

Lab 5.1: ControlLogix 1756 Hardware Lab

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

1. Identify the hardware on a ControlLogix system
2. Remove and insert modules/controllers into the ControlLogix chassis
3. Insert and Remove the SD module on the ControlLogix processor
4. Interpret the information on scrolling display on the controller and the Ethernet module
5. Explain the purpose of the ESM unit on the controller
6. Determine if the ControlLogix processor is in the Run mode
7. Explain the purpose of the ControlLogix chassis backplane
8. Determine the modules on a ControlLogix chassis using RSWho within RSLinx

***This lab could be performed in the Terra PLC Lab.**

Part 1: Identify the Hardware on a ControlLogix System

1. Figure 1 shows the ControlLogix system used to create this lab. Most of the ControlLogix training units in the lab will be similar in size, but possibly different types of I/O modules. The ControlLogix chassis uses 1756 type of I/O modules. The processor number and each module number starts with 1756.

Important: The terms controller and processor are interchangeable on a ControlLogix System.



Figure 1. ControlLogix System.

2. **Identify the power supply and the P/S indicator light.** Open the front cover on the P/S, with the tab under the lower right corner.
 What is inside the cover? _____
3. **Power down the ControlLogix training unit.** Wait until all the indicator lights on the processor and the I/O modules go off, before proceeding.

4. How many processors/modules slots are in the chassis? _____

5. **Remove the processor from the chassis**, by pressing on the top and bottom locking tabs on the processor and removing from the chassis.
 - a. What is the part number for the processor? _____
 - b. What slot number is the processor located in? _____

6. **Identify the following parts on the processor:**
 - a. Key switch
 - b. Scrolling Display
 - c. SD card slot
 - d. ESM (Energy Storage Module)
 - e. USB port

7. **Remove the modules located in slots 1 & 2 of the chassis**, by first removing the removable terminal blocks, then removing each module. View the backplane of the chassis.
 - a. What is the purpose of the backplane? _____

8. Identify the type of module and part number for each module in the chassis. Do this by finding the part number on the RTB, or by removing the module and finding the sticker.
 - a. Slot 0 _____
 - b. Slot 1 _____
 - c. Slot 2 _____
 - d. Slot 3 _____
 - e. Slot 4 _____
 - f. Slot 5 _____
 - g. Slot 6 _____
 - h. Slot 7 _____
 - i. Slot 8 _____
 - j. Slot 9 _____
 - k. Add more slots if the chassis is more than a 10-slot type.

9. Remove an RTB from the front of the discrete input module in slot 1. Reinsert it into the module. Lock the locking tab and try again to remove the RTB.

Part 2: Power up the ControlLogix System

1. **Reinsert the modules and controller into their respective slots**, then power up the ControlLogix system. Monitor the scrolling display and indicators on the processor, as shown in Figure 2.
 - a. What indicator light on the controller is on during power up? _____
 - b. What color is this indicator light during the power up? _____
 - c. How long does the processor take to power up to run the program? _____
 - d. What are the words that appear on the display during the power up? _____
 - e. What is the state of the OK lights on the modules during power up? _____
 - f. What scrolls across the display when the processor has started up and is running the program in the memory? _____

