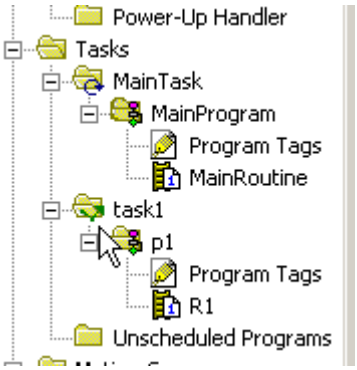
Module 5



Tasks and Programs

Student Materials

Module 5:
Tasks and Programs

Introduction:

When working with CompactLogix / ControlLogix PLCs, a download takes a project file stored on the programming panel (computer) and puts it in the PLC.(See beginning PLC Modules on downloading a project file). A controller can hold one project at a time. A common term many people used when describing a project is a program. At times it can be confusing when using the term program in place of the term project, since a project is made-up of tasks, programs and routines.

A project is composed of tasks, tasks are composed of programs and programs are composed of routines. See Controller Organizer window in RSLogix 5000 software for the organization of a project file.

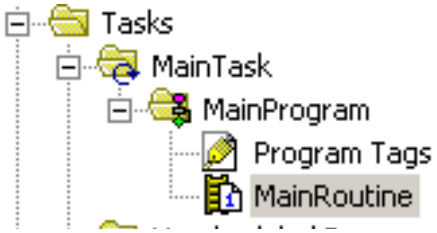


Figure 1-A

Projects in CompactLogix / ControlLogix must have at least one Task, one Program and one Routine. A project file can have as many as 4, 6 8, or 32 tasks, depending on revision and processor being used. Each Task can have between 32 and 100 programs, depending on revision and processor being used. There is no set limit to the number of Routines per Program.

Tasks and Programs are a method of organizing / arranging the processor's execution (scanning) of Routines. Processor instructions are located in Routines.

By default a project will have one Task (MainTask - continuous), one Program (MainProgram) and one Routine (MainRoutine). Routine contain the ladder logic instructions.

Note: Besides Ladder Logic, Routines can also programmed in Structured Text, Function Block Diagrams or Sequential Function Chart.

Tasks, programs and routines can be renamed. Tasks, programs and routines have Properties. The Properties window can be accessed by right clicking the Task name, Program name or Routine name and choosing Properties on the Selection Menu.

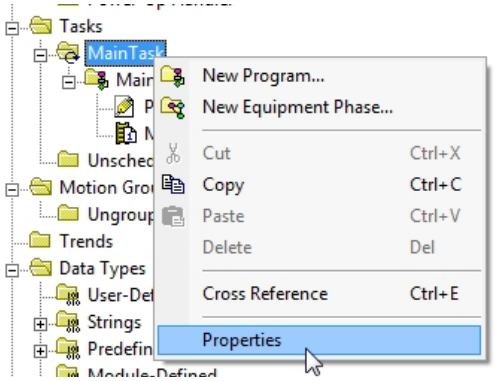


Figure 2-A

Tasks:

A project can have up to 32 tasks, depending on revision and type of processor. There are three different types of tasks in a Logix5000 project: Continuous, Periodic, and Event. A project can have only one continuous task. The other tasks can be either Event or Periodic.

Note: The default Task Type is Continuous

Figure 2-A

Figure 2-A shows the icon for a continuous task.
The Continuous Task is the lowest Priority Task

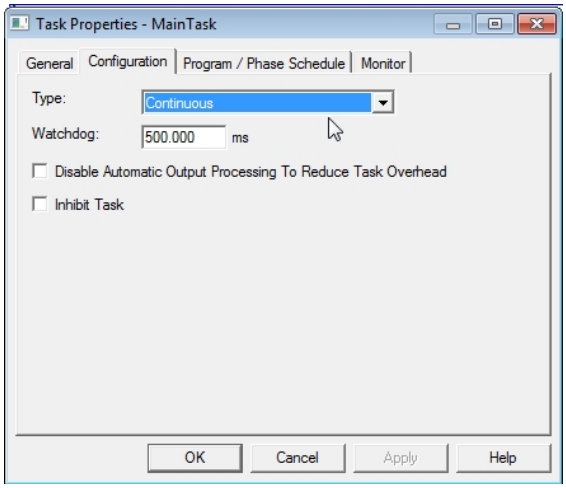


Figure 3-A – Configuration Tab – Continuous Task Properties window

Periodic Task:

Period Tasks execute at a constant time rate (period) based on the Task's Period setting. A Logix 5000 project can have multiple Periodic Tasks

