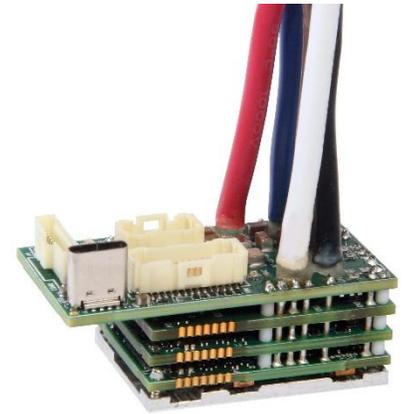


1 Introduction

This document will show users how to import and configure the Add-On Instructions (AOI). In addition, this document will describe the use of the AOI. There are several AOI files that can be imported into the controller software. Two of these files (AMC_StatusWord_Read and AMC_Drive_Enable) will be used as examples later in this document.



1.1 Project Layout

Once the controller and servo drive modules are selected, the input and output data will be mapped to the controller tags (see *Figure 1 [1]*). The controller tags are constantly updated. Information is sent from the drive to the controller (input) and information is sent from the controller to the drive (output). These inputs and outputs are mapped by the servo drive’s EDS file. The tag names will depend on the name assigned to the module. In this example, the module’s name is **FlexPro_Drive** (see *Figure 1 [2]*).

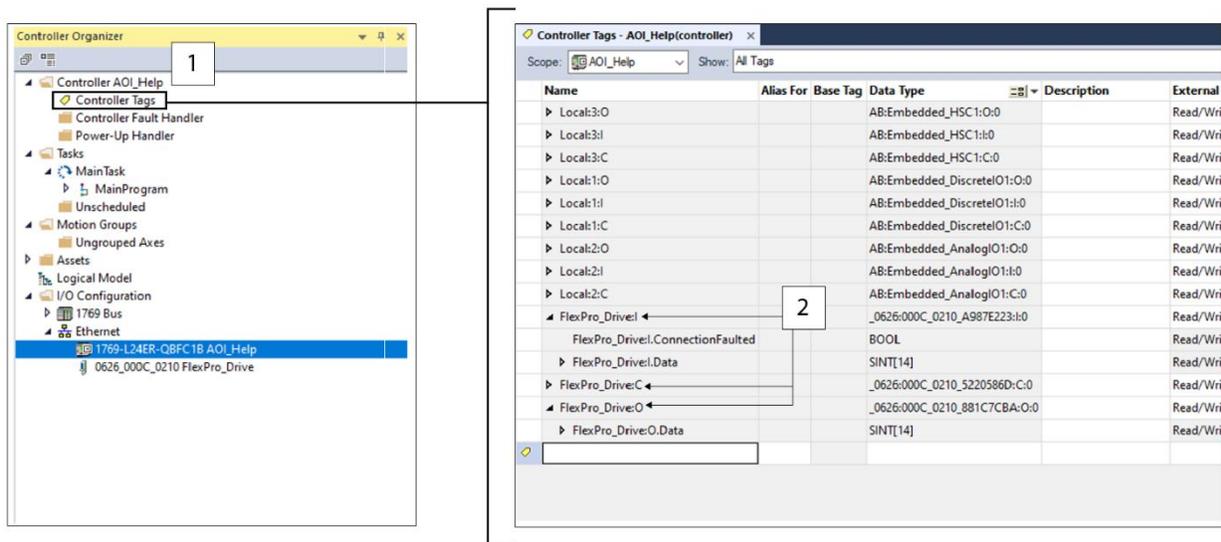


Figure 1 Controller Tags Screen

The SINT[14] tags (shown in *Table 1*) send read and write messages via the User Datagram Protocol (UDP) to the following objects and are used for time critical information.

Inputs		Outputs	
Parameter	Instance	Parameter	Instance
Status Word	912	Control Word	911
Modes of Operation Display	914	Modes of Operation	913
Actual Position	915	Target Position	925
Actual Velocity	920	Target Velocity	938
Actual Current	924	Target Current	923

Table 1 SINT[14] Read and Write Messages

▶ FP:O.Data[0]	Control Word [0]	▶ FP:I.Data[0]	Status Word [0]
▶ FP:O.Data[1]	Control Word [1]	▶ FP:I.Data[1]	Status Word [1]
▶ FP:O.Data[2]	Modes of Operation [0]	▶ FP:I.Data[2]	Modes of Operation Display [0]
▶ FP:O.Data[3]	Modes of Operation [1]	▶ FP:I.Data[3]	Modes of Operation Display [1]
▶ FP:O.Data[4]	Target Position [0]	▶ FP:I.Data[4]	Actual Position [0]
▶ FP:O.Data[5]	Target Position [1]	▶ FP:I.Data[5]	Actual Position [1]
▶ FP:O.Data[6]	Target Position [2]	▶ FP:I.Data[6]	Actual Position [2]
▶ FP:O.Data[7]	Target Position [3]	▶ FP:I.Data[7]	Actual Position [3]
▶ FP:O.Data[8]	Target Velocity [0]	▶ FP:I.Data[8]	Actual Velocity [0]
▶ FP:O.Data[9]	Target Velocity [1]	▶ FP:I.Data[9]	Actual Velocity [1]
▶ FP:O.Data[10]	Target Velocity [2]	▶ FP:I.Data[10]	Actual Velocity [2]
▶ FP:O.Data[11]	Target Velocity [3]	▶ FP:I.Data[11]	Actual Velocity [3]
▶ FP:O.Data[12]	Target Current [0]	▶ FP:I.Data[12]	Actual Current [0]
▶ FP:O.Data[13]	Target Current [1]	▶ FP:I.Data[13]	Actual Current [1]

Table 2 SINT[14] Read and Write Messages

Note: The descriptions for the tags in *Table 2* are not automatically created when the drive is added to the controller program. These descriptions are used as examples for this document.

