Redundant MODBUS Serial Communications Card Configuration Example

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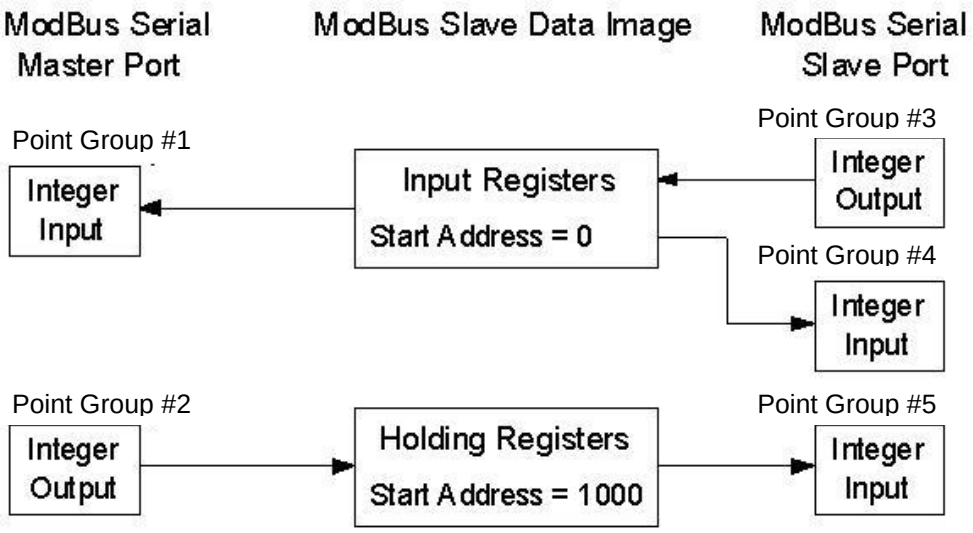
MODBUS Serial Communications Card Configuration Overview

This document provides an example of how to configure the 3019 MODBUS Serial Communications Card. In the first section of this example, a single MODBUS Serial Communications Card will be used; one of its ports will be configured as Master and the second port will be configured as Slave. The MODBUS Serial Communications Card is installed in a 3200T Rack. The Point Groups for this example will create as shown in the figure below where integer variables are going to be exchanged via MODBUS Serial Communication protocol between the two ports.



The 5 Point Groups will be configured as follows. Each point group on the MODBUS Master Port will be identified as (PG1_ and PG2_). The rest of point groups are on the MODBUS Slave Port and will be identified as.(PG3_, PG4_ and PG5).

- Integer Output Point Group #3 writes data into the Input Registers starting at address 0. Integer Input Point Group #4 reads back this data for verification. Integer Input Point Group #1, in the MODBUS Master Port, then reads this data from the Input Registers.
- Integer Output Point Group #2, in the MODBUS Master Port, writes data into the Holding Registers starting at address 1000. Integer Input Point Group #5 then reads this data from the Holding Registers.

The second section of this example consist on showing the configuration of a second MODBUS Serial communication card as redundant.

MODBUS Serial Communications Card Installation

The MODBUS Serial Communications Card system will be configured with Port 1 (J1) designated as the Master Port, and Port 2 (J2) as the Slave Port. The other two ports, J3 and J4, will not be used.

The DIP switches on the MODBUS Serial Communications Termination Module are user configured to connect the RS-232/485 electronic data signals on the Serial DB-9 connectors to the corresponding transmitters and receivers on the MODBUS Serial Communications Card Ports.

This example will provide information for configuring the MODBUS Serial Communications Card Termination Module to utilize either a straight pin-to-pin or crossover RS-232 signal cable.

- Install the MODBUS Serial Communications Card in the slot in the RTP I/O Chassis that matches your system configuration. The card does not require any physical settings by the user as all options are programmable. (DIP Switch SW1 should have all 8 positions set to OFF (left), the factory default settings. See picture below.
- Set the DIP switches for Serial Port 1 (J1) and Serial Port 2 (J2) on the 3099/25-100 Termination Module to be compatible with the RS-232 Serial Cable that will be supplied.
- Connect a DB-9 RS-232 Serial Cable (Straight Pin-to-Pin or Crossover) between Port 1 (J1) and Port 2 (J2) on the Termination Module.
- Connect the MODBUS Serial Communications Card to the Termination Module with a 3056/00 Digital Cable.

Two RS-232 Cable and Termination Module Port Configurations are shown in the Tables below. It is critical that the interconnecting cable and the DIP Switch settings exactly match. For full details on DB-9 Cable Connectors or Port DIP Switch Configurations, refer to the “3019 MODBUS Serial” card manual. A reference picture of the Termination Module is shown below.

Cable and Termination Module Configuration Combinations

RS-232 Cable Type	Termination Module Port 1 Configuration	Termination Module Port 2 Configuration
Straight Pin-to-Pin Cable J1 Pin 3 Tx to J2 Pin 3 Rx J1 Pin 2 Rx to J2 Pin 2 Tx J1 Pin 5 to J2 Pin 5 (Ground)	RS-232 Normal	RS-232 Null-Modem
Crossover Cable J1 Pin 3 Tx to J2 Pin 2 Rx J1 Pin 2 Rx to J2 Pin 3 Tx J1 Pin 5 to J2 Pin 5 (Ground)	RS-232 Normal	RS-232 Normal

Note: Tx = Transmit, Rx = Receive.

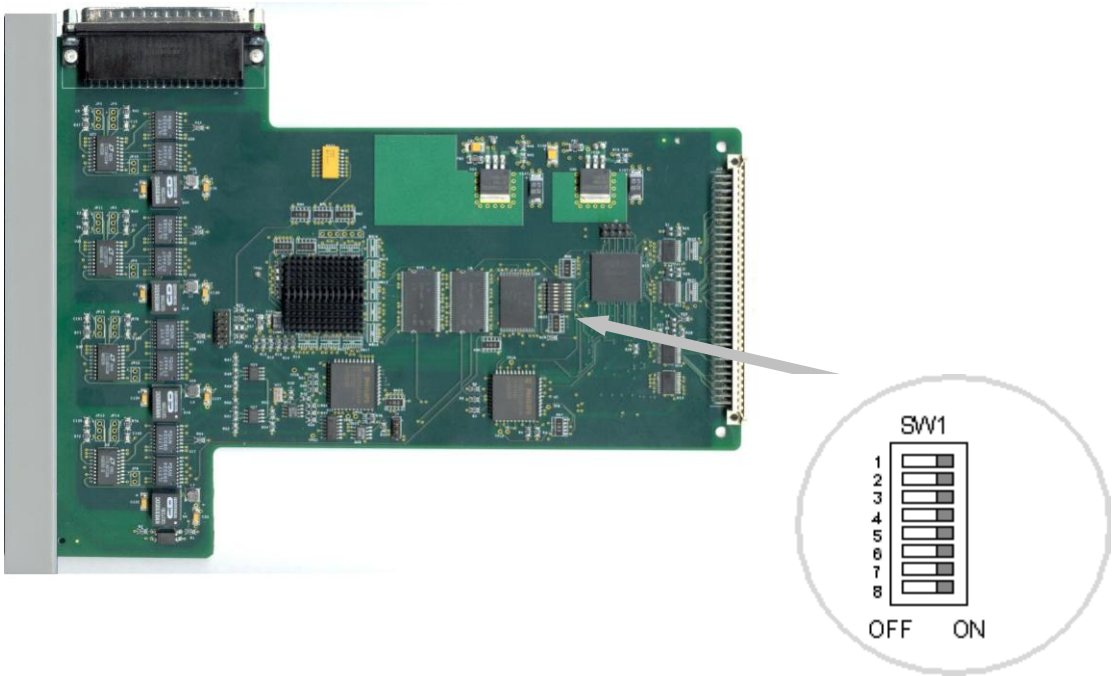
3099/25-100 MODBUS Serial Communications Termination Module Port DIP Switch Settings

Port	Configuration	Switch Setting
J1	Normal	SW1, Switch 2 ON SW2, Switch 6 ON SW3, Switch 3 ON SW4, Switch 5 ON SW4, Switch 8 ON
J2	Normal	SW5, Switch 2 ON SW6, Switch 6 ON SW7, Switch 3 ON SW8, Switch 5 ON SW8, Switch 8 ON
J2	Null-Modem	SW5, Switch 3 ON SW6, Switch 5 ON SW7, Switch 2 ON SW8, Switch 6 ON SW8, Switch 8 ON

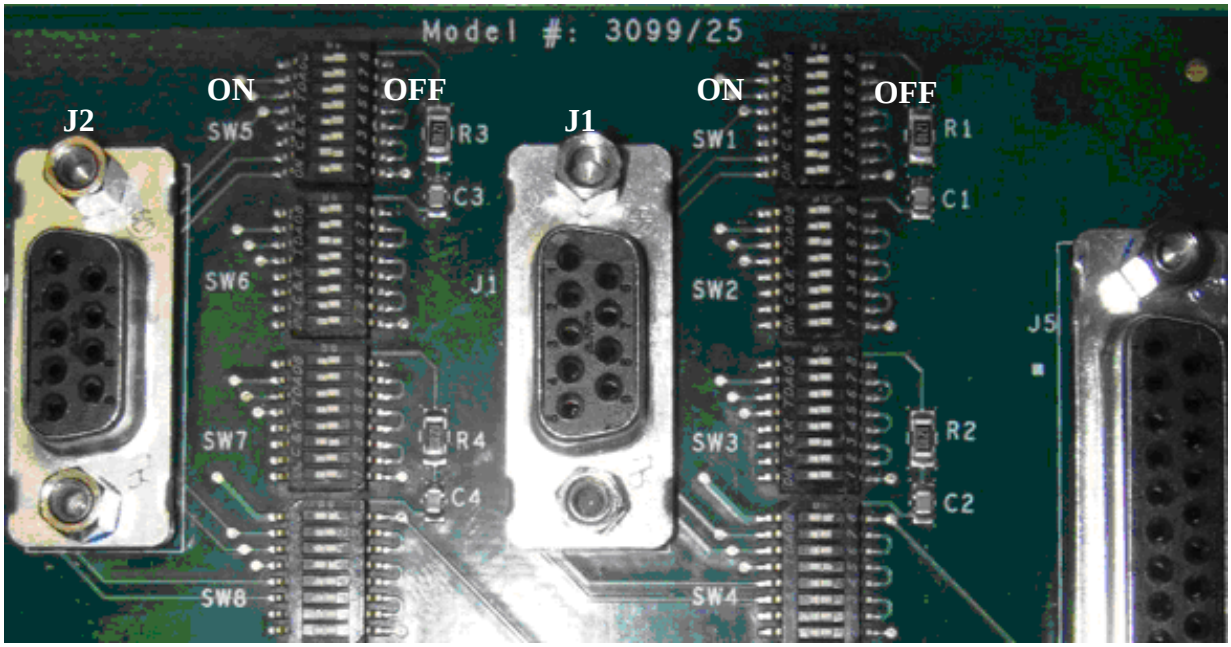
All other switches on SW1 – SW8 **must** be in the **OFF** position.

Note: On SW1 – SW8, Switch 1 is on the **bottom**, and Switch 8 on the **top**.

3019/00 MODBUS Serial Communications Card

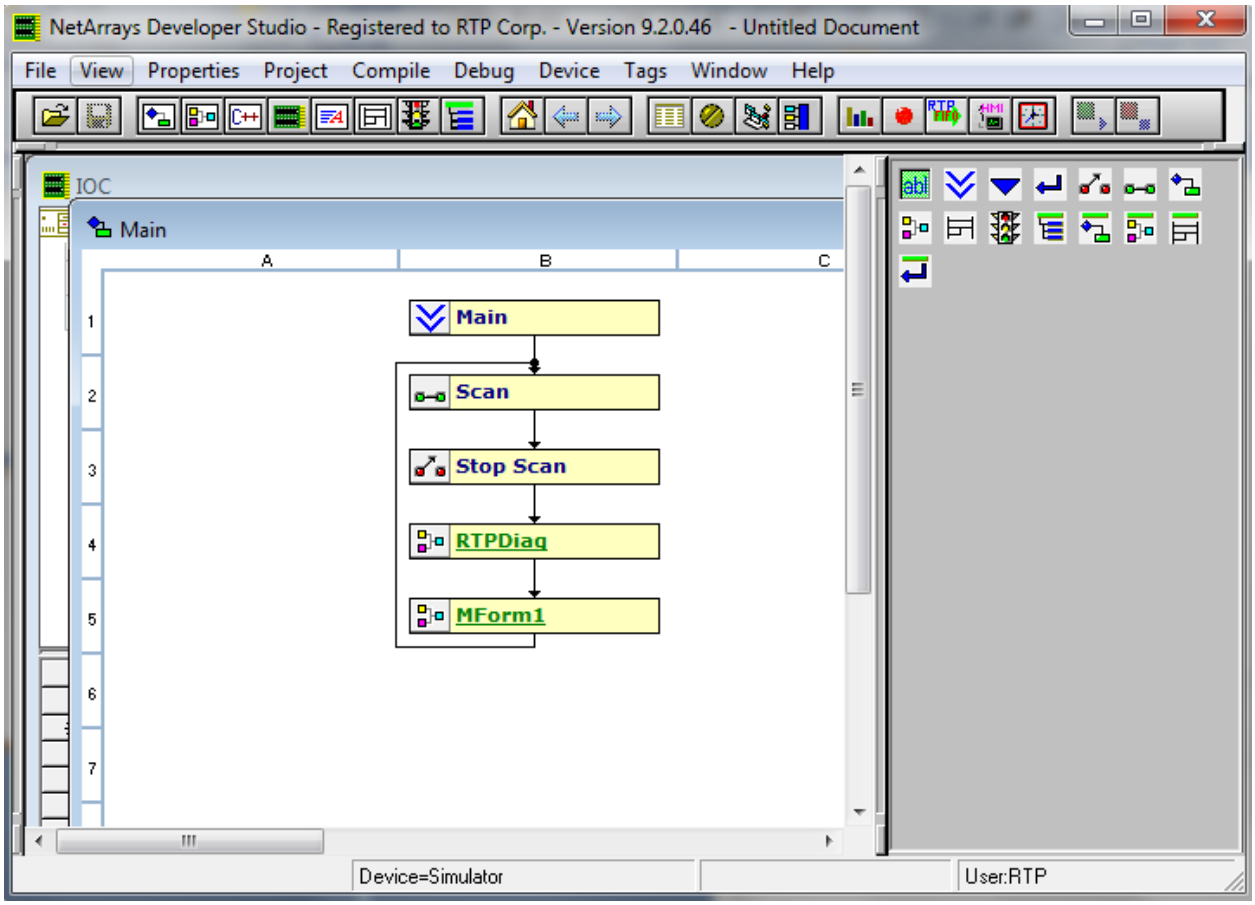


3099/25-100 MODBUS Serial Communications Termination Module (J1 and J2 Ports shown)



MODBUS Master Serial Port Configuration

- Open NetArrays and log in. If you have not created a user account please refers to the file ug-netsuite.pdf found in the directory C:\RTP NetSuite\Manuals. After logging in, you are going to see the figure below

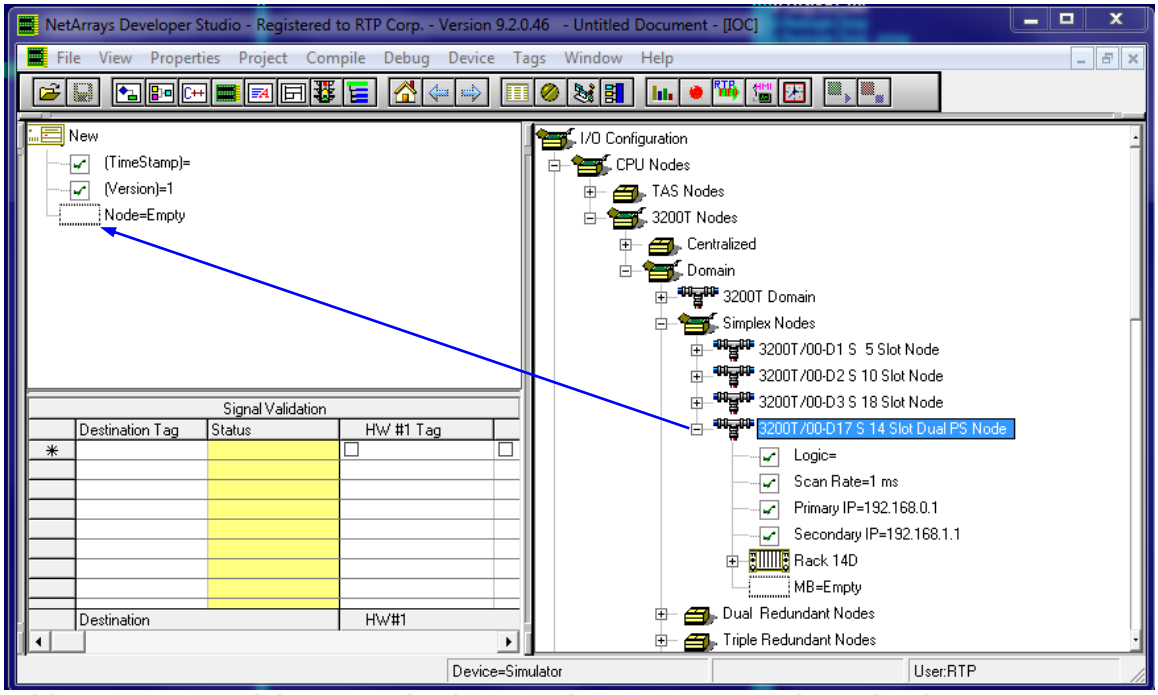


- Click on the I/O Configuration Studio button in the NetArrays main toolbar .

Maximize the I/O Configuration form using the Maximize Icon.

- Drag an icon **RTP3200T Node** from the I/O Configuration Toolbox **CPU Nodes->3200T Nodes->Domain->Simplex Nodes folder** to the "**Node=Empty**" position on the I/O Configuration Form. For this example, the **RTP3200T/00-D17 S 14 Slot Dual PS Node** was chosen. Select an RTP3200T Node that matches your configuration. (This example shows a domain configuration).

I/O Configuration Form I/O Configuration Toolbox

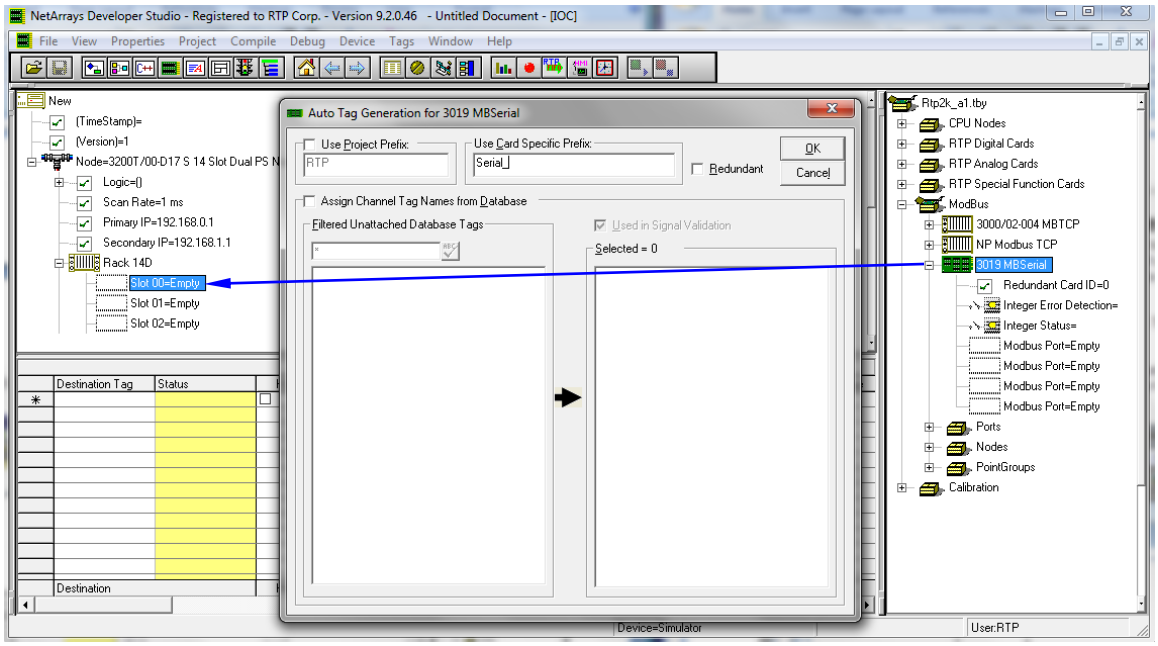


Add a MODBUS Serial Communications Card, Master Port, Node, and Point Groups to the I/O Configuration

Add a MODBUS Serial Communications Card

- In the I/O Configuration Form, expand the "Rack 00=Rack 14D" (left-click on the ⊞). In the I/O Configuration toolbox expand the "MODBUS" branch (left-click on the ⊞). Drag the "3019 MB Serial" icon to the "Slot 00=Empty". (Place the MODBUS Serial Communications Card in the proper chassis and slot to match your configuration.) The Auto Tag Generation dialogue box will appear. Type in "Serial_" and click OK. The Prefix of the Tag names for the MODBUS Serial Communications Card will be set to "Serial_". This does not affect the tag prefixes for the point groups.

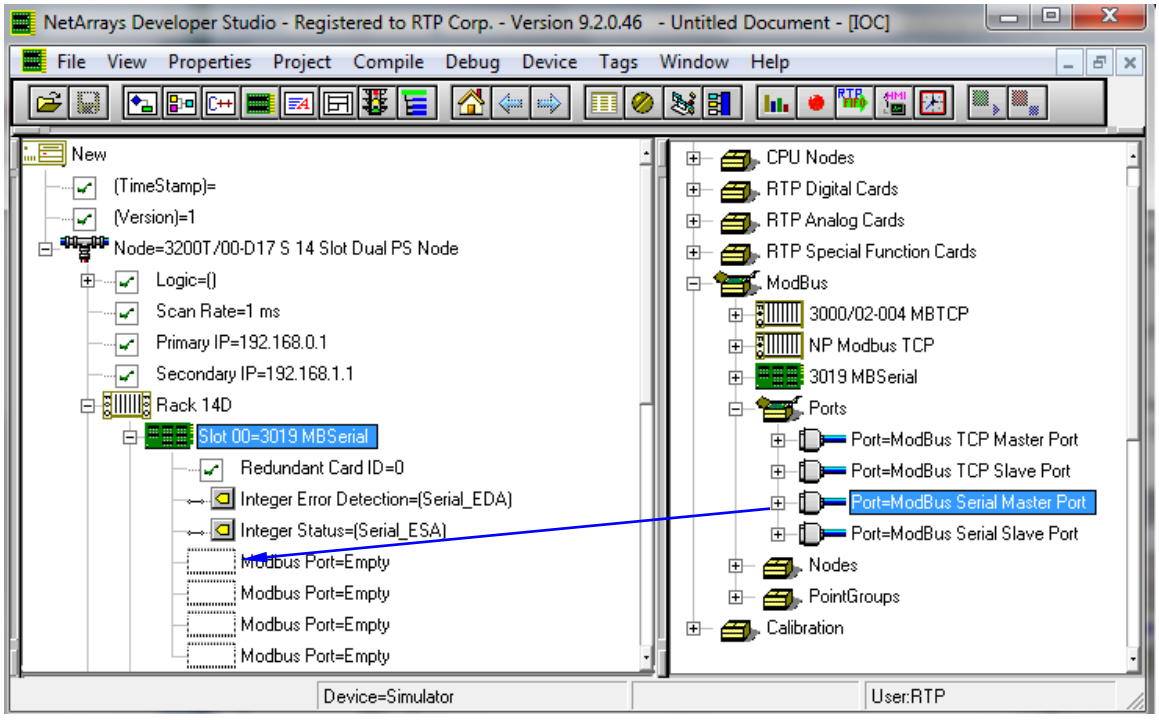
I/O Configuration Form I/O Configuration Toolbox



Add a MODBUS Master Port

- Expand the “Slot 00=3019 MB Serial” branch on the I/O Configuration Form by clicking on the ⊞. Expand the “MODBUS” “Ports” branch on the I/O Configuration Toolbox by clicking on the ⊞. Drag the “Port = MODBUS Serial Master Port” from the I/O Configuration Toolbox to the Port 1 (top) “MODBUS Port =Empty” Slot in the I/O Configuration Form.

