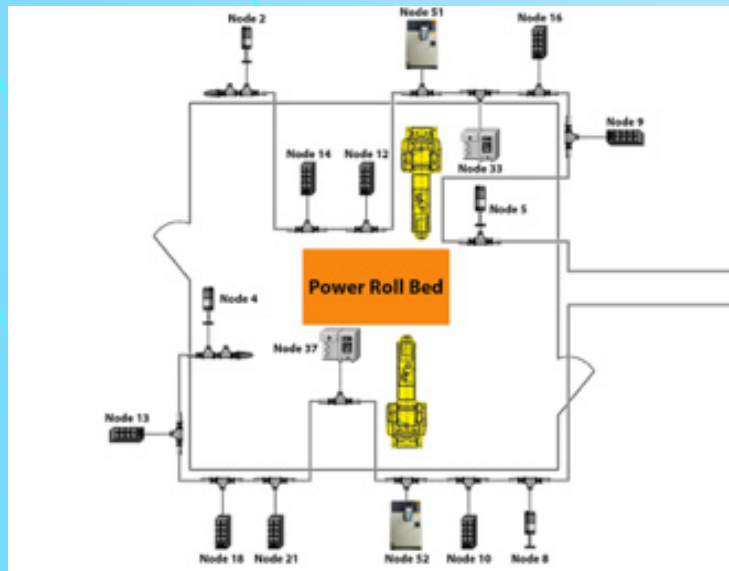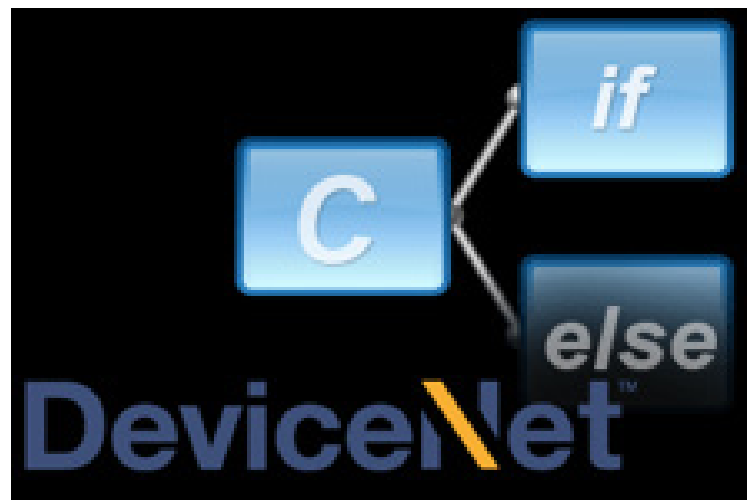# DeviceNet

Full Lesson
100 & 200 Series

Lesson Description

DeviceNet is an open-source, robust, low-cost network system used in the automation industry to interconnect control devices for data exchange. The DeviceNet network is classified as a CAN bus network, whose characteristics are high speed communications using analog signals with diagnostics by the network devices.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Describe the history and evolution of DeviceNet.
2. Explain how DeviceNet works.
3. Identify the different technologies used by DeviceNet.

Lesson Description

All DeviceNet networks share the same essential elements for a functioning network.
The network itself can be configured in many different ways, but the components and wiring in the panel are often similar.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Identify and locate essential components and wiring of a DeviceNet network.
2. Describe the labeling convention of DeviceNet connectors.

Auxiliary Power

Lesson Description

Auxiliary power provides power to nodes with outputs, such as an ArmorStart. When it fails, those outputs will not have 24 VDC and parts of the DeviceNet network can grind to a halt.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Define the purpose of auxiliary power on a DeviceNet network.
2. Identify DeviceNet components that utilize auxiliary power.
3. Describe typical DeviceNet components that cause auxiliary power failure.
4. Perform troubleshooting procedures to determine if auxiliary power has failed on the DeviceNet network.

