```
*********************************************************************
               For Simulation - Leave this at the top of the program and
                          Do Not Delete this rung!
*********************************************************************
```

0
```
                                                                    ┌─ JSR ──────────────────┐
                                                                    │  Jump To Subroutine     │
                                                                    │  Routine Name  R99_Simulate │
                                                                    └─────────────────────────┘
```

WHEN START BUTTON AND POWER BUTTON IS PRESSED THEN START LIGHT TURNS ON, TO OFF THE START LIGHT STOP BUTTON IS PRESSED

1
```
   START BUTTON        STOP BUTTON      POWER ON BUTTON                                  START LIGHT
      I2.0                I2.1               I2.5                                           O3.0
 <Local:2:I.Data.0>  <Local:2:I.Data.1>  <Local:2:I.Data.5>                          <Local:3:O.Data.0>
       ─] [─              ─]/[─             ─] [─                                          ─( )─
    START LIGHT
      O3.0
 <Local:3:O.Data.0>
       ─] [─
```

JSR FOR R01_FILL STATION

2
```
                                                            ┌─ JSR ──────────────────────┐
                                                            │  Jump To Subroutine          │
                                                            │  Routine Name  R01_FillStation │
                                                            └───────────────────────────────┘
```

JSR FOR R03_CAP SECURE STATION

3
```
                                                            ┌─ JSR ──────────────────────┐
                                                            │  Jump To Subroutine          │
                                                            │  Routine Name  R03_CapSecureStn │
                                                            └───────────────────────────────┘
```

JSR FOR THE WALKING BEAM

4
```
                                                            ┌─ JSR ──────────────────────┐
                                                            │  Jump To Subroutine          │
                                                            │  Routine Name  R04_Walkingbeam │
                                                            └───────────────────────────────┘
```

JSR FOR CAP INSERTION STATION

5
```
                                                            ┌─ JSR ──────────────────────┐
                                                            │  Jump To Subroutine            │
                                                            │  Routine Name  R02_CAPINSERTION │
                                                            └─────────────────────────────────┘
```

(End)

R01_FillStation - Ladder Diagram
PROJECT2:MainTask:MainProgram
Total number of rungs in routine: 9

Page 2
2022-03-19 3:41:25 PM
...ming\Unit 2\PROJECT\FILES\Project 2 Template with P1 Solution.ACD

0

WHEN START LIGHT TURNS ON, BOTTLE IS STATION TWO , BEAMED IS IN CLAMPED POSITON ,AND IN RETRACTED STATE, THE SOLINOID IS LOWERED

START LIGHT	FillComplete	I32.3	clamped position	RETRACTED POSITION
O3.0	<TP.PLC.BLUE.LT>	<Ethernet3_PointIO:I.Data[2].3>	I31.0	I31.3
<Local:3:O.Data.0>			<Ethernet3_PointIO:I.Data[1].0>	<Ethernet3_PointIO:I.Data[1].3>

LOWER SOLINOID
O35.0
<Ethernet3_PointIO:O.Data[5].0>

1

WHEN START LIGHT IS ON, FILL SOLINOID IS IN LOWER POSITION, FILL SENSOR IS NOT ACTIVATED THEN FILL THE BOTTLE TILL THE SENSOR IS ACTIVATED

START LIGHT	FillComplete	I32.0	FILL SENSOR	FILL BOTTLE
O3.0	<TP.PLC.BLUE.LT>	<Ethernet3_PointIO:I.Data[2].0>	I32.2	O35.1
<Local:3:O.Data.0>			<Ethernet3_PointIO:I.Data[2].2>	<Ethernet3_PointIO:O.Data[5].1>

2

WHEN FILL SOLENOID IS LOWER POSTION , AND FILL SENSOR IS ACTIVATED AND BOTTLE IS AT STATION 2 THE FILL COMPLE TIMER GET ACTIVATED

