



R90C-4B21, R95C-8B21, R95C-8B22, R130C-8B22 IO-Link Device Parameter Data Add-On Instruction Guide, v4
March 14th, 2024

This document covers the installation and use of an Add-On Instruction (AOI) for the Logix Designer software package from Rockwell Automation. This AOI handles acyclic IO-Link commands to and from the R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22. The document will use IO-Link Hub when referencing all types. This AOI has ten User Defined Tag data types.

This IO-Link Device Parameter Data AOI is meant to be used alongside a v4 Banner IO-Link Master AOI.

Components

Banner_R90C_R95C_Param_v4_AOI.L5X

UDT's Packaged with the AOI

Banner_Hub_Discrete_Host_Out_Mirroring_v4
Banner_Hub_IO_Metrics_v4
Banner_Hub_Port_Config_B22_v4
Banner_Hub_Port_Config_v4
Banner_Hub_RD_v4
Banner_Hub_SMR_Port_v4
Banner_Hub_v4
Banner_Hub_VSC_v4
Banner_Hub_WD_v4
Banner_IOL_Port_v4

NOTE:

This Banner IO-Link Device Parameter AOI is useless on its own.

It is intended to be linked to a v4 Banner IO-Link Master AOI to function.

Other AOIs Available Separately

Banner has AOI files for controlling other Banner IO-Link devices and for a variety of IO-Link Masters. Banner also has AOI files for easily handling Banner device Process Data.

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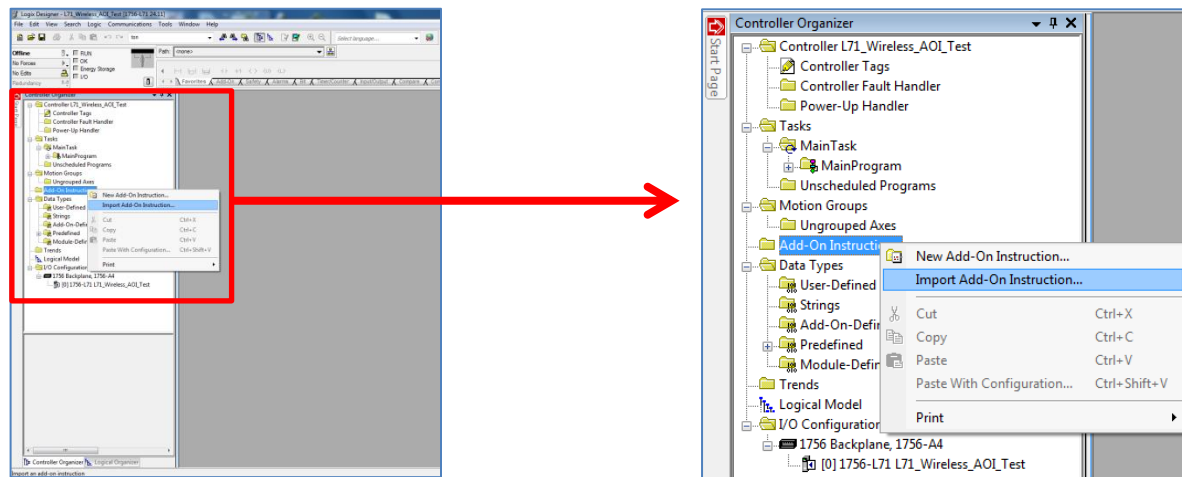
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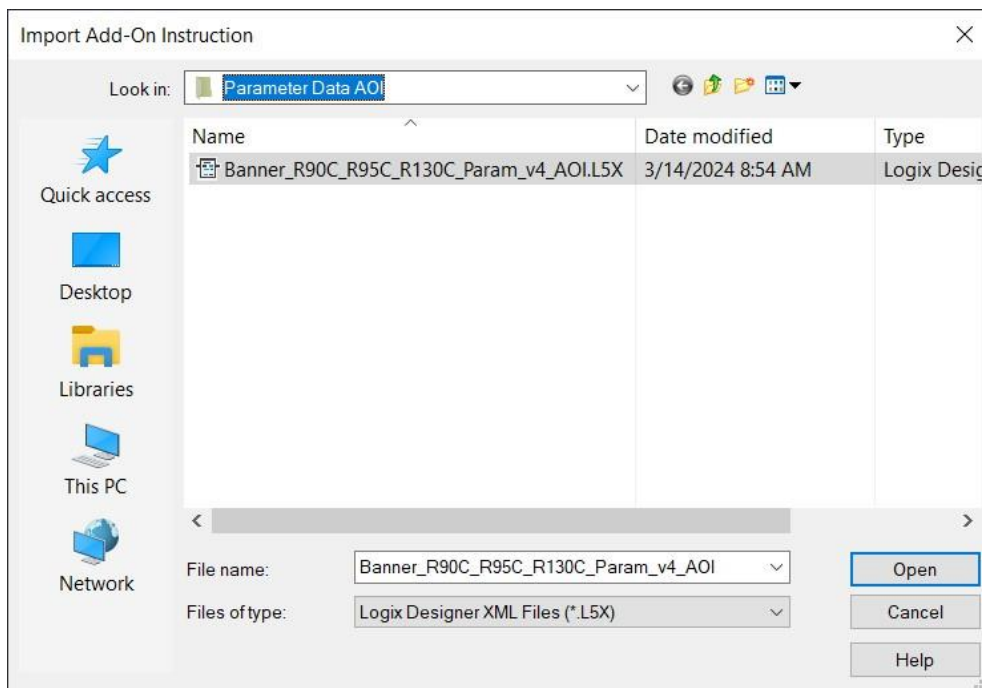
1. Installation Process