Lesson Description

The 1756 DNB module has three indicator lights that identify operation and problems:

1.   MOD/NET
2.   I/O
3.   OK

Understanding these indicator lights can help you properly troubleshoot a malfunctioning network.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1.   Identify the different states of the MOD/NET, I/O, and OK indicator lights on the 1756 DeviceNet Bridge.
2.   Describe the status of the different states of the MOD/NET, I/O, and OK indicator lights on the 1756 DeviceNet Bridge.
3.   Interpret the meaning of the status for the MOD/NET, I/O, and OK indicator lights on the 1756 DeviceNet Bridge.
4.   Apply troubleshooting steps to resolve identified issues with the 1756 DeviceNet Bridge.
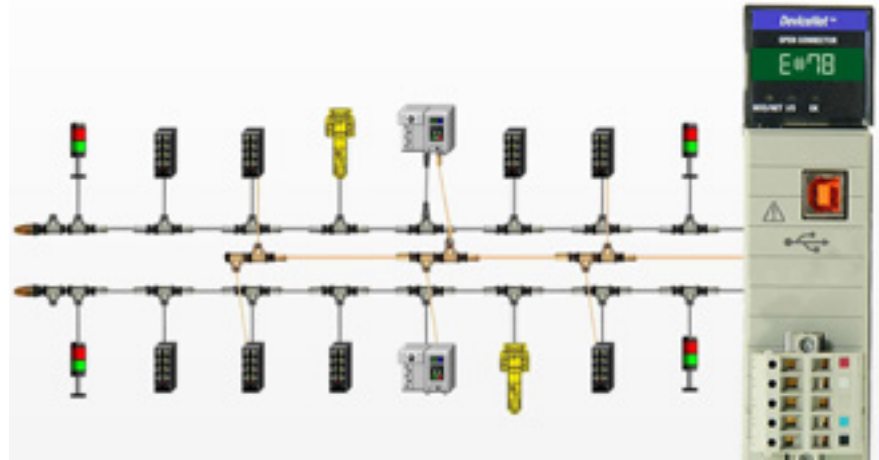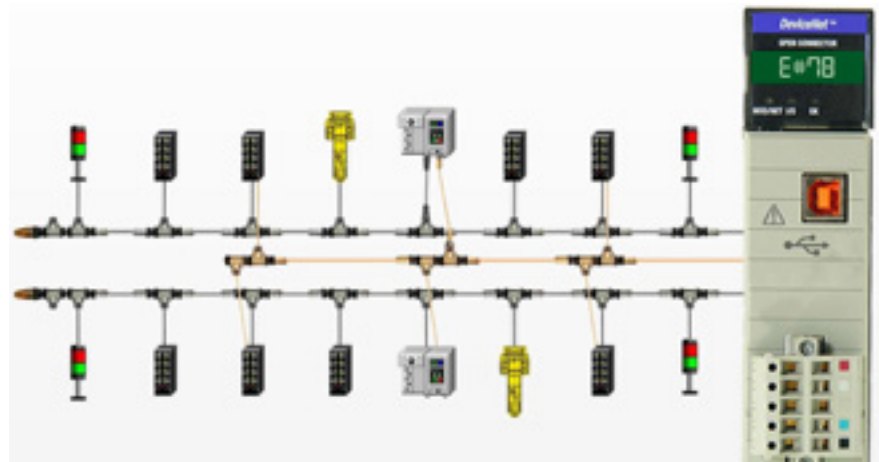
Lesson Description

Error Code E#78 occurs when a node that was programmed into the 1756 DNB Scan List is no longer communicating. It always follows Error Code E#72, which is the first indication of a communication problem with a device. After Error Code E#72 occurs, the 1756 DNB will attempt to communicate with the offending node one more time. If communication is not reestablished, then Error Code E#72 becomes E#78.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Recover the DeviceNet 1756-DNB from Error Code E#78: Single Node Failure.
2. Identify troubleshooting methods and correct malfunctions within DeviceNet
3. Utilize the required knowledge to correct potential faults.
4. Understand the equipment's capabilities and how to ensure mal functions and deficiencies are addressed quickly.

