10 Peer-to-Peer Communications

10.1 Foreword

Communications between MOD30ML instruments takes place over the Instrument Communications Network (ICN). The ICN is a token passing, deterministic network, which updates every 250ms. Using the ICN, MOD30ML can also communicate with MODCELL Multiloop Processors and MOD30 1700 Series instruments on a peer-to-peer basis. "Peer-to-peer" means there is no network master and each instrument is guaranteed access to the network within a certain timeframe.

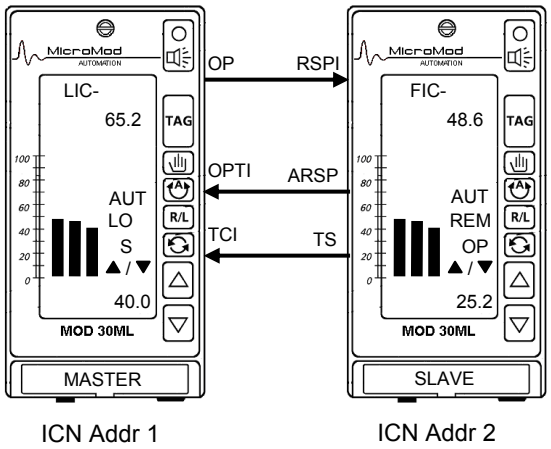
ICN signals are received in the Input Communications Blocks. ICN signals are sent via the Output Communications Blocks. MOD 30ML, MODCELL and MOD 30 all have these blocks. When configuring the Input Communications Block of a MOD 30ML, the user must specify the ICN address and Output Communications Block number from the instrument sending the data. When configuring an Output Communications Block in MOD 30ML, the user must specify the ICN address and Input Communications Block number of the instrument receiving the data.

There are 32 Input Communications Blocks and 32 Output Communications Blocks available in each MOD 30ML controller.

10.2 Objective

In this lab we will configure PID master/slave signals between two MOD 30MLs over the ICN as shown below. The lab is based on a strategy already containing a PID block and display.

Figure 10 .1.
ICN Architecture



(Note that the IC and OC occurrence numbers and instrument addresses are only examples for the purposes of this lab. They do not imply any requirement to use these addresses.)

10.3 Equipment Required

The following equipment will be needed for this lab:

- 2 MOD30ML Controllers
- 2 ICN Modules (2030N)
- 1 ICN Terminator (2030FZ00001A)
- Cable, dual twisted pair (1 ft. min.)
- Small Flat Blade Screwdriver
- Wire Stripper/Cutter
- ViZapp with XMB OPC Server and Download Cable

10.4 Instructions

Follow these instructions step-by-step to add and configure the peer-to-peer communications

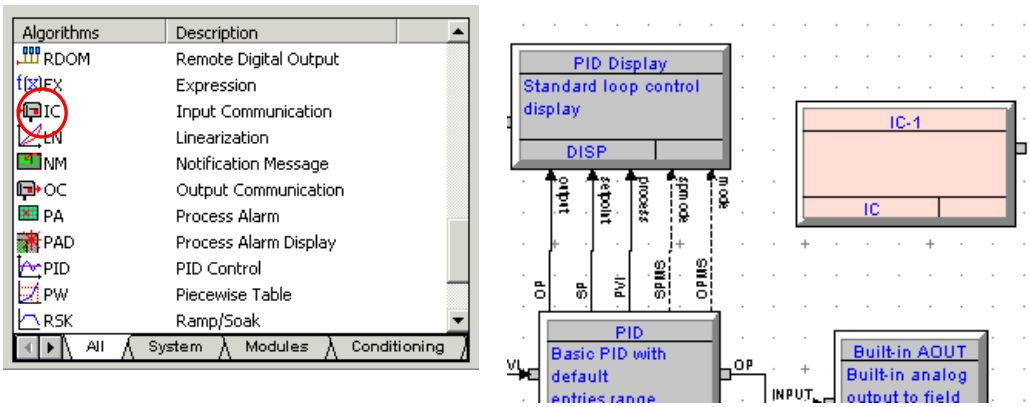
Configure the First Instrument:

1. Install an ICN Module into the controller's slots 7 and 8 set its address to **1**.

2. Add an Input Communications Block to the instrument:

   - Select the **IC** (Input Communications) block from the Algorithms window and add it to the document, near the PID block. **Note:** The IC blocks can only be added from within a Loop Compound.

