

TECH NOTES-313

Integrating RACO[®] Catalyst[®] with Allen-Bradley Micro800 via Modbus RTU

This technical note details the step-by-step procedure to facilitate communications between RACO's Catalyst autodialer and Allen-Bradley's new Micro800[™] PLC platform. With the exception of the Micro800 12-point models, all Micro800 controllers support the Modbus RTU over serial via the embedded non-isolated serial port. In addition, the 2080-SERIALISOL isolated serial port plug-in module also supports Modbus RTU, whereby both the Modbus RTU master and slave are supported. Given that the 48-point controllers can support up to five plug-in serial ports, including the embedded, up to six separate Modbus networks can operate within one PLC. This technical note will only illustrate communications via Modbus RTU protocol to the embedded non-isolated serial port.

RACO-supplied components:

Catalyst (any model) Either 515VAB-Catalyst or AB 1761-CBL-PM02 cable will provide the communications between the Micro800 and the Catalyst.

Allen-Bradley-supplied components:

Micro800 PLC (with the exception of the Micro810 12-point models) USB printer cable will provide the connection between personal computer and Micro800 PLC Standard version of Connected Components Workbench[™] software, available as a free download



Micro800 PLC Software Configuration

STEP #1 — Configure the Micro800 PLC. Obtain the Connected Components Workbench software, available as a free download from the Allen-Bradley website, http://ab.rockwellautomation.com/Programmable-Controllers/Connected-Components-Workbench-Software

STEP #2 — Connect to the Embedded USB 2.0 (non-isolated) port with any standard USB printer cable.



STEP #3 — Launch the Connected Components Workbench software.





STEP #6 — Select Modbus RTU for Serial Port.

Complete the Properties form to suit your application. Remember, when configuring the Baud Rate and Parity, it must match that of the Catalyst.

The Catalyst will always be Modbus RTU Master, so select Modbus RTU Slave when configuring the PLC.



STEP #7 — Click the + icon to open the Advanced Settings form. Under Protocol Control, the Media field should be RS232.

Set Stop Bits to 1.



STEP #8 — We are now ready to configure Modbus tags. To do so, select Modbus Mapping on the Properties tree.

Once selected, double-click in the blank field in the Properties form. This will launch the Variable Selector form.







STEP #11 — Once complete, the Properties field will reveal some of the Tags you've configured.

Once all of your Tags have been configured, Build and Download the project.

We are now ready to configure the Catalyst.



STEP #1 — Launch Alarmware[®] for Catalyst 1.87

Alarmware for Catalyst version 1.87 software.

STEP #2 — Connect Catalyst to PC

The Catalyst to Alarmware PC cable is required (see below for pin-out).

The Alarmware and cable are normally supplied with a new Catalyst. RACO cable part number 707CAT-PC15 (15-foot length).

Once connected to the Catalyst via Alarmware, we are ready to configure the necessary parameters for communication.



This cable can usually be purchased at a computer outlet and may be known as a PC to PC Transfer or Laplink cable.

🚄 Alarmware for Catalyst

Transfer Configuration Copy LogFile Window Help Quit

STEP #3 — Modify Device Settings in Alarmware

Open Alarmware and go to Devices via Configuration.

Once open, click the Modbus Port tab. Configure the Modbus parameters beginning with the Baud Rate. Select the speed best suited for your application.

In this case, we have chosen the fastest available at 38.4K baud. The default Stop bits is 1 and Parity should is Even.

Next, select a Node address. Default is 1.

Do not check the "CTS always ON" box, as we do not require handshaking in this setup.

