CERI 984LL Example Video

Companion Manual

This manual provides more detail on the the CERI 984LL Video demonstrating a migration from a Compact 984 PLC to a Momentum PLC.

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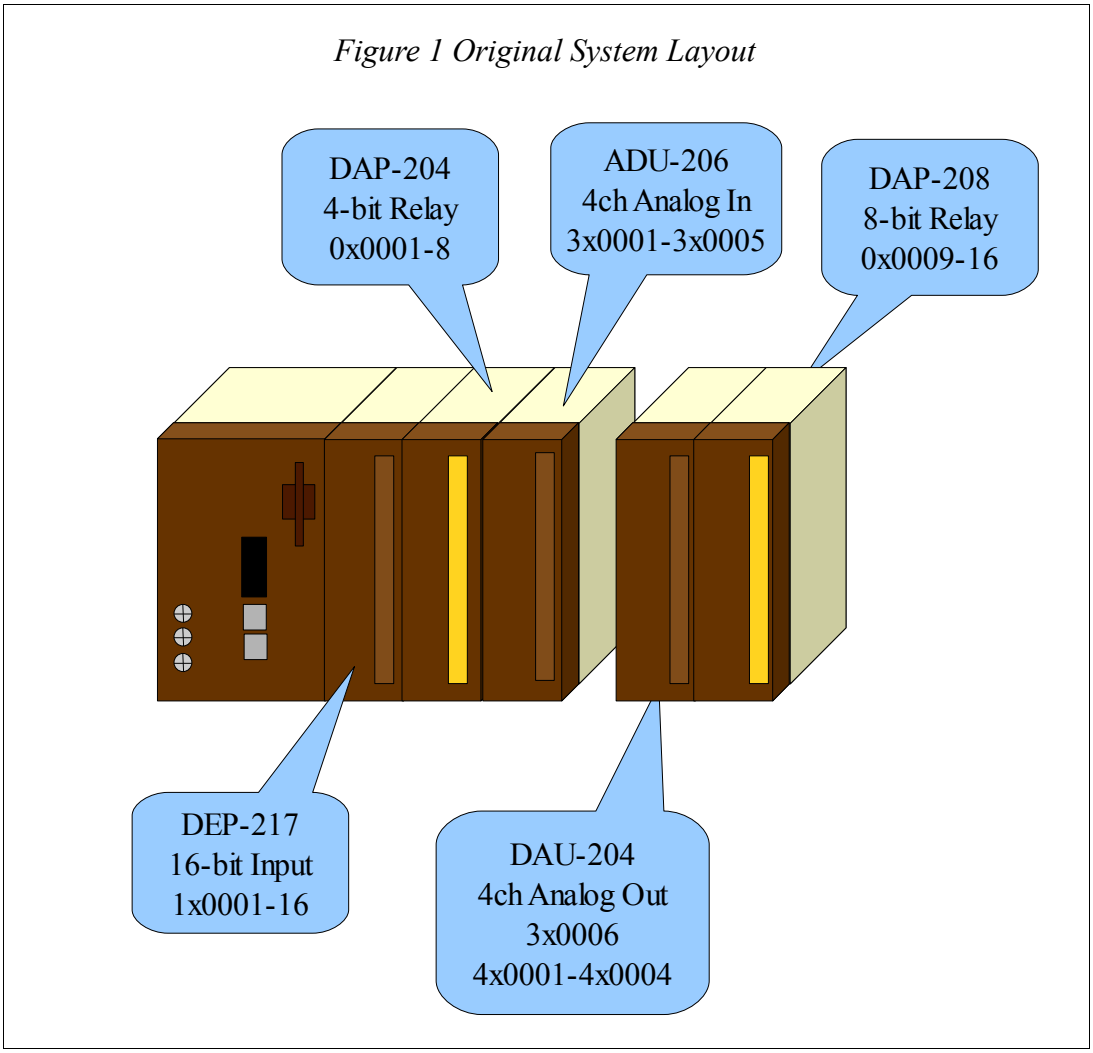
Original System Layout

This demonstration video starts with a simple Modicon Compact 984 PLC system. The system consists of a PC-E984-275 CPU with a DEP-217 (16-bit input), DAP-204 (4-bit relay), and ADU-206 (4ch analog input) in the local rack. A two-slot expansion rack includes a DAU-204 (4ch Analog Out) and a DAP-208 (8-bit relay).

