Instructor Guide

PREVIEW ONLY

401: Programmable Logic Controllers
Module 2: Advanced Programming Systems

SIGNALS TRAINING CONSORTIUM

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Agenda

Topic #	Topic Title	Duration
1	Overview	20 Minutes
2	SLC500 Series Processor Operation	20 Minutes
3	Ladder Logic Programs	20 Minutes
4	Introduction to LogixPro500 Simulation Software	240 Minutes
5	Introduction to RSLinx/RSLogix500 software	90 minutes
6	Running Projects on a PLC-5 or SLC500 Processor	20 minutes
7	Summary	20 minutes
	Total Time:	430 Minutes

PREVIEW ONLY

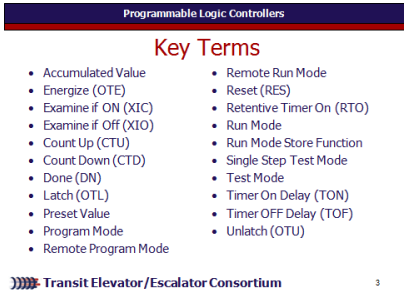
Module Length:430 min Time remaining: 430 min This section: 20 min (4 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW key terms **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets take a look at some of the key words we will be defining as move through this module: -Accumulated value -Examine If Closed (XIC) -Examine if Open(XIO) -Count Up (CTU) -Count Down (CTD) -Done (DN) -Latch (OTL) -Output Energize (OTE) -Preset Value -Program Mode -Remote Program Mode -Remote Run Mode -Reset (RES) -Retentive Timer On (RTO) -Run Mode -Run Mode Store Function	✓PPT slide 3 Programmable Logic Controllers Key Terms • Accumulated Value • Energize (OTE) • Examine if ON (XIC) • Examine if Off (XIO) • Count Up (CTU) • Count Down (CTD) • Done (DN) • Latch (OTL) • Preset Value • Program Mode • Remote Program Mode • Remote Run Mode • Reset (RES) • Retentive Timer On (RTO) • Run Mode • Run Mode Store Function • Single Step Test Mode • Test Mode • Timer On Delay (TON) • Timer OFF Delay (TOF) • Unlatch (OTU) Transit Elevator/Escalator Consortium 3

PREVIEW ONLY

Module Length:430 min Time remaining: 430 min This section: 20 min (4 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW key terms **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets take a look at some of the key words we will be defining as move through this module: -Single Step Test Mode -Test Mode -Timer On Delay (TON) -Timer Off Delay (TOF) -Unlatch (OTU) ***Advance***	✓PPT slide 3



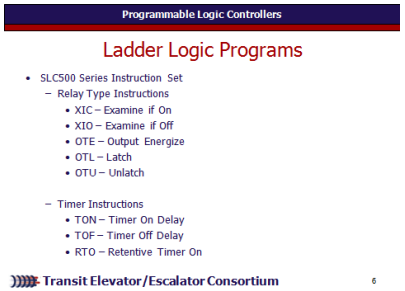
PREVIEW ONLY

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Allen Bradley is the manufacturer of a family of modular processors called the SLC500. This family (SLC 5/01, 5/02, 5/03, 5/04, and 5/05) increases in features as the numbers increase. **SLC 5/01–** This processor has an instruction set that is the same as the SLC500 fixed controller. It contains 3 chassis, 30 modular slots, 52 programming instructions, no remote I/O, and can scan 8 milliseconds per K (thousands) instructions. **SLC 5/02 –**This processor has 71 programming instructions, 4K memory, increased diagnostics, 4096 I/O, DH-485 communications and can scan 4.8 milliseconds per K instructions.	✓PPT slide 5 

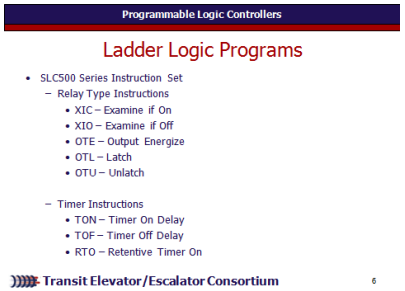
PREVIEW ONLY

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** The SLC500 series processors operate in the following modes: • Program mode – this allows the PLC to make edits to the instructions by adding or deleting instructions • Run Mode – this is when the PLC is executing the instructions that it has been programmed to perform. Also called a processor scan or sweep. • Remote Run Mode – this is when the processor is operated by a key switch to change modes from run to program • Remote Program Mode – this is when the processor is put in program mode from a remote programming device • Test Mode – this is when the processor is testing the program inputs without energizing the outputs.	✓PPT slide 5 