START LIGHT	FILLED SOLENOID LOWER POSITION	FILL SENSOR	BOTTLE AT POSITION 2
O3.0	Ethernet3_PointIO:2:I.0	I32.2	Ethernet3_PointIO:2:I.3
<Local:3:O.Data.0>	<Ethernet3_PointIO:I.Data[2].0>	<Ethernet3_PointIO:I.Data[2].2>	<Ethernet3_PointIO:I.Data[2].3>

FILL_COMPLE_TIMER.EN

TOF
Timer Off Delay
Timer   FILL_COMPLE_TIMER   (EN)
Preset   2000
Accum   2020   (DN)

3

WHEN DN TAG IS ENABLED THE FILL COMPLETE INDICATES(T.P BLUE LT)

FILL_COMPLE_TIMER.DN

FillComplete
<TP.PLC.BLUE.LT>

4

COMPUTE THE ANALOG SENSOR VALUE USING AN EXPRESSION THEN IT IS MOVED TO TP.REAL1

CPT
Compute
Dest   FILL_LEVEL
                          0.0
Expression   (10.9375*CH0)-43.75

MOV
Move
Source   FILL_LEVEL
                          0.0
Dest   TP.PLC.REAL1
                          0.0

5

COMPARE THE FILL LEVEL WITH MAX LEVEL THEN IF THE CONDITION IS SATISFY THEN CURRENT FILL VALULE IS MOVED TO THE MAXIMUM VALUE

START LIGHT
O3.0
<Local:3:O.Data.0>

GRT
Greater Than (A>B)
Source A   FILL_LEVEL
                        0.0
Source B   MAX_LEVEL
                 152.76733

MOV
Move
Source   FILL_LEVEL
                        0.0
Dest   MAX_LEVEL
                 152.76733

WHEN FILL SENSOR GET ACTIVATED USING A ONE SHOT , THE MAX VALUE IS TRANSFERED TO TP.REAL.3

```
         START LIGHT            FILL SENSOR
         O3.0                   I32.2
         <Local:3:O.Data.0>    <Ethernet3_PointIO:I.Data[2].2>    MAXLVL_ONESHOT1              ┌─────MOV─────────┐
  6  ─────┤ ├───────────────────┤ ├──────────────────────────────────[ONS]──────────────────│ Move            │
                                                                                              │ Source MAX_LEVEL│
                                                                                              │        152.76733 │
                                                                                              │ Dest TP.PLC.REAL3│
                                                                                              │        152.76733 │
                                                                                              └─────────────────┘
```

TO FIND THE TOTAL CYCLE TIME, WHEN START LIGHT TURNS ON RTO TURNS ON

```
         START LIGHT
         O3.0
         <Local:3:O.Data.0>                                            ┌─────RTO──────────────────────┐
  7  ─────┤ ├───────────────────────────────────────────────────────│ Retentive Timer On            │──(EN)──
                                                                       │ Timer   TOTAL_CYCLE_TIMER     │
                                                                       │ Preset            99999999    │
                                                                       │ Accum                 10895   │──(DN)──
                                                                       └───────────────────────────────┘
```

USING UNCLAMP AS CONDITION ,MOVE USE RTO TIMEER.ACC TO THE TOAL CYCLE TIME, THEN IT IS CONVERTED INTO SECONDS USING DIV FUCTION , THEN IT IS STORED IN TP.PLC.INT1

```
         START LIGHT            UNCLAMP
         O3.0                   I31.1
         <Local:3:O.Data.0>    <Ethernet3_PointIO:I.Data[1].1>    TOTCYCLTIME_ONESHOT2         ┌─────MOV──────────────────┐
  8  ─────┤ ├───────────────────┤ ├──────────────────────────────────[ONS]──────────────────│ Move                     │
                                                                                              │ Source TOTAL_CYCLE_TIMER.ACC │
                                                                                              │                    10895  │
                                                                                              │ Dest   TOTAL_CYCLE_TIME   │
                                                                                              │                    16871  │
                                                                                              └──────────────────────────┘
                                                                   ┌─────DIV──────────────────┐   TOTAL_CYCLE_TIMER
                                                                   │ Divide                   │      ──(RES)──
                                                                   │ Source A TOTAL_CYCLE_TIME│
                                                                   │                    16871 │
                                                                   │ Source B           1000  │
                                                                   │                          │
                                                                   │ Dest     TP.PLC.INT1     │
                                                                   │                      16  │
                                                                   └──────────────────────────┘
```

