SERI Unity Pro Example Video

Companion Manual

This manual provides more detail on the the SERI Unity Pro Video demonstrating a migration from a SY/MAX PLC to a Unity Pro Quantum PLC.

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Original System Layout

This demonstration video starts with a simple Square D SY/MAX PLC system. The system consists of an RRK-200 rack with a Model 650 CPU with some discrete and analog I/O.



Three toggle switches are connected to the RIM731 inputs 1A7, 8A15, and 8A16.

Channel 1 of the RIM121 is connected to a variable voltage source.

Channel 1 of the ROM121 is connected to an analog volt meter.

The Rack Addressing is shown below:

WINMATE : Rack Addressing			
<u>File H</u> elp			0
🖃 📶 Model 650	Start	End	Module Information
Slot 1	0001	0001	ROM 271 - 16-Function 120 VAC Output Relay Module
🛛 Slot 2	0002	0002	Unknown
🛛 Slot 3	0003	0006	RIM 121, 125, 128 - Analog Input Module
Slot 4	0007	0014	ROM 121 - 4 Function Analog Output Module
Slot 5	0015	0018	RIM 731 - 64-Function 24 VAC/DC Input Module
Slot 6	0019	0019	ROM 221, 431 - 16-Function AC Output Module, CR14 720 - Spe
Slot 7	0020	0021	ROM 441 - 32-Function 24 VDC Output Module
Slot 8			
ann ann ann		te L	
CHNL LI DROP S	LOT	PE DEI	JETE ENTER
F1 F2 F3	F4 1	F5 1	F6 F7 F8 F9 F10
			RUN NUM //

Register 2 is the 16 function input simulator in slot 3 but WINMATE calls it Unknown.

The ladder logic is shown in below:



The logic is simply a few inputs connected to outputs. The analog output is the analog input divided by 2.

New Setup



The SY/MAX CPU is removed from the rack and replaced with the SERI-T.

The new PLC is a Quantum Unity 140 CPU 311 10. The 140 NOE 771 01 Ethernet card is located in slot 3 of the Quantum rack. An input simulator card (140 DAI 540 00) is located in slot 5 and is traffic copped to input bits %I1 through %I16.

IP Settings

The IP Address of the SERI defaults to 10.10.10.10. The video demonstrates the process of setting the PC to this same address range to allow communication with the card.

Local Area Connection Status	x
General	
Connection	
IPv4 Connectivity:	No Internet access
IPv6 Connectivity:	No network access
Media State:	Enabled
Duration:	14:28:37
Speed:	100.0 Mbps
Details	
Activity	
Sent —	Received
Bytes: 78,797	82,789
Properties Pisable	Diagnose

Local Area Connection Properties									
Networking Sharing									
Connect using:									
Realtek PCIe GBE Family Controller									
Configure This connection uses the following items:									
 Client for Microsoft Networks Virtual PC Network Filter Driver QoS Packet Scheduler File and Printer Sharing for Microsoft Networks Internet Protocol Version 6 (TCP/IPv6) Internet Protocol Version 4 (TCP/IPv4) 									
Install Uninstall Properties									
Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.									
OK Cancel									

Internet Protocol Version 4 (TCP/IPv4)	Properties ? X								
General									
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.									
Obtain an IP address automatically									
O Use the following IP address:									
IP address:	192 . 168 . 1 . 215								
Subnet mask:	255.255.255.0								
Default gateway:	· · ·								
Obtain DNS server address autom	natically								
• Use the following DNS server add	resses:								
Preferred DNS server:									
Alternate DNS server:	• • •								
Validate settings upon exit	Ad <u>v</u> anced								
	OK Cancel								

vanced TCP/IP Settin	gs		? <mark>x</mark>
IP Settings DNS V	VINS		
IP add <u>r</u> esses			
IP address		Subnet mask	
192.168.1.215		255.255.255.0	
10.10.10.11		255.0.0.0	
	<u>A</u> dd	<u>E</u> dit	Remove
Defruit enteurore			
De <u>r</u> ault gateways:			
Gateway		Metric	
	٥dd	Edit	Remove
	Agam		Kemove
Automatic metric			
Interface metric:			
		_	
		OK	Cancel

After the new IP Address of 10.10.10.11 is added to the PC, a web browser is then used to change the IP Address of the SERI to is proper value.

