State Machine

0
S:FS

MOV
Move
Source   0
Dest   Current_State
0

MOV
Move
Source   0
Dest   Next_State
0

1
NEQ
Not Equal
Source A   Current_State
0
Source B   Next_State
0

MOV
Move
Source   Next_State
0
Dest   Current_State
0

2
EQU
Equal
Source A   Current_State
0
Source B   0

S2_start_bit

MOV
Move
Source   1
Dest   Next_State
0

3
EQU
Equal
Source A   Current_State
0
Source B   1

S2_Cap_Lift_Bit

MOV
Move
Source   2
Dest   Next_State
0

4
EQU
Equal
Source A   Current_State
0
Source B   2

S2_Elevator_Delay_timer.DN

MOV
Move
Source   3
Dest   Next_State
0

5
EQU
Equal
Source A   Current_State
0
Source B   3

S2_Part_Top_Elevator_Bit   S2_Lift_Rise_timer.DN   Height_accepted_bit

MOV
Move
Source   4
Dest   Next_State
0

rejection rung

6

EQU
Equal
Source A Current_State
                    0
Source B   3

S2_Part_Top_Elevator_Bit   S2_Lift_Rise_timer.DN   Height_accepted_bit
    ] [   ] [   ] / [

Height_rejected_bit

EQU
Equal
Source A   wheel_colour
                    1
Source B   1

GEQ
Grtr Than or Eql (A>=B)
Source A   WheelCount_ALL.BLACK_COUNT.ACC
                                    0
Source B   6

WheelCount_Station[2].BLACK_COUNT.DN
    ] [

EQU
Equal
Source A   wheel_colour
                    1
Source B   2

GEQ
Grtr Than or Eql (A>=B)
Source A   WheelCount_ALL.RED_COUNT.ACC
                                    0
Source B   6

WheelCount_Station[2].RED_COUNT.DN
    ] [

EQU
Equal
Source A   wheel_colour
                    1
Source B   3

GEQ
Grtr Than or Eql (A>=B)
Source A   WheelCount_ALL.METAL_COUNT.ACC
                                    0
Source B   6

WheelCount_Station[2].METAL_COUNT.DN
    ] [

MOV
Move
Source   14

Dest   Next_State
                     0

drop_lift
  ( )

7

EQU
Equal
Source A Current_State
                    0
Source B   4

S2_Conveyor_Delay_timer.DN
    ] [

MOV
Move
Source   5

Dest   Next_State
                     0

8
```
         EQU                          S2_Cylinder_extend_bit              MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source          6
                           0                                             Dest      Next_State
         Source B          5                                                               0
```

9
```
         EQU                          S2_Part_Pick_Ready_Bit             MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source          7
                           0                                             Dest      Next_State
         Source B          6                                                               0
```

10
```
         EQU                          Pick_Move_Done                     MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source          9
                           0                                             Dest      Next_State
         Source B          7                                                               0
```

11
```
         EQU                          S2_Gantry_Arm_Extended_Bit         MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source         10
                           0                                             Dest      Next_State
         Source B          9                                                               0

                                                                         Pick_Move_Done
                                                                              (U)
```

12
```
         EQU                          S2_Gantry_Arm_Retracted_Bit        MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source         11
                           0                                             Dest      Next_State
         Source B         10                                                              0
```

13
```
         EQU                          Move_Done_Bit                      MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source         12
                           0                                             Dest      Next_State
         Source B         11                                                              0
```

14
```
         EQU                          S2_Gantry_Arm_Extended_Bit         MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source         13
                           0                                             Dest      Next_State
         Source B         12                                                              0

                                                                         Move_Done_Bit
                                                                              (U)
```

15
```
         EQU                          S2_Gantry_Arm_Retracted_Bit        MOV
         Equal                              ] [                          Move
         Source A  Current_State                                         Source          1
                           0                                             Dest      Next_State
         Source B         13                                                              0
```

16

```
         EQU                 S2_LiftSen_Bottom_Bit    S2_Cylinder_extend_bit          MOV
     ┌─ Equal ──────────┐    ──┤ ├──          ──┤ ├──                            ┌─ Move ──────────┐
       Source A  Current_State                                                      Source          1
                       0                                                            Dest    Next_State
       Source B        14                                                                            0
     └──────────────────┘                                                         └──────────────────┘
```