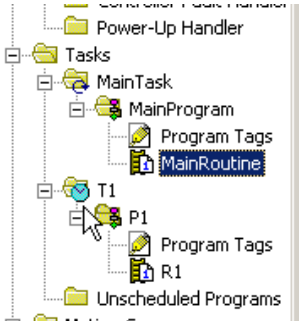


Figure 4-A

Figure 4-A shows a Logix 5000 Project that consists of two tasks –
MainTask is a continuous task
T1 is a periodic task

Note: Icons for Tasks

Icon for Continuous Task

Icon for Period Task

To open the Properties window of the task, right click on the task's name.
Choose Properties from the Selection Menu

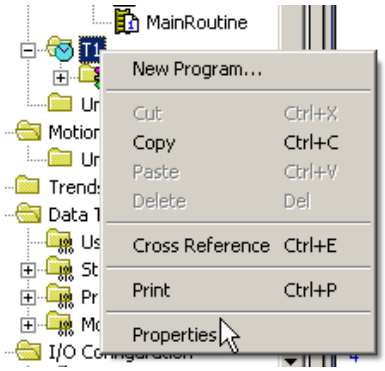


Figure 5-A

The Properties window opens.
The General tab show Name and Description information

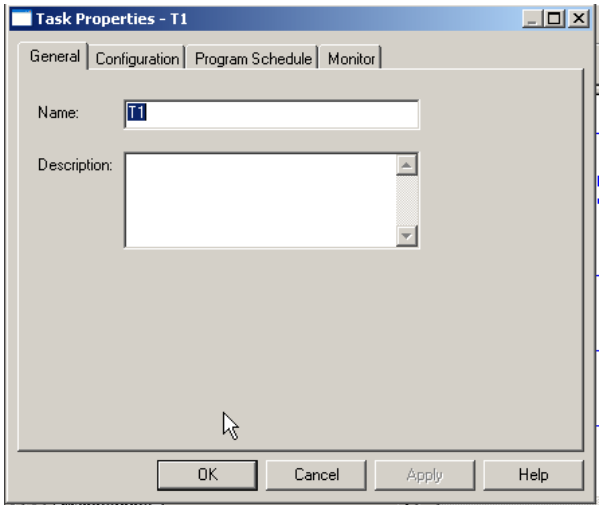


Figure 5-A

Click the Configuration tab to open the screen.

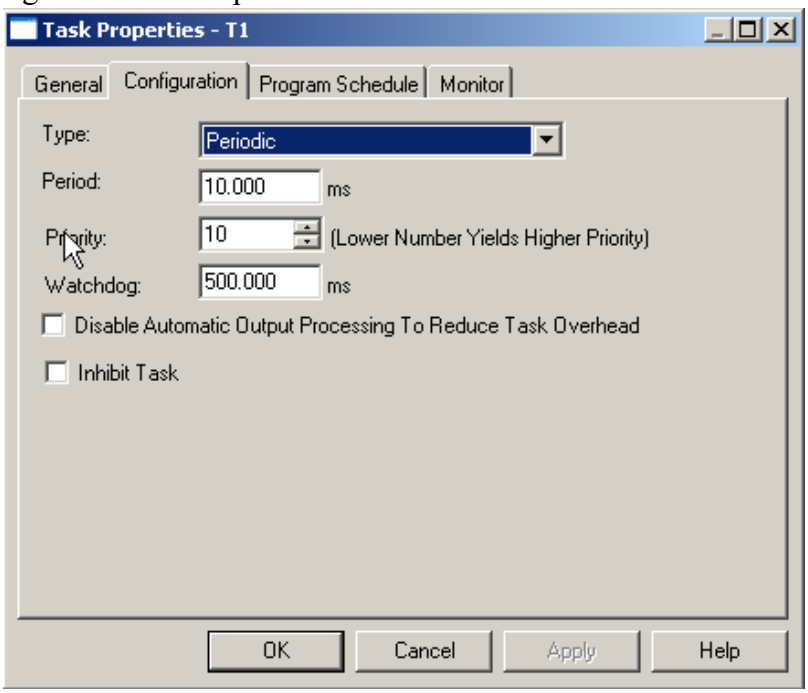


Figure 6-A

This screen shows task
Type: (Periodic)
Period: how often the processor executes the task
Priority: (10).

Note: Priority values can be 1 -15.
A task with a Priority setting of 2 is higher in Priority than a Task with a Priority setting of 6

If the situation occurs that the processor is told to run two tasks at the same time, the higher Priority Task (lower Priority value) is executed first.

Higher priority tasks will interrupt lower priority tasks.

Program Schedule tab.

