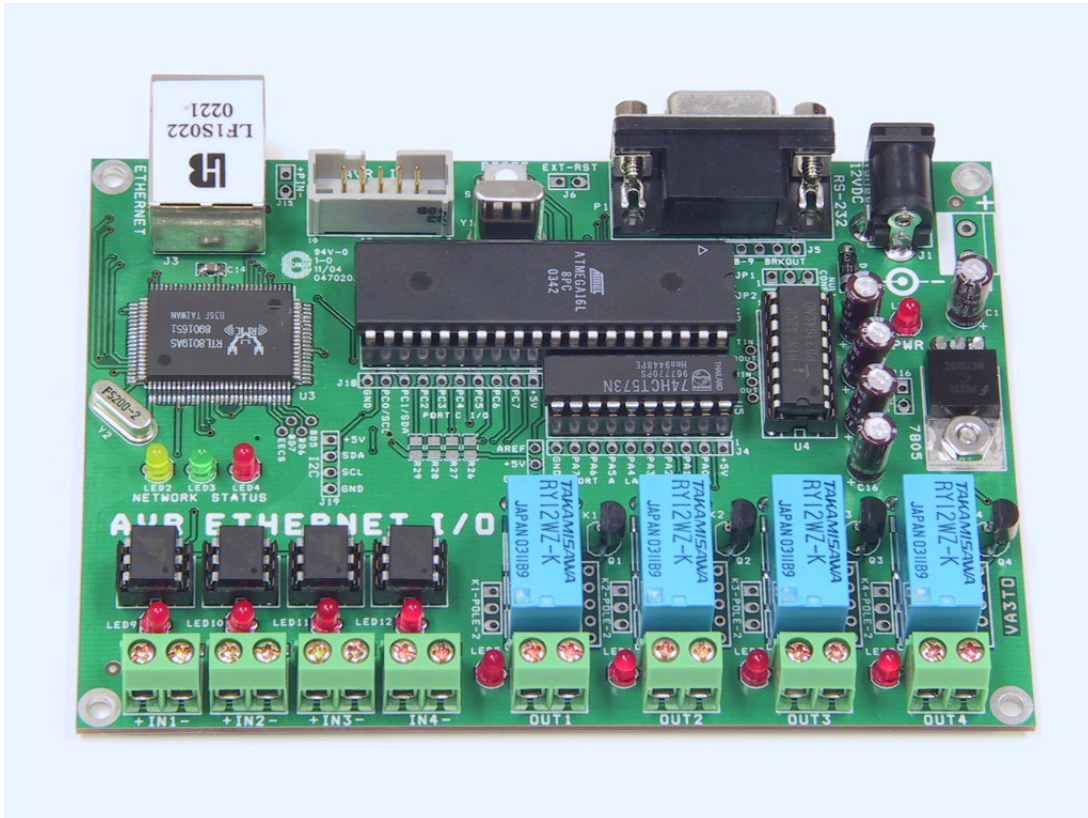


Ethernet I/O Board

Setup & Operating Instructions



1.0 I/P and MAC address selection

The Ethernet I/O board is shipped with a default I/P address of 255.255.255.255. This must be re-configured to an unused address from within your LAN domain. For example, if there are 3 computers on your LAN which are assigned addresses 192.168.1.2, 192.168.1.3 and 192.168.1.4, you can assign the LAN address 192.168.1.5 to the EIO board. If more than one EIO board is to be connected on the same LAN then the next consecutive unused LAN address can be assigned to each board.

The default MAC address FF-FF-FF-FF-FF-FF can be changed to an arbitrary number that is not being used by any other computer or network device on your LAN. If more than one EIO board is to be connected on the same LAN then a different MAC address should be assigned to each board.

Note: The EIO board was designed to operate behind a network router that has a unique MAC address. The Ethernet I/O Board uses an arbitrary MAC address that is not IEEE registered so it must reside on a LAN behind a router or other network distribution device that has a registered MAC address. Do not connect the Ethernet I/O directly to your WAN (Internet) connection.