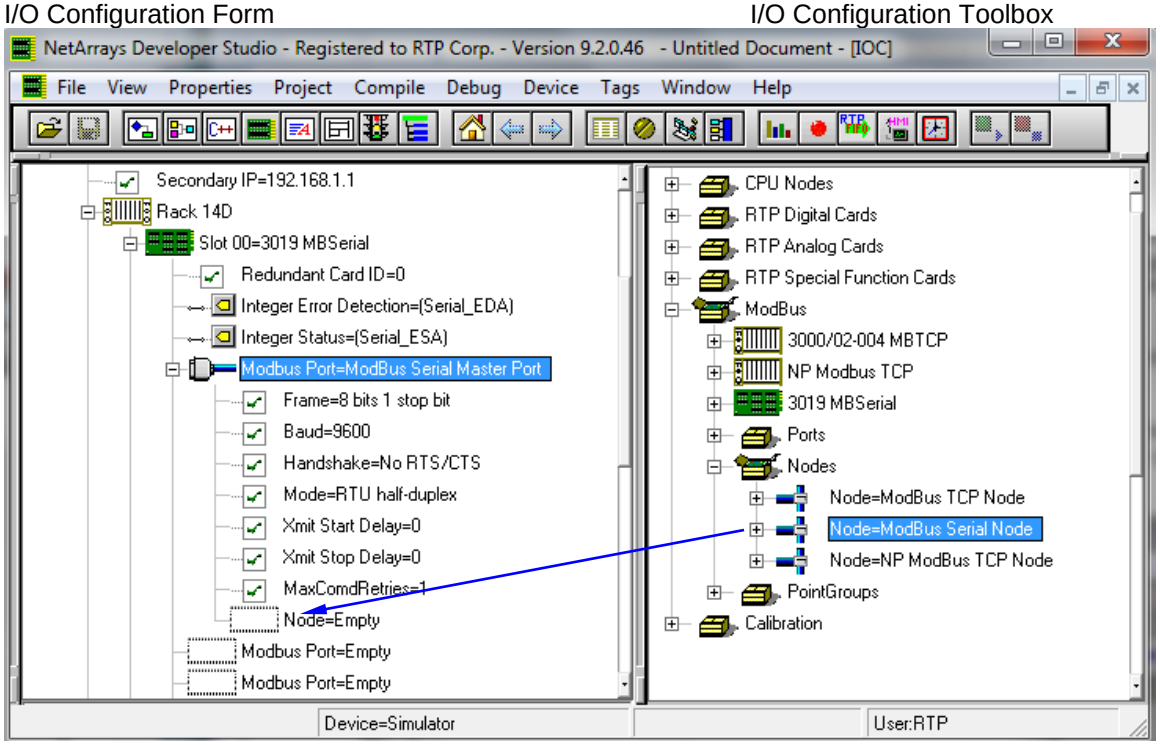
I/O Configuration Form I/O Configuration Toolbox



Add MODBUS Master Node

- Expand the “3019 MB Serial” “MODBUS Port = MODBUS Serial Master Port” branch on the I/O Configuration Form by clicking on the ⊞. Expand the “MODBUS” “Nodes” branch on the I/O Configuration Toolbox by clicking on the ⊞. Drag a “Node = MODBUS Serial Node” from the I/O Configuration Toolbox to the “Node = Empty” Slot in the I/O Configuration Form.

I/O Configuration Form I/O Configuration Toolbox

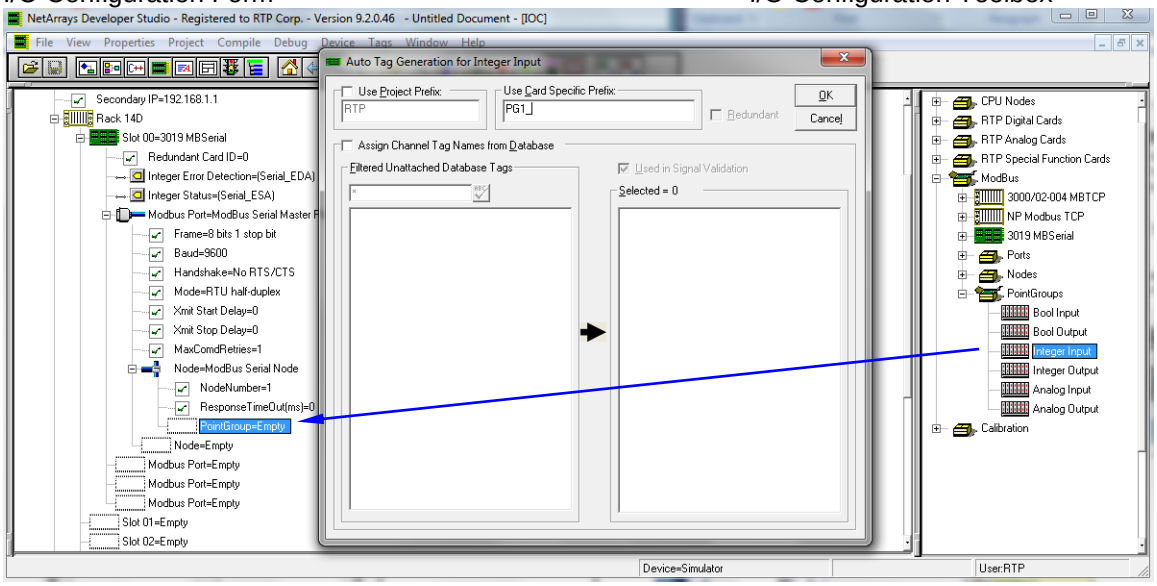


Add 2 MODBUS Master Point Groups

- Move the mouse pointer to the “Node=MODBUS Serial Node” icon on the I/O Configuration Form and expand it by clicking on the ⊞. Expand the “MODBUS” “Point Groups” on the I/O Configuration Toolbox by clicking on the ⊞. Select the Integer Input Point Group icon in the I/O Configuration toolbox and drag it to the “PointGroup=Empty” placeholder under the Node in the I/O Configuration form. The Auto Tag Generation dialogue box will appear. In response to the request for a **Prefix**, enter **PG1**_ and click **OK**. Repeat the process for the Integer Output Group with a prefix of **PG2**_. The Prefix of the Tag names for the MODBUS Master Point Groups will be set to the Tag used.

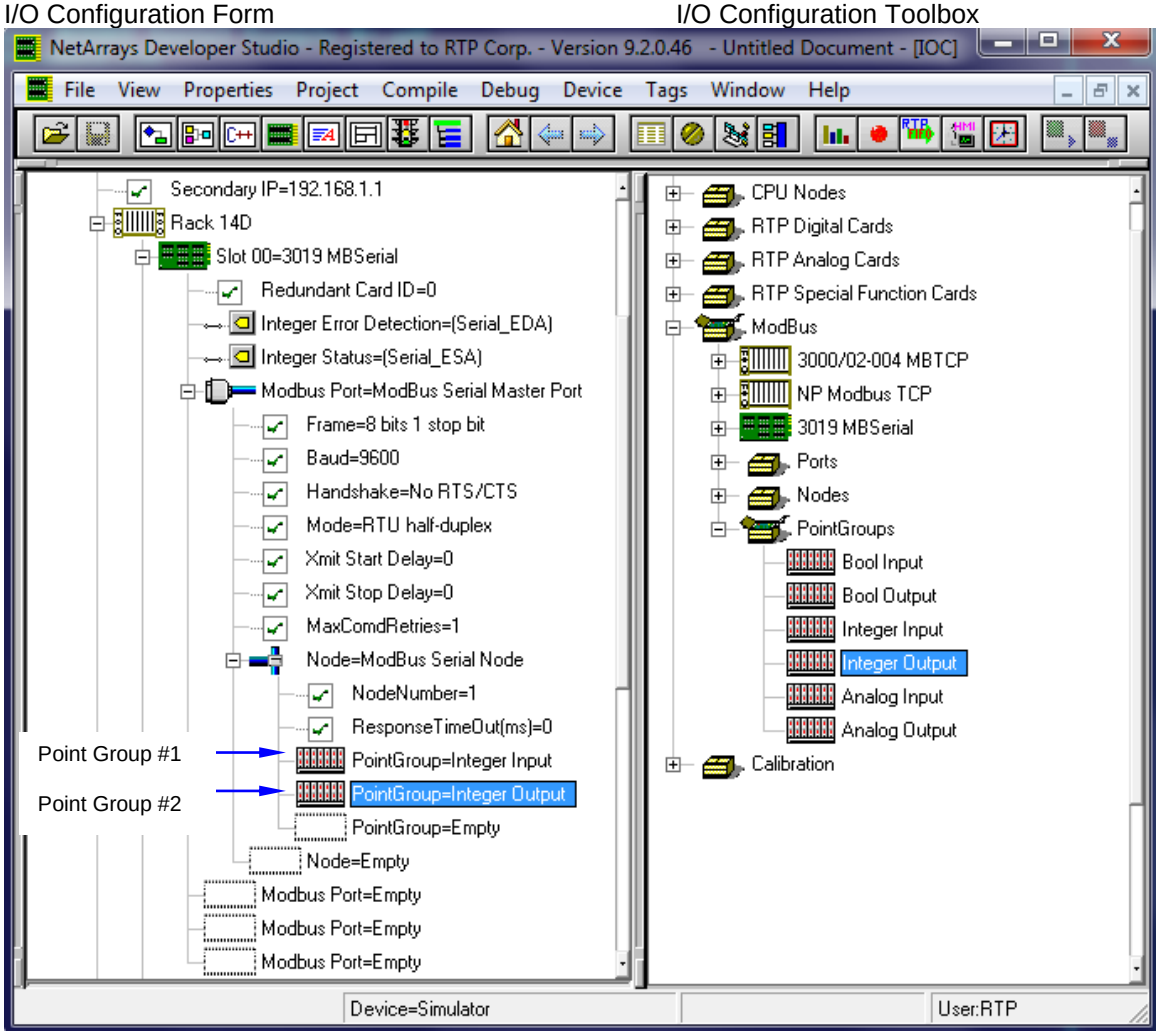
  Point Group #1 Integer Input (**PG1**_)
  Point Group #2 Integer Output (**PG2**_)

I/O Configuration Form I/O Configuration Toolbox



The MODBUS Master I/O Configuration should look as pictured below.

I/O Configuration Form I/O Configuration Toolbox



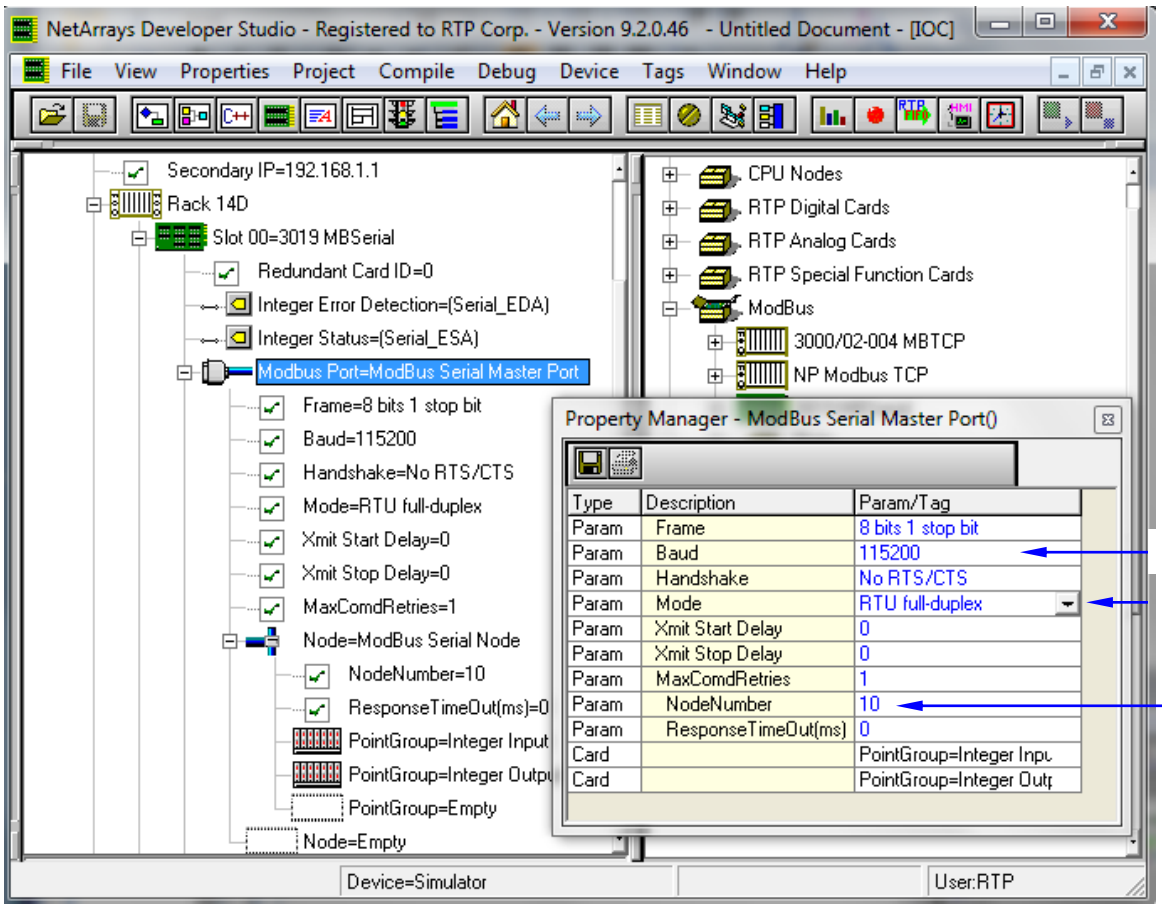
On the following pages you will configure the MODBUS Master Port and Point Group properties. Note that when you enter text or a number into the **Property Manager**, it **must** be followed by **Enter**.

- When the configuration is complete, collapse the MODBUS Port=MODBUS Serial Master Port by clicking on the ⊟.

Configuring the MODBUS Communications Serial Master Port

Right click on the **MODBUS Port=MODBUS Serial Communications Master Port**, and select **Properties**. Change **Baud** to 115200. Select RTU full-duplex for the **Mode** property. Make the **NodeNumber** 10. Leave the other properties at their default settings. Note that Xmit Start Delay and Xmit Stop Delay are specifically for RT-485 multi-drop applications.

The **Property Manager** window is shown below.

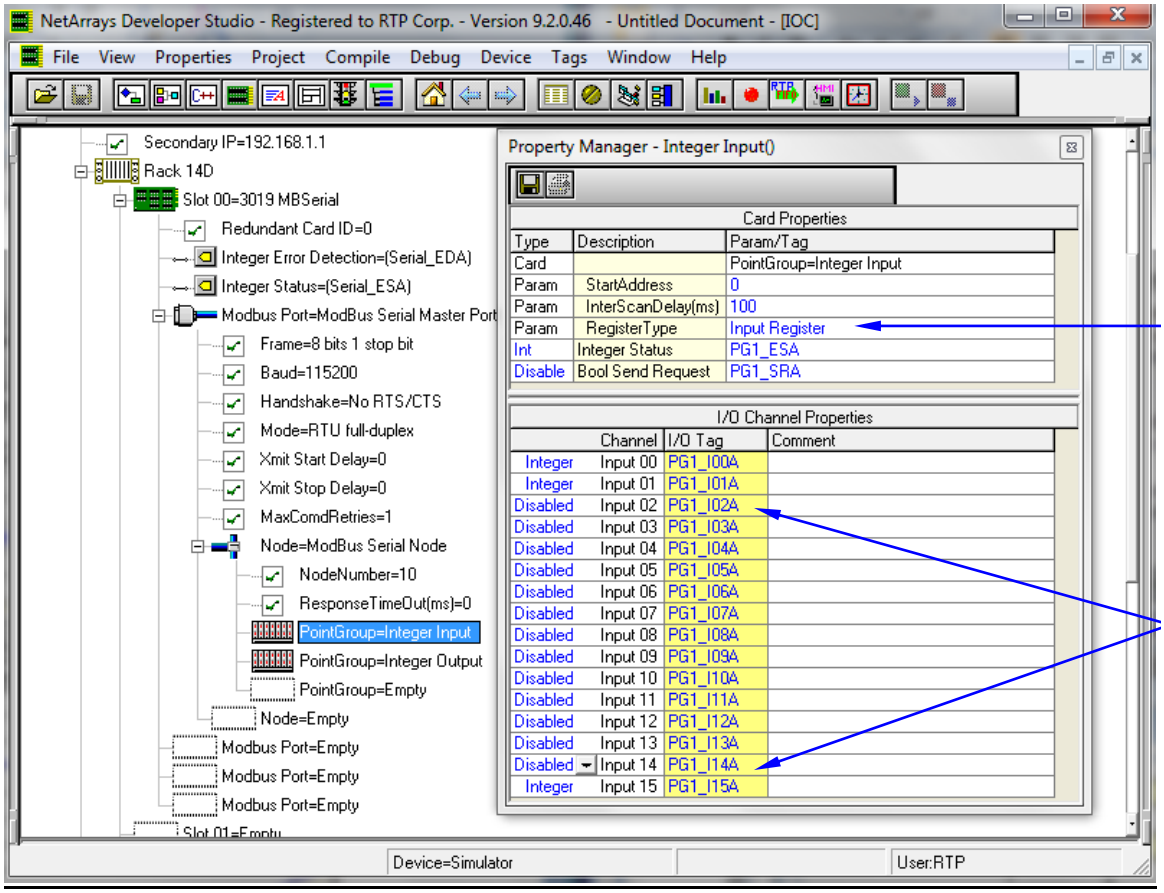


The property settings selected **must** be set the same when configuring the Slave Port.

Point Group #1 Properties – Integer Input Point Group

This Point Group will be reading three Integer inputs from the Input Registers starting at address 0.

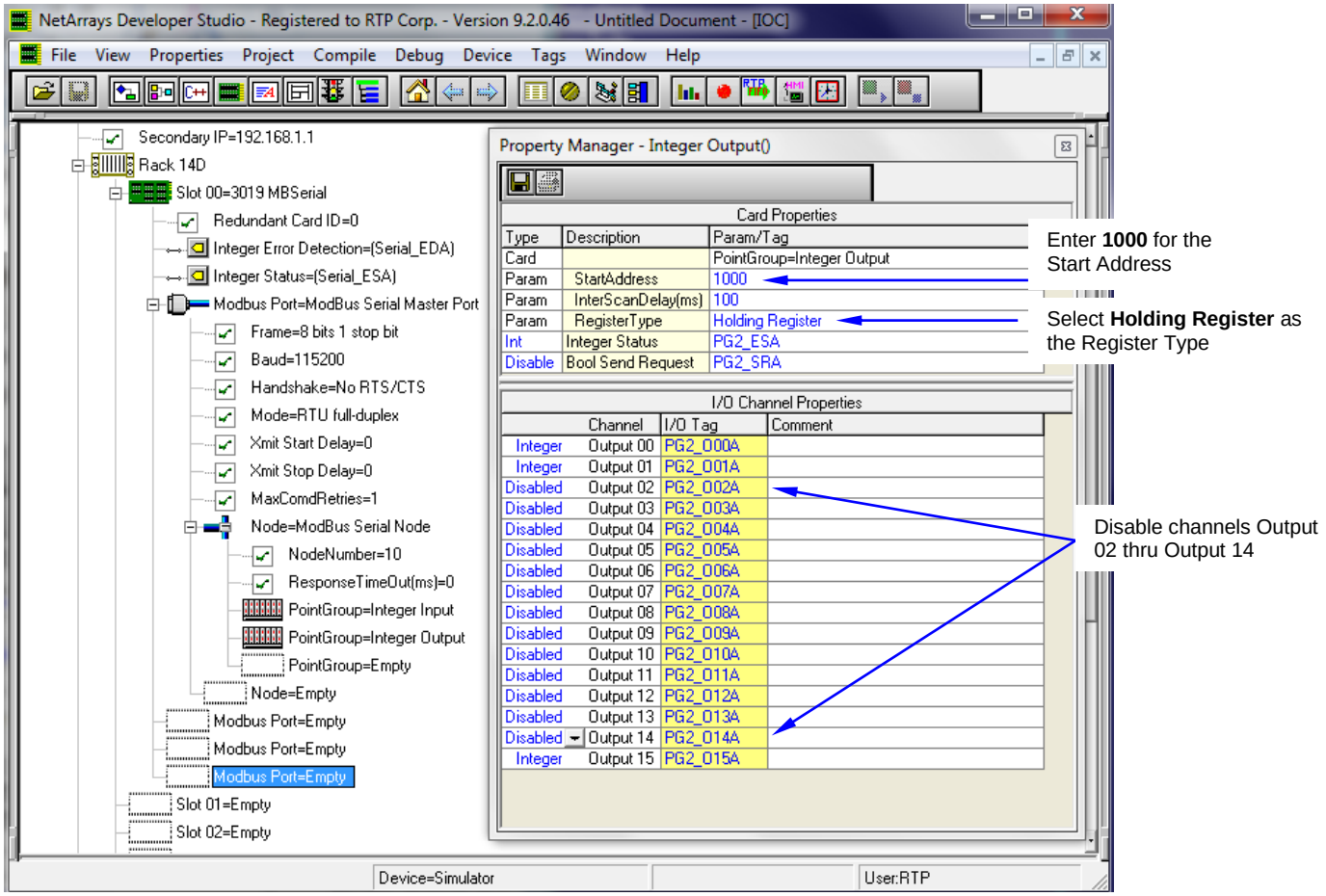
- Select Point Group #1 and right click to display its **Property Manager**. Select **Properties**.
- A **StartAddress** of 0 is specified for the starting point for this Point Group's data in the MODBUS Slave Data Image. This is the default value.
- An **InterScan Delay** of 100 milliseconds is specified. This is the default value.
- The **Register Type** of this point group is "Input Register". We will be reading input data from the MODBUS slave.
- The Tag assigned to the **Integer Status** is "PG1_ESA".
- The **I/O Tags** assigned are "PG1_I00A", "PG1_I01A", and "PG1_I15A".
- **Channel** Input 02 through Input 14 are disabled by selecting "Disabled".
- Close the **Property Manager** display.



Point Group #2 Properties – Integer Output Point Group

This Point Group will be writing three Integer outputs into the Holding Registers starting at address 1000.

- Select Point Group #2 and right click to display its **Property Manager**. Select **Properties**.
- A **StartAddress** of 1000 is entered for the starting point for this Point Group's data in the MODBUS Slave Data Image.
- An **InterScan Delay** of 100 milliseconds is specified. This is the default value.
- Select Holding Register as **Register Type**. We will be writing to the Holding Register of the MODBUS slave.
- The Tag assigned to the **Integer Status** is"PG2_ESA".
- The **I/O Tags** assigned are "PG2_O00A", "PG2_O01A", and "PG2_O15A".
- **Channel** Output 02 through Output 14 are disabled by selecting "Disabled".
- Close the **Property Manager** display.



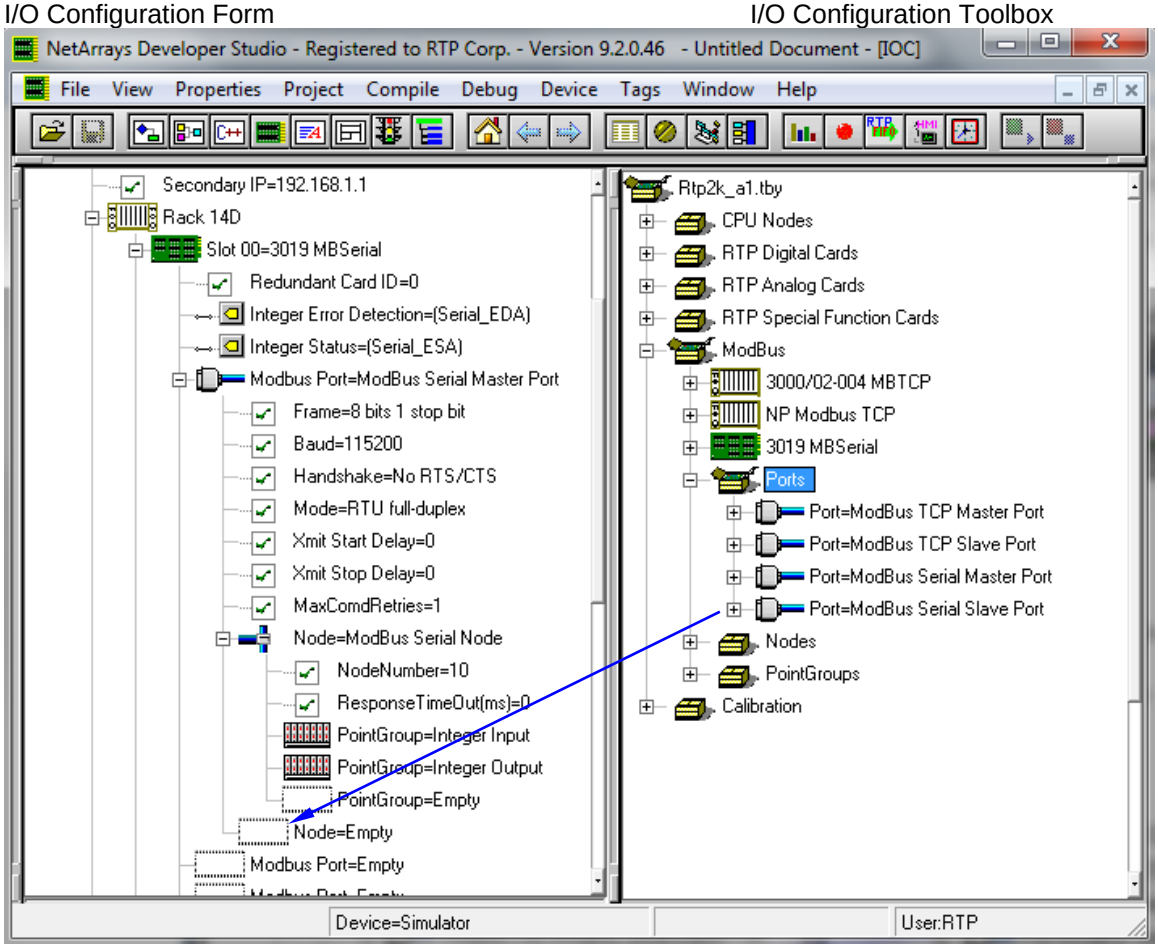
MODBUS Slave Port Configuration

Add a MODBUS Slave Port, Node, and Point Groups to the I/O Configuration

Add MODBUS Slave Port

- Since the same MODBUS Serial Communications Card will be utilized for both Master and Slave Ports, a second card will not be added.
- If required, expand the “Slot 00=3019 MB Serial Card’s” branch on the I/O Configuration Form by clicking on the ⊞. Expand the “MODBUS” “Ports” branch on the I/O Configuration Toolbox by clicking on the ⊞. Drag a “Port = MODBUS Serial Slave Port” from the I/O Configuration Toolbox to the second “MODBUS Port =Empty” Slot in the I/O Configuration Form. This corresponds to the J2 port on the 3099/25-100 MODBUS Serial Termination Module.

