October 23, 2016

This routine reads the part number and process number from an RFID tag at RFID 3. If the robot in Cell 2 has dropped a part, it will also write the process number to 2 on the RFID tag.

This rung sets up command, length, and address conditions when a part arrives at RFID 3.

Rung 0

- Mode_Auto
- RFID Tag at Cell 1 Stop: <RFID_N054:I.Channel[0].TagPresent>
- RFIDTP1 RFID_N054:I.Channel[0].Busy (/)
- R1J_Read (/)
- ONS.21 [ONS]

MOV — Move
Source 0
Dest RFID_N054:O.Channel[0].Command 0

MOV — Move
Source 0
Dest RFID_N054:O.Channel[0].Data[0] 0

MOV — Move
Source 0
Dest RFID_N054:O.Channel[0].Address 0

MOV — Move
Source 10
Dest RFID_N054:O.Channel[0].Length 17

- R1J_Read (L)
- R1J_Read_Start (L)

October 23, 2016

After rung 0, the RFID transceiver command is set to 4 (read).

Rung 1

- R1J_Read_Start

EQU — Equal
Source A RFID_N054:I.Channel[0].Command 0
Source B 0

MOV — Move
Source 4
Dest RFID_N054:O.Channel[0].Command 0

October 23, 2016

After rung 1, the RFID 3 channel going busy indicates that a read operation is in progress.

Rung 2

- R1J_Read_Start
- RFID_N054:I.Channel[0].Busy
- R1J_Read_Start (U)
- R1J_Read_InProgress (L)

October 23, 2016
After rung 2, the RFID 3 channel going NOT busy indicates the read operation has been completed.

3

R1J_Read_InProgress] [RFID_N054:I.Channel[0].Busy] / [

EQU
Equal
Source A   RFID_N054:I.Channel[0].Command
            0
Source B   4

R1J_Read_InProgress (U)

R1J_Read_Results (L)

October 23, 2016
After rung 3, the current part and process numbers are moved into storage tags.

4

R1J_Read_Results] [

MOV
Move
Source   RFID_N054:I.Channel[0].Data[3]
            0
Dest   R1J_Current_Part_NO
            2

MOV
Move
Source   RFID_N054:I.Channel[0].Data[4]
            0
Dest   R1J_Current_Process_NO
            3

R1J_Read_Results (U)

R1J_Read_Finished (L)

October 23, 2016
This rung executes after the part leaves RFID 3. It resets the tags so that this routine is ready for the next part.

5

Mode_Auto] [RFID Tag at Cell 1 Stop
RFIDTP1
<RFID_N054:I.Channel[0].TagPresent>] / [

R1J_Read (U)

R1J_Read_Finished (U)

6

Mode_Start] [
Mode_Semi] [Placement of part from CNC2 to conveyor Program finished DO[1]
Fanuc_Rbt_C1:I.Data[0].0] [

Robot1_DroppedP1 (L)

Rung 7:

Placement of part
from CNC1 to
conveyor
Program finished
DO[2]
Fanuc_Rbt_C1:I.
Mode_Start   Data[0].1   Robot1_DroppedP
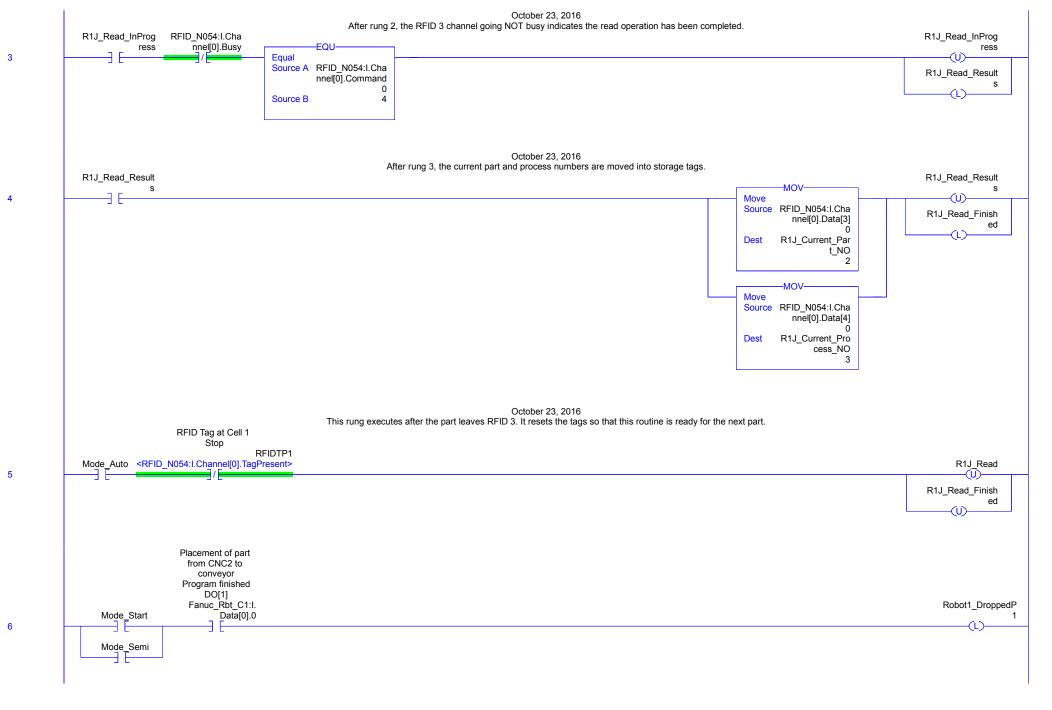   2
                                                                                                           (L)