1.1 Board Configuration

Connect 12vdc/300mA power to the EIO Board using wall cube or other power supply. Using a standard 9 pin M-F serial cable, connect the EIO Board to the computer RS-232C serial port and run your favorite Terminal Program set for 57600,N,8,1. Upon pressing the reset button on the EIO Board, you will be presented with a simple menu like this:

```
VA3TO Atmega32 Loader Version 1.0
Source written by Ben Zijlstra june 2004
Present configuration:
Network:
IP-number: 192.168.1.106
MAC-address: 00-01-02-03-04-05
Press 'y' to enter configuration mode
```

Pressing "y" within 10 seconds will initiate the set-up mode and prompt the user with the following questions:

1. *Change IP-number (y/n)*
Input IP-numbers as decimals, separated by a dot (like 192.168.1.106)

The I/P number is comprised of 4 groups of decimal separated numbers from 0 to 255. Select an unused I/P address that is valid within your LAN domain (i.e. 192.168.1.106). Enter the numbers as prompted, one decimal separated group at a time.

2. *Change MAC-address (y/n)*
Input MAC-address in hexadecimals, separated by a - (like 00-01-02-03-04-05)

This can be an arbitrary number as the EIO Board should be used behind a router in a LAN. MAC address (00-01-02-03-04-05) should be suitable for most users.

3. *Would you like to use it's own IP-number as refresh-URL (y/n)*

This option allows the user to select which URL the HTTP refresh updating should use. Choosing (y)es will default to the use of the LAN I/P number that was programmed in step 1 of the configuration.

Choosing (n)o will bring up the prompt: *Would you like to have another refresh-URL (y/n)* where selecting (y)es will allow you to enter a different URL for refresh updating, such as your WAN address (i.e. 24.255.255.78).

4. *Would you like to change to UDP Portnumber. It's default is 5000 (y/n)*
The default UDP port number is 5000 but it can be changed by selecting (y)es.
Type the portnumber < 65536 as decimal
Enter a new port number as desired. (Leave as port 5000 for normal use.)

5. *Would you like to see all devices on the I2c-bus (y/n)*
If (y)es is selected, the address of any devices connected to the I2C bus will be detected and displayed.

Once the configuration is completed, the board will enter the normal RUN mode. It can now be connected to the LAN using a regular ethernet cable. See the "Connection Diagram" for details.

1.2 Network Configuration

In order for the EIO Board to be seen on the outside world (i.e. the Internet), your router must be set to port-forward a WAN TCP port (i.e. **5050**) to LAN port **80** at the LAN address of the board that was programmed in during the board configuration. UDP port **5000** must also be opened in the firewall. Most commercially available routers have provision for this in their configuration setup. Consult your Router manual for details.

To access the EIO Board remotely, you must determine the current WAN (Internet) address of your Router. This may be found in your Router setup menu or attained by other means like online services such as <http://www.whatismyip.com> . Once the EIO board is properly configured and you have obtained your WAN address, you can access it remotely via the Internet.

A Note on Static vs. Dynamic Internet I/P addresses

Many Internet Service Providers (ISP) provide a static I/P address which means that your WAN address will remain the same for long periods of time. Some ISPs provide a dynamic I/P address which can change on a regular basis. In the latter case, you will need to obtain your WAN address every time it changes.

A static I/P address is preferred however it is important to note that even with this type of service, your assigned I/P address could occasionally change. If you change the device that you normally have connected to your WAN connection (i.e. your Router), or the ISP makes some changes during maintenance, a different WAN I/P address may be assigned.

2.0 Operating Modes

The Ethernet I/O board offers two methods of accessing it for monitor and control;

1. HTTP/ Embedded Web Server mode using any web browser,

OR

2. Custom EIO Control Panel software.

Both methods offers benefits which are detailed in the following chart.