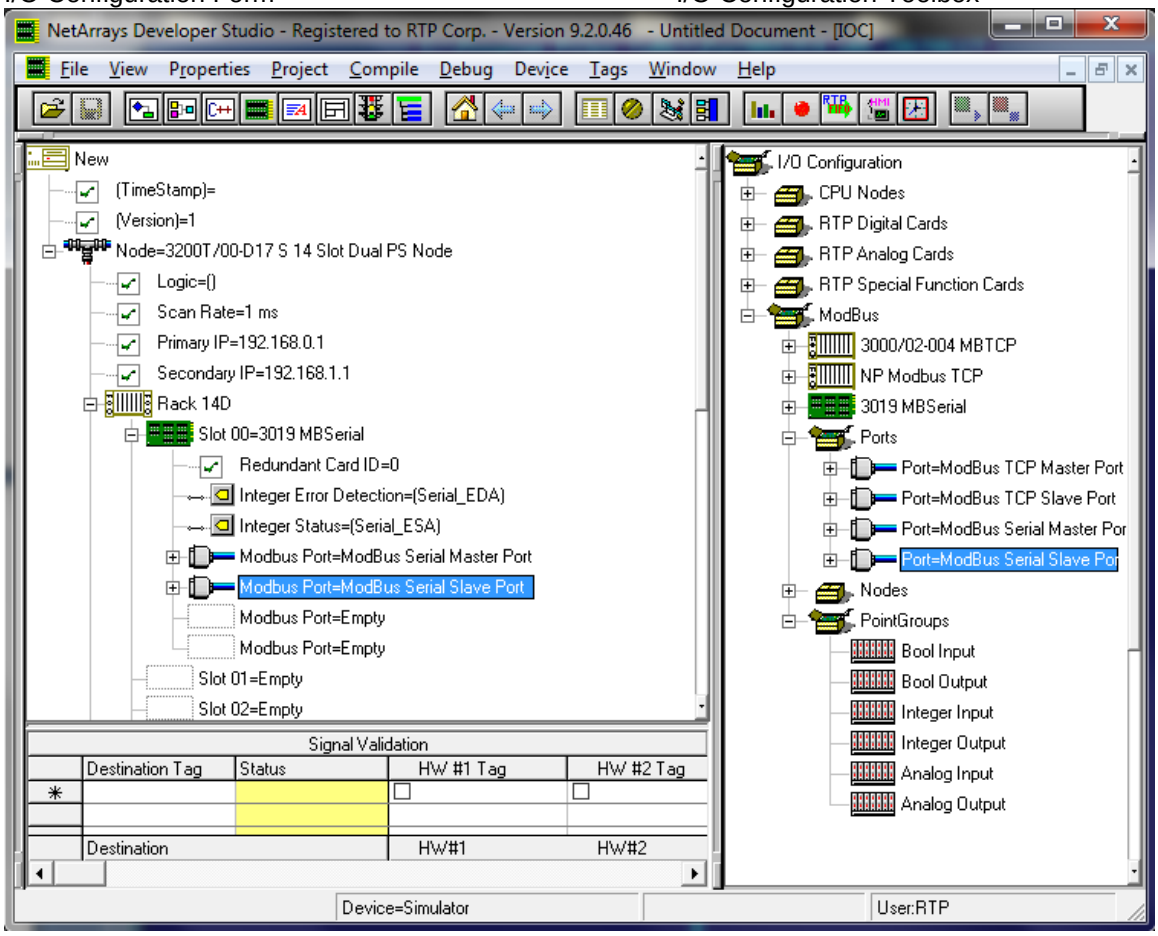
I/O Configuration Form I/O Configuration Toolbox



MODBUS Slave Node

- When the MODBUS Slave Port is added, the MODBUS Slave Node is automatically added. Note: A MODBUS Slave Port can only have 1 MODBUS Slave Node. After adding the MODBUS Slave Port, the I/O Configuration Form will look like the one below.

I/O Configuration Form I/O Configuration Toolbox

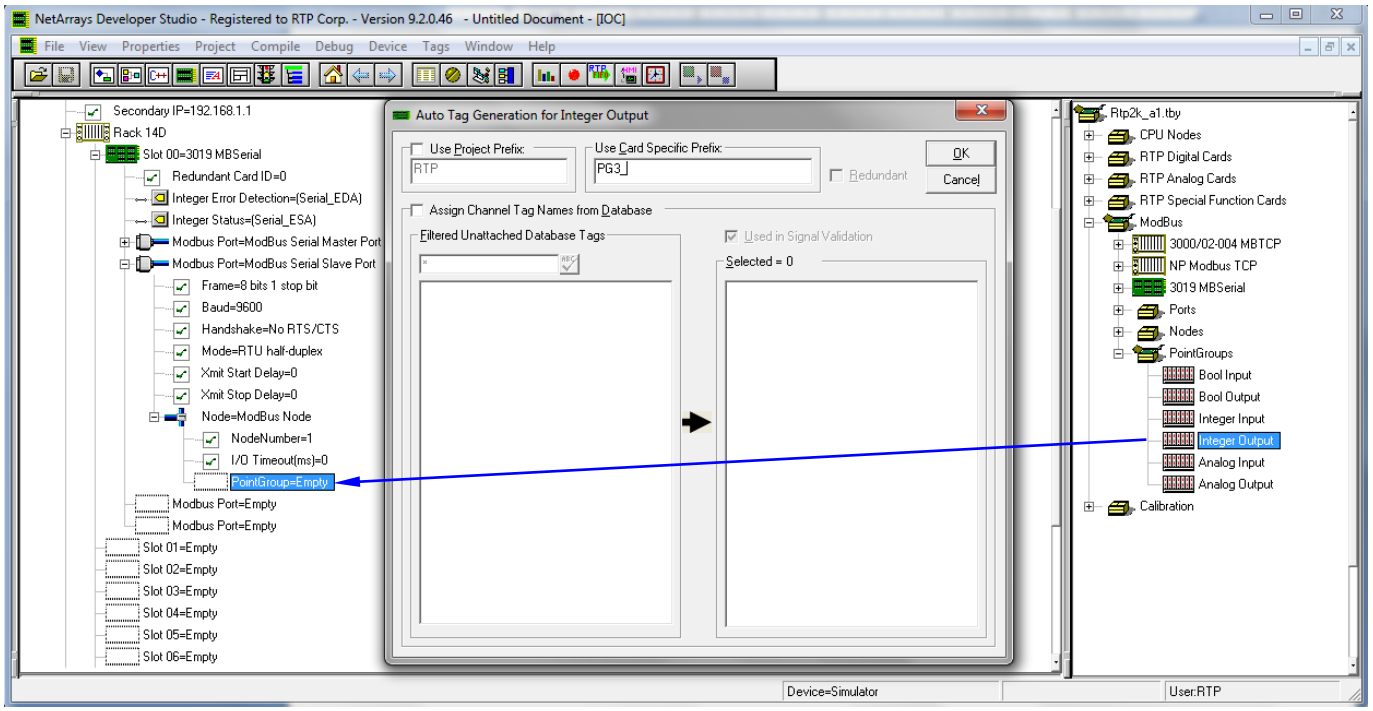


Add 3 MODBUS Slave Point Groups

- Expand the “MODBUS Port=MODBUS Serial Slave Port” clicking on the ⊞. Expand the “Node=ModBus Node” by clicking on the ⊞. Expand the “MODBUS” “Point Groups” on the I/O Configuration Toolbox by clicking on the ⊞. Select the Integer Output Point Group icon in the I/O Configuration Toolbox and drag it to the “PointGroup=Empty” placeholder under the Port in the I/O Configuration form. The Auto Tag Generation dialogue box will appear. In response to the request for a **Prefix**, enter**PG3**_ and click **OK**. In a similar fashion add the two Integer Input point groups. The Prefix of the Tag names for the MODBUS Master Point Groups will be set to the Tag used.

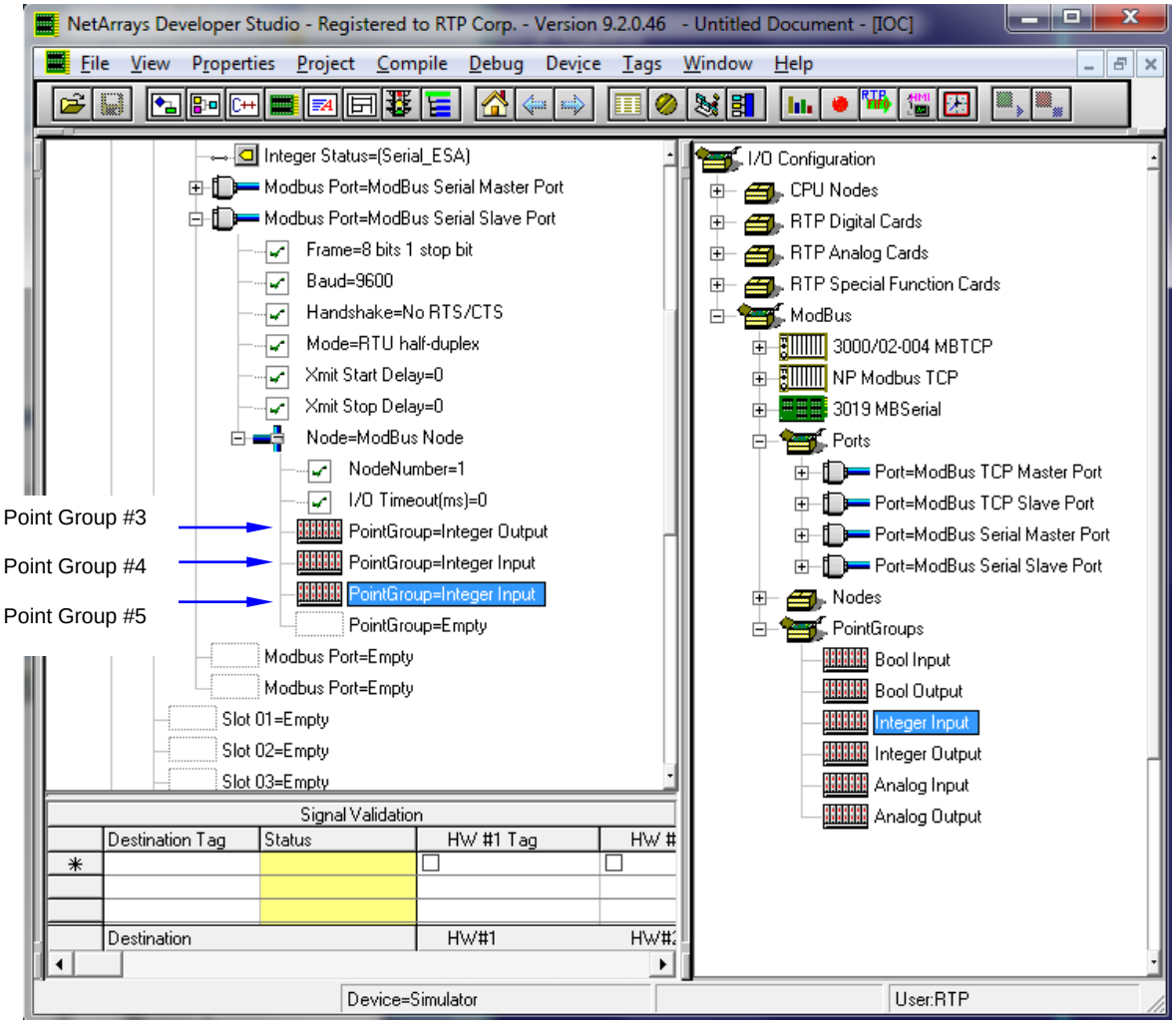
  Point Group #3 Integer Output (**PG3**_)
  Point Group #4 Integer Input (**PG4**_)
  Point Group #5 Integer Input (**PG5**_)

I/O Configuration Form I/O Configuration Toolbox



Once completed, the MODBUS Slave I/O Configuration should look as pictured below.

I/O Configuration Form I/O Configuration Toolbox

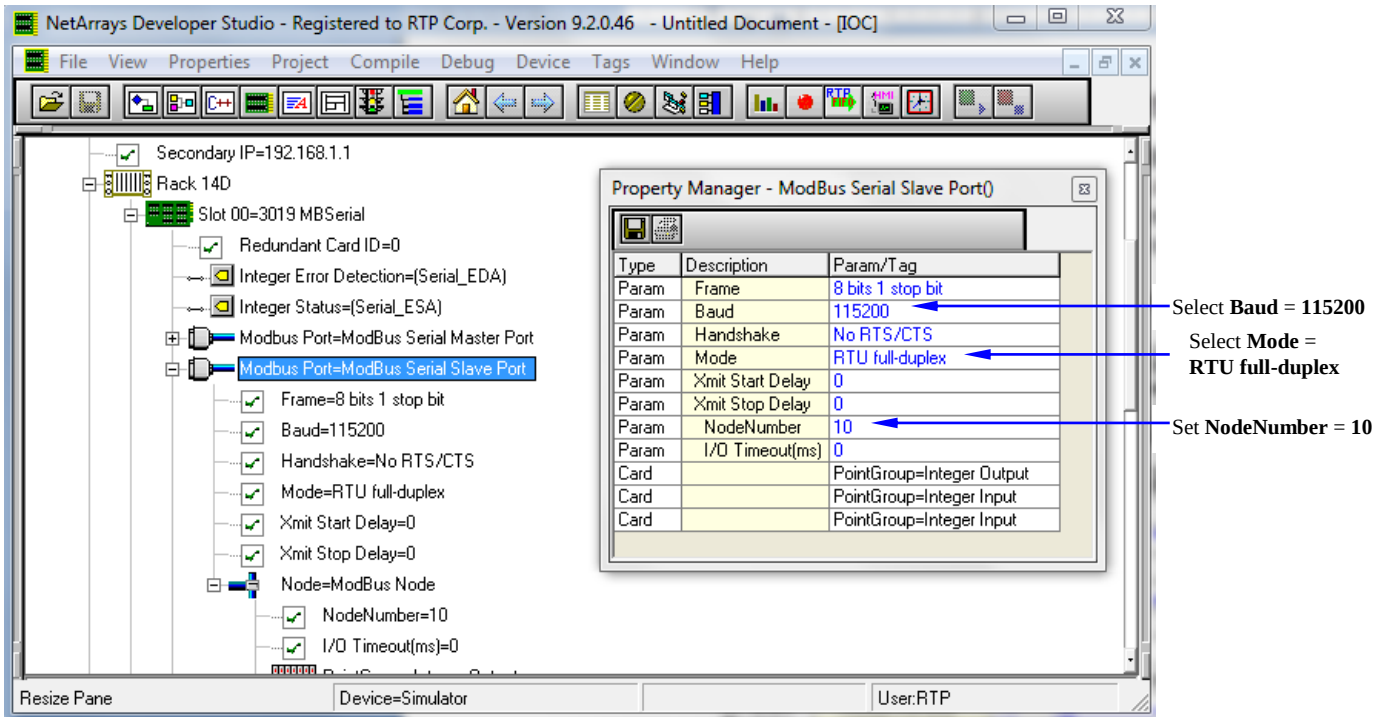


On the following pages you will be configuring the MODBUS Slave Port and Point Group properties. Note that when you enter text or a number into the **Property Manager**, it **must** be followed by **Enter**.

Configuring the MODBUS Serial Communications Slave Port

Right click on the **MODBUS Port=MODBUS Serial Slave Port**, and select **Properties**. Change **Baud** to 115200. Select RTU full-duplex for the **Mode** property. Make the **NodeNumber** 10. Leave the other properties at their default settings. Note that Xmit Start Delay and Xmit Stop Delay are specifically for RT-485 multi-drop applications.

The **Property Manager** window is shown below.

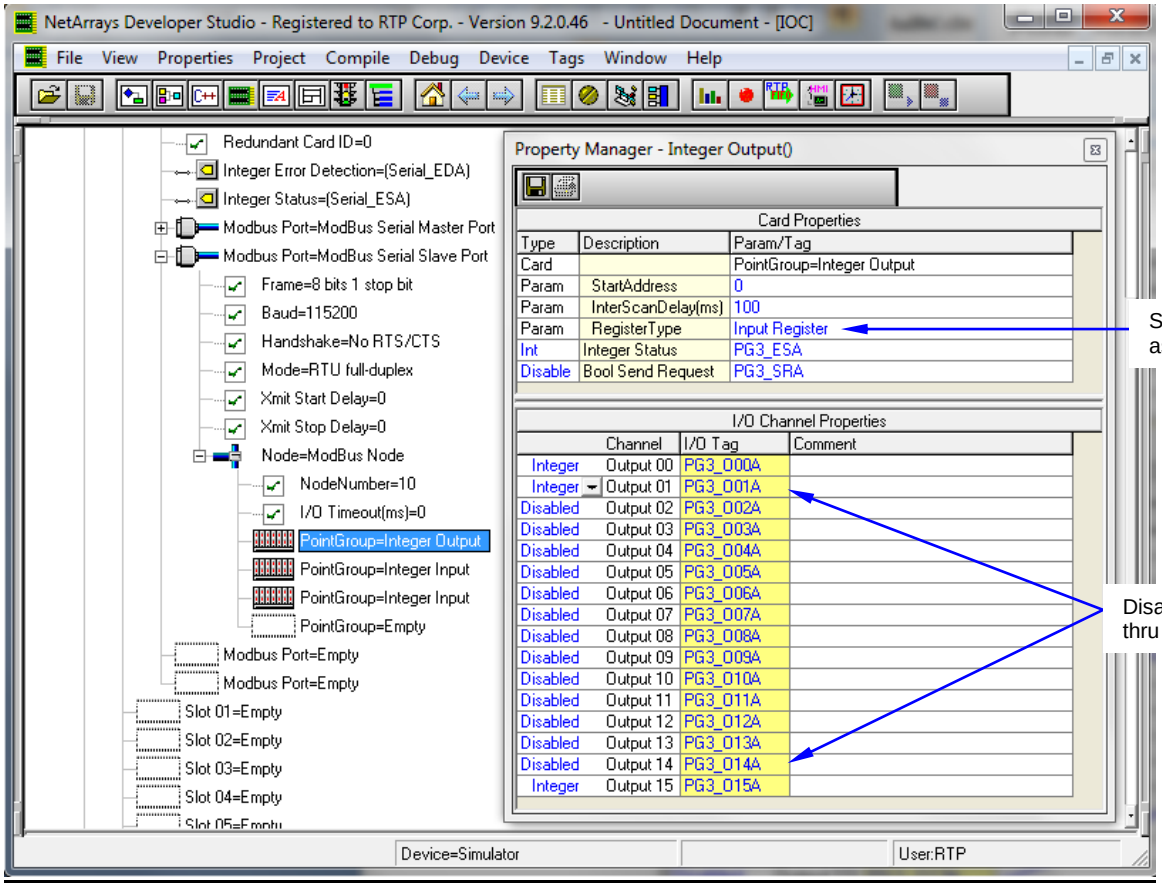


All property settings **must** match the Master Port.

Point Group #3 Properties – Integer Output Point Group

This Point Group will be writing three Integer outputs into the Input Registers starting at address 0.

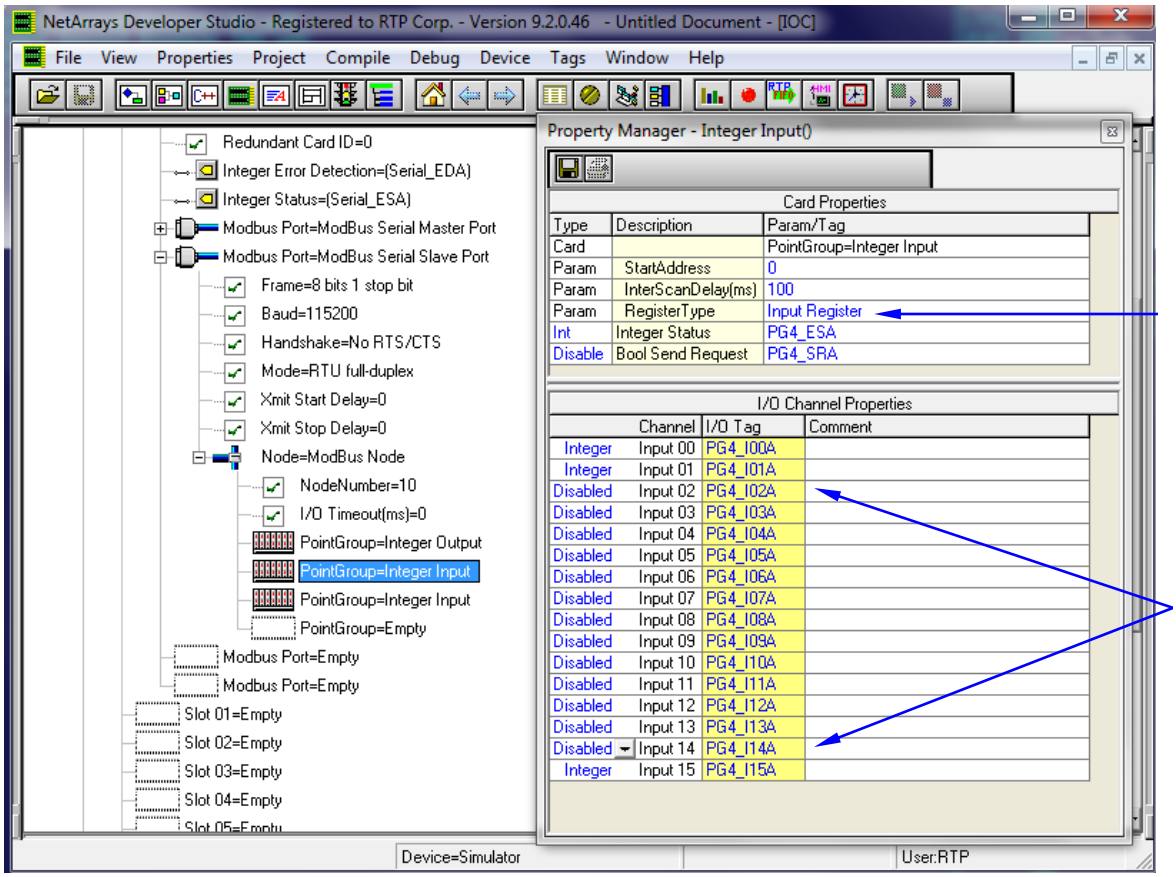
- Select Point Group #3 and right click to display its **Property Manager**. Select **Properties**.
- A **StartAddress** of 0 is specified for the starting point for this Point Group's data in the MODBUS Slave Data Image.
- An **InterScan Delay** of 100 milliseconds is specified. This is the default value.
- The **Register Type** of this point group is "Input Register". We will be writing data to the Input Registers.
- The Tag assigned to the **Integer Status** is "PG3_ESA".
- The **I/O Tags** assigned are "PG3_O00A", "PG3_O01A", and "PG3_O15A".
- **Channel** Output 02 through Output 14 are disabled by selecting "Disabled".
- Close the **Property Manager** display.



Point Group #4 Properties – Integer Input Point Group

This Point Group will be reading three Integer inputs from the Input Registers starting at address 0.