2 Example 1 – AMC_StatusWord_Read

The AOI file (AMC_StatusWord_Read) will map the first word (2 bytes) of the SINT[14] input tag (FlexPro_Drive:I.Data). This first word contains the StatusWord data (instance 912). This example will show users how to setup this AOI file correctly.

Once the controller and drive are selected, follow these steps:

1. From the Control Organizer screen, right-click **Add-On Instructions** (Figure 2 [1]) and select **Import Add-On Instruction...** (Figure 2 [2]).

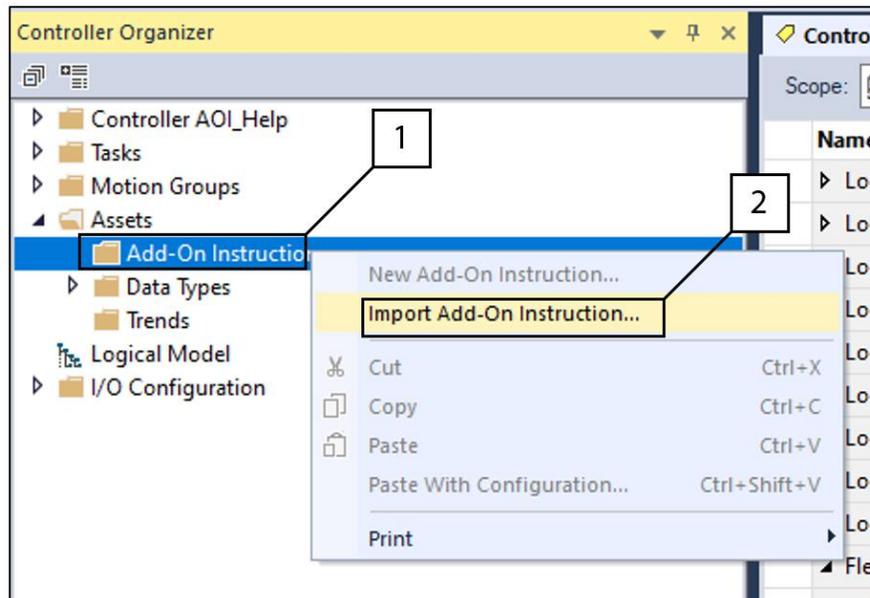


Figure 2 Controller Organizer – Add-On Instructions – Import Add-On Instruction

2. From the Import Add-On Instruction screen, select **AMC_StatusWord_Read.L5X** (Figure 3 [1]). This file will also import the following data types used by the AOI to map drives input data: **AMC_Input_Data** (Figure 4) and **AMC_StatusWord_Data** (Figure 5).