Lesson Description

Error Code E#78 Multiple Node Failure occurs when nodes that were pro-grammed into the 1756 DNB Scan List are no longer communicating. It always follows Error Code E#72, which is the first indication of a communication problem with a device. After Error Code E#72 occurs, the 1756 DNB will attempt to communicate with the problem nodes one more time. If communication is not reestablished, then Error Code E#72 becomes E#78.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Define Error Code E#78 Multiple Node Failure.
2. Describe how to locate faulty nodes on a DeviceNet network.
3. Perform troubleshooting procedures.
4. Explain the difference between consecutive multiple and random multiple node failures.
5. Recommend solutions of how to recover from Error Code E#78 Multiple Node Failure.
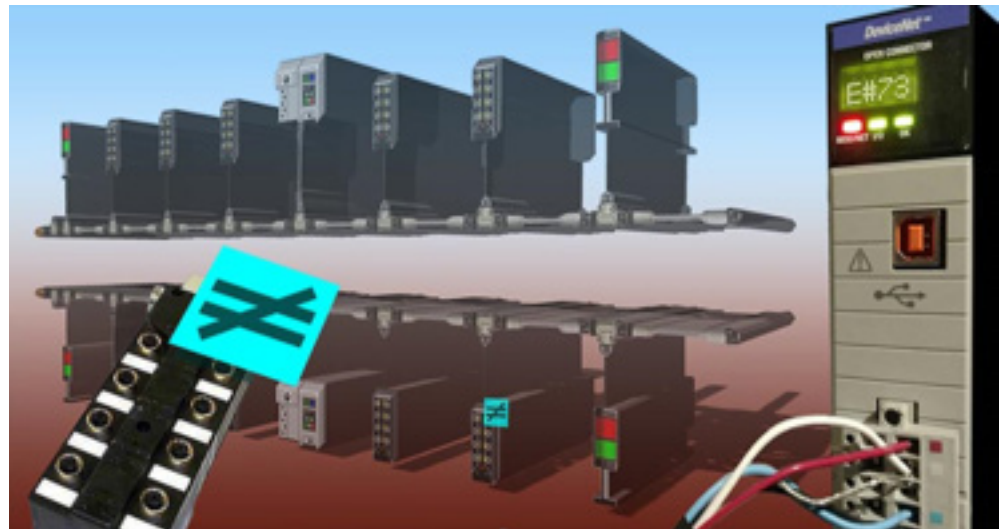
Lesson Description

Bus Off is one of the most difficult errors to troubleshoot on a DeviceNet network. Bus Off occurs when the DeviceNet network becomes unstable and stops communicating. However, there is hope! In this lesson is a simple, easy to follow procedure that systematically breaks down the network to determine the root cause of the Bus Off condition.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Define the Error Code E#91 "Bus Off" condition on a DeviceNet network
2. Identify typical causes of an Error Code E#91 "Bus Off"
3. Perform troubleshooting steps to locate the source of the "Bus Off" condition on a DeviceNet network
4. Recommend solutions on how to recover from an Error Code E#91 "Bus Off Condition" on a DeviceNet network.

Lesson Description

This lesson will explain to the learner what Error Code E#73 is and how to use RSNetWorx to identify the node causing it. Step by step procedures will guide the learner through the most efficient process for recovering from Error Code E#73: Hardware Mismatch.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Explain what Error Code E#73 means.
2. Identify the node in RSNetWorx that is causing Error Code E#73.
3. Describe the steps to take in RSNetWorx to resolve Error Code E#73.

Using the NetMeter

Lesson Description

The NetMeter monitors network traffic through all network connections on its connected computer. The NetMeter displays real-time graphics for downloading and uploading speeds. It logs network traffic and provides daily, weekly, monthly, and summary traffic reports. The NetMeter sends alerts when the network exceeds a certain amount of bandwidth usage.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Describe a NetMeter and its purpose.
2. Explain the meaning of outputs shown on the NetMeter graphic display.
3. Determine the health of a DeviceNet network using the NetMeter.