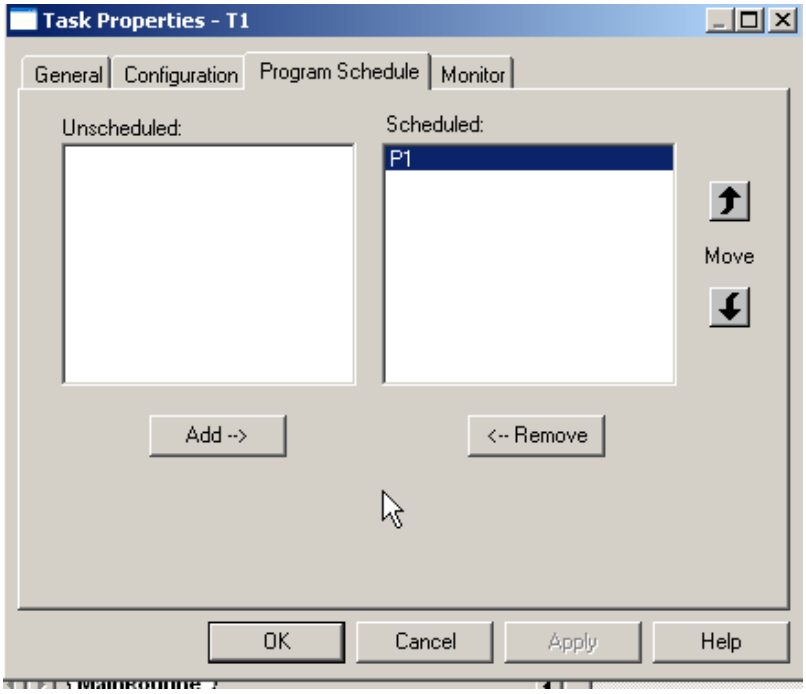


Figure 7-A

This tab shows which programs will run (Scheduled) and the execution order of the programs with the Task.

Event Task:

Event Tasks execute immediately when an Event occurs. A Logix 5000 project can have multiple Event Tasks

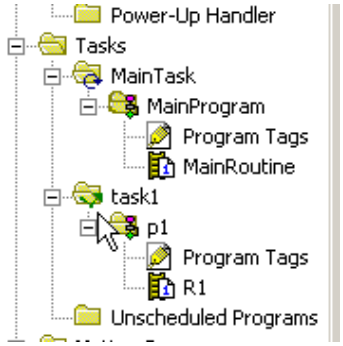


Figure 8-A

Figure 8-A shows a Logix 5000 Project that consists of two tasks –

MainTask is a continuous task
Task1 is an Event task

Note: Icons for Tasks

Icon for Continuous Task

Icon for Event Task

To open the Properties window of the task, right click on the task's name.
Choose Properties from the Selection Menu

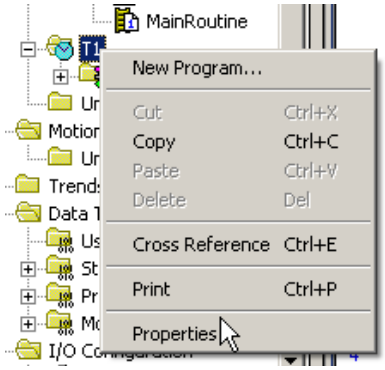


Figure 9-A

The Properties window opens.
The General tab show Name and Description information

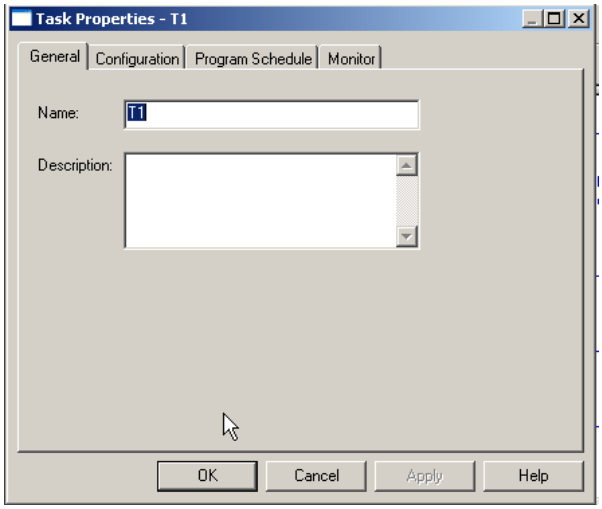


Figure 10-A

Click the Configuration tab to open the screen.