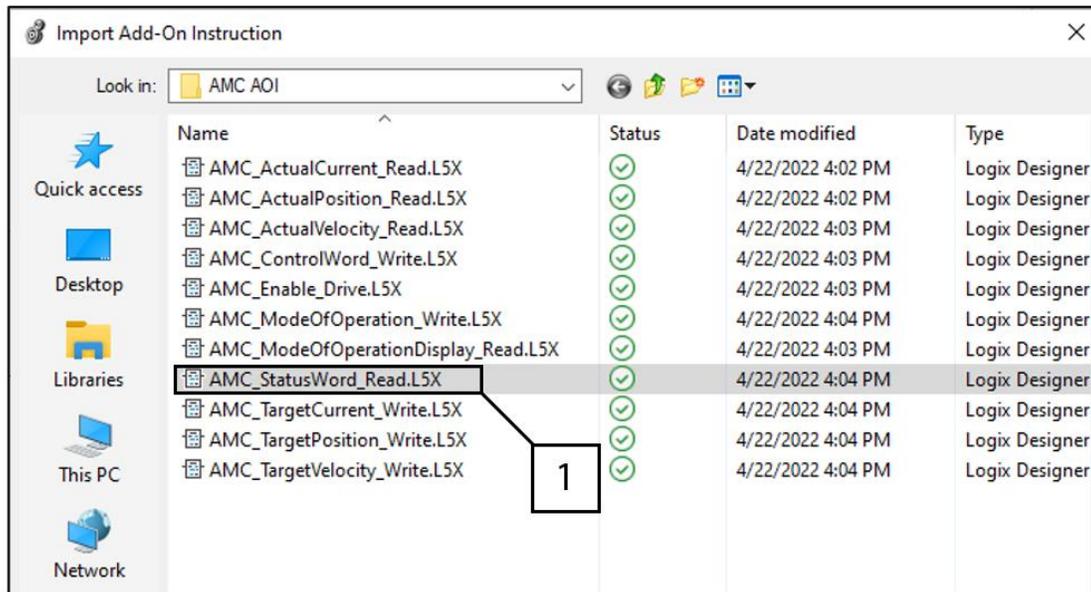


Figure 3 Import Add-On Instruction Screen

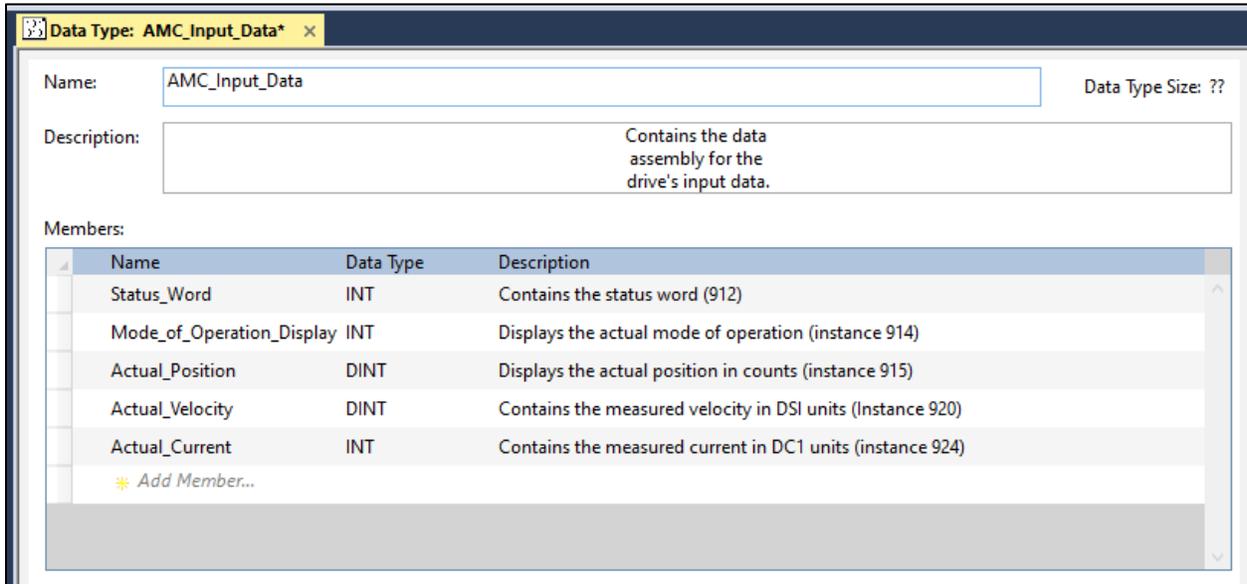


Figure 4 AMC_Input_Data Screen

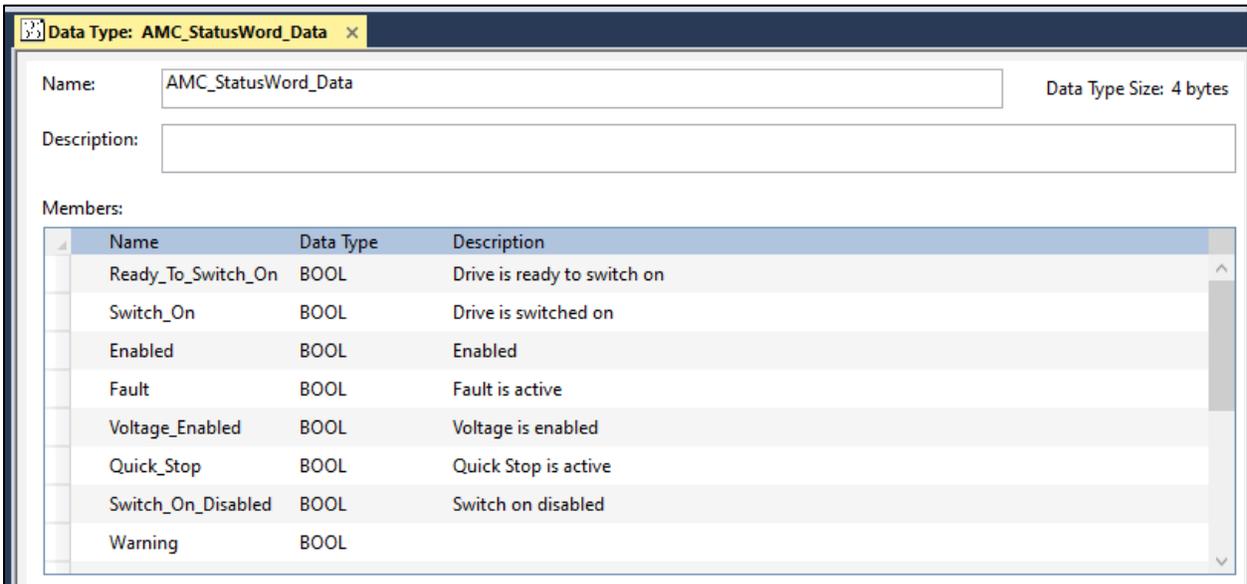


Figure 5 AMC_StatusWord_Data Screen

Once the AOI is imported, it can now be placed on a rung.

For help creating and mapping tags, with their correct data types, parameter information can be viewed under the AOI in the Controller Organizer.

The first parameter, **AMC_StatusWord_Read** (Figure 6), is the primary instance tag and holds input and output parameters.

- Right-click on the “?” (Figure 6 [1]) and create a new tag with any name. In this example, the data type will be named **AMC_StatusWord_Read** (Figure 7 [1]).