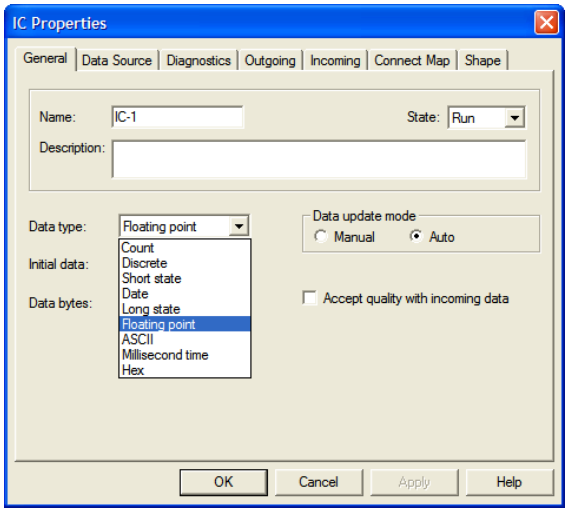
Figure 10 .2.
Algorithms menu



3. Configure the Input Communication Block:

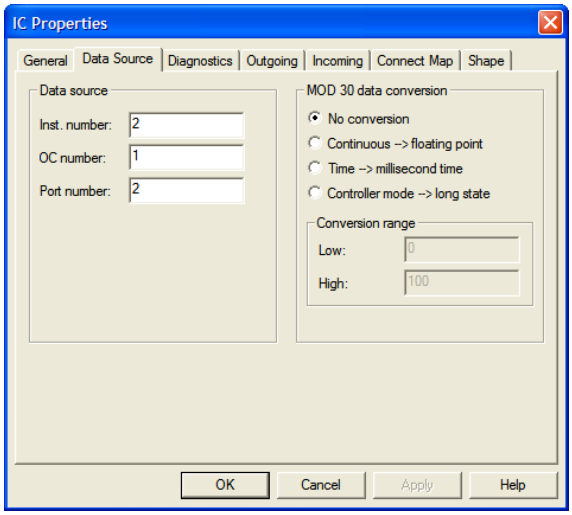
   - Double-click on the IC block to configure: The IC block Properties will open.
   - Click on the pull-down menu to configure the Data Type of the signal being received from the other instrument.

Figure 10 .3.
IC block



- Analog signals are generally Floating Point. For this exercise, choose this option by moving the cursor over "Floating point" and clicking it.
- Click on the Data Source tab at the top of the dialog box.

Figure 10 .4.
Data Source



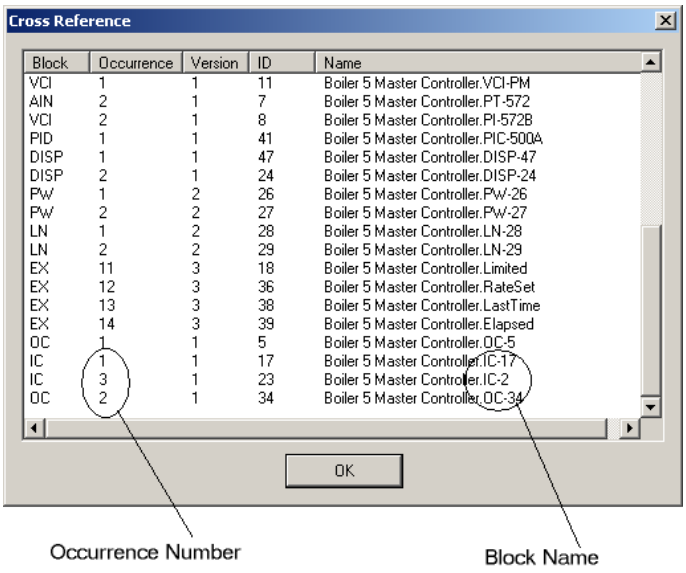
- The Instrument Number is the ICN Address of the instrument from which the data will be received. For this lab, we will use 2.
- The OC Number is the Occurrence Number of the Output Communications Block in the instrument from which the data will be received. We will use 1 for now, though it will need verification after the other instrument's database has been completed and compiled.

In an actual application, you must refer to the CRF (Cross Reference File) for the instrument sending data, to obtain the Occurrence Number of the OC block. This is for MOD 30ML or MODCELL instruments. MOD 30 instruments have fixed OCOM numbers; refer to the instrument's configuration.

The Cross Reference File gives the Tag Name of each algorithm block with its path and block's Type with occurrence number. To view the Cross Reference information, select Instrument from the menu bar at the top and select View CRF from the menu. You could also right-click on a blank are of the function block diagram and then select View CRF.

The next figure shows Cross Reference information for a sample database.

Figure 10 .5.
Cross Reference

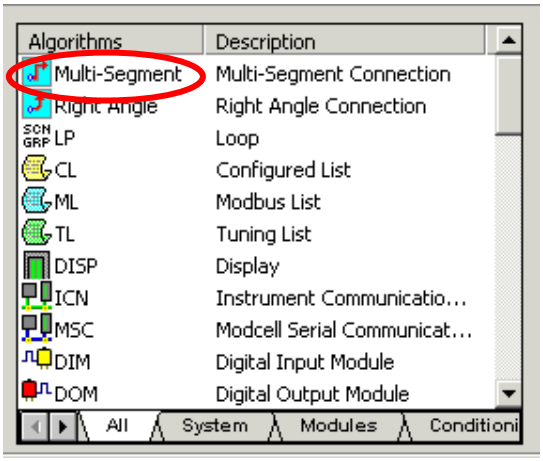


- The Port Number can be either 1 or 2 for a MOD 30ML. The Built-In Port or a module in slots 9 and 10 would be Port 1. For this lab, you will be using a module plugged into slots 7 and 8, the Port 2 location.