This section describes how to install the AOIs in Logix Designer software.

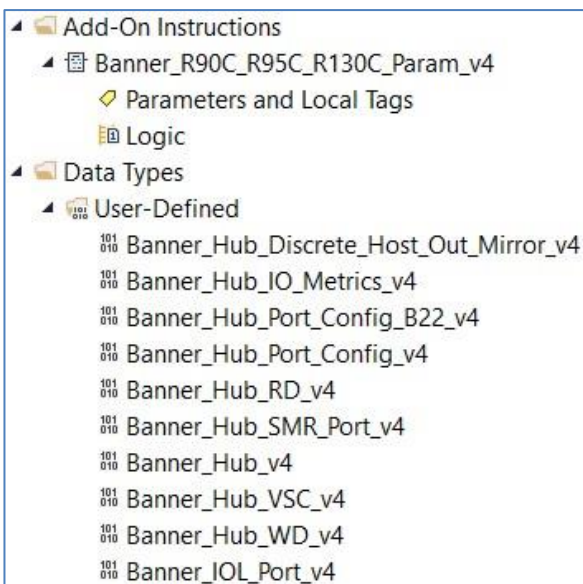
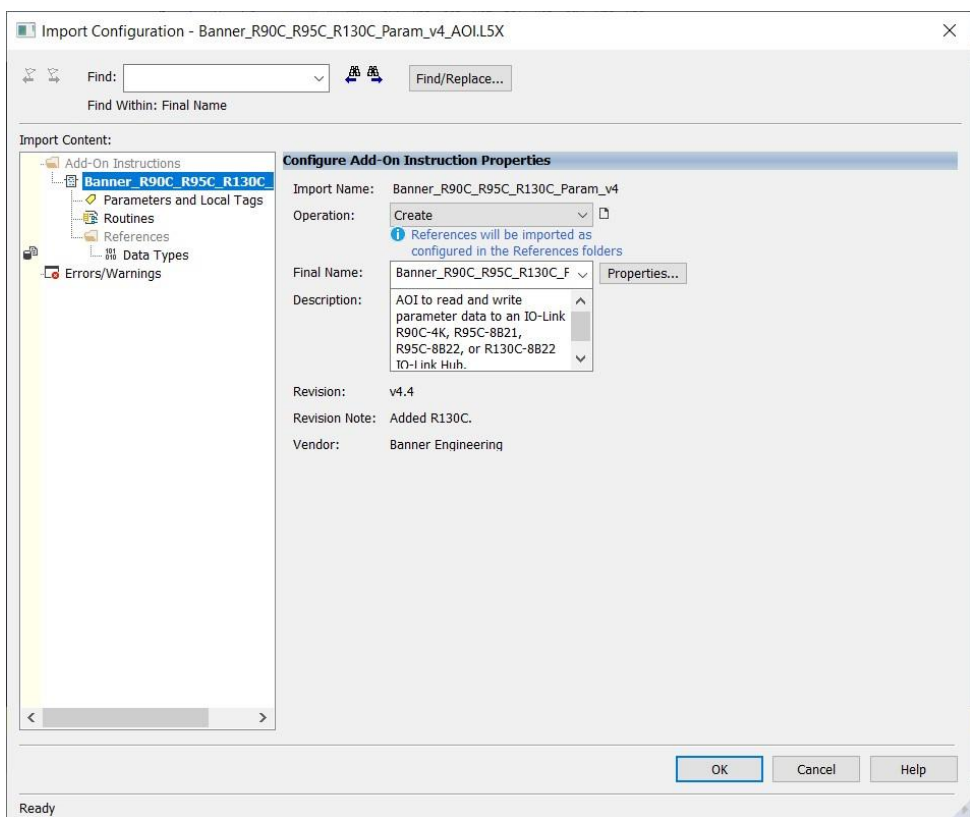
1. Open a project.
2. In the Controller Organizer window, right-click on the Add-On Instruction folder. Select the Import Add-On Instruction option.