Figure 1 Original System Layout

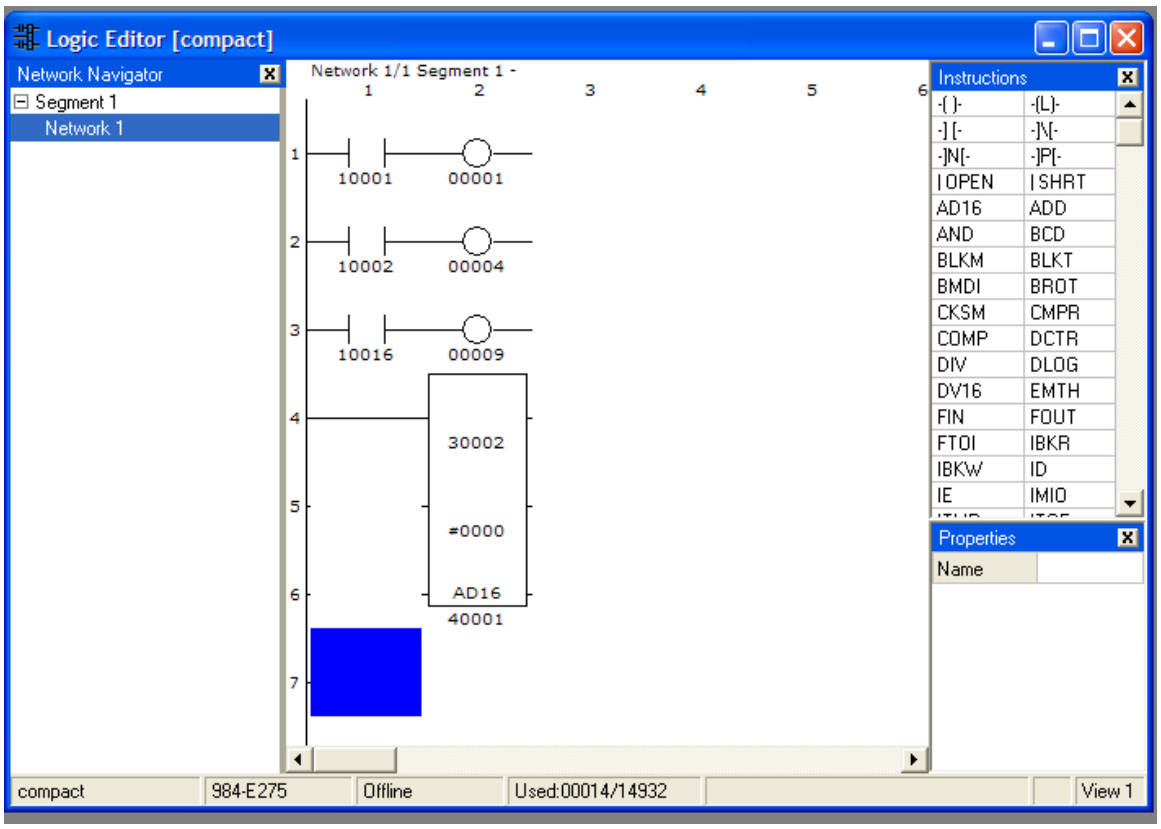


Three toggle switches are connected to the DEP-217 inputs 1, 2, and 16.

Channel 1 of the ADU-206 is connected to a variable voltage source.

Channel 1 of the DAU-204 is connected to an analog volt meter.

The ladder logic is shown in below:



Output 1 is set by Input 10001 (Switch 1).

Output 4 is set by Input 10002 (Switch 2).

Output 9 is set by Input 10016 (Switch 3).

The analog output in 40001 (voltmeter) is simply copied from the analog input in 30001 (potentiometer).

PLC Bit	DEP-217 Input	Description
10001	1	Switch 1
10002	2	Switch 2
10003	3	
10004	4	
10005	5	
10006	6	
10007	7	
10008	8	
10009	9	
10010	10	
10011	11	
10012	12	
10013	13	
10014	14	
10015	15	
10016	16	Switch 3

Table 1: PLC (1x) Input Bits

PLC Bit	Output Card/Number	Description
1	DAP-204/1	Tied to Switch 1
2	DAP-204/2	Tied to Switch 2
3	DAP-204/3	
4	DAP-204/4	
5	Not Used	
6	Not Used	
7	Not Used	
8	Not Used	
9	DAP-208/1	Tied to Switch 3
10	DAP-208/2	
11	DAP-208/3	
12	DAP-208/4	
13	DAP-208/5	
14	DAP-208/6	
15	DAP-208/7	
16	DAP-208/8	

Table 2: PLC (0x) Output Bits

PLC Input	Input Card/Number	Description
30001	ADU-206/1	ADU-206 Status
30002	ADU-206/2	Ch 1 Input Value (potentiometer)
30003	ADU-206/3	Ch 2 Input Value
30004	ADU-206/4	Ch 3 Input Value
30005	ADU-206/5	Ch 4 Input Value
3006	DAU-204/1	DAU-204 Status

Table 3: PLC (3x) Analog Inputs

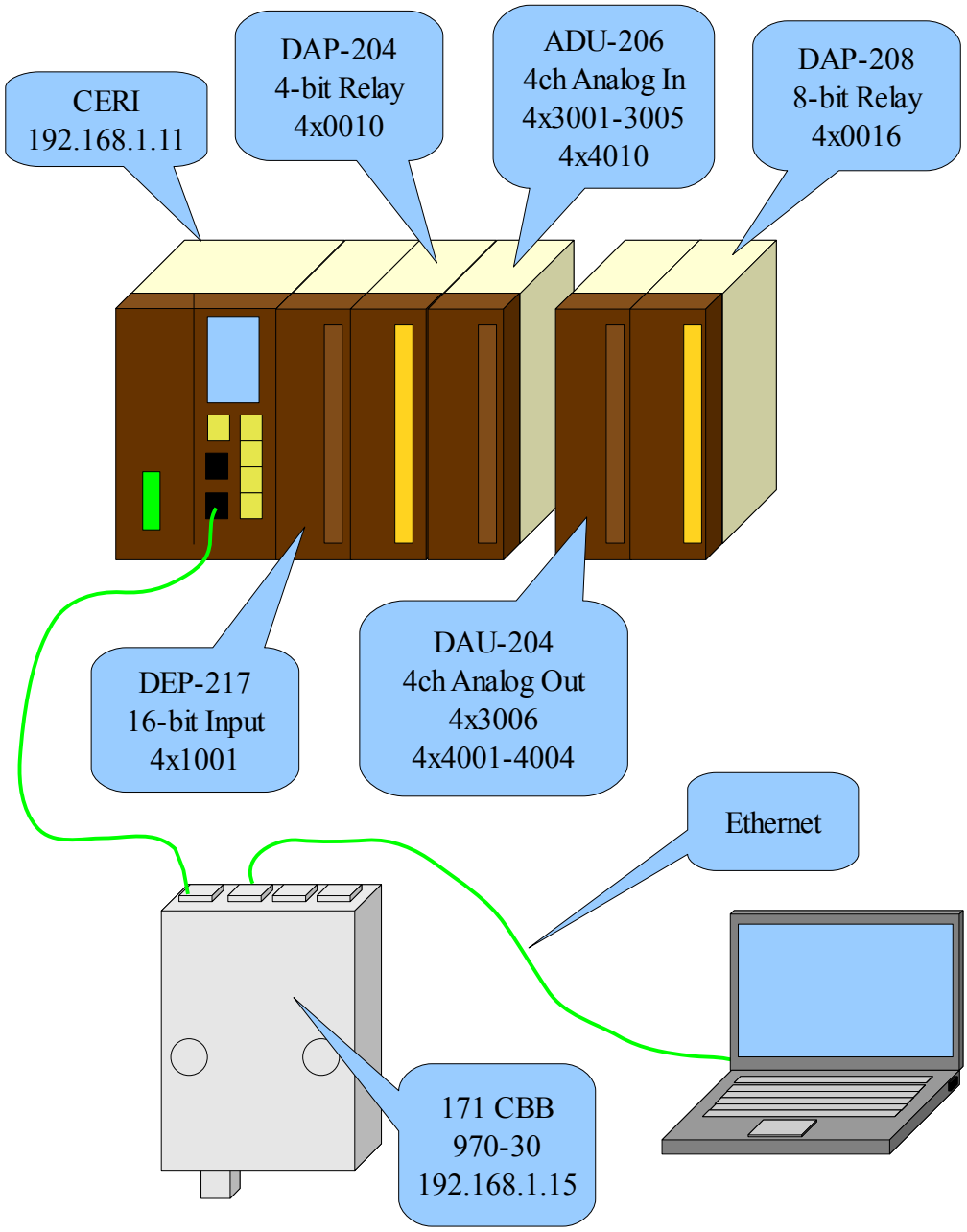
PLC Input	Input Card/Number	Description
40001	DAU-204/1	Ch 1 Output Value (volt meter)
40002	DAU-204/2	Ch 2 Output Value
40003	DAU-204/3	Ch 3 Output Value
40004	DAU-204/4	Ch 4 Output Value

Table 4: PLC (4x) Analog Outputs

New Setup

The Compact CPU is removed from the rack and replaced with a CERI. The original 24VDC power supply is used by the CERI.