MOD 30 1700 series instruments have slightly different data types than MOD 30ML and MODCELL. The MOD 30 Conversion side of this menu is for data being received from MOD 30 instruments.

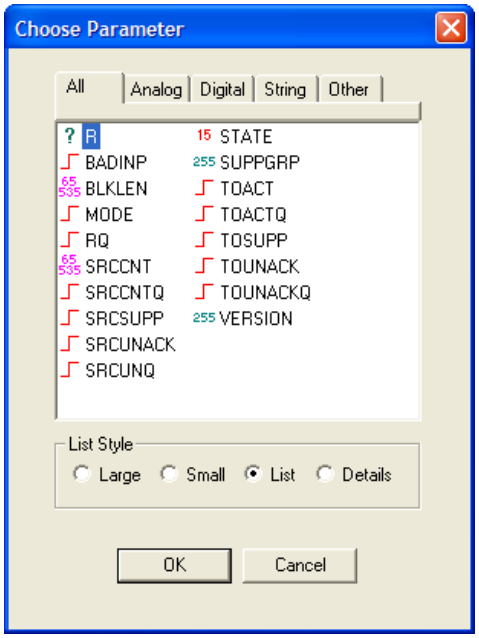
- Click OK to close the dialog box.
- Select the Multi-Segment Connection icon in the Algorithms window

Figure 10 .6.
Multi-Segment
Connection Icon



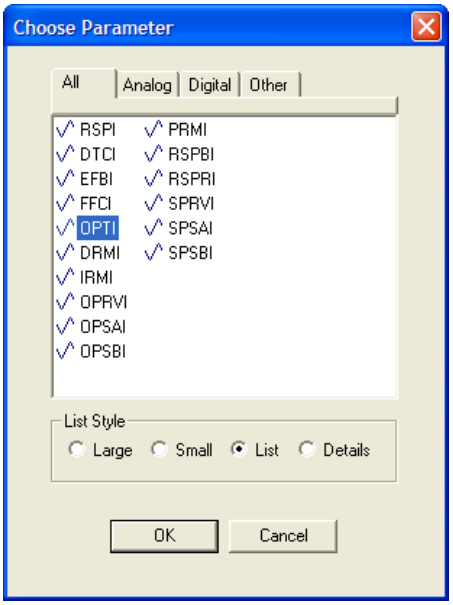
- Click on the IC block in the workspace: the Parameter connection list will appear.
- Double-click on **R** (the output of the block, which is the signal from the other instrument)

Figure 10 .7.
IC Block
Connection Menu



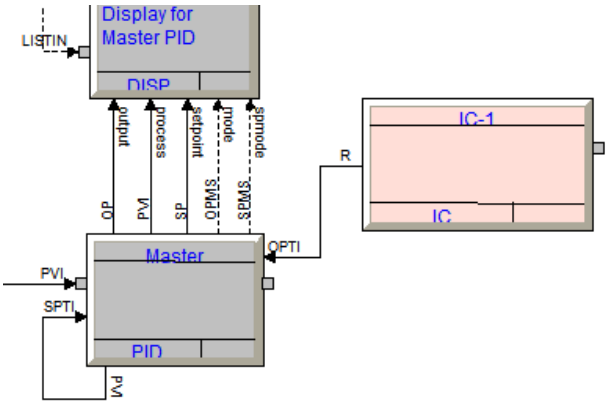
- Drag the line from the IC block directly over the middle of the PID block
- Click on the PID block: the Parameter connection list will appear.
- Double-click on **OPTI** (the output track input)

Figure 10 .8.
PID Block
Connection Menu



- The connection will now be complete. The connection line will have the source name and destination name displayed right on it as shown in the figure below. The signal from the other instrument on the ICN will now be the Output Track signal for this PID block.

Figure 10 .9.
PID Block
Connection Menu



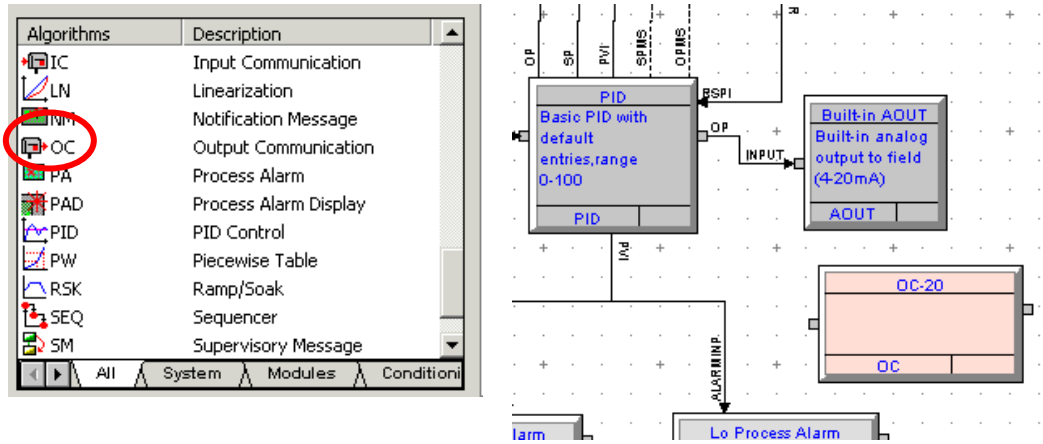
4. Configure another Input Communication Block:

- Place another IC block and configure it from instrument 2's OC2 to the PID block's TCI (Track Command Input). Note that this will be a Discrete signal.

