

PLC126 LAB 3.3: ALLEN BRADLEY SLC-500 COUNTERS

Student Name: _____

Student ID: _____

LAB OUTCOMES:

1. Explain the operation of the CTU and CTD instructions
2. Explain the operation of the Counter instruction status bits
3. Explain how the RES instruction affects the Counter data values
4. Identify one application for a CTU instruction in an industrial environment
5. Change the data values of a CTU / CTD instruction while onl

LAB PROCESS:

Write the program as shown in part 1 and then save it to the hard drive of the computer. You will then download the program to the SLC-500 processor. Once that it is complete you will go online with the SLC-500 and place the processor in RUN mode.

Allen Bradley Counter Basics:

Counter Instruction:

CTU stands for Count UP. The CTU instruction when energized will increase the accumulated value of the counter address by one.

CTD stands for Count Down. The CTD instruction when energized will decrement the accumulated value of the counter address by one. CTD are seldom used, but are usually used with a CTU in a pair.

RES stands for Reset. The RES instruction when energized will reset the Accumulated value and status bits of a Counter.

Data Range: -32768 to +32767

Status Bits:

DN – Done Bit – This bit is “on” when the Acc value is equal to or greater than the PRE value.

CU – CTU Enable – This bit is “on” when the CTU instruction has power on it.

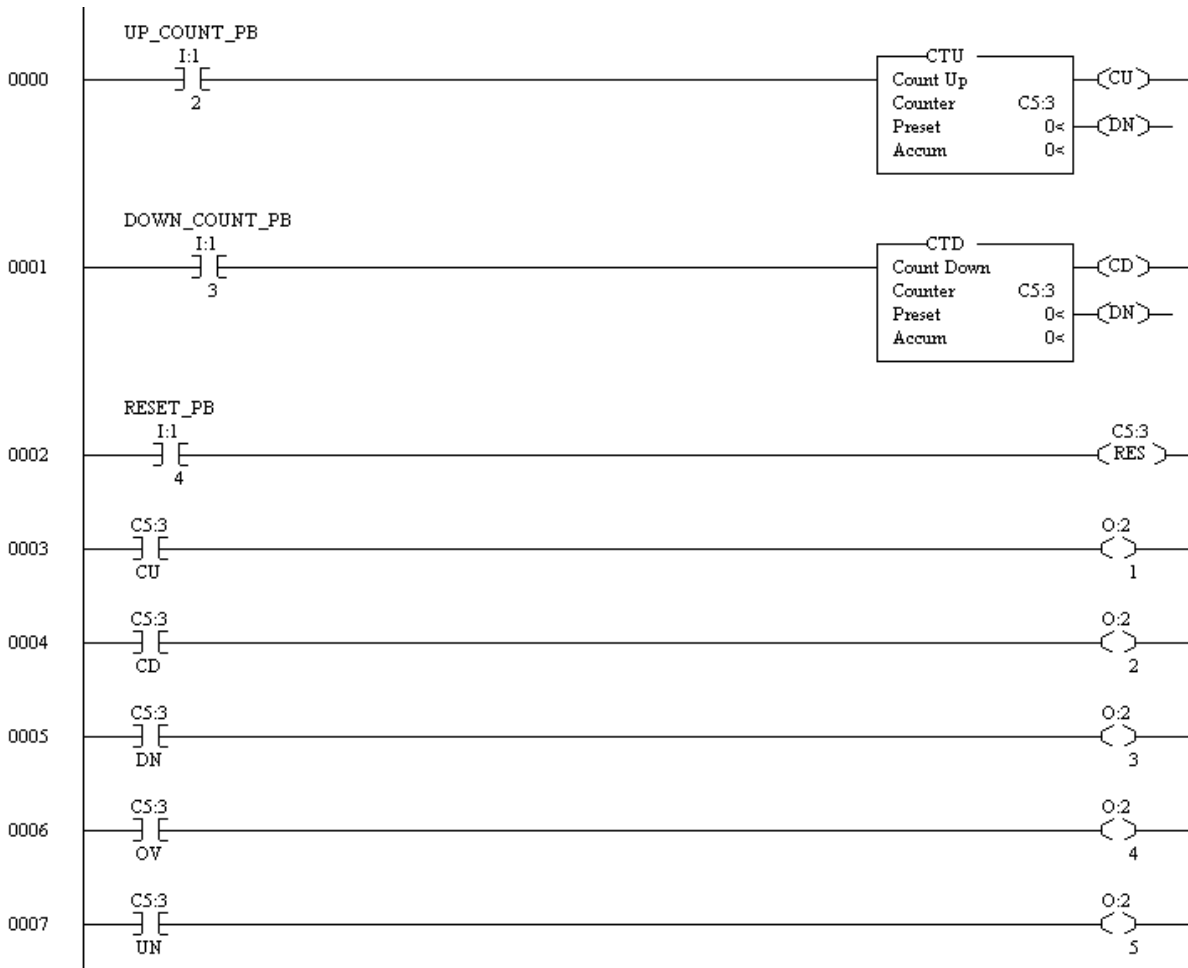
CD – CTD Enable – This bit is “on” when the CTD instruction has power on it.