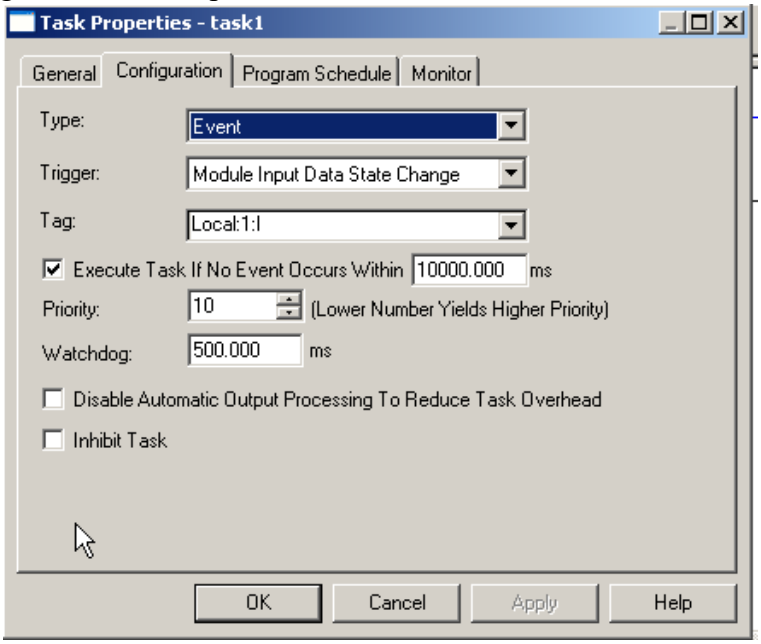


Figure 11-A

This screen shows task
Type: (Event)
Trigger: event that causes the task to execute
available Trigger types are:

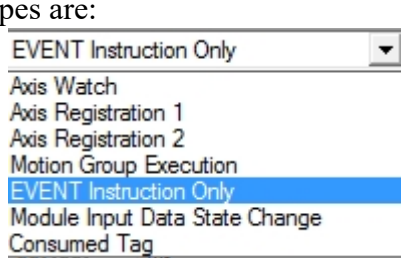


Figure 12-A

Tag: used depending on Trigger type selected
Execute Task Check Box: If check the processor will run (execute) the Task if no Event (Trigger) occurs within the time setting
Priority: Same as Periodic Task setting

Note: Priority values can be 1 -15.
A task with a Priority setting of 2 is higher in Priority than a Task with a Priority setting of 6

If the situation occurs that the processor is told to run two tasks at the same time, the higher Priority Task (lower Priority value) is executed first.

Higher priority tasks will interrupt lower priority tasks.

Note: Continuous Task is lower in Priority than any Periodic or Event Task
No Priority setting on Continuous Task Properties sheet

Program Schedule tab – same as Periodic Task.

Programs:

Programs organize groups of routines that share data and / or functionality.

Programs are schedule to execute in a particular order within the Task Properties sheet.

The number of Programs within a Task is dependent on revision and type of processor being used. Can range between 32 and 100.

Programs can have their own set of tags - Program Tags.

Note: In Studio 5000 software Program tags are referred to as Local Tags

Programs also have access to the Controllers Tags.

Note: All I/O tags are Controller Tags.

Programs contain Routines

In the Controller Organizer window view the Programs in the Project file.

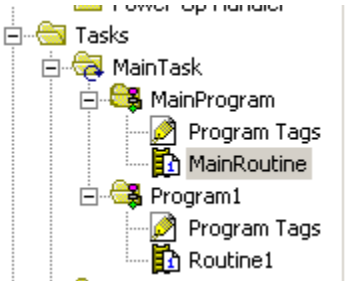


Figure 13-A

This project consists of two programs within the MainTask – MainProgram
- Program1

Right click MainTask > Properties to open the Properties Screen.
See Figure 14-A

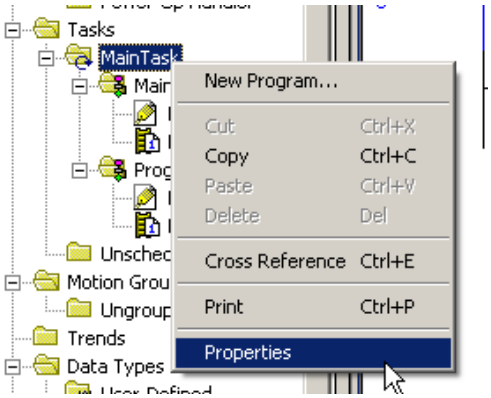


Figure 14-A

On the Properties Screen click the Program Schedule tab.