5. Configure the Output Communication Block:

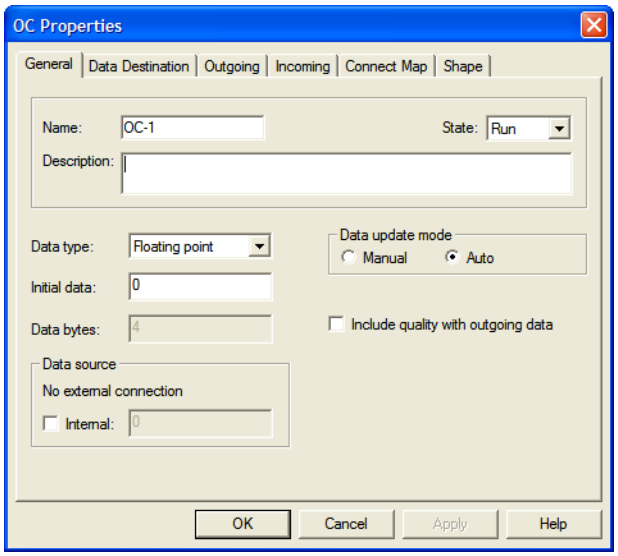
- Select the **OC** (Output Communications) block from the Algorithms window and add it to the document near to the PID block. **Note:** The OC blocks can only be added from within a Loop Compound.

Figure 10 .10.
Algorithm – OC Block



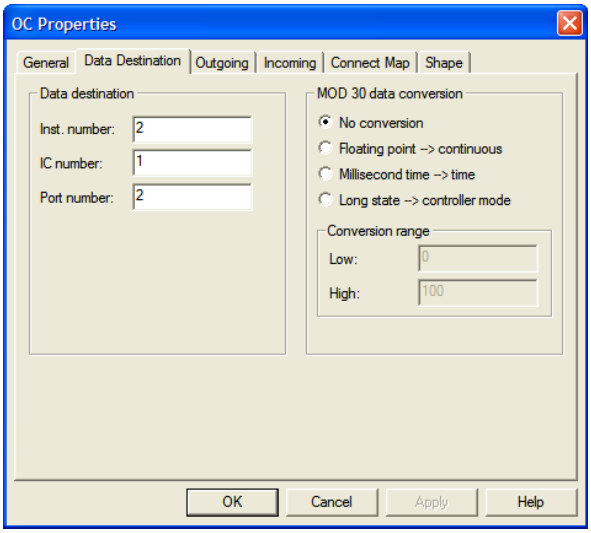
- Double-click on the OC block to configure: The OC block Properties will open.
- Click on the pull-down menu to configure the Data Type of the signal being received from the other instrument.
- We will use the default data type of Floating point.

Figure 10 .11.
OC Block Properties



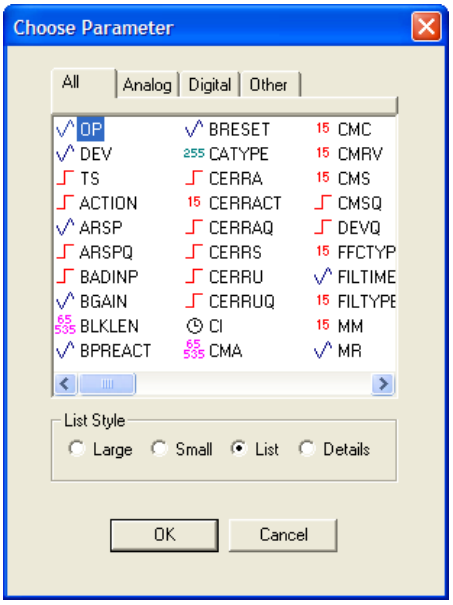
- Click on the Data Destination tab at the top of the dialog box.

