

AB ControlLogix Period Tasks Lab Exercise in Student VM

Upon completion of this lab, the student should be able to:

1. Explain various tasks found in the controller organizer window
2. Explain how to change the parameters for a continuous task
3. Explain how to create a new periodic task
4. Explain how to change the parameters for a periodic task
5. Monitor the scan times of the continuous and periodic tasks

Download the project **Periodic_Task.ACD** from your LMS.

Open the project with Studio 5000, then download it to the Virtual Emulator (inside student VM), or to the CompactLogix or ControlLogix training unit you are using in the PLC Lab (I/O configuration may need to be changed to match your I/O modules)

Go Online and put the Processor into the Run mode to do the following lab.

Video that was created to show the students how to create and configure the tasks:

YouTube Video: T. Wylie, Video setting up the controllogix processor emulator 010821

<https://youtu.be/n5Qv3fzLLAY>

Figure 1 shows the Controller Organizer for this project. Notice that there is a continuous task (MainTask, which is created when the project was created, and a Periodic Task that was created by the user. Within each Task is a Program (MainProgram under MainTask, and P1 under T1), and within each Program is one or more Routines (MainRoutine under MainProgram, and R1 under P1).

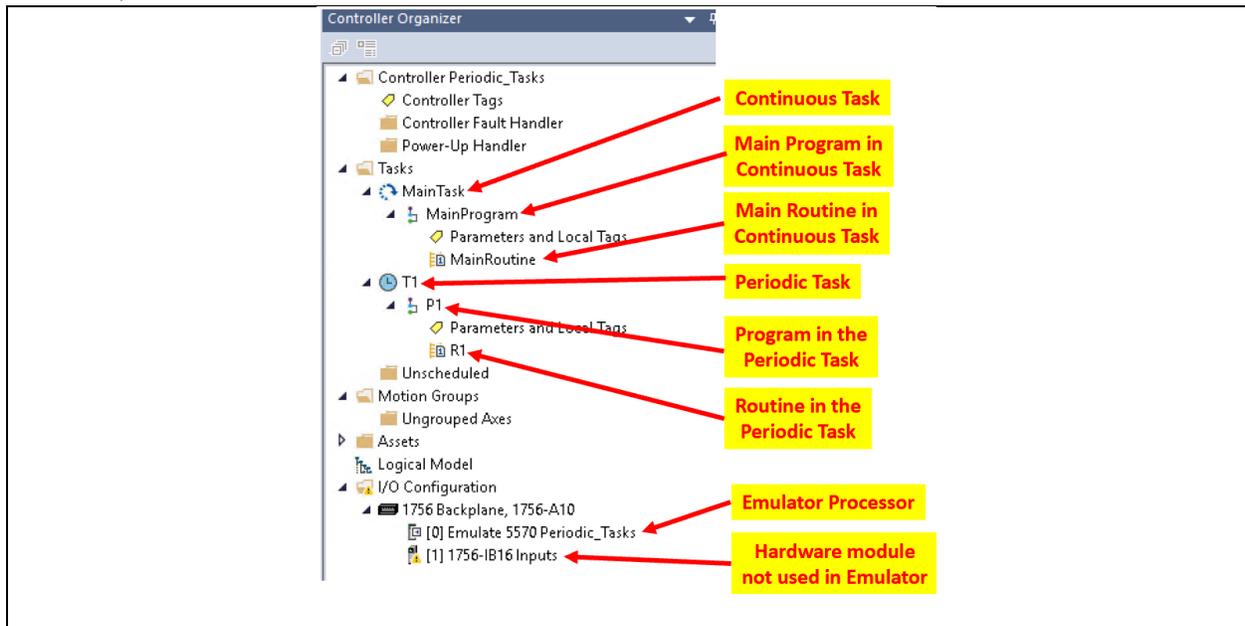


Figure 1. The Controller Organizer for this project.

Step 1 Open the Main Routine:

Figure 2 shows the ladder logic in the Main Routine. The Main Routine is the only Routine scanned in the Continuous task when the processor is put into the Run Mode.

1. Click on the XIC in rung 0, and press “Ctrl T” to toggle the bit, then “Ctrl T” again to toggle the bit off.
2. The int1 bit (BOOL) should turn on, which will highlight both the Latch (rung 0) and Unlatch (rung 2) instructions.
3. Click on the XIC in rung 1, and press “Ctrl T” to toggle the bit on. The TON instruction should be energized and the Accumulated value should start showing the elapsed time.
4. After the timer times out, the Timer1.DN bit should come on, highlighting the XIC in rung 2, thus unlatching bit int1.

