RFID JOURNAL VIRTUALLY LIVE!

SEPTEMBER 30 - OCTOBER 1, 2020

Linking RFID to PLCs to Automate Manufacturing

Kevin Berisso

Director, AutoID Lab – University of Memphis

THE UNIVERSITY OF MEMPHIS
Automatic Identification Lab

Education
Advocation
Tech Transfer

aim

ARM MEMBER

RAIN RFID

Manufacturing | RFID JOURNAL

rfidjournal.com/tag/manufactu

Apps radio AITI Regs MyChart SQ

News | Editor's Notes | E

RFID JOURNAL

PREMIUM CONTENT

Best Practices | Case Studies | Features | How-To Articles

RFID Journal LIVE! Retail 2019 Report

RFID technology is being deployed at stores and warehouses around the world to improve item-level in ...

More Best Practices

Mar

NFC Test

Sep 11, 202

SUKU and test purchase

RFID

Sep 10, 202

Xerafy ad manufact Confidex announce

IoT E

Sep 8, 202

Wilden's transmiss on air-op prevent

Rafik Proc

Aug 28, 20

Videos - RAIN RFID

rainrfid.org/resource-type/videos/?c=man...

Apps radio AITI Regs MyChart SQL Server Web Ad... Edison

RAIN ALLIANCE | RAIN TECHNOLOGY | MARKETS | RESOURCES

September 2020

Global Leader Uses RFID To Improve Manufacturing Process

Case Studies View Resource

May 2020

Digitised Manufacturing Becomes Real

Case Studies View Resource

September 2018

Traceability through the manufacturing process at Dana...

Case Studies View Resource

June 2018

Tamper Evident RFID - Tags for Security Critical Applications

RAIN Alliance Meeting - Vienna, Austria

Presentations View Resource

June 2018

RAIN RFID & BOSCH - OPPORTUNITIES & CHALLENGES

RAIN Alliance Meeting - Vienna, Austria

March 2018

Asset Tracking - Stanley Black & Decker

Stanley Black & Decker addresses the customer needs in Foreign Object Debris (FOD)...

Videos - RAIN RFID | Global Leader Uses RFID To Impr

idplate.com/case-studies/global-leader-uses-rfi...

GoToMeeting Pro Screensharing

Apps radio AITI Regs MyChart SQL Server Web Ad... Edison UofM Portal Other bookmarks

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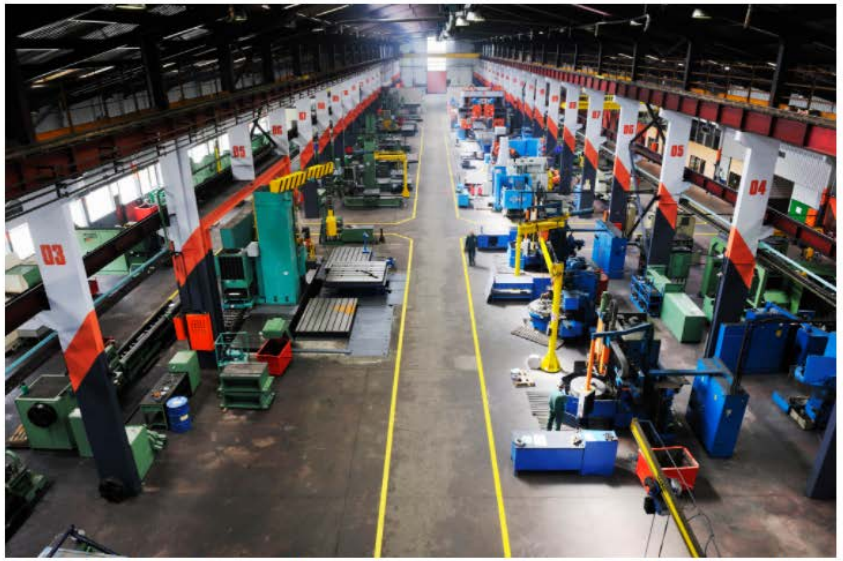
Log in | Your Shopping cart is empty

METAL CRAFT
ID MADE BETTER

Global Leader Uses RFID To Improve Manufacturing Process



A global leader with increasing demand for their products entrusted Metalcraft and CDO Technologies to collaborate on a solution to increase traceability and accuracy. The goal was to improve efficiency and profitability through automatin operations, using Radio Frequency Identification (RFID).

We're Online!
How may I help you toda...

UMApps | Work order | Other bookmarks

LEARN MORE

ation

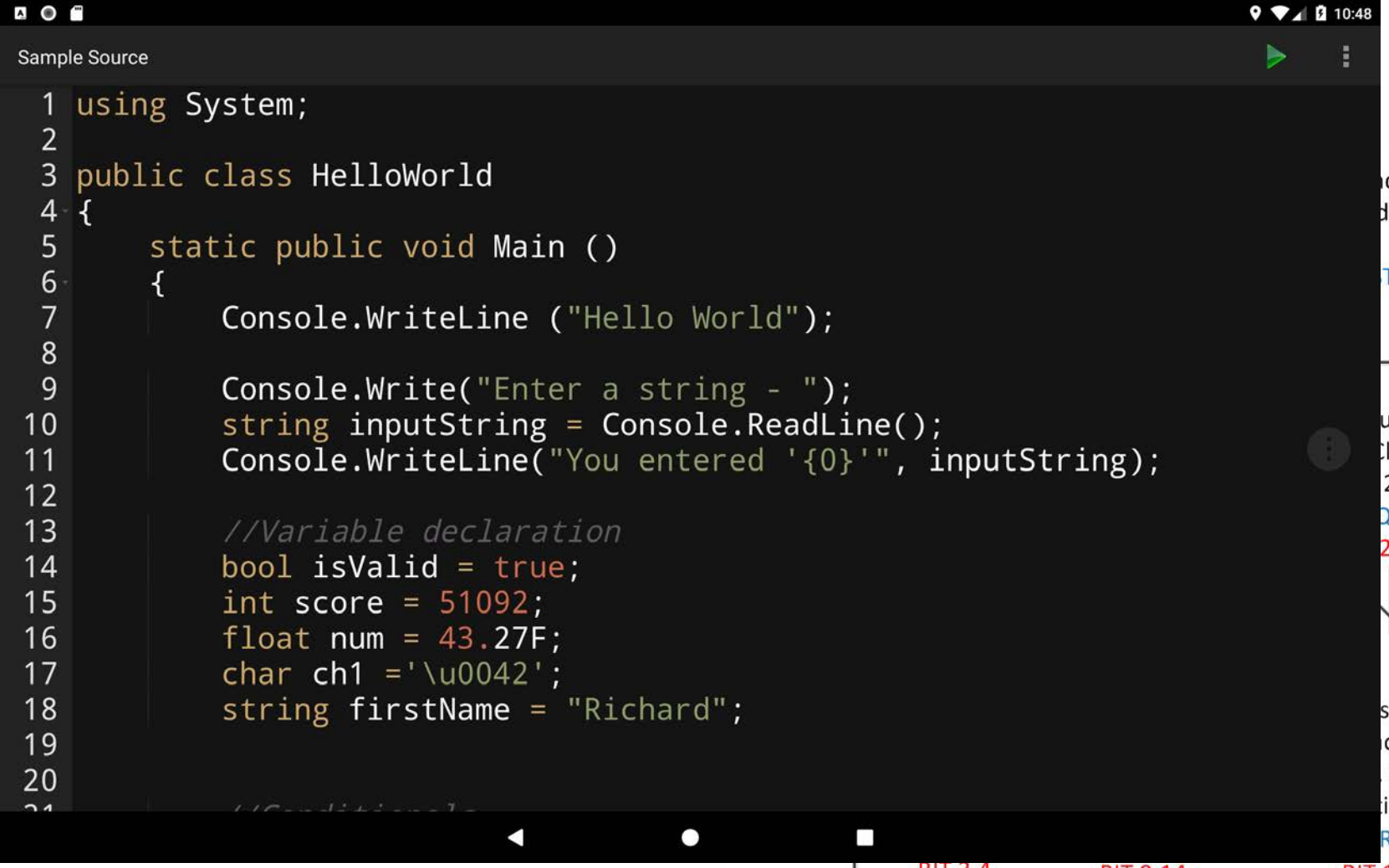
nd explains how RFID ocess improvements.

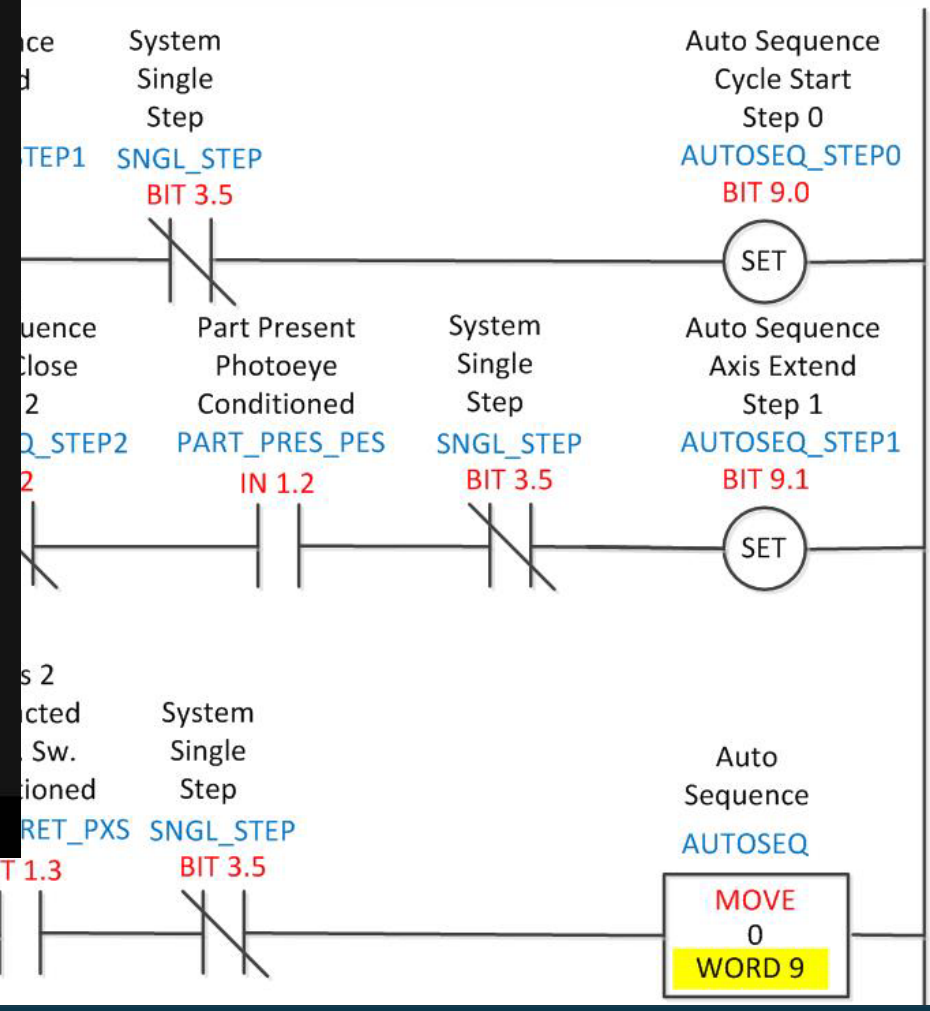
lart and the Department of of processes directly before

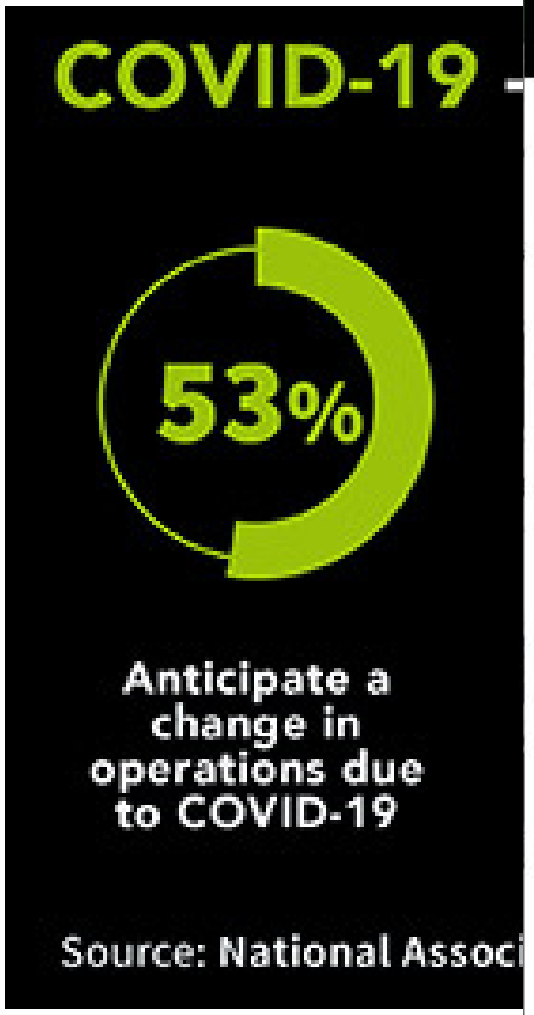
THE UNIVERSITY OF MEMPHIS
Automatic Identification Lab

RFID JOURNAL VIRTUALLY LIVE!

SEPTEMBER 30 - OCTOBER 1, 2020







DC VELOCITY

::COVID-19 COVERAGE:: INDUSTRY PRESS ROOM ABOUT CONTACT MEDIA FILE CREATE ACCOUNT SIGN IN FREE NEWSLETTERS

MAGAZINE TRANSPORTATION MATERIAL HANDLING TECHNOLOGY LIFT TRUCKS PODCAST ETC. DCV-TV

Logistics automation providers add social distancing features to robots, software

As states consider reopening, technology keeps warehouse workers separated to handle booming e-commerce orders.

