

User's Guide

DeviceNet™

68HC05X4 Slave Emulator

DN-X4SEM

Rev. 1.1

*HURON*  
*NET*  
*WORKS*

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## **1. DEVICENET 68HC05X4 SLAVE EMULATOR**

The DeviceNet 68HC05X4 Slave Emulator board is a general purpose development tool for both entire networks or for products that use the 68HC05X4 processor in them. The board comes with a windowed 68HC05X4 which contains a modified version of the Allen-Bradley DeviceNet Example Code. The modifications are for reading the switches and driving the LEDs. The communication protocol is not modified. As such it represents a standard to test similar devices against.

In order to understand the following sections it is expected that the reader is familiar with the DeviceNet Specification Vol. I, Revision 1.3

## **2. HARDWARE COMPONENTS**

The hardware components of the Slave Emulator Board are:

- Microprocessor - 68HC05X4
- 24V to 5V Switching Regulator
- Standard DeviceNet physical layer circuit
- 5-pin DeviceNet (Phoenix) Connector
- 2x13-pin expansion board header
- 24C04 Serial EEPROM
- 10 position **BARLED**
- Four(4) Bi-color status **LEDS**
- Two(2) eight position **DIPSWITCHES(S2 & S3)**
- Manual **RESET(S1)** switch

### **2.1. Microprocessor**

The UV erasable 68HC05X4 is a convenient feature for developing products that will use this device. The X4 contains 4K of EPROM and 176 bytes of RAM. A 16 MHz oscillator is used to allow the onboard CAN peripheral to operate within the DeviceNet specification.

### **2.2. Switching regulator**

A Power Trends 78ST105 switching regulator is used. This device will allow inputs over the entire 11 to 25 volt range. This regulator has sufficient capability to power additional circuitry via the expansion connector. Up to 500 ma can be drawn through the expansion connector for application specific circuitry.

## 2.3. Physical layer circuit

The un-isolated physical layer contains the DeviceNet required mis-wiring protection circuitry. The standard open style (unsealed) 5 pin connector is used.

## 2.4. Expansion connector

The X4 control signals, port lines, bus power lines, and regulated 5 volt lines are brought to this connection to allow custom, application specific circuitry to be added. Any input/output circuitry should be properly isolated.

## 2.5. Serial EEPROM

This hardware is not used by the standard Slave Emulator firmware. It is available for application specific storage of device address, baud rate, or other parameters.

## 2.6. BARLED

Displays output (consumed) data. The most significant position indicates the state of the **RESET** signal. **DIPSWITCH(S2)** is written to the least significant eight positions after reset.

## 2.7. BI-COLOR LEDS

One of the **LEDS** implements the DeviceNet specified combined Network/Module Status **LED**. The other three indicate the states of the three pre-defined master-slave connection instances. An activity **LED** is green when the connection is in the Established state. The activity **LED** is red when the connection is in the Timed-Out state. The order of the **LEDS** starting from the **DIPSWITCHES** is 1)Network/Module Status, 2) explicit messaging, 3) polled I/O, 4) bit strobed I/O.

## 2.8. DIPSWITCHES

**DIPSWITCH(S2)** is transmitted in the least significant byte of the slave's response to either a master's poll or strobe command. **DIPSWITCH(S3)** is transmitted in the next most significant byte of the slave's response to either a master's poll or strobe command. **DIPSWITCH(S2)** is also written to the **BARLED** at reset.



0	0	125 Kbps
0	1	250 Kbps
1	0	500 Kbps
1	1	125 Kbps

SW3	SW4	SW5	SW6	SW7	SW8	
0	0	0	0	0	0	MAC ID 0 (0x00)
0	0	0	0	0	1	MAC ID 1 (0x01)
			•			
			•			
			•			
1	1	1	1	1	0	MAC ID 62 (0x3E)
1	1	1	1	1	1	MAC ID 63 (0x3F)

Turn on the network power supply. The leftmost position of the **BARLED** will blink briefly. Then the contents of **DIPSWITCH(S2)** is displayed on the eight least significant positions of the **BARLED**

Depress the **RESET(S1)** switch and note that the most significant position of the **BARLED** remains lit as long as the **RESET** switch is held. The remaining positions on the **BARLED** should be blank.

Release the **RESET** switch and verify that the **BARLED** shows the value of the **DIPSWITCH(S2)** again. This value will remain in the **BARLED** until after a poll connection has been established and the Slave Emulator receives a valid poll command from its master. The value of the data byte in the masters poll will then be displayed on the **BARLED** until it is changed by a subsequent poll command. The pre-defined poll connection has a consumed size of one(1) byte, and a produced size of two bytes.

If your network has a traffic monitor you should also see two(2) **DUP MAC REQUEST** messages after the **RESET** switch is released or after the board powers up.