Lesson Description

The eNetMeter and its associated NetAlytix software provide an excellent way to monitor the health of a DeviceNet network. This lesson shows how to enable a computer running the NetAlytix software to communicate with the eNetMeter and monitor DeviceNet.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Establish communication with a DeviceNet network and a computer running NetAlytix software.
2. Interpret the meaning of the eNetMeter indicator lights.
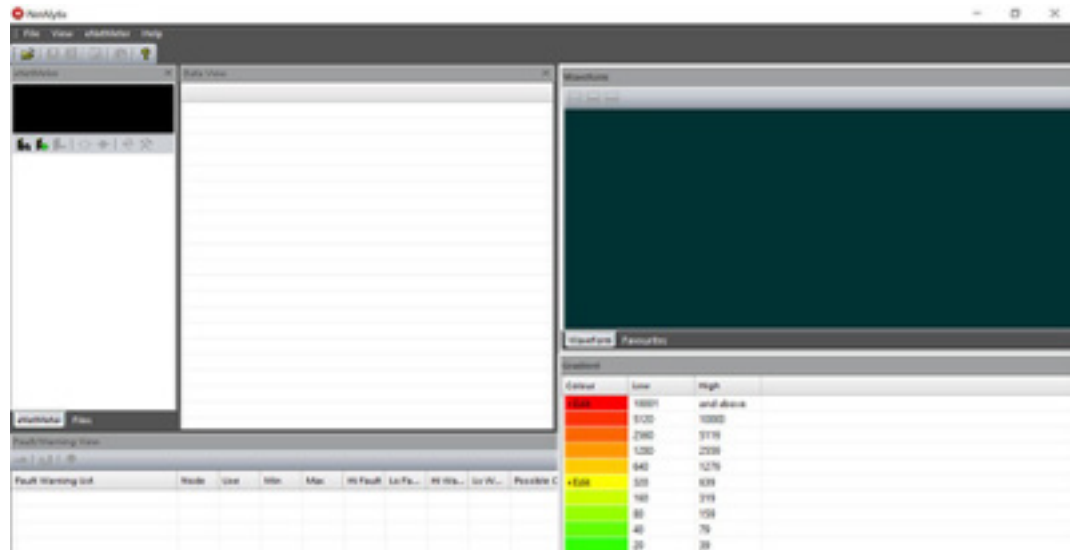3. Configure the power supply for the eNetMeter to operate correctly on a DeviceNet Network.

Lesson Description

The eNetMeter and its associated NetAlytix software provide an excellent way to monitor the health of a DeviceNet network. This lesson takes you through the steps to monitor the DeviceNet network on a computer running NetAlytix software.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1.   Connect the eNetMeter to a DeviceNet network.
2.   Select and install the eNetMeter in order to monitor DeviceNet in WWWreal time with NetAlytix software.
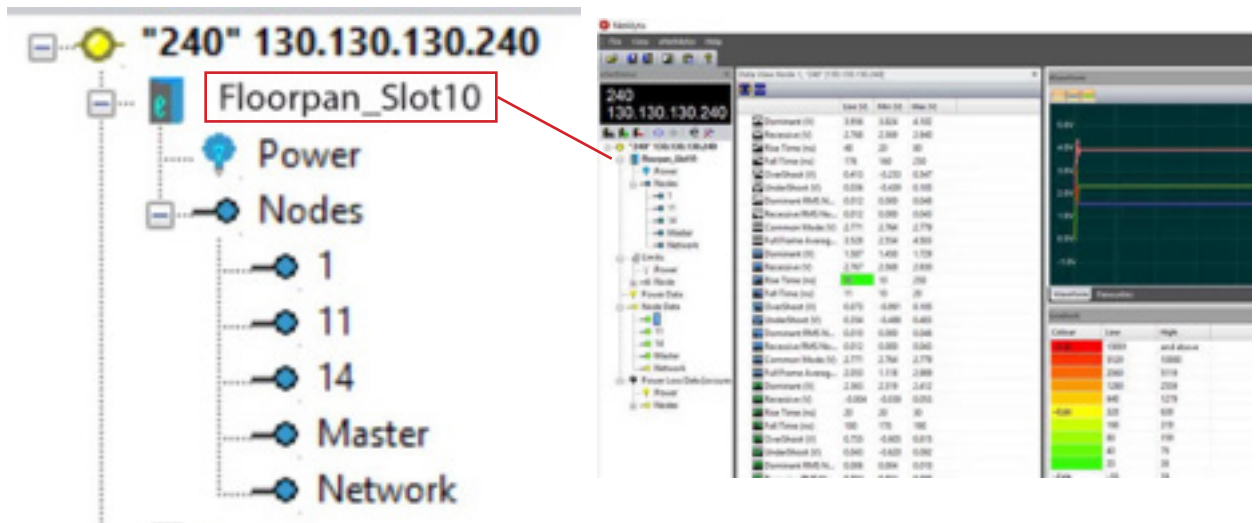
Lesson Description

> The eNetMeter and its associated NetAlytix software provide an excellent way to monitor the health of a DeviceNet network. This lesson describes the various windows which make up the NetAlytix software and explains the basics of how to interpret the data contained within them as the eNetMeter monitors DeviceNet in real time.