The purpose of this ladder logic is to show that the Main Routine is being scanned when the processor is put into the Run Mode.

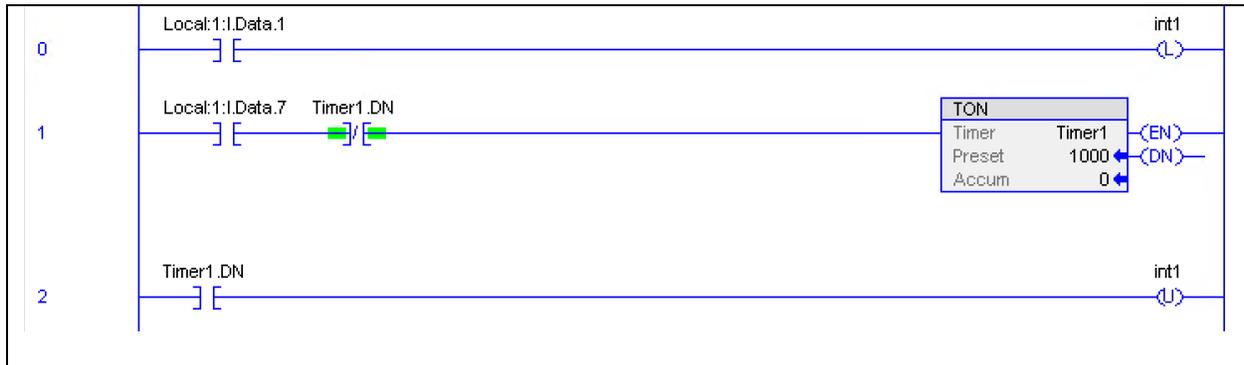


Figure 2. Ladder logic found in the MainRoutine.

Step 2: Check the setting in the Main Task.

Check the properties within the Main Task:

1. Right mouse click on the Main Task, as shown in Figure 3.
2. Click on the Properties tab.
3. Figure 4 shows the settings in the Properties view
4. General tab (marked as “A” in Figure 4) shows the name of the task
5. Configuration tab (marked as “B” in Figure 4) shows that it is a Continuous Task, and that the Watchdog timer is set for 500 msec.
6. Program Schedule tab (marked as “C” in Figure 4) shows that the order in which the Continuous Task will scan the Programs within the task. In this example, it shows only the MainProgram, since there is only one Program within the Task.

Watchdog Timer: A common term when working with PLC processors is Watchdog timer. This timer is reset after every scan. The purpose is that if the scan time gets too long (due to an extremely large ladder logic program, or the scan gets confused due to an uncommon situation, it will fault the processor and shut down the machine the PLC is running.