17   ─[NOP]─

                                   Enter Test Bench State

18
```
   S2_TestBenchStateEnter    TB_ONS1                                              MOV
     ──┤ ├──          ──[ ONS ]──                                       ┌─ Move ──────────┐
                                                                           Source        100
                                                                           Dest    Next_State
                                                                                             0
                                                                        └──────────────────┘
                                                                                 MOV
                                                                        ┌─ Move ──────────┐
                                                                           Source        100
                                                                           Dest    Current_State
                                                                                             0
                                                                        └──────────────────┘
```

                                   Leave Test Bench State

19
```
   S2_TestBenchStateExit    TB_ONS2                                               MOV
     ──┤ ├──          ──[ ONS ]──                                       ┌─ Move ──────────┐
                                                                           Source          0
                                                                           Dest    Next_State
                                                                                             0
                                                                        └──────────────────┘
                                                                                 MOV
                                                                        ┌─ Move ──────────┐
                                                                           Source          0
                                                                           Dest    Current_State
                                                                                             0
                                                                        └──────────────────┘
```
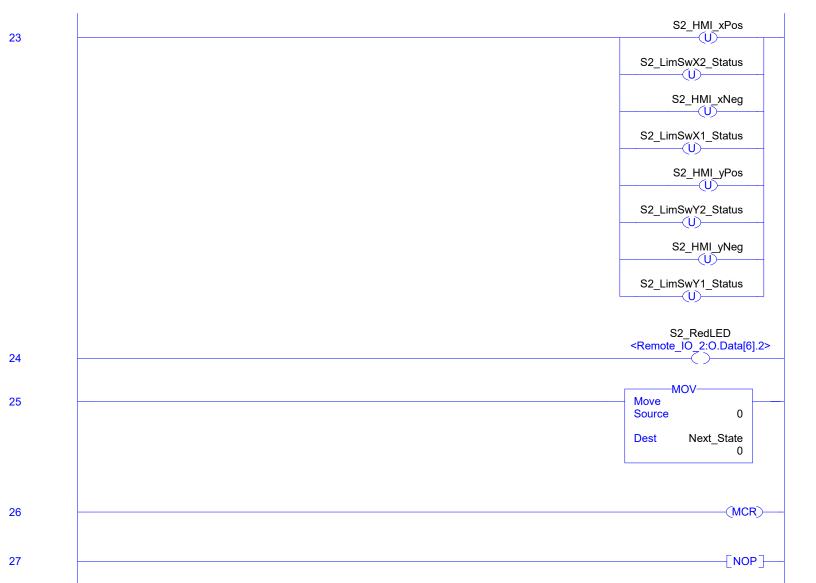
20   ─[NOP]─

21   ─[NOP]─

                                        STOP Logic

22
```
   S2_stop_bit
     ──┤/├──                                                               ─( MCR )─
   S2_FaultFlag
     ──┤ ├──
```

