeroSpd
<Local:4:I.Data.5>
2
TON
Timer On Delay
Timer Drill4_tmrIntlkDelay
Preset 1000
Accum 0
EN
DN
3
System Control Estops OK
Sys.EstopOK
Drill4_RunIntlk.OK[0]
NEQ
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[0] 'SAFETY OK'
0=disabled,1=enabled
ST05.cfgEnabled
Drill4_RunIntlk.OK[1]
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[1] 'DRILL ENABLED'
Drill4_VFD.inpVFDReady
Drill4_RunIntlk.OK[2]
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[2] 'VFD NOT FAULTED'
drill 1234 vac
outDrill1234VacRun
<Local:6:O.Data.12>
Drill4_RunIntlk.OK[3]
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[3] 'DRILL VACUUM RUNNING'
spindel chiller ok
outDrill1234ChillerRun
<Local:6:O.Data.14>
Drill4_RunIntlk.OK[4]
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[4] 'DRILL MOTOR CHILLER '
inpDrill4FlowSw
<Local:4:I.Data.24>
Drill4_RunIntlk.OK[5]
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[5] 'CHILLED WATER FLOWIN'
Drill1234_AirSeal.stsOn
Drill4_RunIntlk.OK[6]
Not Equal
Source A EmptyString ''
Source B Drill4_RunIntlk.Descr[6] 'DRILL AIR SEAL ON'
4
Drill4_RunIntlk.OK[0]
Drill4_RunIntlk.OK[1]
Drill4_RunIntlk.OK[2]
Drill4_RunIntlk.OK[3]
Drill4_RunIntlk.OK[4]
Drill4_RunIntlk.OK[5]
Drill4_RunIntlk.OK[6]
Drill4_tmrIntlkDelay.DN
Drill4_RunIntlk.Bypass
Drill4_RunIntlk.AllOK

INTERLOCKS AND PERMISSIVES- END
---

5 NOP

FAULT HANDLING - START

6 NOP

System Control Reset Request
Sys.ResetReq

7 outDrill4Reset
<Local:6:O.Data.4>

FAULT HANDLING - END
---

8 NOP

---
drill 4

9

EQU
Equal
Source A Drill4_VFD.cmdSpdSP_rpm 4000
Source B Drill4_VFD.cmdSpdSP_rpm 4000

VFD_HighSpeed_Control

VFD_HighSpeed_Control	Drill4_VFD	stsRunning
intlkRun	Drill4_RunIntlk.AllOK	
	0	stsAtZeroSpd
permStart	Drill4_RunIntlk.AllOK	
	0	stsWarmingUp
cfgIdleTimeForWarmup_min	Drill1234_cfgIdleTimeForWarmup_min	
	60	
cfgWarmupTime_min	Drill1234_cfgWarmupInterval_min	
	1	
cfgStopTime_sec	10	
cmdManEnable	Sys.ManualMode	
	1	
cmdAutoRun	0	
cmdManStart	0	
cmdManStop	0	
cmdSpdSP_rpm	4000	
stsIdleTime_min	1571	
stsDecelFactor_Real	1.0008	
stsAccelFactor_Real	1.0	
D_R_I_V_E_I_O	0	
outReset	outDrill4Reset	
	<Local:6:O.Data.4>	
	0	
inpAtSpd	inpDrill4AtSpd	
	<Local:4:I.Data.4>	
	0	
inpAtZeroSpd	inpDrill4AtZeroSpd	
	<Local:4:I.Data.5>	
	1	
inpTemp_DegF	inpDrill4Temp_DegC	
	0.58	
inpVFDReady	inpDrill4Ready	
	<Local:4:I.Data.6>	
	1	
outRun	outDrill4Start	
	<Local:6:O.Data.3>	
	0	
outSpdSP_rpm	4000	

10 Drill4_ocmdStartSpindel | Drill4_ocmdStartSpindel (U) | 0=disabled,1=enabled ST05.cfgEnabled | System Control Immediate Stop Trigger Sys.CriticalStop (/) | Drill4_RunIntlk.AllOK

auto run command to aoi
Drill4_VFD.cmdAutoRun

MOV
Move
Source Rec[0].D4.Spd 4000
Dest Drill4_VFD.cmdSpdSP_rpm 4000

auto run command to aoi
Drill4_VFD.cmdAutoRun

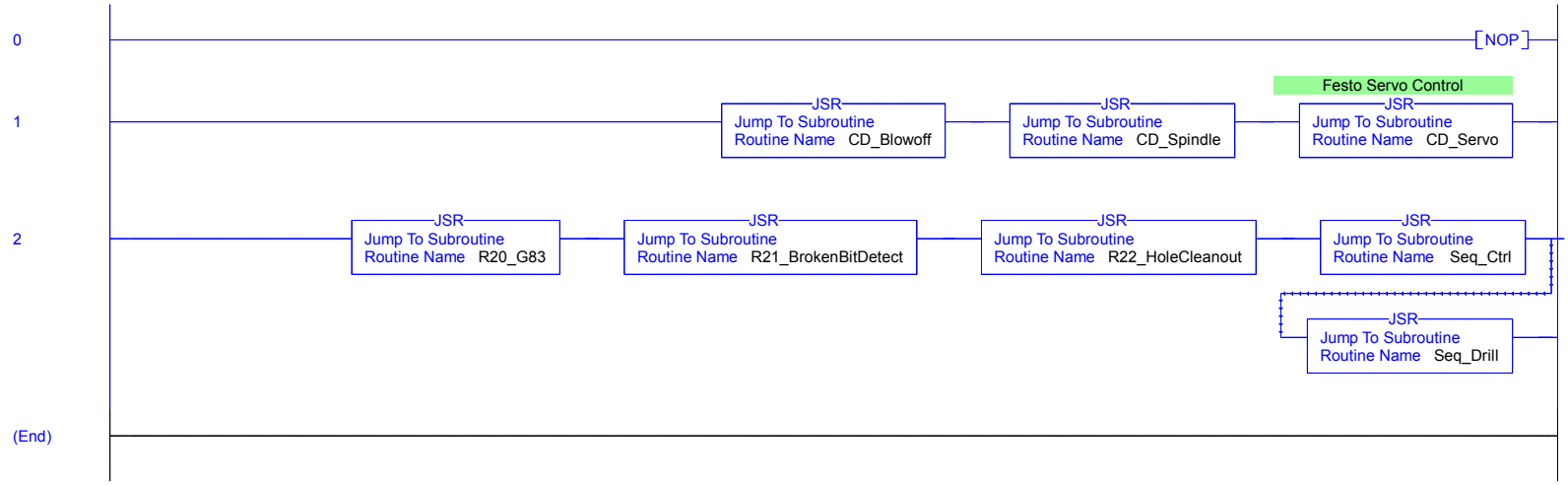
set max speed for drill 4 due to long bit size

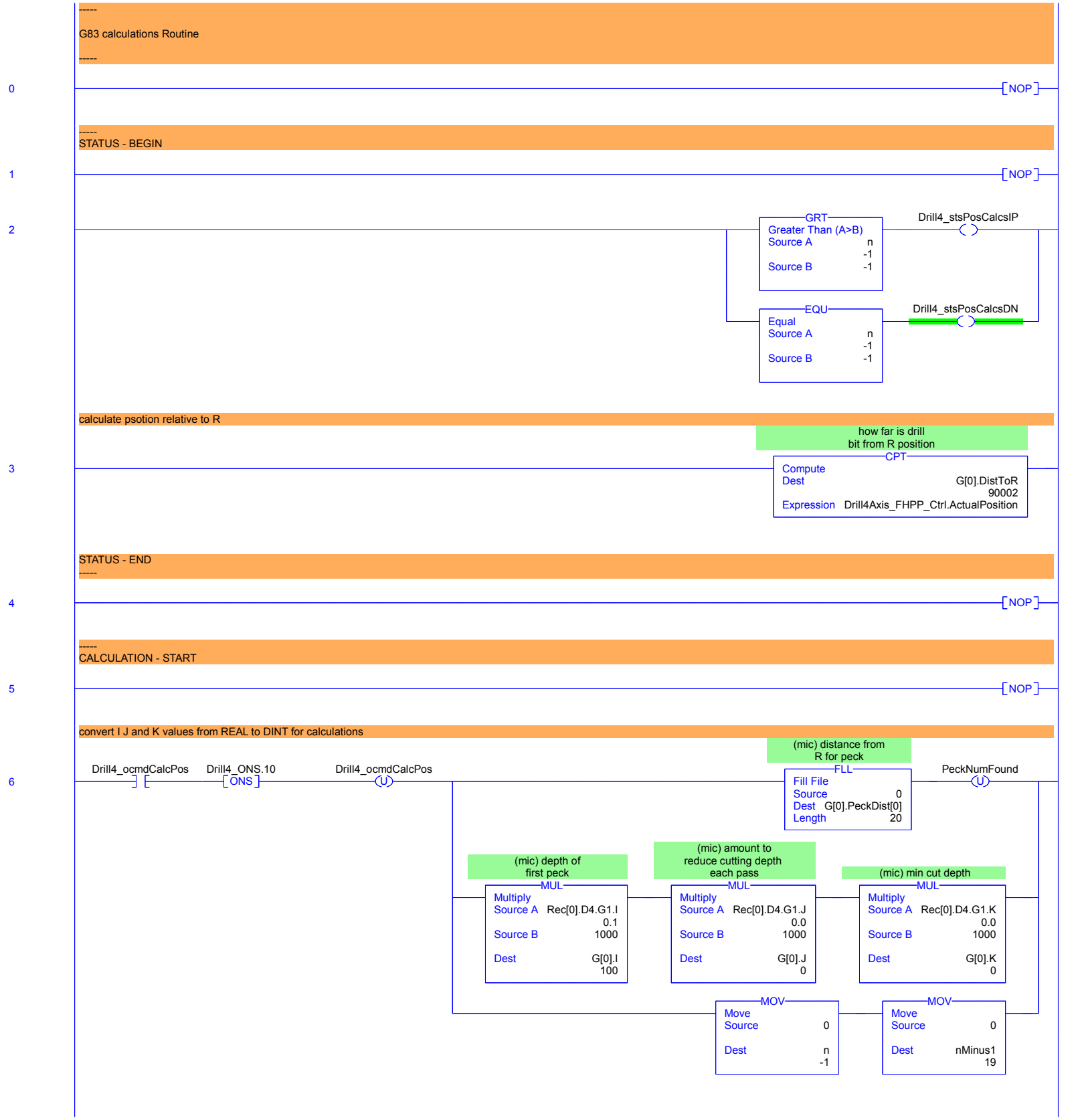
11

GRT
Greater Than (A>B)
Source A Drill4_VFD.cmdSpdSP_rpm 4000
Source B Drill4_cfgMaxRPM 5000

MOV
Move
Source Drill4_cfgMaxRPM 5000
Dest Drill4_VFD.cmdSpdSP_rpm 4000

(End)


0
NOP
Festo Servo Control
1
JSR
Jump To Subroutine
Routine Name CD_Blowoff
JSR
Jump To Subroutine
Routine Name CD_Spindle
JSR
Jump To Subroutine
Routine Name CD_Servo
2
JSR
Jump To Subroutine
Routine Name R20_G83
JSR
Jump To Subroutine
Routine Name R21_BrokenBitDetect
JSR
Jump To Subroutine
Routine Name R22_HoleCleanout
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Drill
(End)



G83 calculations Routine

0
NOP

STATUS - BEGIN
1
NOP
2
GRT
Greater Than (A>B)
Source A n -1
Source B -1
Drill4_stsPosCalcsIP
EQU
Equal
Source A n -1
Source B -1
Drill4_stsPosCalcsDN
calculate psotion relative to R
how far is drill bit from R position
3
CPT
Compute
Dest G[0].DistToR 90002
Expression Drill4Axis_FHPP_Ctrl.ActualPosition
STATUS - END

4
NOP

CALCULATION - START
5
NOP
convert I J and K values from REAL to DINT for calculations
6
Drill4_ocmdCalcPos
Drill4_ONS.10
ONS
Drill4_ocmdCalcPos
(U)
(mic) distance from R for peck
FLL
Fill File
Source 0
Dest G[0].PeckDist[0]
Length 20
PeckNumFound
(U)
(mic) depth of first peck
MUL
Multiply
Source A Rec[0].D4.G1.I 0.1
Source B 1000
Dest G[0].I 100
(mic) amount to reduce cutting depth each pass
MUL
Multiply
Source A Rec[0].D4.G1.J 0.0
Source B 1000
Dest G[0].J 0
(mic) min cut depth
MUL
Multiply
Source A Rec[0].D4.G1.K 0.0
Source B 1000
Dest G[0].K 0
MOV
Move
Source 0
Dest n -1
MOV
Move
Source 0
Dest nMinus1 19

R pos is the retract pos
*note - r value for drill4 calc uses 0 position instead of 90 position like drills123
Z pos is the final peck
*note - z value for drill4 accounts for a part height of 0 so that break through should be exactly how far you are digging into the part
first PeckDist is (I)
first PeckPos is RetractPos (R) + PeckDist (I)

7

EQU
Equal
Source A 0
Source B n -1

Drill4_ONS.11
ONS

(mic) servo retract pos
CPT
Compute
Dest G[0].R 18660
Expression (-(Rec[0].D4.ColletDist-0-Rec[0].D4.BitLength)+Rec[0].PartPertrusionD4+Rec[0].D4.PartClearance)*1000

move position (mm)
CPT
Compute
Dest Drill4Axis_Moves[1].Pos_mm 18.660002
Expression G[0].R*0.001

(mic) servo retract pos
MOV
Move
Source G[0].R 18660
Dest G[1].R 18660

(mic) servo max pecking depth
CPT
Compute
Dest G[0].Z 18060
Expression G[0].R-(Rec[0].D4.PartClearance*1000)-(Rec[0].D4.PartBreakThrough*1000)

pos where the bit breaks through the part
CPT
Compute
Dest G[0].FerrBotPos 18160
Expression G[1].Z+(Rec[0].D4.PartBreakThrough*1000)

pos where the bit touches the part
CPT
Compute
Dest G[0].FerrTopPos 10990
Expression G[0].FerrBotPos - (Rec[0].PartHeight*1000)

(mic) servo max pecking depth
MOV
Move
Source G[0].Z 18060
Dest G[1].Z 18060

(mic) distance from R for peck
CPT
Compute
Dest G[0].PeckDist[0] 100
Expression G[0].I

(mic) servo pos for peck
CPT
Compute
Dest G[0].PeckPos[0] 18060
Expression G[0].R-(Rec[0].D4.PartClearance*1000)-G[0].PeckDist[0]

(mic) servo pos for peck
LES
Less Than (A<B)
Source A G[0].PeckPos[0] 18060
Source B G[0].Z 18060

(mic) servo pos for peck
MOV
Move
Source G[0].Z 18060
Dest G[0].PeckPos[0] 18060

(mic) servo pos for peck
LES
Less Than (A<B)
Source A G[0].PeckPos[0] 18060
Source B G[0].Z 18060

(mic) servo pos for peck
MOV
Move
Source G[0].Z 18060
Dest G[0].PeckPos[0] 18060

MOV
Move
Source n -1
Dest nMinus1 19

ADD
Add
Source A 1
Source B n -1
Dest n -1

calculate peck dist

8

GRT Greater Than (A>B) Source A n -1 Source B 0

LEQ Less Than or Eql (A<=B) Source A n -1 Source B nMax 20

Drill4_ONS.12 [ONS]

(mic) distance from R for peck
CPT Compute Dest G[0].PeckDist[n] ?? Expression G[0].PeckDist[nMinus1]-G[0].J

(mic) distance from R for peck
GRT Greater Than (A>B) Source A G[0].PeckDist[n] ?? Source B G[0].K 0

(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].PeckPos[nMinus1]-G[0].PeckDist[n]

(mic) distance from R for peck
LEQ Less Than or Eql (A<=B) Source A G[0].PeckDist[n] ?? Source B G[0].K 0

(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].PeckPos[nMinus1]-G[0].K

(mic) servo pos for peck
CMP Compare Expression G[0].PeckPos[n]<= G[0].Z

(mic) servo pos for peck
CPT Compute Dest G[0].PeckPos[n] ?? Expression G[0].Z

PeckNumFound (L)

PeckNumFound Drill4_ONS.13 [ONS]

EQU Equal Source A n -1 Source B 1

MOV Move Source 1 Dest G[0].Pecks 1

MOV Move Source G[0].Pecks 1 Dest Drill4_Pecks 1

GRT Greater Than (A>B) Source A n -1 Source B 1

CPT Compute Dest G[0].Pecks 1 Expression n+1

MOV Move Source n -1 Dest nMinus1 19

ADD Add Source A 1 Source B n -1 Dest n -1

Drill4_ONS.12 (U)

9

GEQ Grtr Than or Eql (A>=B) Source A n -1 Source B nMax 20

MOV Move Source -1 Dest n -1

MOV Move Source -1 Dest n -1

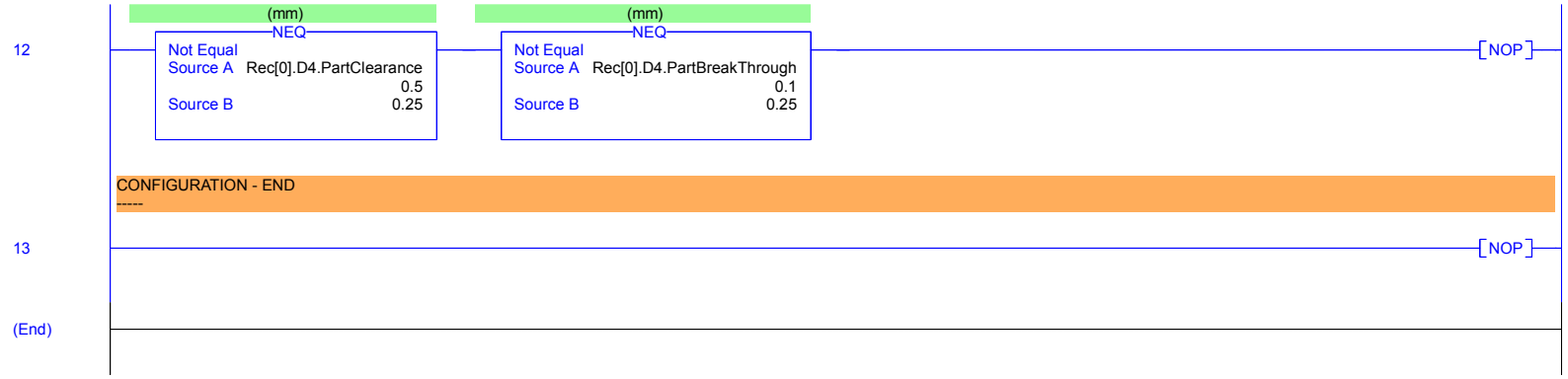
PeckNumFound (U)