3. Navigate to the correct file location and select the AOI to be installed. In this example the “Banner_R90C_R95C_R130C_Param_v4_AOI.L5X” file will be selected. Click the Open button.



4. The Import Configuration window will pop up. The default selection will create all the necessary items for the AOI. Click the OK button to complete the import process.

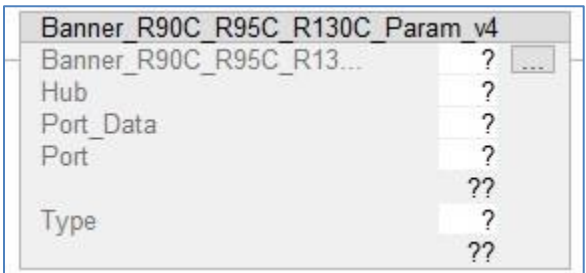


5. The AOI is added to the Controller Organizer windows and should look like the picture at the left.
6. AOI Installation into Logix Designer software is complete.

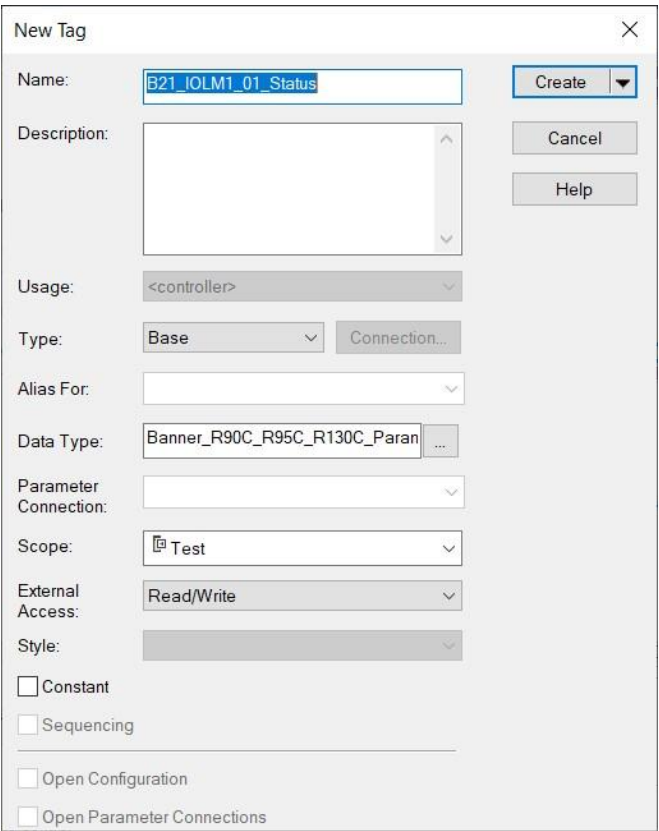
2. Configuring the AOI

Make sure to add and configure a Banner IO-Link Master AOI to your program before adding a Banner IO-Link Device AOI.

1. Add the “Banner_R90C_R95C_R130C_Param_v4” AOI to your ladder logic program. For each of the question marks shown in the instruction we need to create and link a new tag array. The AOI includes new types of User Defined Tag (UDT): custom arrays of tags meant specifically for this AOI.



2. In the AOI, right-click on the question mark on the line labeled “Banner_R90C_R95C_R130C_Param_v4”. Click New Tag. In this example, we’ll use the name “B21_IOLM1_01_Status”. The example naming convention accounts for this being a R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22 sensor connected to IO-Link Master #1, port #1, in our program. More masters could be named IOLM2, IOLM3, and different sensors could be connected at other port numbers, etc.



The “EnableIn” and “EnableOut” variables are ladder logic rung status bits automatically added to all AOIs.

3. Now click on the question mark on the line labeled “Hub”. Click New Tag. In this example, we’ll use the name “B21_IOLM1_01”. This array of tags includes the Read and Write data blocks, made up of the information from the R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22 IO-Link Index and Subindex values.

New Tag

Name:

B21_IOLM1_01

Description:

Usage:

<controller>

Type:

Base

Connection...

Alias For:

Data Type:

Banner_Hub_v4

...