Figure 2 New System Layout



The new PLC is a Momentum 171 CBB 970-30. This PLC has a built-in 4-port Ethernet switch and a Modbus/TCP I/O Scanner. It makes for an ideal controller for the CERI.

IP Settings

The IP Address of the CERII is set to 192.168.1.11. The video demonstrates setting this value with the following screens:

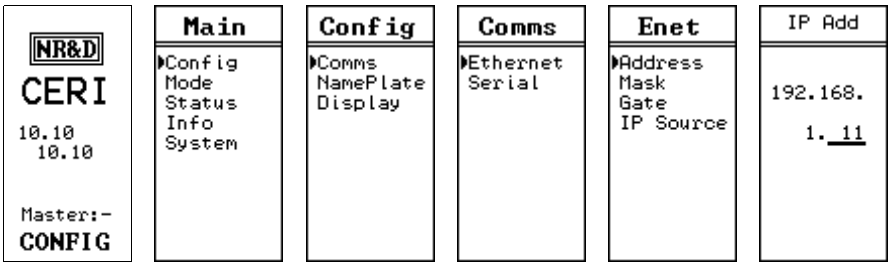


Figure 3: Fixed IP Address Screen

The Subnet Mask and Default Gate are also configured through the front panel.

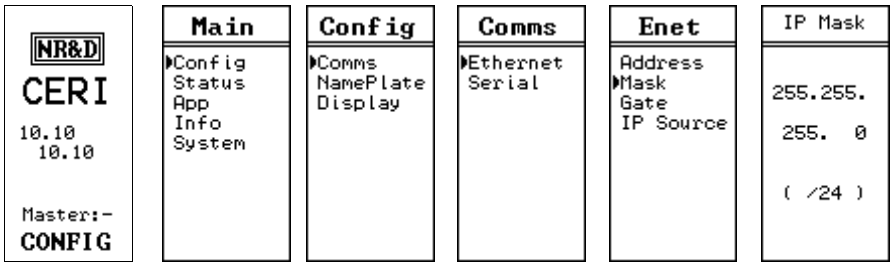


Figure 4: Subnet Mask Screens

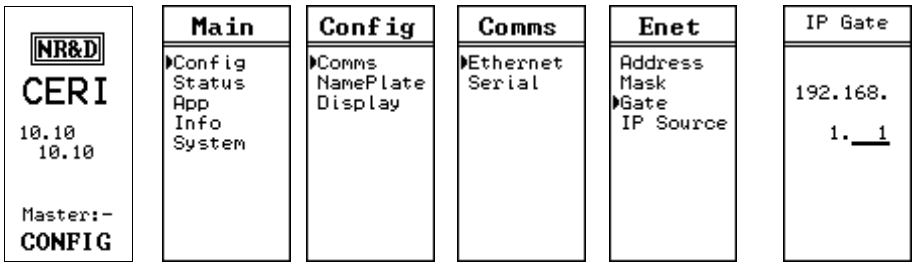


Figure 5: Default Gate Screen

CERI Web Configuration

After the IP Address is configured, the rest of the CERI setup is done with a standard web

browser.

The first time the CERI"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”.