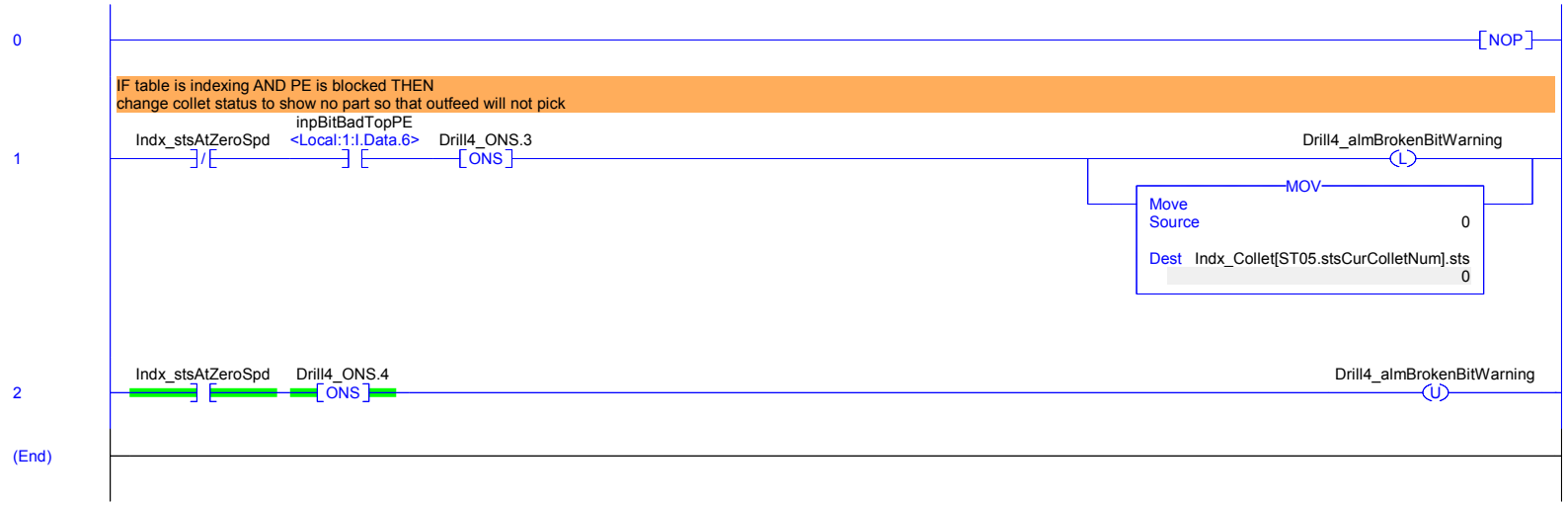
CALCULATION - END
---

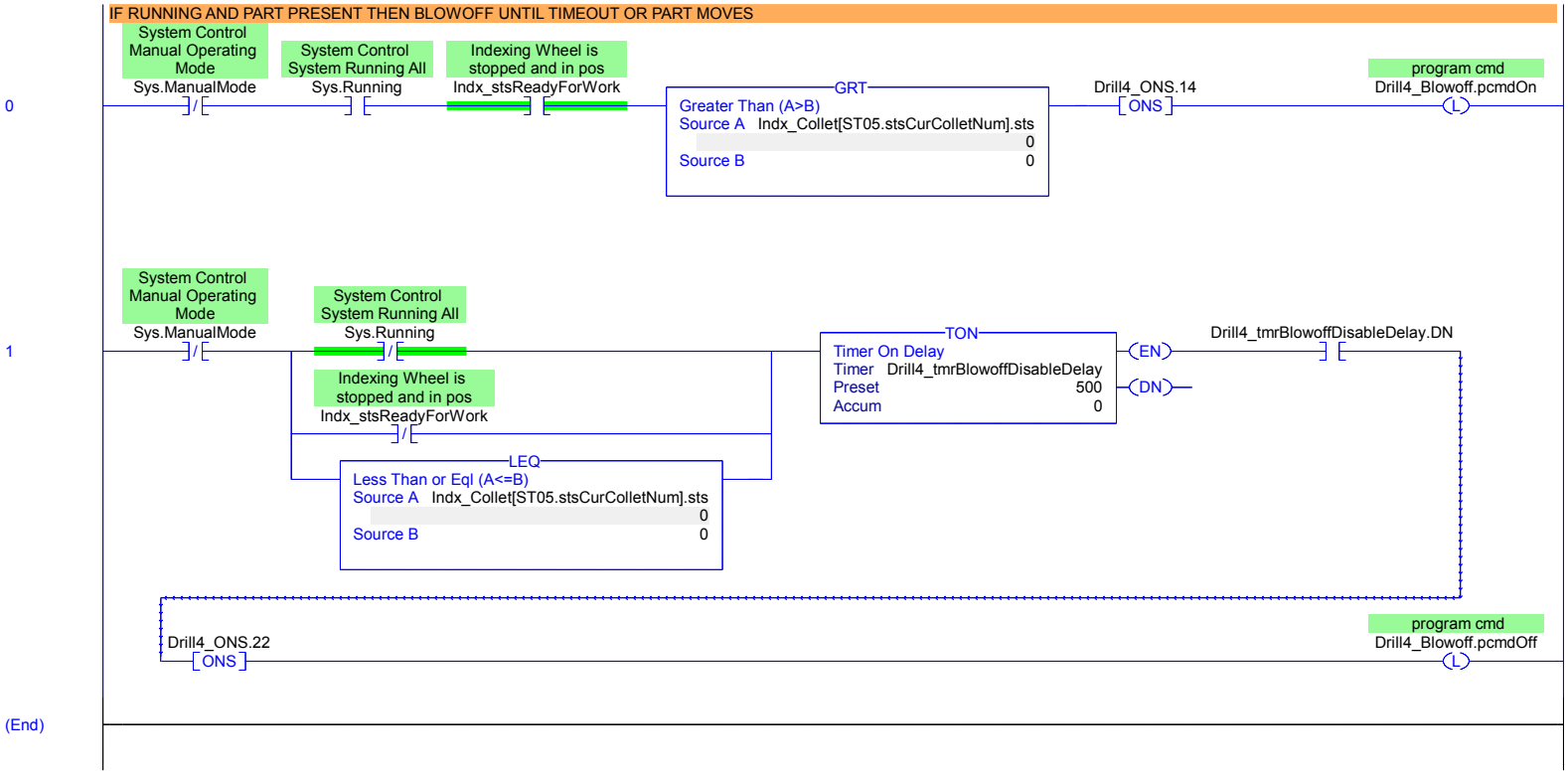
10 [NOP]

CONFIGURATION - START

11 [NOP]


12
(mm)
NEQ
Not Equal
Source A Rec[0].D4.PartClearance
0.5
Source B 0.25
(mm)
NEQ
Not Equal
Source A Rec[0].D4.PartBreakThrough
0.1
Source B 0.25
NOP
CONFIGURATION - END
13
NOP
(End)


0
NOP
IF table is indexing AND PE is blocked THEN
change collet status to show no part so that outfeed will not pick
Indx_stsAtZeroSpd
inpBitBadTopPE
<Local:1:I.Data.6>
Drill4_ONS.3
ONS
Drill4_almBrokenBitWarning
L
MOV
Move
Source
0
Dest
Indx_Collet[ST05.stsCurColletNum].sts
0
1
Indx_stsAtZeroSpd
Drill4_ONS.4
ONS
Drill4_almBrokenBitWarning
U
2
(End)


IF RUNNING AND PART PRESENT THEN BLOWOFF UNTIL TIMEOUT OR PART MOVES
0
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
Indexing Wheel is stopped and in pos
Indx_stsReadyForWork
GRT
Greater Than (A>B)
Source A Indx_Collet[ST05.stsCurColletNum].sts
0
Source B
0
Drill4_ONS.14
ONS
program cmd
Drill4_Blowoff.pcmdOn
L
1
System Control Manual Operating Mode
Sys.ManualMode
System Control System Running All
Sys.Running
Indexing Wheel is stopped and in pos
Indx_stsReadyForWork
LEQ
Less Than or Eql (A<=B)
Source A Indx_Collet[ST05.stsCurColletNum].sts
0
Source B
0
TON
Timer On Delay
Timer Drill4_tmrBlowoffDisableDelay
Preset 500
Accum 0
EN
DN
Drill4_tmrBlowoffDisableDelay.DN
Drill4_ONS.22
ONS
program cmd
Drill4_Blowoff.pcmdOff
L
(End)

Drill4 routine
---

0 [NOP]

INTLK AND PERM - BEGIN

1 [NOP]

Auto interlocks - if one of these is lost then machine is stopped immediately

2
System Control Immediate Stop Trigger
Sys.CriticalStop /
NEQ Not Equal Source A EmptyString '' Source B Drill4_Intlk.Descr[0] 'a'
Drill4_Intlk.OK[0]

System Control Manual Operating Mode
Sys.ManualMode /
Sys_tmrPwrOn.DN
NEQ Not Equal Source A EmptyString '' Source B Drill4_Intlk.Descr[1] 'b'
Drill4_Intlk.OK[1]

Drill4_Intlk.OK[0] Drill4_Intlk.OK[1] Drill4_Intlk.AllOK
Drill4_Intlk.Bypass

permissives - these have to be true for auto mode to be started

3
System Control Normal Stop Trigger
Sys.NormalStop /
NEQ Not Equal Source A EmptyString '' Source B Drill4_perm.Descr[0] 'a'
Drill4_perm.OK[0]

0=disabled,1=enabled
ST05.cfgEnabled
NEQ Not Equal Source A EmptyString '' Source B Drill4_perm.Descr[1] 'b'
Drill4_perm.OK[1]

Drill4_perm.OK[0] Drill4_perm.OK[1] Drill4_perm.AllOK
Drill4_perm.Bypass

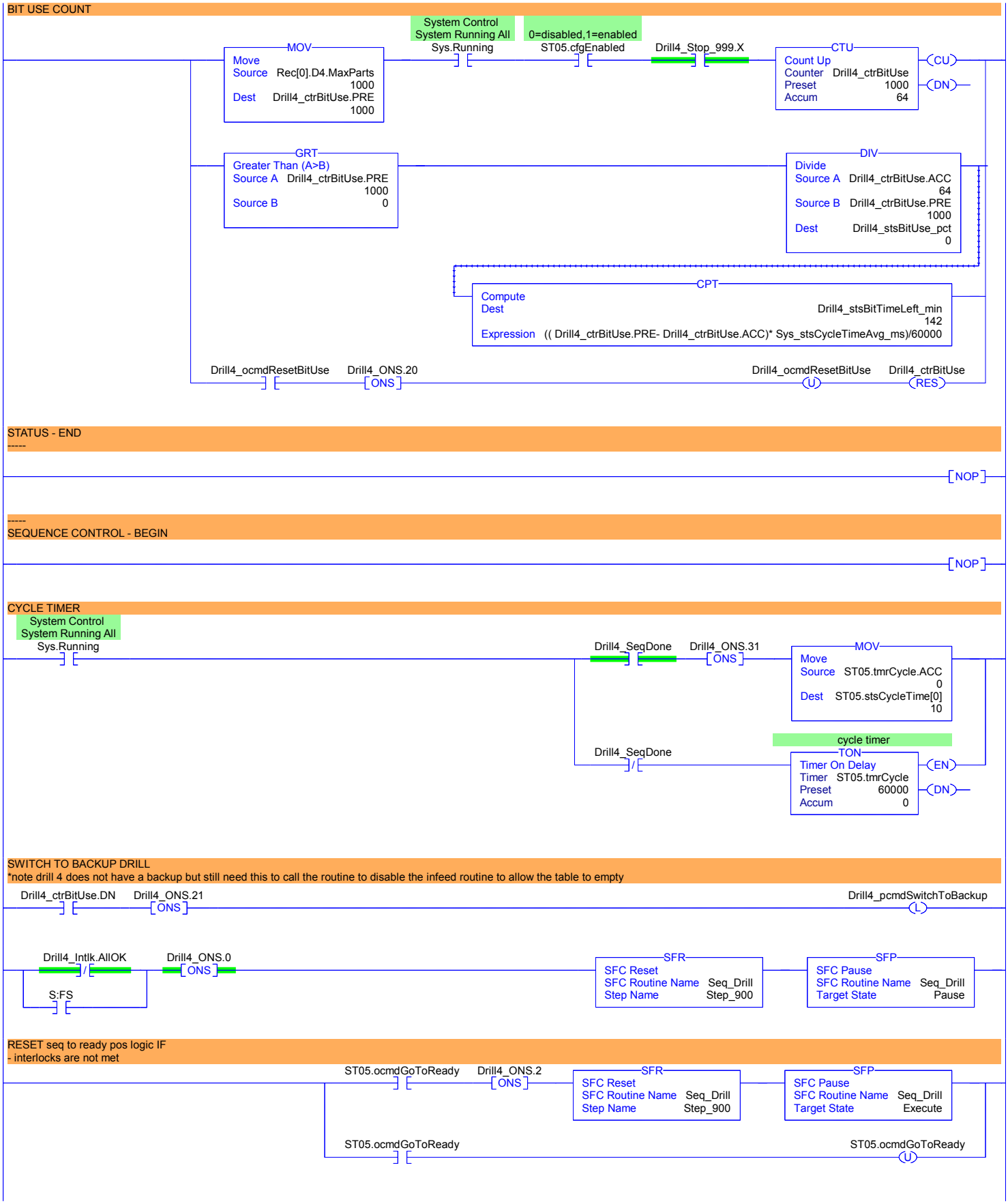
INTLK AND PERM - END
---

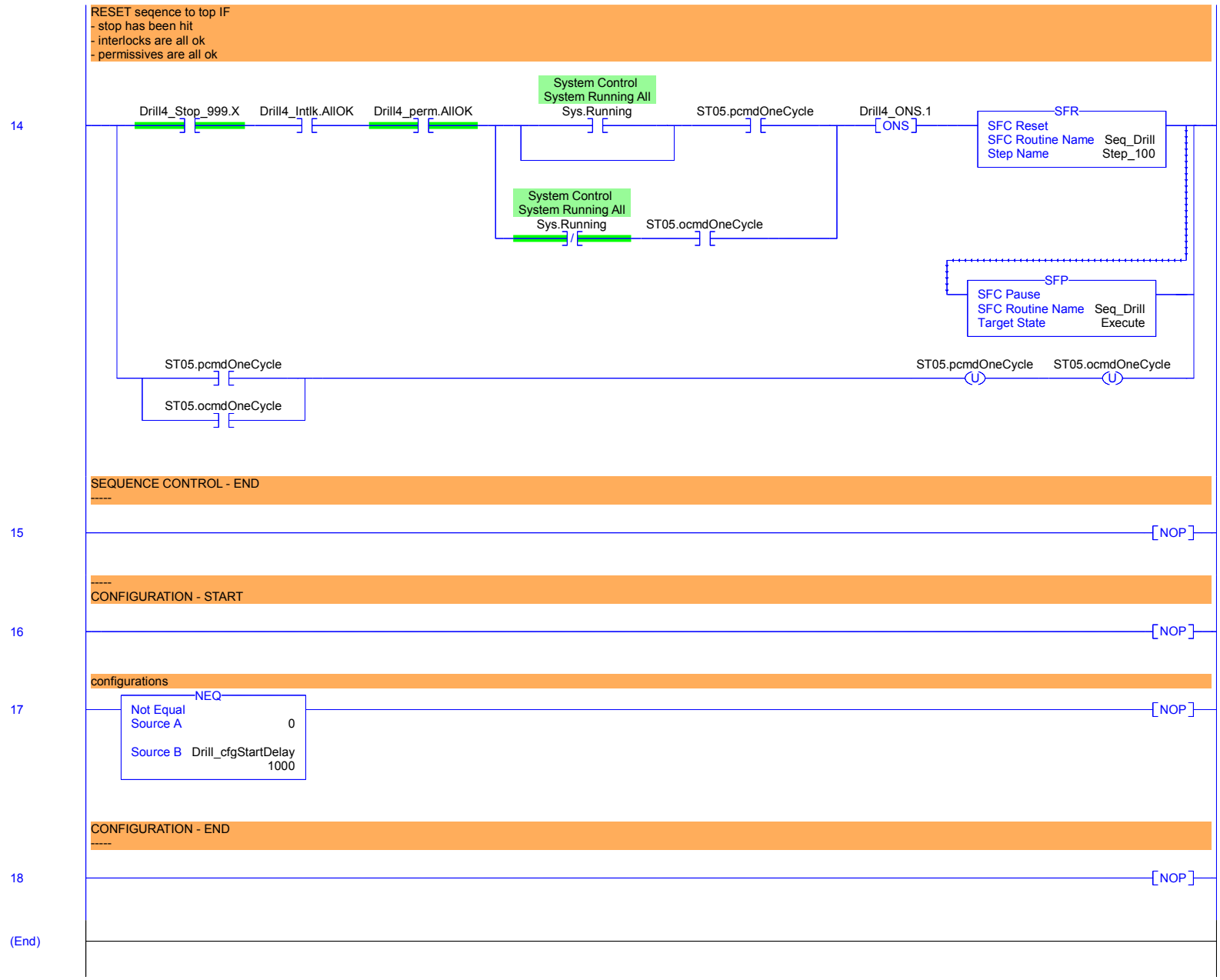
4 [NOP]