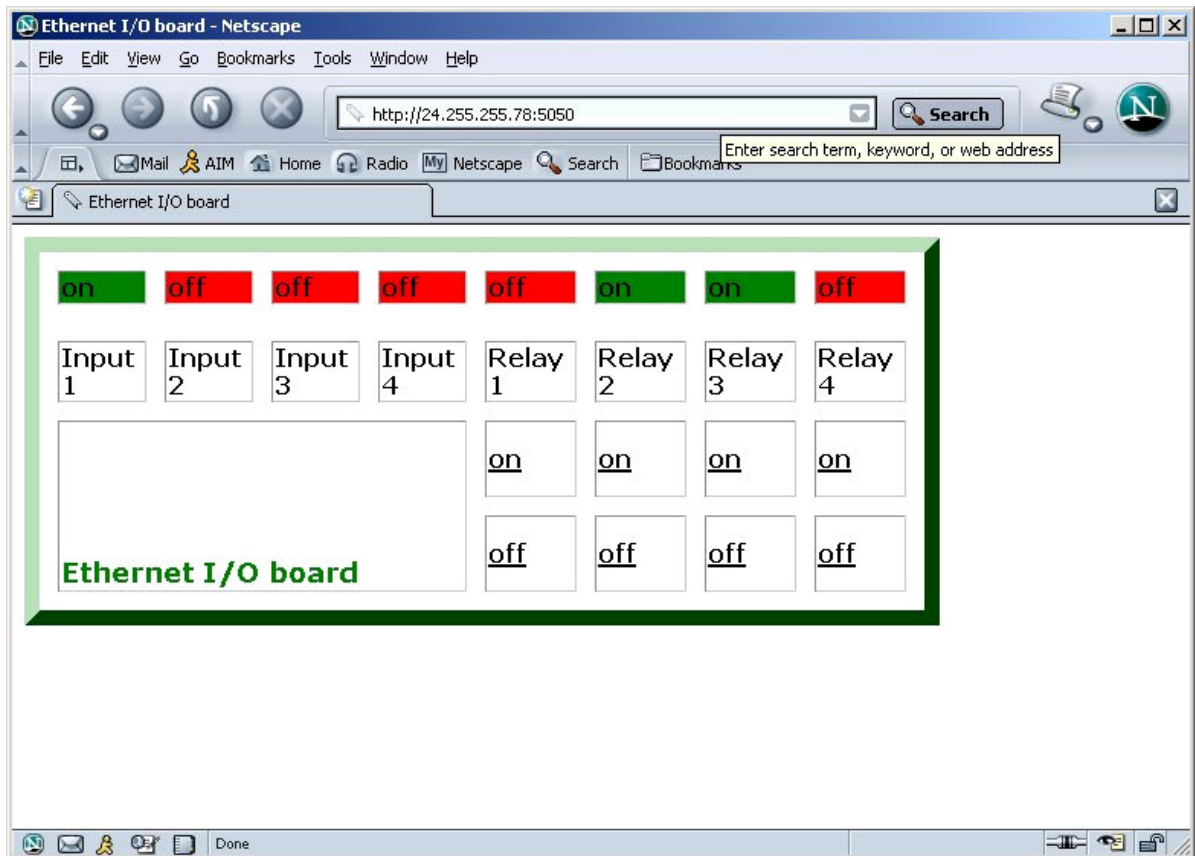
<u>HTTP/ Web Browser</u>	<u>EIO Control Panel Software</u>
<ul style="list-style-type: none">+ Accessible using any computer with Internet access using a generic Web Browser.- Simple On/Off control with text & graphics indicating Relay and Input Status.- Relays provide latched On/Off action.- No Audible Alarm upon Input activation.- Fixed status polling period of 9 seconds.	<ul style="list-style-type: none">- Custom software which must be run on a PC under Windows(TM) 98/2000/XP OS, with Internet access.+ Graphical representation of Relay controls and Input status with user defined labels for each input and output device.+ Relays provide momentary or latched On/Off action.+ Configurable audible alarm upon activation of Input #1. User can record and use a customized WAV file message.+ Configurable status polling period from 1 to 60 seconds (in stepped increments).

2.1 HTTP/ Web Browser mode

Using a web browser on the remote computer, enter the WAN address of the router to which the board is connected. The forwarded port number may need to be appended onto the end of the WAN address. Example: <http://24.255.255.78:5050>

When the proper address is entered, the web browser will respond with the following screen:

EIO Web Browser screen



Web browser operation is relatively straight-forward.

Clicking the lower on or off icons will toggle the appropriate relay accordingly at the EIO board.

The coloured icons along the top row indicate the current status of the Inputs and Relays.