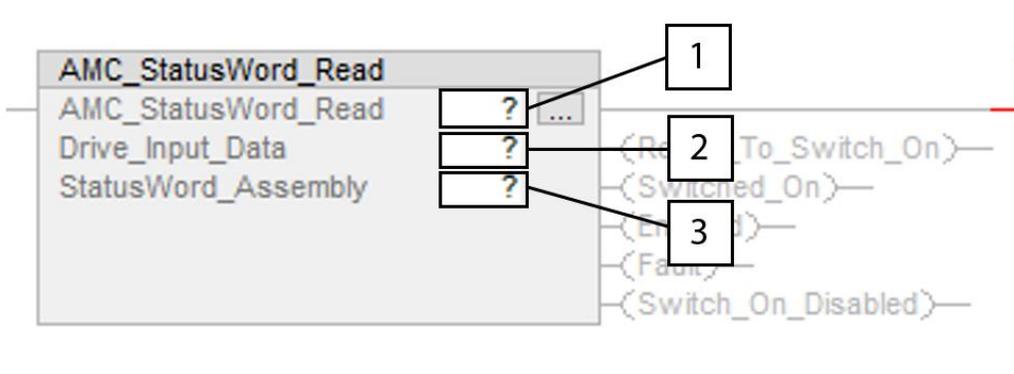


Figure 6 AMC_StatusWord_Read Screen

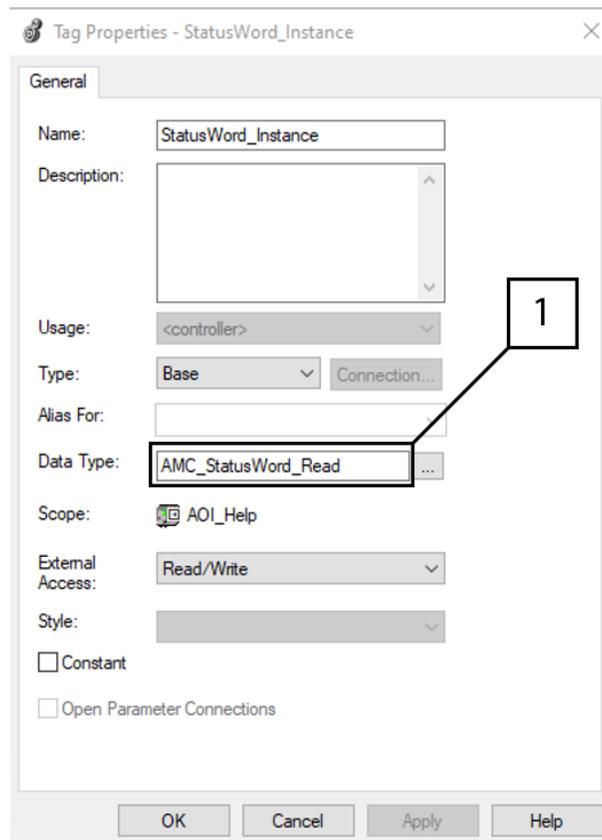


Figure 7 Tag Properties – StatusWord_Instance Screen

- Double-click the second “?” (Figure 6 [2]) and select **FlexPro_Drive:I.Data** (Figure 8-[1]), from the list of controller tags.

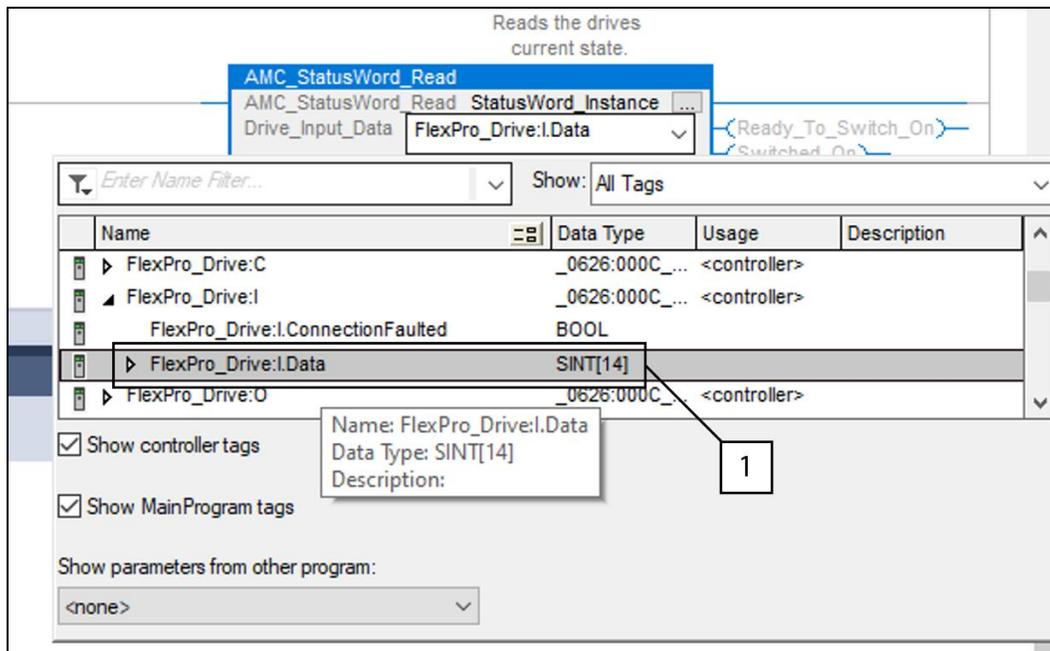


Figure 8 FlexPro_Drive:1.Data Screen

- Right-click the third "?" (Figure 6 [3]) and create a new tag. Select the data type and change it to **AMC_StatusWord_Data** (Figure 9 [1]).