Parameter Connection:

Scope:

Test

External Access:

Read/Write

Style:

☐ Constant

☐ Sequencing

☐ Open Configuration

☐ Open Parameter Connections

Create

Cancel

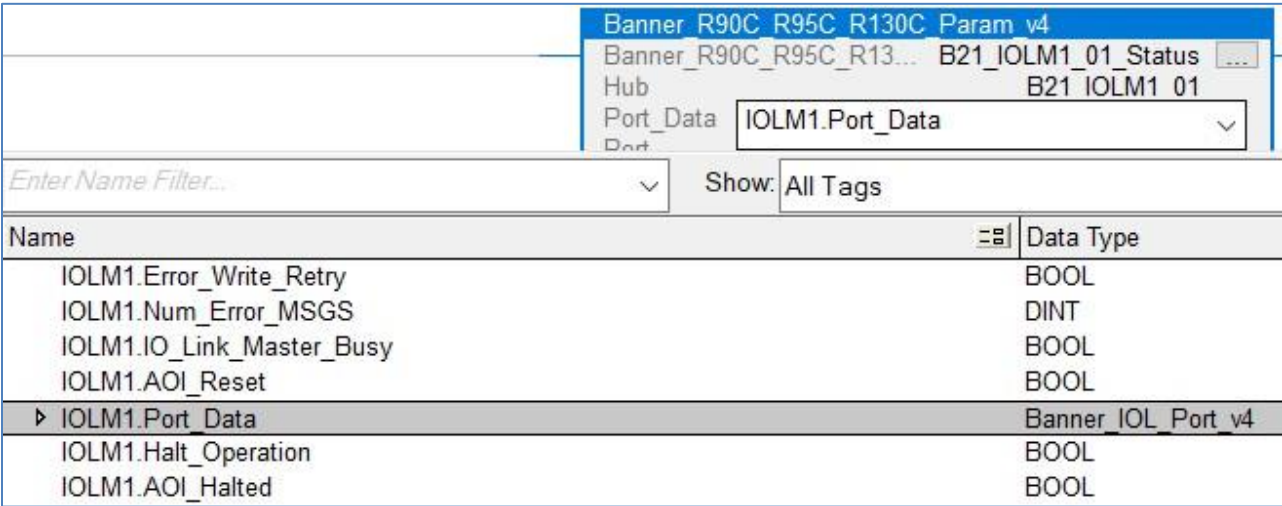
Help

▲ B21_IOLM1_01	{...}
B21_IOLM1_01.Initial_Global_Read	1
▶ B21_IOLM1_01.Command	0
▶ B21_IOLM1_01.Read	{...}
▶ B21_IOLM1_01.Write	{...}
▶ B21_IOLM1_01.Archive	{...}
B21_IOLM1_01.Reset	0

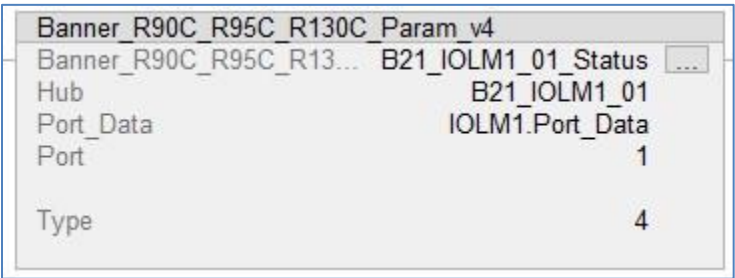
3. Linking the Device AOI to the Master AOI

The third tag in the R90C-4B21 or R95C-8B21 AOI is meant to be tied into the IO-Link Master AOI.

1. For the “Port_Data” line, choose the relevant IO-Link Master AOI’s “Port_Data” variable. In this example, we choose “IOLM1.Port_Data”.



2. For the “Port” line of the R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22 AOI type in a number equal to the IO-Link Master port number to which the R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22 is connected. In this example, the R90C-4B21 is on port 1.



3. The “TYPE” line requires either a 4, 8, or 22.
 - a. 4: R90C-4B21
 - b. 8: R95C-8B21
 - c. 22: R95C-8B22 or R130C-8B22

- 4. Add an Examine On instruction before the R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22 AOI on the same ladder rung and tie it to the IO-Link Master AOI’s “Port_Activate” bit corresponding to the port number to which the device is connected. In this example the R90C-4B21, R95C-8B21, R95C-8B22, or R130C-8B22 is on port 1 of the IO-Link Master named IOLM1, so the bit “IOLM1.Port_Data.Port_Activate.1” is used.