🗳 Alarmware for Catalyst	
Transfer Configuration Copy LogFile Window Help Quit	
Channels 2	
Offli Destinations Messages	
Session Params Annunciation	
PINs Cleardowns	9-12 25-32
SNA (Required) : 1*5*10002 Discrete Mode	13-16 33-40
tfail pt	21-24 49-56
Alarm Trip Delay : 2 seconds	New Window
Alarm Violation Criteria :	Clear All
Alarm on 1 Haw Value	Clear Item
	Groups
Reading Format for Direct Channel Readings (Not used for Reports to Destinations) :	Close
0 Reported as '0'	Help
Messages for this channel	1
Messages for RTU - CATALYST	

Current working directory is : D.\Program Files\RACO\Aware_v187 NVM file path is : D.\Program Files\RACO\Aware_v187 LOG file path is : D.\Program Files\RACO\Aware_v187\data\cat1.nvm LOG file path is : D.\Program Files\RACO\Aware_v187\Log\cat1.log Firmware Version: 1.87

STEP #4 — Modify Channel Settings in Alarmware

Finally, we will configure the Channel Settings. As shown at left, first select Configuration, then select Channels.

Up to 256 remote channels are available (i.e., 1–256), depending upon the Catalyst model you choose.

For the purpose of illustration, we have selected Channel Number 5. Next, we need to choose a mode (i.e., either Discrete or Analog). This is done via SNA.

Enter the SNA as described below and then follow procedure to complete the Channel Settings.

Register			Catalyst					
Address	Description	Size / Limitation	SNA					
0xxxx	Coil number xxxx	1-bit	1*node*0xxxx					
1xxxx	Input number xxxx	1-bit	1*node*1xxxx					
Зхххх	Input register number xxxx	16-bit	1*node*3xxxx					
4xxxx	Output register number xxxx	16-bit	1*node*4xxxx					
5xxxx	Floating Point register	32-bit	1*node*5xxxx					
Note: The 5x and 4x references share the same data space. That is, an address of the form								
5nnnn takes the 32 bits beginning at location 4nnnn and extending through 4nnnn + 1.								
These 32 bits are then interpreted as an IEEE floating point number.								

Important: Catalyst Modbus SNA addresses begin with the number 1

Table #1 shows the Modbus data file convention within the Catalyst and the link to PLC via SNA (source net address).

Important:

It is important to note that Output Register (4xxxx) and Holding Register (5xxxx) data types use the same data area at the Catalyst end. The Holding Register (5xxxx) uses two consecutive 16-bit addresses that are interpreted as a 32-bit floating point number (i.e., 5xxxx & 5xxxx+1). Not unlike the Holding Register, the Output Register (4xxxx) also reserves two consecutive 16-bit words, however the extended word is left blank. Similarly, when addressing the input register (3xxx), allow for two consecutive 16-bit words, keeping in mind the extended word is reserved but not used. Hence, consecutive addressing of both Input and Output Registers will appear as follows. For example, first Input Register address point 30001, second address point 30003, third address point 30005, etc. Also, the Micro800 follows the six-digit addressing scheme as mentioned earlier, Table #1 shows a five-digit Modbus convention. Follow the five-digit format with the Catalyst, as this will sync to the Micro800 Modbus standard, as per the example below. The SNA is comprised of: Net / Node / Address.

Net: This is either a 0 or 1.

0 when using local physical I/O

1 when using remote PLC I/O

Node: This is the node address of the PLC we wish to communicate with (in this tech note we have configured our slave device to have a node address of 5).

Address: Points to the Modbus address mapped to the slave device.

The following two examples construct the SNA for both a discrete and analog address tag, as per file assignment illustrated in this tech note.

Example #1

To configure the Boolean channel that links to the Boolean Tag on the Micro800 PLC, set the SNA as follows: 1*5*00001

Example #2

To configure the Integer channel that links to the Integer Tag on the Micro800 PLC, set the SNA as follows: 1*5*40001

Debugging Global Variables via Connected Components Workbench

With the aid of the debugging tool, we can simulate actual process conditions. Debug mode gives us the capability to modify the Modbus Tag values live in runtime.

STEP #1 — Connect the Catalyst to your PLC via the 515VAB-Catalyst or AB 1761-CBL-PM02 cable.