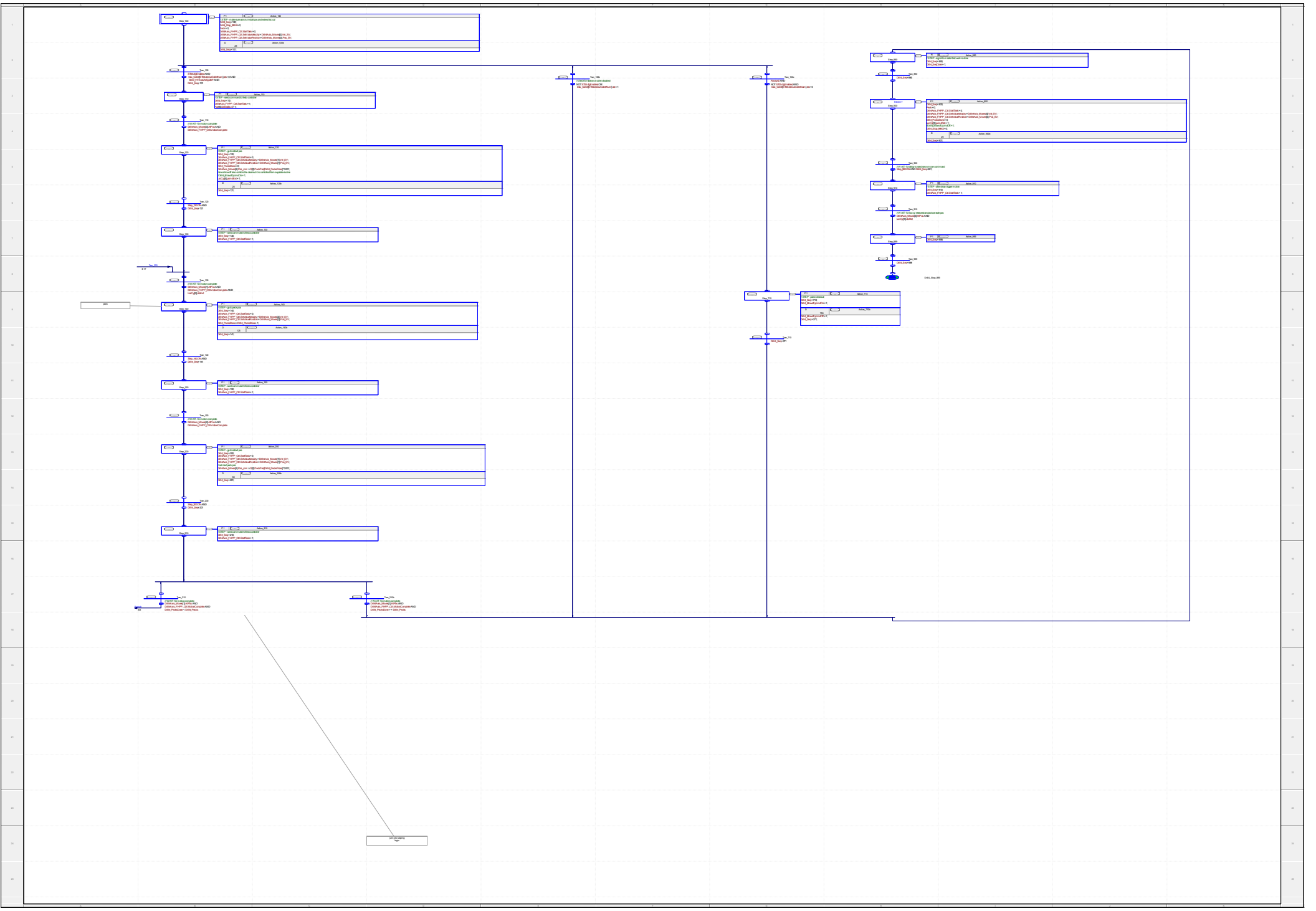
STATUS - BEGIN

5 [NOP]

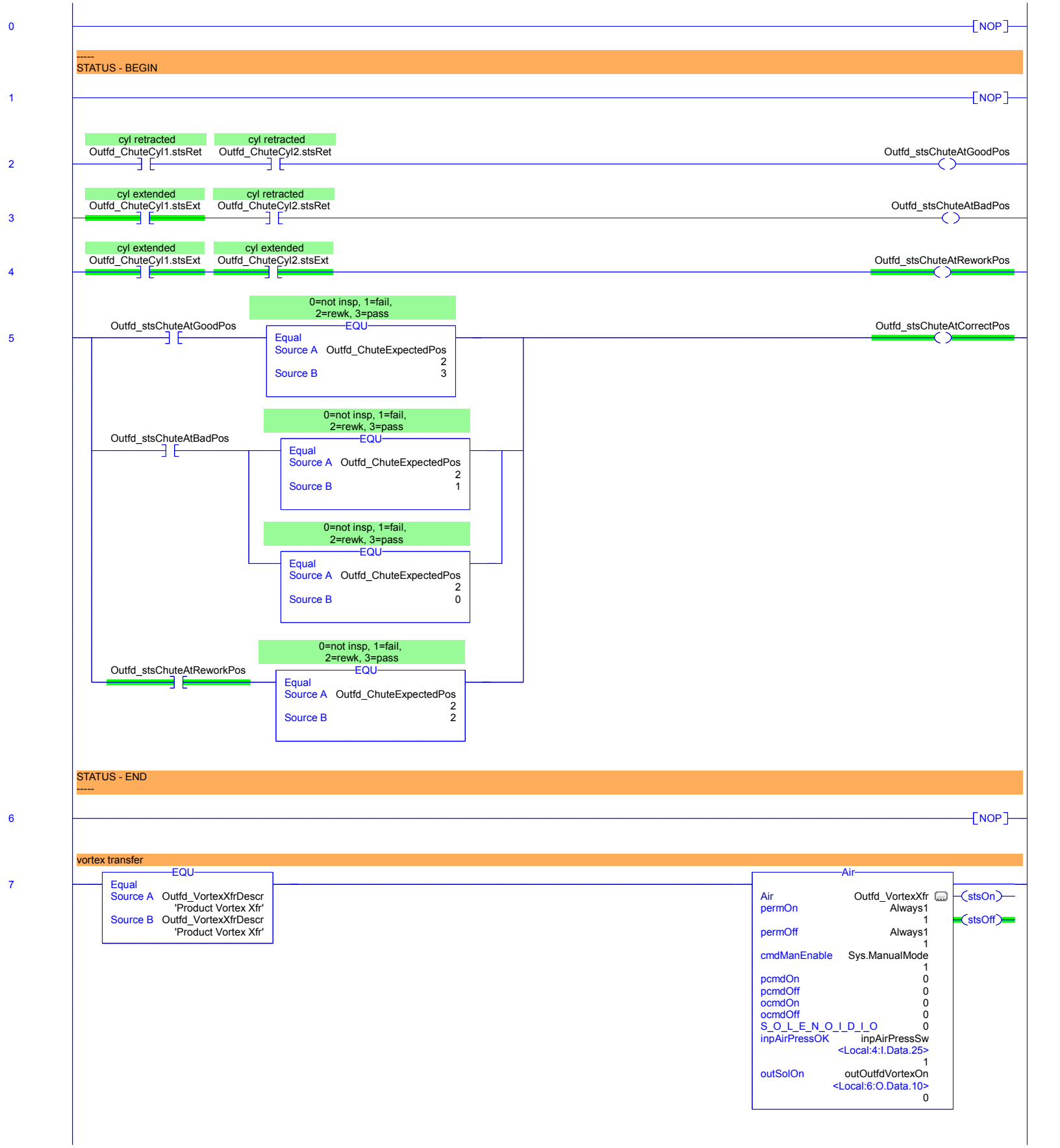
6
cyl retracted
LocCyl[5].stsRet
Drill4Axis_Moves[0].AtPos
EQU Equal Source A Drill4_Seq 999 Source B 999
ST05.stsOkToIndex


BIT USE COUNT
System Control
System Running All
Sys.Running
0=disabled,1=enabled
ST05.cfgEnabled
Drill4_Stop_999.X
MOV
Move
Source Rec[0].D4.MaxParts
1000
Dest Drill4_ctrBitUse.PRE
1000
CTU
Count Up
Counter Drill4_ctrBitUse
Preset 1000
Accum 64
CU
DN
GRT
Greater Than (A>B)
Source A Drill4_ctrBitUse.PRE
1000
Source B 0
DIV
Divide
Source A Drill4_ctrBitUse.ACC
64
Source B Drill4_ctrBitUse.PRE
1000
Dest Drill4_stsBitUse_pct
0
CPT
Compute
Dest Drill4_stsBitTimeLeft_min
142
Expression ((Drill4_ctrBitUse.PRE- Drill4_ctrBitUse.ACC)* Sys_stsCycleTimeAvg_ms)/60000
Drill4_ocmdResetBitUse
Drill4_ONS.20
ONS
Drill4_ocmdResetBitUse
U
Drill4_ctrBitUse
RES
STATUS - END
7
8
NOP
SEQUENCE CONTROL - BEGIN
9
NOP
CYCLE TIMER
System Control
System Running All
Sys.Running
10
Drill4_SeqDone
Drill4_ONS.31
ONS
MOV
Move
Source ST05.tmrCycle.ACC
0
Dest ST05.stsCycleTime[0]
10
cycle timer
Drill4_SeqDone
TON
Timer On Delay
Timer ST05.tmrCycle
Preset 60000
Accum 0
EN
DN
SWITCH TO BACKUP DRILL
*note drill 4 does not have a backup but still need this to call the routine to disable the infeed routine to allow the table to empty
Drill4_ctrBitUse.DN
Drill4_ONS.21
ONS
11
Drill4_pcmdSwitchToBackup
L
Drill4_Intlk.AllOK
Drill4_ONS.0
ONS
S:FS
12
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Pause
RESET seq to ready pos logic IF
- interlocks are not met
ST05.ocmdGoToReady
Drill4_ONS.2
ONS
13
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_900
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute
ST05.ocmdGoToReady
ST05.ocmdGoToReady
U


RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok
14
Drill4_Stop_999.X
Drill4_Intlk.AllOK
Drill4_perm.AllOK
System Control
System Running All
Sys.Running
ST05.pcmdOneCycle
Drill4_ONS.1
ONS
SFR
SFC Reset
SFC Routine Name Seq_Drill
Step Name Step_100
System Control
System Running All
Sys.Running
ST05.ocmdOneCycle
SFP
SFC Pause
SFC Routine Name Seq_Drill
Target State Execute
ST05.pcmdOneCycle
ST05.ocmdOneCycle
ST05.pcmdOneCycle
ST05.ocmdOneCycle
U
U
SEQUENCE CONTROL - END
15
NOP
CONFIGURATION - START
16
NOP
configurations
17
NEQ
Not Equal
Source A 0
Source B Drill_cfgStartDelay
1000
NOP
CONFIGURATION - END
18
NOP
(End)




0
NOP
vision blowoff
1
EQU
Equal
Source A Outfd_BlowoffDescr
'Vision Blowoff'
Source B Outfd_BlowoffDescr
'Vision Blowoff'
Air
Air Outfd_Blowoff
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 1
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outInspectionBlowoff
<VB2:O.Data[3].0>
0
stsOn
stsOff
(End)


0
NOP
STATUS - BEGIN
1
NOP
cyl retracted
Outfd_ChuteCyl1.stsRet
cyl retracted
Outfd_ChuteCyl2.stsRet
2
Outfd_stsChuteAtGoodPos
cyl extended
Outfd_ChuteCyl1.stsExt
cyl retracted
Outfd_ChuteCyl2.stsRet
3
Outfd_stsChuteAtBadPos
cyl extended
Outfd_ChuteCyl1.stsExt
cyl extended
Outfd_ChuteCyl2.stsExt
4
Outfd_stsChuteAtReworkPos
0=not insp, 1=fail,
2=rewk, 3=pass
Outfd_stsChuteAtGoodPos
EQU
Equal
Source A Outfd_ChuteExpectedPos
2
Source B 3
5
Outfd_stsChuteAtCorrectPos
0=not insp, 1=fail,
2=rewk, 3=pass
Outfd_stsChuteAtBadPos
EQU
Equal
Source A Outfd_ChuteExpectedPos
2
Source B 1
0=not insp, 1=fail,
2=rewk, 3=pass
EQU
Equal
Source A Outfd_ChuteExpectedPos
2
Source B 0
0=not insp, 1=fail,
2=rewk, 3=pass
Outfd_stsChuteAtReworkPos
EQU
Equal
Source A Outfd_ChuteExpectedPos
2
Source B 2
STATUS - END
6
NOP
vortex transfer
EQU
Equal
Source A Outfd_VortexXfrDescr
'Product Vortex Xfr'
Source B Outfd_VortexXfrDescr
'Product Vortex Xfr'
7
Air
Air Outfd_VortexXfr
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outOutfdVortexOn
<Local:6:O.Data.10>
0
stsOn
stsOff

outfeed chute cyl 1

8

EQU
Equal
Source A Outfd_ChuteCyl1Descr
'Chute Cyl 1'
Source B Outfd_ChuteCyl1Descr
'Chute Cyl 1'

Cyl
Cyl Outfd_ChuteCyl1
permExt Always1
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpOutfdChuteCyl1ExtPRX
<Local:3:I.Data.6>
1
inpRetPRX inpOutfdChuteCyl1RetPRX
<Local:3:I.Data.7>
0
outExtSOL outOutfdChuteCyl1Ext
<VB1:O.Data[5].0>
1
stsExt 1
stsRet 0

outRetSOL
stsExtFail
stsRetFail

outfeed chute cyl 2

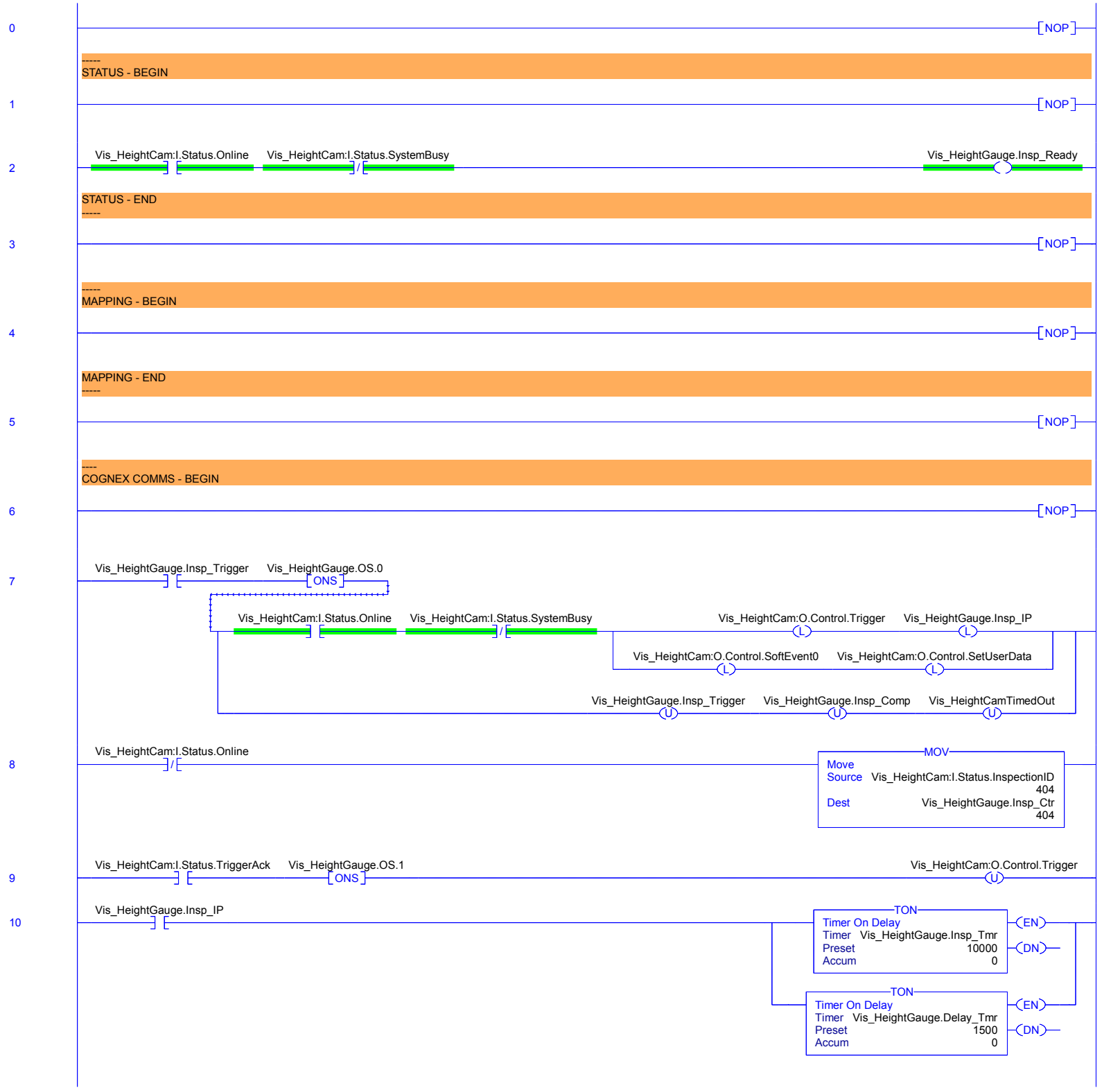
9

EQU
Equal
Source A Outfd_ChuteCyl2Descr
'Chute Cyl 2'
Source B Outfd_ChuteCyl2Descr
'Chute Cyl 2'

Cyl
Cyl Outfd_ChuteCyl2
permExt Always1
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpOutfdChuteCyl2ExtPRX
<Local:3:I.Data.8>
1
inpRetPRX inpOutfdChuteCyl2RetPRX
<Local:3:I.Data.9>
0
outExtSOL outOutfdChuteCyl2Ext
<VB1:O.Data[5].2>
1
stsExt 1
stsRet 0

outRetSOL
stsExtFail
stsRetFail

(End)


0
NOP

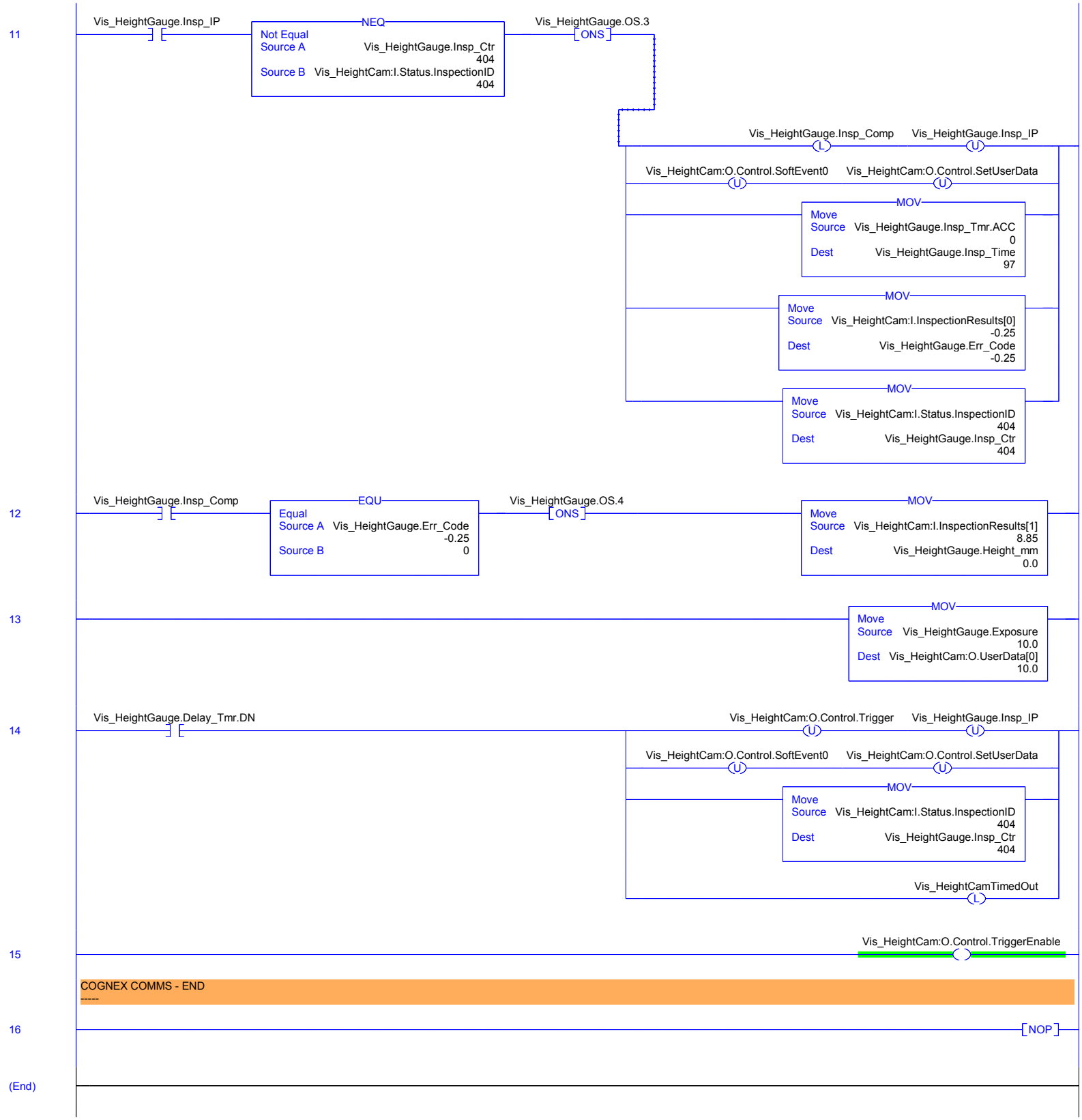
STATUS - BEGIN
1
NOP
Vis_HeightCam:I.Status.Online
Vis_HeightCam:I.Status.SystemBusy
Vis_HeightGauge.Insp_Ready
2
STATUS - END