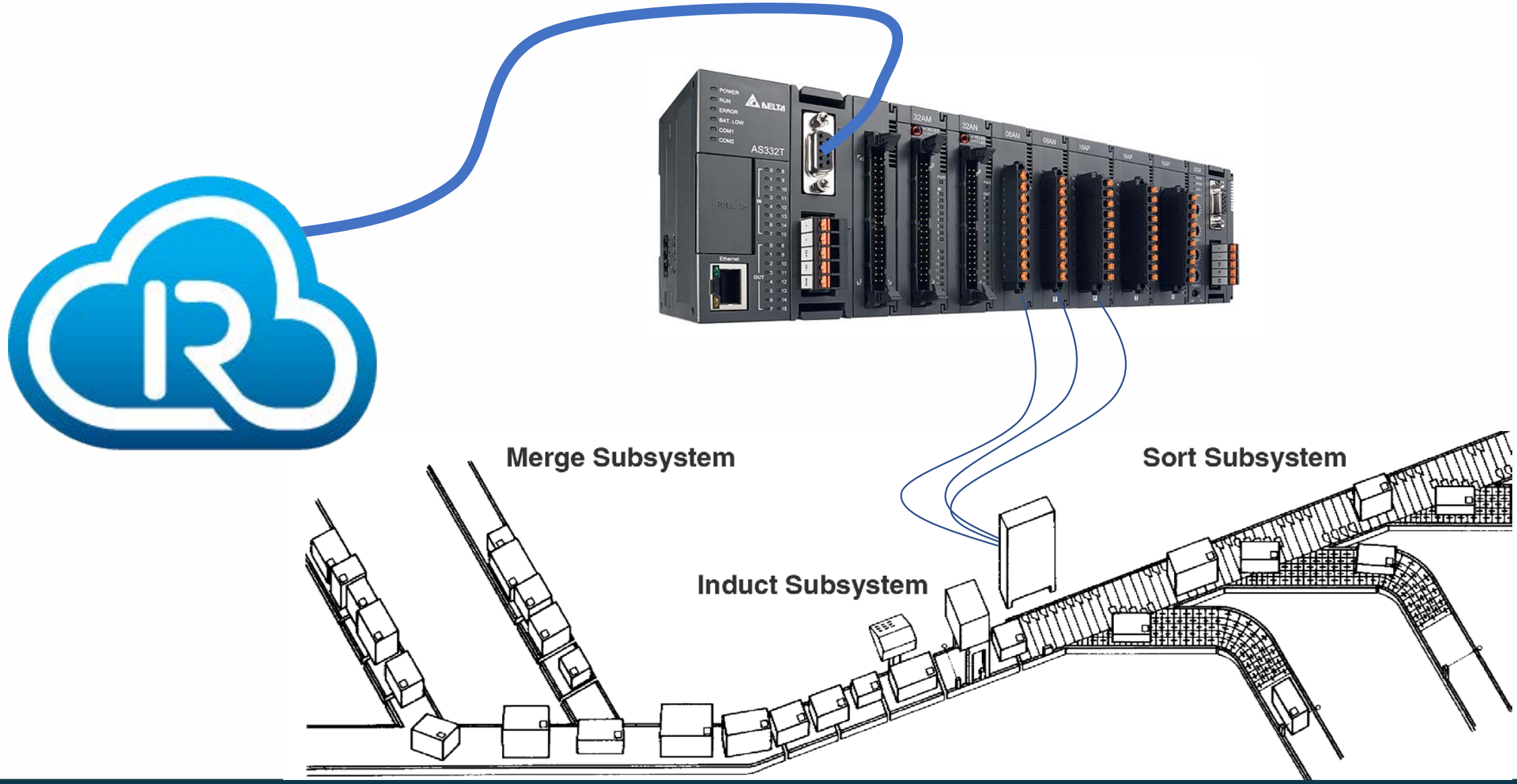
MOST POPULAR ARTICLES >

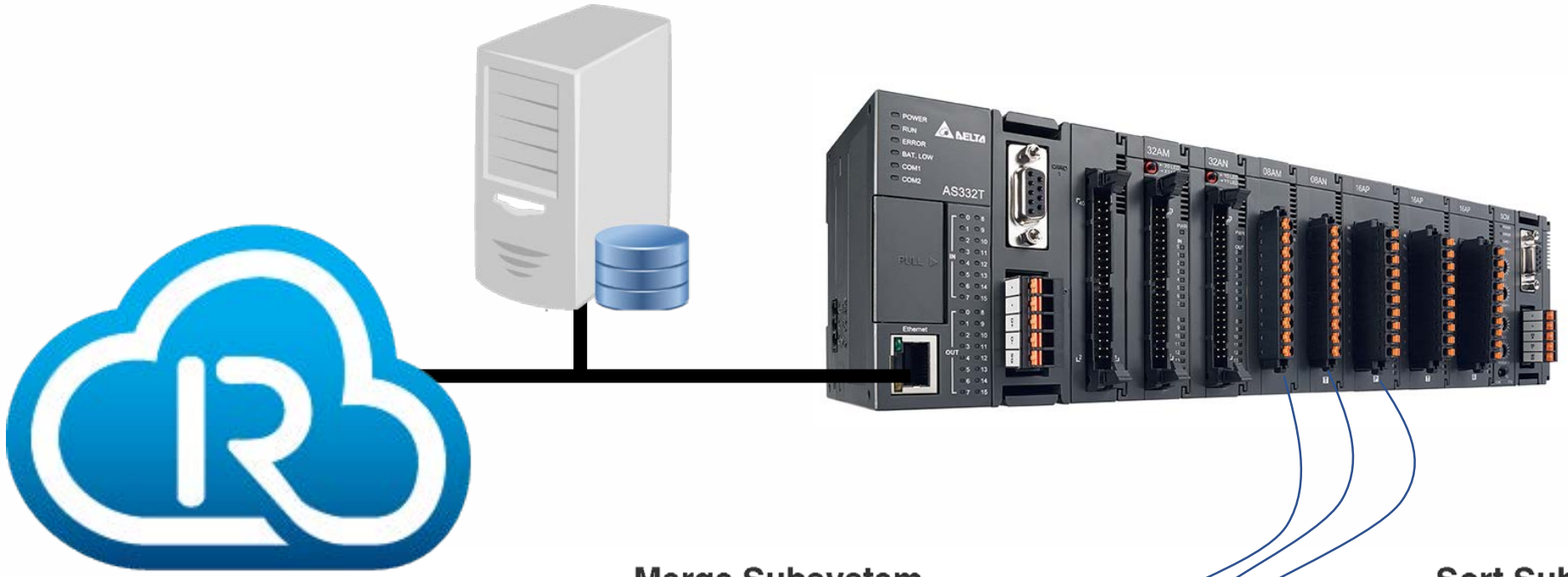
C.H. Robinson continues digital expansion with links to 19 TMS and ERP products

I think ... therefore I might be a material handling robot: interview with Ted Stinson

Ports will need to double or quadruple in size by 2050, climate study says


E-COMMERCE
HYTROL


POWER
RUN
ERROR
BAT. LOW
COM1
COM2
AS332T
Ethernet
OUT
32AM
32AN
08AM
08AN
16AP
16AP
16AP
Merge Subsystem
Induct Subsystem
Sort Subsystem


POWER
RUN
ERROR
BAT. LOW
COM1
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Ethernet
OUT
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32AN
08AM
08AN
16AP
16AP
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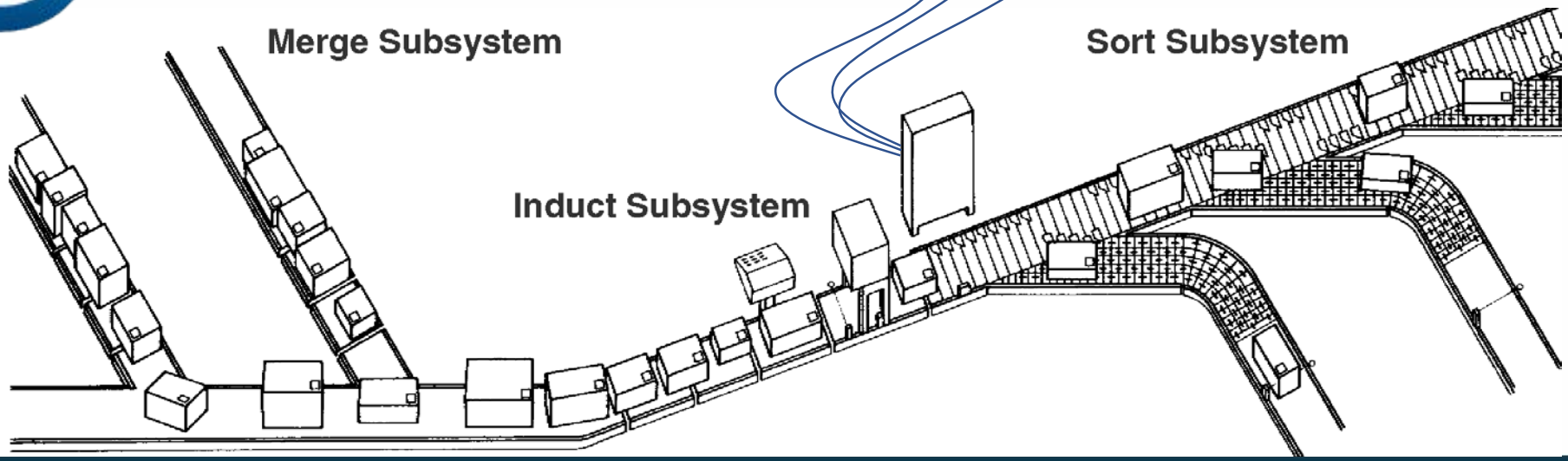
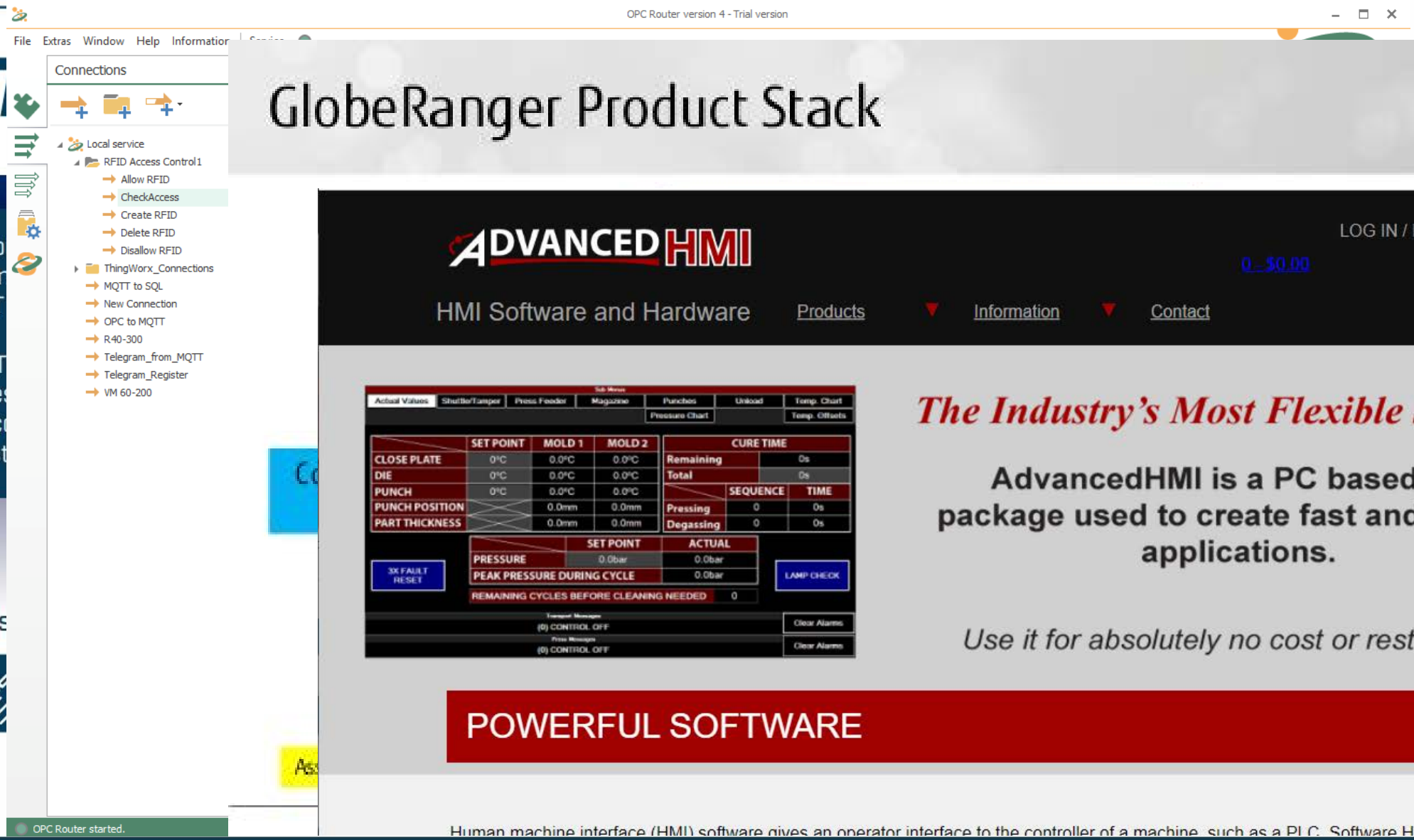
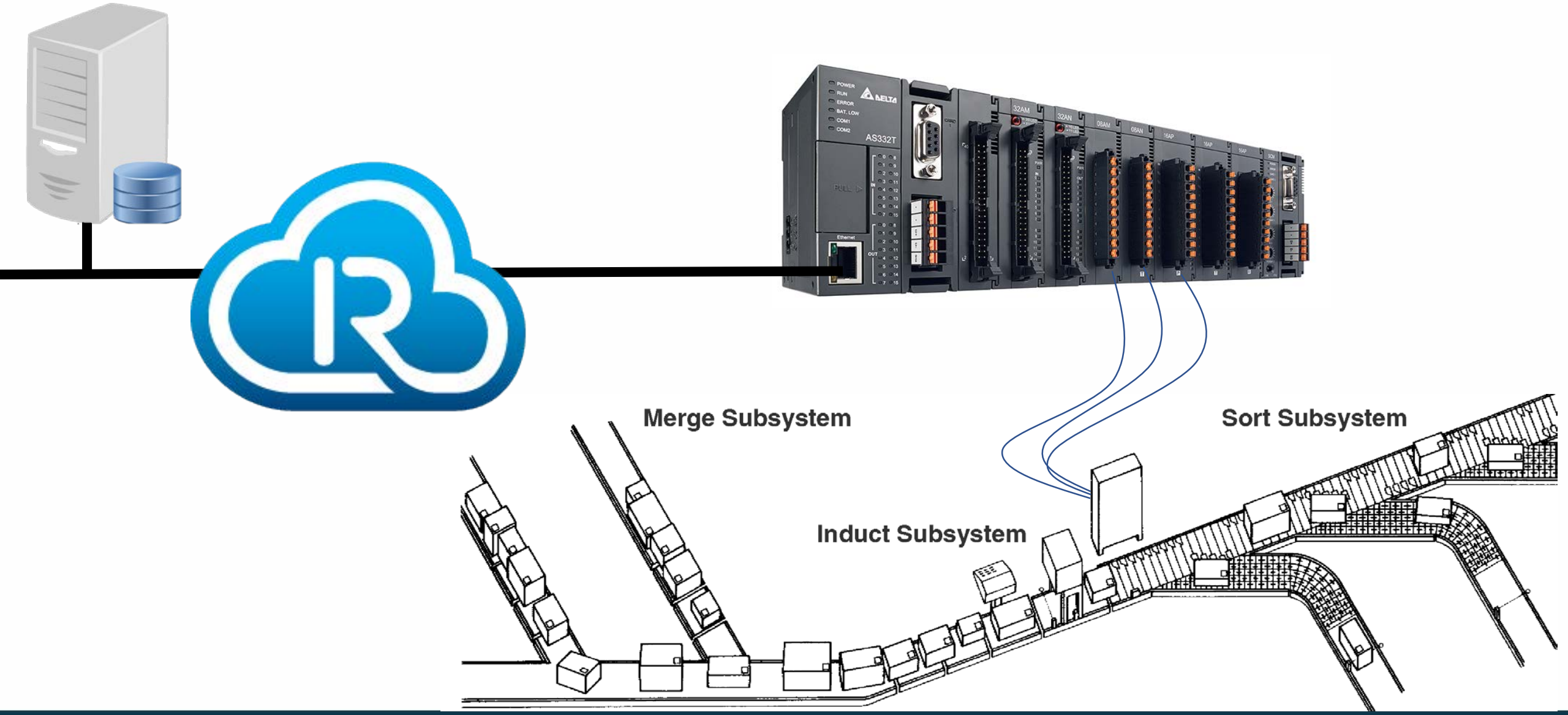