Mode_Semi

Rung 8:

Pallet with Flipped
Part can be Let Go
DO[17]
Fanuc_Rbt_C1:I.
Mode_Start   Data[1].0   Robot1_Flipped
                                                                                                           (L)

Mode_Semi

Rung 9:

November 1, 2016
After rung 4, IF robot 1 has dropped a part from CNC 1 or 2, assigning a new process number begins.
November 9, 2016
Added Robot1DroppedPart to ensure process number is only updated after part is dropped onto pallet.

Robot1_DroppedP
1   R1J_Assign
                                                                                                           (L)

Robot1_DroppedP
2

Robot1_Flipped

November 1, 2016
After rung 5, write new process number to 1 if part B or C; write new process number to 2 if part A. Keep part number the same. Note that address is set to 4 (process number) and length is set to 1.

RFID Tag at Cell 1
Stop

RFIDTP1   RFID_N054:I.Cha
R1J_Assign   <RFID_N054:I.Channel[0].TagPresent>   nnel[0].Busy   Robot1_DroppedP
                                                                                                                                        1   R1J_Assign
10   ] [   ] [   ]/[   ] [┌─────MOV─────┐   (U)
                                                                                                                         │Move   │
                                                                                                                         │Source   1│   R1J_Write
                                                                                                                         │   │   (L)
                                                                                                                         │Dest RFID_N054:O.Cha│
                                                                                                                         │   nnel[0].Data[0]│
                                                                                                                         │   0│
                                                                                                                         └─────────────┘