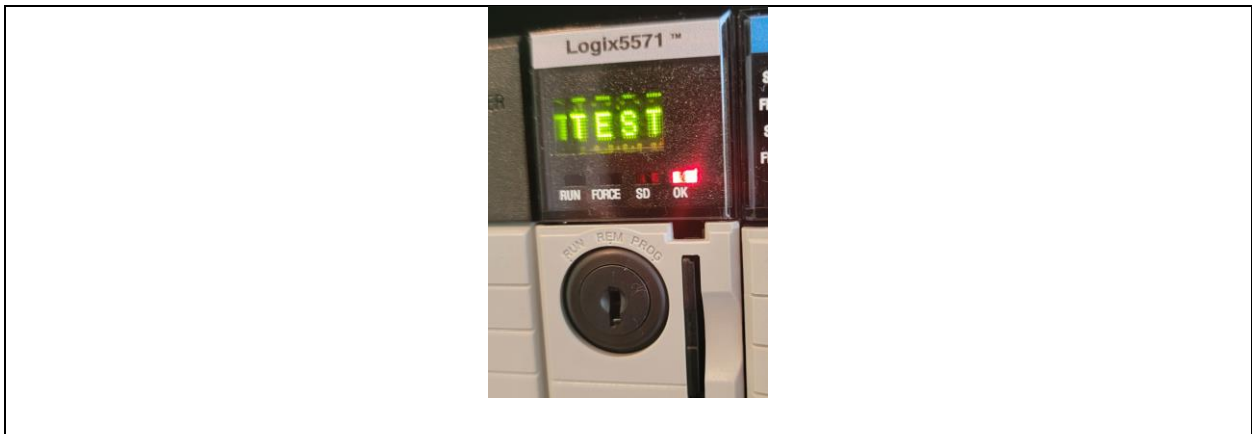


Figure 2. The scrolling display on the controller.

2. **Change the processor mode** with the key switch on the front of the controller.
3. **Identify the Ethernet/IP module** on the chassis as shown in Figure 3.
 - a. What is displayed in the scrolling display on the module? _____

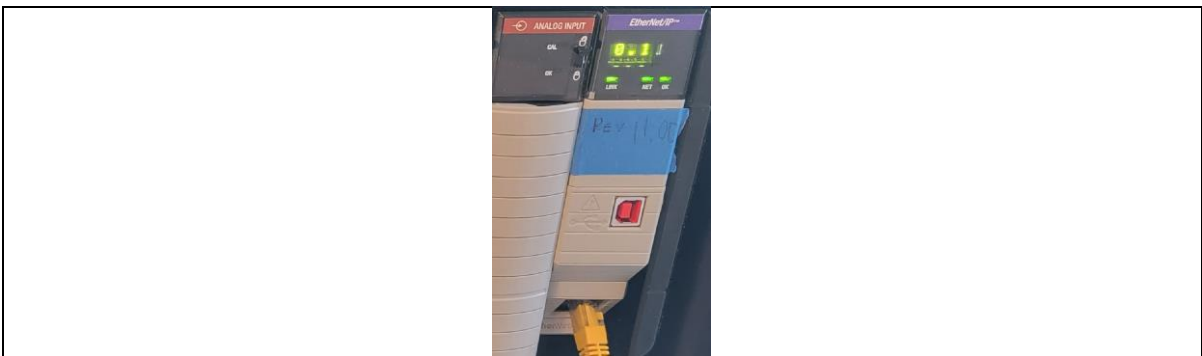


Figure 3. Ethernet/IP module on the ControlLogix chassis.

Part 3: Power Down the ControlLogix unit:

1. **Remove the power from the ControlLogix training unit.** Notice that the OK light is on after the unit is turned off.
 - a. How long does the OK light on the controller stay red? _____
 - b. Open the cover for the SD card, then remove the SD card (see Figure 4).
 - c. Can you find the lock protection on the SD card?
 - d. Reinsert the SD card into the slot and close the cover.

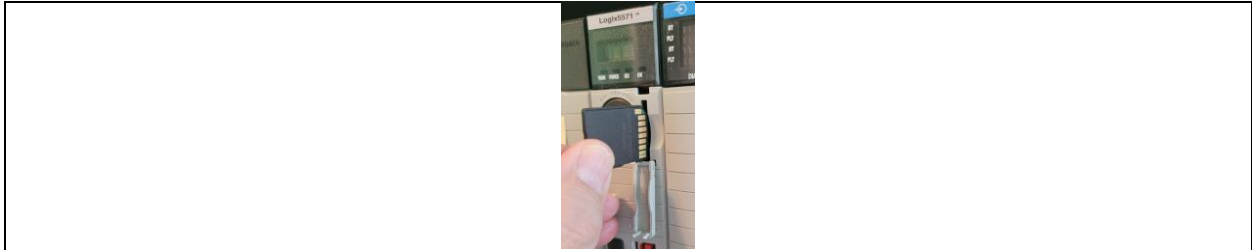


Figure 4. Removing/inserting the SD module in the controller.

Part 4: View the Modules in the chassis in RSLinx:

2. **Power up the ControlLogix training unit.**
3. **Create an Ethernet/IP driver in RSLinx,** and view the modules in the chassis with the RSWho window of your computer, as shown in Figure 5.