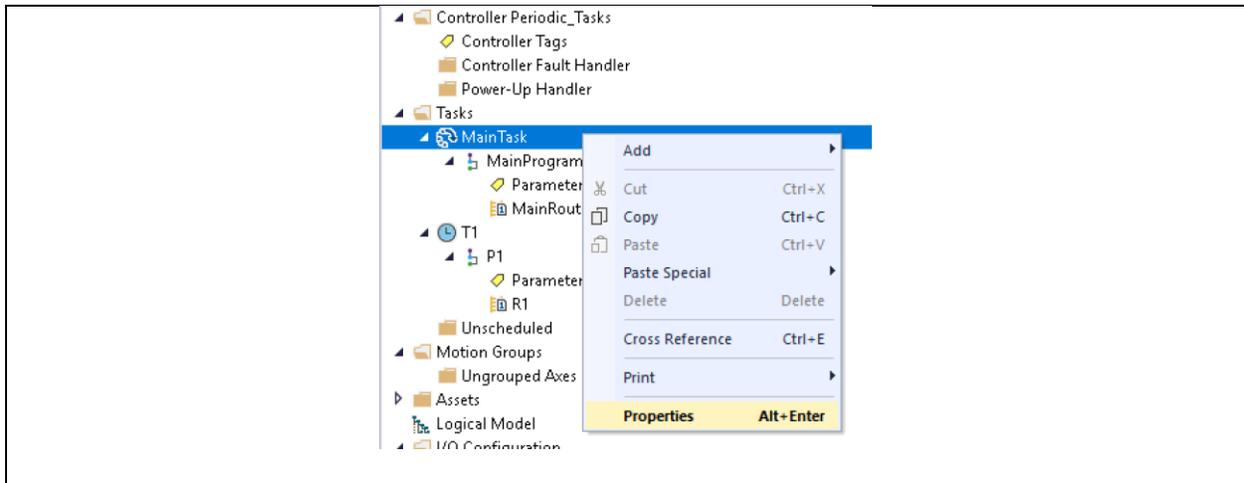


Figure 3. Right click on the Task, then choose Properties.

Within the Continuous Task there can be multiple Programs. The number of programs will vary based on the type of processor. Typically, a CompactLogix will allow 32 Programs per Task, and a ControlLogix will allow 100 Programs per Task.

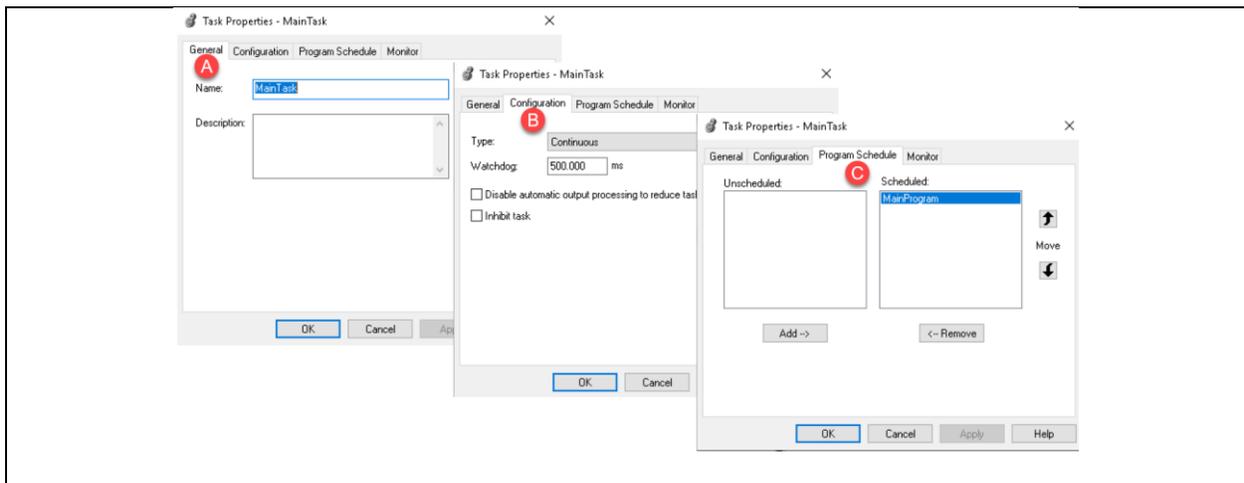


Figure 4. Setting within Task Properties.

Step 3: View the ladder routine in the Periodic Task:

Double click on the R1 Routine located within the P1 Program within the T1 Task:

1. Double click on the R1 Routine located within the P1 Program within the T1 Task
2. The ladder Routine is shown in Figure 5.
3. Program tags: tag1 and tag2 are DINT type of tags, and used in the addition instruction will increment the value in tag 1 every time the Period Task is scanned.



Figure 5. Ladder logic in R1 Routine.

Step 4: Configure the T1 Task

The intent of this step is to configure the Period Task to run every 6 seconds.

1. Right mouse click on the T1 Periodic Task and choose Properties (Figure 6)
2. Click on the Configuration Tab as shown in Figure 7, and set the time for 6000 msec, which is 6 seconds.
3. The default priority is 10. The lower the number, the higher the priority when using multiple Periodic Tasks.

