4 Front Face Configuration Lab – Datapoint Configuration

4.1 Foreword

In the previous lab, we learned to default the instrument, load and run a single loop Flexible Control Strategy. The single loop control strategy we loaded had all the database or control parameters in their default values and ranges. It is important to change some of these default values to suit the process application.

4.2 Objectives

In this lab we will change the analog input's span and zero, controller's range and setpoint limits, and set the alarm limits and the alarm index: After completing this lab, you should know how to modify the settings of a single loop control strategy.

4.3 Instructions

1. **Enter Configuration mode:**

   - Press the E-mode button (dot button) until you see DISPLAY, CONFIGURE or PROGRAM at the bottom of the display.
   - Press the F2 button until **CONFIGURE** is displayed at the bottom.
   - Press F3 to accept the configuration mode. On design level A controllers, the bottom line should now display the following: **POINT** ₗ. On a design level B controller, the bottom line should read **DATAPOINT** or **MODULE**. Press the F2 button until **DATAPOINT** is displayed.
   - Press F3 to accept the DATAPOINT configuration mode. The bottom line should now display the following: **POINT** ₗ

2. **Change the Analog Input's Span and Zero:**

   - The Span and Zero for the process variable (CS1 Single Loop Control Strategy) are stored in memory locations C256 and C276 respectively. We will change the value of Span to 350.00 and Zero to 0.
   - Using the UP arrow  , locate the letter C. The display should look like the following now: **POINT** ₗ**C**

- Using the output decrease button, shift the letter **C** one space left. Using the UP arrow again, display the number 2 and then shift it to the left by pressing the output decrease button. Using the button again, display the number 5 and shift it to left. Display the number 6 next. The display should look like**:**

  `POINT  ˪C256`

- Press F3 to accept the selection. The default value for the analog input span is 100.00. The display should look like: `C256  100.000`

- We will change this value to 350.00. Using / / / buttons, modify the value 100.000 to a value of 350. The display should now show:

  `C256  350.000`. Extra zeros to the right of the decimal point and the decimal point need not be displayed. `C256  350` is also acceptable.

- Press F3 to accept this value.

- Using the arrow buttons again, select location C276. This is where the Zero of the analog input is stored. The default value of Zero is 0. The display should look like: `C276  0.0`

- Press F3 now to accept this default value. We have now configured the value of Span and Zero for the analog input.

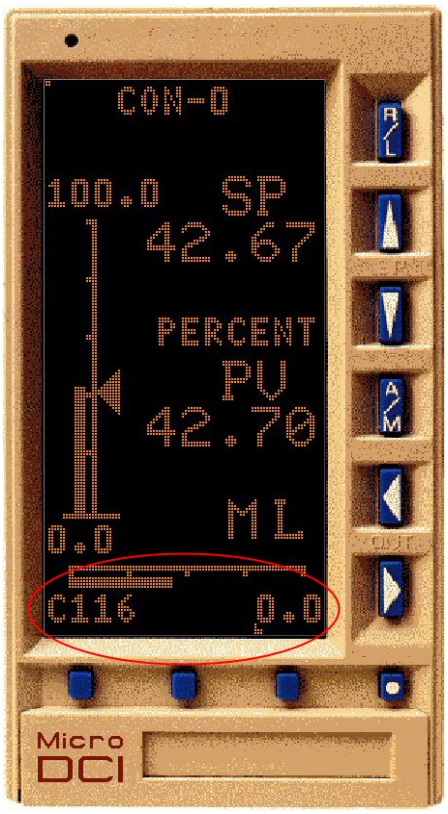
3. Change the control range for the single loop.

- Control Loop 0 high and low ranges are stored in memory locations C115 and C116 respectively.

- Use the arrow keys to display C115 at the bottom and then press the F3 key. Enter a value 350 using the arrow keys and then press the Enter (F3) key (Procedure for doing this is similar to the procedure followed in the previous step above).

- Similarly select location C116 and enter a value of 0 for that location. See figure below:

Figure 4-1.
Configuration Mode



Refer to Table 4-1 for a complete listing of commonly used memory locations in the single loop control strategy. Remember to press F3 after selecting the location and also after changing the location.

Table 4-1
Commonly Used Locations in Single Loop Controller

Memory Location	Value	Parameter
B000	 1 0 99	Function Index Flexible Control Suspended, All outputs frozen Default database
B016	 1 2 3 4 5 98	Link List Loader CS1 PID Controller CS2 Analog Back-up CS3 Ratio Controller CS4 Automatic / Manual CS5 Ratio Auto / Manual Default wirelist (ABB logo on front) (Removes Control selection)
C256		ANI0 Span (engineering span)
C276		ANI0 Zero (engineering zero)
B269		Digital Filter (smoothing the constant)
L440	 1 0	Square root (selects linear or sq. root) Square root Linear
C257		ANI1 Span (RSP, engineering span)
C277		ANI1 Zero (RSP, engineering zero)
B270		Digital Filter (smoothing time constant)
L441	 1 0	Square root Square root Linear
A000		Con 0 Tag name (10 characters)
A001		Con 0 Engineering Units (7 characters)
C100		Process Variable (measured)
C120		Remote Setpoint (measured)
C103		Process Limit 1 (process alarm 1 setpoint)
C104		Process Limit 2 (process alarm 2 setpoint)
C105		Alarm Deadband (maintain alarm band)
C106		Proportional band (tuning parameter in percent)
C107		Reset time (tuning parameter in minutes)

Table 4-1 Cont.