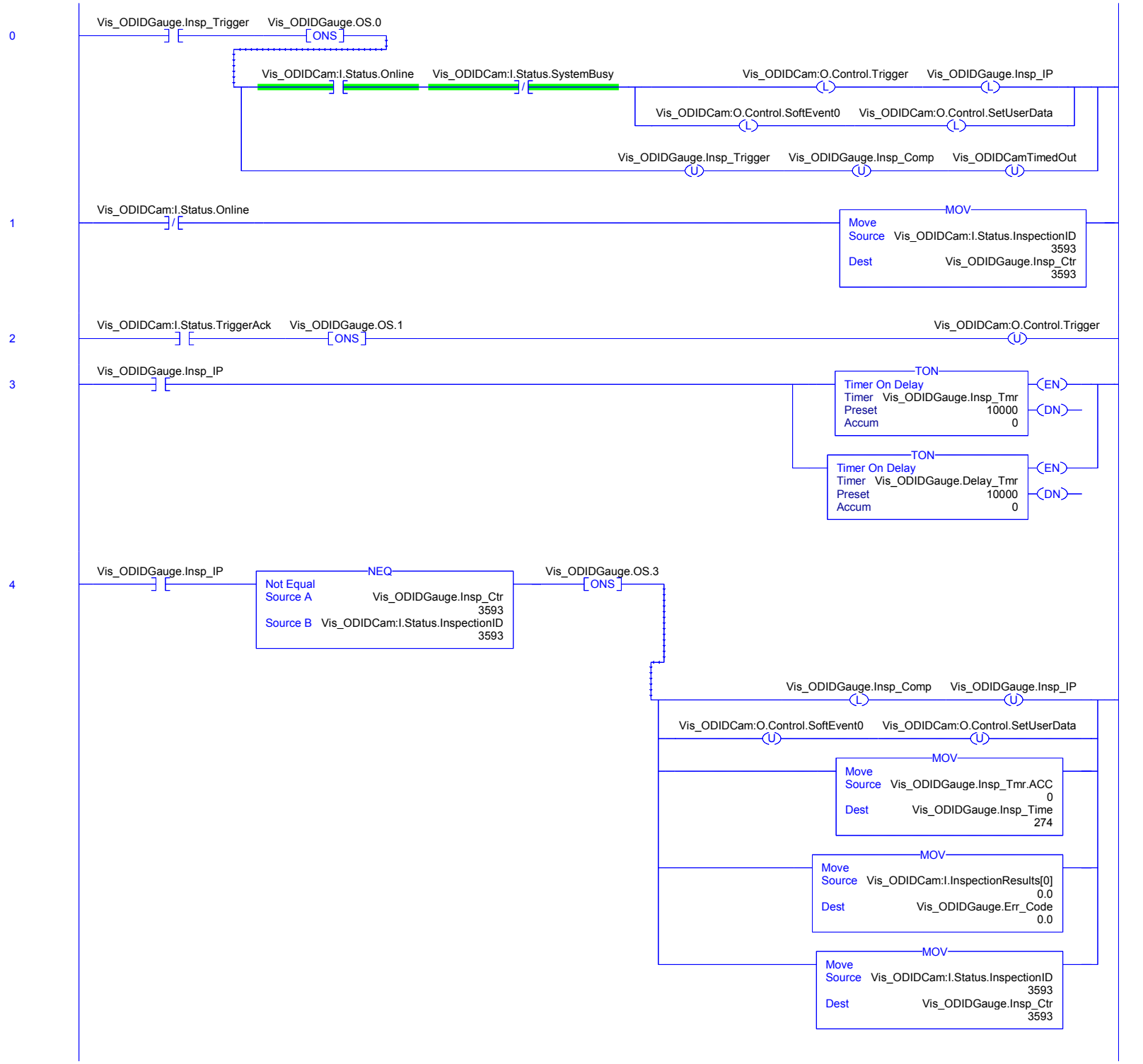
3
NOP

MAPPING - BEGIN
4
NOP
MAPPING - END

5
NOP

COGNEX COMMS - BEGIN
6
NOP
Vis_HeightGauge.Insp_Trigger
Vis_HeightGauge.OS.0
ONS
7
Vis_HeightCam:I.Status.Online
Vis_HeightCam:I.Status.SystemBusy
Vis_HeightCam:O.Control.Trigger
L
Vis_HeightGauge.Insp_IP
L
Vis_HeightCam:O.Control.SoftEvent0
L
Vis_HeightCam:O.Control.SetUserData
L
Vis_HeightGauge.Insp_Trigger
U
Vis_HeightGauge.Insp_Comp
U
Vis_HeightCamTimedOut
U
Vis_HeightCam:I.Status.Online
8
MOV
Move
Source Vis_HeightCam:I.Status.InspectionID
404
Dest Vis_HeightGauge.Insp_Ctr
404
Vis_HeightCam:I.Status.TriggerAck
Vis_HeightGauge.OS.1
ONS
9
Vis_HeightCam:O.Control.Trigger
U
Vis_HeightGauge.Insp_IP
10
TON
Timer On Delay
Timer Vis_HeightGauge.Insp_Tmr
Preset 10000
Accum 0
EN
DN
TON
Timer On Delay
Timer Vis_HeightGauge.Delay_Tmr
Preset 1500
Accum 0
EN
DN


11
Vis_HeightGauge.Insp_IP
NEQ
Not Equal
Source A Vis_HeightGauge.Insp_Ctr 404
Source B Vis_HeightCam:I.Status.InspectionID 404
Vis_HeightGauge.OS.3
ONS
Vis_HeightGauge.Insp_Comp
Vis_HeightGauge.Insp_IP
Vis_HeightCam:O.Control.SoftEvent0
Vis_HeightCam:O.Control.SetUserData
MOV
Move
Source Vis_HeightGauge.Insp_Tmr.ACC 0
Dest Vis_HeightGauge.Insp_Time 97
MOV
Move
Source Vis_HeightCam:I.InspectionResults[0] -0.25
Dest Vis_HeightGauge.Err_Code -0.25
MOV
Move
Source Vis_HeightCam:I.Status.InspectionID 404
Dest Vis_HeightGauge.Insp_Ctr 404
12
Vis_HeightGauge.Insp_Comp
EQU
Equal
Source A Vis_HeightGauge.Err_Code -0.25
Source B 0
Vis_HeightGauge.OS.4
ONS
MOV
Move
Source Vis_HeightCam:I.InspectionResults[1] 8.85
Dest Vis_HeightGauge.Height_mm 0.0
13
MOV
Move
Source Vis_HeightGauge.Exposure 10.0
Dest Vis_HeightCam:O.UserData[0] 10.0
14
Vis_HeightGauge.Delay_Tmr.DN
Vis_HeightCam:O.Control.Trigger
Vis_HeightGauge.Insp_IP
Vis_HeightCam:O.Control.SoftEvent0
Vis_HeightCam:O.Control.SetUserData
MOV
Move
Source Vis_HeightCam:I.Status.InspectionID 404
Dest Vis_HeightGauge.Insp_Ctr 404
Vis_HeightCamTimedOut
15
Vis_HeightCam:O.Control.TriggerEnable
COGNEX COMMS - END
16
NOP
(End)


0
Vis_ODIDGauge.Insp_Trigger
Vis_ODIDGauge.OS.0
ONS
Vis_ODIDCam:I.Status.Online
Vis_ODIDCam:I.Status.SystemBusy
Vis_ODIDCam:O.Control.Trigger
Vis_ODIDGauge.Insp_IP
Vis_ODIDCam:O.Control.SoftEvent0
Vis_ODIDCam:O.Control.SetUserData
Vis_ODIDGauge.Insp_Trigger
Vis_ODIDGauge.Insp_Comp
Vis_ODIDCamTimedOut
1
Vis_ODIDCam:I.Status.Online
MOV
Move
Source Vis_ODIDCam:I.Status.InspectionID
3593
Dest Vis_ODIDGauge.Insp_Ctr
3593
2
Vis_ODIDCam:I.Status.TriggerAck
Vis_ODIDGauge.OS.1
ONS
Vis_ODIDCam:O.Control.Trigger
3
Vis_ODIDGauge.Insp_IP
TON
Timer On Delay
Timer Vis_ODIDGauge.Insp_Tmr
Preset 10000
Accum 0
EN
DN
TON
Timer On Delay
Timer Vis_ODIDGauge.Delay_Tmr
Preset 10000
Accum 0
EN
DN
4
Vis_ODIDGauge.Insp_IP
NEQ
Not Equal
Source A Vis_ODIDGauge.Insp_Ctr
3593
Source B Vis_ODIDCam:I.Status.InspectionID
3593
Vis_ODIDGauge.OS.3
ONS
Vis_ODIDGauge.Insp_Comp
Vis_ODIDGauge.Insp_IP
Vis_ODIDCam:O.Control.SoftEvent0
Vis_ODIDCam:O.Control.SetUserData
MOV
Move
Source Vis_ODIDGauge.Insp_Tmr.ACC
0
Dest Vis_ODIDGauge.Insp_Time
274
MOV
Move
Source Vis_ODIDCam:I.InspectionResults[0]
0.0
Dest Vis_ODIDGauge.Err_Code
0.0
MOV
Move
Source Vis_ODIDCam:I.Status.InspectionID
3593
Dest Vis_ODIDGauge.Insp_Ctr
3593

5

Vis_ODIDGauge.Insp_Comp Vis_ODIDGauge.OS.4 ONS

EQU
Equal
Source A Vis_ODIDGauge.Err_Code 0.0
Source B 0

MOV
Move
Source Vis_ODIDCam:I.InspectionResults[1] 5.860709
Dest Vis_ODIDGauge.ID_mm 5.860709

MOV
Move
Source Vis_ODIDCam:I.InspectionResults[3] 0.0
Dest Vis_ODIDGauge.Concentricity_mm 0.0

MOV
Move
Source Vis_ODIDCam:I.InspectionResults[4] 74.68225
Dest Vis_ODIDGauge.Inclusion_pct 74.68225

MOV
Move
Source Vis_ODIDCam:I.InspectionResults[5] 0.0
Dest Vis_ODIDGauge_X 0.0

MOV
Move
Source Vis_ODIDCam:I.InspectionResults[6] 0.0
Dest Vis_ODIDGauge_Y 0.0

MOV
Move
Source Vis_ODIDCam:I.InspectionResults[2] 0.0
Dest Vis_ODIDGauge.OD_mm 0.0

6

MOV
Move
Source Vis_ODIDGauge.Exposure 1.5
Dest Vis_ODIDCam:O.UserData[0] 1.5

7

Vis_ODIDGauge.Delay_Tmr.DN

Vis_ODIDCam:O.Control.Trigger U
Vis_ODIDGauge.Insp_IP U
Vis_ODIDCam:O.Control.SoftEvent0 U
Vis_ODIDCam:O.Control.SetUserData U

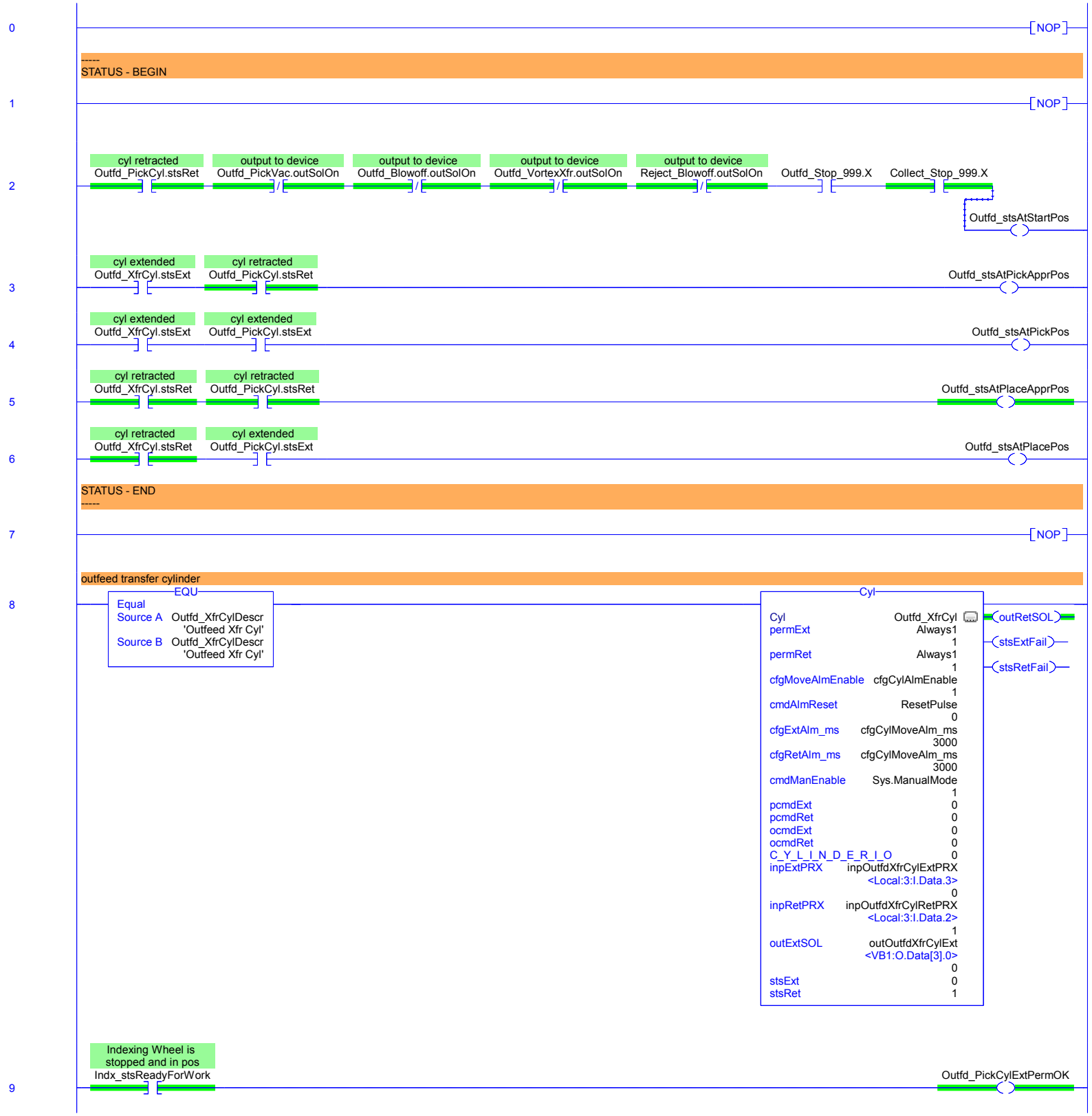
MOV
Move
Source Vis_ODIDCam:I.Status.InspectionID 3593
Dest Vis_ODIDGauge.Insp_Ctr 3593

Vis_ODIDCamTimedOut L

8

Vis_ODIDCam:O.Control.TriggerEnable

(End)


0
NOP
STATUS - BEGIN
1
NOP
cyl retracted
Outfd_PickCyl.stsRet
output to device
Outfd_PickVac.outSolOn
output to device
Outfd_Blowoff.outSolOn
output to device
Outfd_VortexXfr.outSolOn
output to device
Reject_Blowoff.outSolOn
Outfd_Stop_999.X
Collect_Stop_999.X
2
Outfd_stsAtStartPos
cyl extended
Outfd_XfrCyl.stsExt
cyl retracted
Outfd_PickCyl.stsRet
3
Outfd_stsAtPickApprPos
cyl extended
Outfd_XfrCyl.stsExt
cyl extended
Outfd_PickCyl.stsExt
4
Outfd_stsAtPickPos
cyl retracted
Outfd_XfrCyl.stsRet
cyl retracted
Outfd_PickCyl.stsRet
5
Outfd_stsAtPlaceApprPos
cyl retracted
Outfd_XfrCyl.stsRet
cyl extended
Outfd_PickCyl.stsExt
6
Outfd_stsAtPlacePos
STATUS - END
7
NOP
outfeed transfer cylinder
8
EQU
Equal
Source A Outfd_XfrCylDescr
'Outfeed Xfr Cyl'
Source B Outfd_XfrCylDescr
'Outfeed Xfr Cyl'
Cyl
Cyl Outfd_XfrCyl
permExt Always1
1
permRet Always1
1
cfgMoveAlmEnable cfgCylAlmEnable
1
cmdAlmReset ResetPulse
0
cfgExtAlm_ms cfgCylMoveAlm_ms
3000
cfgRetAlm_ms cfgCylMoveAlm_ms
3000
cmdManEnable Sys.ManualMode
1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpOutfdXfrCylExtPRX
<Local:3:I.Data.3>
0
inpRetPRX inpOutfdXfrCylRetPRX
<Local:3:I.Data.2>
1
outExtSOL outOutfdXfrCylExt
<VB1:O.Data[3].0>
0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail
Indexing Wheel is
stopped and in pos
Indx_stsReadyForWork
9
Outfd_PickCylExtPermOK

infeed transfer cylinder

10

EQU
Equal
Source A Outfd_PickCylDescr 'Outfeed Pick Cyl'
Source B Outfd_PickCylDescr 'Outfeed Pick Cyl'