Merge Subsystem
Sort Subsystem
Induct Subsystem

GlobeRanger Product Stack

FUJITSU




POWER
RUN
ERROR
BAT. LOW
COM1
COM2
AS332T
Ethernet
OUT
32AM
32AN
08AM
08AN
16AP
16AP
16AP
Merge Subsystem
Induct Subsystem
Sort Subsystem

DATALOGIC

SICK

SIEMENS

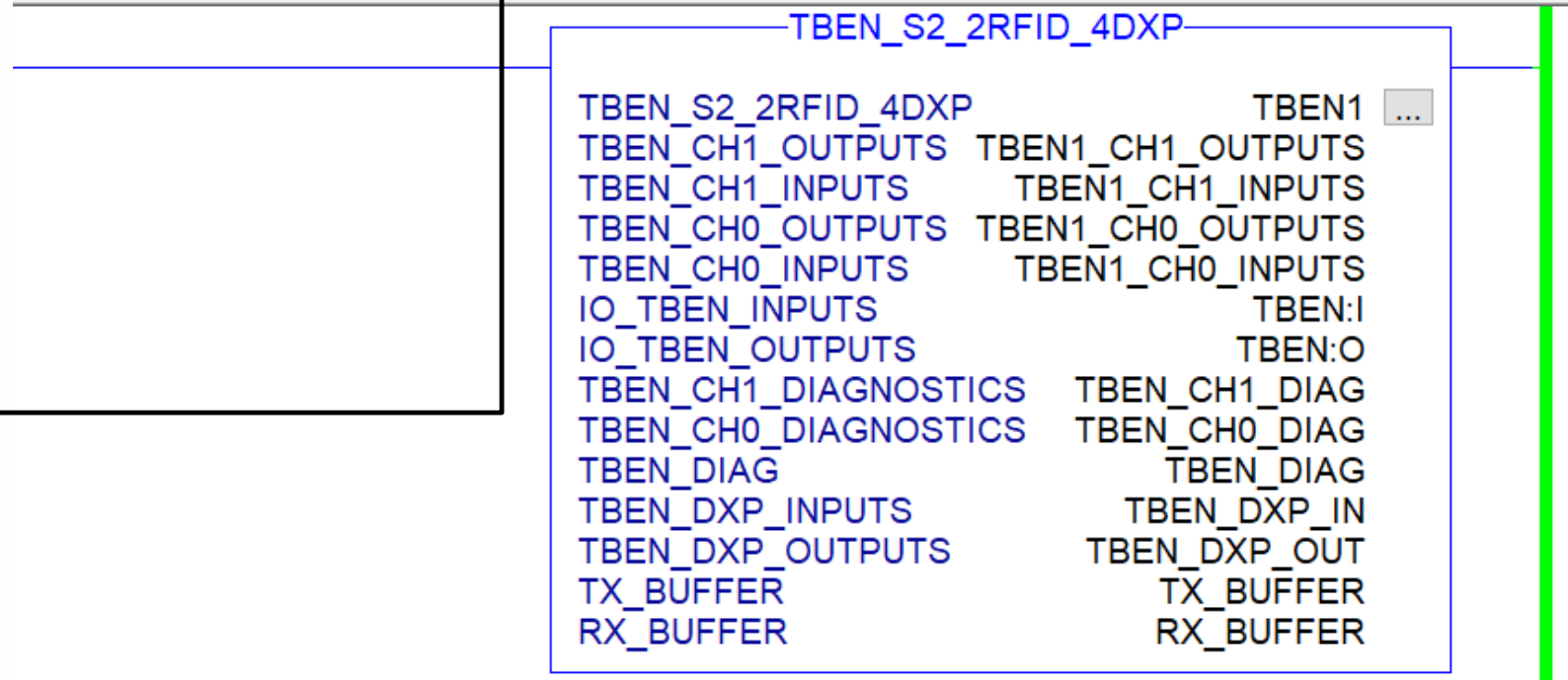
TURCK

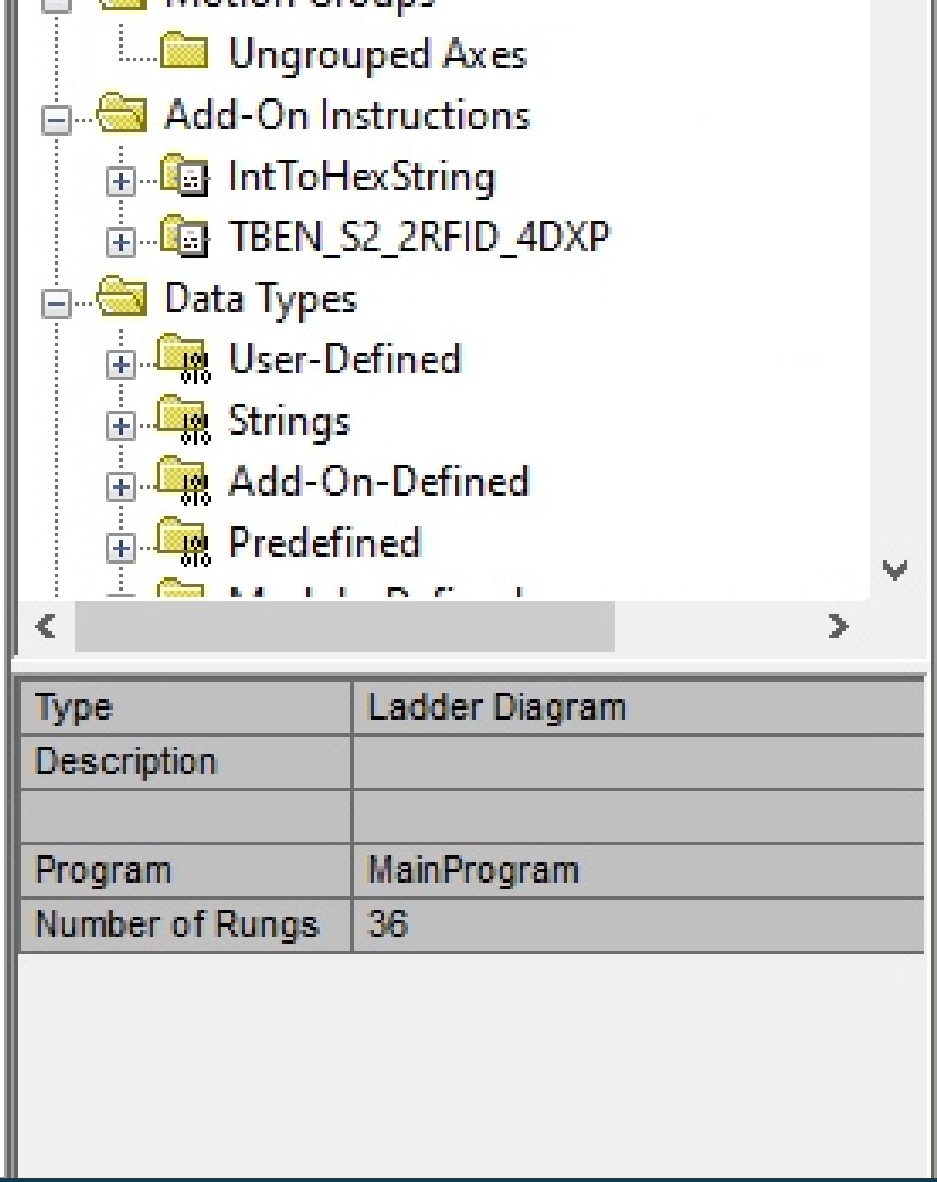
ZEBRA TECHNOLOGIES

Thanks for the support…

TURCK

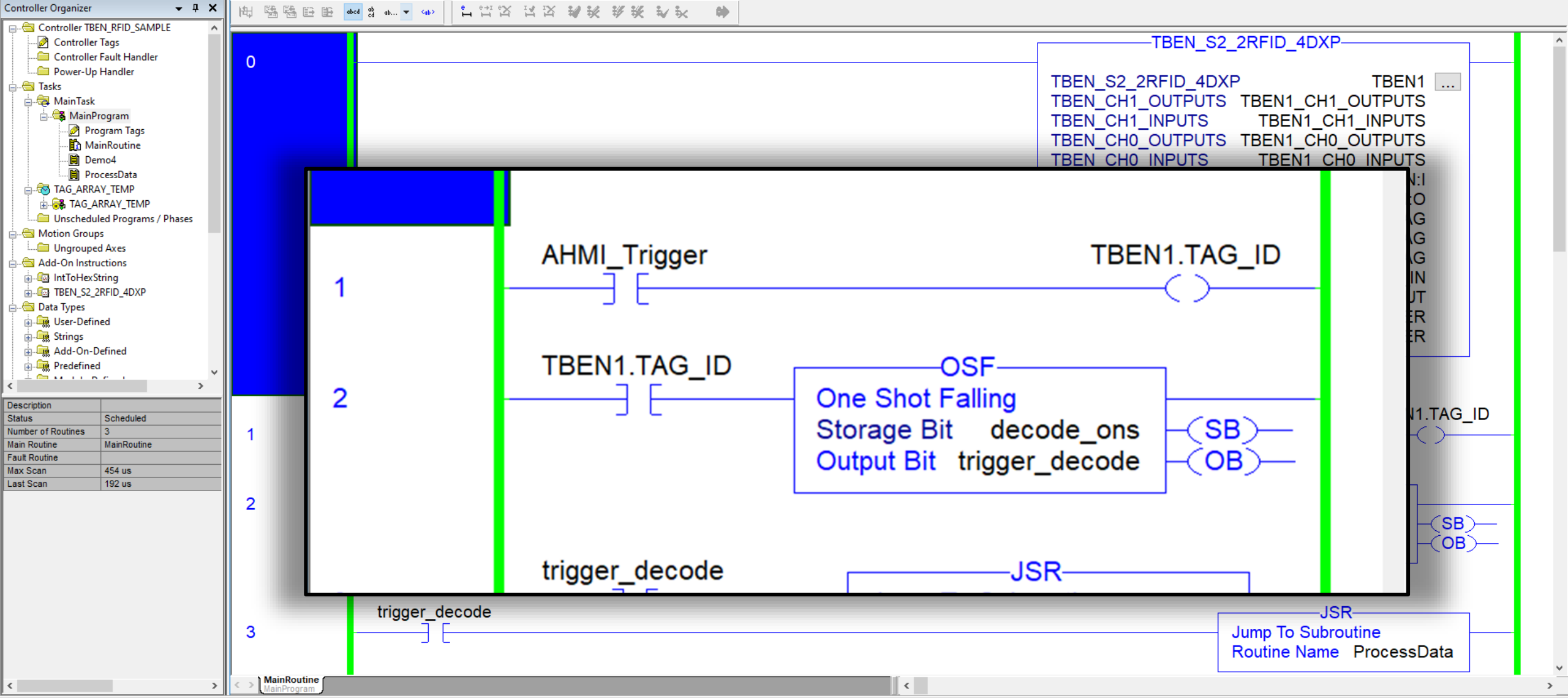

CompactLogix L23E
Allen-Bradley
PLC: 1
160.105
9
TURCK
BL ident.


TBEN_S2_2RFID_4DXP
TBEN_S2_2RFID_4DXP TBEN1 ...
TBEN_CH1_OUTPUTS TBEN1_CH1_OUTPUTS
TBEN_CH1_INPUTS TBEN1_CH1_INPUTS
TBEN_CH0_OUTPUTS TBEN1_CH0_OUTPUTS
TBEN_CH0_INPUTS TBEN1_CH0_INPUTS
IO_TBEN_INPUTS TBEN:I
IO_TBEN_OUTPUTS TBEN:O
TBEN_CH1_DIAGNOSTICS TBEN_CH1_DIAG
TBEN_CH0_DIAGNOSTICS TBEN_CH0_DIAG
TBEN_DIAG TBEN_DIAG
TBEN_DXP_INPUTS TBEN_DXP_IN
TBEN_DXP_OUTPUTS TBEN_DXP_OUT
TX_BUFFER TX_BUFFER
RX_BUFFER RX_BUFFER



Type	Ladder Diagram
Description	
Program	MainProgram
Number of Rungs	36

RX_BUFFER	{...}
RX_BUFFER_Count	{...}
TBEN:C	{...}
TBEN:I	{...}
TBEN:O	{...}
TBEN1	{...}
TBEN1.EnableIn	1
TBEN1.EnableOut	1
TBEN1.READ	0
TBEN1.WRITE	0
TBEN1.TAG_ID	0
TBEN1.DOMAIN	1
TBEN1.LENGTH	12
TBEN1.START_ADDRESS	1
TBEN1.RESET	0
TBEN1.UHF_CONTINOU...	0
TBEN1.NODE_ADDRESS	0
TBEN1.NODE_ADDRES...	0