Figure 10 .12.
Data Destination



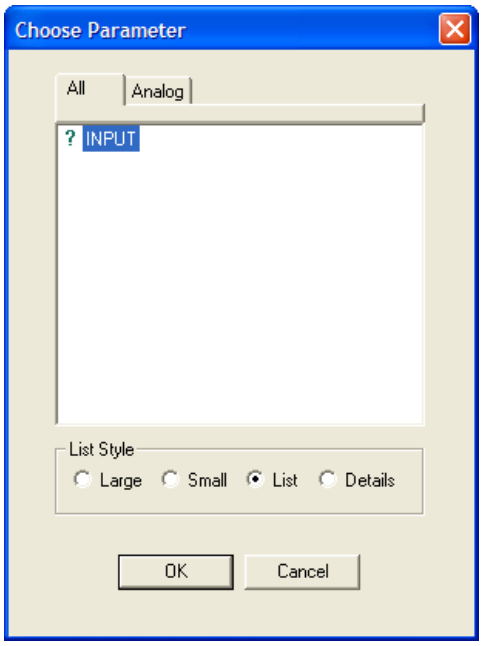
- The Instrument Number is the ICN Address of the instrument to which the data will be sent. For the purposes of this lab we will enter an address of 2.
- The IC Number is the Occurrence Number of the Input Communications Block in the instrument to which the data will be sent. We will use 1 for now, though it will need verification after the other instrument's database has been completed and compiled.
- For this lab, you will be using a module plugged into slots 7 and 8, the Port 2 location.
- Click OK to close the dialog box.
- Select the Multi-Segment Connection icon in the Algorithms window
- Click on the PID block in the workspace: the Parameter connection list will appear.
- Double-click on **OP** (the output)

Figure 10 .13.
Alarm Block
Connection Menu



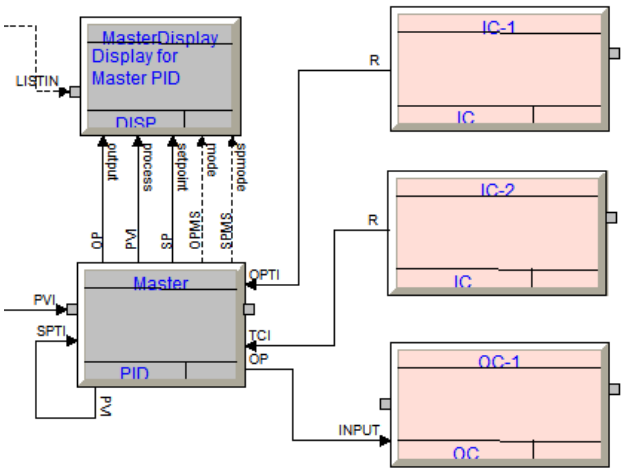
- Drag the line from the PID block directly over the middle of the OC block
- Click on the OC block: the Parameter connection list will appear.
- Double-click on **INPUT**

Figure 10 .14.
OC Block
Connection Menu



- The connection will now be complete. The connection line will have the source name and destination name displayed right on it as shown in the figure below. The output signal from the PID block will be sent to the other instrument on the ICN for use in its control strategy.

Figure 10 .15.
Connecting blocks



- Compile and download your database to instrument **1**

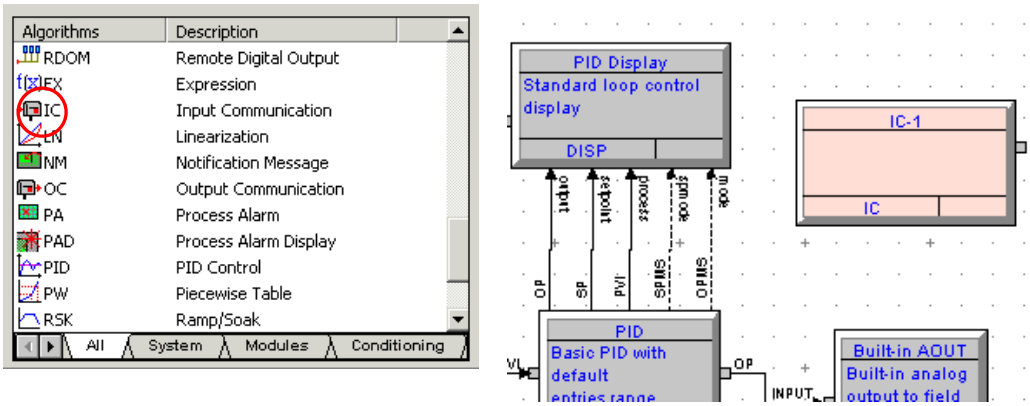
Configure the Second Instrument:

1. Install an ICN Module into the controller's slots 7 and 8 and set its address to **2**.

2. Add an Input Communications Block to the instrument:

- Select the **IC** (Input Communications) block from the Algorithms window and add it to the document, near the PID block. **Note:** The IC blocks can only be added from within a Loop Compound.