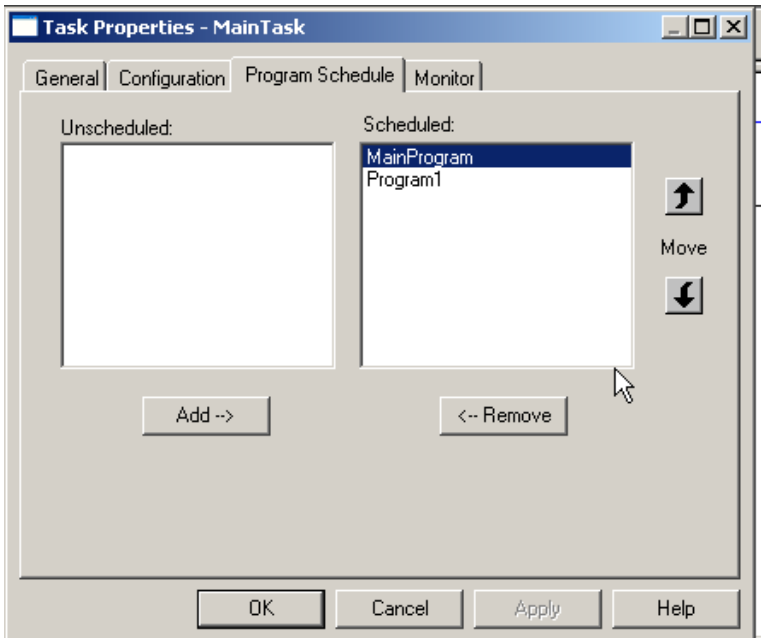


Figure 15-A

The Scheduled box shows which Programs from the task will execute and the order that the programs will execute. The example in Figure 15-A shows the MainProgram routine(s) will executes first, followed by the Program1 routine(s).

Programs can access Controller Tags and their own Program Tags

Note: Controller Tags are sometimes referred to as global tag.
Controller(global) tags can be used in any routine in the entire project.
All I/O tags are Controller tags.

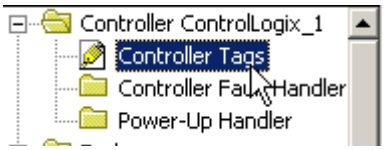


Figure 16-A

Program Tags are sometimes referred to as local tags.
Program (local) tags can be used only by routines listed under that particular program.

Figure 17-A

The Scope setting of a Tag determines if it is a Controller Tag or a Program Tag.
If the Scope of a tag is the name of the processor, the tag is a Controller Tag.
Controller Tags can be used in any Routine within the Project File

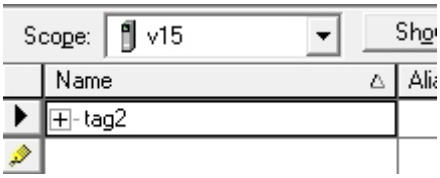


Figure 18-A – Controller Tag

If the Scope of a tag is the name of a Program, the tag is a Program Tag.
Program Tags can only be used in Routines within that particular Program.

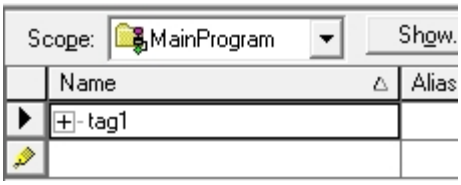


Figure 19-A – Program Tag

The state of local tags does not influence other local tags even if the tag name is the same.

Note: Program tags can have the same Name as long as the Scopes are different.
Having different Scopes makes the Tags different tags, even if the Names are the same.
When troubleshooting it is important to understand the differences in Controller tags and Program tags and the differences in Tag Scopes

Review Questions

1. T **F** **A project contains only one Task**

2. **A project is made-up of:**

a) Tasks

b) Routines

c) Programs

d) All the above

3. **How many tasks can be in a project?**

a) Depends on processor type and /or revision

b) 100

c) 32

d) 1

4. **Only one task can be _____**

a) continuous

b) Event.

c) Periodic

d) Programs

5. **The default Task is:**

a) Periodic

b) Continuous

c) Event

d) Main.

6. T F A project may have only one routine.

7 Which program is run first with-in a task:

a) The Main Program

b) The Continuous Program

c) Depends on the Program Schedule

d) The Main Control Program

8. A periodic task is run how often:

a) Every 20 ms

b) Every second

c) Every 10ms

d) Depends on Period setting

9. Program Tags are:

a) Local

b) Global

10. Controller Tags are

a) Local

b) Global

11. T F **I/O Tags are Controller Tags**

Review Questions Answers

1. F

2. d

3. a

4. a

5. b

6. F

7. c

8 d

9. a

10. b

11. T

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