Controller Organizer
Controller TBEN_RFID_SAMPLE
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Demo4
ProcessData
TAG_ARRAY_TEMP
TAG_ARRAY_TEMP
Unscheduled Programs / Phases
Motion Groups
Ungrouped Axes
Add-On Instructions
IntToHexString
TBEN_S2_2RFID_4DXP
Data Types
User-Defined
Strings
Add-On-Defined
Predefined
Description
Status Scheduled
Number of Routines 3
Main Routine MainRoutine
Fault Routine
Max Scan 454 us
Last Scan 192 us
TBEN_S2_2RFID_4DXP
TBEN_S2_2RFID_4DXP TBEN1
TBEN_CH1_OUTPUTS TBEN1_CH1_OUTPUTS
TBEN_CH1_INPUTS TBEN1_CH1_INPUTS
TBEN_CH0_OUTPUTS TBEN1_CH0_OUTPUTS
TBEN_CH0_INPUTS TBEN1_CH0_INPUTS
0
1
AHMI_Trigger
TBEN1.TAG_ID
2
TBEN1.TAG_ID
OSF
One Shot Falling
Storage Bit decode_ons
Output Bit trigger_decode
SB
OB
trigger_decode
JSR
3
trigger_decode
JSR
Jump To Subroutine
Routine Name ProcessData
MainRoutine
MainProgram
Display the language elements contained in the group: Compare
Rung 0 of 4
APP
VER

Controller Organizer

- TAG_ARRAY_TEMP
- Unscheduled Programs / Phases
- Motion Groups
  - Ungrouped Axes
- Add-On Instructions
  - IntToHexString
  - TBEN_S2_2RFID_4DXP
- Data Types
  - User-Defined
  - Strings
  - Add-On-Defined
  - Predefined
  - Module-Defined
- Trends
- I/O Configuration
  - CompactLogix5323E-QBFC1 System
    - 1769-L23E-QBFC1 TBEN_RFID_SAMPL
    - 1769-L23E-QBFC1 Ethernet Port Local
      - Ethernet
        - 1769-L23E-QBFC1 Ethernet Por
        - ETHERNET-MODULE TBEN
    - CompactBus Local
      - Embedded I/O
        - [1] Embedded IQ16F Discrete_I

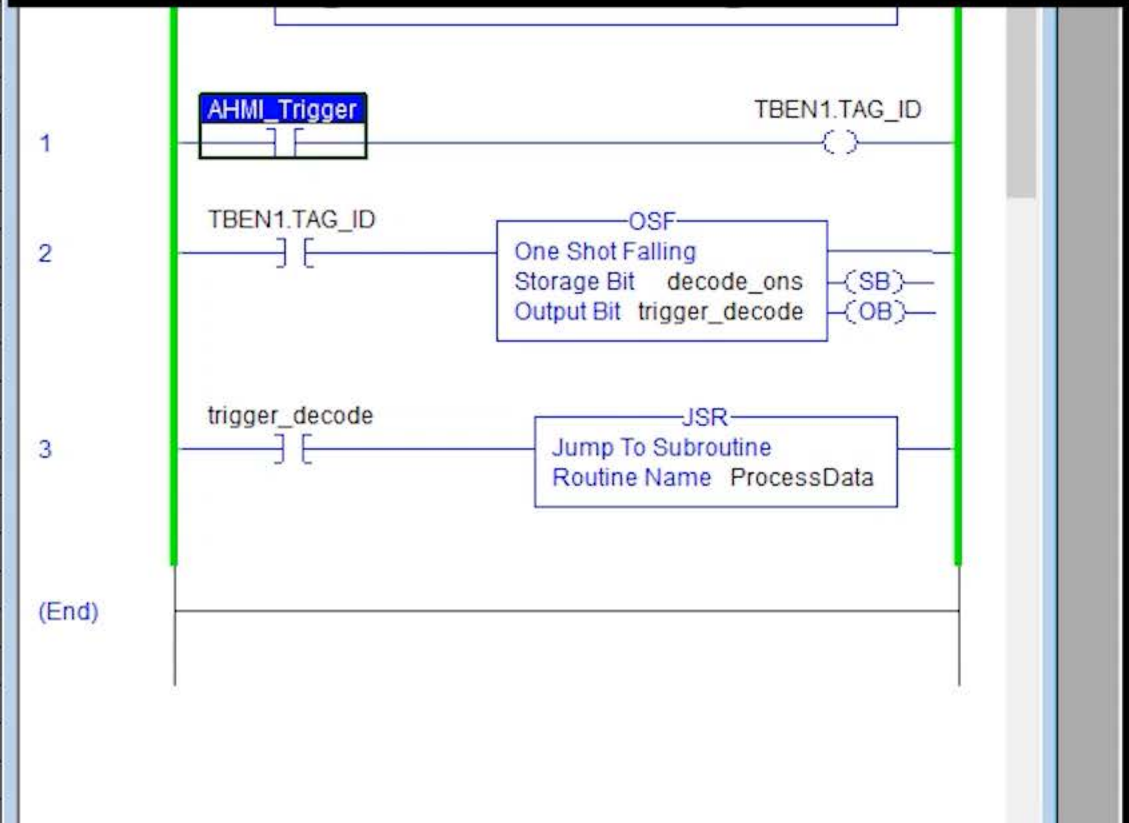
Module Defined Tags
- TBEN:I
- TBEN:O
- TBEN:C

Description	
Status	Running
Module Fault	

Controller Tags - TBEN_RFID_SAMPLE(controller)

Scope: TBEN_RFID_SA Show: All Tags Enter Nan

Name	Value
Local:2:I	{...}
Local:2:O	{...}
Local:3:C	{...}
Local:3:I	{...}
Local:3:O	{...}
Local:4:C	{...}
Local:4:I	{...}
Local:4:O	{...}
myConversion	{...}
myIndex	0
mystring2	'226'
PETrigger	0
PETriggerFallingEdge	0
ProcessDataBit	0
reset_ons	0
RX_BUFFER	{...}
RX_BUFFER[0]	14
RX_BUFFER[1]	1
RX_BUFFER[2]	-30
RX_BUFFER[3]	0
RX_BUFFER[4]	52
RX_BUFFER[5]	18
RX_BUFFER[6]	-36
RX_BUFFER[7]	3
RX_BUFFER[8]	1
RX_BUFFER[9]	24
RX_BUFFER[10]	40
RX_BUFFER[11]	5
RX_BUFFER[12]	-110
RX_BUFFER[13]	117
RX_BUFFER[14]	1
RX_BUFFER[15]	0
RX_BUFFER[16]	0
RX_BUFFER[17]	0



ZEBRA

- Home
- Status
- Operation Statistics
- Configure Reader
- Read Tags
- Communication
- Date Time
- IP Sec
- License Manager
- Change Password
- GPIO
- Applications
- Profiles
- Firmware
- Commit/Discard
- System Log
- Diagnostics
- Shutdown
- Logout

User Application Page

Existing Packages:

List of Installed apps	Start/Stop	AutoStart	Uninstall
RFIDSample4App			Uninstall

Meta Data

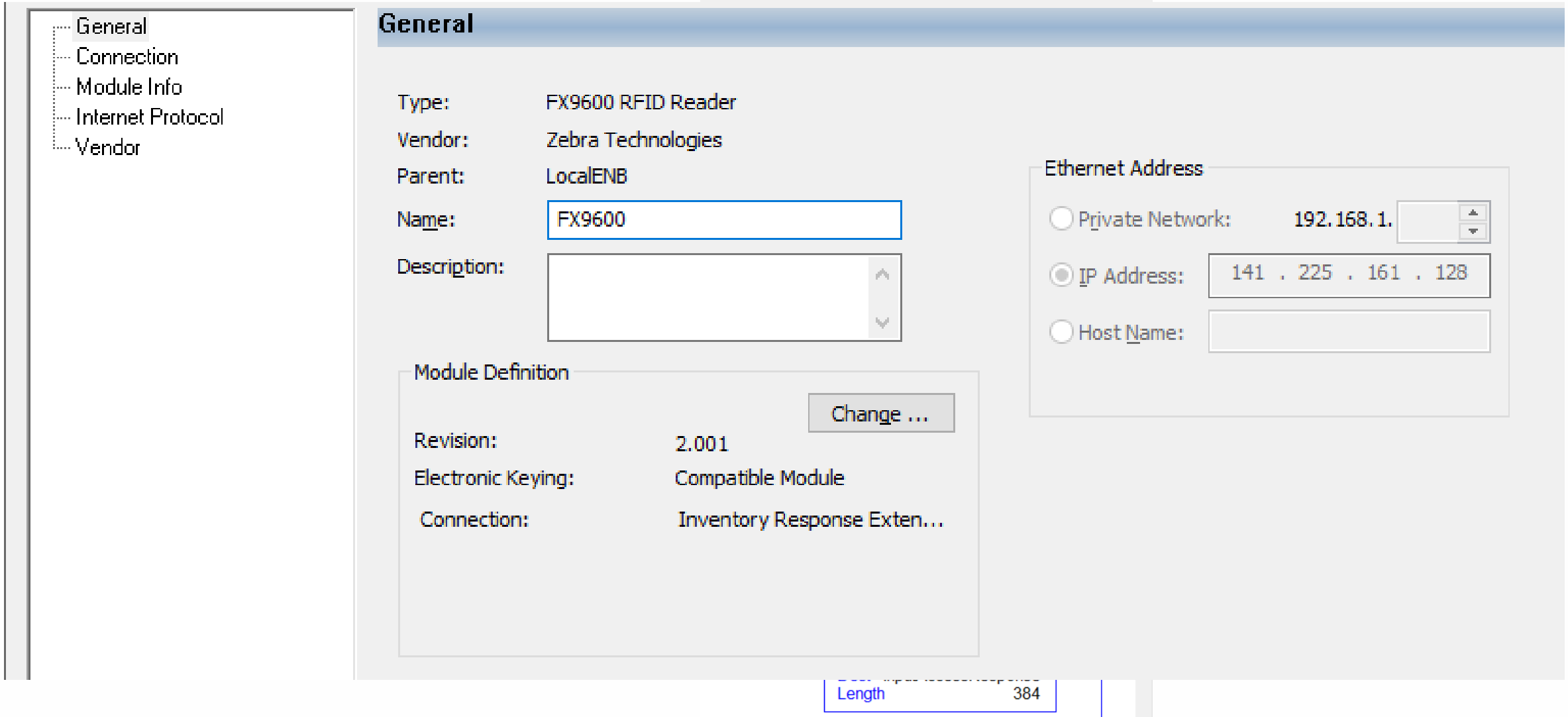
Package Name:RFIDSample4App
Package Version: 1.0
Status: install user installed
architecture: all

Install New Package:

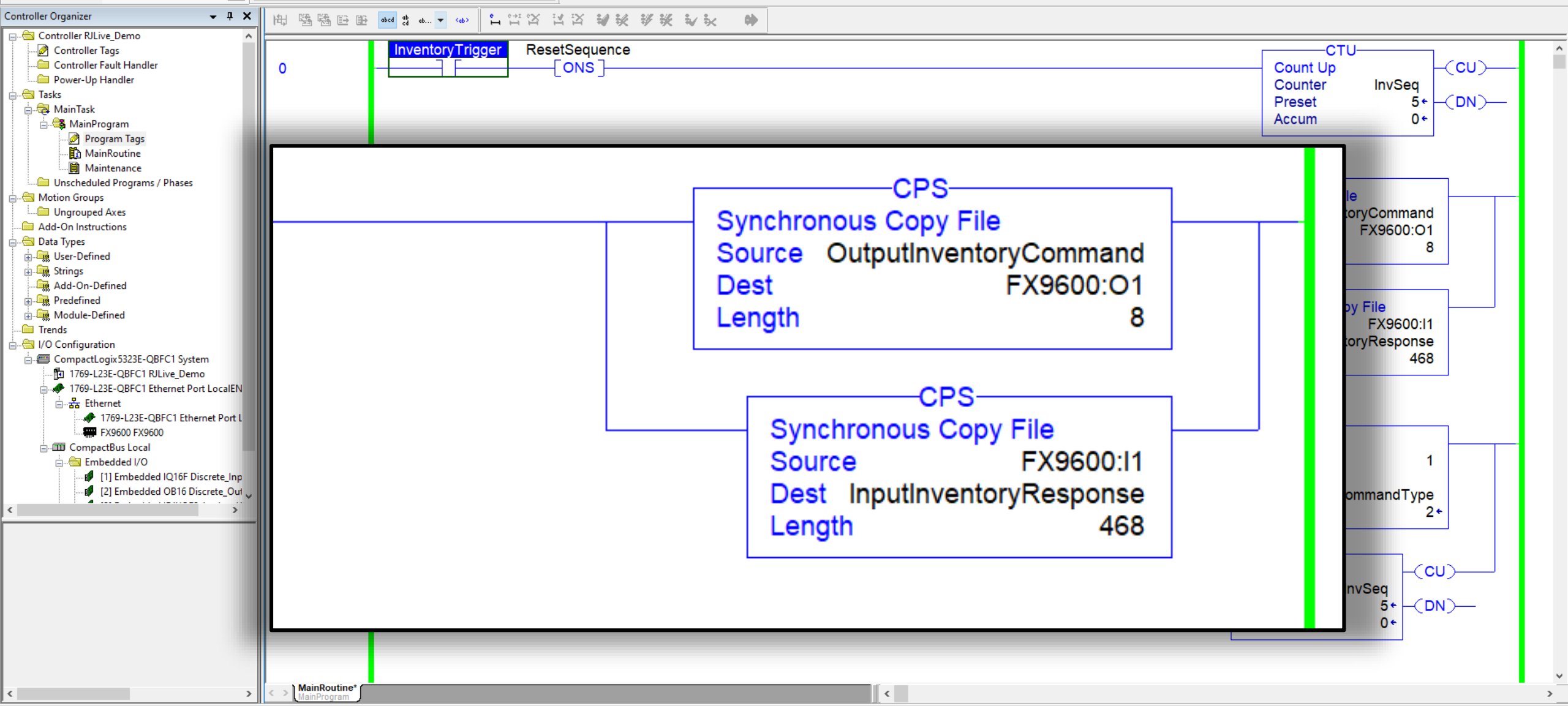
Current Status: Select package from the browser button

package: Browser

Install


General
Connection
Module Info
Internet Protocol
Vendor
General
Type: FX9600 RFID Reader
Vendor: Zebra Technologies
Parent: LocalENB
Name: FX9600
Description:
Module Definition
Change ...
Revision: 2.001
Electronic Keying: Compatible Module
Connection: Inventory Response Exten...
Ethernet Address
Private Network: 192.168.1.
IP Address: 141 . 225 . 161 . 128
Host Name:
Length 384

FX9600:I1	{...}	{...}	
FX9600:I1.ConnectionFaulted	0		Decimal
FX9600:I1.StatusMask	{...}	{...}	
FX9600:I1.PacketSequenceNumber	119		Decimal
FX9600:I1.NumberOfTagReports	0		Decimal
FX9600:I1.TagReports	{...}	{...}	
FX9600:I1.TagReports[0]	{...}	{...}	
FX9600:I1.TagReports[0].TagEPC	{...}	{...}	
FX9600:I1.TagReports[0].TagPC	0		Decimal
FX9600:I1.TagReports[0].TagCRC	0		Decimal
FX9600:I1.TagReports[0].AntennaID	0		Decimal
FX9600:I1.TagReports[0].RSSI	0		Decimal
FX9600:I1.TagReports[0].ChannelIndex	0		Decimal
FX9600:I1.TagReports[0].SeenCount	0		Decimal
FX9600:I1.TagReports[0].PhaseInfo	0		Decimal
FX9600:I1.TagReports[0].FirstSeenTimeStamp	{...}	{...}	
FX9600:I1.TagReports[0].LastSeenTimeStamp	{...}	{...}	
FX9600:I1.TagReports[0].AccessStatus	0		Decimal