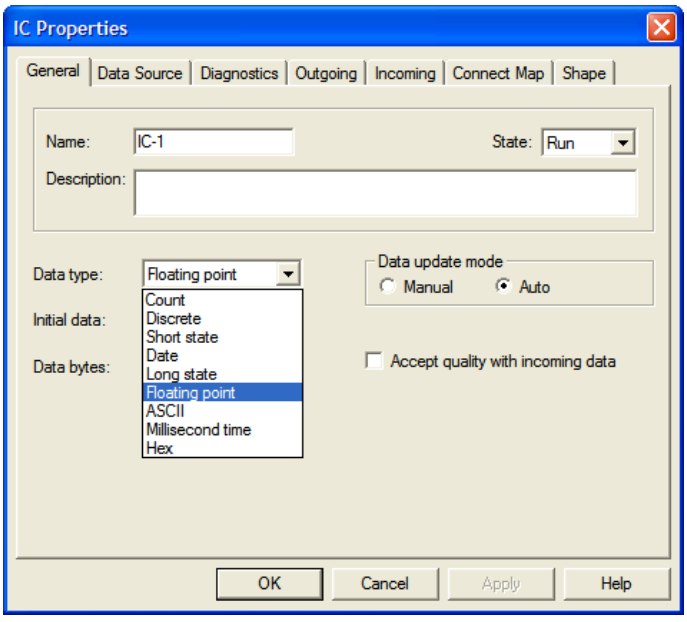
Figure 10 .16.
Algorithms menu



3. Configure the Input Communication Block:

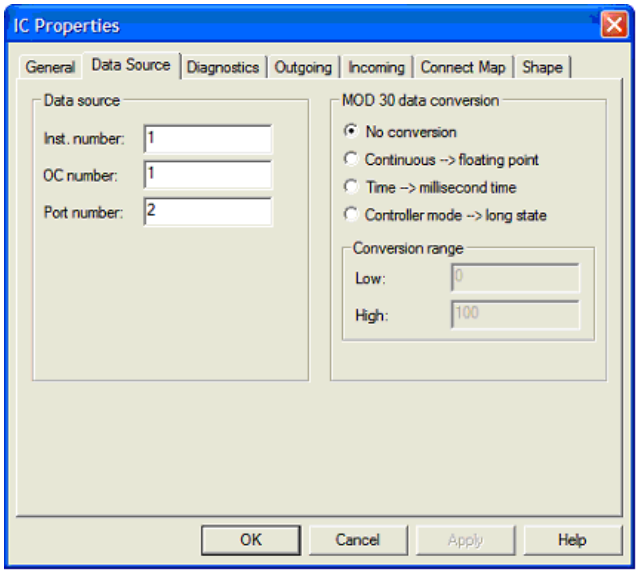
- Double-click on the IC block to configure: The IC block Properties will open.
- Click on the pull-down menu to configure the Data Type of the signal being received from the other instrument.

Figure 10 .17.
IC block



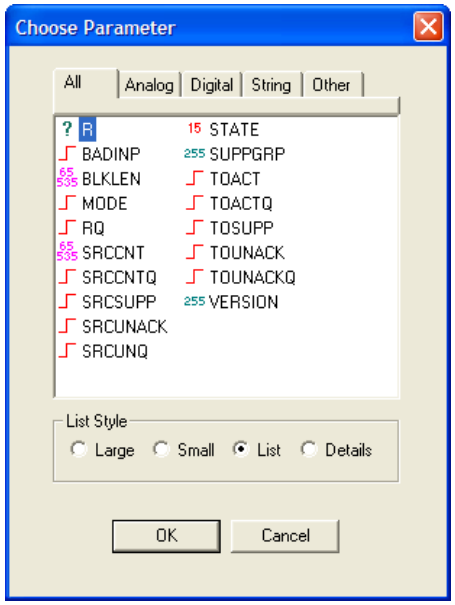
- Analog signals are generally Floating Point. For this exercise, choose this option by moving the cursor over "Floating point" and clicking it.
- Click on the Data Source tab at the top of the dialog box.

Figure 10 .18.
Data Source



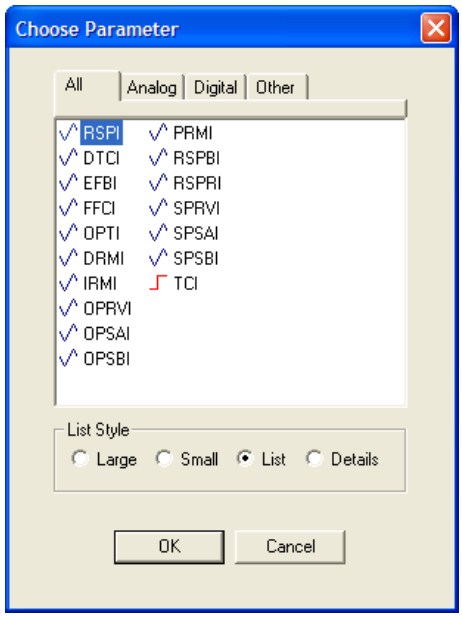
- The Instrument Number is the ICN Address of the instrument from which the data will be received. For this lab, we will use 1.
- The OC Number is the Occurrence Number of the Output Communications Block in the instrument from which the data will be received. We will use 1 for now, though it will need verification after the other instrument's database has been completed and compiled.
- The Port Number can be either 1 or 2 for a MOD 30ML. The Built-In Port or a module in slots 9 and 10 would be Port 1. For this lab, you will be using a module plugged into slots 7 and 8, the Port 2 location.
- Click OK to close the dialog box.
- Select the Multi-Segment Connection icon in the Algorithms window
- Click on the IC block in the workspace: the Parameter connection list will appear.
- Double-click on **R** (the output of the block, which is the signal from the other instrument)