S2_Logic - Ladder Diagram
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MultiStation_test:MainTask:Station2_Program
5/2/2022 3:10:27 PM
Total number of rungs in routine: 44
E:\Mechatronics Project\MultiStationMaster_Version12.ACD
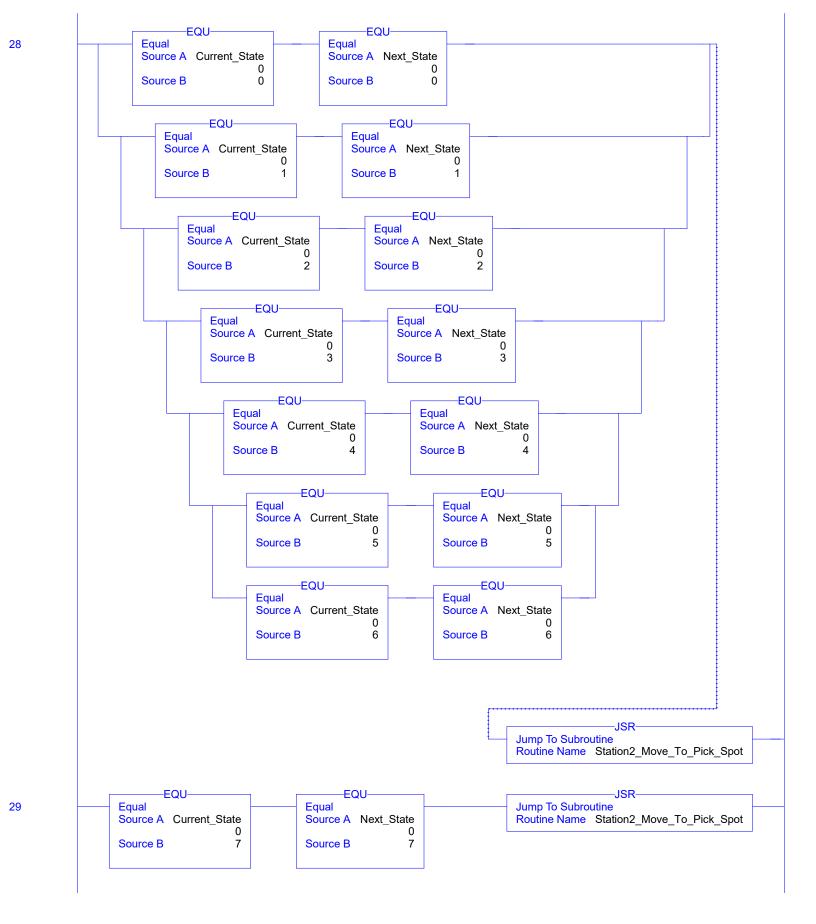
23

S2_HMI_xPos
—(U)—

S2_LimSwX2_Status
—(U)—

S2_HMI_xNeg
—(U)—

S2_LimSwX1_Status
—(U)—

S2_HMI_yPos
—(U)—

S2_LimSwY2_Status
—(U)—

S2_HMI_yNeg
—(U)—

S2_LimSwY1_Status
—(U)—

24

S2_RedLED
<Remote_IO_2:O.Data[6].2>
—( )—

25

```
          MOV
          Move
Source              0

Dest         Next_State
                    0
```

26

—(MCR)—

27

—[NOP]—

28

```
EQU                              EQU
Equal                            Equal
Source A    Current_State        Source A    Next_State
                         0                            0
Source B              0           Source B              0

            EQU                              EQU
            Equal                            Equal
            Source A    Current_State        Source A    Next_State
                                 0                            0
            Source B              1           Source B              1

                  EQU                              EQU
                  Equal                            Equal
                  Source A    Current_State        Source A    Next_State
                                       0                            0
                  Source B              2           Source B              2

                     EQU                              EQU
                     Equal                            Equal
                     Source A    Current_State        Source A    Next_State
                                          0                            0
                     Source B              3           Source B              3

                        EQU                              EQU
                        Equal                            Equal
                        Source A    Current_State        Source A    Next_State
                                             0                            0
                        Source B              4           Source B              4

                           EQU                              EQU
                           Equal                            Equal
                           Source A    Current_State        Source A    Next_State
                                                0                            0
                           Source B              5           Source B              5

                           EQU                              EQU
                           Equal                            Equal
                           Source A    Current_State        Source A    Next_State
                                                0                            0
                           Source B              6           Source B              6

                                                         JSR
                                                         Jump To Subroutine
                                                         Routine Name    Station2_Move_To_Pick_Spot
```

29

```
EQU                              EQU                              JSR
Equal                            Equal                            Jump To Subroutine
Source A    Current_State        Source A    Next_State           Routine Name    Station2_Move_To_Pick_Spot
                     0                            0
Source B              7           Source B              7
```

Logic Section

30

EQU
Equal
Source A   Current_State
0
Source B   2

EQU
Equal
Source A   Next_State
0
Source B   2

TON
Timer On Delay   (EN)
Timer   S2_Elevator_Delay_timer
Preset   2000
Accum   0   (DN)