IOLM1.Port_Data.Port_Activate.1

Banner_R90C_R95C_R130C_Param_v4

Banner_R90C_R95C_R13... B21_IOLM1_01_Status

Hub B21_IOLM1_01

Port_Data IOLM1.Port_Data

Port 1

Type 4

- 5. Parameter AOI Setup complete.

4. Using the Paired IO-Link Master and Device Parameter Data AOIs

The goal is to make the Banner device's IO-Link Index and Subindex values appear in PLC tag arrays as if it were an EtherNet/IP-speaking device. Reading from and writing to the Banner IO-Link device becomes as easy as changing tag values in the PLC. All the complicated work of translating from EtherNet/IP to IO-Link is handled automatically, behind the scenes.

When the program is downloaded to the PLC and the PLC goes into run mode, the IO-Link Master AOI performs a global read for each connected Banner device AOI. The Banner device AOI then creates an archive copy of all writeable parameters for that device. This archive is used to determine whether one of the writeable data tags has been changed. If so, the AOI automatically triggers the process of acyclic writing, using correctly formatted CIP generic message commands.

There are two methods for acyclic reading of Banner device Index and Subindex values.

1. The initial global read, as requested by the IO-Link Master AOI after the PLC program is downloaded and run.
2. Manually via the "Command" variable found in every Device Parameter Data AOI. The "Command" register can be used to force one-time read or write actions, as described in Appendix A of any Banner Device Parameter AOI guide.

Acyclic writes to the IO-Link device are handled by simply changing the relevant tag values in the device's "Write_Data" tag array.

Indexes for IO Metrics and Port Configuration do not automatically update. It is necessary to manually enter the write update value into the "Command" variable. See the table on page 8 for the "Command" variable.

Appendix A Command Register

The “Command” register can be used to control the connected IO-Link device ‘by hand’. Placing the correct command numbers into this register is how the AOI achieves its automatic control. The write commands are most useful when an IO-Link device has been physically replaced with a new device of the same type—in this situation executing the “41” command will restore all the PLC saved settings to the new unit.

Name	Value
◀ B21_IOLM1_01	{...}
B21_IOLM1_01.Initial_Global_Read	0
▶ B21_IOLM1_01.Command	0
▶ B21_IOLM1_01.Read	{...}
▶ B21_IOLM1_01.Write	{...}
▶ B21_IOLM1_01.Archive	{...}
B21_IOLM1_01.Reset	0

The table below shows the command numbers associated with the reading and writing of specific pieces of data. See the R90C-4B21, R95C-8B21, or R95C-8B22 IODD file or IO-Link Data Reference Guide for more information of the parameters.

Table 1: AOI Command Numbers

S15C-UI Parameter (IO-Link Index #)	Read Command	Write Command
Global Read (all)	1	
Direct Parameters (0)	2	
System Command (2)		42
Device Access Locks (12)	3	43
Serial Number (21)	4	
All Time Run Time (69)	5	
Resettable Run Time (70)	6	44
Vendor Specific Config (76)	7	45
All Time Run Time Event Time (78)	8	46
Resettable Run Time Event Time (79)	9	47
IO Metrics 1 to 4 (80)	10	
IO Metrics 5 to 8 (82) – R95C-8B21 Only	11	
Selectable Metric Reset (81)	12	50
Port 1 Configuration (87)	13	51
Port 2 Configuration (87)	14	52
Port 3 Configuration (87)	15	53
Port 4 Configuration (87)	16	54
Port 5 Configuration (87) – R95C-8B21 Only	17	55
Port 6 Configuration (87) – R95C-8B21 Only	18	56
Port 7 Configuration (87) – R95C-8B21 Only	19	57
Port 8 Configuration (87) – R95C-8B21 Only	20	58
Discrete Host Out Mirroring (91)	21	59

Appendix B AOI Resets

From time to time, a reset may be needed for an AOI, particularly if one of the read/write processes the AOI undertakes is interrupted. To this end, each Device Parameter Data AOI and IO-Link Master AOI has a reset bit.

Toggling this bit to a “1” causes the AOI to start over and try again.

Name	Value
▾ B21_IOLM1_01	{...}
B21_IOLM1_01.Initial_Global_Read	0
▸ B21_IOLM1_01.Command	0
▸ B21_IOLM1_01.Read	{...}
▸ B21_IOLM1_01.Write	{...}
▸ B21_IOLM1_01.Archive	{...}
B21_IOLM1_01.Reset	0

Best practices suggest adding a rung to your ladder logic program that resets all IO-Link Master and Device Parameter AOIs on the first scan. The example below shows one IO-Link Master, called IOLM1, and one connected R90C-4B21 having their respective AOIs being reset in this way.