Figure 10 .19.
IC Block
Connection Menu



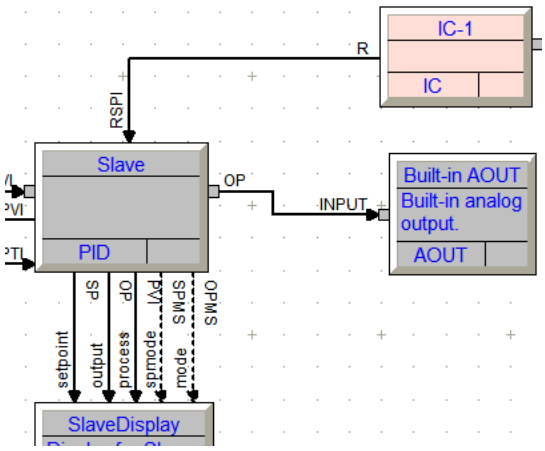
- Drag the line from the IC block directly over the middle of the PID block
- Click on the PID block: the Parameter connection list will appear.
- Double-click on **RSPI** (the remote setpoint input)

Figure 10 .20.
PID Block
Connection Menu



- The connection will now be complete. The connection line will have the source name and destination name displayed right on it as shown in the figure below. The signal from the other instrument on the ICN will now be the Remote Setpoint signal for this PID block.

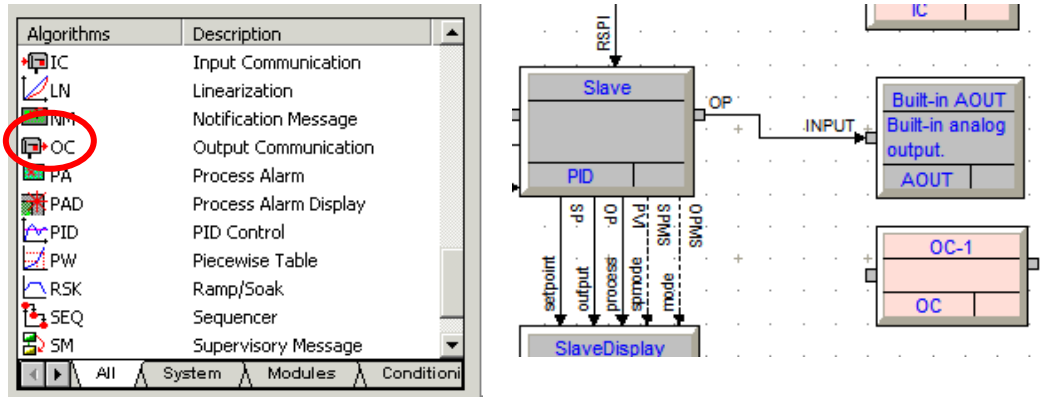
Figure 10 .21.
PID Block
Connection Menu



4. Configure an Output Communication Block:

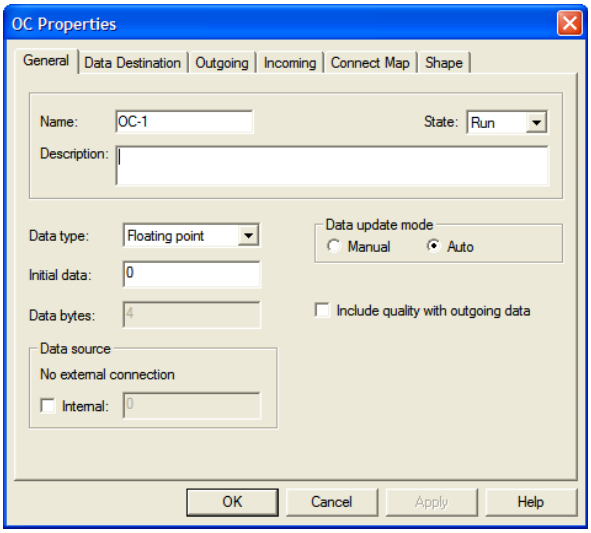
- Select the **OC** (Output Communications) block from the Algorithms window and add it to the document near to the PID block. **Note:** The OC blocks can only be added from within a Loop Compound.

Figure 10 .22.
Algorithm – OC
Block



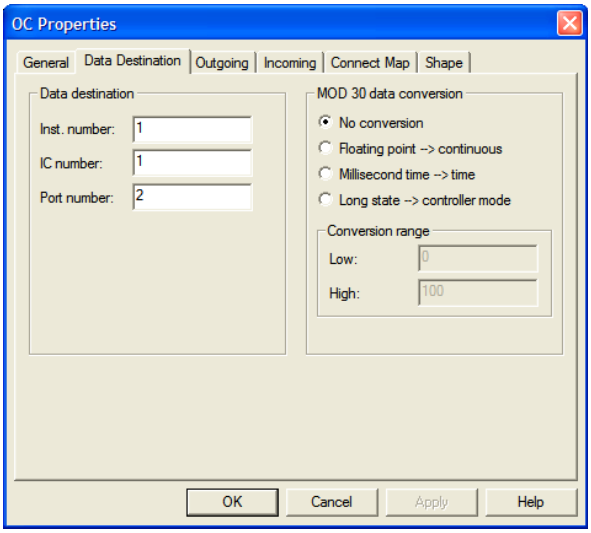
- Double-click on the OC block to configure: The OC block Properties will open.
- Click on the pull-down menu to configure the Data Type of the signal being received from the other instrument.
- We will use the default data type of Floating point.