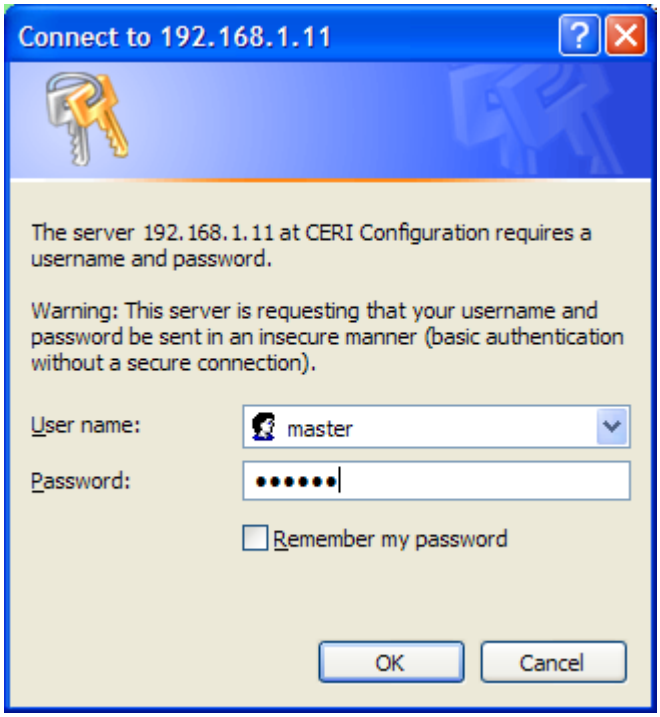


Figure 6: Password = master

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

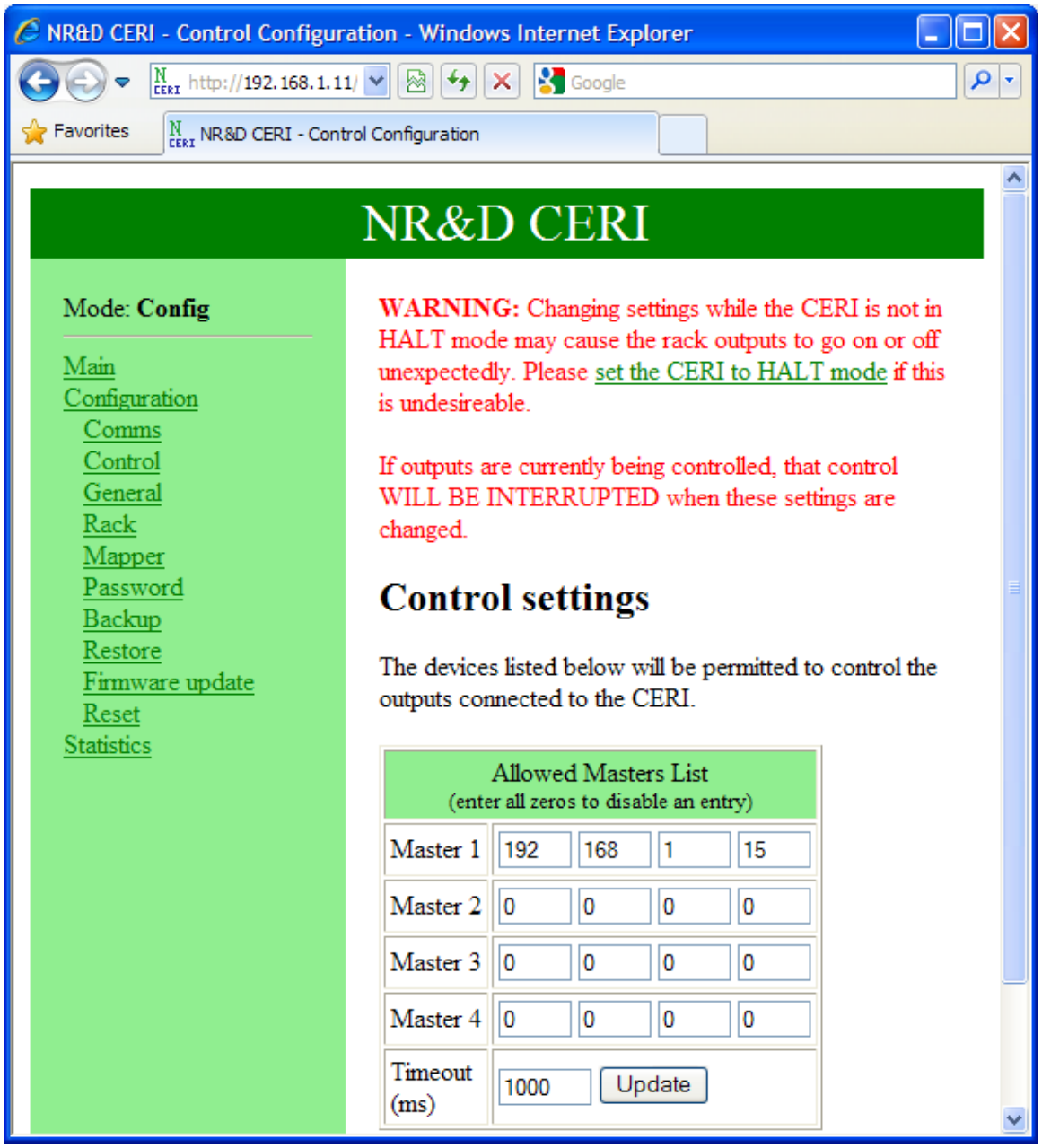


Figure 7: Control Settings Web Page

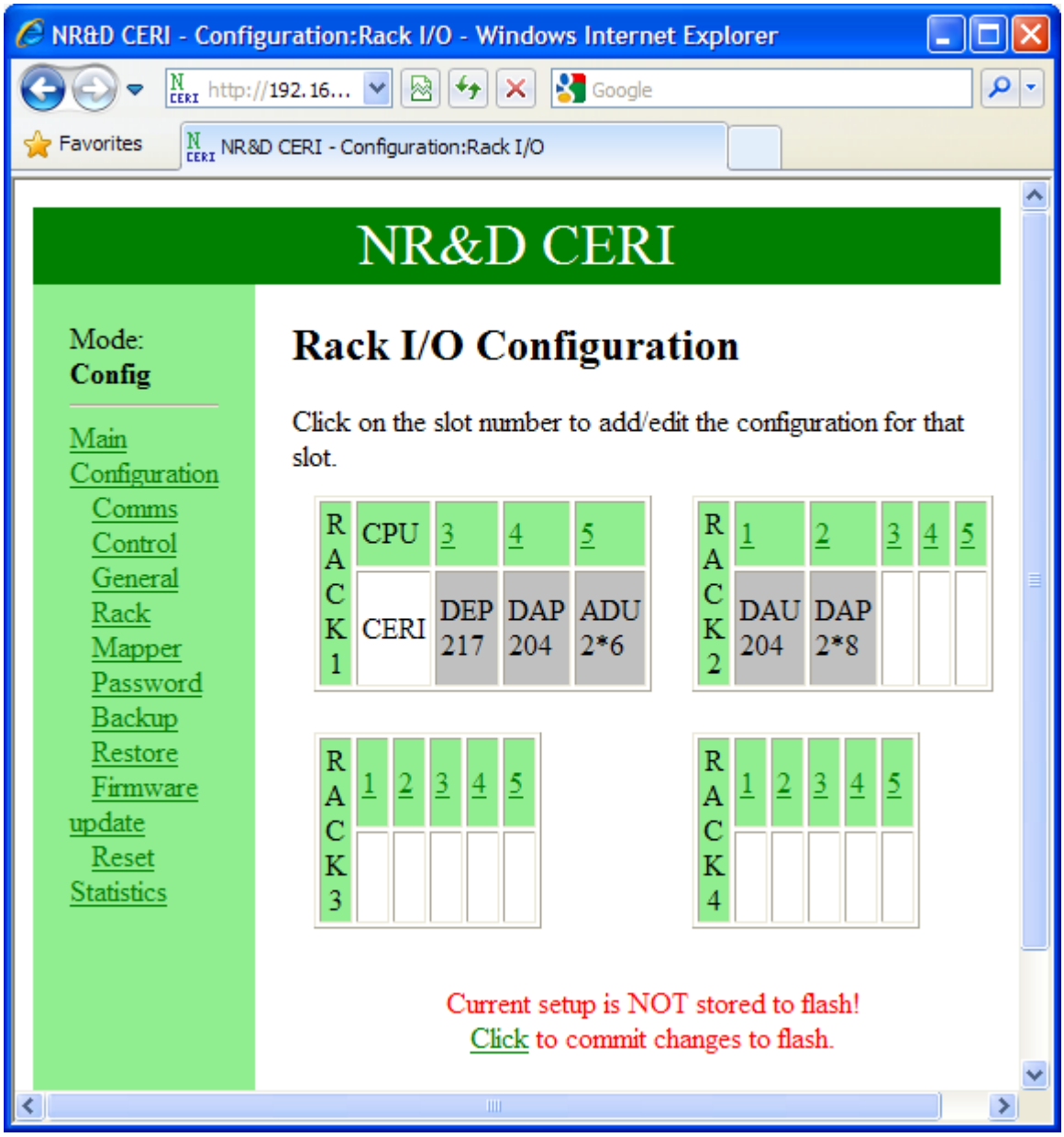


Figure 8: Rack Web Page

The Rack web page shows an overview of the I/O system. Each slot shows the configured (white background) or detected (gray background) module. Clicking on the numbered link at the top of a slot brings the slot edit page.