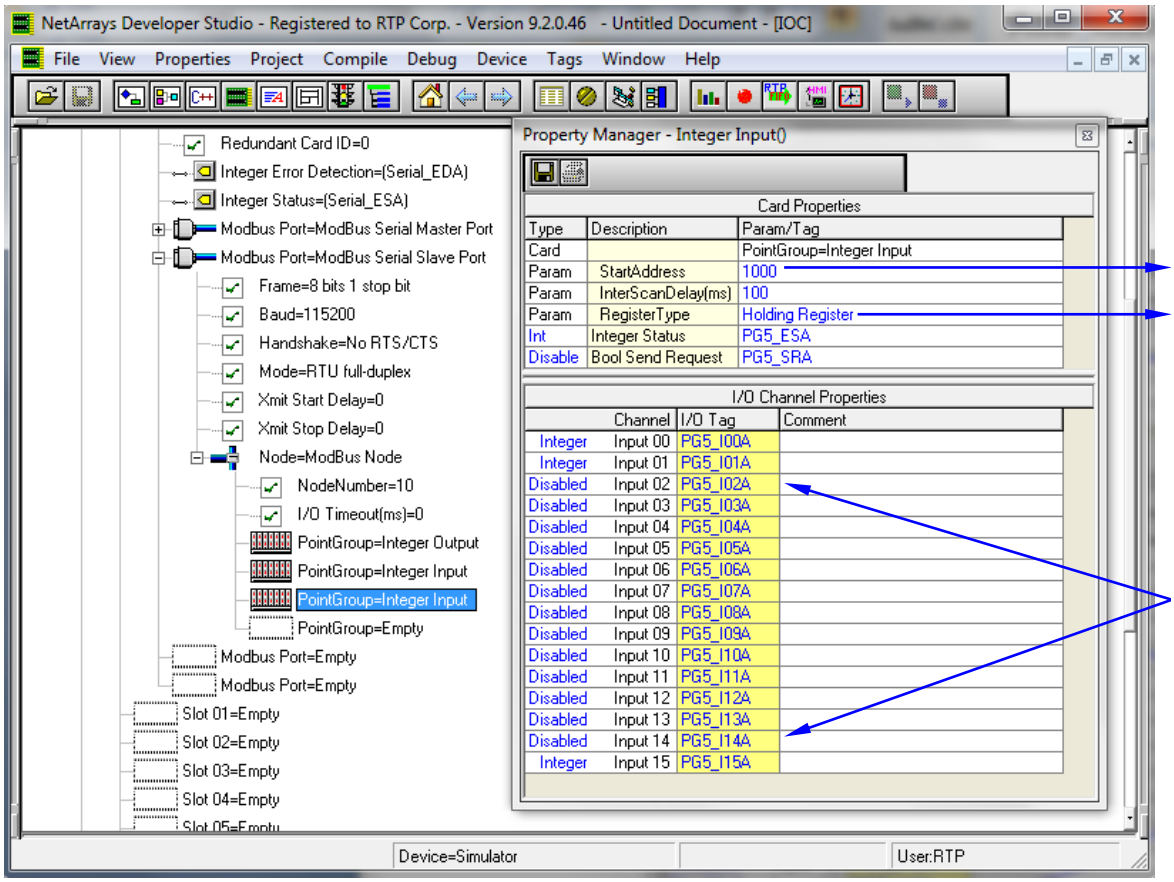
- Select Point Group #4 and right click to display its **Property Manager**. Select **Properties**.
- A **StartAddress** of 0 is specified for the starting point for this Point Group's data in the MODBUS Slave Data Image.
- An **InterScan Delay** of 100 milliseconds is specified. This is the default value.
- The **Register Type** of this point group is "Input Register". We will be reading back data from the Input Registers.
- The Tag assigned to the **Integer Status** is PG4_ESA".
- The **I/O Tags** assigned are "PG4_I00A", "PG4_I01A", and "PG4_I15A".
- **Channel** Input 02 through Input 14 are disabled by selecting "Disabled".
- Close the **Property Manager** display.



Point Group #5 Properties – Integer Input Point Group

This Point Group will be reading three Integer inputs from the Holding Registers starting at address 1000.

- Select Point Group #5 and right click to display its **Property Manager**. Select **Properties**.
- A **StartAddress** of 1000 is entered for the starting point for this Point Group's data in the MODBUS Slave Data Image.
- An **InterScan Delay** of 100 milliseconds is specified. This is the default value.
- The **Register Type** of this point group is "Holding Register". We will be reading data from the Holding Register.
- The Tag assigned to the **Integer Status** is "PG5_ESA".
- The **I/O Tags** assigned are "PG5_I00A", "PG5_I01A", and "PG5_I15A".
- **Channel** Input 02 through Input 14 are disabled by selecting "Disabled".
- Close the **Property Manager** display.



Enter **1000** for the Start Address

Select **Holding Register** as the Register Type

Disable channels Input 02 thru Input 14

NetArrays Project Program

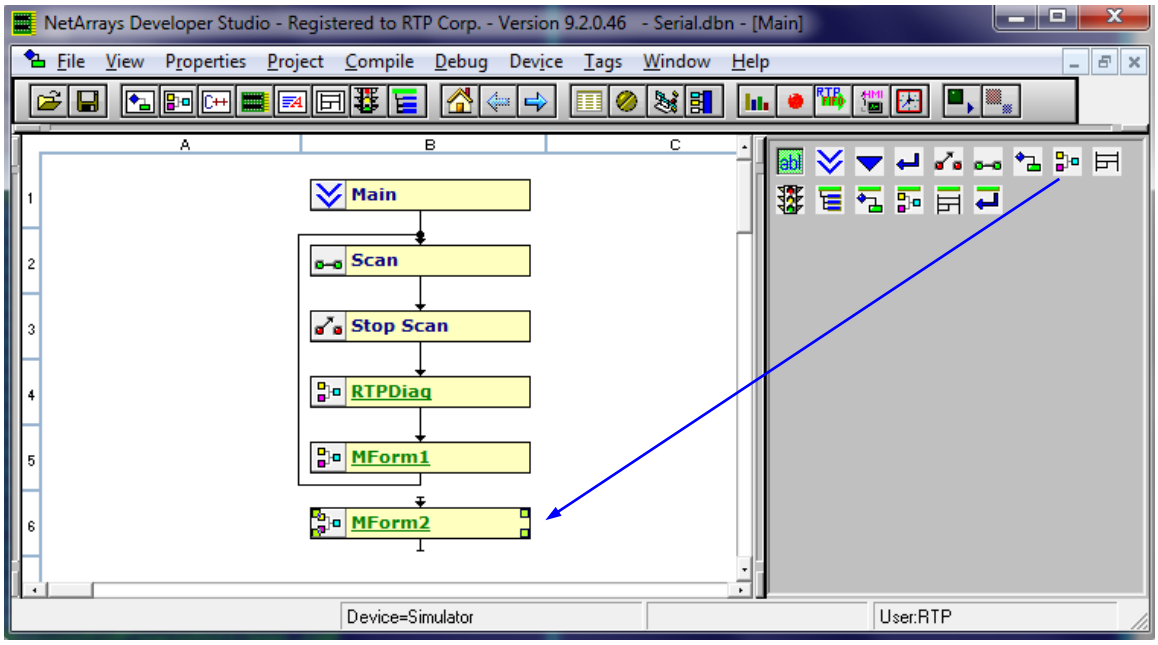
You have completed the I/O configuration of the MODBUS Serial Communications Card Master Port and the Slave Port. The next step is to add some logic to the NetArrays project program to test the card's operation.

Save the Project

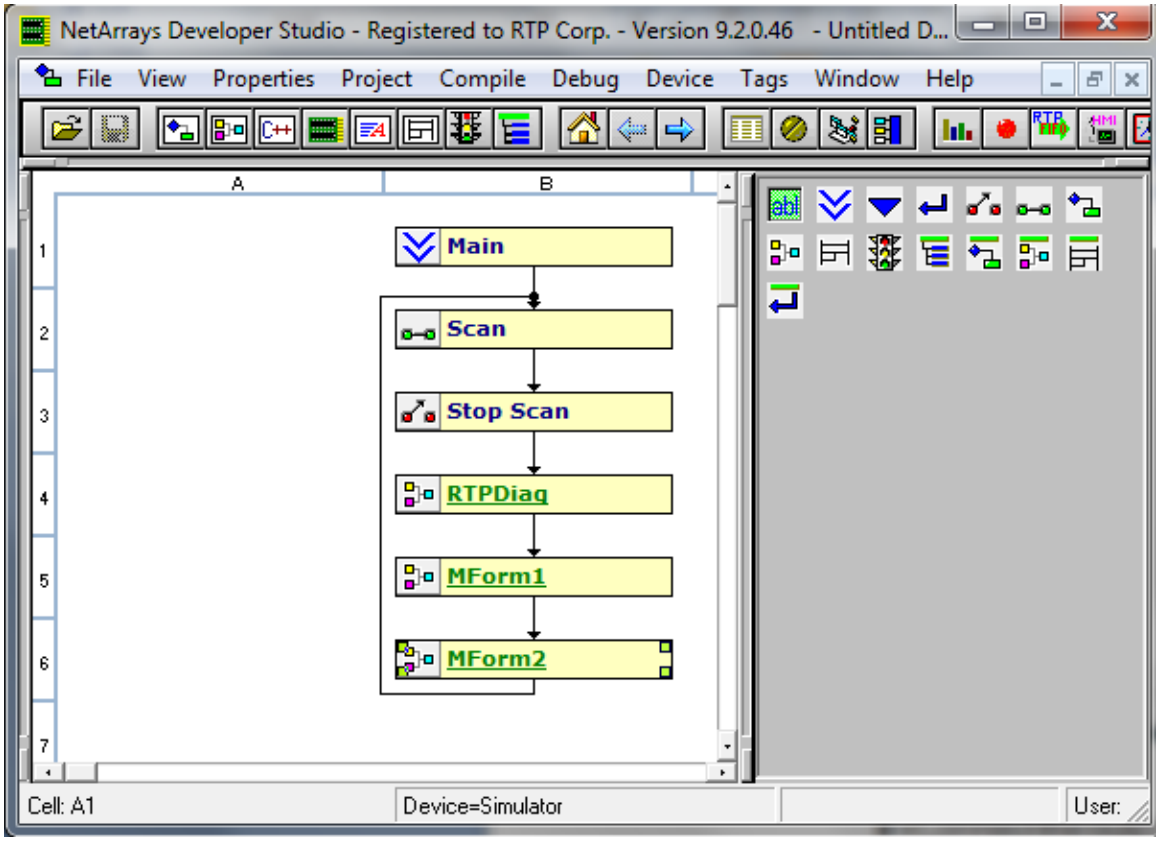
- First save the project. From the NetArrays **File** menu select **Save New Project As…** type the project name in **File name:** and click **Save** (We used "Serial".)

Modify the Main Flow Chart Form

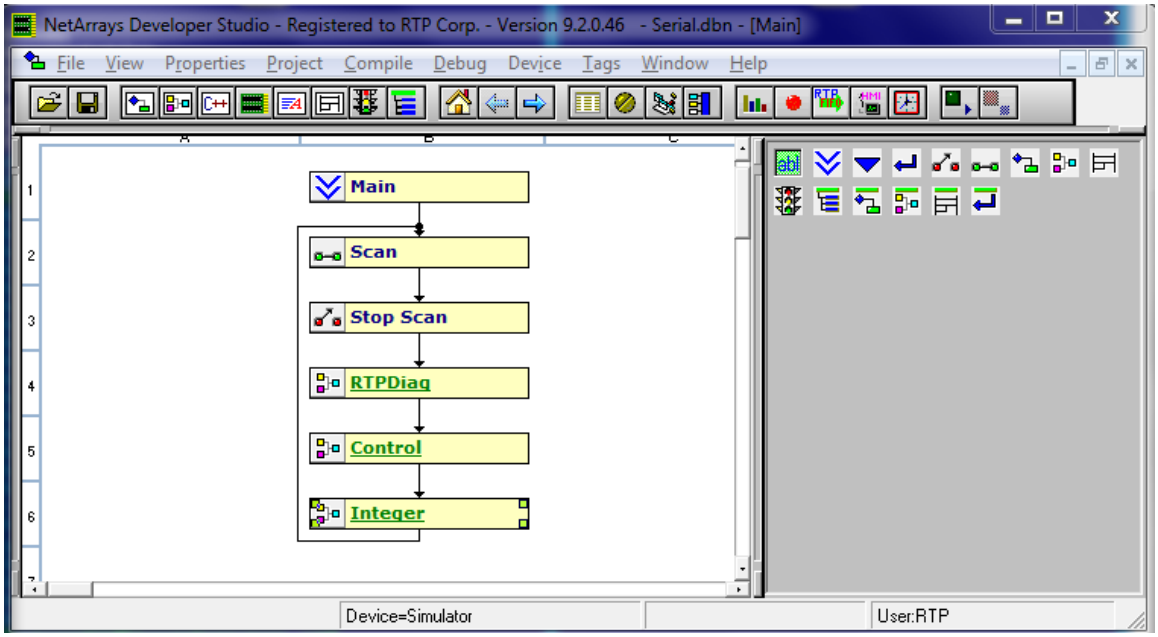
- Add one Module Form objects to the Main Form by selecting the **Module** icon in the Toolbox and dragging the object to the positions shown below.



- Connect the output of the **MForm1** to the input of **MForm2**. This automatically breaks the existing connection between **MForm1** and **Scan**. Connect the output of **MForm2** to the input of the **Scan** object.

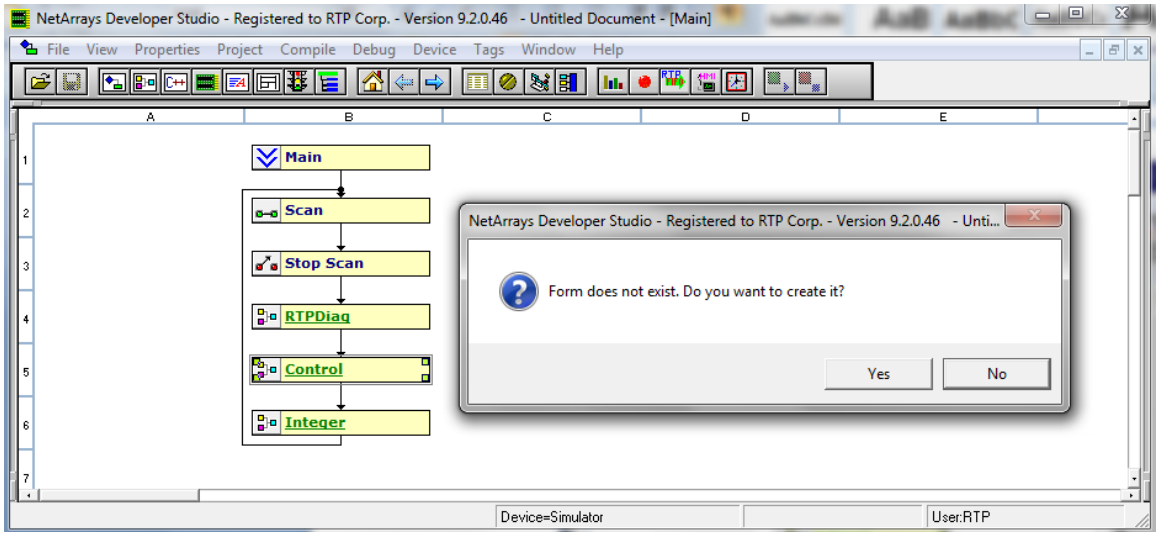


- Right click on the **MForm1** and select **Properties** from the pop-up menu. In the Property Manager display, type in the Tag name "**Control"**, followed by **Enter**. Close the Property Manager display. Repeat this for **MForm2** renaming it "**Integer"**.

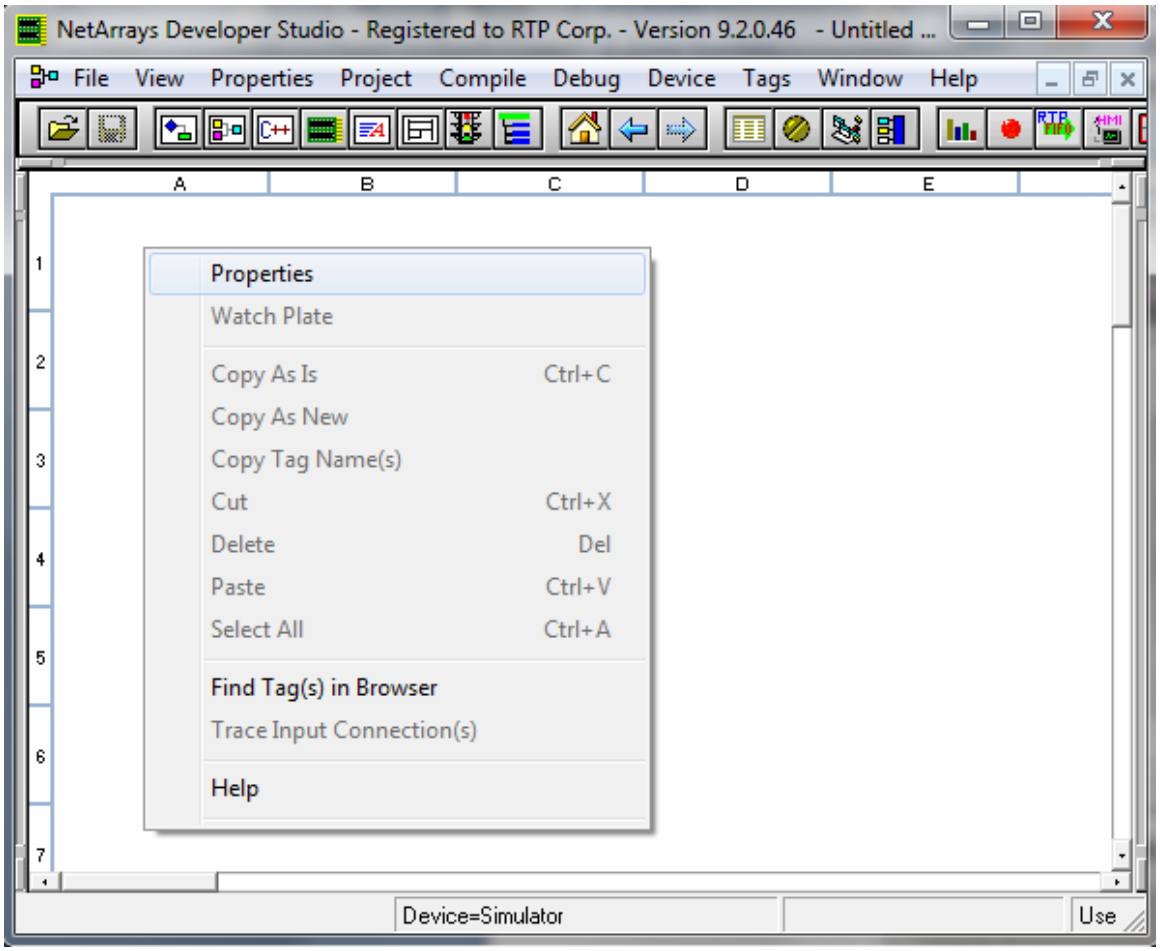


Construct the Control Module Form

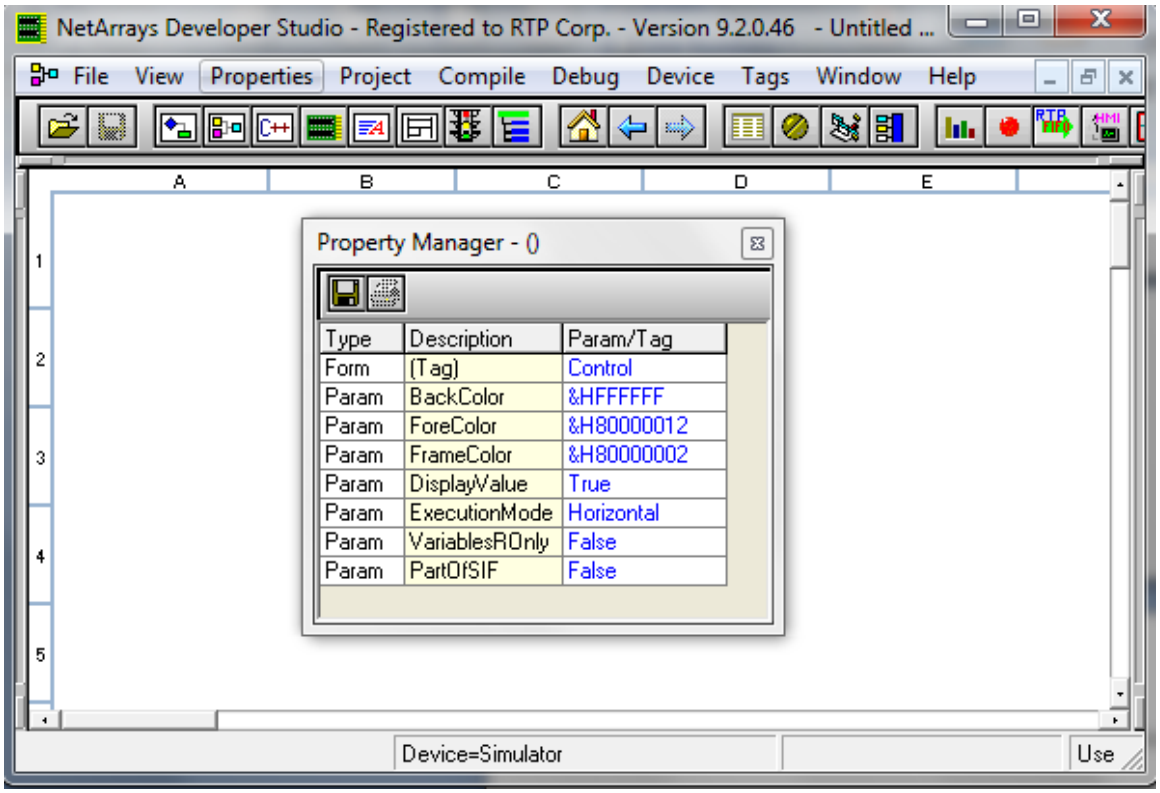
- Double-click on the **Control Module Form** to display the module form.
- Select **Yes** to open **Control**.



Right click in a blank area of the page and select **Properties**.



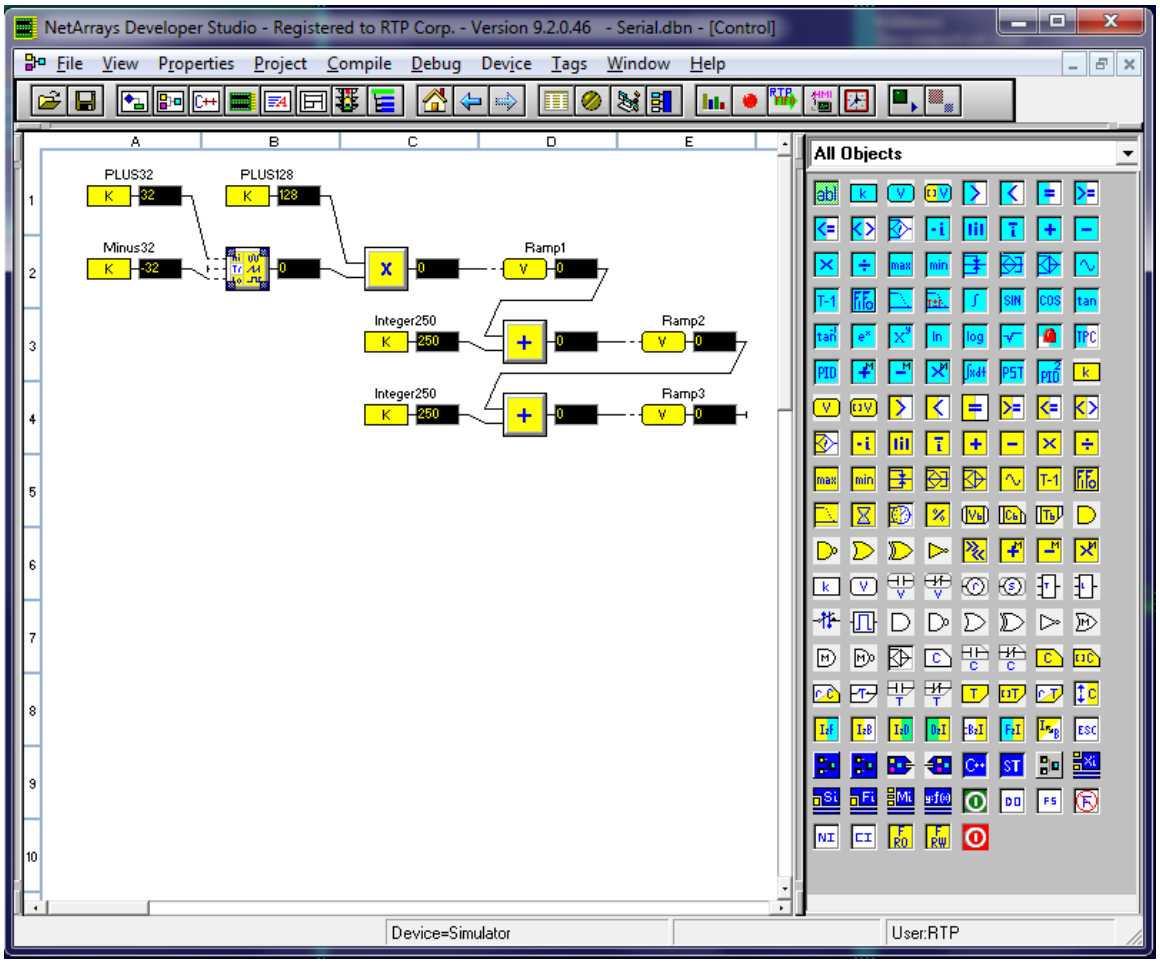
- Set "**PartOfSIF**" and "**VariablesROnly**" **False**. Close the **Property Manager** Window. This will allow placing the Non-SIL MODBUS variables on this MForm.



- Place the objects into the Module Form and connect the inputs to the outputs as shown in the following figures. Note: When entering a Tag name, you can either type the entire name or start typing the name and select the name from the available existing Tags. All of the I/O Tags will already exist as a function of the Auto Tag Generator. The Tag Prefix will be Serial_ or PG***n***_ where ***n*** is the number of the Point Group.
- The function of the Control Module Form is to generate changing Integer output data for the MODBUS Serial Communications Card.