                                                                                                          Robot1_DroppedP
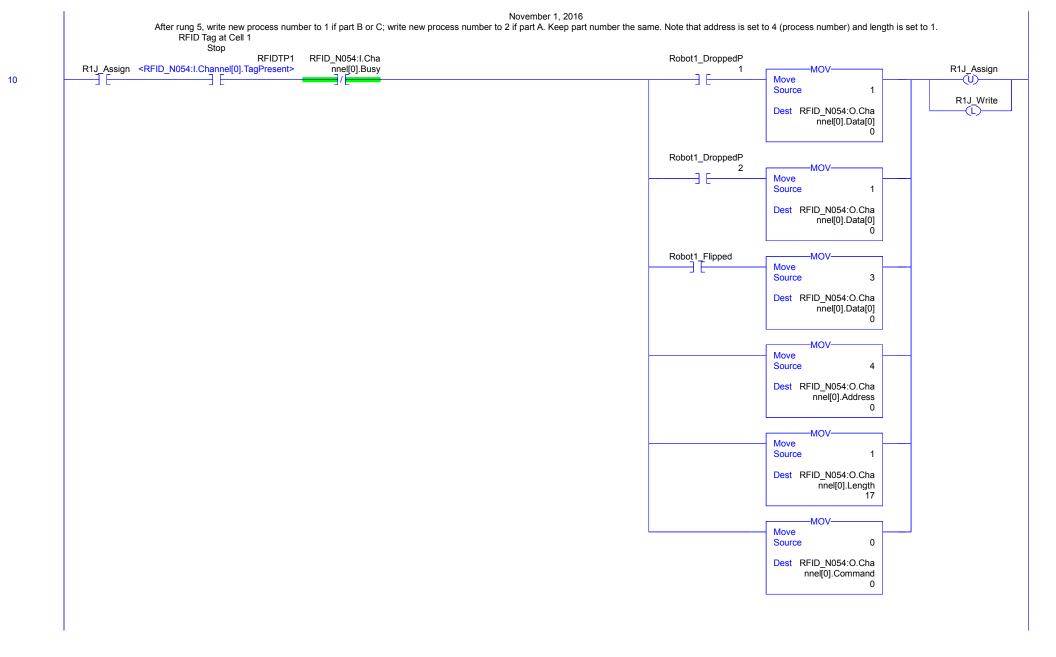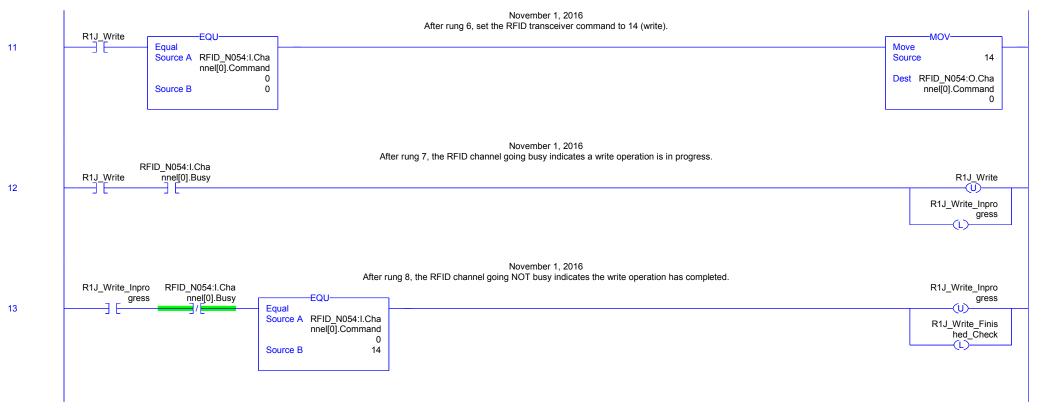   2
                                                                                                          ] [┌─────MOV─────┐
                                                                                                                       │Move   │
                                                                                                                       │Source   1│
                                                                                                                       │   │
                                                                                                                       │Dest RFID_N054:O.Cha│
                                                                                                                       │   nnel[0].Data[0]│
                                                                                                                       │   0│
                                                                                                                       └─────────────┘

                                                                                                          Robot1_Flipped
                                                                                                          ] [┌─────MOV─────┐
                                                                                                                       │Move   │
                                                                                                                       │Source   3│
                                                                                                                       │   │
                                                                                                                       │Dest RFID_N054:O.Cha│
                                                                                                                       │   nnel[0].Data[0]│
                                                                                                                       │   0│
                                                                                                                       └─────────────┘

                                                                                                                       ┌─────MOV─────┐
                                                                                                                       │Move   │
                                                                                                                       │Source   4│
                                                                                                                       │   │
                                                                                                                       │Dest RFID_N054:O.Cha│
                                                                                                                       │   nnel[0].Address│
                                                                                                                       │   0│
                                                                                                                       └─────────────┘

                                                                                                                       ┌─────MOV─────┐
                                                                                                                       │Move   │
                                                                                                                       │Source   1│
                                                                                                                       │   │
                                                                                                                       │Dest RFID_N054:O.Cha│
                                                                                                                       │   nnel[0].Length│
                                                                                                                       │   17│
                                                                                                                       └─────────────┘

                                                                                                                       ┌─────MOV─────┐
                                                                                                                       │Move   │
                                                                                                                       │Source   0│
                                                                                                                       │   │
                                                                                                                       │Dest RFID_N054:O.Cha│
                                                                                                                       │   nnel[0].Command│
                                                                                                                       │   0│
                                                                                                                       └─────────────┘

November 1, 2016
After rung 6, set the RFID transceiver command to 14 (write).

11

R1J_Write

```
┌─EQU──────────────────┐
│ Equal                │
│ Source A  RFID_N054:I.Cha │
│           nnel[0].Command │
│                      0 │
│ Source B            0 │
└──────────────────────┘
```

```
┌─MOV──────────────────┐
│ Move                 │
│ Source           14 │
│                      │
│ Dest   RFID_N054:O.Cha │
│        nnel[0].Command │
│                   0 │
└──────────────────────┘
```

November 1, 2016
After rung 7, the RFID channel going busy indicates a write operation is in progress.

12

R1J_Write   RFID_N054:I.Cha
              nnel[0].Busy

R1J_Write
(U)

R1J_Write_Inpro
gress
(L)

November 1, 2016
After rung 8, the RFID channel going NOT busy indicates the write operation has completed.