OV – Overflow Bit – This bit is “on” when the Acc value of the counter goes greater than +32767.

UN – Underflow Bit – This bit is “on” when the Acc value of the counter goes less than -32,768.

Part 1

1. Key in the following program and save it to the hard drive. Name the project something you will be able to easily remember.



2. Push input I:1/2 (Up Count PB)

What happens to the Accumulated value in the CTU and CTD?

What status bit comes on?

3. Push input I:1/2 (Up count PB) 10 more times.

What is the Accumulated value now?

What status bits are on?

4. Push **I:1/2 (Down Count PB)** four times

What is the Accumulated value?

What status bits are on?

Is the Accumulated value in the CTD the same as the value in the CTU? Explain.

5. Now turn on input **I:1/4 (Reset PB)**

What happens to the Accumulated value?

What happens to the state of the status bits?

6. Change the **Accumulated** value of the counter to **32,765**.

7. Push input **I:1/2 (Up Count PB)** three times

What is the Accumulated value?

What status bits are on?

8. Change the **Accumulated** value of the counter to **-32,765**

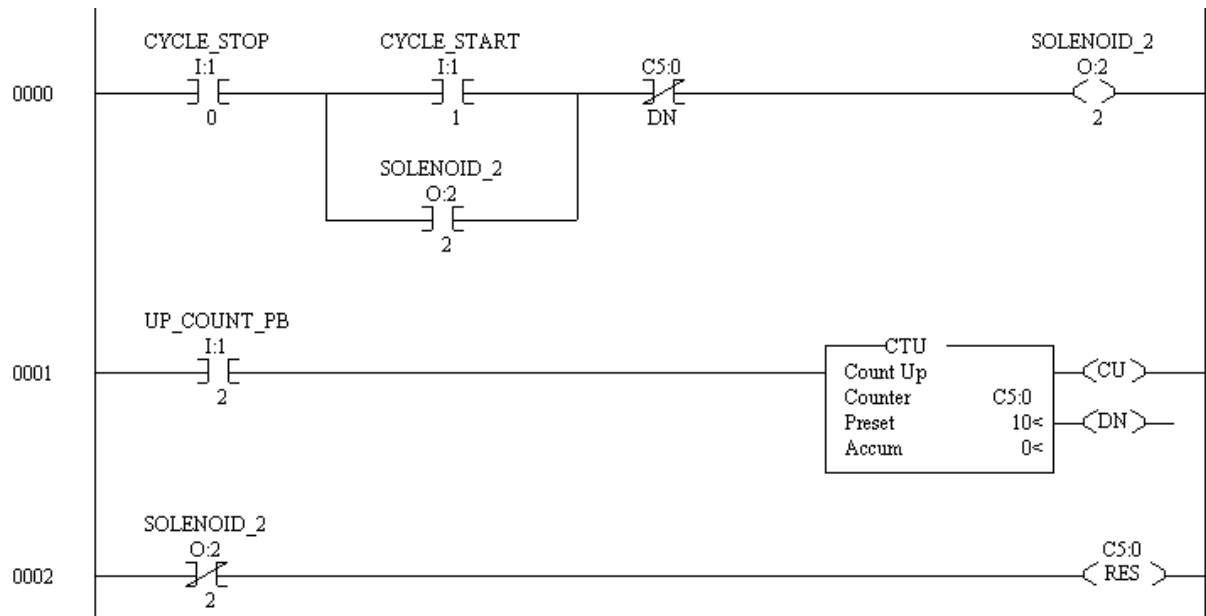
9. Push input **I:1/3 (Down Count PB)** four times

What is the Accumulated value?

What status bits are on?

Part 2

1. Key in the following program and save it to the hard drive. Name the project something you will be able to easily remember.



2. Push the **Cycle Start** button to energize **Solenoid_2**

3. Push **I:0.0/2** ten times

What happens to **Solenoid_2**?

Why?

4. Change the preset of **C5:0** to twelve

Questions

1. Why is the Accumulated value in both the CTU and CTD instruction in the lab always the same?

2. What increments the Accumulated value of a CTU instruction?
3. When does the DN bit referenced from a counter turn on?
4. When does the OV bit referenced from a counter turn on?
5. When does the UN bit referenced from a counter turn on?
6. What happens to the Accumulated value of a counter when a CTD of that address is energized?
7. When does the CU status bit come on?

The outcomes of this exercise (listed on page 1) specifies the skills that the Student must demonstrate to the Instructor. Once the Instructor is satisfied with the demonstration of Knowledge & Skills by the individual student, they will sign this document (for the student), then enter a 100% into the Hands-On Lab grade in Sakai.

I verify that this student has completed all of the requirements of this Hands-On Assessment:

Student Name: _____

Faculty Signature: _____ Date: _____

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