
Honeywell

PlantScape Controller Implementation

Lesson 6

Configure a Common SCM (SCM#_XFER)

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Notes

Introduction

The purpose of this Lesson is to give you the knowledge to be able to configure a Common Sequential Control Module and its Alias Table. Upon completion of this Lesson you will have Created a Common SCM that will control material transfer. Using specific instances from the Alias Table you will apply this SCM to the transfer of ingredient B to the Reactor.

Objectives

- ❶ Create a New SCM
- ❷ Create an Alias Table for the SCM
- ❸ Configure Steps and Transitions using “generic” parameters from the Alias Table
- ❹ Run the SCM using devices for the transfer of Ingredient B



➤ Introduction

- A **Common SCM** is one that can control several equipment units, one at a time, with no code change requirements. The decision on which unit to control can be made at run time through a single parameter choice in the SCM's Alias Table.
- An **Alias Table** is a matrix that associates alias names with the actual parameters that the aliases resolve to at run-time. The Alias Table is the key component to the Common SCM function. It creates the foundation for dynamic indirection
- **Dynamic indirection** allows common SCM Step outputs and Transition conditions to communicate to different CM blocks at run-time. This provides the ability for a user to create a single SCM that may control different equipment each time it runs.
- The Alias Table owner tries to locate the specific CM blocks for the aliases at load time or at run-time. This process is called **binding**. The binding process results in the creation of two sets of connections: the connection between the common SCM Step output or Transition condition code and the aliases; and the connection between the aliases and the referenced CM blocks.
- Binding status is visible in the Monitoring Tab, SCM's Configuration Parameters, **Aliases** tab
- We will now configure a common SCM

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Notes

Background

A SCM can be configured to reference aliases instead of actual C200 parameters. The specific C200 parameters to be used when the SCM executes can then be assigned dynamically. Hence, one SCM can control various sets of CMs with out any changes in its configuration.

The mechanism used in the C200 to allow this common code configuration is the Alias Table. It must be configured on the common SCM prior to Step\Transition configuration. (In R320, an SCM can reference only its own table.) Since the Alias Table establishes function block type and parameter for each alias, the standard Control Builder Point Selection and Enumeration Fetch are functional with the “generic” SCM code.

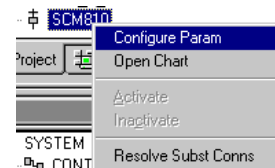


For more information about Common SCMs refer to
Control Builder Components Theory, Common SCMs.

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➤ Create a New SCM

- Add a new SCM to your project
- In the Project view, right-click on the SCM, and click on **Configure Param**
- Enter the following information on the Main tab
 - Name **SCM#_XFER**
 - Description **COMMON SCM FOR TRANSFER**
 - KEY WORD **XFER**
- Close SCM and Assign to **CEE0101**



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Notes

SCM#_XFER Process Description

The SCM#_XFER automates the transfer of material using a totalizer, a 2-state valve, and a 2-state pump.

The transfer process is as follows:

- A Specified amount of material is entered into the SCM's Recipe Target Value 1.
- Modeattr parameters for both the valve and the pump are set to Program
- The totalizer target is set equal to the Recipe Target Value. The valve is then opened
- After the pump interlock clears, the pump is turned on.
- When the totalizer reaches the target amount, interlocks close the valve which in turn interlocks the pump off.
- The modeattr parameters of the pump and drain are then set back to Operator.
- The SCM notifies the Server Message Summary of the completed material transfer and then goes to Complete status

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➤ **Alias Table**

- First, we must configure the Alias Table
- Right-click on the SCM, and click on **Configure Param**
- Select the **Aliases** Tab to bring up the form shown below:

SYSTEM:SCM Block, SCM_XFER - Parameters [Project]

Main | Handlers | Alarm | Recipe | History | Aliases | Server | Status

☐ Enable Alias Configuration

Number of Aliases: 1

Number of Instances: 1

Instance Selected: 1

#	Alias	Model Block	Model Param	Status	Instance 1
1					

Use right mouse button to invoke the edit menu

☐ Show Parameter Names

OK Cancel Help

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Notes

Alias Table

A common SCM is added to the Project just like any other. The property that makes it common is the alias table and the use of aliases in the code.

The **Alias** tab is where the table is configured.



➤ Alias Table (continued)

- Click the **Enable Alias Configuration** check box
- Input 11 for the **Number of Aliases** and 1 for the **Number of Instances**

#	Alias	Model Block	Model Param	Status	Instance 1
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

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Notes

Alias Table (continued)

In order to configure an Alias Table, table configuration must first be enabled.

Next the **Number of Aliases** and **Number of Instances** are entered. This sets up the initial table size. Both of these can be changed in the Project Tab at any time. Also, you can right click to copy and paste rows, or to append columns and rows. The maximums are **500 Aliases** and **100 Instances** per table. An additional restriction is that the Number of Aliases times the Number of Instances must be ≤ 4500 .

Here we need 11 parameters to configure the SCM to accomplish the transfer of material. We therefore enter 11 for the **Number of Aliases**. We are doing only Transfer Ingredient B so we need only one **Instance**.

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➤ **Alias Table (continued)**

- Fill out the table to include the following aliases:

#	Alias
1	TOTALIZER_CMD
2	TOTALIZER_STATUS
3	VALVE_MODEATTR
4	VALVE_GOP
5	PUMP_MODEATTR
6	PUMP_GOP
7	VALVE_GPV
8	PUMP_OI_0
9	TOTALIZER_ACCTV
10	TOTALIZER_ACCTVFL
11	END_MESSAGE

- Select the proper Function Block type in the **Model Block** column and the proper parameter in the **Model Param** column to match the Parameters required to accomplish material transfer (Parameters for Ingredient B Transfer are shown on the next page.)

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Notes

Alias Table (continued)

Each Alias consists of a name, a block type or **Model Block**, and a parameter type or **Model Param**. The Model Block and Model Param allow Control Builder to verify that the “generic” code is properly configured.

To connect the Aliases to actual C200 parameters, **Instances** are added to the table. The set of parameters to be used at run time can be selected by choosing a particular instance.

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➤ Alias Table (continued)

- Enter these parameters for the Transfer B instance. (Remember to use your # number!)

Instance 1
CM_ACCA.TOTAL_B.COMMAND
CM_ACCA.TOTAL_B.STATE
CM_FV102.DEVCTLA.MODEATTR
CM_FV102.DEVCTLA.GOP
CM_PMP102.DEVCTLA.MODEATTR
CM_PMP102.DEVCTLA.GOP
CM_FV102.DEVCTLA.GPV
CM_PMP102.DEVCTLA.OI[0]
CM_ACCA.TOTAL_B.ACCTV
CM_ACCA.TOTAL_B.ACCTVFL
CM_MESSAGES.XFERB.SENDFL[1]

- The completed table is shown on the next page

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Notes

Instances

Instance Parameters are what tie the Alias Table to C200 parameters. At run time, a particular instance can be chosen.


The instance selection may be changed in the following ways at run-time:

- Change the instance selection from a display
- Store to the Common SCM's parameter **INSTSELEC** from an SCM Step Output
- Store to **INSTSELEC** from Total Plant Batch

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➤ **Alias Table (continued)**

- Below is the completed Alias Table (Connection **Status** will be active in the Monitoring tab.)



#	Alias	Model Block	Model Param	Status	Instance 1
1	TOTALIZER_CMD	AUXILIARY:TOTALIZER	COMMAND		CM_ACCA.TOTAL_B.COMMAND
2	TOTALIZER_STATUS	AUXILIARY:TOTALIZER	STATE		CM_ACCA.TOTAL_B.STATE
3	VALVE_MODEATTR	DEVCTL:DEVCTL	MODEATTR		CM_FV102.DEVCTLA.MODEATTR
4	VALVE_GOP	DEVCTL:DEVCTL	GOP		CM_FV102.DEVCTLA.GOP
5	PUMP_MODEATTR	DEVCTL:DEVCTL	MODEATTR		CM_PMP102.DEVCTLA.MODEATTR
6	PUMP_GOP	DEVCTL:DEVCTL	GOP		CM_PMP102.DEVCTLA.GOP
7	VALVE_GPV	DEVCTL:DEVCTL	GPV		CM_FV102.DEVCTLA.GPV
8	PUMP_OI_0	DEVCTL:DEVCTL	OI		CM_PMP102.DEVCTLA.OI[0]
9	TOTALIZER_ACCTV	AUXILIARY:TOTALIZER	ACCTV		CM_ACCA.TOTAL_B.ACCTV
10	TOTALIZER_ACCTVFL	AUXILIARY:TOTALIZER	ACCTVFL		CM_ACCA.TOTAL_B.ACCTVFL
11	END_MESSAGE	UTILITY:MESSAGE	SENDFL		CM_MESSAGES.XFERB.SENDFL[1]