(End)

R02_CAPINSERTION - Ladder Diagram

Page 4

PROJECT2:MainTask:MainProgram

2022-03-19 3:41:26 PM

Total number of rungs in routine: 5

...ming\Unit 2\PROJECT\FILES\Project 2 Template with P1 Solution.ACD

0 — WHE START LIGHT TURNS ON , BOTTLE IS AT STATION 3, THE CAP IS ON , THE CLAMPED POSITION , AND IN RETRACTED POSTION , TIMER ON DELAY GETS ACTIVATED FOR HALF A SECONDS

START LIGHT	BOTTLE AT STATION 3	CAP CHECK	clamped position
O3.0	I32.7	I32.5	I31.0
<Local:3:O.Data.0>	<Ethernet3_PointIO:I.Data[2].7>	<Ethernet3_PointIO:I.Data[2].5>	<Ethernet3_PointIO:I.Data[1].0>

RETRACTED POSITION — I31.3 — <Ethernet3_PointIO:I.Data[1].3>
CAP LOWER POSITION — I32.6 — <Ethernet3_PointIO:I.Data[2].6>

TON
Timer On Delay
Timer   CAPINSERTTIMER
Preset   500
Accum   0
(EN)
(DN)

1 — WHEN CAP INSERT TIME IS DONE MODE THE CAP INSERT IS LOWER

CAPINSERTTIMER.DN

CAP INSERT LOWER
O35.6
<Ethernet3_PointIO:O.Data[5].6>

2 — TO FIND THE FAULT DURING INSERTION, THE CAP INSERT LOWER CONNECTED TO TON TIMER ,IF TIMER EXCEED 4 SECONDS FAULT IS DETECTED IN THE NEXT RUNG

START LIGHT
O3.0
<Local:3:O.Data.0>

CAP INSERT LOWER
O35.6
<Ethernet3_PointIO:O.Data[5].6>

TON
Timer On Delay
Timer   CAPFAULTTIMER
Preset   4000
Accum   0
(EN)
(DN)

3 — WHEN TIMER TAG DN IS ACTIVATED THEN FAULT IS DETECTED , THEN GRAY LIGHT TURNS ON

CAPFAULTTIMER.DN

TP.PLC.GRAY.LT

4

TP.PLC.GRAY.LT   CAP_FAULT_ONESHOT5 [ONS]

ADD
Add
Source A   TOTAL_NO_FAULTS
0
Source B   1
Dest   TOTAL_NO_FAULTS
0

MOV
Move
Source   TOTAL_NO_FAULTS
0
Dest   TP.PLC.INT4
0

(End)

R03_CapSecureStn - Ladder Diagram

Page 5

PROJECT2:MainTask:MainProgram

2022-03-19 3:41:26 PM

Total number of rungs in routine: 6

...ming\Unit 2\PROJECT\FILES\Project 2 Template with P1 Solution.ACD

0 — WHEN START LIGHT TURNS ON , BOTTLE IS AT STATION 4, THE CAP IS ROTATING , THE BEAM IN CLAMPED AND RETRACTED POSITION THEN CAP IS LOWERD

- START LIGHT — O3.0 — <Local:3:O.Data.0>
- CapSecured — <TP.PLC.YELLOW.LT>
- BOTTLE AT STATION 4 — I33.3 — <Ethernet3_PointIO:I.Data[3].3>
- Cap Rotating — I33.2 — <Ethernet3_PointIO:I.Data[3].2>
- clamped position — I31.0 — <Ethernet3_PointIO:I.Data[1].0>
- RETRACTED POSITION — I31.3 — <Ethernet3_PointIO:I.Data[1].3>
- CAP INSERT LOWER — O36.0 — <Ethernet3_PointIO:O.Data[6].0>