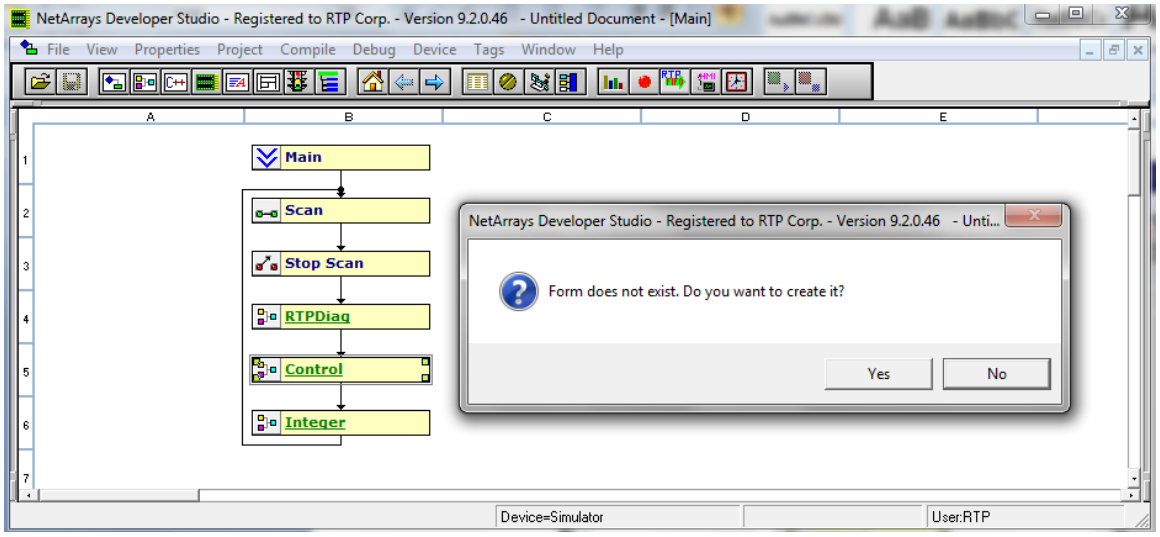
Cell	Object	Properties
A1	Int Constant	(Tag) = PLUS32; (Initial Value) = 32
B1	Int Constant	(Tag) = PLUS128; (Initial Value) = 128
A2	Int Constant	(Tag) = Minus32; (Initial Value) = -32
B2	Int Waveform Generator	(Wave) = Ramp Up; (Period) = 2
C2	Int Multiply	
D2	Int Variable	(Tag) = Ramp1
C3	Integer Constant	(Tag) = Integer250; (Initial Value) = 250
D3	Integer Add	
E3	Int Variable	(Tag) = Ramp2
C4	Integer Constant	(Tag) = Integer250; (Initial Value) = 250 (same object as C3)
D4	Integer Add	
E4	Int Variable	(Tag) = Ramp3

Note: Any properties not listed are to remain at their default value.

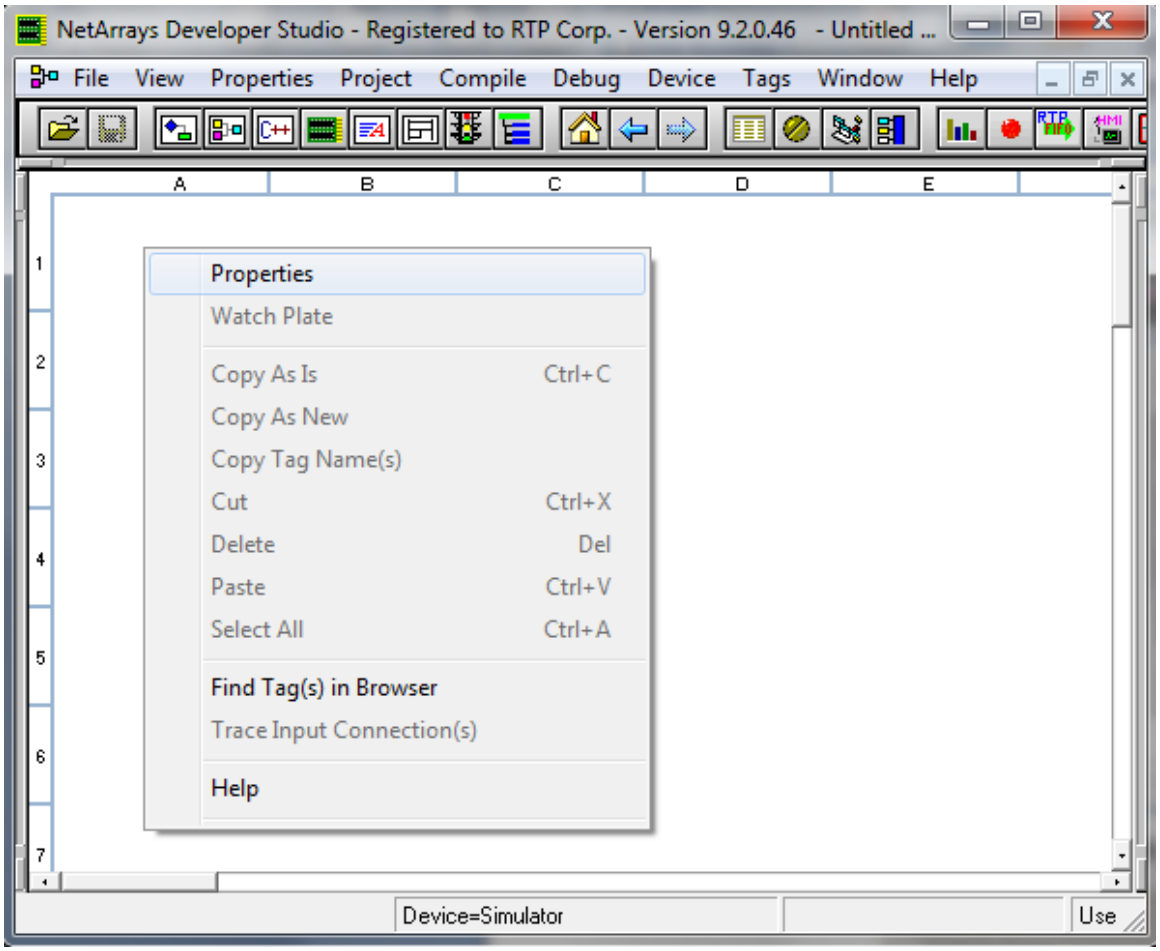


Construct the Integer Module Form

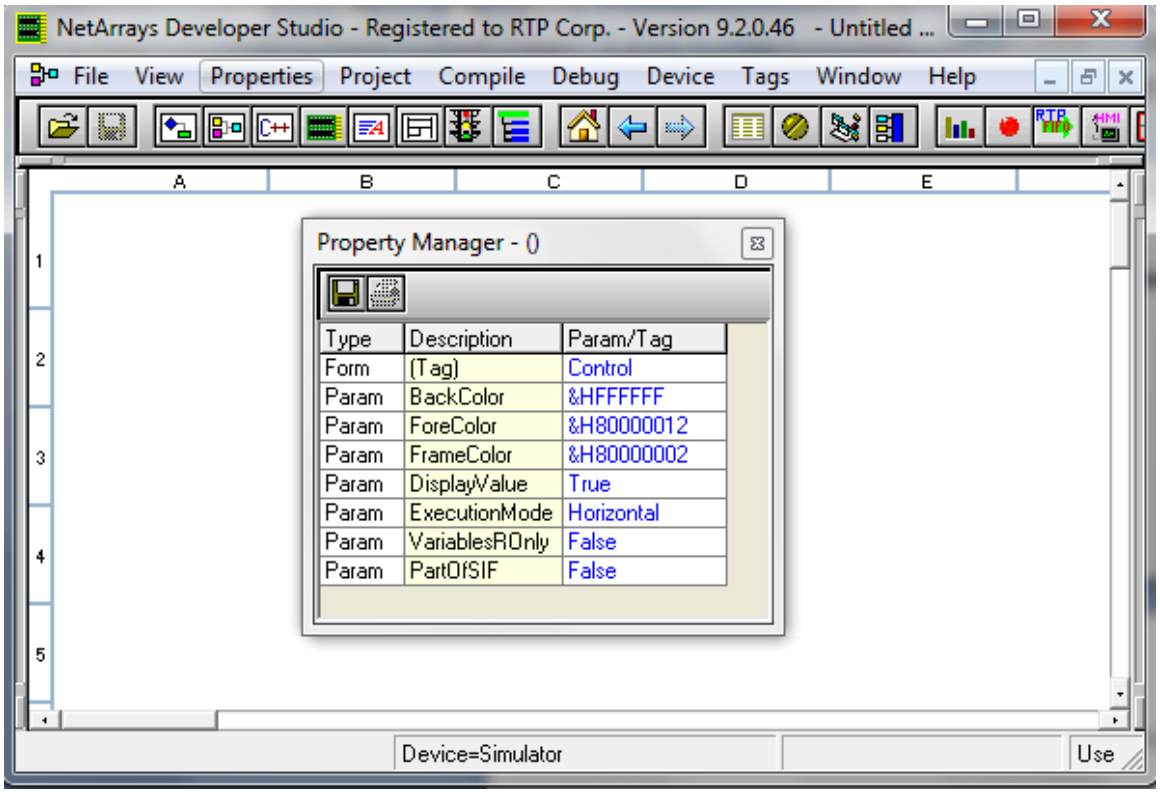
- Return to the Main Form by clicking on the button in the Main Toolbar.
- Double-click on the **Integer** object to create a new Module Form. When prompted to create the form, answer **Yes**.



- Right click in a blank area of the page and select **Properties**.



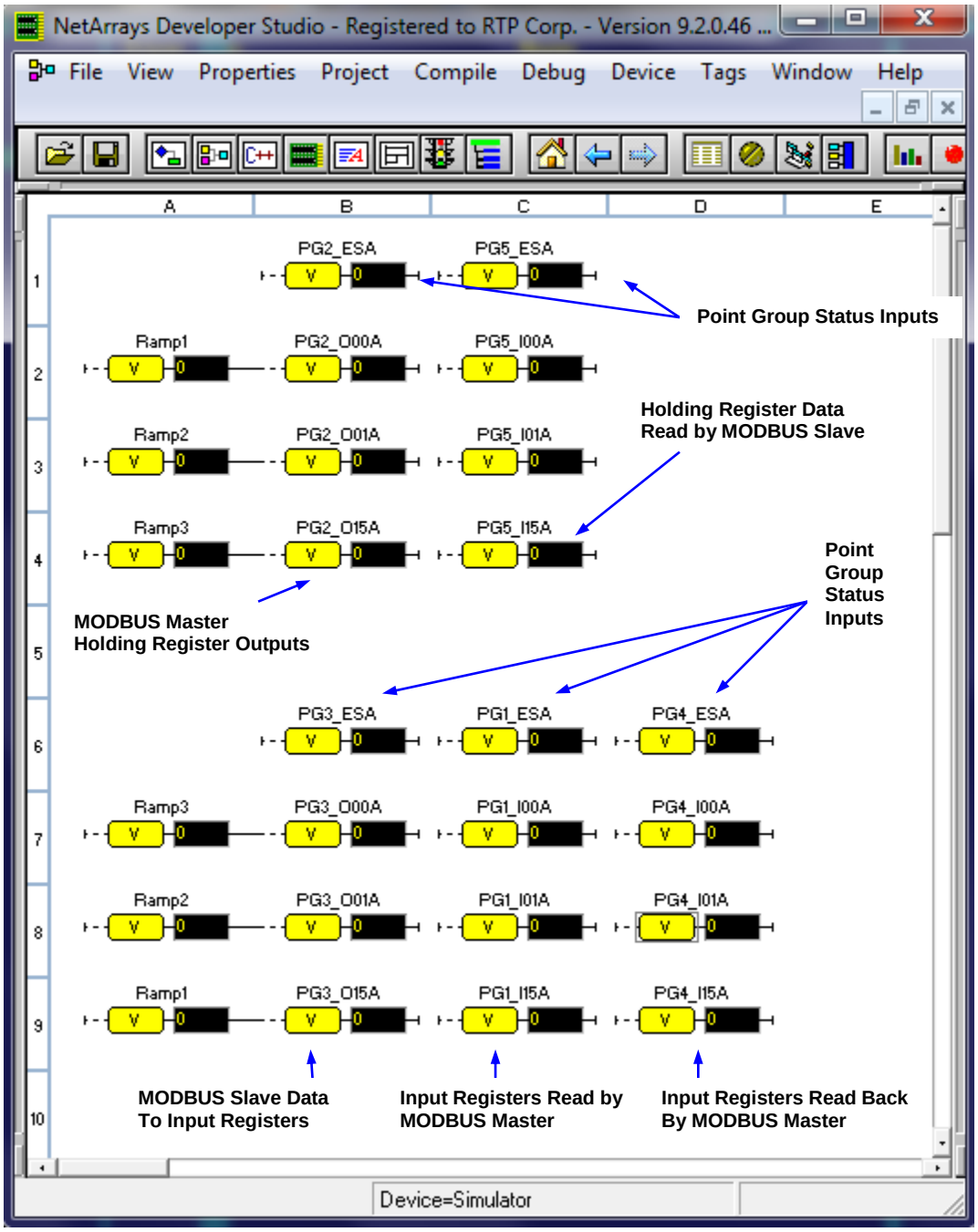
- Set "**PartOfSIF**" and "**VariablesROnly**" **False**. Close the **Property Manager** Window. This will allow placing the Non-SIL MODBUS variables on this MForm.



- Place the objects into the Module Form and connect the inputs to the outputs as shown in the following figures.
- The function of the Integer Module Form is to display the Integer outputs and inputs to and from the MODBUS Serial Communications Card and the Point Groups Status.

Cell	Object	Properties
B1	Int Variable	(Tag) = PG2_ESA
C1	Int Variable	(Tag) = PG5_ESA
A2	Int Variable	(Tag) = Ramp1
B2	Int Variable	(Tag) = PG2_O00A
C2	Int Variable	(Tag) = PG5_I00A
A3	Int Variable	(Tag) = Ramp2
B3	Int Variable	(Tag) = PG2_O01A
C3	Int Variable	(Tag) = PG5_I01A
A4	Int Variable	(Tag) = Ramp3
B4	Int Variable	(Tag) = PG2_O15A
C4	Int Variable	(Tag) = PG5_I15A
B6	Int Variable	(Tag) = PG3_ESA
C6	Int Variable	(Tag) = PG1_ESA
D6	Int Variable	(Tag) = PG4_ESA
A7	Int Variable	(Tag) = Ramp3
B7	Int Variable	(Tag) = PG3_O00A
C7	Int Variable	(Tag) = PG1_I00A
D7	Int Variable	(Tag) = PG4_I00A
A8	Int Variable	(Tag) = Ramp2
B8	Int Variable	(Tag) = PG3_O01A
C8	Int Variable	(Tag) = PG1_I01A
D8	Int Variable	(Tag) = PG4_I01A
A9	Int Variable	(Tag) = Ramp1
B9	Int Variable	(Tag) = PG3_O15A
C9	Int Variable	(Tag) = PG1_I15A
D9	Int Variable	(Tag) = PG4_I15A

Note: Any properties not listed are to remain at their default value.

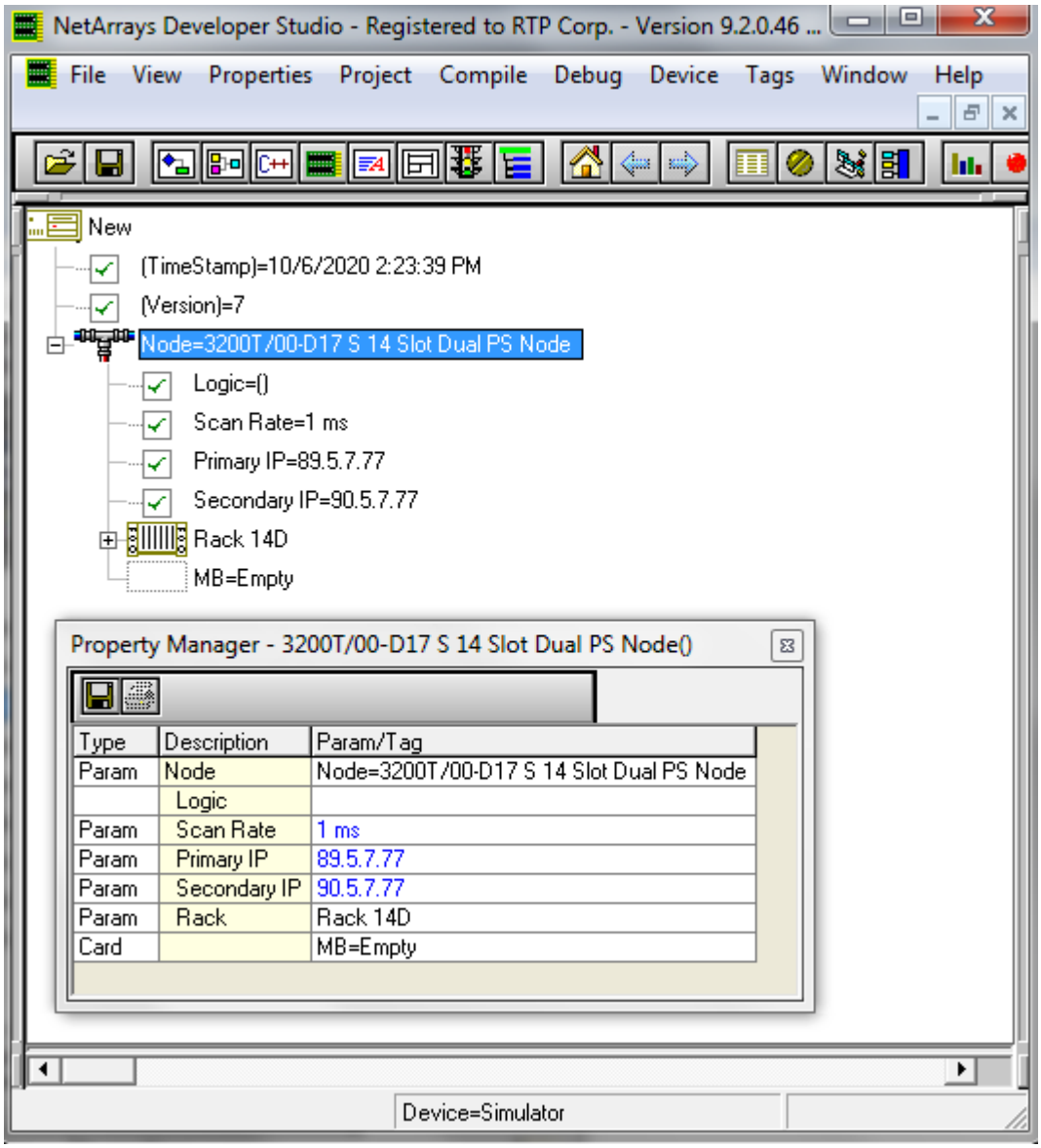


The following addresses are going to be used for the system node in this example:

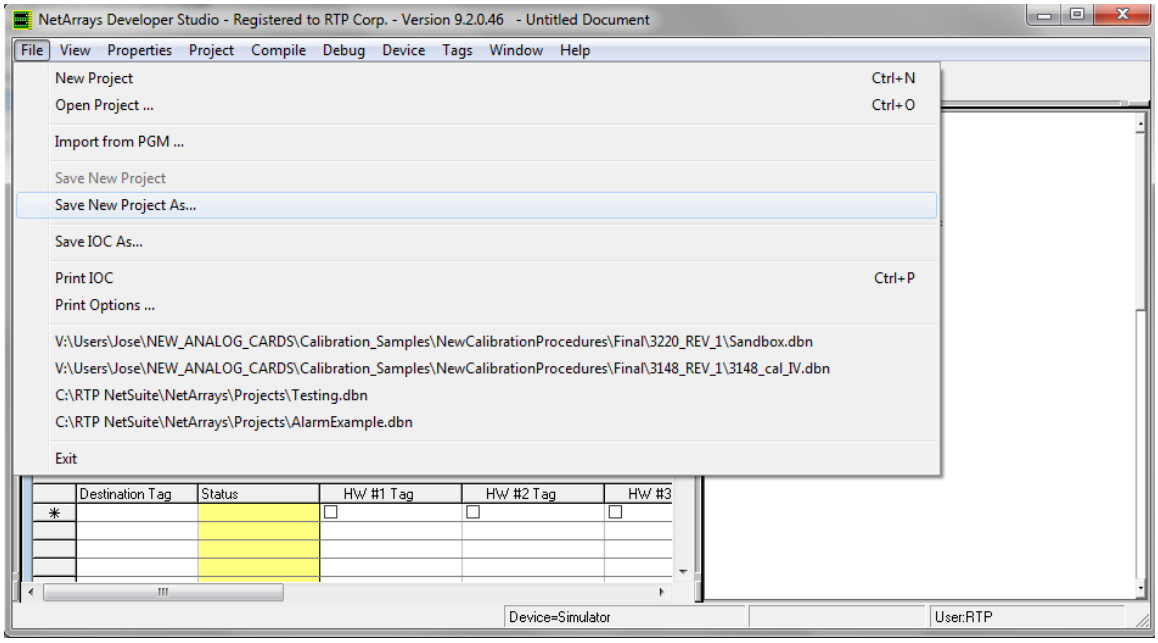
Device Name	Type	IP Address1	IP Address 2
MBSerial	Single	89.5.7.77	90.5.8.77

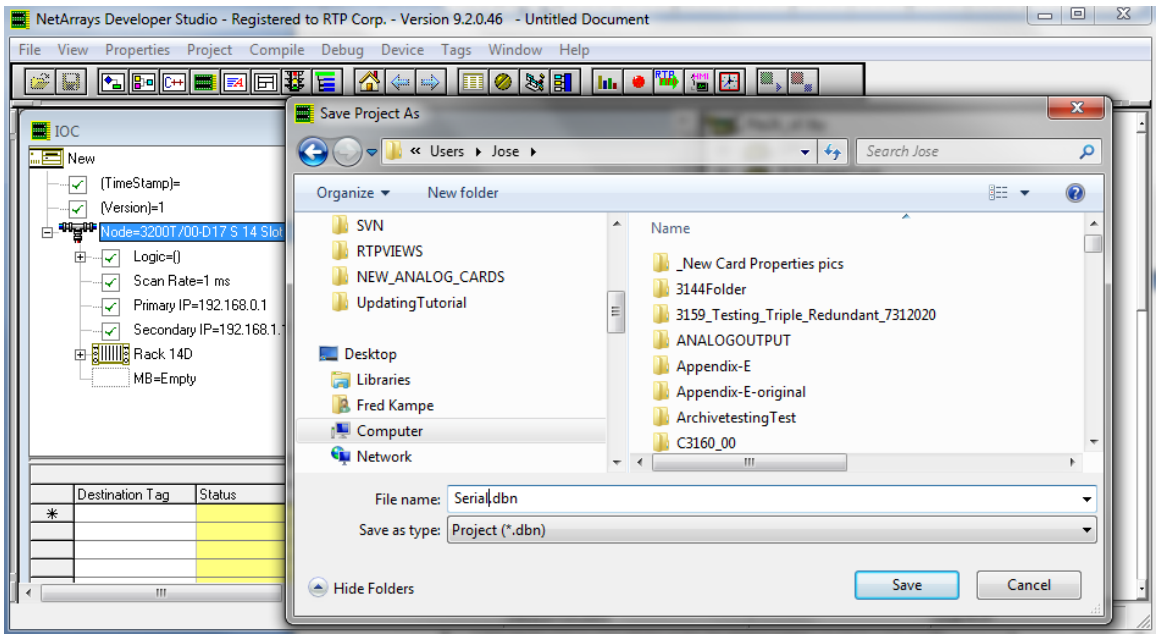
Enter Node IP Address and Save File for the Serial ModBus Project.

- Left Click on **Node=3200T/00-D17 S 14 Slot Dual PS Node,** select **Properties**, and enter the IP Addresses of your RTP3201T Node Processor (Primary IP **89.5.7.77** and Secondary IP **90.5.7.77** as shown in the picture below.)