- Next, we will configure the SCM using the Aliases

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Notes

Status Field

The Status column in the Alias Table is blank in the Project view. It indicates the connection status from the Alias to the SCM, and from the Alias to all of its block instances.

Status is established at download or at runtime and is visible in the Monitoring tab.



➤ SCM Configuration with Aliases

- As with all SCMs, we will be coding Steps and Transitions. For this exercise, you will be given a detailed process description from which you will configure the SCM.
 - Step names, Transition names, and descriptions can be anything you choose
 - Step Outputs and Transition Conditions will use the Aliases only
 - The process description is on the next page
 - A complete solution is at the end of the module
 - Below is the table for the first Step to demonstrate code using aliases. Note that the alias is treated as a SCM parameter in the code (SCMname.alias)

Tab	Name		Description	
Main	INITIALIZE		INITIALIZE	
	Wait Time	0	Active Time	240
	Description		Output Expression	
Out #1	VALVE MODEATTR TO PGM		SCM#_XFER.VALVE_MODEATTR:= 2	
Out #2	PUMP MODEATTR TO PRM		SCM#_XFER.PUMP_MODEATTR := 2	
Out #3	RESET TOTALIZER		SCM#_XFER.TOTALIZER_CMD := 3	
Out #4	START TOTALIZER		SCM#_XFER.TOTALIZER_CMD := 1	
Out #5	SET TARGET AMT = RECIPE 1		SCM#_XFER.TOTALIZER_ACCTV := SCM#_XFER.RECTARGET[1]	

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Notes

Common SCM Code

The use of Aliases in SCM code allows it to be applied to different Instances.

Aliases are actually parameters of the SCM in which their Table is configured. In the SCM code, therefore, we reference the Aliases just like any other SCM parameter, namely SCM.Alias.

In R320, aliases are only available locally to the SCM which contains the Alias Table.



➤ Process Description

- Start the SCM on command (no start conditions)
- Ready the process
 - Set the pump and valve MODEATTRs to PROGRAM
 - RESET and START the totalizer
 - Set the totalizer target equal to the SCM recipe value 1
- Verify the MODEATTR on the valve is PROGRAM and the totalizer is running
- Open the valve
- Verify the valve is open and the pump interlock is clear
- Start the pump
- Wait for the totalizer actual amount to reach the target amount
- Set the pump and valve MODEATTRs to operator
- Send a message stating that SCM is complete

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Notes

Process Description

Recall that we configured an INFO type Message at Index 1 in the XFERB Message block in CM#_MESSAGES to indicate that the transfer of ingredient B is complete. Here is where we use that message.



➤ **SCM Operation**

- After configuration, close and save your SCM
- Download and Activate your SCM
- Look at the Alias Table in Monitoring to check the Connection (binding) Status to the SCM code and the transfer B CMs *
- Add SCM#_XFER to Group 3, Slot 7
- Enter a target amount into SCM#_XFER Recipe Value 1
- Run the SCM

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Notes

***Binding Status**

The binding status is represented by parameter STATUS. This parameter is an enumeration with value Null (0), OK (1) and Binding (2). If the data owner/reference destination block of an alias is successfully connected, the STATUS of the alias will be set to OK. If the instance parameter is not configured (null instance parameter), the STATUS of the alias will be set to Null. If the data owner/reference destination block of an alias can not be located or connected, the STATUS of the alias will be set to Binding. Failure to bind is caused by any of the following situations:

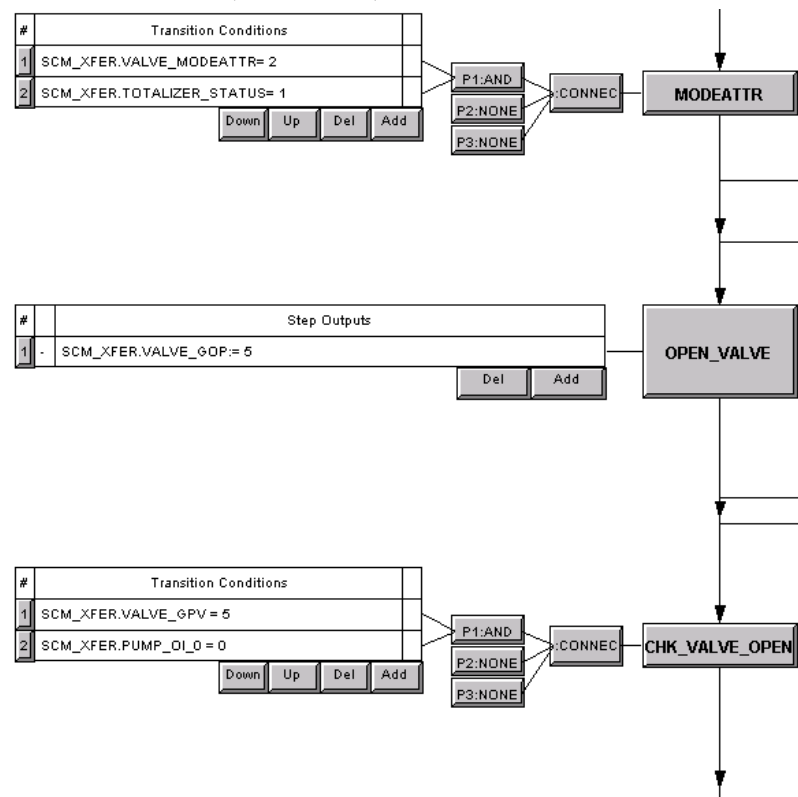
- The data owner/reference destination block is not loaded;
- The data owner/reference destination block is deleted;
- The SCM does not use the alias in the code anywhere;
- The parameter referenced cannot be continuously connected, for example, the send flag for a message which is a pulse trigger.

-
- The screenshot displays the HMI interface for the 'Transition Conditions' and 'Step Outputs' sections. The 'Transition Conditions' table at the top has a single row with a '#' column and a 'Transition Conditions' column. Below it is an 'Add' button. To the right, there are three stacked buttons labeled 'P1:NONE', 'P2:NONE', and 'P3:NONE', which are connected by arrows to a single button labeled 'S:NONE'. Below this is an 'Invoke' button. The 'Step Outputs' table at the bottom has a '#' column and a 'Step Outputs' column. It contains five rows of data. To the right of the table are four buttons labeled 'Down', 'Up', 'Del', and 'Add'. Below the 'Invoke' button is an 'INITIALIZE' button. Arrows indicate a flow from the 'Invoke' button down to the 'INITIALIZE' button, and from the 'INITIALIZE' button down to the bottom of the screen.
- | # | Transition Conditions |
|---|-----------------------|
| | |
- Add
- P1:NONE
P2:NONE
P3:NONE
- S:NONE
- Invoke
- | # | Step Outputs |
|---|---|
| 1 | SCM_XFER.VALVE_MODEATTR:= 2 |
| 2 | SCM_XFER.PUMP_MODEATTR := 2 |
| 3 | SCM_XFER.TOTALIZER_CMD := 3 |
| 4 | SCM_XFER.TOTALIZER_CMD := 1 |
| 5 | SCM_XFER.TOTALIZER_ACCTV := SCM_XFER.RECTARGET[1] |
- Down Up Del Add
- INITIALIZE

Notes

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➤ **SCM#_XFER Possible Solution (continued)**



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Notes

[illegible]

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This completes....

PlantScape Controller Implementation

Lesson 6

**Configure a Common SCM
(SCM#_XFER)**

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Notes