SERI Web Configuration

The default web page is seen when the PC connects to the SERI at address 10.10.10.10.

The first time the SERI's configuration pages are accessed, the password must be entered. The user name does not matter but the password must be entered correctly and is case sensitive. The default password is "master".

The server 10.1 password.	0.10.10 at SERI Configuration requires a username and
Warning: This sent in an inse connection).	server is requesting that your username and password be cure manner (basic authentication without a secure
	User name
	OK Cancel

Figure 3: Password = master

الله الله://10.10.1 الم	R C X NR&	D SERI -	Comms	Confi >	<		× ?∰			
NR&D SERI										
<u>Main</u> Configuration	Commun	nicat	ions							
Comms Configure the SERI's IP settings, or configure it to get the settings from DHCP or BootP server. Rack DHCP or BootP server.										
Backup		IP	Settings							
<u>Restore</u> <u>Reset</u>	BootP	Disat	oled 💌							
<u>Firmware Update</u> Statistics	DHCP	Disat	oled 🔻				Ξ			
	IP Address	10	10	10	10					
	Subnet Mask	255	0	0	0					
	Default Gate	0	0	0	0					
	Update									
	This unit's MAC	C addre	ess is 00	-20-BD	0-0A-FC-8	8.				
	N	iobrara	n Resear	ch and	Developme	ent Corporation	-			
•		I	I							

The SERI's IP Address is changed to the final address by selecting "Configuration, Comms". After the address is changed to 192.168.1.27, the PC will automatically reconnect to the SERI.

NOTE: It is a good idea to remove the 10.10.10.11 address from the PC after changing the SERI's address.

NOTE: It is a good idea to save the setup to FLASH after changing the IP Address of the SERI. Otherwise, a power cycle will revert the card back to the previous value.



Figure 4: Configure Rack Web Page

The goal of this setup is to replicate the original SY/MAX register layout in the new Quantum controller. This is simple if we group all of the inputs together and all of the outputs together so they may be read/written with a single I/O Scanner entry. By reserving the first 21 %IW and %MW words in the new PLC, it is a simple matter to overlay the appropriate values and minimize the Ethernet communication.

%IW	Description	%MW	Description
1	skip	1	Relay outputs
2	Input simulator	2	skip
3	Analog IN #1	3	skip
4	Analog IN #2	4	skip
5	Analog IN #3	5	skip
6	Analog IN #4	6	skip
7	skip	7	Analog OUT #1
8	skip	8	Analog OUT #2
9	skip	9	Analog OUT #3
10	skip	10	Analog OUT #4
11	skip	11	AO #1 Preset
12	skip	12	AO #2 Preset
13	skip	13	AO #3 Preset
14	skip	14	AO #4 Preset
15	Inputs 1A1-2A16	15	skip
16	Inputs 3A1-4A16	16	skip
17	Inputs 5A1-6A16	17	skip
18	Inputs 7A1-8A16	18	skip
19	skip	19	120VAC outputs
20	skip	20	24V Outputs 1V1-1V16
21	skip	21	24V Outputs 2V1-2V16

N Nttp://192.168 P → N NR&D SERI - Rack Configur × Image: Configur											
NR&D SERI											
Main Configuration Comms Control											
Rack	Rack Existing Entries										
<u>Change Rack</u> <u>Add Rack Entry</u> <u>Add Mapper Entry</u> Password	Mođbus ("A") Register	Slot	Slot ("B") Word	Word Count	Mode	Default Value (hex)	Action				
Backup	4001	R2	1	1	Output	4001=0000	Edit Delete	-			
<u>Restore</u> Reset	3002	R3	1	1	Input		Edit Delete	=			
Firmware Update	3003-3006	R 4	1	4	Input		Edit Delete				
<u>Statistics</u>	4007-4014	R5	1	8	Output	4007=0000 4008=0000 4009=0000 4010=0000 4011=0000 4012=0000 4013=0000 4014=0000	<u>Edit</u> Delete				
	3015-3018	R6	1	4	Input		Edit Delete				
	4019	R7	1	1	Output	4019=0000	Edit Delete				
	4020-4021	R8	1	2	Output	4020=0000 4021=0000	Edit Delete				
		С	urrent s	etup is I	NOT stor	red to flash!		+			

Figure 5: Rack Overview after all entries are added

The IP Address of the new Quantum NOE is entered on the "Control" page. This page also shows the communication Timeout value of 1000mS. If the PLC stops writing to the SERI for 1000mS then the SERI will revert all outputs to their default values.