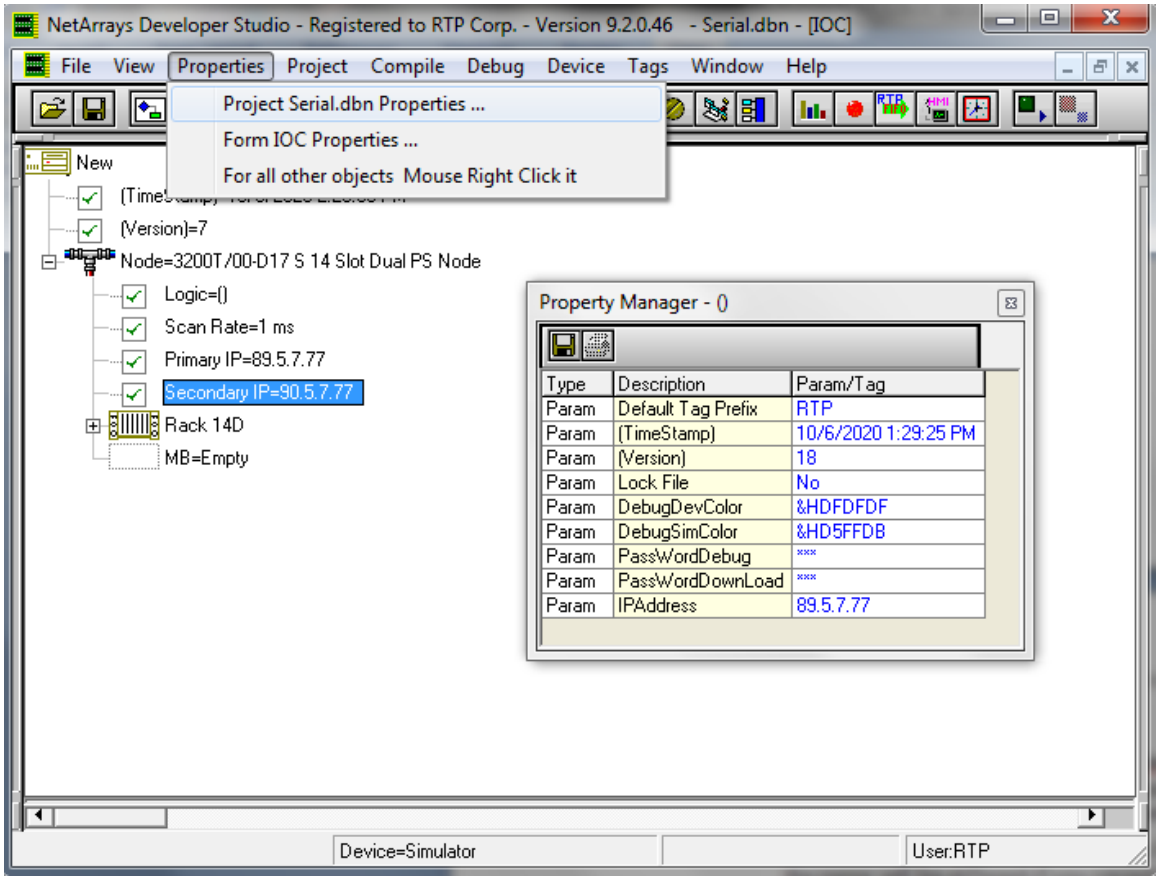


- Save the project. From the NetArrays **File** menu select and **Save** this project as **Serial.dbn** (the project can be saved under a different r name).





● Click on **Properties,** select **Project Serial.dbn** (name of the NetArrays project) **Properties**, and enter the IP Address of your RTP3201T Node Processor (**89.5.7.77** is shown as an example) in the **IPAddress** field in the **Property Manager** window.



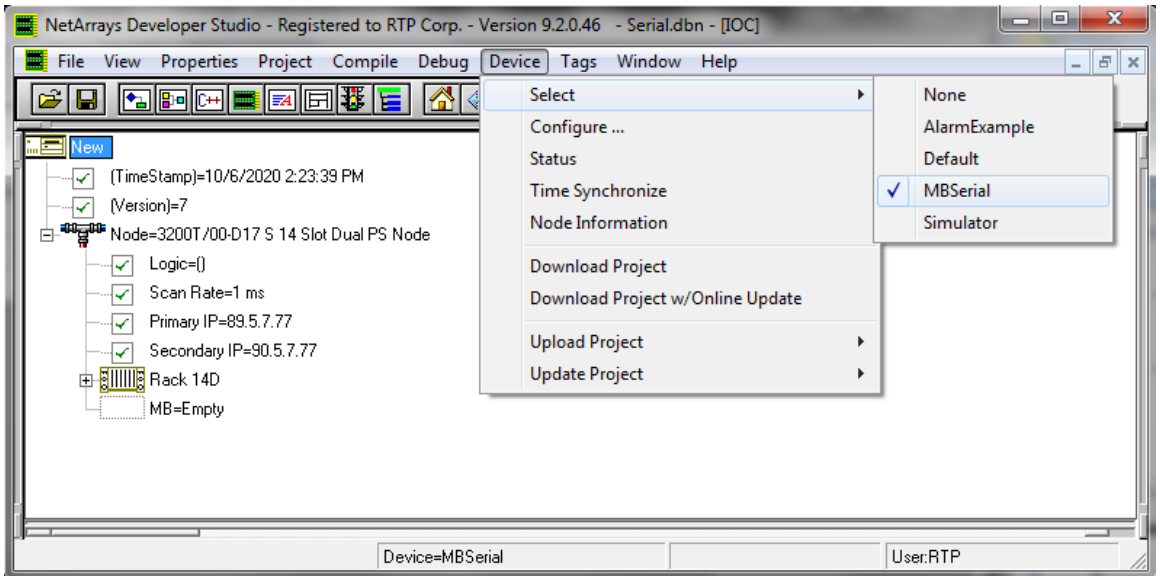
Note that **PassWordDebug** and **PassWordDownload** are set to "**rtp**" by default. If your RTP32001T Node has different passwords, change the **Properties** to match. Then use **<u>your</u>** passwords for the download and debug steps instead of "**rtp**".

- Save the project. From the NetArrays **File** menu select **Save Serial.dbn** (note that the name will be different if you saved the project file under another name).

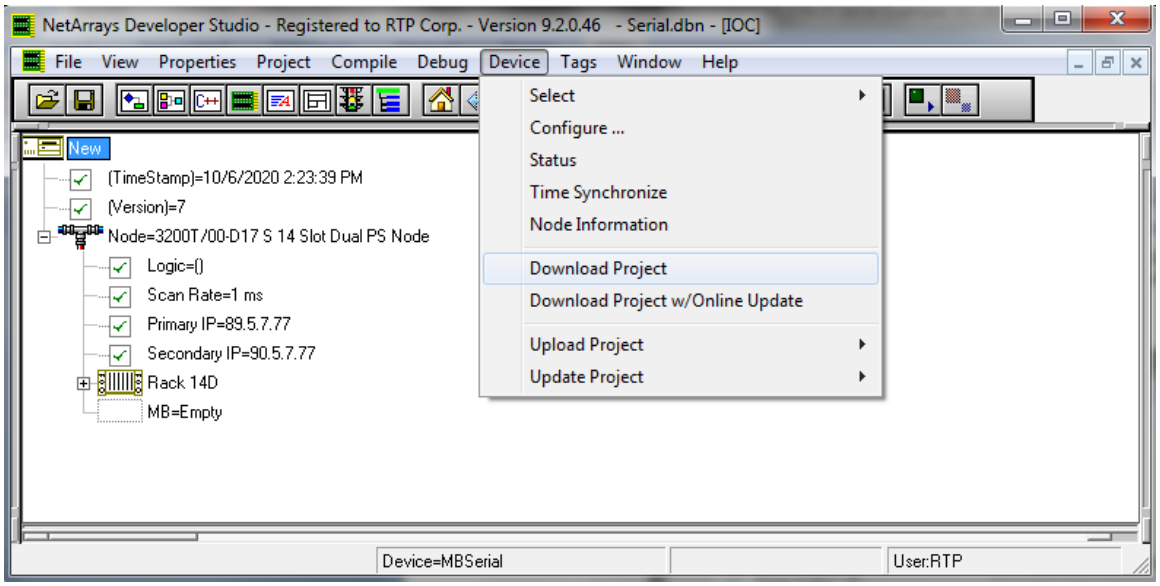
Verification

Downloading the Program

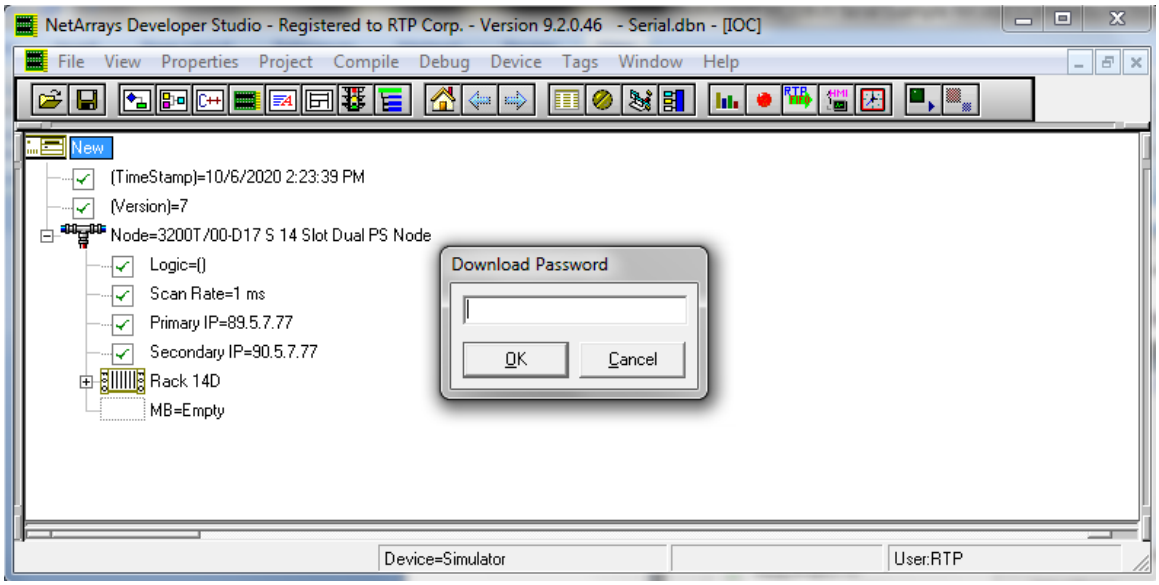
- Make sure that the MODBUS Serial Communications Card is installed, the MODBUS Serial Communications Card is connected to the Termination Module, the Termination Module DIP Switches are configured, and the 2 MODBUS Serial Ports (J1 and J2) are connected to each other by an RS-232 cable.
- Connect power to the chassis power supply.
- In NetArrays, select the target node containing the MODBUS Serial Communications Card from the **Device** ▸ **Select** menu.



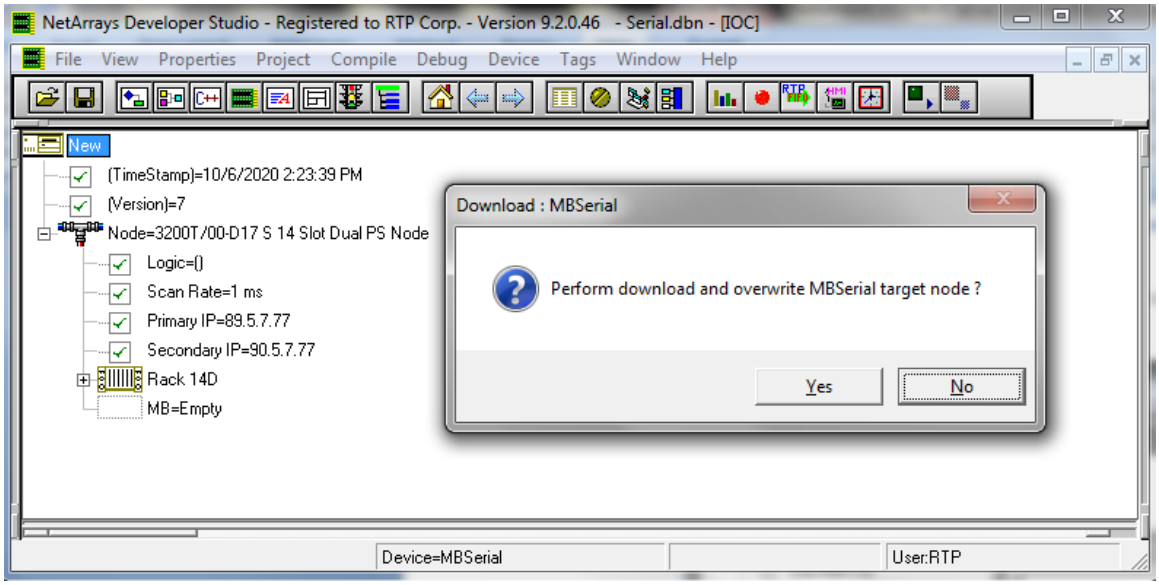
- Select **Device** and **Download Project** to download the project.



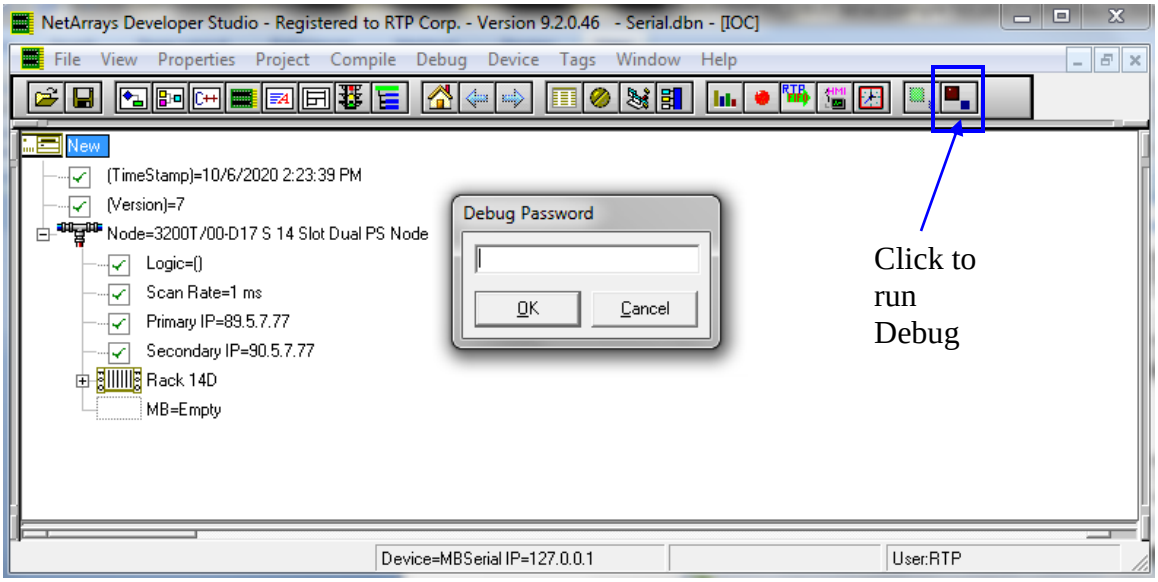
- Enter the Download Password, we use **rtp**, and select **OK**.



- Click "**Yes**" to overwrite to the current Target Node.

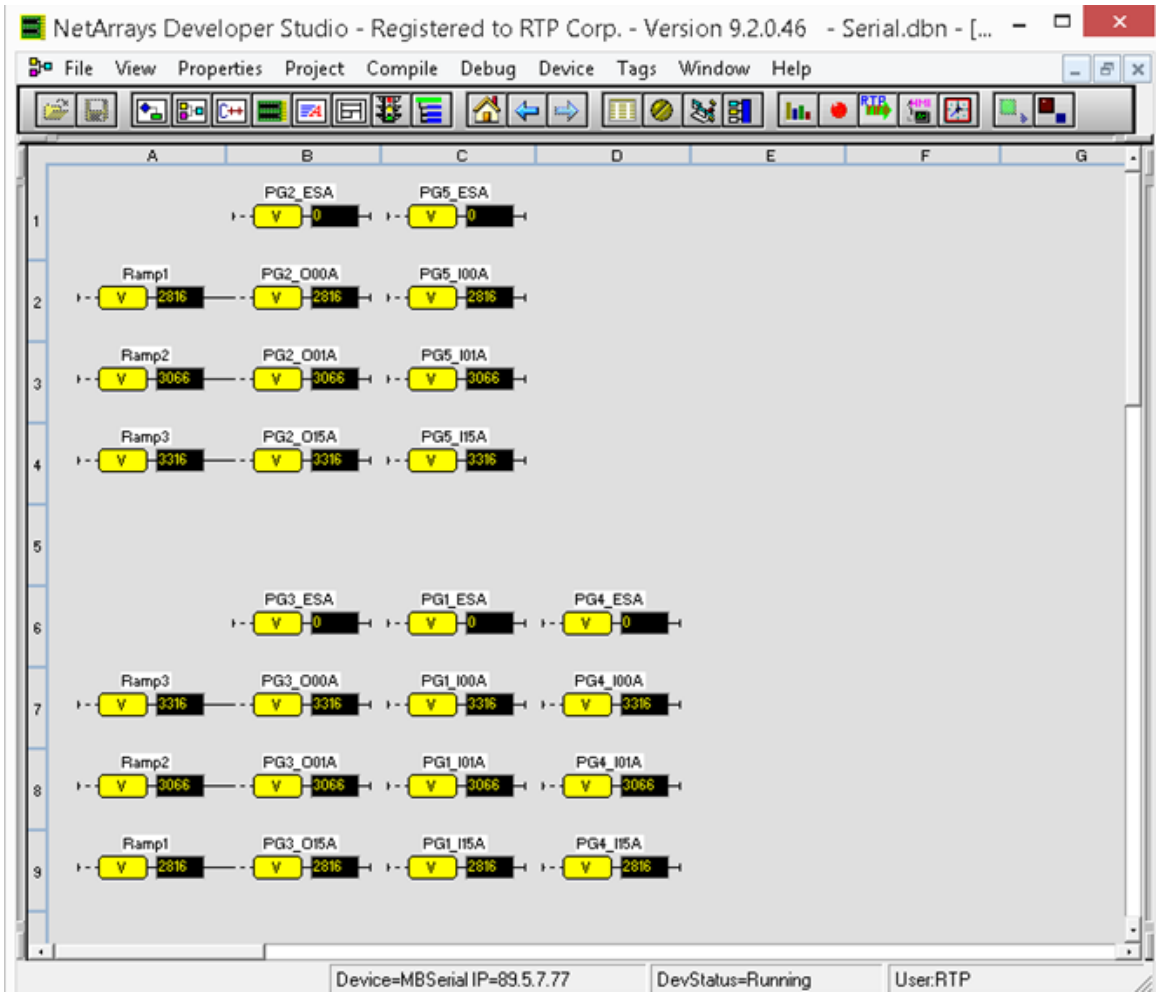


- Run the project in Debug mode by clicking on the **Run** button in the Main Toolbar.
- Enter the Debug Password, we use **rtp**, and select **OK**.


NetArrays Developer Studio - Registered to RTP Corp. - Version 9.2.0.46 - Serial.dbn - [IOC]
File View Properties Project Compile Debug Device Tags Window Help
New
(TimeStamp)=10/6/2020 2:23:39 PM
(Version)=7
Node=3200T/00-D17 S 14 Slot Dual PS Node
Logic=()
Scan Rate=1 ms
Primary IP=89.5.7.77
Secondary IP=90.5.7.77
Rack 14D
MB=Empty
Debug Password
OK
Cancel
Click to run Debug
Device=MBSerial IP=127.0.0.1
User:RTP

Verify Integer Module Form

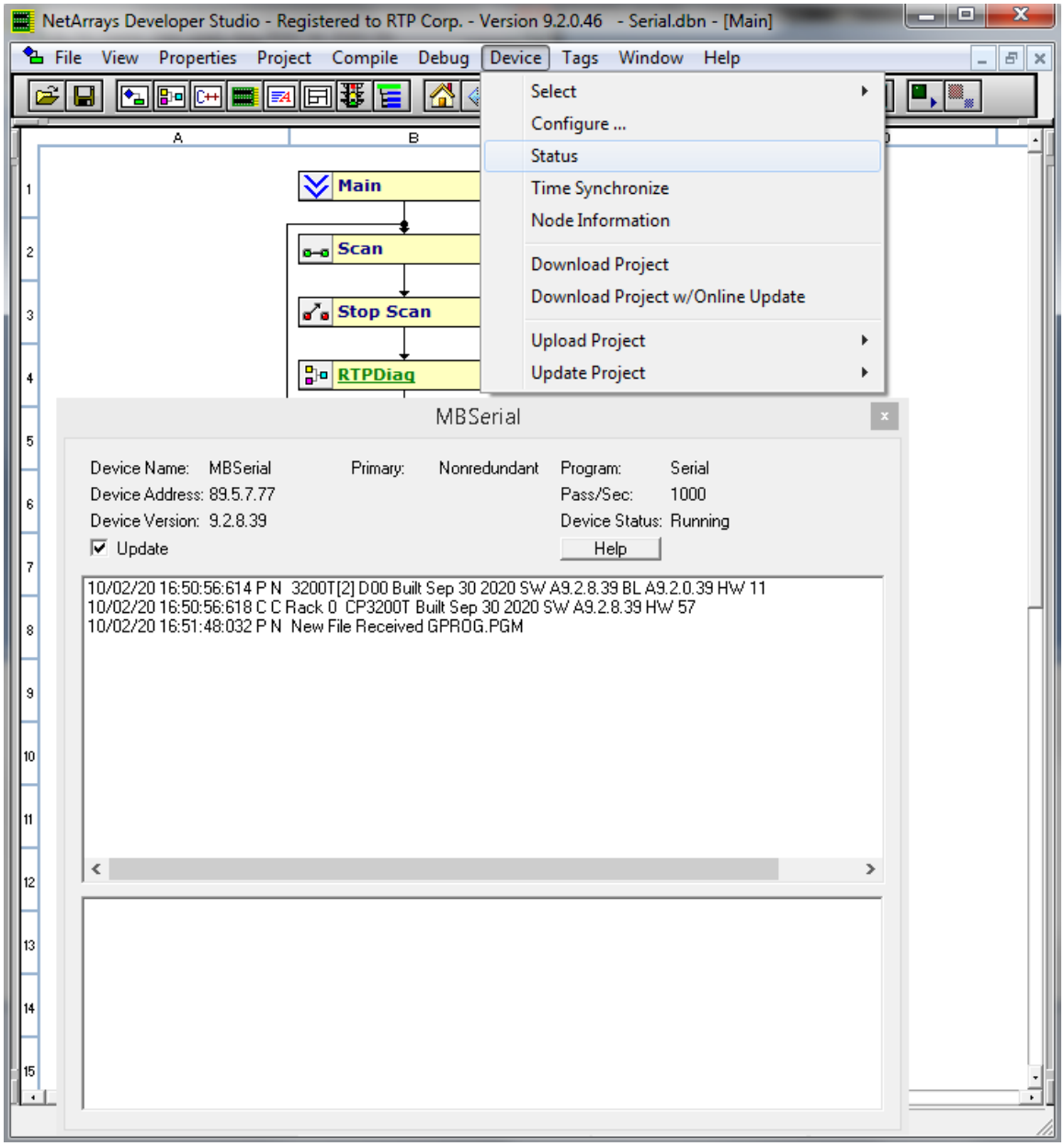
- Return to the Main Form by clicking on the button in the Main Toolbar.
- Double-click on the **Integer** object to open the Module Form.
- Observe that the Point Group status variables equal zero, and that the values from the Integer Input Point Groups are equal to the values of the Integer Output Point Groups. For example, the variable PG5_I00_A matches the variables PG2_O00A andRamp1.



- If the inputs and outputs are not equal, carefully check the configuration of the MODBUS Serial Communications Card and the Point Groups.
- If any Master Point Group Status is not zero, carefully check the setting of the DIP Switches on the Termination Module and the RS-232 Cable.

Status Window

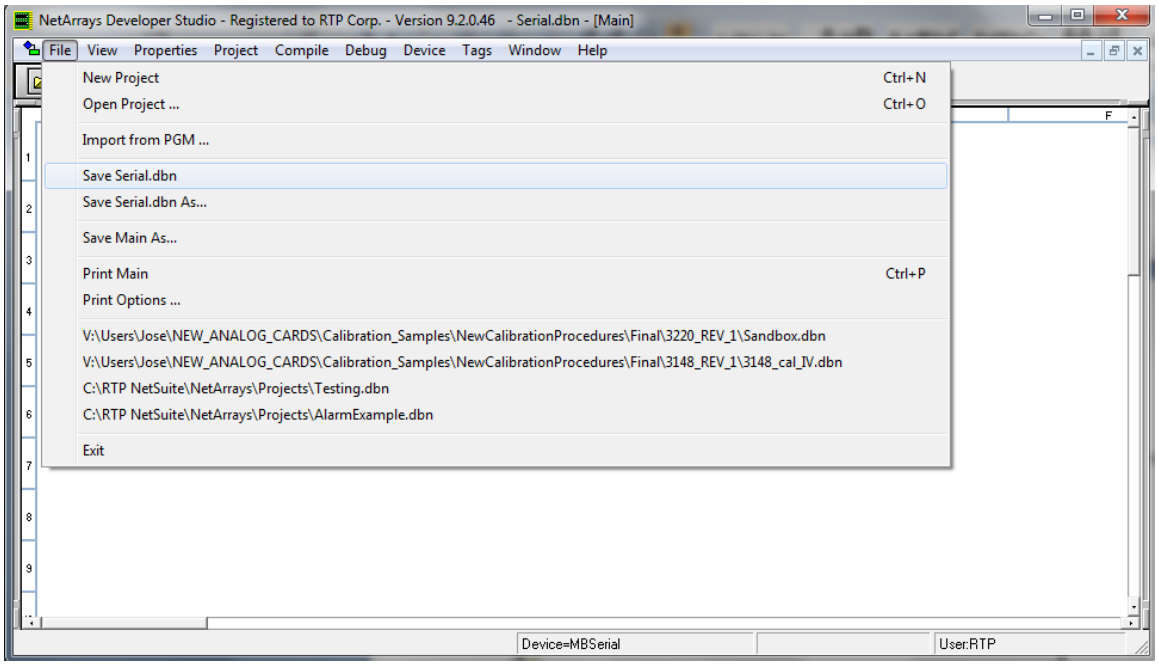
The Status Window should show the RTP3201T Node's **Device Status: = "Running"**. The bottom panel should be empty to indicate that there are no I/O Errors. The top panel shows historical messages.