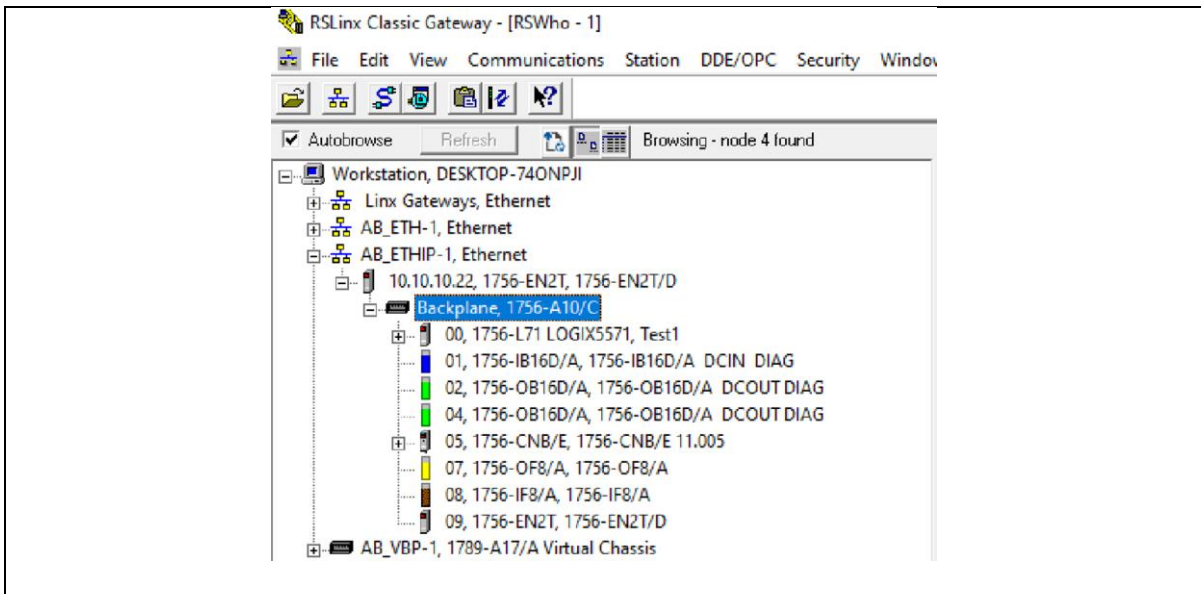


Figure 5. The modules shown at each slot in RSWho, within RSLinx.

4. What is the name of the project in the processor in Figure 5? _____

Part 5: Clearing the memory of ControlLogix Processor:

Important: The 1756-L71 controller uses an Energy Storage Module (ESM) instead of a battery to backup the project in the controller in case there is a loss of power. During a power down, the ESM stores the project (program) from the RAM memory to a Non-Volatile Storage (NVS - which is different from the SD module). The ESM module is still working until the OK light goes to an off state after a power down. On a power up, the ESM module loads the project from the Non-Volatile Storage to the RAM (During this time the OK light is solid red). When the OK light goes to a solid green state, the ESM is done loading and the controller will have the project back in RAM to run the machine.

Important: The SD module is called Non-Volatile Memory, which is different from the Non-Volatile Storage which the ESM writes to and reads from on a power down and a power up.



Figure 6. Removing the ESM from the controller.

1. **Power up the training unit.**
2. **Remove the ESM from the controller.** Figure 6 shows the tab to unlock and remove the ESM from the controller.
 - a. What does the Scrolling Display show about the ESM? _____
3. **Power down the unit and Remove the SD module** (the SD module can be programmed to load to RAM on a power up if the RAM memory is cleared or corrupt. Let the unit sit powered off for about 10 seconds.

4. **Power up the unit** and wait until the OK goes to a solid green state.
 - a. What does the scrolling display show about the project? _____
 - b. How does the user get a new project into the controller? _____

5. **Open RSWho in RSLinx to view the project name.**

In RSWho, drill down to the processor and view the name of the project. If it shows the processor parr number instead of a project name, the processor memory has been cleared.