1 — WHEN START LIGHT IS ON AND CAP SECURED INDICATOR IS ON THEN CAP INSERT RISE

- START LIGHT — O3.0 — <Local:3:O.Data.0>
- CapSecured — <TP.PLC.YELLOW.LT>
- BOTTLE AT STATION 4 — I33.3 — <Ethernet3_PointIO:I.Data[3].3>
- CAP INSERT RISE — O36.1 — <Ethernet3_PointIO:O.Data[6].1>

2 — THE START LIGHT TURN ON , BOTTLE IS AT STATION 4, IN CLAMPED POSITION AND RETRACTED , THEN ROTATION STARTS

- START LIGHT — O3.0 — <Local:3:O.Data.0>
- CapSecured — <TP.PLC.YELLOW.LT>
- BOTTLE AT STATION 4 — I33.3 — <Ethernet3_PointIO:I.Data[3].3>
- clamped position — I31.0 — <Ethernet3_PointIO:I.Data[1].0>
- RETRACTED POSITION — I31.3 — <Ethernet3_PointIO:I.Data[1].3>
- ROTATION — O36.2 — <Ethernet3_PointIO:O.Data[6].2>

3 — WHEN SOLINOID IS AT LOWER POSITION AND BOTTLE IS AT STATION 4 , CAP SECURED INDICATOR GETS ACTIVATED

- START LIGHT — O3.0 — <Local:3:O.Data.0>
- SOLINOID LOWER POSITION — I33.0 — <Ethernet3_PointIO:I.Data[3].0>
- BOTTLE AT STATION 4 — I33.3 — <Ethernet3_PointIO:I.Data[3].3>
- CapSecured — <TP.PLC.YELLOW.LT>
- CapSecured — <TP.PLC.YELLOW.LT>

4 — COMPUTE SPEED SENSOR VALUE AND MOVE TO TP.REAL 2

CPT
Compute
Dest   SPEED_SENSOR
                   0.0
Expression   1.5*CH1

MOV
Move
Source   SPEED_SENSOR
                   0.0
Dest   TP.PLC.REAL2
                   0.0

5 — WHEN CAP IS ROTATING WITHIN THE RANGE THEN GREEN TP LT TURNS ON

- START LIGHT — O3.0 — <Local:3:O.Data.0>
- Cap Rotating — I33.2 — <Ethernet3_PointIO:I.Data[3].2>

LIM
Limit Test (CIRC)
Low Limit   0
Test   TP.PLC.REAL2
                   0.0
High Limit   12

- GREEN TP LIGHT — TP.PLC.GREEN.LT

R03_CapSecureStn - Ladder Diagram
PROJECT2:MainTask:MainProgram
Total number of rungs in routine: 6

Page 6
2022-03-19 3:41:26 PM
...ming\Unit 2\PROJECT\FILES\Project 2 Template with P1 Solution.ACD

(End)

R04_Walkingbeam - Ladder Diagram
PROJECT2:MainTask:MainProgram
Total number of rungs in routine: 8

Page 7
2022-03-19 3:41:27 PM
...ming\Unit 2\PROJECT\FILES\Project 2 Template with P1 Solution.ACD

WHEN START LIGHT IS ON AND WALKING BEAM IS IN RETRACTED POSITION THE BEAM CLAMPS

0

START LIGHT
O3.0
<Local:3:O.Data.0>

RETRACTED POSITION
I31.3
<Ethernet3_PointIO:I.Data[1].3>

CLAMP
O34.0
<Ethernet3_PointIO:O.Data[4].0>

WHEN FILL SENSOR ON, TIMER ON DELAY ACTIVATES

1

START LIGHT
O3.0
<Local:3:O.Data.0>

FILL SENSOR
I32.2
<Ethernet3_PointIO:I.Data[2].2>

```
                    TON
Timer On Delay
Timer   FILLSENSDELAYTIMER         (EN)
Preset                    500
Accum                       0      (DN)
```