PREVIEW ONLY

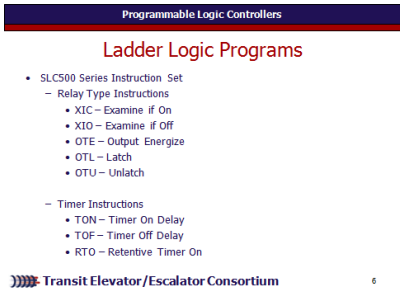
DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Ladder logic programs are software programs that provide PLCs with instructions. These programs require instructions to be input into a computer and then downloaded to a PLC. **SLC500 Series Instruction Set –** the ladder logic programs that are downloaded unto the PLC provide instructions to the PLC. This programming language is called the instruction set. The SLC500 series contains a number of instruction sets based on the type of functions that the PLC needs to perform. These include relay-type, timer, counter, compare, compute logical, conversion, bit modify and move, etc. (more sets can be found in your book). For the purposes of this course, we will be only covering relay type, timer, and counter.	✓PPT slide 6 

PREVIEW ONLY

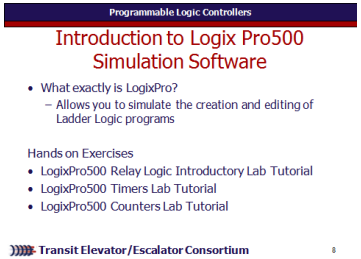
DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** •OTU – Unlatch – this instruction can only be used to turn off a bit. This is normally paired with the OTL instruction to turn the bit off. *Timer Instructions* – These are basic instructions that lets you program the processor to energize outputs based on time or a certain number of events. To use this instruction, you have to provide the processor with the timer structure number, the timer file number, and the timer file type. The time base, which includes the preset and accumulated value, will instruct the timer how to operate. The preset value tells the processor the number it must reach before it can set the bit to done (DN). The accumulated value is how much the processor has counted during the processing. These functions are controlled by:	✓PPT slide 6 

PREVIEW ONLY

PREVIEW ONLY

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** •RTO – Retentive Timer On – this instruction turns an output on or off after the timer has been on for a certain amount of time. It starts timing when the input instructions are true so that means it continuously update the accumulated value until it reaches its specified number. *Counter Instructions* - Counter instructions are used to count. Counter is the address in the counter area of data storage that uses the address format: counter (file type), counter file number (3-999), and counter structure number (0-999). Based on these counter instructions, preset value, and accumulated value the count will determine an output. The three most commonly used counter instructions are:	✓PPT slide 6 

Module Length: 430 min Time remaining: 370 min This section: 240 min (1 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Ladder logic programs are software that provide instructions to PLCs. For this course we will be using a $35 software called LogixPro500 from a company called The Learning Pit. *What exactly is LogixPro?* – LogixPro is actually 3 programs in one. It allows you to create and edit ladder logic programs, it allows you to download ladder logic programs and run them, and it shows you a simulation of how the ladder program would work on a real Allen Bradley PLC. *For this section we will be getting our feet wet with some LogixPro500 tutorials and student exercises.* ***Advance to lab to complete tutorials***	✓PPT slide 8 

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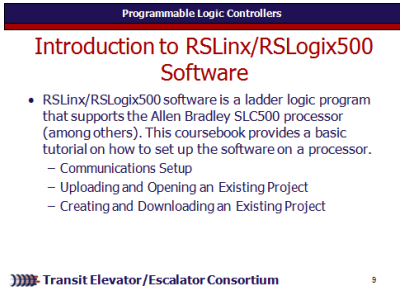
Module Length: 430 min Time remaining: 130 min This section: 90 min (23 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Now that we have some experience, lets talk about the actual software that is used on an Allen Bradley PLC. This software is called RSLinx/RSLogix500 and is created by Rockwell Automation. While most of you in your daily jobs will not have to worry about programming an Allen Bradley PLC with this software, this section will provide you with an overview of how to set up a PLC using the RSLogix software. We will talk about the communications set up, uploading and downloading an existing project, and creating and downloading an existing project.	✓PPT slide 9



PREVIEW ONLY

Elevator – Escalator – Programmable Logic Controllers

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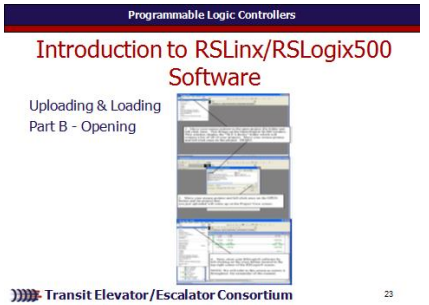
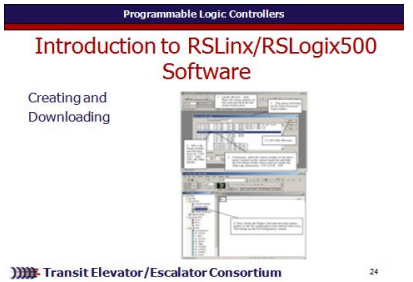
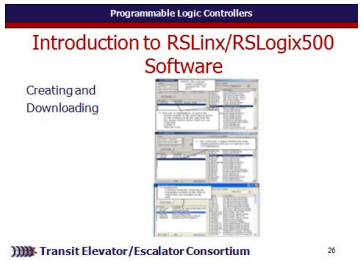
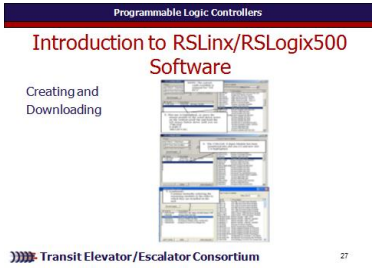
Module Length: 430 min Time remaining: 130 min This section: 90 min (23 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Now lets open an existing project. Left click on the Open project file folder in the main menu toolbar. This will bring up the Open/Import SL500 window . The SLC Library will contain a list of all of your projects. Highlight and left click on DEMO. Left click Open and the DEMO project should come up on the Project view screen. Close the software by left clicking on the close button in the top right corner of the screen. ***Advance*** Now lets create and download projects. When creating projects,y ou will use the same instruction sets that you used during the Logix500 simulations. To begin creating a project, you first must Left click on the New icon in the main menu toolbar.	✓PPT slides 23, 24  