13

R1J_Write_Inpro   RFID_N054:I.Chan
gress   nel[0].Busy
                    /

```
┌─EQU──────────────────┐
│ Equal                │
│ Source A  RFID_N054:I.Cha │
│           nnel[0].Command │
│                      0 │
│ Source B           14 │
└──────────────────────┘
```

R1J_Write_Inpro
gress
(U)

R1J_Write_Finis
hed_Check
(L)

RFID_1_JW_ZZ - Ladder Diagram   **Page 6**
AdvManLab:MainTask:MainProgram
11/9/2017 3:50:47 PM
Total number of rungs in routine: 22   C:\Users\VRMILLING\Documents\control_team_manuals\Logic W2017\Separate branches\Chris_branch_20171109_1.ACD

November 1, 2016
After the write operation has completed, a new read operation is begun to check that write operation.

14

R1J_Write_Finis
hed_Check

MOV
Move
Source 0
Dest RFID_N054:O.Cha
nnel[0].Command
0

MOV
Move
Source 0
Dest RFID_N054:O.Cha
nnel[0].Data[0]
0

MOV
Move
Source 0
Dest RFID_N054:O.Cha
nnel[0].Address
0

MOV
Move
Source 10
Dest RFID_N054:O.Cha
nnel[0].Length
17

R1J_Write_Finis
hed_Check
U

R1J_Read_Check_
Start
L

November 1, 2016
After rung 10, set the RFID transceiver comand to 4 (read).

15

R1J_Read_Check_
Start

EQU
Equal
Source A RFID_N054:I.Cha
nnel[0].Command
0
Source B 0

MOV
Move
Source 4
Dest RFID_N054:O.Cha
nnel[0].Command
0

November 1, 2016
After rung 11, the RFID channel going busy indicates that the read operation is in progress.

16

R1J_Read_Check_
Start

RFID_N054:I.Cha
nnel[0].Busy

R1J_Read_Check_
Start
U

R1J_Read_Check_
InProgress
L

November 1, 2016
After rung 12, the RFID channel going NOT busy indicates that the read operation has completed.

Rung 17:

R1J_Read_Check_InProgress   RFID_N054:I.Channel[0].Busy
--] [--------------]/[--------

EQU
Equal
Source A   RFID_N054:I.Channel[0].Command
                    0
Source B   4

R1J_Read_Check_InProgress
--(U)--

R1J_Read_Check_Results
--(L)--

November 1, 2016
After the read operation has completed, move the read process number into a storage tag.

Rung 18:

R1J_Read_Check_Results
--] [--------

MOV
Move
Source   RFID_N054:I.Channel[0].Data[4]
                    0
Dest   R1J_Check_Process_NO
                    1

R1J_Read_Check_Results
--(U)--

R1J_Read_Check_Fail
--(L)--

November 1, 2016
After rung 14, if the read process number is correct for the given part (Parts B and C from CNC 1; Part A from CNC 2), the write operation was successful.
November 5, 2016
Fixed error: R3J tags were being used instead of R1J tags

Rung 19:

R1J_Read_Check_Fail   Robot1_DroppedP1
--] [----------------] [--------

EQU
Equal
Source A   R1J_Check_Process_NO
                    1
Source B   1

Robot1_DroppedP2
--] [--------

EQU
Equal
Source A   R1J_Check_Process_NO
                    1
Source B   1

Robot1_Flipped
--] [--------

EQU
Equal
Source A   R1J_Check_Process_NO
                    1
Source B   3

R1J_Read_Check_Fail
--(U)--

R1J_Write_Pass
--(L)--

November 1, 2016
This rung executes once the correct process number has been written to the RFID tag. It resets the robot and CNC tags.

Rung 20

R1J_Write_Pass

Robot1_DroppedP 1 — Robot1_DroppedP 1 (U)

CNC 1 has completed cutting the part
CNC_1_Done (U)

Robot1_DroppedP 2 — Robot1_DroppedP 2 (U)

CNC 2 has completed cutting the part
CNC_2_Done (U)

Robot1_Flipped — Robot1_Flipped (U)

November 1, 2016
After rung 14, if the read process number is NOT correct for the given part, the write operation was not successful, and the write is restarted.

Rung 21

R1J_Read_Check_Fail — Robot1_DroppedP 1

NEQ
Not Equal
Source A   R1J_Check_Process_NO
                1
Source B   1

Robot1_DroppedP 2

NEQ
Not Equal
Source A   R1J_Check_Process_NO
                1
Source B   2

Robot1_Flipped

NEQ
Not Equal
Source A   R1J_Check_Process_NO
                1
Source B   3

R1J_Read_Check_Fail (U)

R1J_Assign (L)

(End)