N http://192.168 D	- 🗟 C × N SERI NR&	&D SERI	- Control	Confi	×	₩ 🗘	÷				
NK&D SEKI											
Main Configuration	Control	Sett	ings								
<u>Control</u> Rack	A (enter	Allowed all zeros	l Master to disab	s List le an ent	try)						
Password Backup	Master 0	192	168	1	157						
<u>Restore</u> Reset	Master 1	0	0	0	0						
Firmware Update	Master 2	0	0	0	0						
Statistics	Master 3	0	0	0	0						
	Control Reg	Clear		•							
	Timeout (ms)	1000	U	odate							
		Cur C	rent setu <u>'lick</u> to c	ıp is No commit Copyrig	OT stored t changes to : tht 2010	o flash! flash.					
	Nic	obrara I	Researc	h and I	Developmen	t Corporation					
							-				

Figure 6: Master IP Address

PLC I/O Scanner Setup

The Ethernet I/O Scanner is configured with a single entry to transfer the data to/from the SERI.

#	IP Address	Unit ID	RD Master	RD Slave	RD Len	Last Value	WR Master	WR Slave	WR Len
1	192.168.1.127	0	%IW1	403001	21	0	%MW1	404001	21

Table 2: NOE I/O Scanner

Ethernet_1									
Model Family Module Address TCP/IP 10/100 Regular connection Image: Second Stress in the second stress									
IP Configuration Messaging IO Scanning Global Data SNMP Address Gerver NTP Bandwidth									
Health Block (%//%///): 1/1/100 Device Control Block (%///%): from to Repetitive rate step: 16									
Scanned peripherals									
IP address Device Name	Unit ID Slave Time Syntax (m	lth Repetitive RD out rate Master s) (ms) Object	RD Ref Slave	RD Last value length (Input)	VR Master Object	VR Ref Slave	VR length		
1 192.168.1.27	0 Modbus 💌 1500	0 ×1V1	403001 21	Set to 0	▼ %MW1	404001	21		
	····				⊻ ▼				

Figure 7: NOE I/O Scanner

🕮 Ethernet_1	
Model Family Module Address TCP/IP 10/100 Regular connection Image: State of the state of	Module Utilities YES IO Scanning NO V Global Data NO V SNMP NO V Address Server NO V NTP
IP Configuration Messaging IO Scanning Global Data SNMP Address Server	NTP Bandwidth
IP address configuration Configured IP address 192.168.1.157 Subnetwork mask 255.255.0 Gateway address 0.0.0.0 From a server	
Ethernet configuration © Ethernet II © 802.3	

Figure 8: NOE Configuration

Ladder Program

The I/O Scanner and SERI configuration is carefully configured to allow the Quantum CPU to have the I/O in exactly the same words/bits as the original SY/MAX CPU. The very simple ladder program is simply replicated in Unity Pro Ladder.

symaxil : [MAST]												
		1	2	3	4	5	6	7	8	9	10	11 📤
1		%1\\2.0	%MW1.0									
2		%IW2.1	%MW1.15									
		%jW2.2										
3			00 INVAD 45	00 NOV40 4E								
4			~10018.15	~~~()-								
5		%IW18.14	%MW21.0									
6			. ,	_	OPE %MW7 := D	RATE						
7		%11	%MW20.15									
-												
												<u> </u>

Figure 9: Unity Ladder Section

Figure 9 shows this simple ladder segment.

Notice that the register numbers are the same as the SY/MAX ladder but the bit numbers are off by 1. This is because SY/MAX numbers the bits 16-1 while Unity numbers the bits 15-0.

The OPERATE block is used to perform the division by 2 on the analog output.