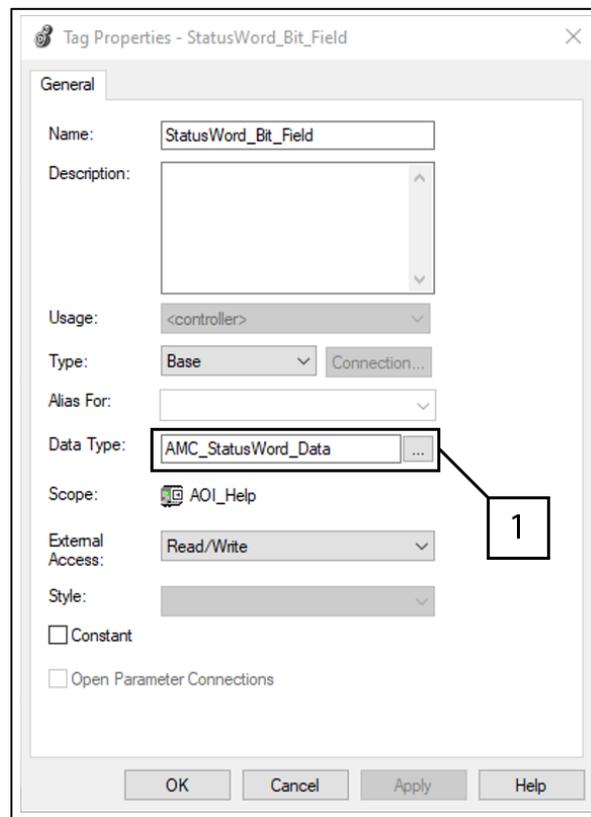


Figure 9 Tag Properties – StatusWord_Bit_Field Screen

The ladder element has now been configured. This can be used to monitor the drives current state. The **StatusWord_Instance** (Figure 10 [1]) indicates more common drive states. The **StatusWord_Bit_Field** (Figure 10 [2]) contains the full word of Instance 912.

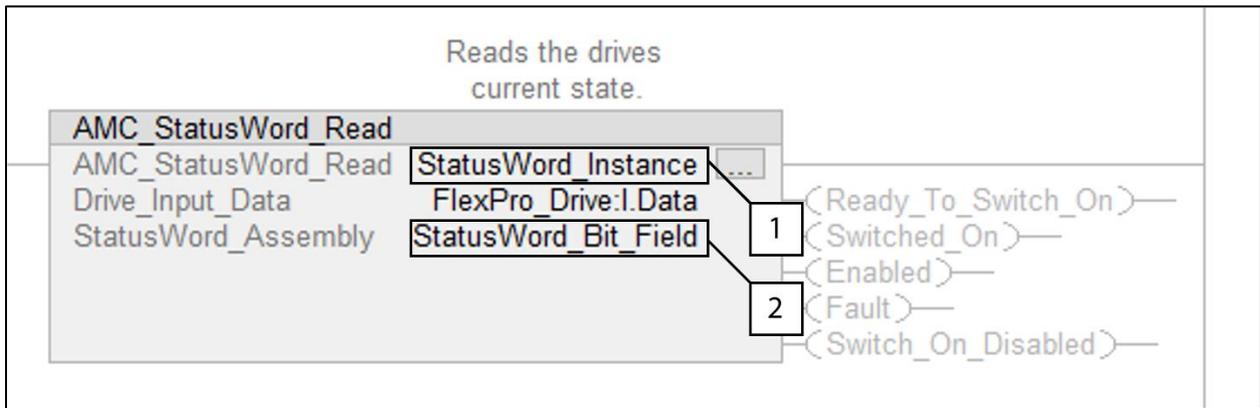


Figure 10 AMC_StatusWord_Read Screen

StatusWord_Instance (Figure 11 [1]) and **StatusWord_Bit_Field** (Figure 11 [2]) can be viewed in the list of Controller Tags.

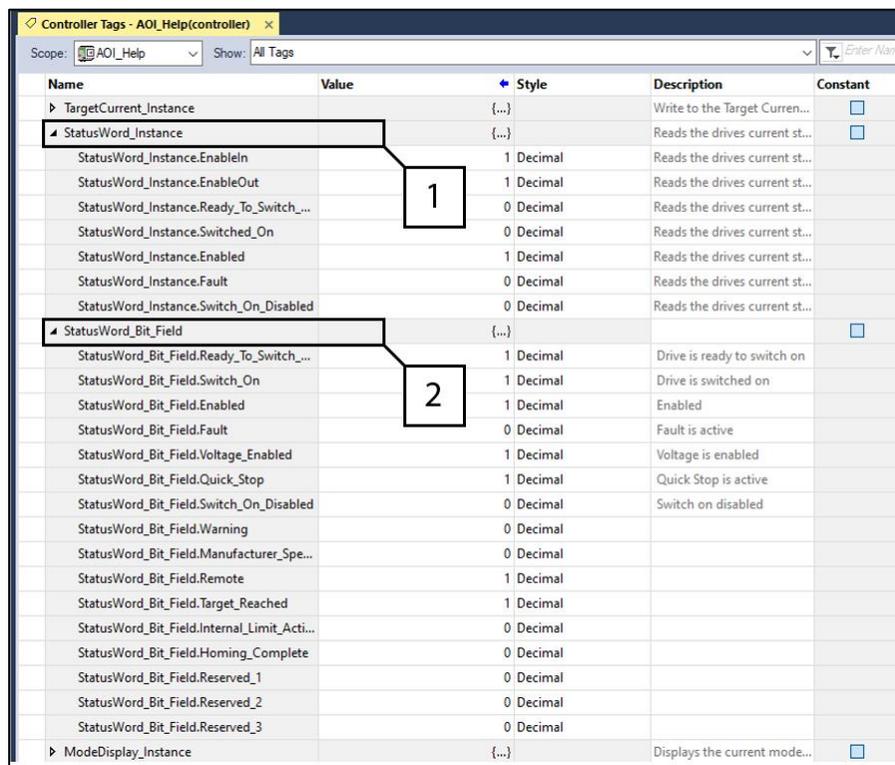


Figure 11 Controller Tags – AOL_Help(controller) Screen

3 Example 2 – AMC_Enable_Drive

The AOI tag (AMC_Drive_Enable) is used to transition to “Operation Enabled” and to clear faults. To enable the drive, this AOI tag will transition from one state to another in a particular order using the ControlWord command instance (911). Figure 12 shows a graphical overview of the state machine.