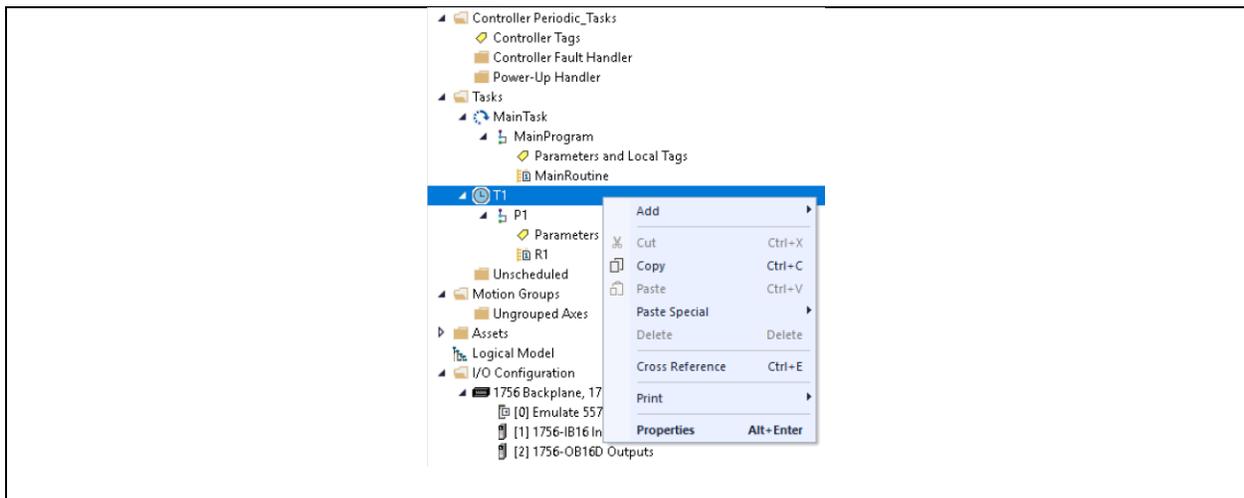


Figure 6. Viewing the Properties of the T1 Periodic Task.

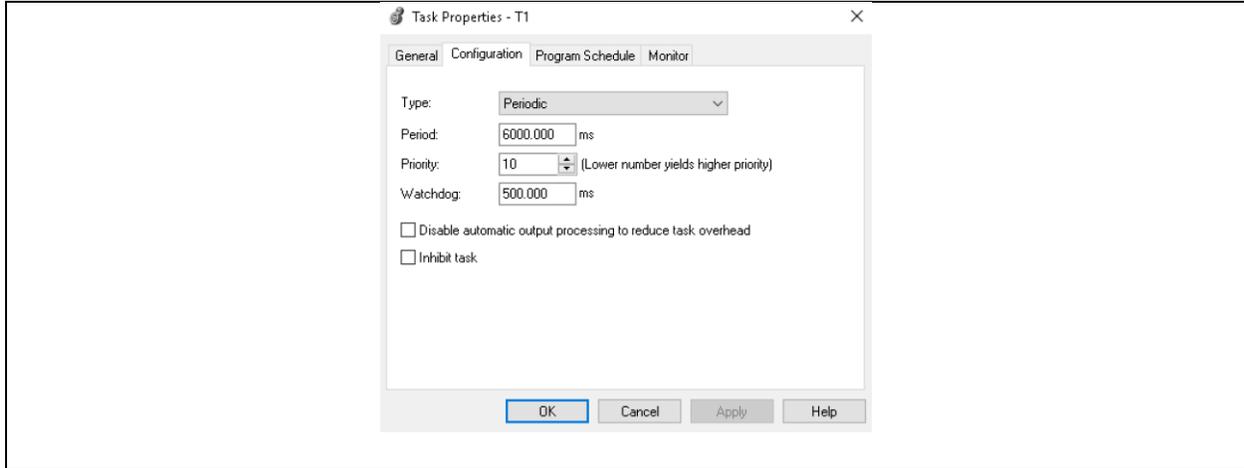


Figure 7. Configuration of the T1 Task.

Step 5: Monitor the R1 Routine

1. Double click on the R1 Routine within the T1 Task, as shown in Figure 8.
2. The ADD instruction should be scanned once every 6 seconds
3. Verify that the value in tag1 increments by one every 6 seconds
4. Go back to the configuration tab within the T1 Task Properties
5. Change the Period time value to 2000.
6. How often does the value in tag1 increment? _____
7. Change the Period time value back to 6000.