FOR EXTENDING WALKING BEAM THE START LIGHT AND BEAM SHOULD BE IN RETRACTED POSITION , CLAMPED POSITION,AND TIMER SET TO .5 SECONDS, AND STOPS EXTENDING TILL REACHES THE EXTENDING POSTION

2

START LIGHT
O3.0
<Local:3:O.Data.0>

START LIGHT
O3.0
<Local:3:O.Data.0>

RETRACTED POSITION
I31.3
<Ethernet3_PointIO:I.Data[1].3>

clamped position
I31.0
<Ethernet3_PointIO:I.Data[1].0>

EXTENDED POSITION
I31.2
<Ethernet3_PointIO:I.Data[1].2>

CAP LOWER POSITION
I32.6
<Ethernet3_PointIO:I.Data[2].6>

FILLSENSDELAYTIMER.DN

EXTEND WALKING BEAM
O34.2
<Ethernet3_PointIO:O.Data[4].2>

EXTEND WALKING BEAM
O34.2
<Ethernet3_PointIO:O.Data[4].2>

WHEN START LIGHT TURNS ON AND WHEN IT IS IN EXTENDED POSTION , UNCLAMP TAKE PLACE

3

START LIGHT
O3.0
<Local:3:O.Data.0>

EXTENDED POSITION
I31.2
<Ethernet3_PointIO:I.Data[1].2>

UNCLAMP
O34.1
<Ethernet3_PointIO:O.Data[4].1>

WHEN START LIGHT IS ON,WHEN IT IS EXTENDED POSTION, AND WHEN IT IS UNCLAMPED, RETRACTION TAKE PLACE

4

START LIGHT
O3.0
<Local:3:O.Data.0>

EXTENDED POSITION
I31.2
<Ethernet3_PointIO:I.Data[1].2>

UNCLAMP
I31.1
<Ethernet3_PointIO:I.Data[1].1>

RETRACTED POSITION
I31.3
<Ethernet3_PointIO:I.Data[1].3>

RETRACTION
O34.3
<Ethernet3_PointIO:O.Data[4].3>

RETRACTION
O34.3
<Ethernet3_PointIO:O.Data[4].3>

WHEN BOTTLE IS AT POSITON 5 , THE COUNTER ACTIVATES AND COUNTS THE NO OF BOTTLES

START LIGHT   BOTTLE AT POSITION 5
O3.0   I33.6
<Local:3:O.Data.0>   <Ethernet3_PointIO:I.Data[3].6>

Rung 5:

```
                                                      CTU
                                                      Count Up
                                                      Counter    NO_OF_BOTTLES        (CU)
                                                      Preset         999999999
                                                      Accum                  1        (DN)
```

WHEN BLUE TP PB IS PRESSED THE NO OF BOTTLES IN ACC IS MOVED TO CURRENT NO OF BOTTLES AND USING THE ADD FUNCTION
THE CURRENT NO OF BOTTLE IS STORED IN TOTAL NO OF BOTTLE THEN COUTER IS RESETED

START LIGHT
O3.0
<Local:3:O.Data.0>   TP.PLC.BLUE.PB   NOOFBOT_ONESHOT3

Rung 6:

```
                                    [ONS]

                                                      ADD
                                                      Add
                                                      Source A    TOTAL_NO_OF_BOT
                                                                                7
                                                      Source B   NO_OF_BOTTLES.ACC
                                                                                1
                                                      Dest         TOTAL_NO_OF_BOT
                                                                                7

                                                      MOV                  NO_OF_BOTTLES
                                                      Move                     (RES)
                                                      Source   TOTAL_NO_OF_BOT
                                                                            7
                                                      Dest             TP.PLC.INT3
                                                                            7
```

MOVE THE NO OF BOTTLES.ACC TO TP.PLC.INT2

Rung 7:

```
                                                      MOV
                                                      Move
                                                      Source   NO_OF_BOTTLES.ACC
                                                                            1
                                                      Dest             TP.PLC.INT2
                                                                            1
```

(End)