PREVIEW ONLY

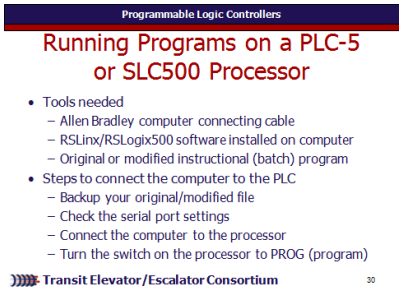
DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Once the slot is highlighted (Tia to finish based on slide) ***Advance*** Left click on the Read IO Configuration button and wait for the software to configure your I/O. This will bring up a Read IO Config from Online Processor Window. You must have your PLC trainer powered up and the processor connected to the computer before proceeding to the next step. Left click the Read IO Config button and wait for the software to configure your I/O. The configuration should now be complete and all modules should appear as assigned. Close the window once the configuration is complete. ***Advance***	✓PPT slides 26, 27  

PREVIEW ONLY

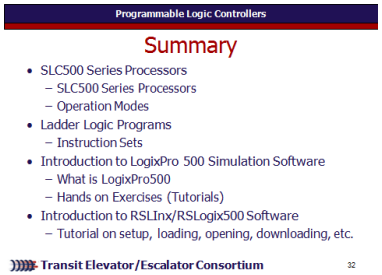
Module Length: 430 min | Time remaining: 40 min | This section: 20 min (2 slides) | *Section start time: _____* | *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Step 4 (cont): Follow the directions and steps in your manual for your PLC. ***Advance*** To start installation after major work on a PLC, you will need a medium blade screwdriver, programming equipment (computer and software programs) and proper network interface and cables. In your book there is a chart that references the correct network interfaces for SLC500 series processors. Once you have made sure that you have the proper network interface associated with the proper cable you can begin installation.	✓PPT slides 30,31

PREVIEW ONLY



Module Length: 430 min | Time remaining: 20 min | This section: 20 min (2 slides) | *Section start time: _____* | *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** We then moved on to explain the relatively cheap software LogixPro500, which is a simulation program that functions like the real Allen Bradley software. Using this simulation, we did some hands on tutorials where we learned how to use relay type, counter, and timer instructions to simulate different scenarios within the program. Once we finished with the hands on tutorial we moved on to a tutorial on how to actually install the RSLinx/RSLinx500 software from Allen Bradley. This included instructions on how to install and set up the communications for this program, upload a project, open an existing project, create a project, download a project, use programming instructions, and download and go online.	✓PPT slide 32 

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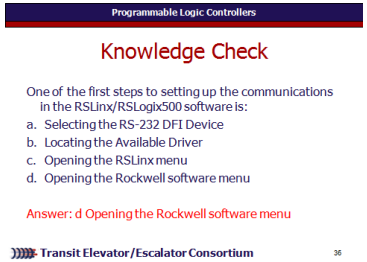
Module Length: 430 min | Time remaining: 20 min | This section: 20 min (2 slides) | *Section start time:* _____ | *Section End Time:* _____

DO	SAY	Materials Needed
ASK **SMALL GROUP ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Now lets see what you can remember. ***Ask*** Which of the following is NOT a SLC500 Series Operation? a. Program Mode b. Run Mode Store Function c. Reset Mode d. Test Mode ***Advance*** The correct answer is c. Reset Mode. Reset is an instruction, not a mode.	✓PPT slide 34 Programmable Logic Controllers Knowledge Check Which of the following is NOT a SLC500 Series Operation? a. Program Mode b. Run Mode Store Function c. Reset Mode d. Test Mode Answer: c Reset Mode Transit Elevator/Escalator Consortium 34

PREVIEW ONLY

DO	SAY	Materials Needed
ASK **SMALL GROUP ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Now lets see what you can remember. ***Ask*** One of the first steps to setting up the communications in the RSLinx/RSLogix500 software is: a. Selecting the RS-232 DFI Device b. Locating the Available Driver c. Opening the RSLinx menu d. Opening the Rockwell software menu ***Advance*** The correct answer is d. Opening the Rockwell software menu. While they are all steps you first have to open the Rockwell Automation software menu which actually contains the RSLinx/RSLogix500 software.	✓PPT slide 36 

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