Cyl
Cyl Outfd_PickCyl
permExt Outfd_PickCylExtPerm.AllOK 1
permRet Always1 1
cfgMoveAlmEnable cfgCylAlmEnable 1
cmdAlmReset ResetPulse 0
cfgExtAlm_ms cfgCylMoveAlm_ms 3000
cfgRetAlm_ms cfgCylMoveAlm_ms 3000
cmdManEnable Sys.ManualMode 1
pcmdExt 0
pcmdRet 0
ocmdExt 0
ocmdRet 0
C_Y_L_I_N_D_E_R_I_O 0
inpExtPRX inpOutfdPickCylExtPRX <Local:3:I.Data.4> 0
inpRetPRX inpOutfdPickCylRetPRX <Local:3:I.Data.5> 1
outExtSOL outOutfdPickCylExt <VB1:O.Data[2].6> 0
stsExt 0
stsRet 1
outRetSOL
stsExtFail
stsRetFail

ext permissives

11

EQU
Equal
Source A Outfd_PickCylExtPerm.Descr[0] 'Index Table Stopped'
Source B Outfd_PickCylExtPerm.Descr[0] 'Index Table Stopped'

Indx_stsAtZeroSpd Outfd_PickCylExtPerm.OK[0]

EQU
Equal
Source A Outfd_PickCylExtPerm.Descr[1] 'Index Table at good '
Source B Outfd_PickCylExtPerm.Descr[1] 'Index Table at good '

Indx_stsAtGoodPos Outfd_PickCylExtPerm.OK[1]

Outfd_PickCylExtPerm.OK[0] Outfd_PickCylExtPerm.OK[1] Outfd_PickCylExtPerm.AllOK

Outfd_PickCylExtPerm.Bypass

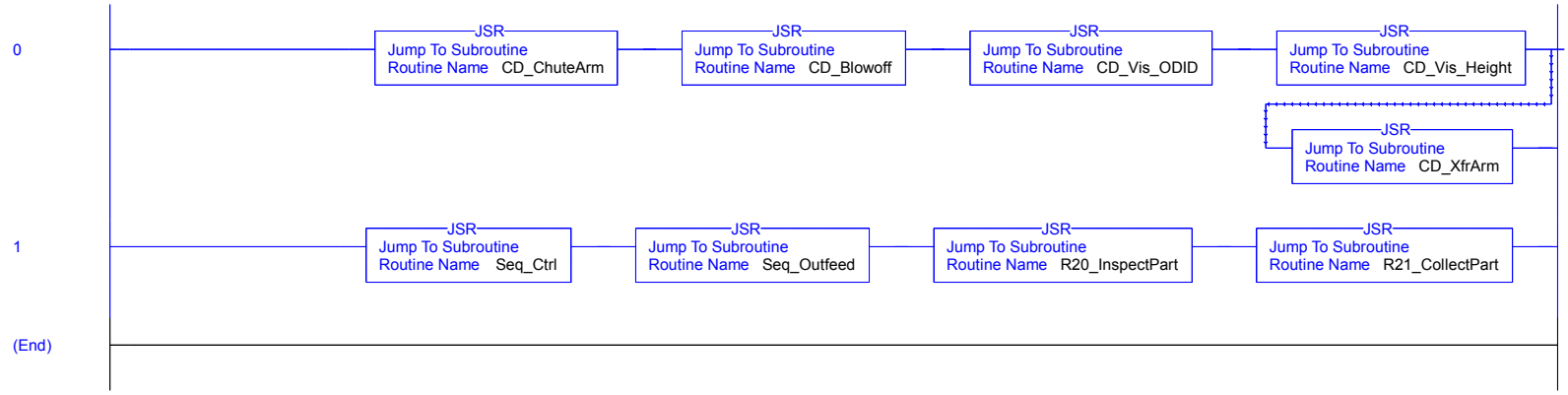
outfeed pick vac

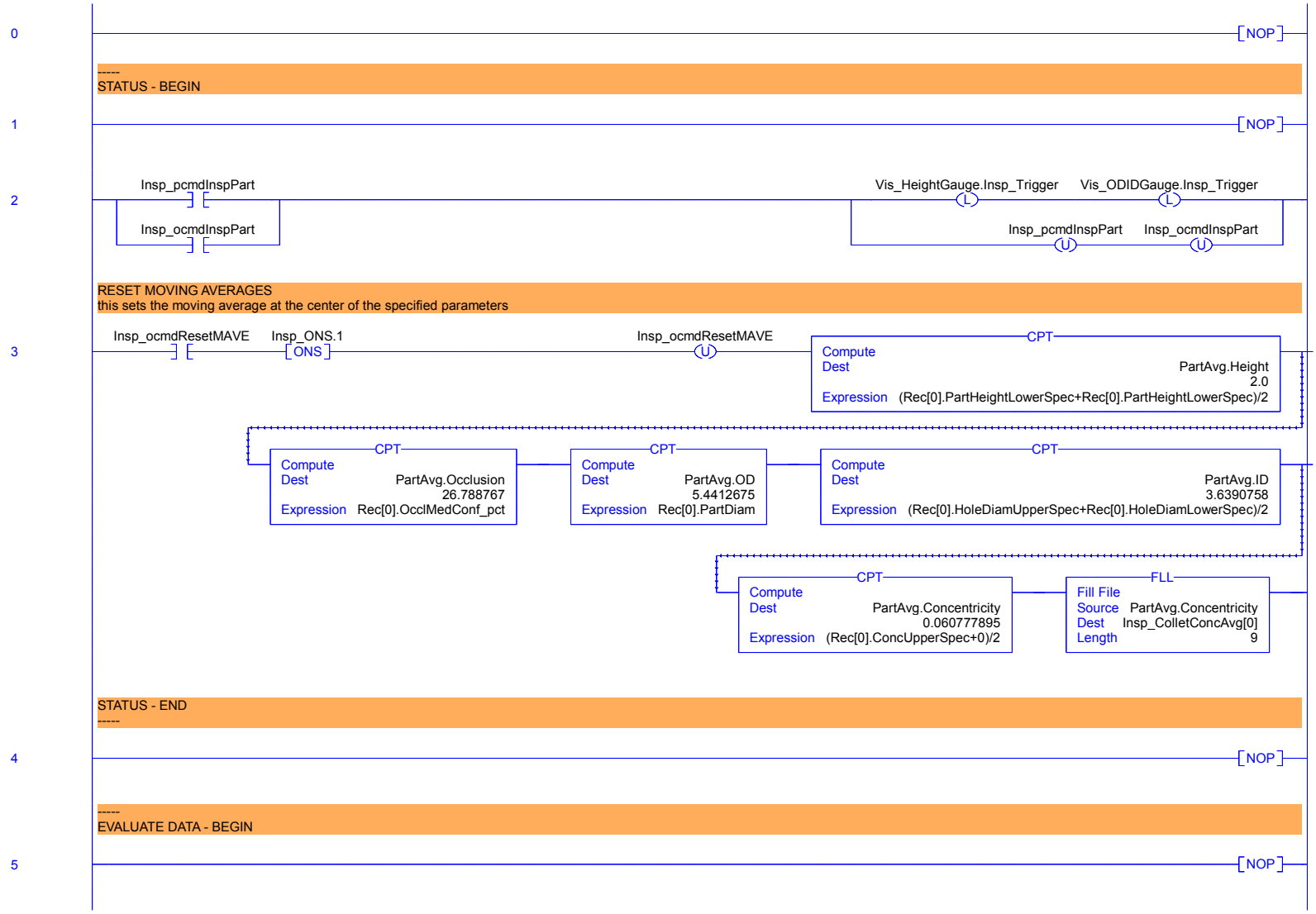
12

EQU
Equal
Source A Outfd_PickVacDescr 'Outfeed Pick Vac'
Source B Outfd_PickVacDescr 'Outfeed Pick Vac'

Air
Air Outfd_PickVac
permOn Always1 1
permOff Always1 1
cmdManEnable Sys.ManualMode 1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw <Local:4:I.Data.25> 1
outSolOn outOutfdPickVacOn <Local:6:O.Data.9> 0
stsOn
stsOff

(End)

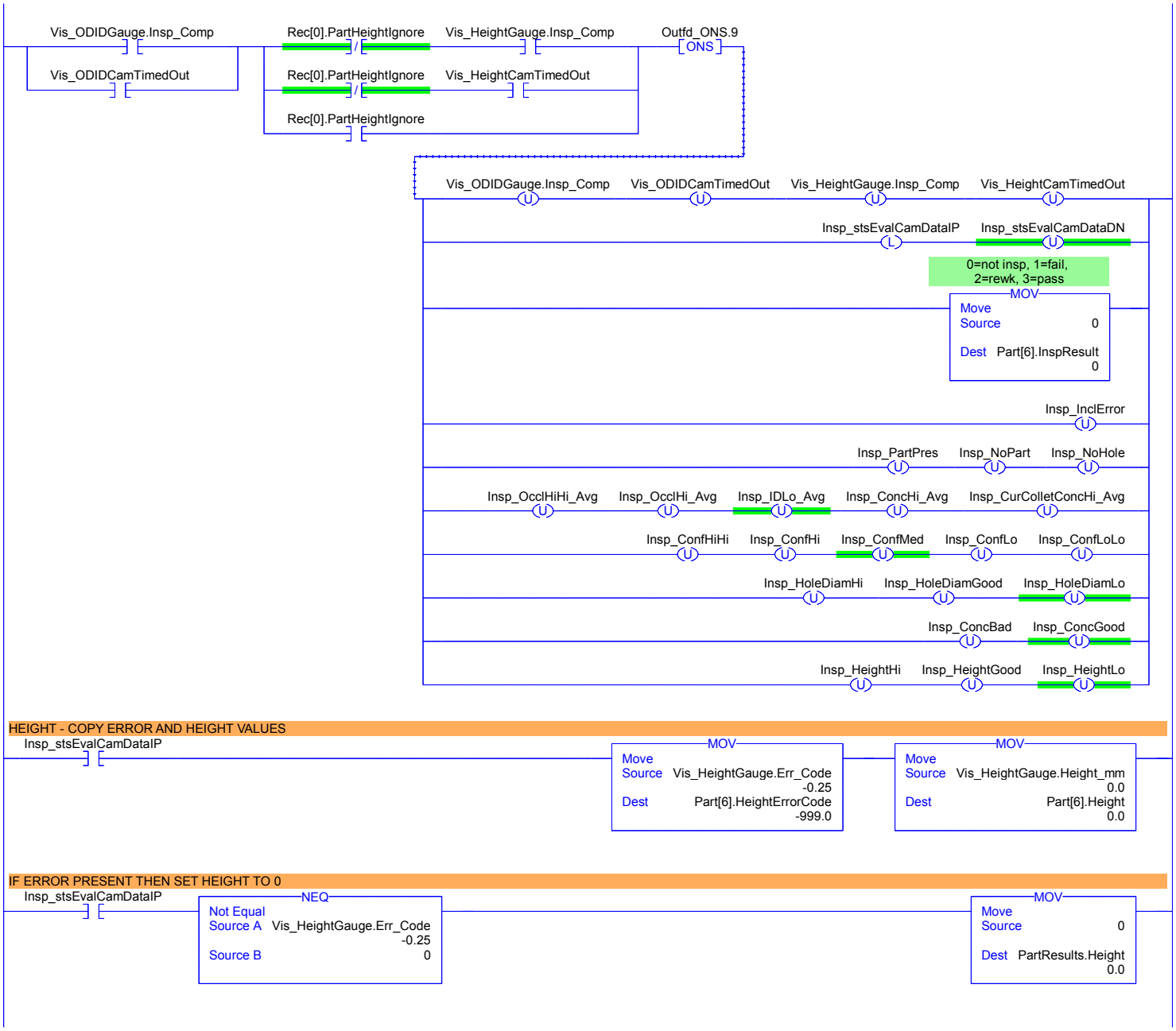

0
JSR
Jump To Subroutine
Routine Name CD_ChuteArm
JSR
Jump To Subroutine
Routine Name CD_Blowoff
JSR
Jump To Subroutine
Routine Name CD_Vis_ODID
JSR
Jump To Subroutine
Routine Name CD_Vis_Height
JSR
Jump To Subroutine
Routine Name CD_XfrArm
1
JSR
Jump To Subroutine
Routine Name Seq_Ctrl
JSR
Jump To Subroutine
Routine Name Seq_Outfeed
JSR
Jump To Subroutine
Routine Name R20_InspectPart
JSR
Jump To Subroutine
Routine Name R21_CollectPart
(End)


0
NOP

STATUS - BEGIN
1
NOP
2
Insp_pcmdInspPart
Insp_ocmdInspPart
Vis_HeightGauge.Insp_Trigger
L
Vis_ODIDGauge.Insp_Trigger
L
Insp_pcmdInspPart
U
Insp_ocmdInspPart
U
RESET MOVING AVERAGES
this sets the moving average at the center of the specified parameters
3
Insp_ocmdResetMAVE
Insp_ONS.1
ONS
Insp_ocmdResetMAVE
U
CPT
Compute
Dest PartAvg.Height
2.0
Expression (Rec[0].PartHeightLowerSpec+Rec[0].PartHeightLowerSpec)/2
CPT
Compute
Dest PartAvg.Occlusion
26.788767
Expression Rec[0].OcclMedConf_pct
CPT
Compute
Dest PartAvg.OD
5.4412675
Expression Rec[0].PartDiam
CPT
Compute
Dest PartAvg.ID
3.6390758
Expression (Rec[0].HoleDiamUpperSpec+Rec[0].HoleDiamLowerSpec)/2
CPT
Compute
Dest PartAvg.Concentricity
0.060777895
Expression (Rec[0].ConcUpperSpec+0)/2
FLL
Fill File
Source PartAvg.Concentricity
Dest Insp_ColletConcAvg[0]
Length 9
STATUS - END

4
NOP

EVALUATE DATA - BEGIN
5
NOP


6
Vis_ODIDGauge.Insp_Comp
Vis_ODIDCamTimedOut
Rec[0].PartHeightIgnore
Vis_HeightGauge.Insp_Comp
Rec[0].PartHeightIgnore
Vis_HeightCamTimedOut
Rec[0].PartHeightIgnore
Outfd_ONS.9
ONS
Vis_ODIDGauge.Insp_Comp
Vis_ODIDCamTimedOut
Vis_HeightGauge.Insp_Comp
Vis_HeightCamTimedOut
Insp_stsEvalCamDataIP
Insp_stsEvalCamDataDN
0=not insp, 1=fail, 2=rewk, 3=pass
MOV
Move
Source 0
Dest Part[6].InspResult
0
Insp_InclError
Insp_PartPres
Insp_NoPart
Insp_NoHole
Insp_OcclHiHi_Avg
Insp_OcclHi_Avg
Insp_IDLo_Avg
Insp_ConcHi_Avg
Insp_CurColletConcHi_Avg
Insp_ConfHiHi
Insp_ConfHi
Insp_ConfMed
Insp_ConfLo
Insp_ConfLoLo
Insp_HoleDiamHi
Insp_HoleDiamGood
Insp_HoleDiamLo
Insp_ConcBad
Insp_ConcGood
Insp_HeightHi
Insp_HeightGood
Insp_HeightLo
HEIGHT - COPY ERROR AND HEIGHT VALUES
7
Insp_stsEvalCamDataIP
MOV
Move
Source Vis_HeightGauge.Err_Code
-0.25
Dest Part[6].HeightErrorCode
-999.0
MOV
Move
Source Vis_HeightGauge.Height_mm
0.0
Dest Part[6].Height
0.0
IF ERROR PRESENT THEN SET HEIGHT TO 0
8
Insp_stsEvalCamDataIP
NEQ
Not Equal
Source A Vis_HeightGauge.Err_Code
-0.25
Source B 0
MOV
Move
Source 0
Dest PartResults.Height
0.0

ODID - COPY VALUES

9 Insp_stsEvalCamDataIP

MOV
Move
Source Vis_ODIDGauge.Err_Code
0.0
Dest Part[6].ODIDErrorCode
-999.0

MOV
Move
Source Vis_ODIDGauge.OD_mm
0.0
Dest Part[6].OD
0.0

CPT
Compute
Dest Part[6].Occlusion
0.0
Expression Vis_ODIDGauge.Inclusion_pct

LES
Less Than (A<B)
Source A Vis_ODIDGauge.Inclusion_pct
74.68225
Source B 0

MOV
Move
Source 0
Dest Part[6].Occlusion
0.0

MOV
Move
Source Vis_ODIDGauge.ID_mm
5.860709
Dest Part[6].ID
0.0

MOV
Move
Source Vis_ODIDGauge.Concentricity_mm
0.0
Dest Part[6].Concentricity
0.0

NO PART ERROR
- no part if no OD

10 Insp_stsEvalCamDataIP

NEQ
Not Equal
Source A Part[6].ODIDErrorCode
-999.0
Source B 0

LEQ
Less Than or Eql (A<=B)
Source A Part[6].OD
0.0
Source B 0

Insp_NoPart (L)

NO HOLE ERROR
- no hole if there is an OD and error code from camera

11 Insp_stsEvalCamDataIP

NEQ
Not Equal
Source A Part[6].ODIDErrorCode
-999.0
Source B 0

GRT
Greater Than (A>B)
Source A Part[6].OD
0.0
Source B 0

Insp_NoHole (L)

OCCLUSION ERROR
- if inclusion value from cam is out of range then error

12 Insp_stsEvalCamDataIP

LES
Less Than (A<B)
Source A Vis_ODIDGauge.Inclusion_pct
74.68225
Source B Insp_cfgIncl
-10

Insp_InclError (L)

IF ERRORS PRESENT THEN ADJUST RESULTS

13

Insp_stsEvalCamDataIP

Insp_NoPart

MOV Move Source 0 Dest Part[6].OD 0.0

MOV Move Source 0 Dest Part[6].Occlusion 0.0

MOV Move Source 0 Dest Part[6].ID 0.0

MOV Move Source 0 Dest Part[6].Concentricity 0.0

Insp_NoHole

GRT Greater Than (A>B) Source A Part[6].DrilledBy 0 Source B 0

CTU Count Up Counter Insp_ctrConsecNoHole Preset 5 Accum 0 (CU) (DN)

MOV Move Source Part[6].OD 0.0 Dest Part[6].OD 0.0

MOV Move Source 100 Dest Part[6].Occlusion 0.0

MOV Move Source 0 Dest Part[6].ID 0.0

MOV Move Source 0 Dest Part[6].Concentricity 0.0

Insp_NoHole

Insp_ctrConsecNoHole (RES)

Insp_InclError

(NOP)

OCCLUSION TEST
* note that occlusion test ignores the error code if OD is detected (part pres)

14

Insp_stsEvalCamDataIP

EQU Equal Source A Vis_ODIDGauge.Err_Code 0.0 Source B 0

Insp_NoHole

LEQ Less Than or Eql (A<=B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclHighConf_pct 20

Insp_ConfHiHi (L)

GRT Greater Than (A>B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclHighConf_pct 20

LEQ Less Than or Eql (A<=B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclMedConf_pct 40

Insp_ConfHi (L)

GRT Greater Than (A>B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclMedConf_pct 40

LEQ Less Than or Eql (A<=B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclLowConf_pct 75

Insp_ConfMed (L)

GRT Greater Than (A>B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclLowConf_pct 75