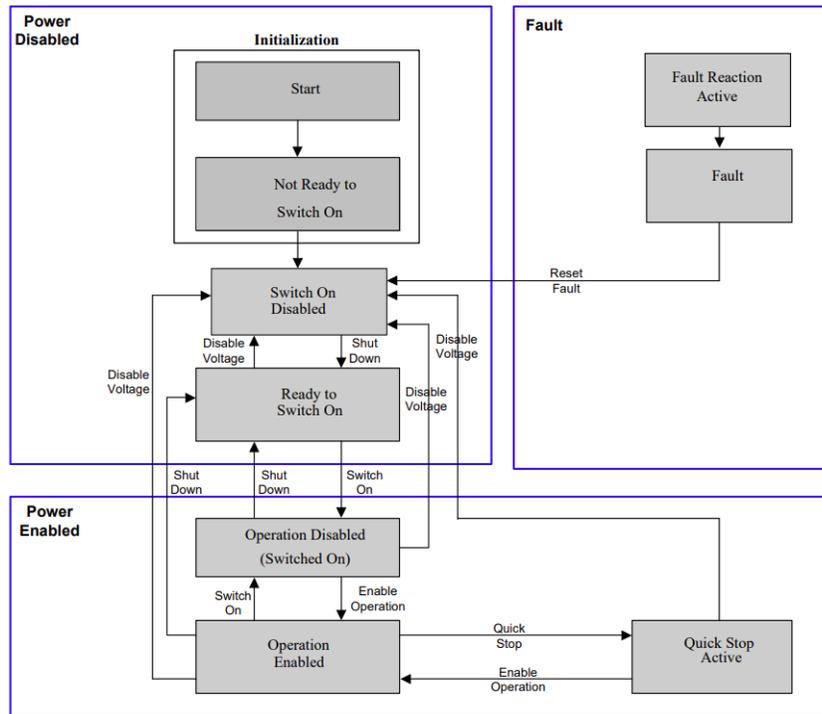


Figure 12 Overview of the State Machine

Upon power-up, the drive will automatically step through the “Start” and “Not Ready to Switch On” states, arriving at the “Switch On Disabled” state. The AOI is used to transition from the “Fault” state to the “Switch On Disabled,” and/or from this the “Switch On Disabled” state to “Operation Enabled.”

To enable the drive, follow these steps:

1. From the Control Organizer screen, right-click **Add-On Instructions** (Figure 13 [1]) and select **Import Add-On Instruction...** (Figure 13 [2]).

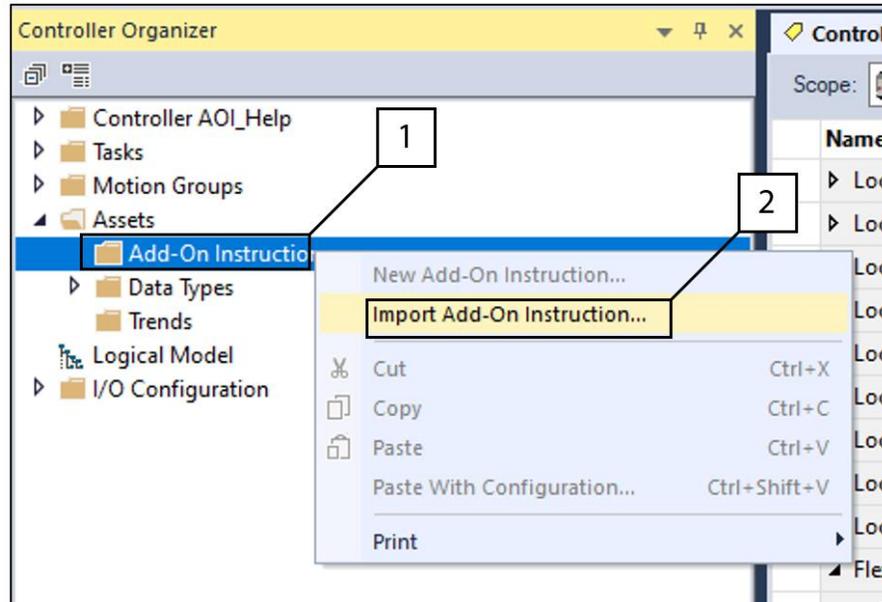


Figure 13 Controller Organizer – Add-On Instructions – Import Add-On Instruction

2. From the Import Add-On Instruction screen, select **AMC_Enable_Drive.L5X** (Figure 14 [1]).

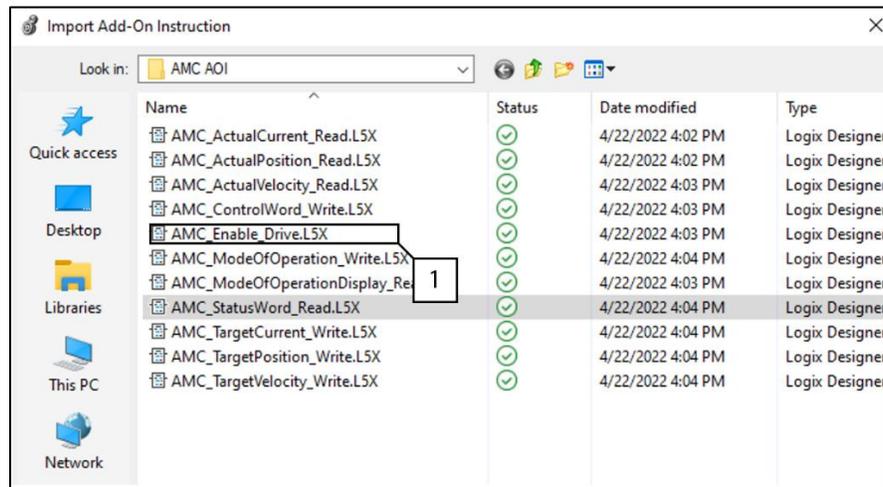


Figure 14 Import Add-On Instruction Screen

3. Create and name the first instance tag, **Enable_Instance** (Figure 15 [1]), with any name. In this example, the data type will be named **AMC_Enable_Drive**.
4. Map the **Drive_Output_Data** and **Drive_Input_Data** to the drive's controller tags (see step 2 in Example 1 – *AMC_StatusWord_Read*).