31

EQU
Equal
Source A   Current_State
0
Source B   2

EQU
Equal
Source A   Next_State
0
Source B   2

S2_Ind_Lift_Bit   S2_Opt_Lift_Bit   S2_Cap_Lift_Bit
—] [—   —] [—   —] [—

MOV
Move
Source   3
Dest   wheel_colour
1

32

EQU
Equal
Source A   Current_State
0
Source B   2

EQU
Equal
Source A   Next_State
0
Source B   2

S2_Ind_Lift_Bit   S2_Opt_Lift_Bit   S2_Cap_Lift_Bit
—]/[—   —] [—   —] [—

MOV
Move
Source   2
Dest   wheel_colour
1

33

EQU
Equal
Source A   Current_State
0
Source B   2

EQU
Equal
Source A   Next_State
0
Source B   2

S2_Ind_Lift_Bit   S2_Opt_Lift_Bit   S2_Cap_Lift_Bit
—]/[—   —]/[—   —] [—

MOV
Move
Source   1
Dest   wheel_colour
1

34

EQU
Equal
Source A   Current_State
0
Source B   4

EQU
Equal
Source A   Next_State
0
Source B   4

TON
Timer On Delay   (EN)
Timer   S2_Conveyor_Delay_timer
Preset   1000
Accum   0   (DN)

S2_Logic - Ladder Diagram
MultiStation_test:MainTask:Station2_Program
Total number of rungs in routine: 44

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E:\Mechatronics Project\MultiStationMaster_Version12.ACD

35
```
EQU                          EQU                              TON
Equal                        Equal                            Timer On Delay              (EN)
Source A  Current_State      Source A  Next_State             Timer   S2_Lift_Rise_timer
               0                           0                  Preset              2000    (DN)
Source B       3             Source B       3                 Accum                  0
```

36
```
EQU                          EQU                              JSR
Equal                        Equal                            Jump To Subroutine
Source A  Current_State      Source A  Next_State             Routine Name  Station2_HeightCheck_Subroutine
               0                           0
Source B       3             Source B       3
```

37
```
EQU                          EQU                              TON
Equal                        Equal                            Timer On Delay              (EN)
Source A  Current_State      Source A  Next_State             Timer   S2_Lift_Drop_timer
               0                           0                  Preset              1000    (DN)
Source B      14             Source B      14                 Accum                  0
```

38
```
EQU                          EQU                              EQU
Equal                        Equal                            Equal
Source A  Current_State      Source A  Next_State             Source A  wheel_colour
               0                           0                            1
Source B      11             Source B      11                 Source B       1
```
```
JSR
Jump To Subroutine
Routine Name   Station2_Black_Sorting_Subroutine
```

39
```
EQU                          EQU                              EQU
Equal                        Equal                            Equal
Source A  Current_State      Source A  Next_State             Source A  wheel_colour
               0                           0                            1
Source B      11             Source B      11                 Source B       2
```
```
JSR
Jump To Subroutine
Routine Name   Station2_Red_Sorting_Subroutine
```

40
```
EQU                          EQU                              EQU
Equal                        Equal                            Equal
Source A  Current_State      Source A  Next_State             Source A  wheel_colour
               0                           0                            1
Source B      11             Source B      11                 Source B       3
```
```
JSR
Jump To Subroutine
Routine Name   Station2_Metal_Sorting_Subroutine
```

41

EQU — Equal — Source A Current_State 0 — Source B 12

EQU — Equal — Source A Next_State 0 — Source B 12

EQU — Equal — Source A wheel_colour 1 — Source B 1

counter_debouncer1 — ONS

CTU — Count Up — Counter WheelCount_Station[2].BLACK_COUNT — Preset 6 — Accum 0 — CU — DN

42

EQU — Equal — Source A Current_State 0 — Source B 12

EQU — Equal — Source A Next_State 0 — Source B 12

EQU — Equal — Source A wheel_colour 1 — Source B 2

counter_debouncer2 — ONS

CTU — Count Up — Counter WheelCount_Station[2].RED_COUNT — Preset 6 — Accum 0 — CU — DN

43

EQU — Equal — Source A Current_State 0 — Source B 12

EQU — Equal — Source A Next_State 0 — Source B 12

EQU — Equal — Source A wheel_colour 1 — Source B 3

counter_debouncer3 — ONS

CTU — Count Up — Counter WheelCount_Station[2].METAL_COUNT — Preset 6 — Accum 0 — CU — DN

(End)