LEQ Less Than or Eql (A<=B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclNoConf_pct 95

Insp_ConfLo (L)

GRT Greater Than (A>B) Source A Part[6].Occlusion 0.0 Source B Rec[0].OcclNoConf_pct 95

Insp_ConfLoLo (L)

HOLE DIAMETER

15

Insp_stsEvalCamDataIP

EQU
Equal
Source A Vis_ODIDGauge.Err_Code 0.0
Source B 0

LES
Less Than (A<B)
Source A Part[6].ID 0.0
Source B Rec[0].HoleDiamLowerSpec 6.41
Insp_HoleDiamLo (L)

GEQ
Grtr Than or Eql (A>=B)
Source A Part[6].ID 0.0
Source B Rec[0].HoleDiamLowerSpec 6.41

LEQ
Less Than or Eql (A<=B)
Source A Part[6].ID 0.0
Source B Rec[0].HoleDiamUpperSpec 6.45
Insp_HoleDiamGood (L)

GRT
Greater Than (A>B)
Source A Part[6].ID 0.0
Source B Rec[0].HoleDiamUpperSpec 6.45
Insp_HoleDiamHi (L)

CONCENTRICITY

16

Insp_stsEvalCamDataIP

EQU
Equal
Source A Vis_ODIDGauge.Err_Code 0.0
Source B 0

LEQ
Less Than or Eql (A<=B)
Source A Part[6].Concentricity 0.0
Source B Rec[0].ConcUpperSpec 0.1
Insp_ConcGood (L)

GRT
Greater Than (A>B)
Source A Part[6].Concentricity 0.0
Source B Rec[0].ConcUpperSpec 0.1
Insp_ConcBad (L)

HEIGHT

17

Insp_stsEvalCamDataIP

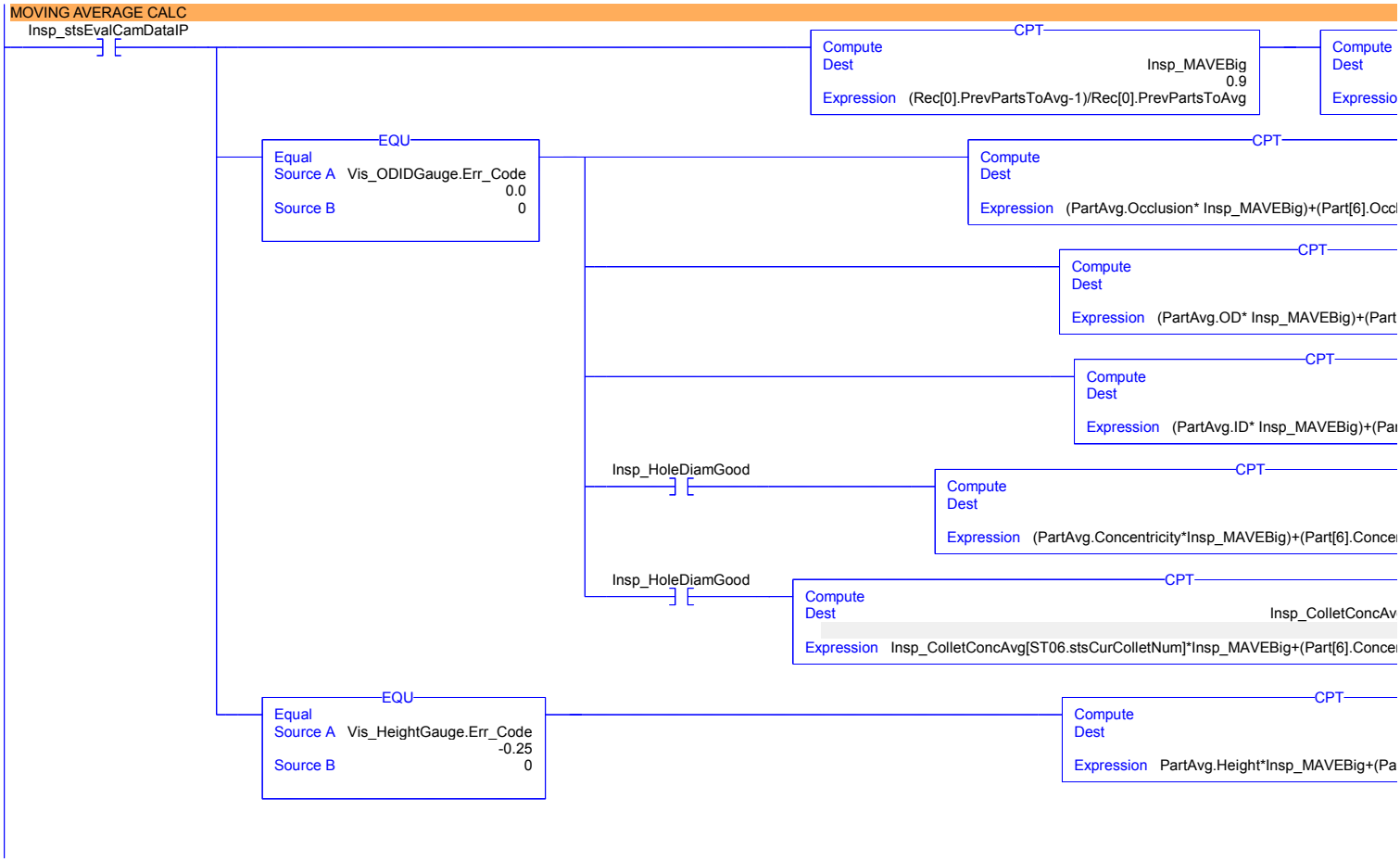
NEQ
Not Equal
Source A Vis_HeightGauge.Err_Code -0.25
Source B 0

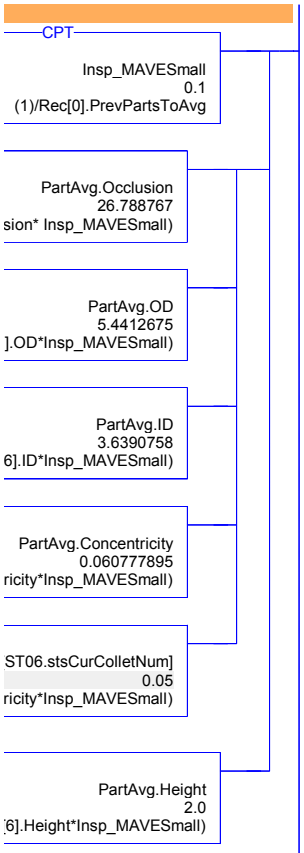
LES
Less Than (A<B)
Source A Part[6].ID 0.0
Source B Rec[0].PartHeightLowerSpec 6.91
Insp_HeightLo (L)

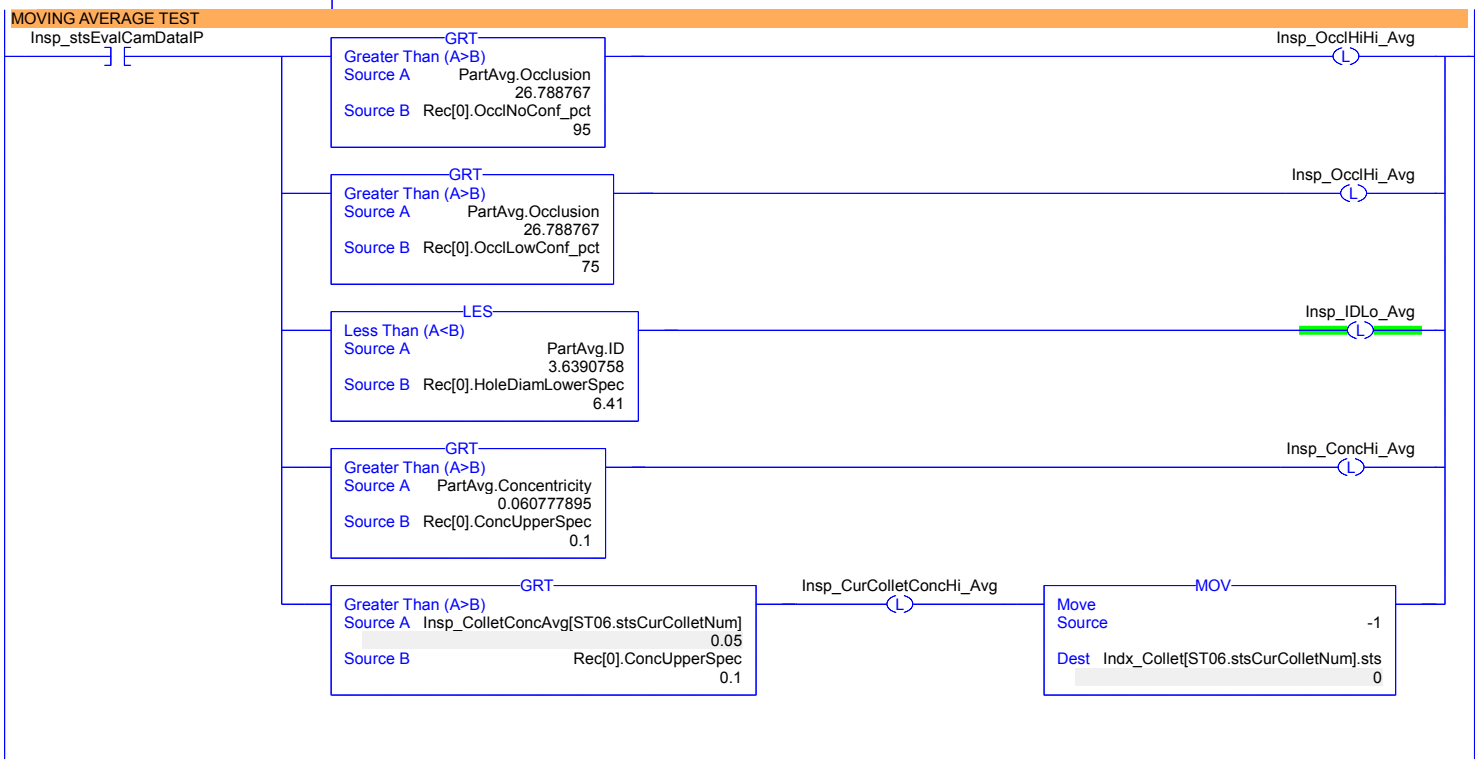
GEQ
Grtr Than or Eql (A>=B)
Source A Part[6].ID 0.0
Source B Rec[0].PartHeightLowerSpec 6.91

LEQ
Less Than or Eql (A<=B)
Source A Part[6].ID 0.0
Source B Rec[0].PartHeightUpperSpec 7.11
Insp_HeightGood (L)

GRT
Greater Than (A>B)
Source A Part[6].ID 0.0
Source B Rec[0].PartHeightUpperSpec 7.11
Insp_HeightHi (L)


MOVING AVERAGE CALC
18
Insp_stsEvalCamDataIP
CPT
Compute
Dest
Insp_MAVEBig
0.9
Expression (Rec[0].PrevPartsToAvg-1)/Rec[0].PrevPartsToAvg
Compute
Dest
Expressio
EQU
Equal
Source A Vis_ODIDGauge.Err_Code
0.0
Source B 0
CPT
Compute
Dest
Expression (PartAvg.Occlusion* Insp_MAVEBig)+(Part[6].Occl
CPT
Compute
Dest
Expression (PartAvg.OD* Insp_MAVEBig)+(Part
CPT
Compute
Dest
Expression (PartAvg.ID* Insp_MAVEBig)+(Par
Insp_HoleDiamGood
CPT
Compute
Dest
Expression (PartAvg.Concentricity*Insp_MAVEBig)+(Part[6].Concer
Insp_HoleDiamGood
CPT
Compute
Dest
Insp_ColletConcAv
Expression Insp_ColletConcAvg[ST06.stsCurColletNum]*Insp_MAVEBig+(Part[6].Concer
EQU
Equal
Source A Vis_HeightGauge.Err_Code
-0.25
Source B 0
CPT
Compute
Dest
Expression PartAvg.Height*Insp_MAVEBig+(Pa


CPT
Insp_MAVESmall
0.1
(1)/Rec[0].PrevPartsToAvg
PartAvg.Occlusion
26.788767
sion* Insp_MAVESmall)
PartAvg.OD
5.4412675
].OD*Insp_MAVESmall)
PartAvg.ID
3.6390758
6].ID*Insp_MAVESmall)
PartAvg.Concentricity
0.060777895
ricity*Insp_MAVESmall)
ST06.stsCurColletNum]
0.05
ricity*Insp_MAVESmall)
PartAvg.Height
2.0
6].Height*Insp_MAVESmall)


MOVING AVERAGE TEST
19
Insp_stsEvalCamDataIP
GRT
Greater Than (A>B)
Source A PartAvg.Occlusion
26.788767
Source B Rec[0].OcclNoConf_pct
95
Insp_OcclHiHi_Avg
GRT
Greater Than (A>B)
Source A PartAvg.Occlusion
26.788767
Source B Rec[0].OcclLowConf_pct
75
Insp_OcclHi_Avg
LES
Less Than (A<B)
Source A PartAvg.ID
3.6390758
Source B Rec[0].HoleDiamLowerSpec
6.41
Insp_IDLo_Avg
GRT
Greater Than (A>B)
Source A PartAvg.Concentricity
0.060777895
Source B Rec[0].ConcUpperSpec
0.1
Insp_ConcHi_Avg
GRT
Greater Than (A>B)
Source A Insp_ColletConcAvg[ST06.stsCurColletNum]
0.05
Source B Rec[0].ConcUpperSpec
0.1
Insp_CurColletConcHi_Avg
MOV
Move
Source -1
Dest Indx_Collet[ST06.stsCurColletNum].sts
0

REWORKS

20

Insp_stsEvalCamDataIP Rec[0].PartHeightIgnore

NEQ
Not Equal
Source A Vis_HeightGauge.Err_Code
-0.25
Source B 0

NEQ
Not Equal
Source A Vis_ODIDGauge.Err_Code
0.0
Source B 0

Insp_ConfLoLo

Insp_ConfLo

Insp_HoleDiamLo

Insp_ConcBad Insp_HoleDiamLo

0=not insp, 1=fail,
2=rewk, 3=pass

MOV
Move
Source 2
Dest Part[6].InspResult
0

GOOD

21

Insp_stsEvalCamDataIP

0=not insp, 1=fail,
2=rewk, 3=pass

NEQ
Not Equal
Source A Part[6].InspResult
0
Source B 2

Insp_ConfMed Insp_HoleDiamGood Insp_ConcGood Rec[0].PartHeightIgnore Insp_HeightGood

Insp_ConfHi

Insp_ConfHiHi

Rec[0].PartHeightIgnore

0=not insp, 1=fail,
2=rewk, 3=pass

MOV
Move
Source 3
Dest Part[6].InspResult
0

FAILS

22

Insp_stsEvalCamDataIP

0=not insp, 1=fail,
2=rewk, 3=pass

NEQ
Not Equal
Source A Part[6].InspResult
0
Source B 2

0=not insp, 1=fail,
2=rewk, 3=pass

NEQ
Not Equal
Source A Part[6].InspResult
0
Source B 3

0=not insp, 1=fail,
2=rewk, 3=pass

MOV
Move
Source 1
Dest Part[6].InspResult
0

Insp_stsEvalCamDataIP (U) Insp_stsEvalCamDataDN (L)

EVALUATE CURRENT PART- END

23

NOP

INDEX DATA ARRAY - BEGIN

24

NOP

command to copy data
most recent part data is stored at Part[0]
previous part data is shifted to Part[n+1]