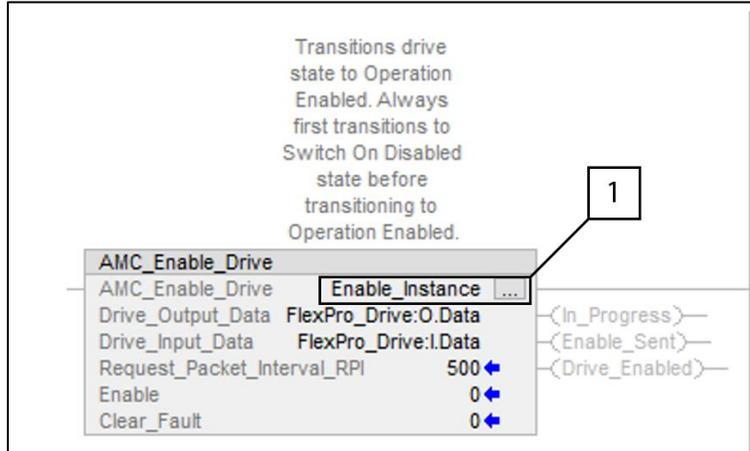


Figure 15 AMC_Enable_Drive Screen

5. Enter the RPI (Request_Packet_Interval_RPI) so the sequence of commands is sent with a delay between transitions. The units are in milliseconds. If the process skips steps, increase the interval time. Once configured, the **Enable_Instance** tag (Figure 16 [1]) will be placed in the list of controller tags.

Two input parameters (Enable_Instance.Enable and Enable_Instance.Clear_Fault) are mapped to the Enable_Instance tag. Setting the **Enable_Instance.Enable** (Figure 16 [2]) value to high (1) will transition the drive to "Operation Enabled." Setting the **Enable_Instance.Clear_Fault** (Figure 16 [3]) value to high (1) will clear latched faults.

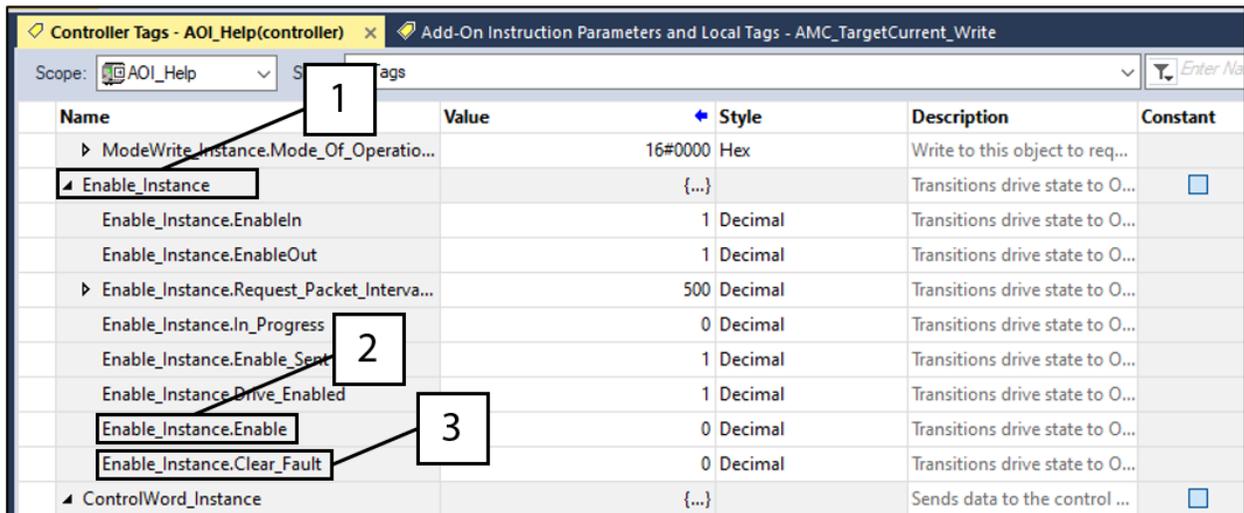


Figure 16 Controller Tags – AOI_Help(controller) Screen

4 Additional AOI Examples

4.1 AMC_ModeofOperationDisplay_Read

AMC_ModeOfOperationDisplay_Read maps the second word of the FlexPro_Drive:I.Data to a local tag and outputs the current mode of operation.

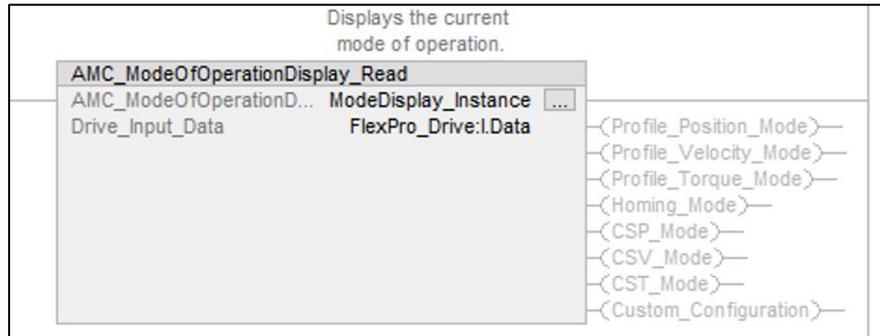


Figure 17 AMC_ModeOfOperationDisplay_Read Screen

The first parameter, AMC_ModeOfOperationDisplay_Read, is the instance parameter. The second parameter is mapped to FlexPro_Drive:I.Data.