Controller Organizer
Controller RJLive_Demo
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Maintenance
Unscheduled Programs / Phases
Motion Groups
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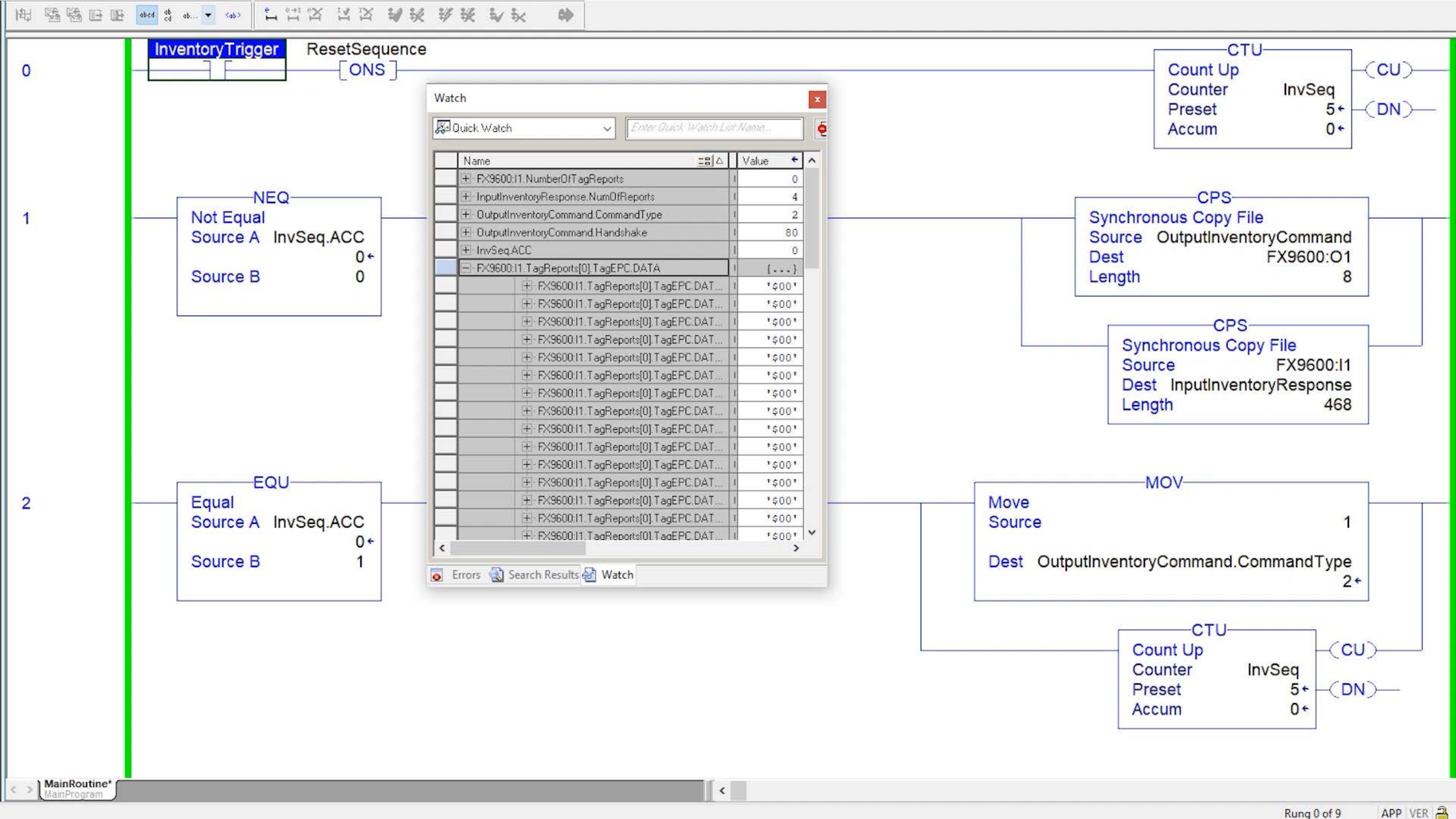
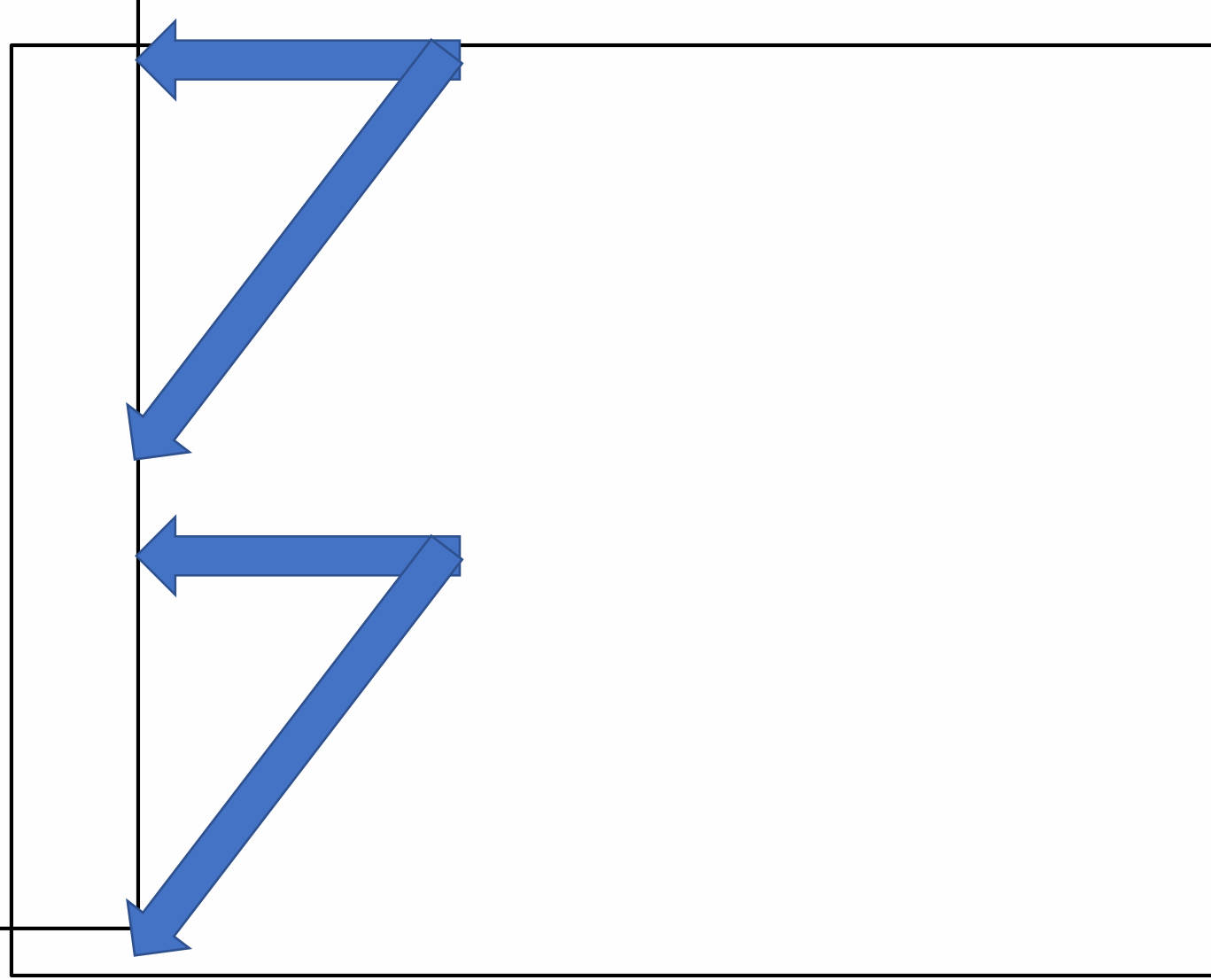
1769-L23E-QBFC1 Ethernet Port LocalEN
Ethernet
1769-L23E-QBFC1 Ethernet Port L
FX9600 FX9600
CompactBus Local
Embedded I/O
[1] Embedded IQ16F Discrete_Inp
[2] Embedded OB16 Discrete_Out
0
InventoryTrigger
ResetSequence
ONS
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
CPS
Synchronous Copy File
Source OutputInventoryCommand
Dest FX9600:O1
Length 8
CPS
Synchronous Copy File
Source FX9600:I1
Dest InputInventoryResponse
Length 468
MainRoutine*
MainProgram
Ready
Rung 0 of 9
APP
VER


InventoryTrigger
ResetSequence
ONS
0
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
1
NEQ
Not Equal
Source A InvSeq.ACC
0
Source B 0
CPS
Synchronous Copy File
Source OutputInventoryCommand
Dest FX9600:O1
Length 8
CPS
Synchronous Copy File
Source FX9600:I1
Dest InputInventoryResponse
Length 468
2
EQU
Equal
Source A InvSeq.ACC
0
Source B 1
MOV
Move
Source 1
Dest OutputInventoryCommand.CommandType
2
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
Watch
Quick Watch
Enter Quick Watch List Name...
Name
Value
FX9600:I1.NumberOfTagReports 0
InputInventoryResponse.NumOfReports 4
OutputInventoryCommand.CommandType 2
OutputInventoryCommand.Handshake 80
InvSeq.ACC 0
FX9600:I1.TagReports[0].TagEPC.DATA {...}
FX9600:I1.TagReports[0].TagEPC.DAT... '$00'
Errors
Search Results
Watch
MainRoutine*
MainProgram
Rung 0 of 9
APP
VER

$




Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
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MainRoutine
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TAG_ARRAY_TEMP
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Add-On Instructions
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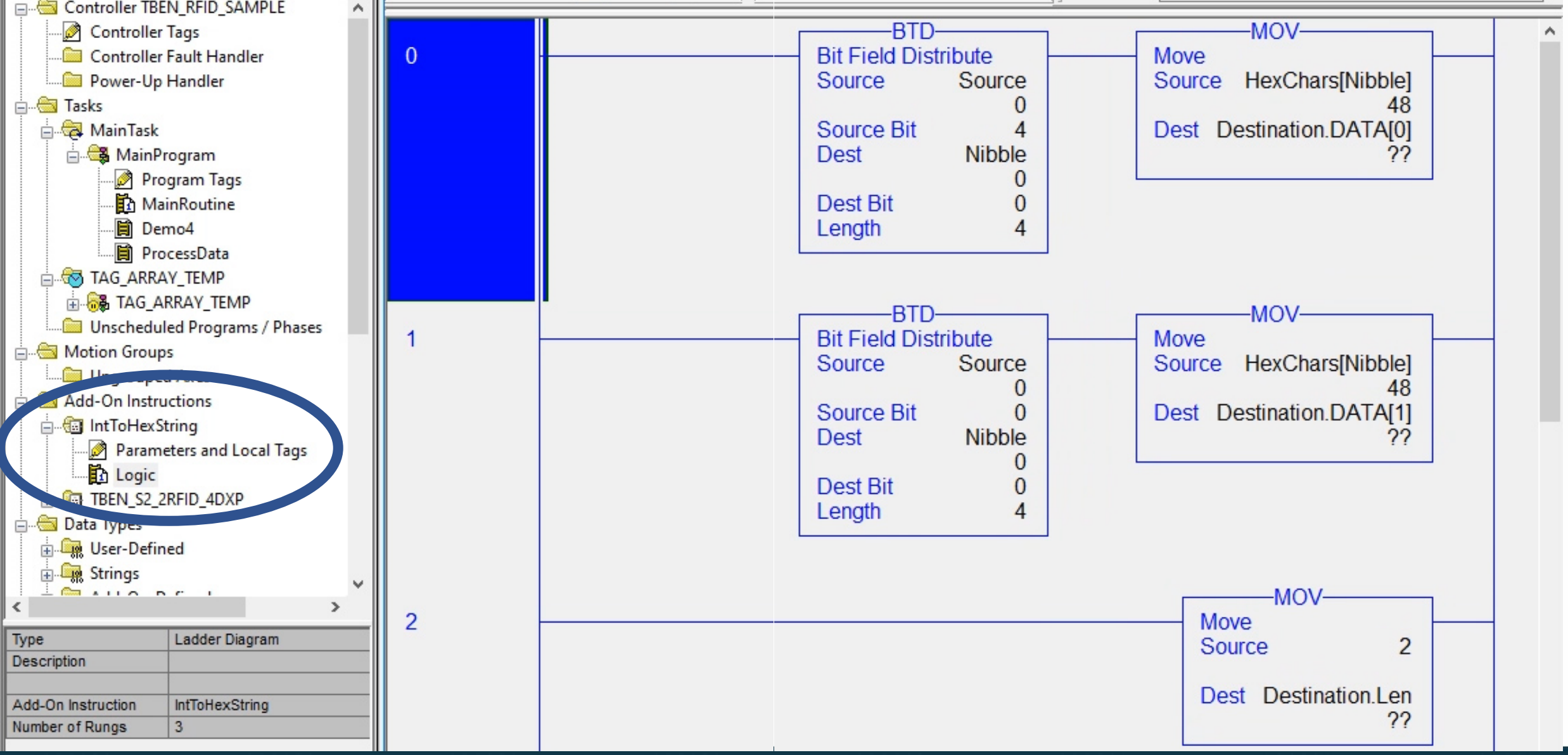
TBEN_S2_2RFID_4DXP
Data Types
User-Defined
Strings
Add-On-Defined
Predefined
Type
Ladder Diagram
Description
Program
MainProgram
Number of Rungs
36
0
AND
Bitwise AND
Source A
RX_BUFFER[2]
-30
Source B
65535
Dest
testing2
115
1
IntToHexString
IntToHexString
myConversion
Source
testing2
115
Destination
testing
2
CONCAT
String Concatenate
Source A
EPC_String
'E2003412DC0301182805'
Source B
testing
'73'
Dest
EPC_String
'E2003412DC0301182805'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MainRoutine
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TAG_ARRAY_TEMP
Unscheduled Programs / Phases
Motion Groups
Add-On Instructions
IntToHexString
Parameters and Local Tags
Logic
TBEN_S2_2RFID_4DXP
Data Types
User-Defined
Strings
Type Ladder Diagram
Description
Add-On Instruction IntToHexString
Number of Rungs 3
0
BTD
Bit Field Distribute
Source Source
0
Source Bit 4
Dest Nibble
0
Dest Bit 0
Length 4
MOV
Move
Source HexChars[Nibble]
48
Dest Destination.DATA[0]
??
1
BTD
Bit Field Distribute
Source Source
0
Source Bit 0
Dest Nibble
0
Dest Bit 0
Length 4
MOV
Move
Source HexChars[Nibble]
48
Dest Destination.DATA[1]
??
2
MOV
Move
Source 2
Dest Destination.Len
??