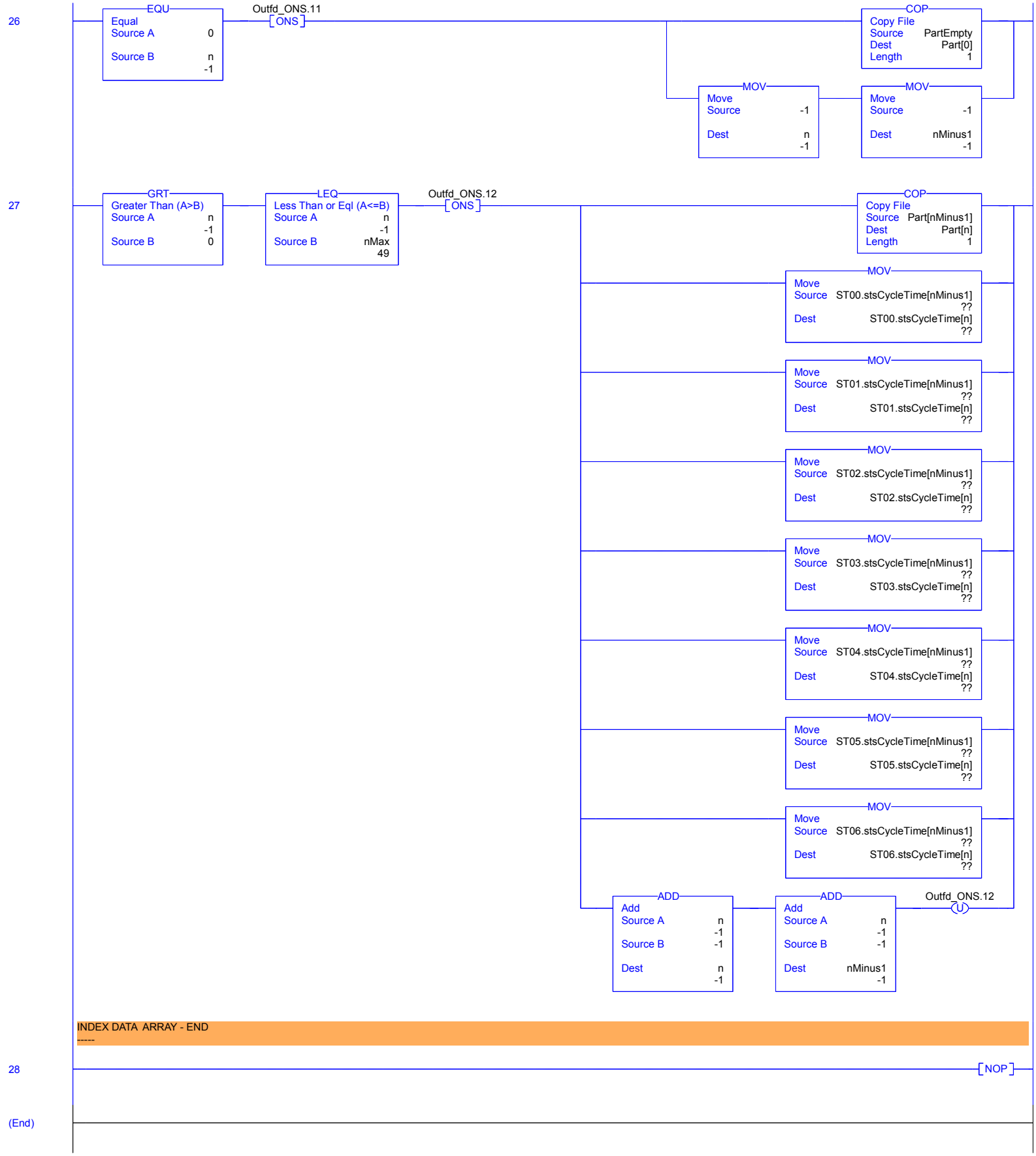
25

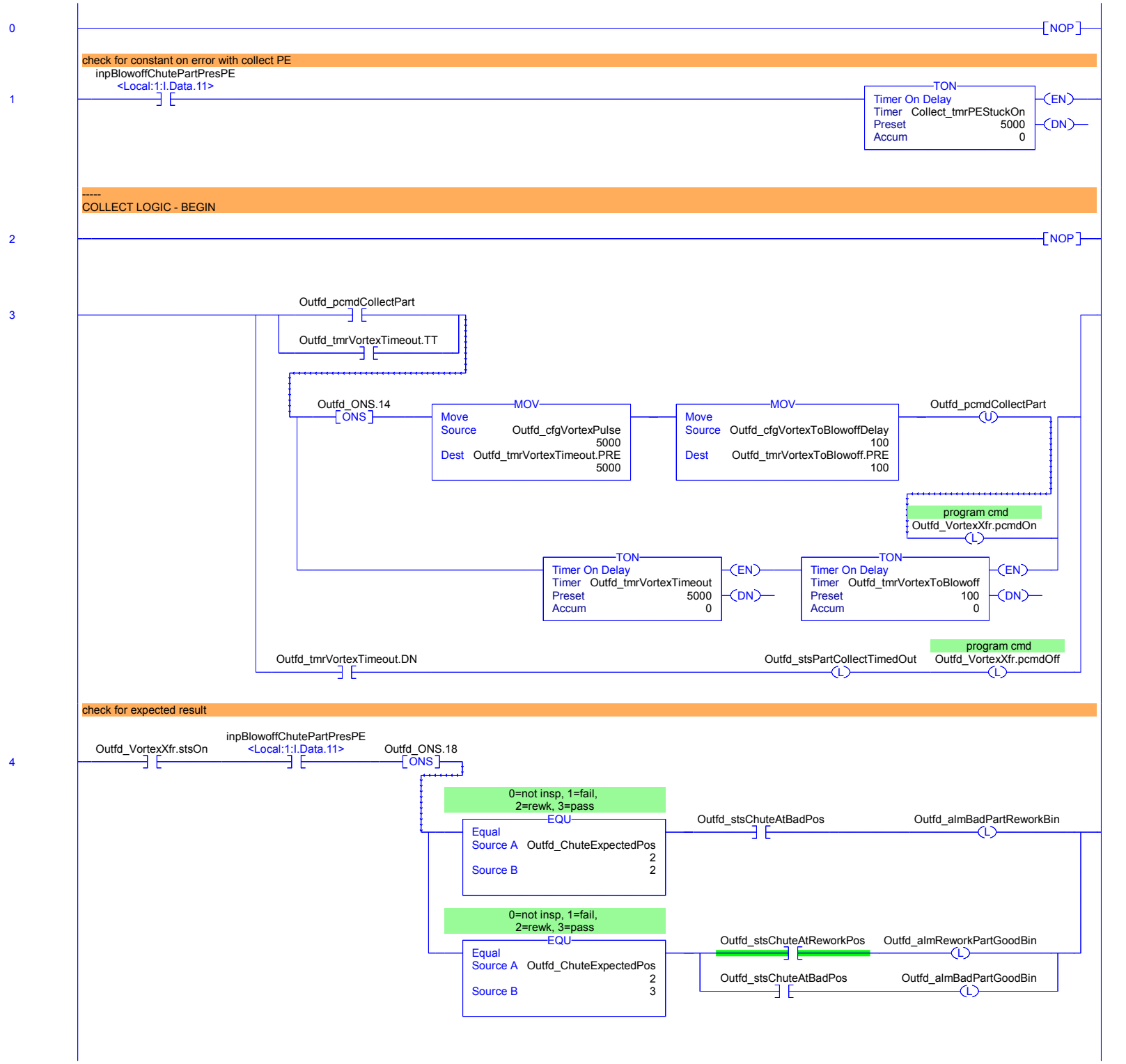
Indx_pcmdIndexPartArray Outfd_ONS.10 ONS

Indx_pcmdIndexPartArray (U)

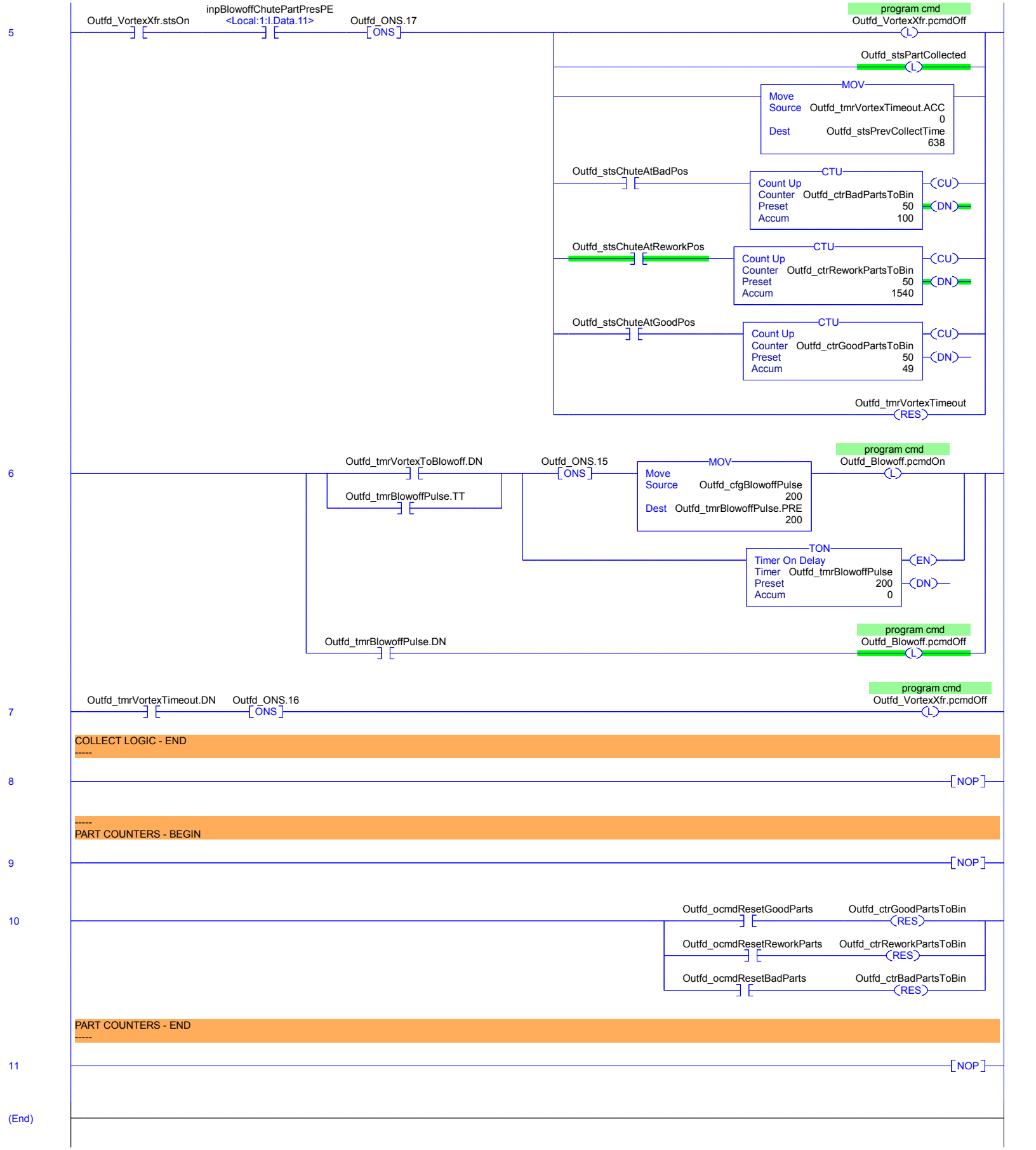
MOV
Move
Source nMax
49
Dest n
-1

ADD
Add
Source A n
-1
Source B -1
Dest nMinus1
-1


26
EQU
Equal
Source A 0
Source B n -1
Outfd_ONS.11
ONS
COP
Copy File
Source PartEmpty
Dest Part[0]
Length 1
MOV
Move
Source -1
Dest n -1
MOV
Move
Source -1
Dest nMinus1 -1
27
GRT
Greater Than (A>B)
Source A n -1
Source B 0
LEQ
Less Than or Eql (A<=B)
Source A n -1
Source B nMax 49
Outfd_ONS.12
ONS
COP
Copy File
Source Part[nMinus1]
Dest Part[n]
Length 1
MOV
Move
Source ST00.stsCycleTime[nMinus1] ??
Dest ST00.stsCycleTime[n] ??
MOV
Move
Source ST01.stsCycleTime[nMinus1] ??
Dest ST01.stsCycleTime[n] ??
MOV
Move
Source ST02.stsCycleTime[nMinus1] ??
Dest ST02.stsCycleTime[n] ??
MOV
Move
Source ST03.stsCycleTime[nMinus1] ??
Dest ST03.stsCycleTime[n] ??
MOV
Move
Source ST04.stsCycleTime[nMinus1] ??
Dest ST04.stsCycleTime[n] ??
MOV
Move
Source ST05.stsCycleTime[nMinus1] ??
Dest ST05.stsCycleTime[n] ??
MOV
Move
Source ST06.stsCycleTime[nMinus1] ??
Dest ST06.stsCycleTime[n] ??
ADD
Add
Source A n -1
Source B -1
Dest n -1
ADD
Add
Source A n -1
Source B -1
Dest nMinus1 -1
Outfd_ONS.12
U
INDEX DATA ARRAY - END
28
NOP
(End)


0
NOP
check for constant on error with collect PE
inpBlowoffChutePartPresPE
<Local:1:I.Data.11>
1
TON
Timer On Delay
Timer Collect_tmrPEStuckOn
Preset 5000
Accum 0
EN
DN

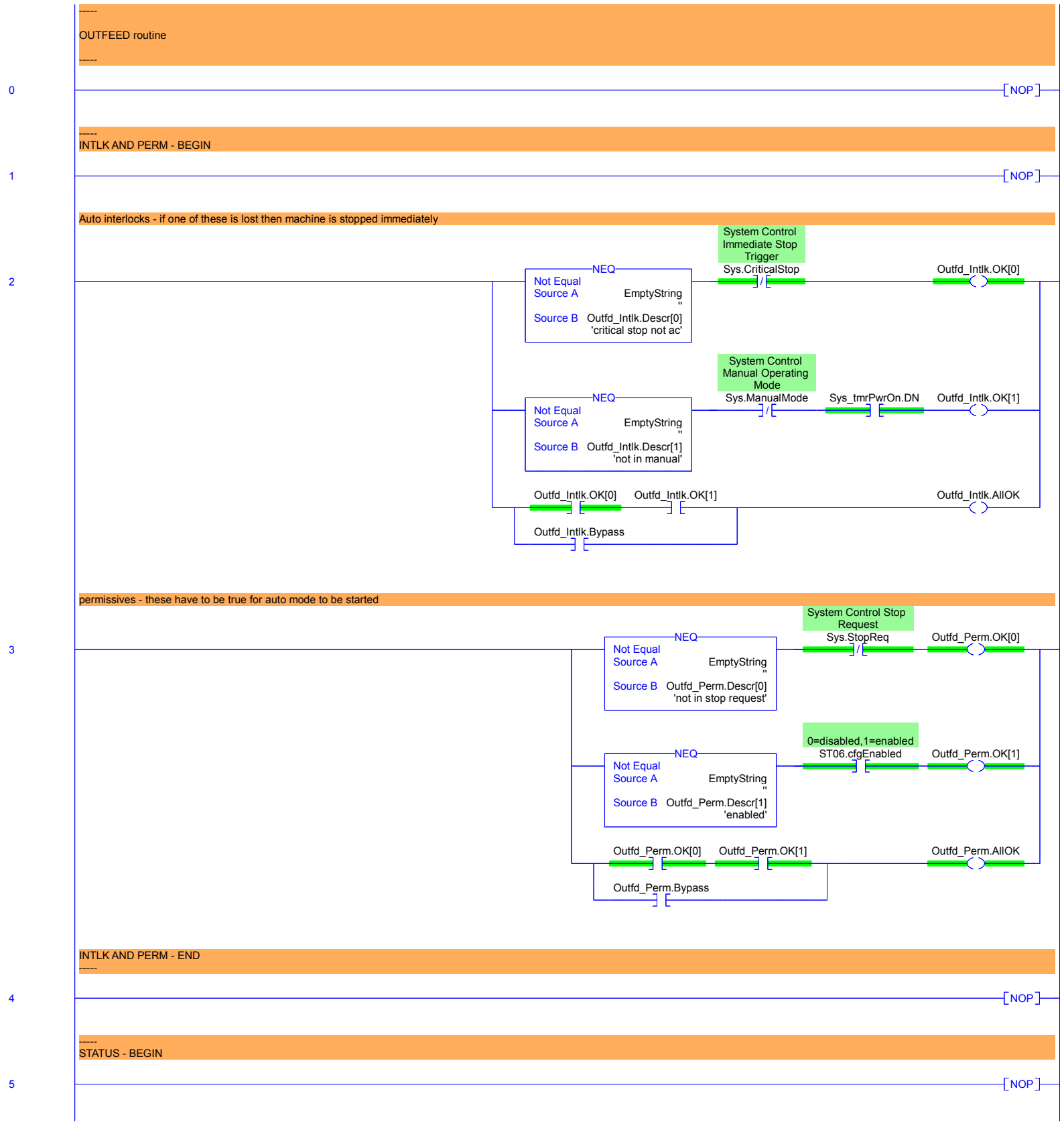
COLLECT LOGIC - BEGIN
2
NOP
3
Outfd_pcmdCollectPart
Outfd_tmrVortexTimeout.TT
Outfd_ONS.14
ONS
MOV
Move
Source Outfd_cfgVortexPulse 5000
Dest Outfd_tmrVortexTimeout.PRE 5000
MOV
Move
Source Outfd_cfgVortexToBlowoffDelay 100
Dest Outfd_tmrVortexToBlowoff.PRE 100
Outfd_pcmdCollectPart
U
program cmd
Outfd_VortexXfr.pcmdOn
L
TON
Timer On Delay
Timer Outfd_tmrVortexTimeout
Preset 5000
Accum 0
EN
DN
TON
Timer On Delay
Timer Outfd_tmrVortexToBlowoff
Preset 100
Accum 0
EN
DN
Outfd_tmrVortexTimeout.DN
Outfd_stsPartCollectTimedOut
L
program cmd
Outfd_VortexXfr.pcmdOff
L
check for expected result
4
Outfd_VortexXfr.stsOn
inpBlowoffChutePartPresPE
<Local:1:I.Data.11>
Outfd_ONS.18
ONS
0=not insp, 1=fail,
2=rewk, 3=pass
EQU
Equal
Source A Outfd_ChuteExpectedPos 2
Source B 2
Outfd_stsChuteAtBadPos
Outfd_almBadPartReworkBin
L
0=not insp, 1=fail,
2=rewk, 3=pass
EQU
Equal
Source A Outfd_ChuteExpectedPos 2
Source B 3
Outfd_stsChuteAtReworkPos
Outfd_almReworkPartGoodBin
L
Outfd_stsChuteAtBadPos
Outfd_almBadPartGoodBin
L


5
Outfd_VortexXfr.stsOn
inpBlowoffChutePartPresPE
<Local:1:I.Data.11>
Outfd_ONS.17
ONS
program cmd
Outfd_VortexXfr.pcmdOff
L
Outfd_stsPartCollected
L
MOV
Move
Source Outfd_tmrVortexTimeout.ACC
0
Dest Outfd_stsPrevCollectTime
638
Outfd_stsChuteAtBadPos
CTU
Count Up
Counter Outfd_ctrBadPartsToBin
Preset 50
Accum 100
CU
DN
Outfd_stsChuteAtReworkPos
CTU
Count Up
Counter Outfd_ctrReworkPartsToBin
Preset 50
Accum 1540
CU
DN
Outfd_stsChuteAtGoodPos
CTU
Count Up
Counter Outfd_ctrGoodPartsToBin
Preset 50
Accum 49
CU
DN
Outfd_tmrVortexTimeout
RES
6
Outfd_tmrVortexToBlowoff.DN
Outfd_tmrBlowoffPulse.TT
Outfd_ONS.15
ONS
MOV
Move
Source Outfd_cfgBlowoffPulse
200
Dest Outfd_tmrBlowoffPulse.PRE
200
program cmd
Outfd_Blowoff.pcmdOn
L
TON
Timer On Delay
Timer Outfd_tmrBlowoffPulse
Preset 200
Accum 0
EN
DN
Outfd_tmrBlowoffPulse.DN
program cmd
Outfd_Blowoff.pcmdOff
L
7
Outfd_tmrVortexTimeout.DN
Outfd_ONS.16
ONS
program cmd
Outfd_VortexXfr.pcmdOff
L
COLLECT LOGIC - END

8
NOP

PART COUNTERS - BEGIN
9
NOP
10
Outfd_ocmdResetGoodParts
Outfd_ctrGoodPartsToBin
RES
Outfd_ocmdResetReworkParts
Outfd_ctrReworkPartsToBin
RES
Outfd_ocmdResetBadParts
Outfd_ctrBadPartsToBin
RES
PART COUNTERS - END

11
NOP
(End)



OUTFEED routine

0
NOP

INTLK AND PERM - BEGIN
1
NOP
Auto interlocks - if one of these is lost then machine is stopped immediately
System Control Immediate Stop Trigger
NEQ
Not Equal
Source A EmptyString ''
Source B Outfd_Intlk.Descr[0] 'critical stop not ac'
Sys.CriticalStop
Outfd_Intlk.OK[0]
2
System Control Manual Operating Mode
NEQ
Not Equal
Source A EmptyString ''
Source B Outfd_Intlk.Descr[1] 'not in manual'
Sys.ManualMode
Sys_tmrPwrOn.DN
Outfd_Intlk.OK[1]
Outfd_Intlk.OK[0]
Outfd_Intlk.OK[1]
Outfd_Intlk.AllOK
Outfd_Intlk.Bypass
permissives - these have to be true for auto mode to be started
System Control Stop Request
NEQ
Not Equal
Source A EmptyString ''
Source B Outfd_Perm.Descr[0] 'not in stop request'
Sys.StopReq
Outfd_Perm.OK[0]
3
0=disabled,1=enabled
NEQ
Not Equal
Source A EmptyString ''
Source B Outfd_Perm.Descr[1] 'enabled'
ST06.cfgEnabled
Outfd_Perm.OK[1]
Outfd_Perm.OK[0]
Outfd_Perm.OK[1]
Outfd_Perm.AllOK
Outfd_Perm.Bypass
INTLK AND PERM - END