Several Compact I/O modules share the same device ID. In these cases, the CERI displays as much information about the detected device as it can and includes the wildcard character "*" when needed. In Figure 8: Rack Web Page, the ADU-2*6 and DAP-2*8 which indicate that the detected modules could be ADU-206 or ADU-256 and DAP-208 or DAP-258 respectively.

Clicking on the slot number pulls up a specific web configuration page for that slot. The Module is selected from a pull-down menu. The appropriate input and output words are then assigned.

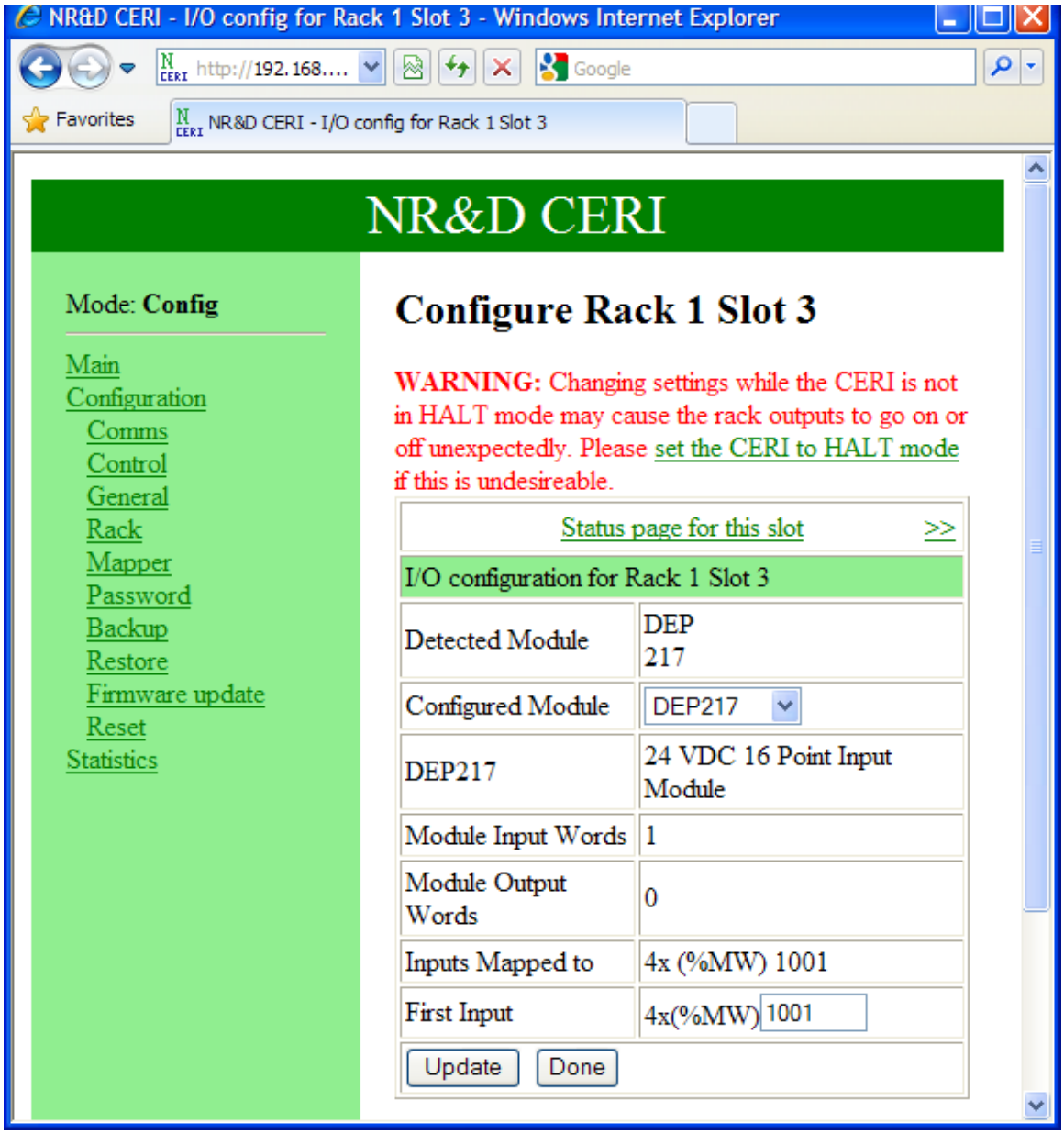


Figure 9: DEP-217 Seup Page

Some modules have optional "Configuration" web pages to set additional parameters.

Figure 10: ADU-206 Configuration sub-page

After all of the CERI configuration is complete, be sure to commit the changes to FLASH by clicking on the link at the bottom.