Closing thoughts…

- Great first steps
- Demand better adoption
- Inherent SINT conversion
- Common reader control access

Questions?

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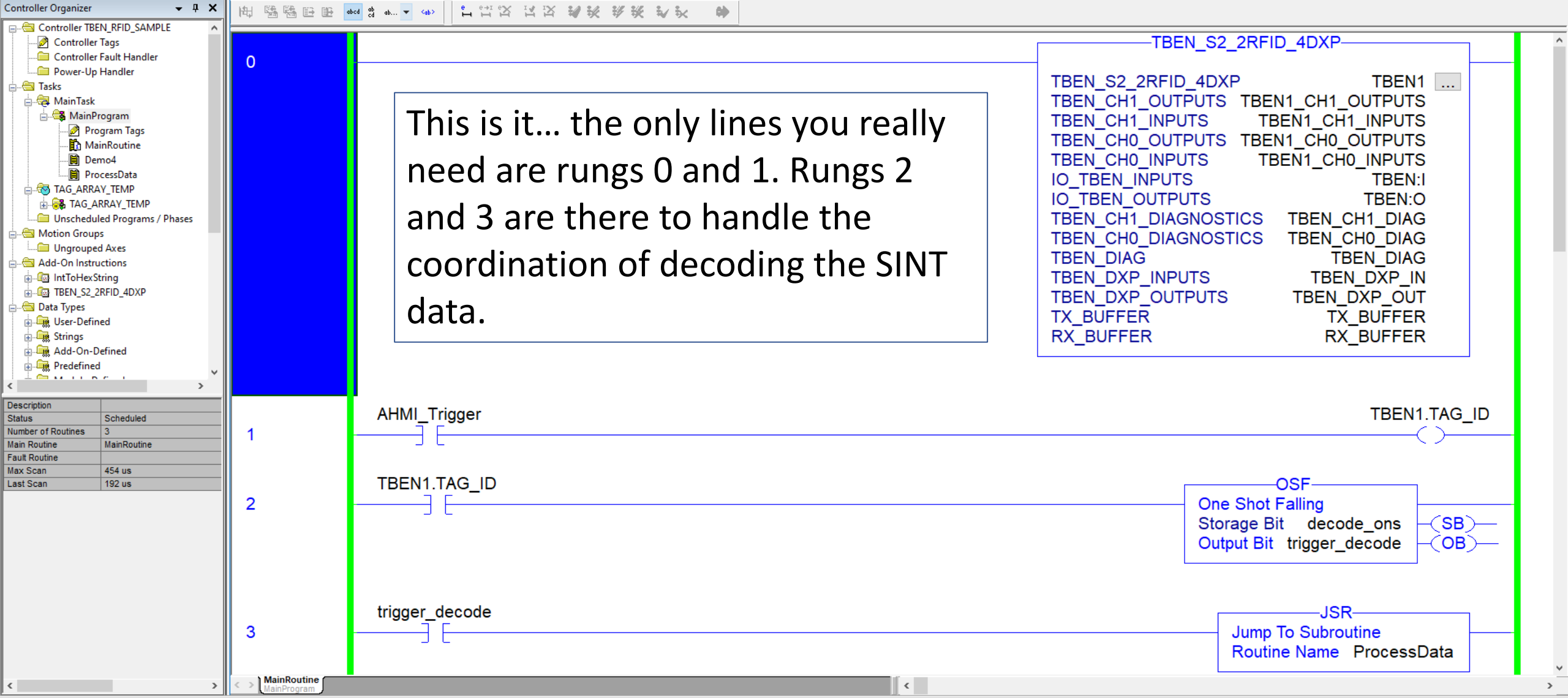
University of Memphis
Automatic Identification Lab
kberisso@memphis.edu

THANK YOU

RFID JOURNAL VIRTUALLY LIVE!

Turck Program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TAG_ARRAY_TEMP
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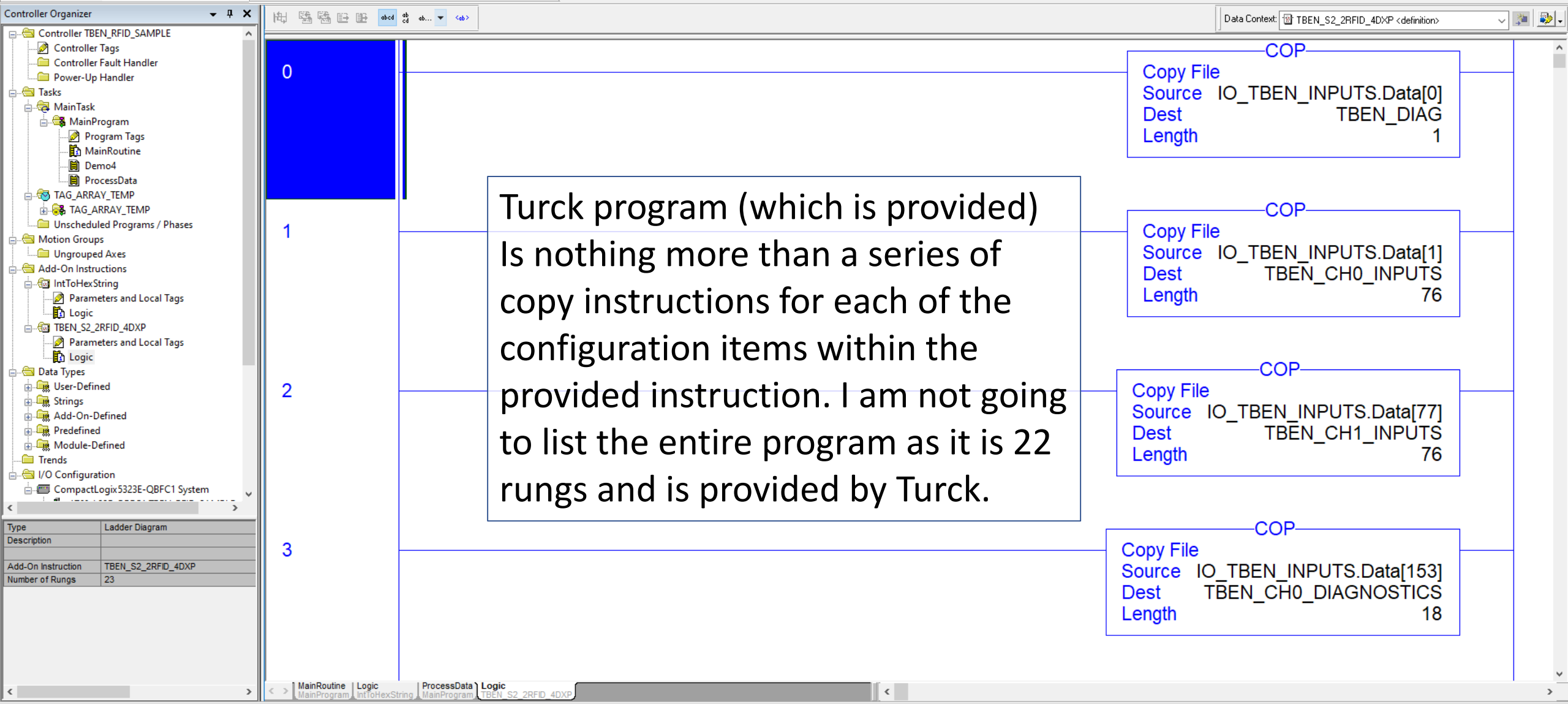
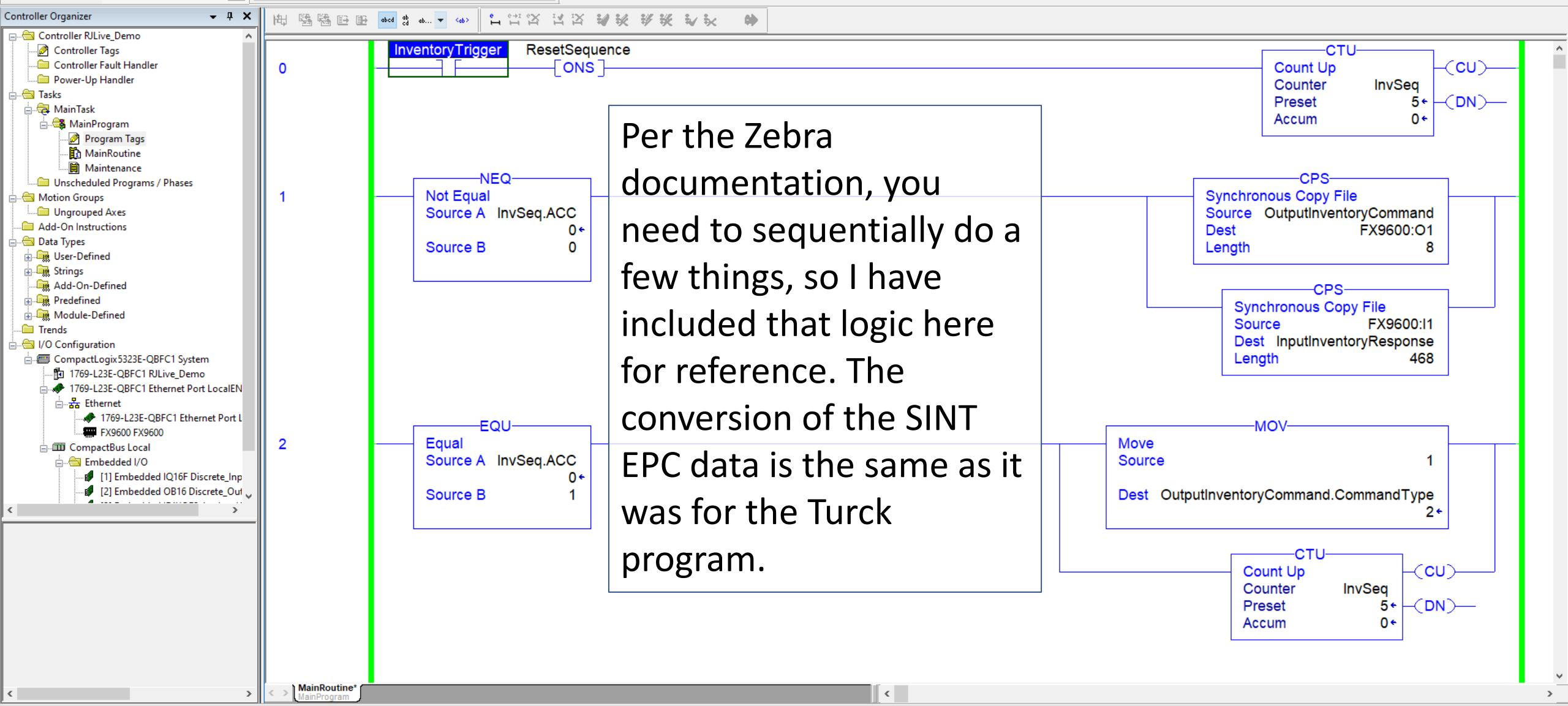
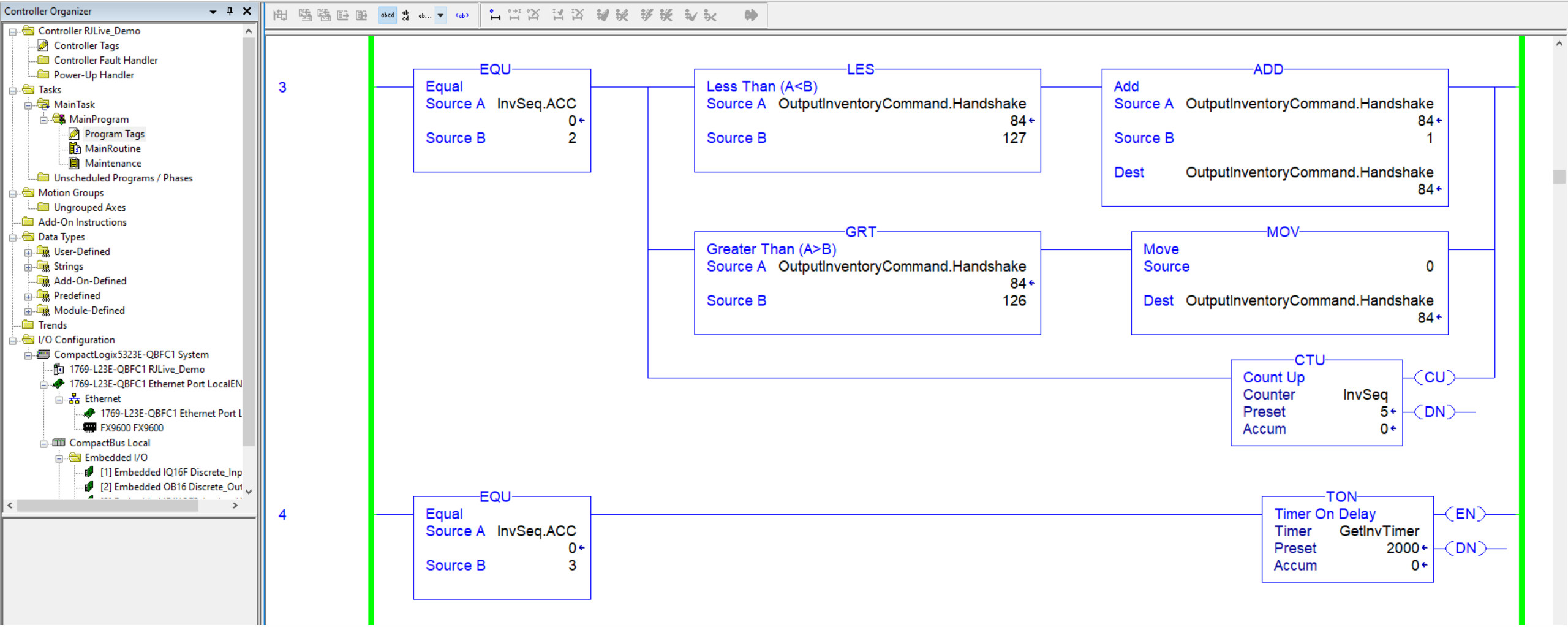
Add-On Instructions
IntToHexString
TBEN_S2_2RFID_4DXP
Data Types
User-Defined
Strings
Add-On-Defined
Predefined
Description
Status Scheduled
Number of Routines 3
Main Routine MainRoutine
Fault Routine
Max Scan 454 us
Last Scan 192 us
0
This is it… the only lines you really need are rungs 0 and 1. Rungs 2 and 3 are there to handle the coordination of decoding the SINT data.
TBEN_S2_2RFID_4DXP
TBEN_S2_2RFID_4DXP TBEN1
TBEN_CH1_OUTPUTS TBEN1_CH1_OUTPUTS
TBEN_CH1_INPUTS TBEN1_CH1_INPUTS
TBEN_CH0_OUTPUTS TBEN1_CH0_OUTPUTS
TBEN_CH0_INPUTS TBEN1_CH0_INPUTS
IO_TBEN_INPUTS TBEN:I
IO_TBEN_OUTPUTS TBEN:O
TBEN_CH1_DIAGNOSTICS TBEN_CH1_DIAG
TBEN_CH0_DIAGNOSTICS TBEN_CH0_DIAG
TBEN_DIAG TBEN_DIAG
TBEN_DXP_INPUTS TBEN_DXP_IN
TBEN_DXP_OUTPUTS TBEN_DXP_OUT
TX_BUFFER TX_BUFFER
RX_BUFFER RX_BUFFER
1
AHMI_Trigger
TBEN1.TAG_ID
2
TBEN1.TAG_ID
OSF
One Shot Falling
Storage Bit decode_ons
Output Bit trigger_decode
SB
OB
3
trigger_decode
JSR
Jump To Subroutine
Routine Name ProcessData
MainRoutine
MainProgram
Display the language elements contained in the group: Compare
Rung 0 of 4
APP
VER