Figure 10 .23.
OC Block Properties



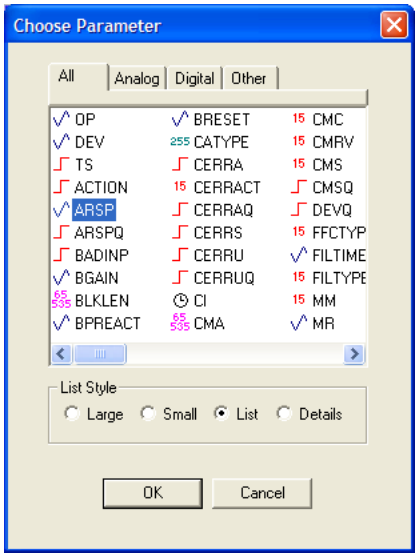
- Click on the Data Destination tab at the top of the dialog box.

Figure 10 .24.
Data Destination



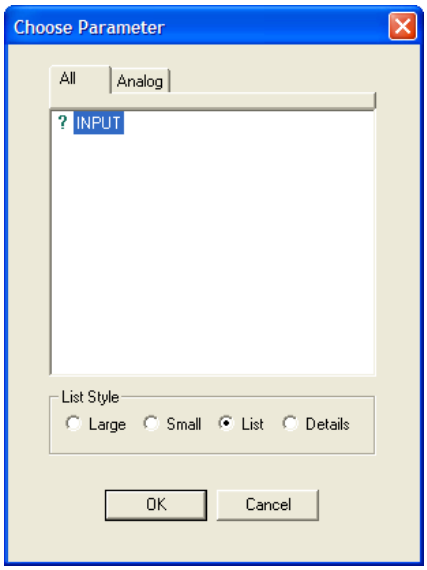
- The Instrument Number is the ICN Address of the instrument to which the data will be sent. For the purposes of this lab we will enter an address of 1.
- The IC Number is the Occurrence Number of the Input Communications Block in the instrument to which the data will be sent. We will use 1 for now, though it will need verification after the other instrument's database has been completed and compiled.
- For this lab, you will be using a module plugged into slots 7 and 8, the Port 2 location.
- Click OK to close the dialog box.
- Select the Multi-Segment Connection icon in the Algorithms window
- Click on the PID block in the workspace: the Parameter connection list will appear.
- Double-click on **ARSP** (the adjusted remote setpoint)

Figure 10 .25.
Alarm Block
Connection Menu



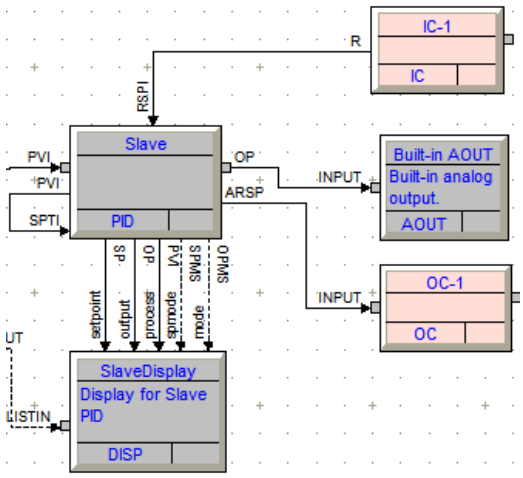
- Drag the line from the PID block directly over the middle of the OC block
- Click on the OC block: the Parameter connection list will appear.
- Double-click on **INPUT**

Figure 10 .26.
OC Block
Connection Menu



- The connection will now be complete. The connection line will have the source name and destination name displayed right on it as shown in the figure below. The output signal from the PID block will be sent to the other instrument on the ICN for use in its control strategy.

Figure 10 .27.
Connecting blocks



5. Configure another Output Communications Block:

- Place another OC block and configure it to send the PID block's TS (track status) to IC2 of the first instrument. Note that this will be a Discrete signal.
- Compile and download your database to instrument 2.

6. Connect the ICN:

   - Devices on an ICN are wired in parallel, with the +/- using one pair of wires and 24V/Com using the other pair.
   - The terminals required for this exercise are as follows:

     15: 24Vdc
     14: COM
     13: +
     12: -
   - Each ICN requires one terminator. The terminator is to be installed into the same terminals as the ICN wires on one of the instruments. Because the terminator has solid wires, care must be taken to ensure that both it and the ICN wires are secured into the terminal.

7. Test your configurations for proper operation:

   - Look for ICN errors "Not Receiving Data" on either instrument.
   - In normal operation, both controllers are in Auto mode, the Master is using a Local Setpoint and the Slave is using a Remote Setpoint.
   - Placing the Slave controller into Manual, or changing its Setpoint mode to Local should force the Master controllers into Track mode.