Lesson Scope

> Learners who successfully complete this lesson should be able to:
>
> 1. Identify the various information windows contained within the NetAlytix software.
> 2. Describe what type of data is displayed in each window.
> 3. Perform basic troubleshooting of a DeviceNet network using an eNetMeter and its associated NetAlytix software.

Lesson Description

One of the most useful features of the NetAlytix software is the ability to export a baseline report of current DeviceNet conditions and compare that report to future conditions over time. This lesson will show the learner how to export a report, then import it later and compare future readings to the saved data.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Describe a baseline report and its purpose.
2. Demonstrate how to import and export baseline reports.
3. Use Compare and Difference modes in NetAlytix to identify any changes over time to the health of a DeviceNet network.

**Generating Network Reports
with RSNetWorx for DeviceNet**

Lesson Description

Network reports are one of the simplest and most effective ways to have a last resort backup file documented. When you generate a network report, it collects all the data from your entire network, with every piece of information that you will need. This is usually only pulled out as a last resort for reference when mapping data, or when rebuilding a destroyed network.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Describe a network report and what it is for.
2. Identify the necessary steps to generate a network report from RSNetWorx.
3. Print the network report.
4. Save the network report.

```
$ Description:   RightSight 42EF Photoelectric Sensors Ser A, 1.0x
$ Last Changes: 2.01      PAH      10/30/05       Cfg Assy added, updated naming, vendor name,
$                                                 3D Assy added, diagnostic enumeration, data types
$ Note: !!! Not compatible with old .dnt files !!!
$
$ Edit History:           BJT      3/26/98        Created
$                1.01     BJT      6/26/98        Updated with changes from MMT
$                1.02     PAH      10/10/00       Updated for RSnetworks alpha 2.51 parms 9,10,13,14,17 data type
$                1.03     PAH      10/01/03       Help update/Formatting, Data types, Ico
$                1.04     PAH      05/17/05       Assy section added, Device Classification section
$                2.01     PAH      10/30/05       Cfg Assy added, updated param naming, vendor name, help,
$                                                 3D Assy added, diagnostic enumeration, conformant data types, Baudrate param

[File]
        DescText = "RightSight 42EF Photoelectric Sensor EDS File";

        CreateDate     = 07-30-2005;
        CreateTime     = 12:00:00;
        ModDate        = 10-13-2005;
        ModTime        = 11:40:00;
        Revision       = 2.01;                          $ EDS revision
        HomeURL        = "http://www.ab.com/networks/eds/CN/0001000440250100.eds";

[Device]
        VendCode       = 0001;
        VendName       = "Rockwell Automation/Allen-Bradley";
```

Lesson Description

Electronic Data Sheets are simple text files used by network configuration tools to help you identify products and easily commission them on a network.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1.   Define what and how Electronic Data Sheets are used on a DeviceNet network.
2.   Discuss how to locate EDS files on the Rockwell Automation website.
3.   Identify the catalog number for hardware that is needed to download EDS files.
4.   Execute the download of EDS files for use on the DeviceNet network.