4
NOP

STATUS - BEGIN
5
NOP

CYCLE TIMER

System Control
System Running All

6
Sys.Running
Outfd_SeqDone Outfd_ONS.31
ONS
MOV
Move
Source ST06.tmrCycle.ACC
0
Dest ST06.stsCycleTime[0]
4821
cycle timer
Outfd_SeqDone
TON
Timer On Delay
Timer ST06.tmrCycle
Preset 60000
Accum 0
EN
DN

part picked and placed

7
Outfd_stsPartPicked Outfd_ONS.5 Outfd_stsPickPartPres Outfd_stsPartPicked
ONS L U
Outfd_stsPartPlaced Outfd_ONS.6 Outfd_stsPickPartPres Collect_stsPartPres Outfd_stsPartPlaced
ONS U L U

8
inpBlowoffChutePartPresPE
<Local:1:I.Data.11>
CTU
Count Up
Counter Outfd_ctrChuteParts
Preset 0
Accum 0
CU
DN

9
TON
Timer On Delay
Timer Outfd_tmrCycle
Preset 1000000
Accum 0
EN
DN
Outfd_ctrChuteParts.DN
DIV
Divide
Source A Outfd_tmrCycle.ACC
0
Source B 3
Dest Outfd_ppmreal
0.0
Outfd_ctrChuteParts Outfd_tmrCycle
RES RES

10
EQU
Equal
Source A 400
Source B Collect_Seq
999
NOP

11
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
LES
Less Than (A<B)
Source A Outfd_Seq
361
Source B 100
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
LES
Less Than (A<B)
Source A Collect_Seq
999
Source B 100
ST06.stsOkToIndex
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
EQU
Equal
Source A Outfd_Seq
361
Source B 999
10-99 - pre table work
100-899 - table work
900-999 - go to ready pos
EQU
Equal
Source A Collect_Seq
999
Source B 999

STATUS - END

12
NOP

SEQUENCE - BEGIN

13

EQU
Equal
Source A 400
Source B Outfd_Seq 361

TON
Timer On Delay
Timer Out_CameraTimeout
Preset 1000
Accum 0
EN
DN

10-99 - pre table work
100-899 - table work
900-999 - go to ready pos

Out_CameraTimeout.DN

MOV
Move
Source 499
Dest Outfd_Seq 361

trigger pick part sequence

14

jlbBool.4 Outfd_ONS.1 ONS

Outfd_pcmdPickPart L

trigger place part seq

15

Indexing Wheel is stopped and in pos

jlbBool.5 Outfd_ONS.2 ONS Indx_stsReadyForWork

Outfd_pcmdPlacePart L

16

Outfd_Intlk.AllOK

SFR
SFC Reset
SFC Routine Name Seq_Outfeed
Step Name Outfd_Step_900

SFP
SFC Pause
SFC Routine Name Seq_Outfeed
Target State Pause

RESET seq to ready pos logic IF
- interlocks are not met

17

ST06.ocmdGoToReady Outfd_ONS.3 ONS

Outfd_HMI_SeqRetry

SFR
SFC Reset
SFC Routine Name Seq_Outfeed
Step Name Outfd_Step_900

SFP
SFC Pause
SFC Routine Name Seq_Outfeed
Target State Execute

ST06.ocmdGoToReady

ST06.ocmdGoToReady U

RESET seqence to top IF
- stop has been hit
- interlocks are all ok
- permissives are all ok

18

Outfd_Stop_999.X Outfd_Intlk.AllOK Outfd_Perm.AllOK

System Control
System Running All
Sys.Running

ST06.pcmdOneCycle Outfd_ONS.7 ONS

System Control
System Running All
Sys.Running

ST06.ocmdOneCycle

SFR
SFC Reset
SFC Routine Name Seq_Outfeed
Step Name Outfd_Step_010

SFP
SFC Pause
SFC Routine Name Seq_Outfeed
Target State Execute

ST06.pcmdOneCycle

ST06.ocmdOneCycle

ST06.pcmdOneCycle U ST06.ocmdOneCycle U

SEQUENCE - END

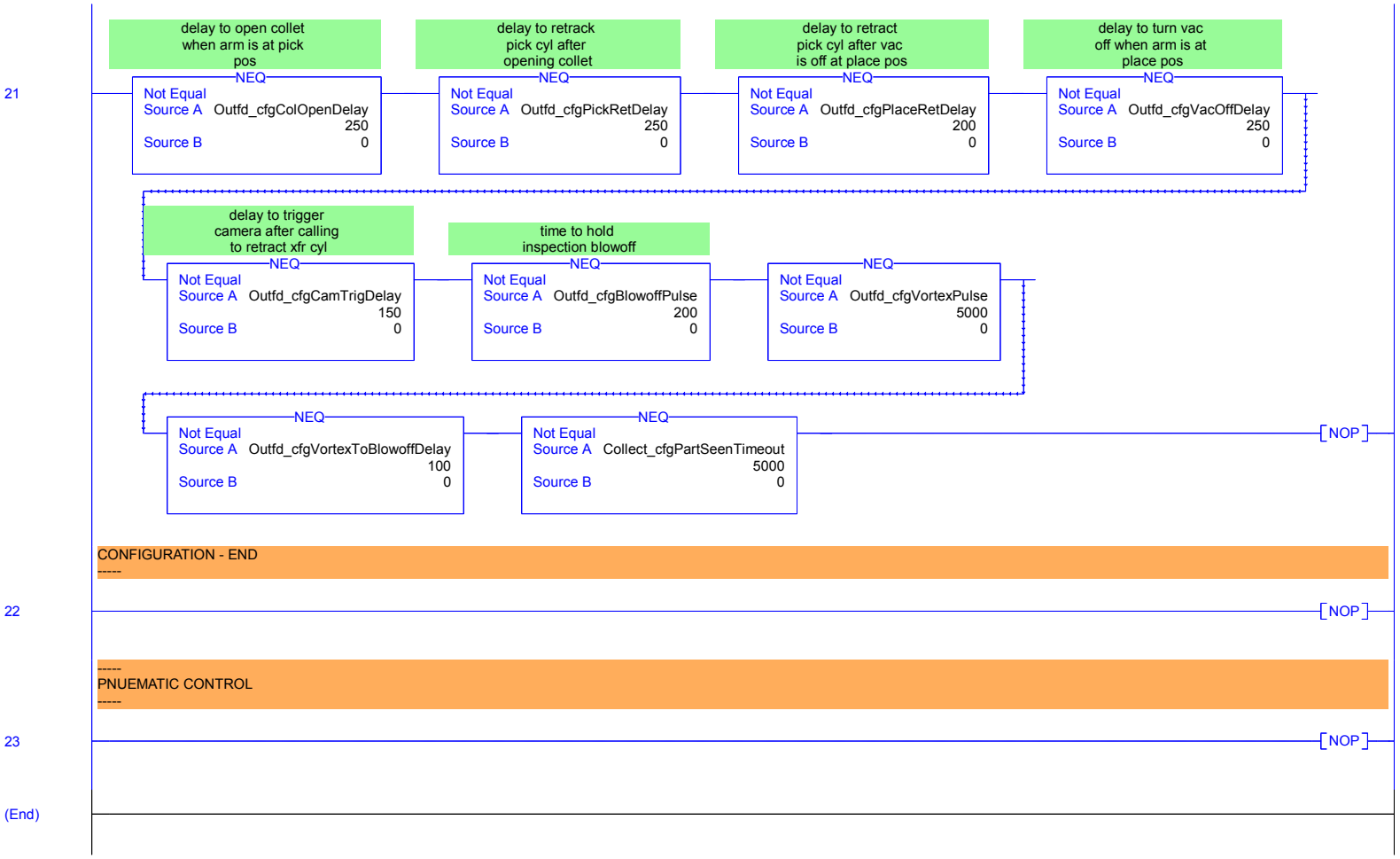
19

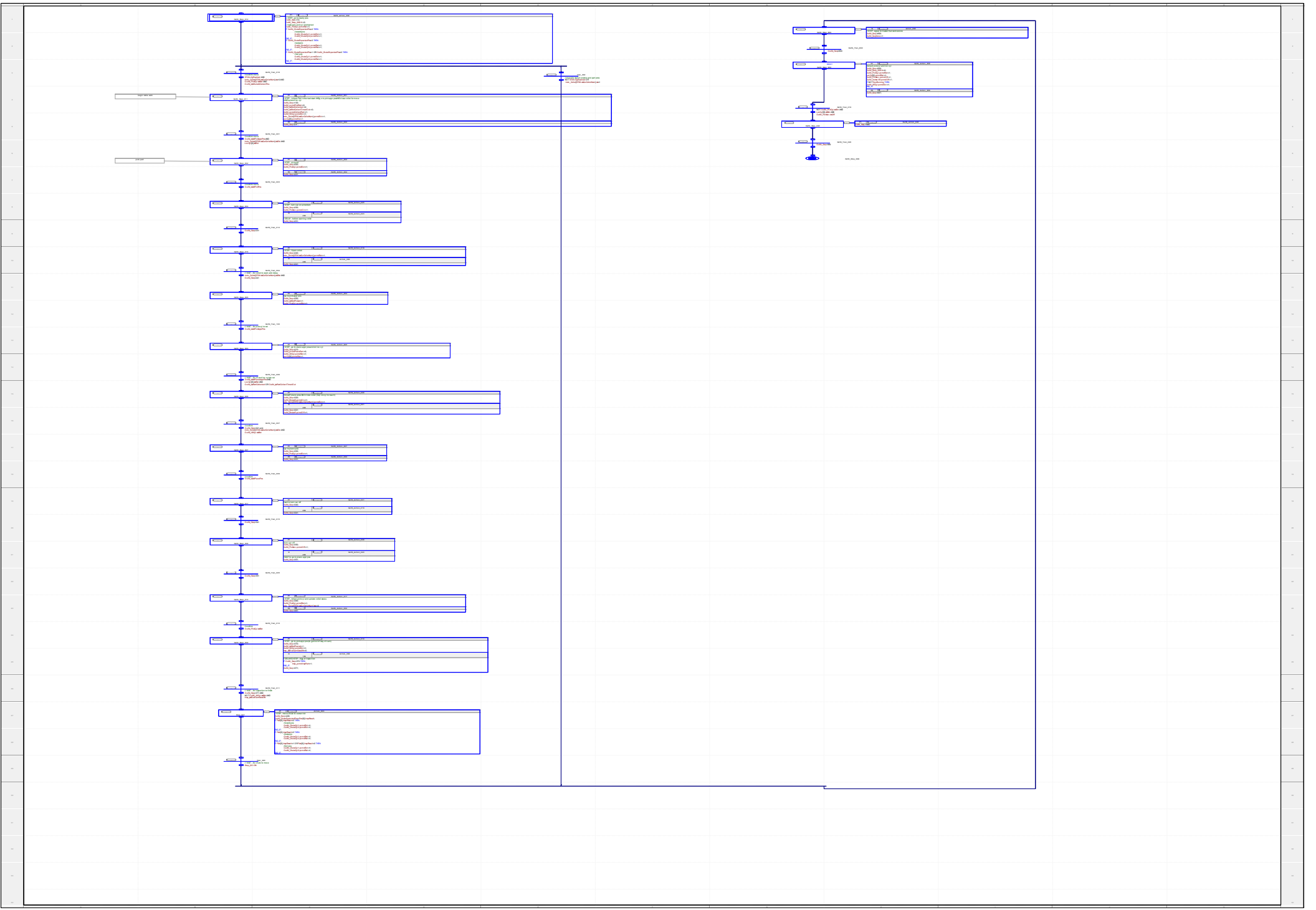
NOP

CONFIGURATION - START

20

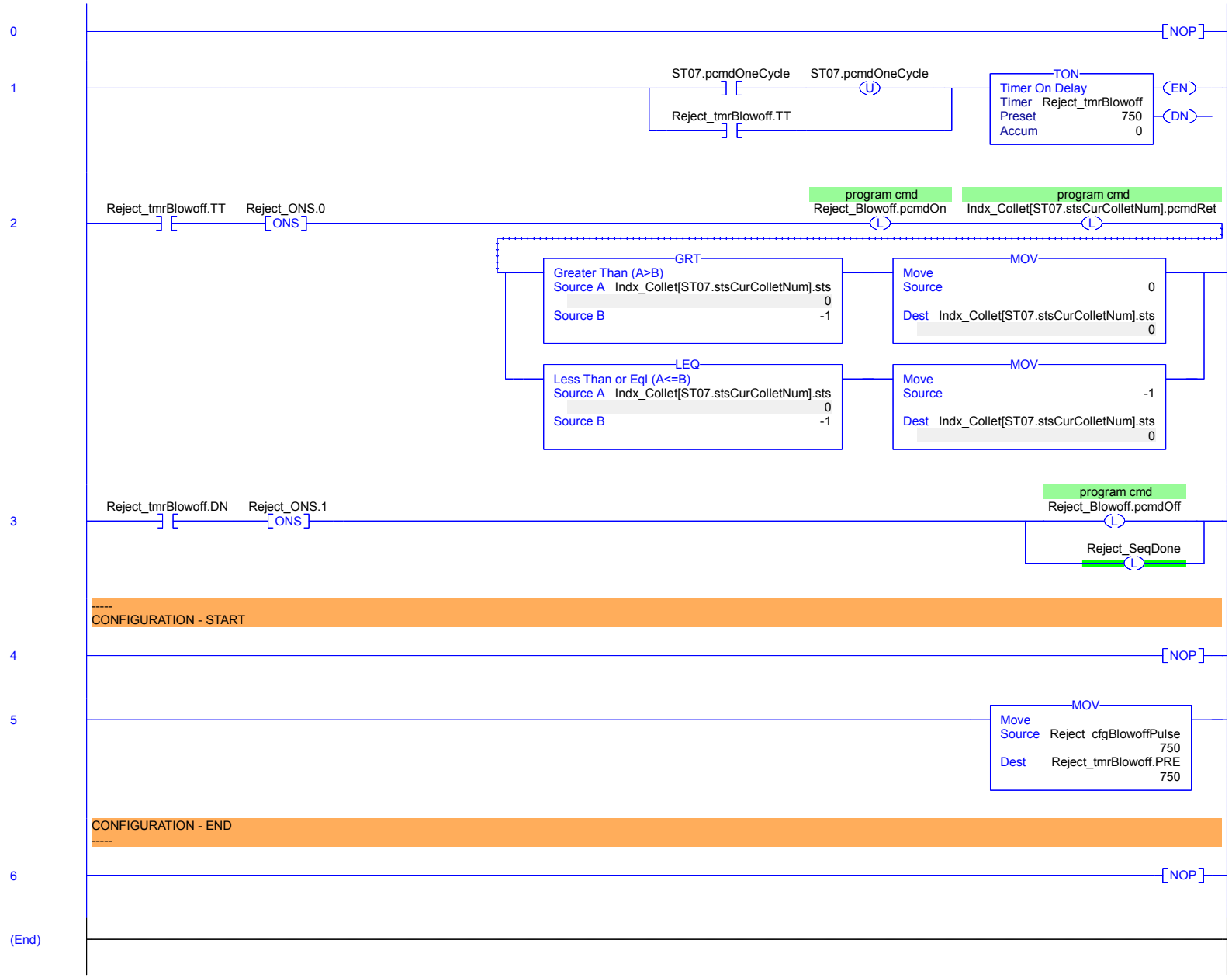
NOP


delay to open collet when arm is at pick pos
delay to retrack pick cyl after opening collet
delay to retract pick cyl after vac is off at place pos
delay to turn vac off when arm is at place pos
21
NEQ
Not Equal
Source A Outfd_cfgColOpenDelay
250
Source B 0
NEQ
Not Equal
Source A Outfd_cfgPickRetDelay
250
Source B 0
NEQ
Not Equal
Source A Outfd_cfgPlaceRetDelay
200
Source B 0
NEQ
Not Equal
Source A Outfd_cfgVacOffDelay
250
Source B 0
delay to trigger camera after calling to retract xfr cyl
time to hold inspection blowoff
NEQ
Not Equal
Source A Outfd_cfgCamTrigDelay
150
Source B 0
NEQ
Not Equal
Source A Outfd_cfgBlowoffPulse
200
Source B 0
NEQ
Not Equal
Source A Outfd_cfgVortexPulse
5000
Source B 0
NEQ
Not Equal
Source A Outfd_cfgVortexToBlowoffDelay
100
Source B 0
NEQ
Not Equal
Source A Collect_cfgPartSeenTimeout
5000
Source B 0
NOP
CONFIGURATION - END
22
NOP
PNUEMATIC CONTROL
23
NOP
(End)




0
NOP
reject blowoff
1
EQU
Equal
Source A Outfd_RejectBlowoffDescr
'Reject Blowoff'
Source B Outfd_RejectBlowoffDescr
'Reject Blowoff'
Air
Air Reject_Blowoff
permOn Always1
1
permOff Always1
1
cmdManEnable Sys.ManualMode
1
pcmdOn 0
pcmdOff 0
ocmdOn 0
ocmdOff 0
S_O_L_E_N_O_I_D_I_O 0
inpAirPressOK inpAirPressSw
<Local:4:I.Data.25>
1
outSolOn outRejectBlowoff
<VB2:O.Data[3].2>
0
stsOn
stsOff
(End)


0
NOP
inputs
1
NOP
sequence
2
JSR
Jump To Subroutine
Routine Name R10_Reject
control devices
3
JSR
Jump To Subroutine
Routine Name CD_RejectBlowoff
(End)


0
NOP
1
ST07.pcmdOneCycle
ST07.pcmdOneCycle
U
Reject_tmrBlowoff.TT
TON
Timer On Delay
Timer Reject_tmrBlowoff
Preset 750
Accum 0
EN
DN
2
Reject_tmrBlowoff.TT
Reject_ONS.0
ONS
program cmd
Reject_Blowoff.pcmdOn
L
program cmd
Indx_Collet[ST07.stsCurColletNum].pcmdRet
L
GRT
Greater Than (A>B)
Source A Indx_Collet[ST07.stsCurColletNum].sts 0
Source B -1
MOV
Move
Source 0
Dest Indx_Collet[ST07.stsCurColletNum].sts 0
LEQ
Less Than or Eql (A<=B)
Source A Indx_Collet[ST07.stsCurColletNum].sts 0
Source B -1
MOV
Move
Source -1
Dest Indx_Collet[ST07.stsCurColletNum].sts 0
3
Reject_tmrBlowoff.DN
Reject_ONS.1
ONS
program cmd
Reject_Blowoff.pcmdOff
L
Reject_SeqDone
L

CONFIGURATION - START
4
NOP
5
MOV
Move
Source Reject_cfgBlowoffPulse 750
Dest Reject_tmrBlowoff.PRE 750
CONFIGURATION - END

6
NOP
(End)