Controller Organizer
Controller TBEN_RFID_SAMPLE
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Demo4
ProcessData
TAG_ARRAY_TEMP
TAG_ARRAY_TEMP
Unscheduled Programs / Phases
Motion Groups
Ungrouped Axes
Add-On Instructions
IntToHexString
Parameters and Local Tags
Logic
TBEN_S2_2RFID_4DXP
Parameters and Local Tags
Logic
Data Types
User-Defined
Strings
Add-On-Defined
Predefined
Module-Defined
Trends
I/O Configuration
CompactLogix5323E-QBFC1 System
Type
Ladder Diagram
Description
Add-On Instruction
TBEN_S2_2RFID_4DXP
Number of Rungs
23
Data Context:
TBEN_S2_2RFID_4DXP <definition>
0
1
2
3
COP
Copy File
Source IO_TBEN_INPUTS.Data[0]
Dest TBEN_DIAG
Length 1
COP
Copy File
Source IO_TBEN_INPUTS.Data[1]
Dest TBEN_CH0_INPUTS
Length 76
COP
Copy File
Source IO_TBEN_INPUTS.Data[77]
Dest TBEN_CH1_INPUTS
Length 76
COP
Copy File
Source IO_TBEN_INPUTS.Data[153]
Dest TBEN_CH0_DIAGNOSTICS
Length 18
Turck program (which is provided) Is nothing more than a series of copy instructions for each of the configuration items within the provided instruction. I am not going to list the entire program as it is 22 rungs and is provided by Turck.
MainRoutine MainProgram
Logic IntToHexString
ProcessData MainProgram
Logic TBEN_S2_2RFID_4DXP
Ready
Rung 0 of 23
APP
VER

Zebra Program


Controller Organizer
Controller RJLive_Demo
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Maintenance
Unscheduled Programs / Phases
Motion Groups
Ungrouped Axes
Add-On Instructions
Data Types
User-Defined
Strings
Add-On-Defined
Predefined
Module-Defined
Trends
I/O Configuration
CompactLogix5323E-QBFC1 System
1769-L23E-QBFC1 RJLive_Demo
1769-L23E-QBFC1 Ethernet Port LocalEN
Ethernet
1769-L23E-QBFC1 Ethernet Port L
FX9600 FX9600
CompactBus Local
Embedded I/O
[1] Embedded IQ16F Discrete_Inp
[2] Embedded OB16 Discrete_Out
0
InventoryTrigger
ResetSequence
ONS
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
1
NEQ
Not Equal
Source A InvSeq.ACC
0
Source B 0
CPS
Synchronous Copy File
Source OutputInventoryCommand
Dest FX9600:O1
Length 8
CPS
Synchronous Copy File
Source FX9600:I1
Dest InputInventoryResponse
Length 468
2
EQU
Equal
Source A InvSeq.ACC
0
Source B 1
MOV
Move
Source 1
Dest OutputInventoryCommand.CommandType
2
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
Per the Zebra documentation, you need to sequentially do a few things, so I have included that logic here for reference. The conversion of the SINT EPC data is the same as it was for the Turck program.
MainRoutine*
MainProgram
Ready
Rung 0 of 9
APP
VER


Controller Organizer
Controller RJLive_Demo
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
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Maintenance
Unscheduled Programs / Phases
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Data Types
User-Defined
Strings
Add-On-Defined
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CompactLogix5323E-QBFC1 System
1769-L23E-QBFC1 RJLive_Demo
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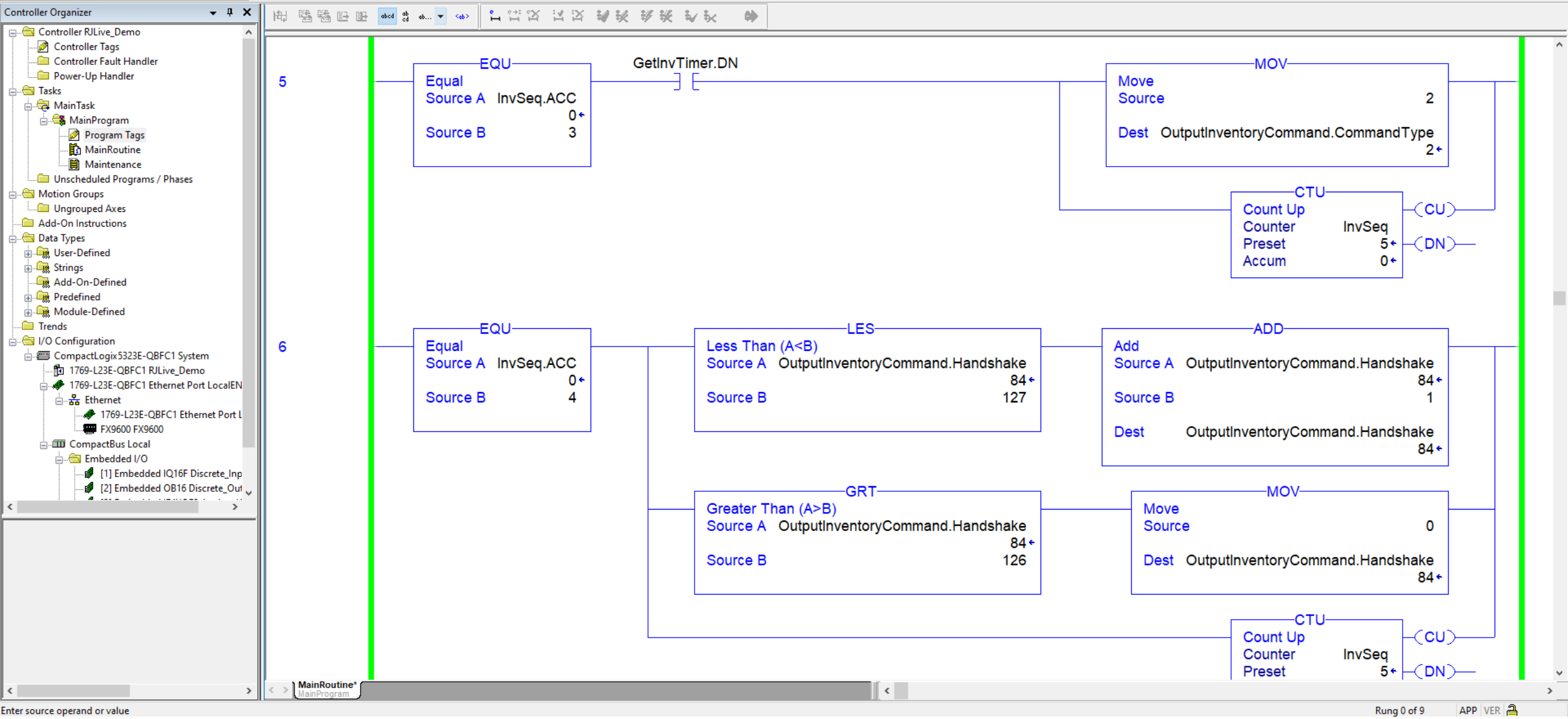
Ethernet
1769-L23E-QBFC1 Ethernet Port L
FX9600 FX9600
CompactBus Local
Embedded I/O
[1] Embedded IQ16F Discrete_Inp
[2] Embedded OB16 Discrete_Out
3
EQU
Equal
Source A InvSeq.ACC
0
Source B 2
LES
Less Than (A<B)
Source A OutputInventoryCommand.Handshake
84
Source B 127
ADD
Add
Source A OutputInventoryCommand.Handshake
84
Source B 1
Dest OutputInventoryCommand.Handshake
84
GRT
Greater Than (A>B)
Source A OutputInventoryCommand.Handshake
84
Source B 126
MOV
Move
Source 0
Dest OutputInventoryCommand.Handshake
84
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
4
EQU
Equal
Source A InvSeq.ACC
0
Source B 3
TON
Timer On Delay
Timer GetInvTimer
Preset 2000
Accum 0
EN
DN


Controller Organizer
Controller RJLive_Demo
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Maintenance
Unscheduled Programs / Phases
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Data Types
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Strings
Add-On-Defined
Predefined
Module-Defined
Trends
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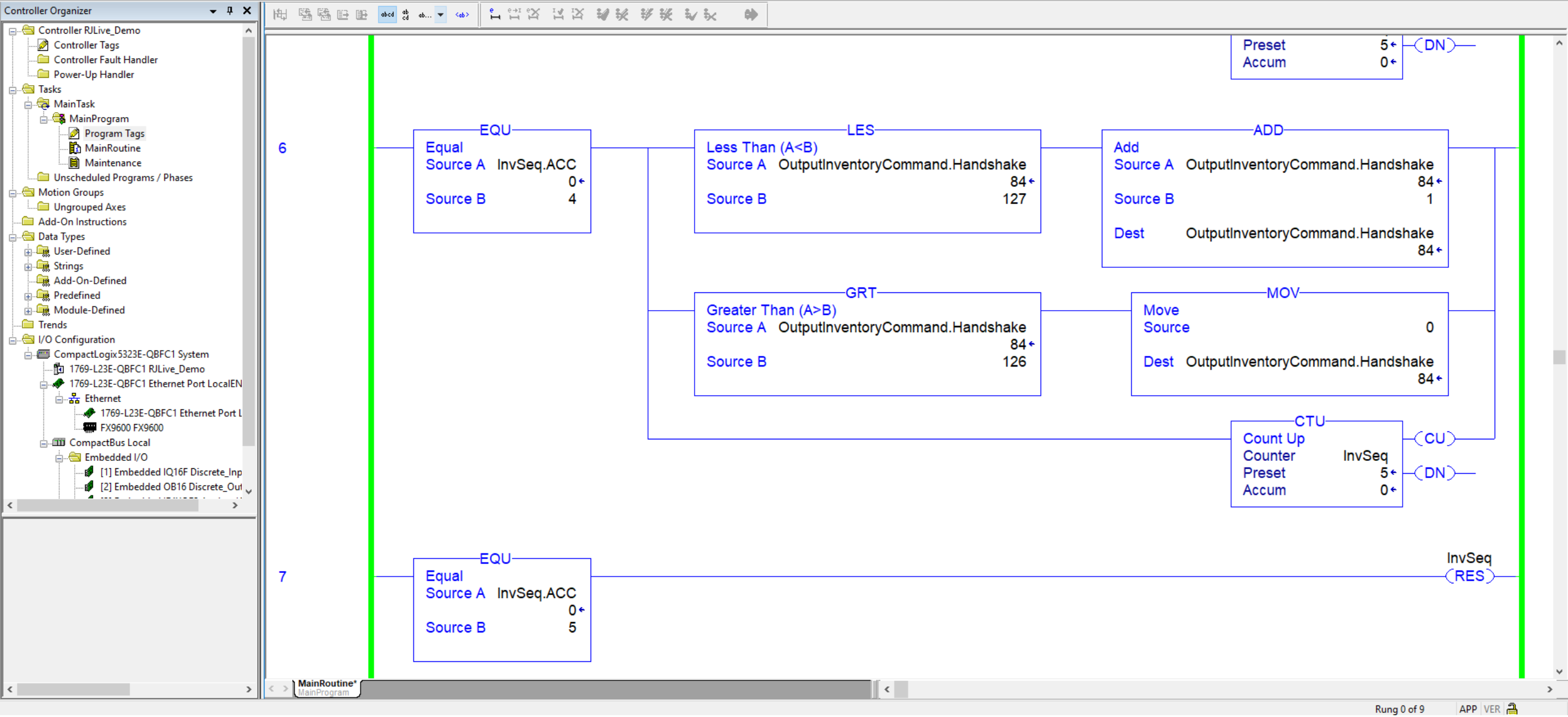
1769-L23E-QBFC1 Ethernet Port LocalEN
Ethernet
1769-L23E-QBFC1 Ethernet Port L
FX9600 FX9600
CompactBus Local
Embedded I/O
[1] Embedded IQ16F Discrete_Inp
[2] Embedded OB16 Discrete_Out
5
EQU
Equal
Source A InvSeq.ACC
0
Source B 3
GetInvTimer.DN
MOV
Move
Source 2
Dest OutputInventoryCommand.CommandType
2
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
6
EQU
Equal
Source A InvSeq.ACC
0
Source B 4
LES
Less Than (A<B)
Source A OutputInventoryCommand.Handshake
84
Source B 127
ADD
Add
Source A OutputInventoryCommand.Handshake
84
Source B 1
Dest OutputInventoryCommand.Handshake
84
GRT
Greater Than (A>B)
Source A OutputInventoryCommand.Handshake
84
Source B 126
MOV
Move
Source 0
Dest OutputInventoryCommand.Handshake
84
CTU
Count Up
Counter InvSeq
Preset 5
CU
DN
MainRoutine*
MainProgram
Enter source operand or value
Rung 0 of 9
APP
VER