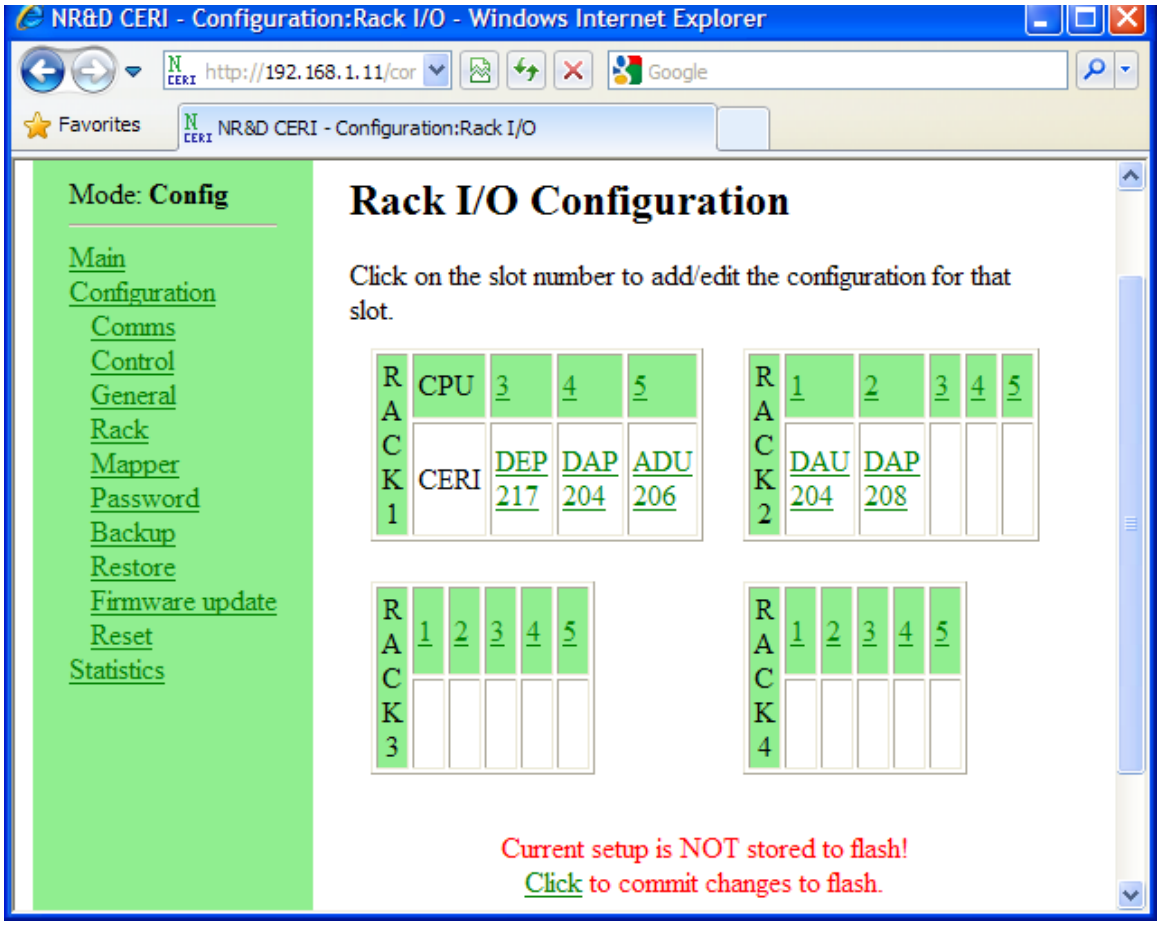


Figure 11: Config not Saved

PLC I/O Scanner Setup

The Ethernet I/O Scanner is configured with two entries to transfer the data to/from the CERI. Entry 1 moves the discrete data while Entry 2 moves the analog data.

#	IP Address	Index	Read Local	Read Remote	Read Cnt	Def Value	Write Local	Write Remote	Write Cnt
1	192.168.1.11	1	1x0001	4x1001	1	zero	0x0001	4x0001	1
2	192.168.1.11	1	3x0001	4x3001	6	zero	4x0001	4x4001	4

Table 5: Momentum PLC I/O Scanner

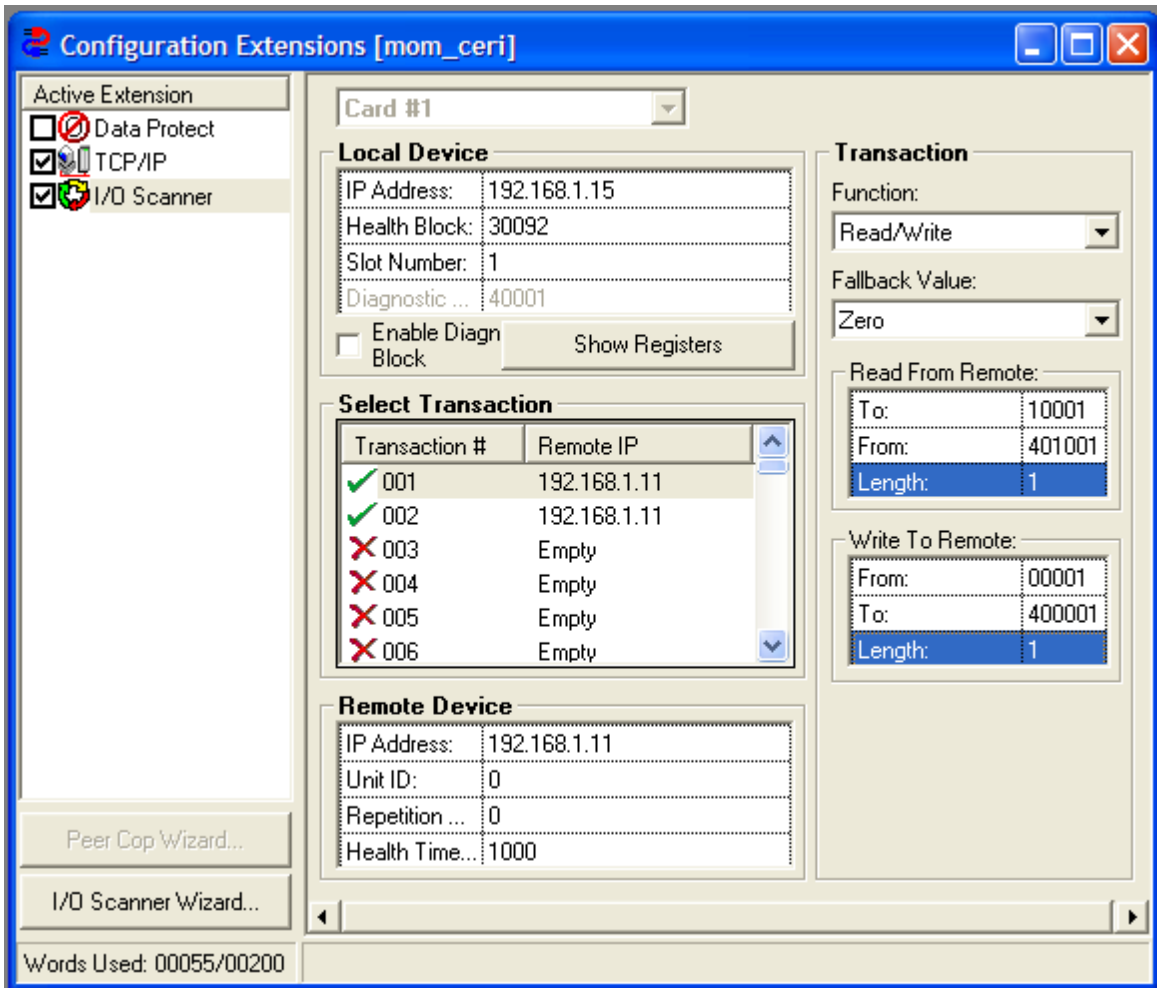


Figure 12: Discrete I/O Scanner Entry

Discrete Inputs

I/O Scanner Entry 1 (See Figure 12) moves the value from Holding Register 1001 in the CERI into the 16 1x input bits in the PLC. Table 6: CERI 4x1001 Bit Assignments shows the mapping of the input bits and I/O points in the CERI. The DEP-217 card bit-map in the CERI exactly matches this layout so no further data manipulation is required.

CERI Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PLC 1x Bit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DEP-217 Input	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Table 6: CERI 4x1001 Bit Assignments

Discrete Outputs

I/O Scanner Entry 1 also moves the 16 0x Coils from the PLC into Holding Register 1 in the CERI. Table 7: CERI 4x0001 Bit Assignments shows the mapping of the output bits and I/O points in the CERI.

CERI Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PLC 0x Bit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DAP-204 Output	1	2	3	4												
DAP-208 Output									1	2	3	4	5	6	7	8

Table 7: CERI 4x0001 Bit Assignments

Table 8: CERI DAP-204 and DAP-208 Bit Assignments shows the required mapping of the output bits and I/O points in the CERI. Notice that the bits for the DAP-204 do not line up with the bits coming from the PLC. The CERI's mapper is used to move these bits around to the required locations.

CERI Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DAP-204 Output													1	2	3	4
DAP-208 Output									1	2	3	4	5	6	7	8

Table 8: CERI DAP-204 and DAP-208 Bit Assignments

CERI Mapper Entry 1 unpacks the nybble data to properly align the DAP-204 output data to the CERI's required arrangement. Mapper Entry 2 is not technically required for the DAP-208 data but is useful in demonstrating the unpacking of byte data.

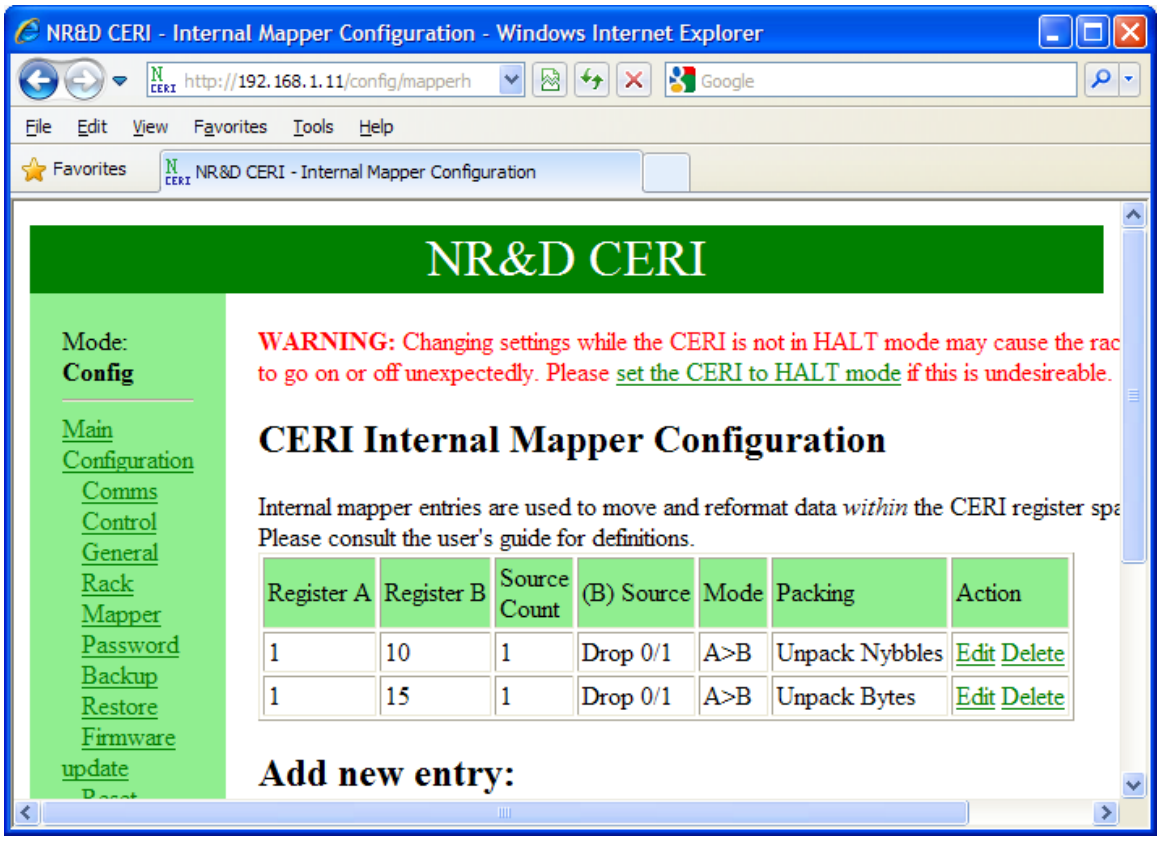


Figure 13: Mapper Entries

Mapper Entry 1 unpacks two Nybbles from CERI register 1 into CERI registers 10 and 11. Table 9: CERI Nybble Unpack Bit Assignments shows the mapping of the output bits and I/O points in the CERI. Register 10 data is all that is needed because it contains the four bits needed for the DAP-204. In this particular case, CERI register 11 contains ½ of the data needed for the DAP-208. This data is simply ignored and nothing is done with register 11.

CERI Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Register 1 Data	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Register 10 Data													1	2	3	4
Register 11 Data													9	10	11	12

Table 9: CERI Nybble Unpack Bit Assignments

Mapper Entry 2 unpacks two Bytes from CERI register 1 into CERI registers 15 and 16. Table 10: CERI Byte Unpack Bit Assignments shows the mapping of the output bits and I/O points in the CERI. Register 16 data is all that is needed because it contains the eight bits needed for the DAP-208. In this particular case, CERI register 15 contains the data

needed for the DAP-204 and the four unused bits. This data is simply ignored and nothing is done with register 15.

CERI Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Register 1 Data	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Register 15 Data									1	2	3	4	5	6	7	8
Register 16 Data									9	10	11	12	13	14	15	16

Table 10: CERI Byte Unpack Bit Assignments

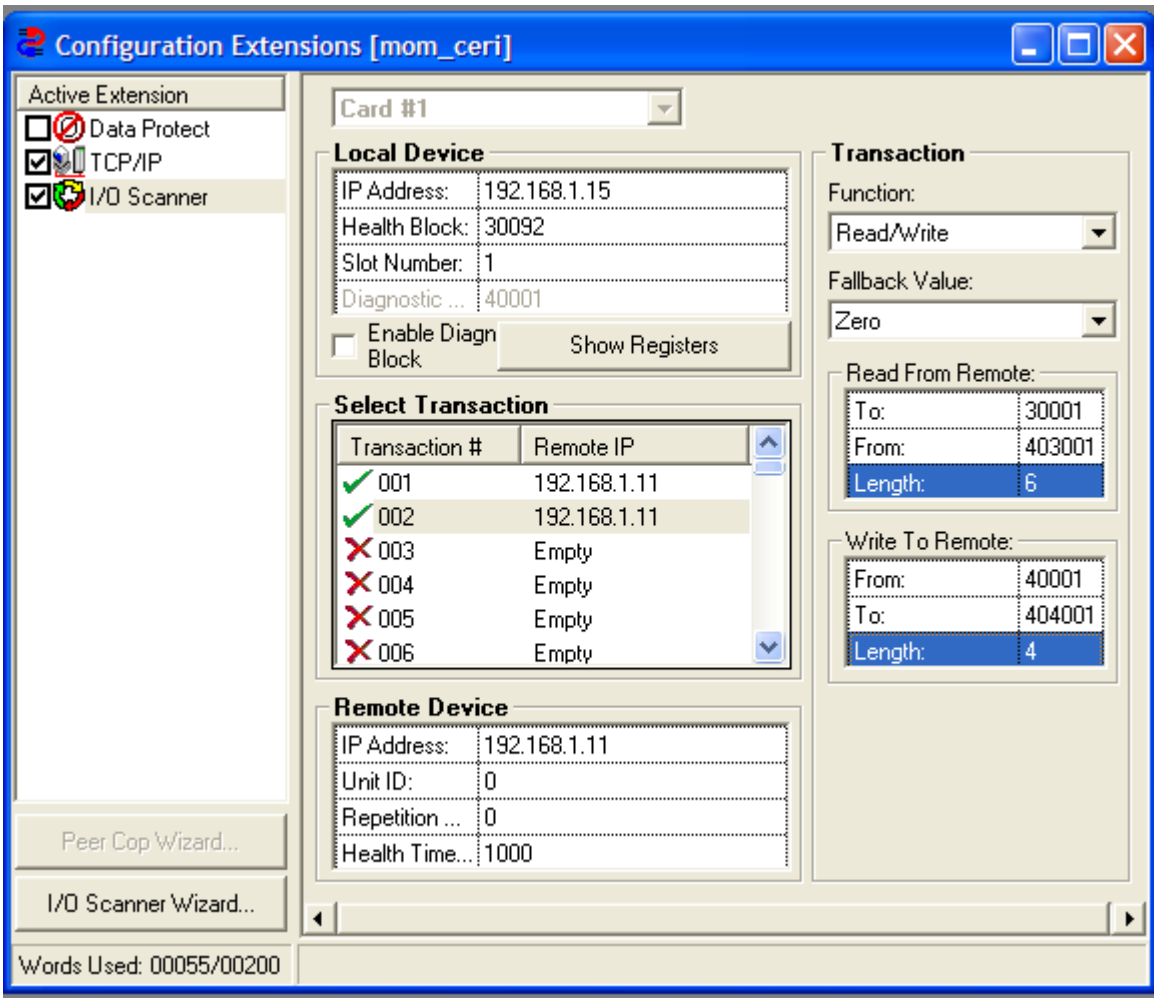


Figure 14: Analog I/O Scanner Entry

Analog Inputs

I/O Scanner Entry 2 (Figure 14) moves the six words of analog input data from the CERI

into the PLC 3x registers 1 through 6. The first 5 words are from the ADU-206 input card while word 6 is the status word from the DAU-204 output card.

Analog Outputs

I/O Scanner Entry 2 also moves four words of Holding Registers from the PLC into the CERI for use with the DAU-204 output card.

Ladder Program

The I/O Scanner and CERI configuration is carefully configured to allow the Momentum CPU to have the I/O in exactly the same words/bits as the original Compact CPU. The very simple ladder program is simply cut from the old system and pasted into the new CPU.

Figure 15 shows this simple ladder segment. Quite simply, input 10001 sets the state of output 1, input 10002 controls output 4, input 10016 controls output 9, and the analog input value in 30002 is directly copied to analog output 40001.

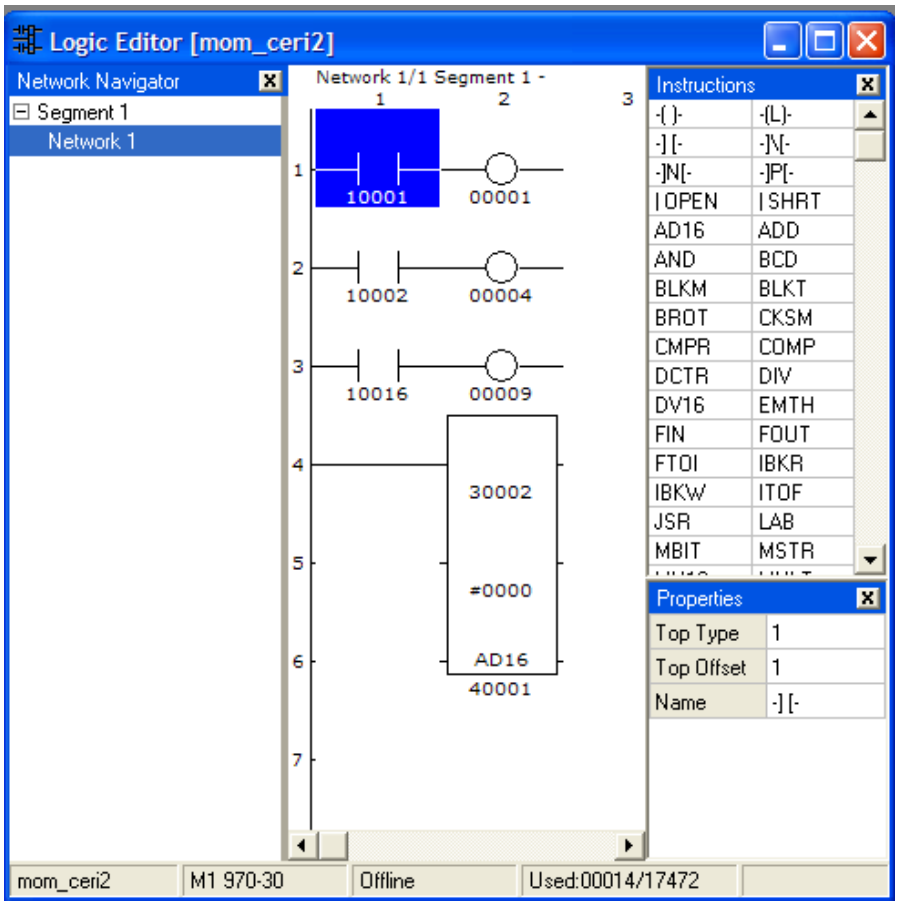


Figure 15: Ladder Segment