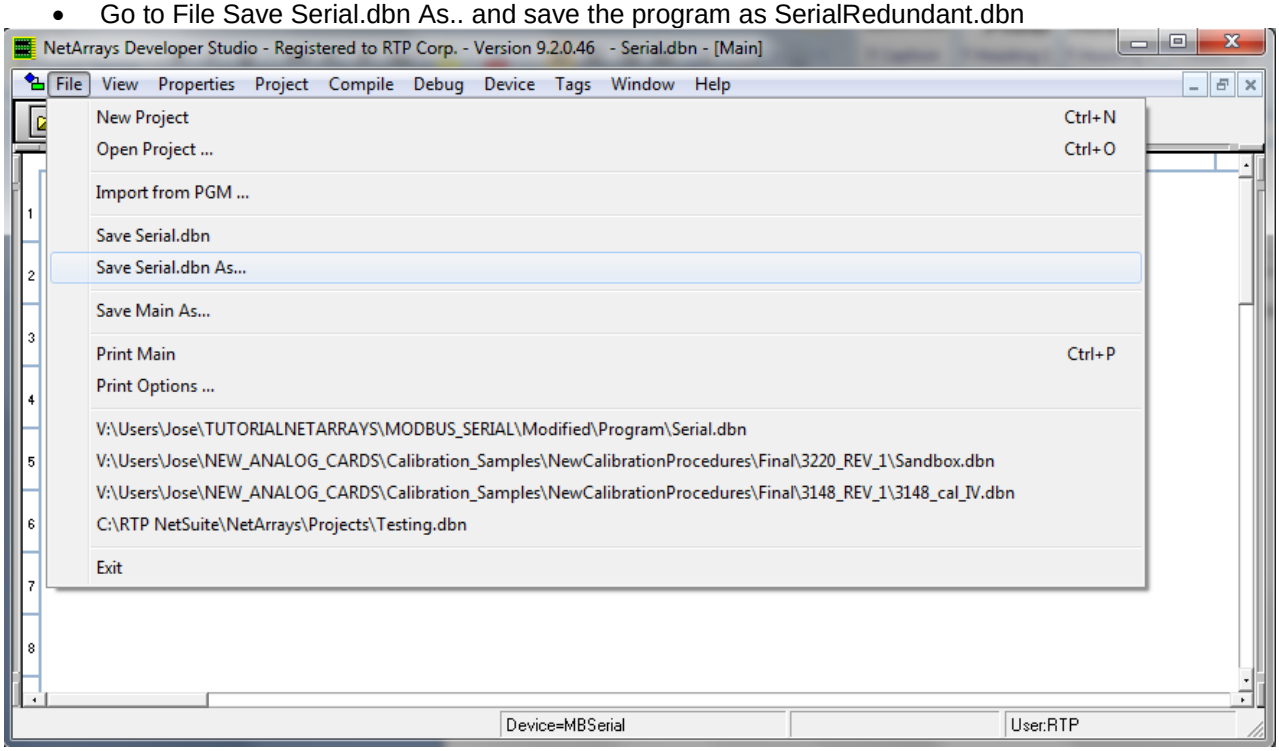
Redundant Card Configuration

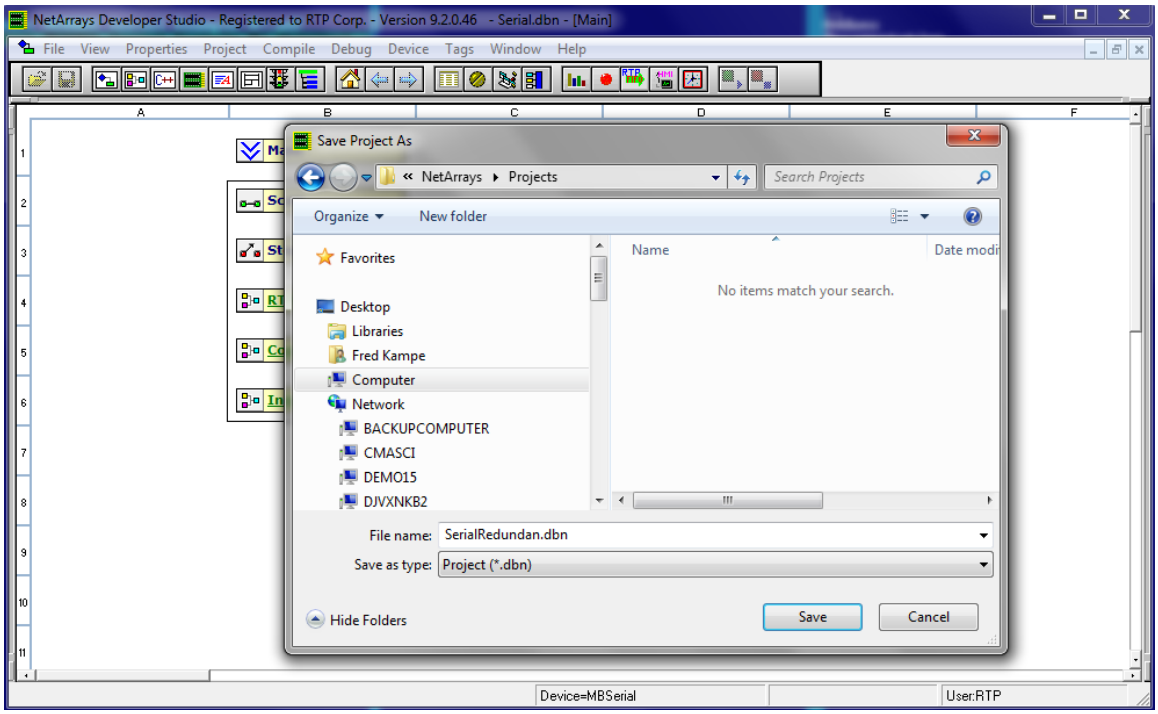
- At this point, you have successfully configured and tested the MODBUS Serial Communication Card with both a Master and a Slave Port. Now, the next step of this example is to add a redundant card to the existing Modbus serial card..

- Save the current Netarray project by clicking on File and Save Serial.dbn

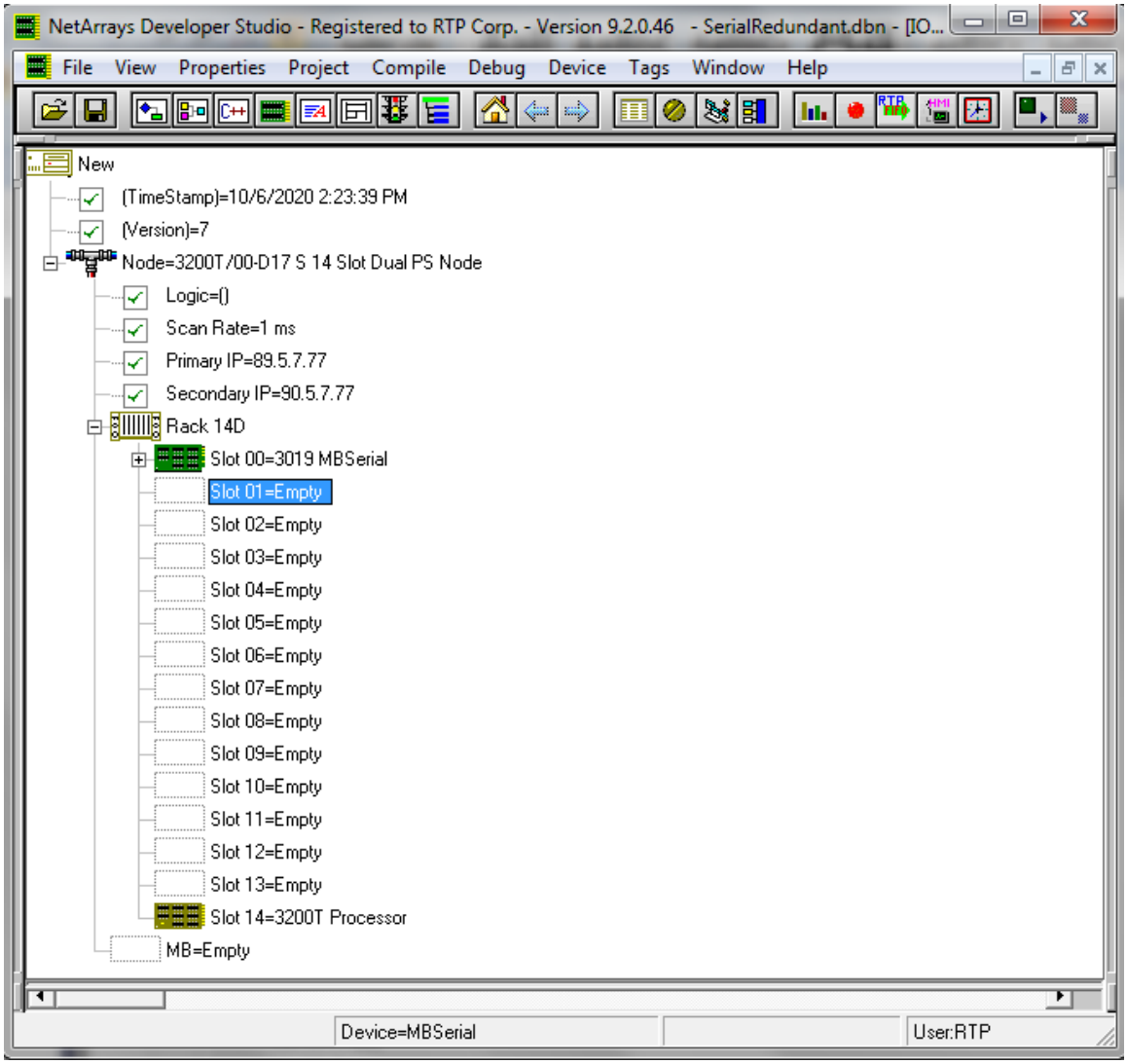


- Go to File Save Serial.dbn As.. and save the program as SerialRedundant.dbn

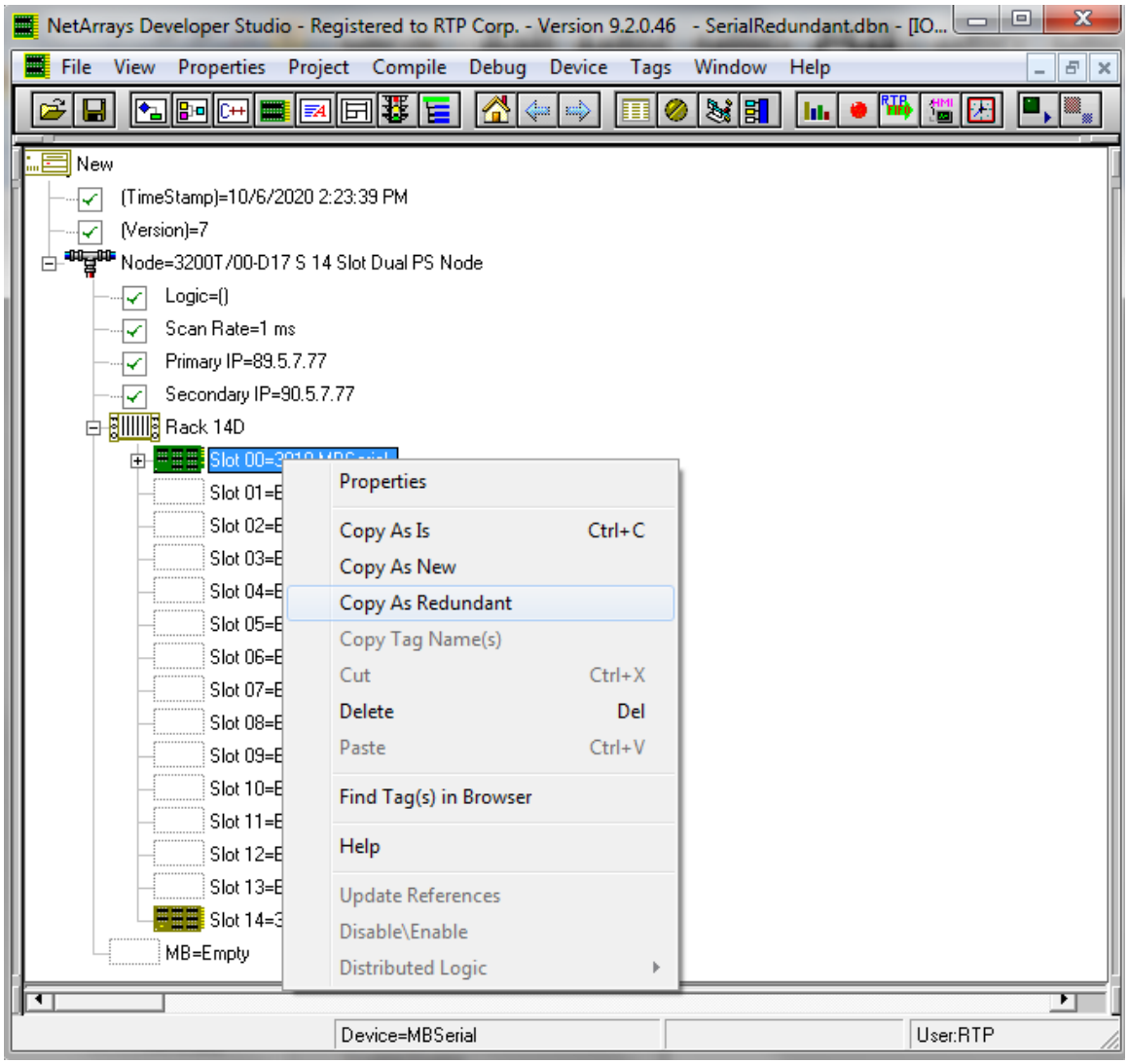




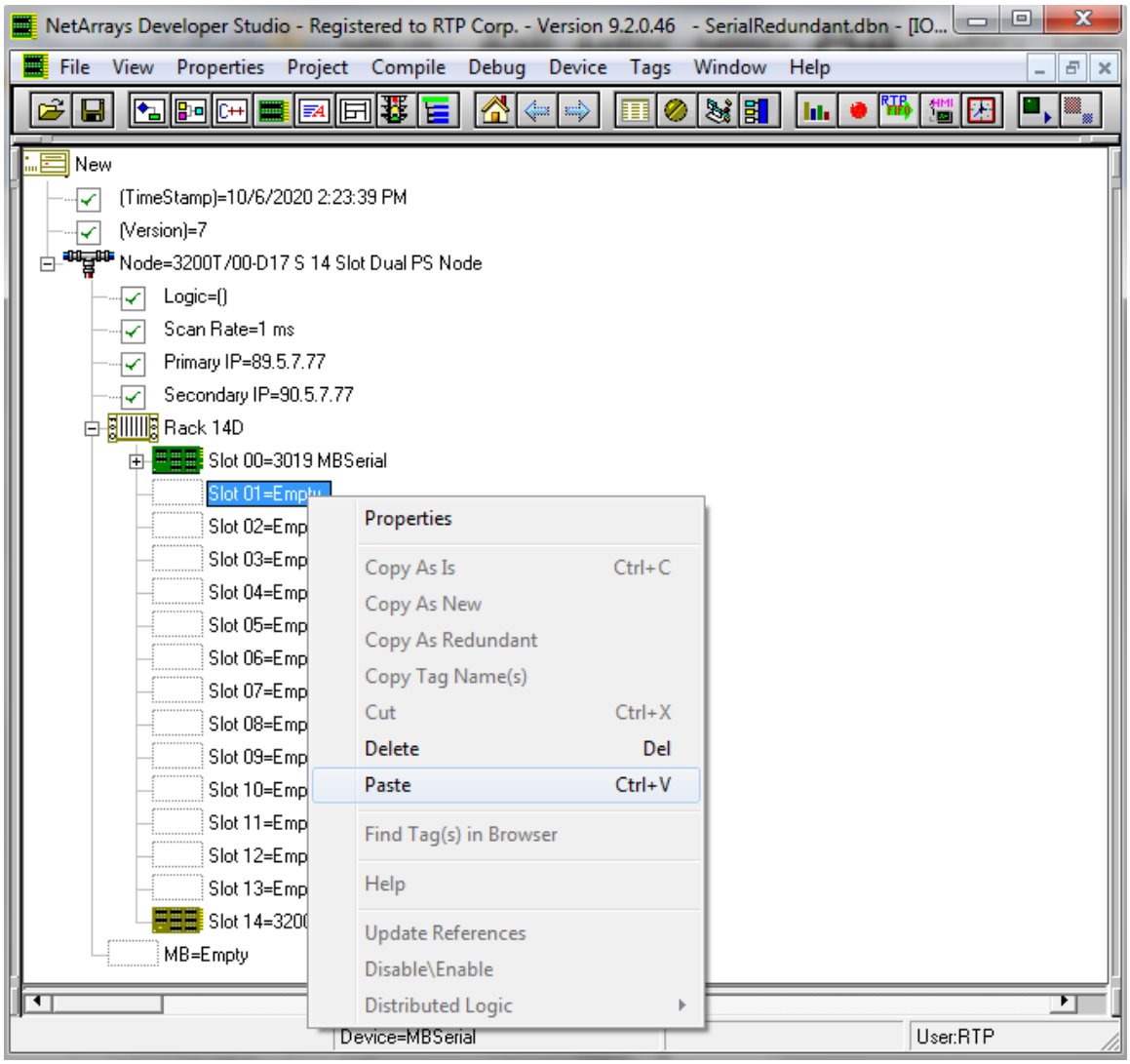
- Go to the configuration panel and expand the Rack 14D as shown in the figure below.



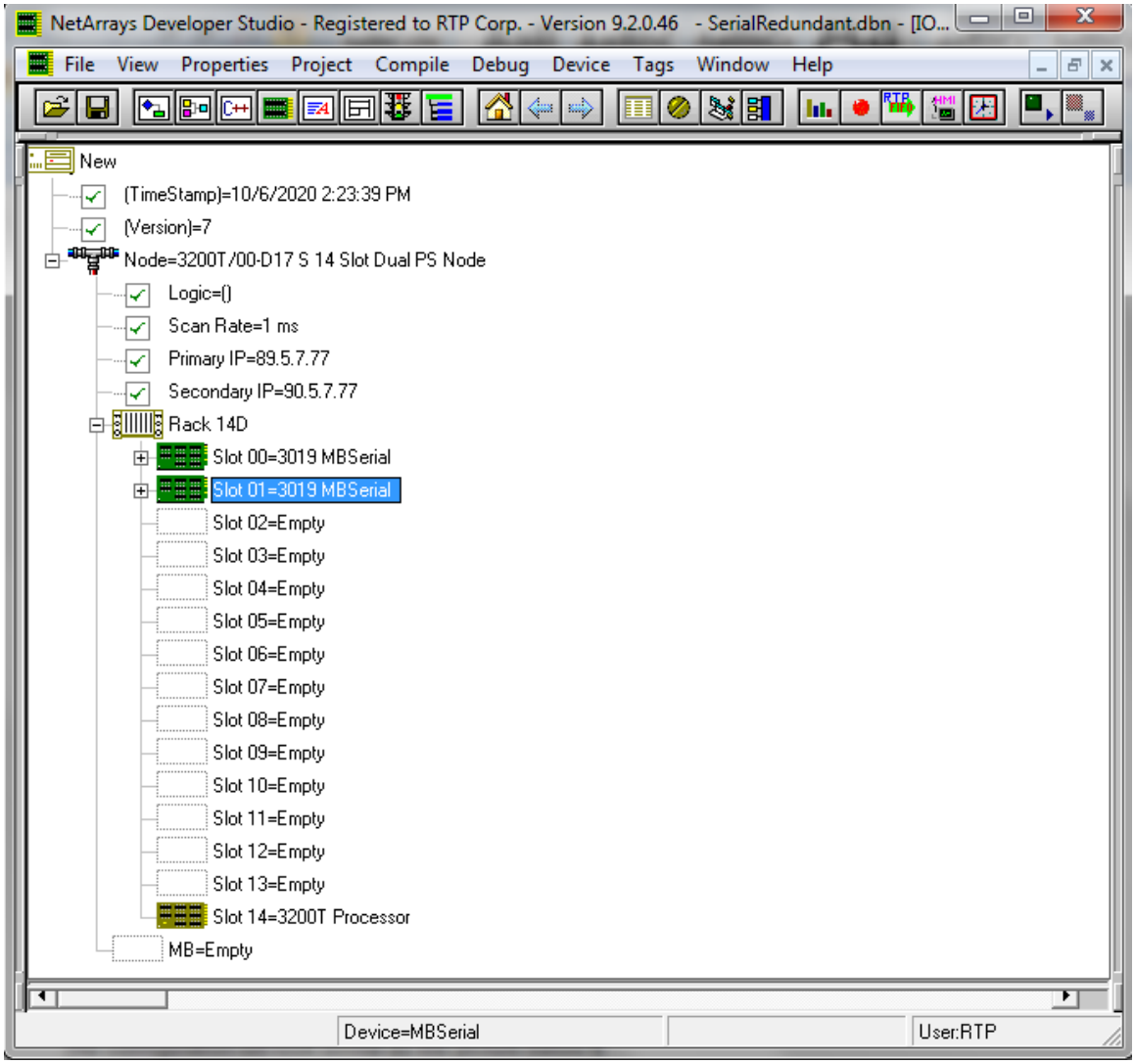
- Right Click on Slot 00=3019 MB Serial and select Copy As Redundant.



- Go to Slot 01 = Empty, Right Click on it and pasted the redundant card.



The configuration will look similar as the picture below.



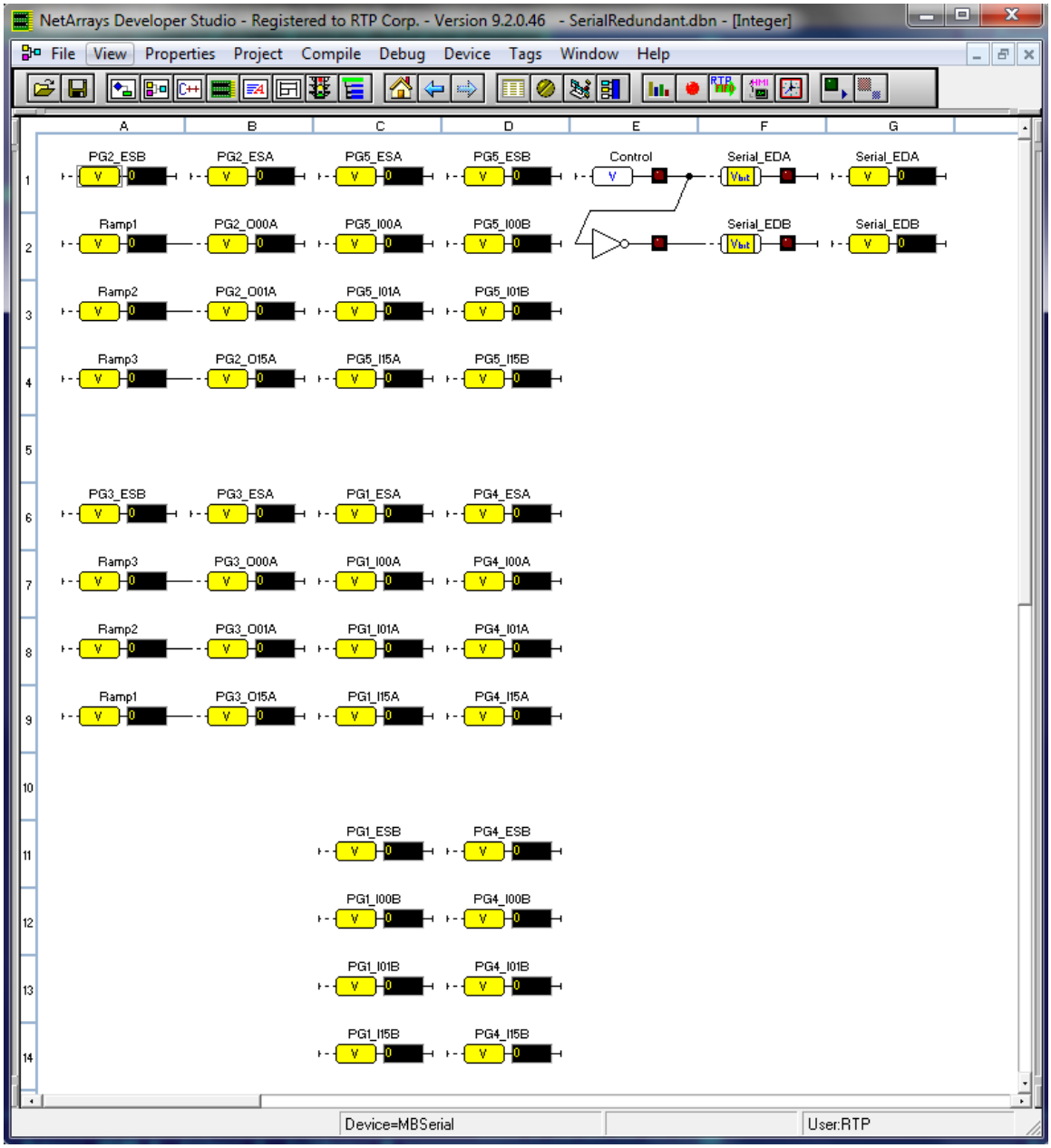
- Return to the Main Form by clicking on the button in the Main Toolbar and double click on the Integer Module.

Modify the original Integer Module as shown in the Table below.