Some important things to know about this lab:

1. The modules and processors used on the ControlLogix system use a 1756 prefix, so the 1756-L71 processor is also a Logix5571 processor. The part number for any module/processor will start with 1756.
2. The ControlLogix chassis backplane uses ControlBus technology to have modules interconnect and communicate with each other. The backplane powers the internal circuitry inside the module and also allows interconnectivity between the modules. As an example, the Ethernet/IP module (1756-EN2T) found in slot 9, will communicate through the backplane to the processor in slot 0, allowing for upload, download, online types of communication.
3. The processor (controller) in a ControlLogix system can be located in any slot on the chassis. There can also be multiple processors in the same chassis. The communication modules, such as the Ethernet IP module can also be located in any slot.
4. If the OK light is solid red during a power up and a power down, the ESM is still working and loading/saving and going through diagnostics. When the OK light goes to a solid green, the processor can run the project.
5. The 1756-L71 controller uses an Energy Storage Module (ESM) instead of a battery to backup the project in the controller in case there is a loss of power. During a power down, the ESM stores the project (program) from the RAM memory to a Non-Volatile Storage (which is different from the SD module). The ESM module is still working until the OK light goes to an off state after a power down. On a power up, the ESM module loads the project from the NVS to the RAM. When the OK light goes to a solid green state, the ESM is done loading and the controller will have the project back in RAM to run the machine.
6. The NVS (Non-Volatile Storage) is different from the SD module on the processor. The NVS is where the ESM saves and reloads the project from/to RAM memory during a

power down and a power up. The SD module (which is called Non-Volatile Memory - NVM) is a place the project can be backed up to manually. The SD can be programmed to load the project into RAM on a power up or if the RAM memory of the controller is empty or corrupt. The SD can only be programmed with Logix Designer while online and in the Remote Program Mode. Do not remove or insert an SD module unless the processor is powered off.

7. The scrolling display on the Ethernet/IP module will show the IP address of the Ethernet port on the module.

Questions:

1. What is the purpose of the ControlLogix chassis backplane?
 - a. Protect the I/O modules from moisture
 - b. Power the internal circuitry of an I/O module
 - c. Allow interconnectivity between the modules
 - d. Allows all the modules to be on the internet
2. Find the Ethernet/IP module this ControlLogix Training unit?
 - a. What slot number is this module in?
 - b. What is the I/P address for this Ethernet/IP module?
 - c. How do you determine what the address is?
3. Which indicator light on the processor will be on during the power up and power down cycle of the ControlLogix processor?
 - a. Run
 - b. Force
 - c. SD
 - d. OK
4. T F The 1756-L71 processor uses a battery to backup the program in the processor if power is lost to the processor.
5. T F A ControlLogix controller must always be located in slot 0 of the chassis.
6. Where does the ESM save the ControlLogix project to during a power down?
 - a. SD module
 - b. Computer hard drive
 - c. Non-Volatile Memory
 - d. RAM Memory

7. What will show on the scrolling display of the ControlLogix processor after the unit has powered up and ran through the initial diagnostics?
8. T F The Ethernet/IP module must be located in the very rightmost slot on the ControlLogix chassis.
9. What are the two ways to communicate from the computer (that has Logix Designer and RSLinx installed) to the ControlLogix processor on the training units in the lab?
10. What does the scrolling display on the processor show about the project if the RAM memory is cleared by removing the ESMB and cycling power?
 - a. There will be no scrolling display if the RAM is cleared
 - b. The display will show “No Project”
 - c. The display will show the name of the previous project
 - d. The display will show “Cleared Memory”

Answers to the Questions Asked in this Lab:

This section will be important for the student to verify that the answers they had written down in the lab, are correct. If you have any questions, please contact your instructor. It is important to perform this lab exercise in its entirety, since questions will be asked about it in both the KAA and the performance assessments.

Part 1:

2. Power switch to turn off incoming power into the power supply

7. 10 slots

8a. 1756-L71

8b. Slot 0

10a. To power the internal electronic circuitry inside each module and the controller, and to also allow connectivity between the different modules/controller.

Part 2:

1a. OK light

1b. Red solid

1c. 2 minutes

1d. Test, Wait, Pass, Test, then firmware, then the project name.

1e. Solid red

1f. Project name in the controller

3a. The IP address of the Ethernet port on the module.

Part 3:

1a. About 2 minutes

Part 4:

4. Test1

Part 5:

2a. ESM is missing

4a. No Project

4b. A project must be downloaded to the controller using Logix Designer and RSLinx

Answers to the Review Questions:

1. b and c
2. a: 9, b: 10.10.10.22, c: scrolling display
3. d
4. F, it uses an ESM instead of a battery
5. F
6. c
7. The project name
8. F
9. USB & Ethernet
10. b

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