Controller Organizer
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Controller Tags
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Power-Up Handler
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MainProgram
Program Tags
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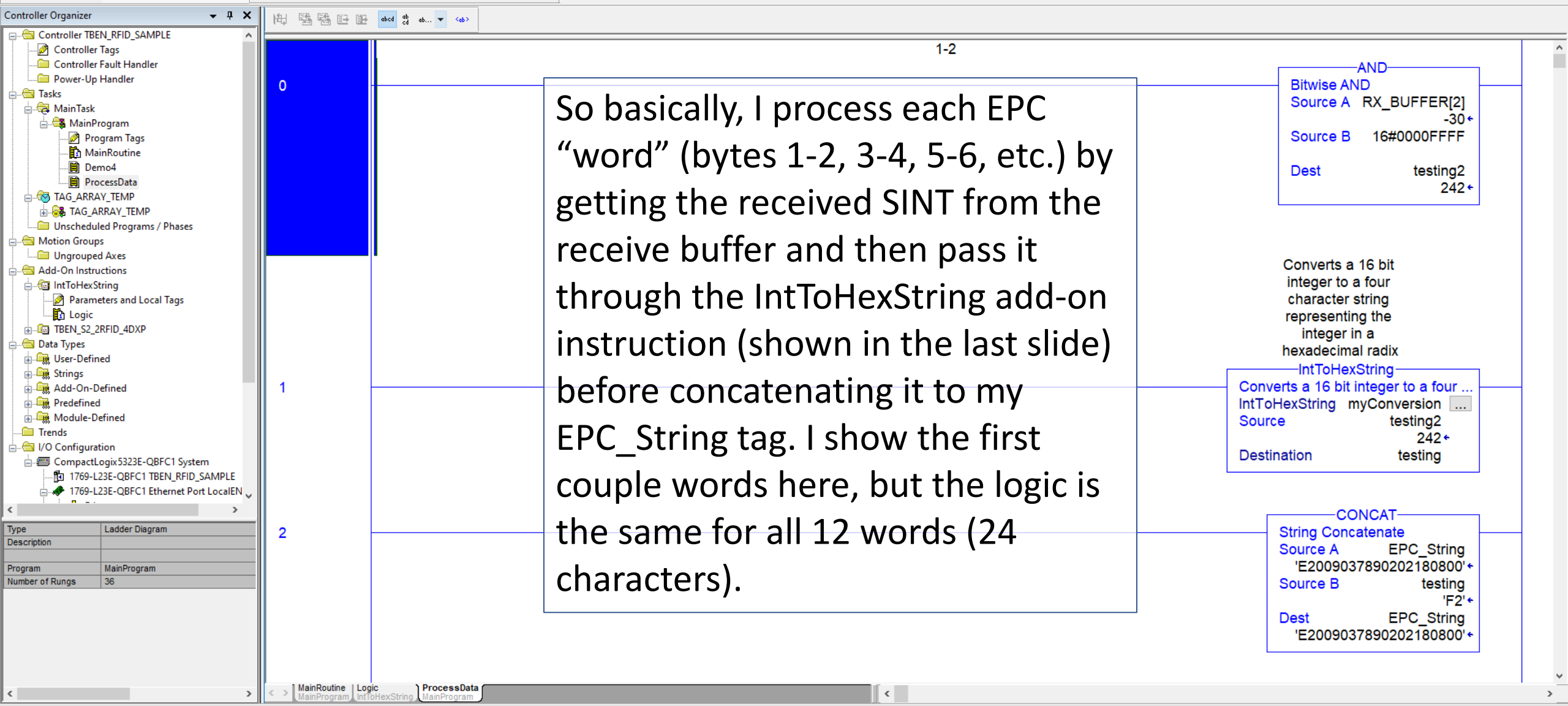
FX9600 FX9600
CompactBus Local
Embedded I/O
[1] Embedded IQ16F Discrete_Inp
[2] Embedded OB16 Discrete_Out
Preset 5
Accum 0
DN
6
EQU
Equal
Source A InvSeq.ACC
0
Source B 4
LES
Less Than (A<B)
Source A OutputInventoryCommand.Handshake
84
Source B 127
ADD
Add
Source A OutputInventoryCommand.Handshake
84
Source B 1
Dest OutputInventoryCommand.Handshake
84
GRT
Greater Than (A>B)
Source A OutputInventoryCommand.Handshake
84
Source B 126
MOV
Move
Source 0
Dest OutputInventoryCommand.Handshake
84
CTU
Count Up
Counter InvSeq
Preset 5
Accum 0
CU
DN
7
EQU
Equal
Source A InvSeq.ACC
0
Source B 5
InvSeq
RES
MainRoutine*
MainProgram
Rung 0 of 9
APP
VER

SINT to HEX Program Logic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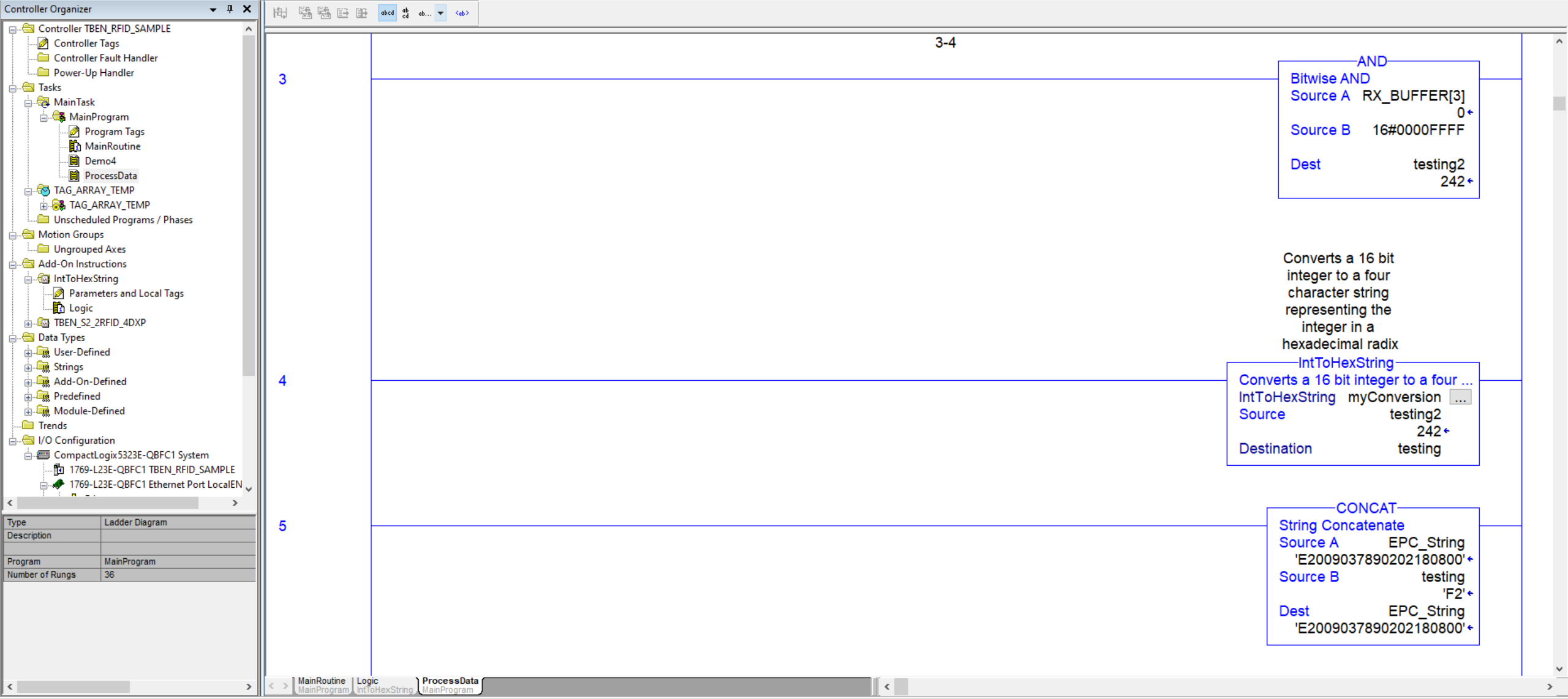
Predefined
Module-Defined
Trends
I/O Configuration
CompactLogix5323E-QBFC1 System
1769-L23E-QBFC1 TBEN_RFID_SAMPLE
1769-L23E-QBFC1 Ethernet Port LocalEN
Type Ladder Diagram
Description
Program MainProgram
Number of Rungs 36
1-2
0
1
2
So basically, I process each EPC "word" (bytes 1-2, 3-4, 5-6, etc.) by getting the received SINT from the receive buffer and then pass it through the IntToHexString add-on instruction (shown in the last slide) before concatenating it to my EPC_String tag. I show the first couple words here, but the logic is the same for all 12 words (24 characters).
AND
Bitwise AND
Source A RX_BUFFER[2]
-30
Source B 16#0000FFFF
Dest testing2
242
Converts a 16 bit integer to a four character string representing the integer in a hexadecimal radix
IntToHexString
Converts a 16 bit integer to a four ...
IntToHexString myConversion
Source testing2
242
Destination testing
CONCAT
String Concatenate
Source A EPC_String
'E200903789020218080'
Source B testing
'F2'
Dest EPC_String
'E200903789020218080'
MainRoutine MainProgram
Logic IntToHexString
ProcessData MainProgram
Ready
Rung 0 of 36
APP VER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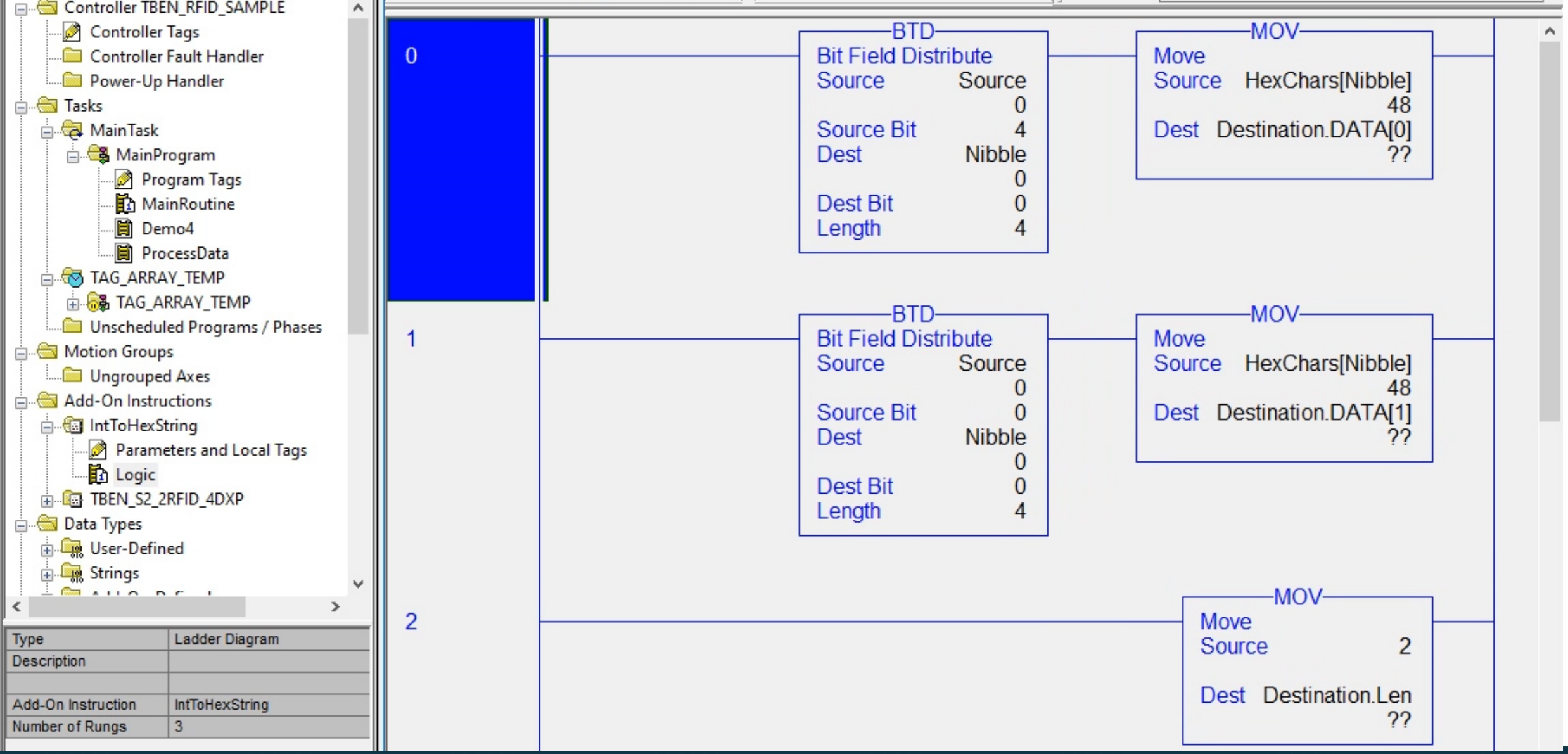
CompactLogix5323E-QBFC1 System
1769-L23E-QBFC1 TBEN_RFID_SAMPLE
1769-L23E-QBFC1 Ethernet Port LocalEN
Type Ladder Diagram
Description
Program MainProgram
Number of Rungs 36
3-4
3
AND
Bitwise AND
Source A RX_BUFFER[3]
0
Source B 16#0000FFFF
Dest testing2
242
Converts a 16 bit integer to a four character string representing the integer in a hexadecimal radix
4
IntToHexString
Converts a 16 bit integer to a four ...
IntToHexString myConversion
Source testing2
242
Destination testing
5
CONCAT
String Concatenate
Source A EPC_String
'E200903789020218080'
Source B testing
'F2'
Dest EPC_String
'E200903789020218080'
MainRoutine MainProgram
Logic IntToHexString
ProcessData MainProgram


Controller TBEN_RFID_SAMPLE
Controller Tags
Controller Fault Handler
Power-Up Handler
Tasks
MainTask
MainProgram
Program Tags
MainRoutine
Demo4
ProcessData
TAG_ARRAY_TEMP
TAG_ARRAY_TEMP
Unscheduled Programs / Phases
Motion Groups
Ungrouped Axes
Add-On Instructions
IntToHexString
Parameters and Local Tags
Logic
TBEN_S2_2RFID_4DXP
Data Types
User-Defined
Strings
Type | Ladder Diagram
Description
Add-On Instruction | IntToHexString
Number of Rungs | 3
0
BTD
Bit Field Distribute
Source Source
0
Source Bit 4
Dest Nibble
0
Dest Bit 0
Length 4
MOV
Move
Source HexChars[Nibble]
48
Dest Destination.DATA[0]
??
1
BTD
Bit Field Distribute
Source Source
0
Source Bit 0
Dest Nibble
0
Dest Bit 0
Length 4
MOV
Move
Source HexChars[Nibble]
48
Dest Destination.DATA[1]
??
2
MOV
Move
Source 2
Dest Destination.Len
??