Lesson Description

Electronic Data Sheets are simple text files that can be installed using Rockwell Automation's EDS Wizard and viewed with Notepad.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Locate the RSLinx EDS Hardware Installation Tool.
2. Describe the steps for installing EDS files using the WRSLinx EDS Hardware Installation Tool.
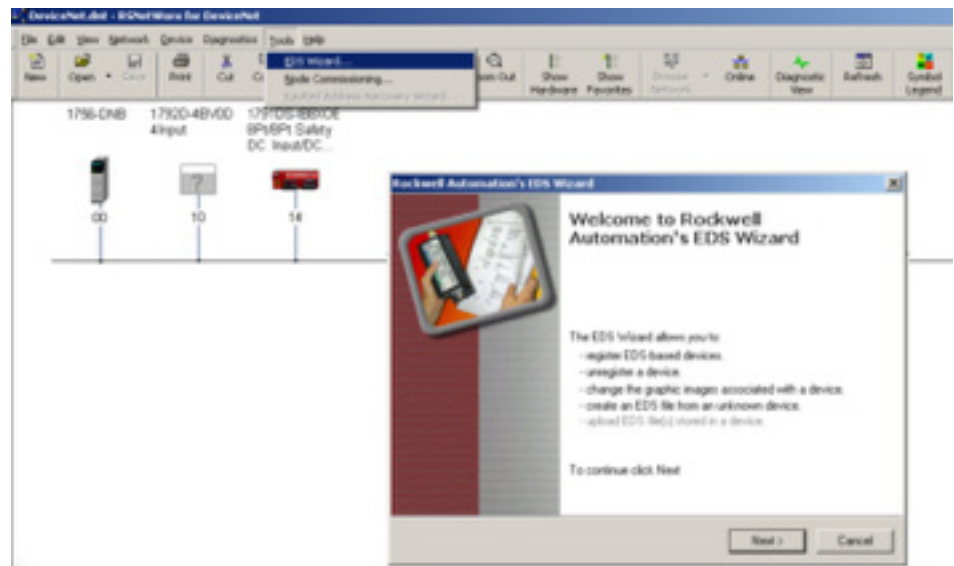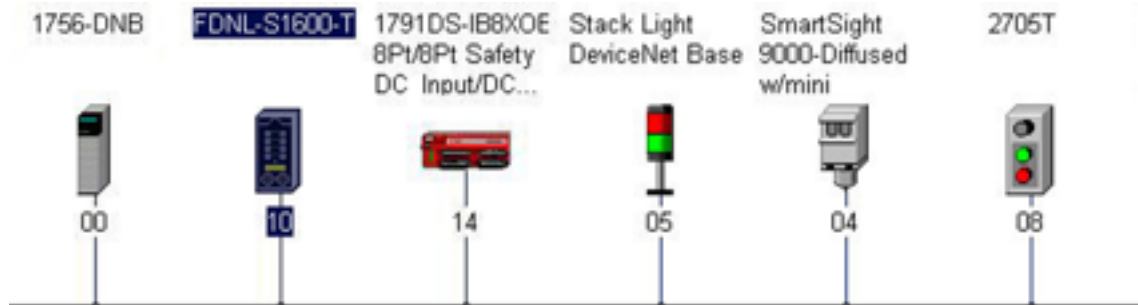
Lesson Description

RSNetWorx EDS Wizard is software that is used to download and install EDS files, much like installing a print driver for your home computer.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Explain the purpose of the RSNetWorx EDS Wizard.
2. Describe the process for downloading and installing EDS files.

Lesson Description

.ico files, or icon files are graphic representations of a device. Icons are created using special graphics software which creates .ico files that are 48 pixels wide by 48 pixels tall. Icons help you quickly identify devices with RSNetWorx for DeviceNet. While you could use one of the default icons, or a completely unrelated icon, icons that relate well to their respective devices are always best.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Explain why icon files are used on RSNetWorx for DeviceNet
2. Describe how icons can show up correctly when installing an EDS file
3. Demonstrate how icons can be selected or changed using the EDS Wizard

Lesson Description

Control Flash is a software program provided by Rockwell Automation for the purpose of maintaining the firmware revisions of many different types of controllers and communication modules. Control Flash software uses RSLinx software also from Rockwell Automation to communicate on a network such as DeviceNet. This lesson describes the process of "Flashing" a device like the 1756-DNB, and details the caution that must be taken when performing this action.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Explain how to launch ControlFLASH.
2. Navigate through ControlFLASH.
3. Flash modules.

Lesson Description

RSNetWorx software allows you to configure and view the communications between the 1756 DNB and the DeviceNet network via an ethernet network or in some cases USB. A scan list is created in RSNetWorx for the purpose of communicating between the controller and the nodes on the network. The scan list and the parameters of each node are saved in a .dnt file. When any node is replaced, the saved parameters are available to download to the new device.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Create a scan list utilizing RSNetWorx.
2. Discuss how to upload the configuration of a DeviceNet network and save it to a .dnt file.
3. Describe how to download the parameters saved in the .dnt file to a device that has been replaced.

Lesson Description

Mapping involves assigning a unique address to each node on the network so they can communicate with the PLC, or Programmable Logic Controller. This lesson takes the learner step by step through process of mapping nodes using RSNetworx for DeviceNet.

Lesson Scope

Learners who successfully complete this lesson should be able to:

1. Explain what node commissioning is.
2. Describe the process in RSNetWorx for assigning a unique input and output address to each node.