4.2 AMC_ModeofOperationDisplay_Write

This AOI writes commands to the first word of the SINT[14] input tag, which contains the Mode Of Operation (instance 912).

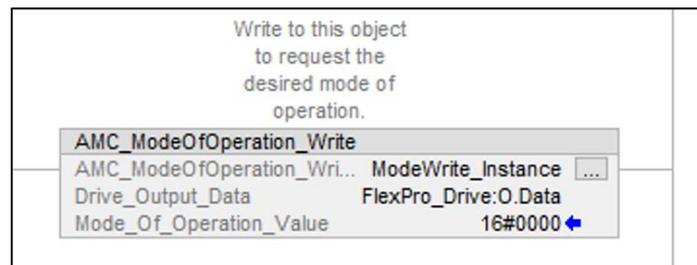


Figure 18 AMC_ModeOfOperationDisplay_Write Screen

The first parameter, AMC_ModeOfOperation_Write, is the instance parameter. The second parameter is mapped FlexPro_Drive:O.Data. The instance tag contains the parameter Mode_Of_Operation_Value [INT], which is sent to the second word of FlexPro_Drive:O.Data (instance 912).

4.3 AMC_ControlWord_Write

This AOI writes commands to the first word of the SINT[14] output tag, which contains ControlWord (instance 911).

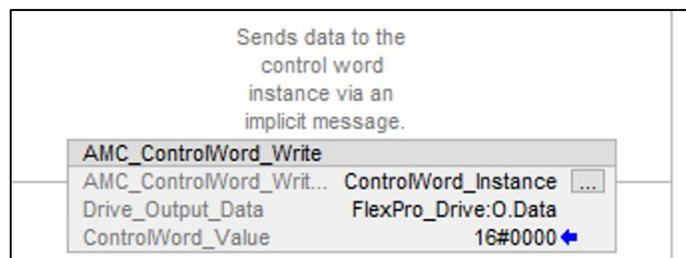


Figure 19 AMC_ControlWord_Write Screen

The ControlWord_Value parameter has a data type of INT (16-bit).

4.4 AMC_TargetPosition_Write

This AOI writes commands to the 3rd and 4th (32-bits) word of the SINT[14] output tag, which contains the Target Position (instance 925)

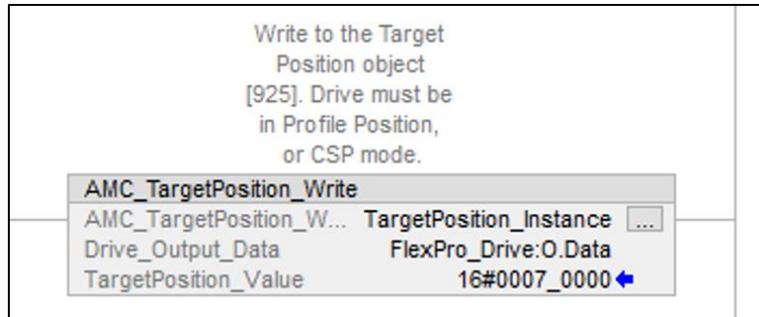


Figure 20 AMC_TargetPosition_Write Screen

The TargetPosition_Value parameter has a data type of DINT (32-bit).

4.5 AMC_ActualPosition_Write

This AOI writes commands to the 3rd and 4th (32-bits) word of the SINT[14] input tag, which contains the Target Position (instance 915)

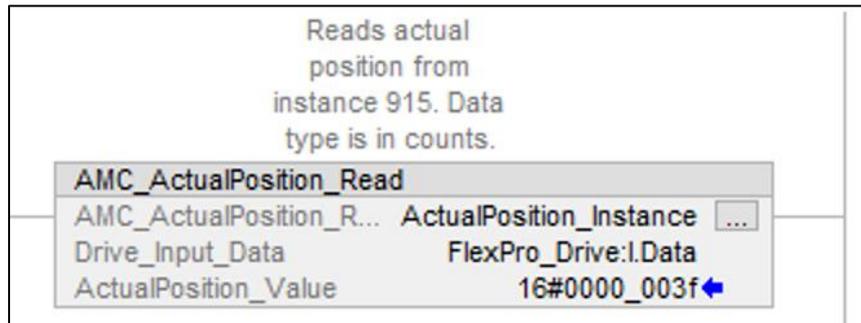


Figure 21 AMC_ActualPosition_Write Screen

The ActualPosition_Value parameter has a data type of DINT (32-bit).

5 All Add-On Instructions

This document gives two examples (AMC_StatusWord_Read and AMC_Drive_Enable) of importing and configuring AOI files into the Control Organizer. If necessary, users can import and configure other additional AOI files from the “AMC AOI” folder from the “Import Add-On Instruction” screen (Figure 3 or Figure 14).

The list below shows all AOI files that can be imported into the Control Organizer. To import and configure a desired AOI file, repeat steps 1 and 2 from *Example 1* or *Example 2* of this document. Select the desired AOI file to import and configure.

The full list of AOI files include...

- AMC_StatusWord_Read (used in Example 1)
- AMC_Enable_Drive (used in Example 2)
- AMC_ModeOfOperationDisplay_Read
- AMC_ModeOfOperation_Write
- AMC_ControlWord_Write
- AMC_TargetPosition_Write
- AMC_ActualPosition_Read
- AMC_TargetVelocity_Write
- AMC_TargetCurrent_Write
- AMC_ActualVelocity_Read
- AMC_ActualCurrent_Read