Cell	Object	Properties
A1	Int Variable	(Tag) = PG2_ESB
D1	Int Variable	(Tag) = PG5_ESB
E1	Bool Variable	(Tag) = Control
F1	Int BitVariable	(Tag) = Serial_EDA Bit = 14
G1	Int Variable	(Tag) = Serial_EDA
D2	Int Variable	(Tag) = PG5_I00B
E2	Bool Inverter	

F2	Int Variable	(Tag) = Serial_EDB Bit = 14
G2	Int Variable	(Tag) = Serial_EDB
D3	Int Variable	(Tag) = PG5_I01B
D4	Int Variable	(Tag) = PG5_I15B
A6	Int Variable	(Tag) = PG3_ESB
C11	Int Variable	(Tag) = PG1_ESB
D11	Int Variable	(Tag) = PG4_ESB
C12	Int Variable	(Tag) = PG1_I00B
D12	Int Variable	(Tag) = PG4_I00B
C13	Int Variable	(Tag) = PG1_I01B
D13	Int Variable	(Tag) = PG4_I01B
C14	Int Variable	(Tag) = PG1_I15B
D14	Int Variable	(Tag) = PG4_I15B

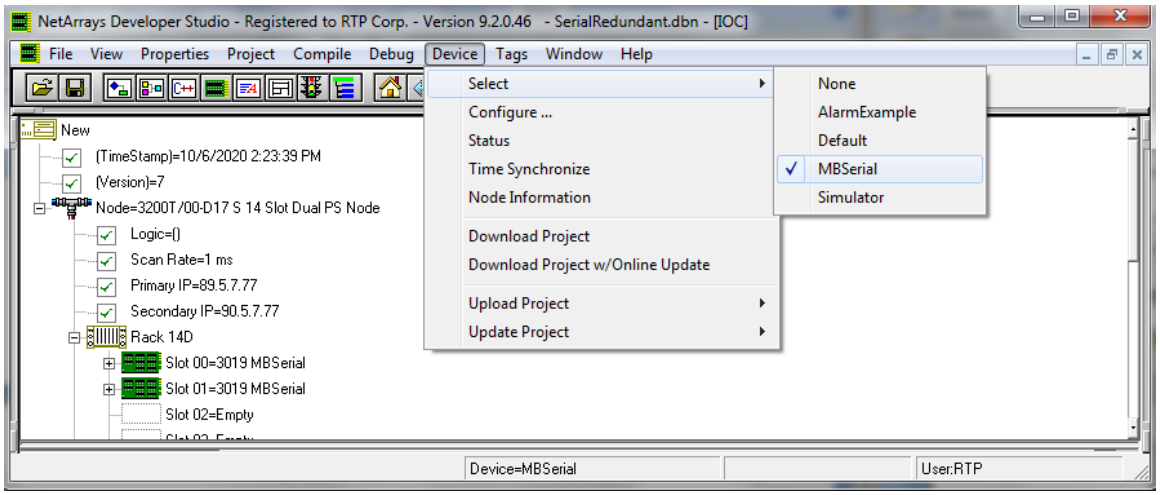
The Integer Module should look like the picture below after adding the new objects.



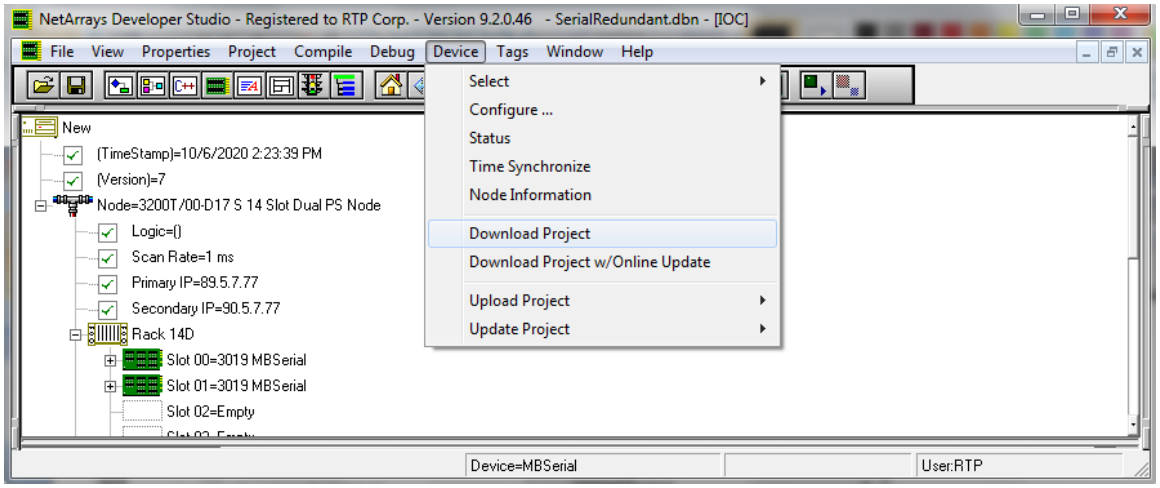
Verification

Downloading the Program

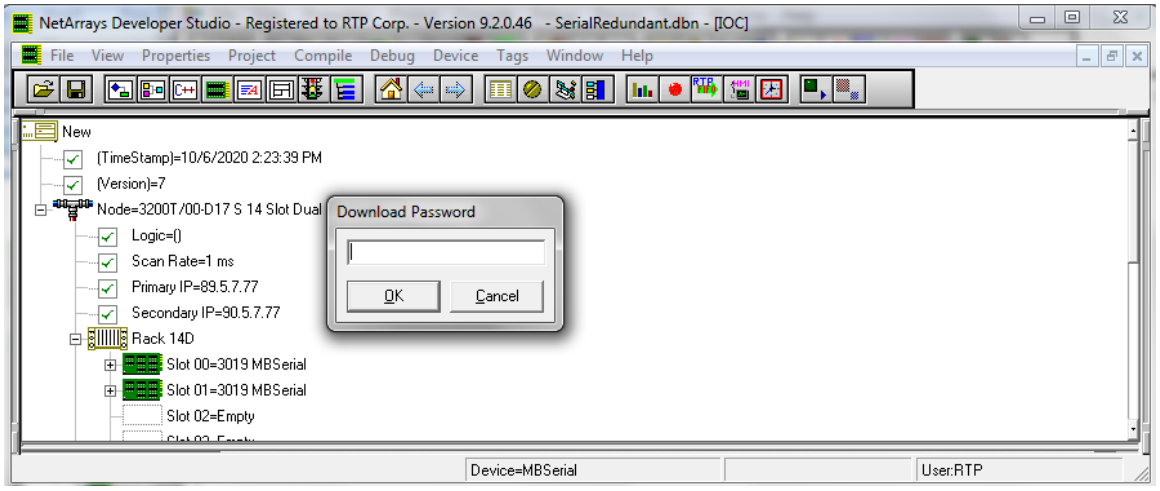
- Make sure that the MODBUS Serial Communications Cards are installed and connected to the Termination Module. Verify that the Termination Modules' DIP Switches are configured corrected, and each card has the 2 MODBUS Serial Ports (J1 and J2) connect to each other by an RS-232 cable.
- In NetArrays, select the target node containing the MODBUS Serial Communications Card from the **Device ▸ Select** menu.



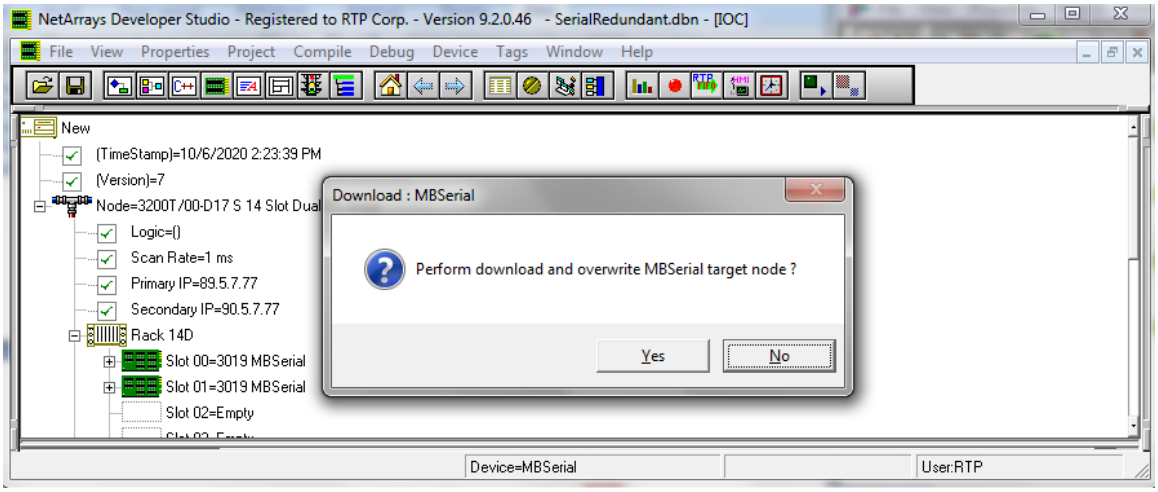
- Select **Device** and **Download Project** to download the project.



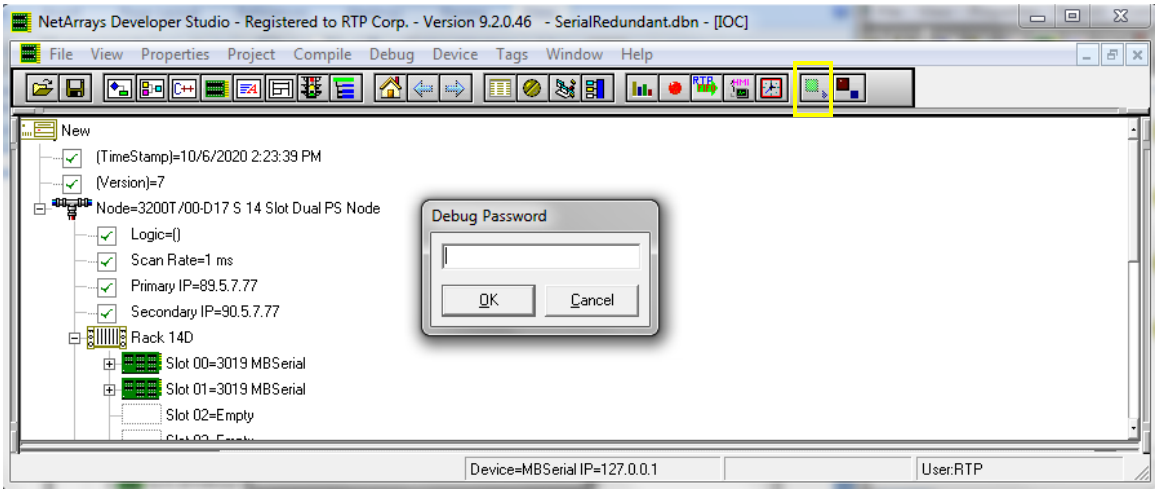
- Enter the Download Password, we use **rtp**, and select **OK**.



- Click "**Yes**" to overwrite to the current Target Node.

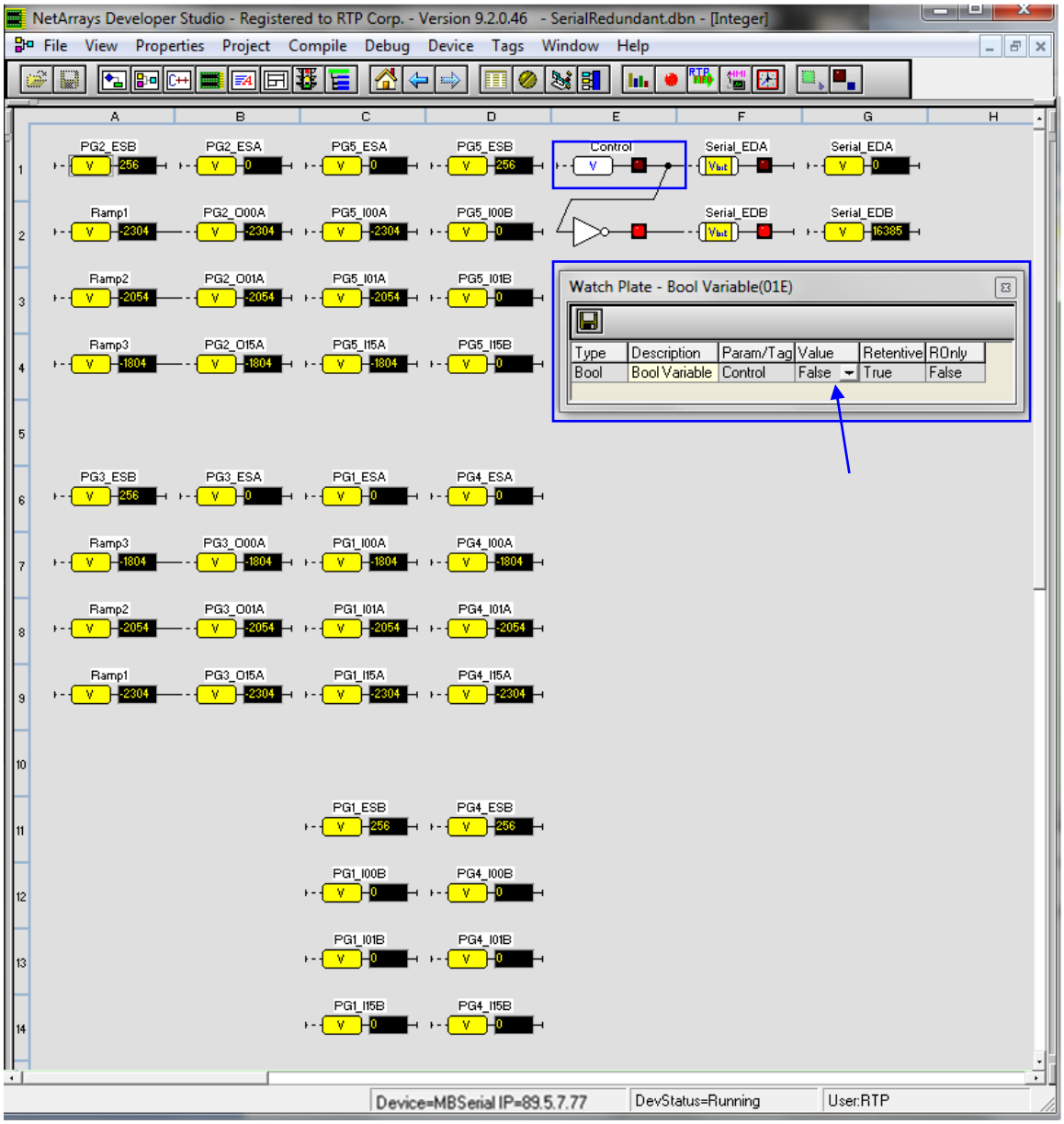


- Run the project in Debug mode by clicking on the **Run** button in the Main Toolbar.
- Enter the Debug Password, we use **rtp**, and select **OK**.

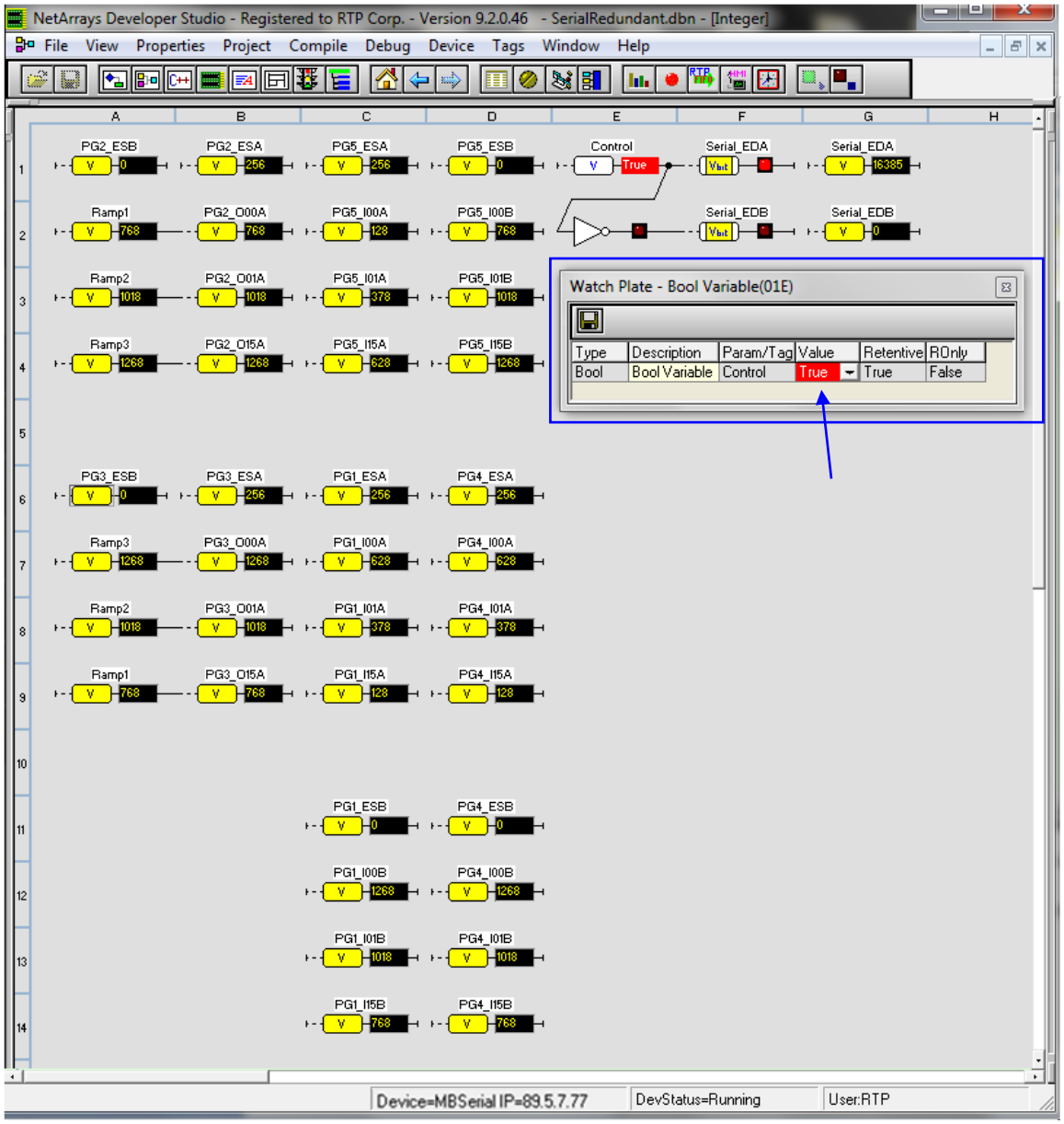


Verify Integer Module Form

- Return to the Main Form by clicking on the button in the Main Toolbar.
- Double-click on the **Integer** object to open the Module Form.
- Right click once on the light of the Boolean Control variable as shown in picture below. This will prompt Watch Plate Window that allows changing the value of the control variable.
- Observe that the Point Group status for all the tags ending with _ESA variables are equal to zero. On the other hand, the Point Group status variables for the tags ending with _ESB are set to 256, indicating that the point status are not active because the card associated with them is offline. Also, observe that the values from the Integer Input Point Groups are equal to the values of the Integer Output Point Groups. For example, the variable PG5_I00_A matches the variables PG2_O00A and Ramp1.



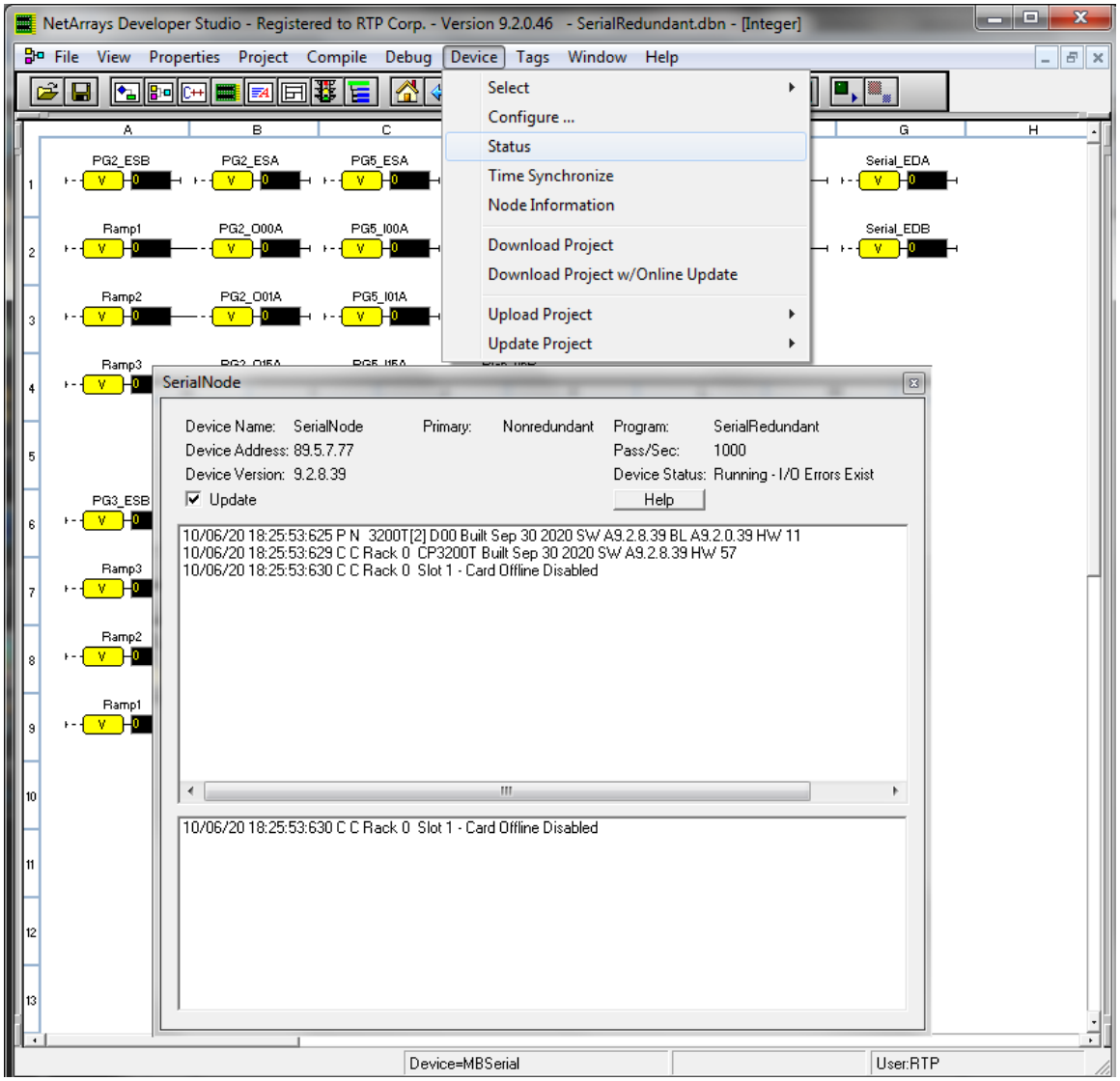
- If the inputs and outputs are not equal, carefully check the configuration of the MODBUS Serial Communications Card and the Point Groups.
- If any Master Point Group Status is not zero, carefully check the setting of the DIP Switches on the Termination Module and the RS-232 Cable.
- Go to the Watch Plate for the Bool-Variable and change it to True as shown in the picture below.
- This action disables the Modbus serial card on slot 0 and enables the Modbus serial card on slot 1.



- Observe that the Point Group status variables for all the tags ending with _ESB are equal to zero. On the other hand, the Point Group status variables for the tags ending with _ESA are set to 256, indicating that the point status are not active because the card associated with them is offline. Also, observe that the values from the Integer Input Point Groups are equal to the values of the Integer Output Point Groups. For example, the variable PG5_I00_B matches the variables PG2_O00A and Ramp1. The Point Group Variables associated with the slot0 card are not changing and they conserve the last received value from the source before the card is disabled.

Status Window

The Status Window should show the RTP3201T Node's **Device Status: = "Running"**. The bottom panel should only show a message indicating that slot 1 Modbus Serial card is offline. The top panel shows historical messages.


NetArrays Developer Studio - Registered to RTP Corp. - Version 9.2.0.46 - SerialRedundant.dbn - [Integer]
File View Properties Project Compile Debug Device Tags Window Help
Select
Configure ...
Status
Time Synchronize
Node Information
Download Project
Download Project w/Online Update
Upload Project
Update Project
PG2_ESB
PG2_ESA
PG5_ESA
Serial_EDA
Ramp1
PG2_O00A
PG5_I00A
Serial_EDB
Ramp2
PG2_O01A
PG5_I01A
Ramp3
PG3_ESB
SerialNode
Device Name: SerialNode
Primary: Nonredundant
Program: SerialRedundant
Device Address: 89.5.7.77
Pass/Sec: 1000
Device Version: 9.2.8.39
Device Status: Running - I/O Errors Exist
Update
Help
10/06/20 18:25:53:625 P N 3200T[2] D00 Built Sep 30 2020 SW A9.2.8.39 BL A9.2.0.39 HW 11
10/06/20 18:25:53:629 C C Rack 0 CP3200T Built Sep 30 2020 SW A9.2.8.39 HW 57
10/06/20 18:25:53:630 C C Rack 0 Slot 1 - Card Offline Disabled
10/06/20 18:25:53:630 C C Rack 0 Slot 1 - Card Offline Disabled
Device=MBSerial
User:RTP