Memory	Value	Parameter

Commonly Used Locations in Single Loop Controller

Location		
C108		Rate time (tuning parameter in minutes)
C111		Manual Reset (tuning parameter in percent
C115		Control Range (Control Functions)
C116		Control Lower Range (Control Functions)
C125		Setpoint Limit high (Control Functions)
C126		Setpoint Limit Low (Control Functions)
L106		Control Action (Control Functions)
L109		Reverse Value (Control Functions)
L114		Auto Enable (smoothing the constant)
L120		Manual Fallback Disable
B335	 0 1 2 3 4 5 6	Alarm Index Selection of Alarm Function Hi/Low Alarms No Alarms Hi Only Low Only Hi Hi-Hi Low / Low-Low Deviation from setpoint

4. **Set the Alarm Limits and Alarm Index (Alarm Function):** We will configure a Low and a High alarm for the process variable.

You can configure 2 alarms on the process variable. The two alarms could be High only, Low only, High & Low, High & High-High, Low &Low-Low, (+) & (-) Deviation. The alarm limits are stored in locations C103 and C104. Refer to Table 4-2 for a detailed listing of locations and alarm functions.

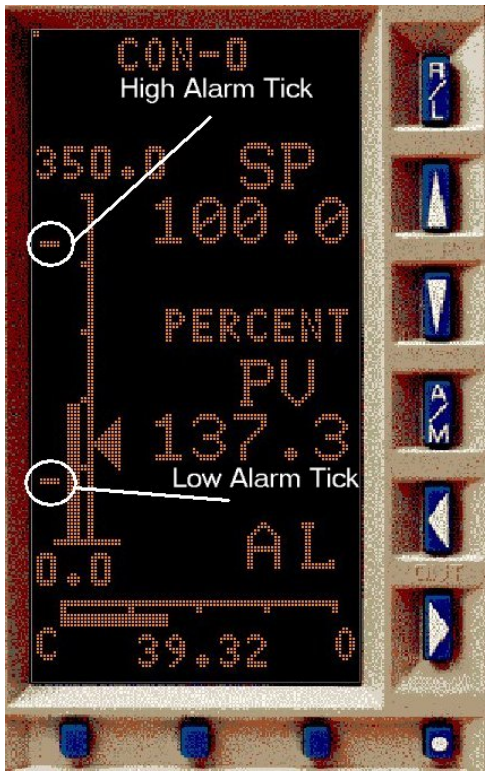
- Using the arrow keys, select location C103 and enter a value 300. This will be the High Alarm setpoint.
- Select location C104 and enter a value of 50. This will be the Low Alarm setpoint.
- Enter an Alarm Deadband of 2 by selecting location C105
- Select B335 and enter the value 0 for configuring the Alarm Index or Alarm Function as High and Low.
- Press the E-mode (dot button) to exit the configure mode. This will complete the alarm configuration for the single loop control strategy.

Table 4- 2 Cont.
Alarm configuration in Single Loop Controller

Memory Location	Value	Parameter
C103		Process Limit 1
C104		Process Limit 2
C105		Alarm Deadband
B335	 0 1 2 3 4 5 6	Selection of Alarm Function Hi/Low Alarms; C103 = High, C104 = Low No Alarms Hi Only; C103 = High Low Only; C104 = Low Hi/Hi-Hi; C103 = High, C104 = Hi-Hi Low/Low-Low; C103 = Low, C104 = Low-Low Deviation from Setpoint; C103 = positive Deviation, C104 = negative Deviation

Alarm "Ticks" will appear on the standard control loop display. They are added to the left of the process variable bargraph, refer to figure 4.2.

Figure 4-2.
Single loop display with alarm ticks



5. Testing the alarm limits

- The controller should currently be in the manual mode. There are two ways to generate an alarm with the training equipment we are using. The analog output of the controller will have a loop-back connector wired to the analog input.

- If the current output is zero, the controller should already be in alarm.

- Press the Dot button once to acknowledge the flashing alarm. There should also be a LOW alarm indicator across the screen.

- Press and hold the output increase pushbutton. As the output increases, the process variable will also increase. When the process variable rises above the alarm limit, the LOW alarm indicator will disappear.

- As the output continues to increase, the process variable will reach the high alarm limit. The flashing alarm will return and the HIGH indicator will be displayed.

- Pressing the DOT pushbutton will acknowledge the flashing alarm. The HIGH indication will remain until the process variable falls below the alarm point.

Notes: