

E3C: Enabled 3-Wire Communication

The RS-232 Serial Networking Standard for Communication to 256 Devices on a Single RS-232 Serial Port.

E3C: PLAIN-ENGLISH Q&A

What is E3C?

E3C stands for Enabled 3-Wire Communication. E3C is a set of commands that allows 256 devices to share a single RS-232 serial port.

What is E3C Used For?

E3C is used to communicate to devices via RS-232 commands. E3C allows you to control same or different types of devices on a single serial port.

Is E3C Easy to Use?

Yes. E3C is **NOT** a "Networking Protocol", it is simply a set of commands. You may choose to use these commands for controlling multiple devices, or you may choose to ignore them and they will never interfere with normal operation of any device.

How Does E3C Work?

E3C is a set of commands that allow you to select which devices are ignoring or listening to your commands. Bear in mind, E3C commands are NEVER ignored by the devices you are controlling.

You can use E3C commands to communicate to a single device, multiple devices, all devices, no devices, or all but one device.

Once you have selected the devices you want to control using the E3C command set, simply send commands that are compatible with that device.

Where do I Begin?

The first thing you must do is program each device with a device number. Next, daisy-chain all devices to the serial port. Use the E3C command set to select a device to control.

How do I Enable a Device?

Devices are automatically enabled when first powered up. You never need to enable a device unless you have used another E3C command to disable it.

E3C: REAL-WORLD EXAMPLE

Let's assume you have two R165 relay controllers you need to connect to a single RS-232 serial port. You need to control each relay individually on each relay board.

The first thing you would do is program each R16 relay controller with a unique E3C device number (we also recommend labeling the device with its device number). For simplicity, we will program one board with device number 0, the other board with device number 1.

The best way to program the R165 is to use the Visual Basic example software. This provides a Windows GUI so you don't have to write a single line of code to program the device numbers. You can also use ASCII character codes to program the device number in the R16.

Each NCD device may have a slightly different method of programming or setting the E3C device number so you should always consult the manual.

Now that both R165 relay controllers are programmed and individually labeled with a device number, it is time to connect them to the serial port of your computer.

For simplicity, let's assume you are going to use the R165 in one-way communication. Simply connect the RS-232 ground and RS-232 data output of your computer to the RS-232 ground and RS-232 data input on BOTH R165 boards.

Note that you can daisy chain up to 256 boards on a single serial port. An RSB booster may be required for large networks.

Once connected to the serial port of your computer, power up the boards and open your favorite programming language.

Send commands for controlling relays 1-16 (see the R165 manual for details). BOTH R165 RELAY BOARDS WILL RE-

SPOND TO YOUR COMMANDS!!! Remember, E3C devices are enabled when power is first applied, so any command received to activate a relay will be processed by BOTH boards.

Now it's time to use the E3C command set (the complete command set can be found on the next page). Most people prefer the E3C command 252. This command tells a specific device to listen to your commands and disables all other devices. In plain English, it means control one device at a time. Note that you need to specify a device you want to control. In our example, you should use 0 or 1 for the "Device" parameter in the VB example below:

```
Public Sub DisableAllDevicesExcept(Device)
  'Disable All E3C Devices Except (Device)
  'Enter Command Mode
  MSComm1.Output = Chr$(254)
  'E3C Disable All Device Except Command
  MSComm1.Output = Chr$(252)
  'Device Number that will be Active
  MSComm1.Output = Chr$(Device)
End Sub
```

To control Device 0:

```
DisableAllDevicesExcept(0)
```

To control Device 1:

```
DisableAllDevicesExcept(1)
```

Once you have selected the device you want to control, simply send the appropriate commands to control that device.

At any time, you can tell both R165 boards to respond to your commands or use other E3C functions to control exactly which boards you want to control.

As you can see, the E3C command set does not add any complexity to the use of devices. It simply adds capabilities that are extremely versatile and powerful should you choose to use them.

The E3C Command Set: Software Control of Multiple NCD Devices

The E3C command set allows you to control up to 256 NCD devices from a single serial port. It is OK to mix different types of devices, as long as the devices are E3C compliant. This device supports the full set of E3C commands.

How does E3C Work?

First of all, each device must be assigned a device number from 0 to 255. Most devices allow you to program the E3C device number using ASCII character code commands. Other devices include .EXE programs that will allow you to program the device number from the Windows GUI.

E3C stands for Enabled 3-Wire Communication. Put simply, when you first power up your computer and all the devices attached to the serial port, all devices will respond to your commands.

Using the E3C command set, you can specify which devices will listen and which devices will ignore your commands. Note that E3C commands are never ignored by any device, regardless of the commands you send to the controller.

The number to the left of each command indicates the ASCII character code that must be sent to issue the command. All commands must be preceded with ASCII character code 254 to place the device in command mode. See examples at right.

The E3C Command Set

248 Enable All Devices:

Tells all devices to respond to your commands.

249 Disable All Devices:

Tells all devices to ignore your commands.

250 Enable a Selected Device:

Tells a specific device to listen to your commands.

251 Disable Selected Device:

Tells a specific device to ignore your commands.

252 Enable Selected Device Only:

Tells a specific device to listen to your commands, all other devices will ignore your commands.

253 Disable a Selected Device Only:

Tells a specific device to ignore your commands, all others will listen.

255 Program E3C Device Number:

Programs the device number into the controller. Only ONE controller should be attached to your computer at the time of programming. Once programmed, use the above E3C commands to control which devices you are speaking to.

E3C Visual Basic Programming Examples

The E3C command set is easily used from any programming language that supports serial communication. The following Visual Basic 6 Example source code demonstrates subroutines that can be used to control which devices will listen and which devices will ignore your commands.

Sample Code: The E3C Command Set

```
Public Sub EnableAllDevices()  
    'Enable All E3C Devices  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(248) 'E3C Enable All Device Command  
End Sub  
  
Public Sub DisableAllDevices()  
    'Disable All E3C Devices  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(249) 'E3C Disable All Device Command  
End Sub  
  
Public Sub EnableSpecificDevice(Device)  
    'Enable A Specific E3C Devices, Other Devices will be unchanged  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(250) 'E3C Disable Specific Device Command  
    MSComml.Output = Chr$(Device) 'Device Number that will be Disabled  
End Sub  
  
Public Sub DisableSpecificDevice(Device)  
    'Disable A Specific E3C Devices, Other Devices will be unchanged  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(251) 'E3C Disable Specific Device Command  
    MSComml.Output = Chr$(Device) 'Device Number that will be Disabled  
End Sub  
  
Public Sub DisableAllDevicesExcept(Device)  
    'Disable All E3C Devices Except (Device)  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(252) 'E3C Disable All Device Except Command  
    MSComml.Output = Chr$(Device) 'Device Number that will be Active  
End Sub  
  
Public Sub EnableAllDevicesExcept(Device)  
    'Enable All E3C Devices Except (Device)  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(253) 'E3C Enable All Device Except Command  
    MSComml.Output = Chr$(Device) 'Device Number that will be Inactive  
End Sub  
  
Public Sub ProgramDeviceNumber(Device)  
    'Enable All E3C Devices Except (Device)  
    MSComml.Output = Chr$(254) 'Enter Command Mode  
    MSComml.Output = Chr$(255) 'Program E3C Device Number Command  
    MSComml.Output = Chr$(Device) 'Device Number to be Programmed  
End Sub
```

NOTICE:

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