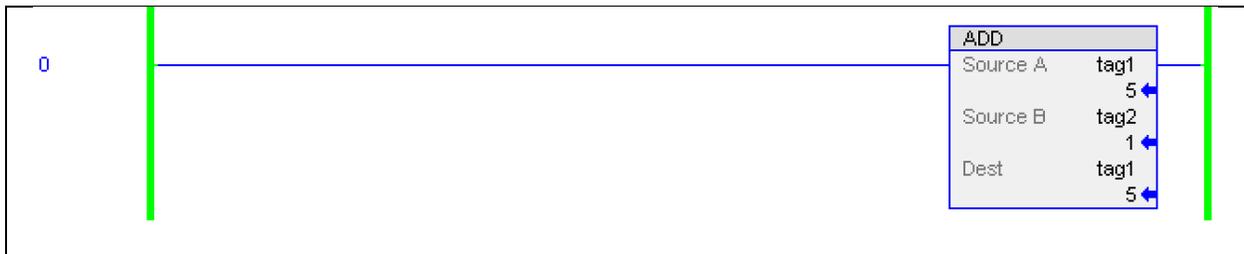


Figure 8. Verifying that the R1 Routine is being scanned.

Step 6: Monitor the Scan Time in the T1 Task

1. Go back to the Monitor tab within the T1 Task Properties (Figure 9)
2. What is the maximum scan time in msec? _____
3. Notice the values for the Interval times. The values should be right about 6000, for the 6 second intervals.

It is important to understand the difference between the Period time in the Periodic Task setting and the scan time. The Periodic time is how often the processor scans the Periodic Task. The scan time is the amount of time it takes to scan the information in the Routines (in this case it is ladder logic). If by chance the scan time takes longer than the Periodic time, a Task overlap will occur (see Figure 9).

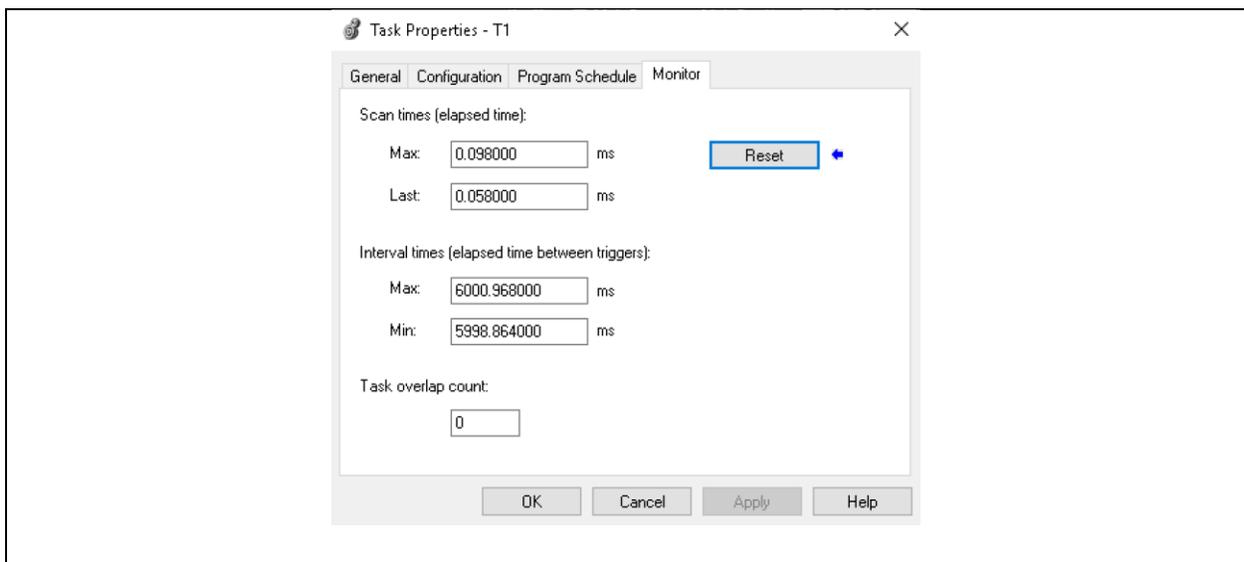


Figure 9. Monitoring the scan time for the T1 Task.

Questions from this Lab:

After completing this lab, the students should be able to answer the following questions. These questions will also help the students to prepare for the online assessment in Canvas.

1. What determines how often a Period Task is executed?
2. How often is the Continuous Task executed?
3. How many Continuous Tasks can be in a Studio 5000 project?
4. How often is a Periodic Task executed, if the Period time is set for 200?
5. What is the purpose of a Watchdog Timer?

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