STEP #4 — As you will find (below), both the current Integer and Boolean Tag values are present. One can easily modify these values. Simply click edit for the Logical Value of the Tag you wish to edit.

📓 (Running) - Connected Compone	ents Workbench										
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Project Organizer 🚽 🗕 🖌 🦷	icro830-VAR Micro830										• × .
Name: CopyOfModbus	Name	Logical Value	Physical Value	Lock	Data Type	Dimension	Alias	Initial Value	Attribu	ıte	String Size
Micro830	- A*	- A+	- A*	- A	- A	- A+	- A*	- A		- A*	
	_IO_EM_DI_07				BOOL 🔹				Read	~	
Programs	_IO_EM_DI_08				BOOL 👻				Read	*	
Global Variables	_IO_EM_DI_09				BOOL 🔹				Read	~	
	Integer	31987 Jm	N/A		INT 💌				Read/Write	*	
	Boolean		N/A		BOOL 🔹				Read/Write	*	
	_IO_P2_AI_00	63093	63093		UINT -				Read	~	

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Name: ModbusProject	POBSO-VAR MICroB3U			Concernance of the	filmen and a second second second		Concernment of		(378	• •	-
	Name	Logical ¥alue	Physical Value	Lock	Data Type	Dimension	Alias	Initial Value	Attribut	e	SI	tring Size	
Micro830	* A*	- of	- A*	- 01	* - A	1 - A1	- A	- A		de*			
	_IO_EM_DI_06				BOOL 😽				Read	*			
Programs	_IO_EM_DI_07				BOOL ~				Read	*			
	_IO_EM_DI_08				BOOL -				Read	*			
- Ondeard	_IO_EM_DI_09				BOOL ·				Read	*			
Loc M	Integer	12359	N/A		INT 👻				Read/Write	Ŷ			
	Boolean	շ[հոյ 🗹	N/A		BOOL				Read/Write	*			
	_IO_P2_AI_00	63261	63261		UINT				Read				
	_IO_P2_AI_01	20	20		UINT				Read	÷			1
DataTypes	_IO_P2_AI_02	21	21		UINT 👻	8			Read	4			
Exection Blocks	_IO_P2_AI_03	20	20		UINT ~				Read	*			
	SYSVA_ABORT_CYCLE		N/A		BOOL 💡			FALSE	Read	+			
	SYSVA_TCYCURRENT	T#0s	N/A		TIME				Read	-			
	SYSVA_CYCLECNT	22359134	N/A		DINT				Read	*			
	SVSVA_CCEXEC		N/A		BOOL .	8			Read/Write	*			
	SYSVA_SCANCNT	22359178	N/A		DINT				Read	-			
	SYSVA_KVBCERR		N/A		BOOL ~				Read/Write	*			
	SYSVA_KVBPERR		N/A		BOOL				Read	*			
	SYSVA_SUSPEND_ID	0	N/A		UINT ~			0	Read	*			
	SYSVA_MAJ_ERR_HALT		N/A		BOOL ~			FALSE	Read	*			
	SYSVA_TCYMAXIMUM	T#3ms	N/A		TIME				Read	~			
	SYSVA_TCYOVERFLOW	0	N/A		DINT				Read	*			
	SYSVA TCYCYCTIME	T#0s	N/A		TIME				Read/Write	*			
	SYSVA REMOTE		N/A		BOOL -			FALSE	Read	+			
	SYSVA RESMODE	3	N/A	1	SINT				Read	*			
	SYSVA RESNAME	CONTROLLER MI	N/A		STRING -				Read	4			
	SYSVA TCYWDG	2000	NA		UDINT			2000	Read/Write	*			
	SYSVA CYCLEDATE	T#1h14m29ms	N/A		TIME				Read	÷			
			11.00										
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STEP #5 — At this point, you should be able to both READ and WRITE to your programmed tags.

Should your Catalyst be configured for call-outs, going online with your Micro800 PLC via Connected Components Workbench software and Debugging Global Variables is an ideal means for simulating conditions that will trigger alarms or messages.

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