(Green = ON/Active, Red = OFF/Inactive)

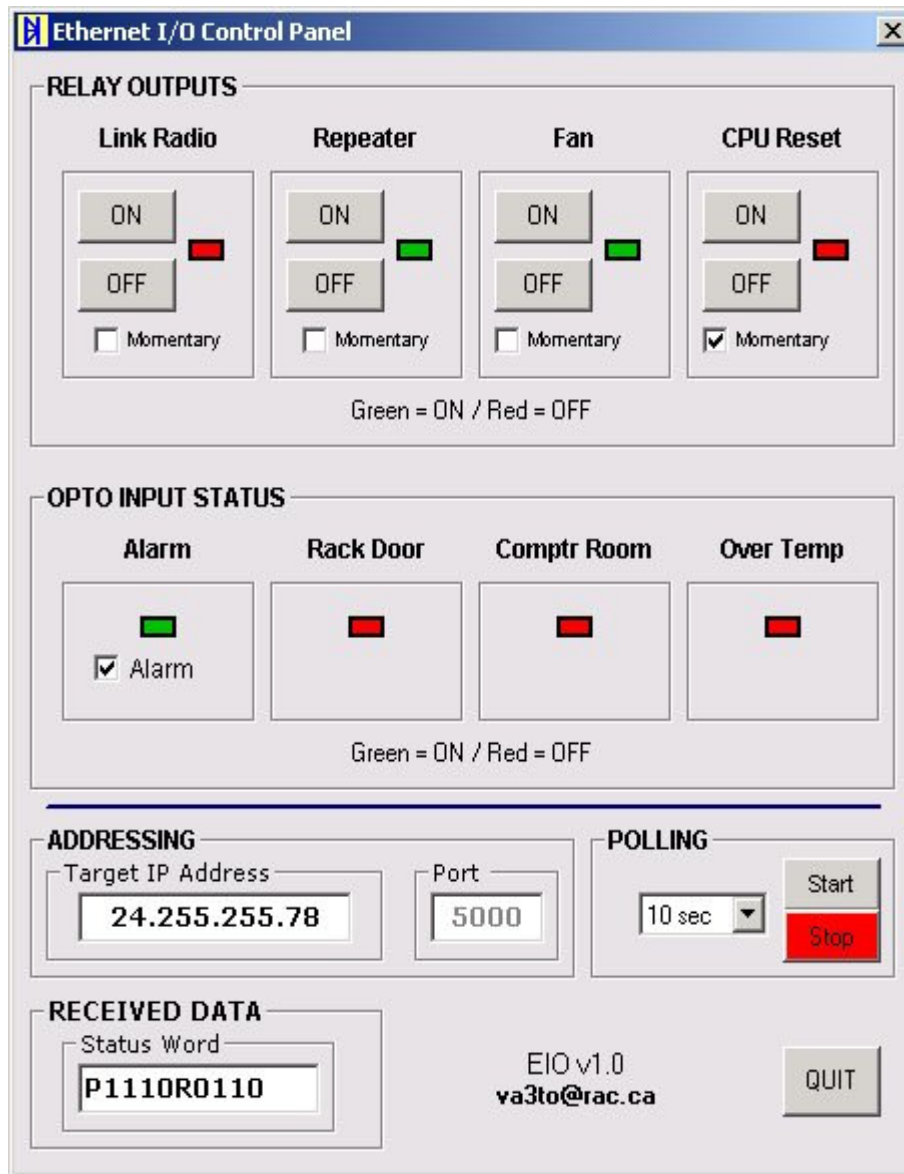
The board is polled and the browser is refreshed every 9 seconds in order to keep the status icons updated. When a relay is toggled, the status will be updated after the next polling period.

2.2 EIO Control Panel mode:

The EIO Control Panel software offers more customized control and monitoring compared to Web Browser mode, however it must be installed and run on each remote access PC. This software has been tested on computers running Windows(tm) 98, 2000 and XP Operating Systems. It can be downloaded from <http://www.drftech.com> .

Install the software and follow the directions as prescribed.
Upon executing, the program will look similar to this:

EIO Control Panel screen



2.21 EIO Control Panel description

The EIO Control Panel program was designed to be simple and intuitive. The screen is broken down into 5 fields as follows:

RELAY OUTPUTS

Clicking the ON or OFF buttons will activate the relays accordingly. The status of the 4 relays is displayed on the rectangular LED indicators. (Green = ON/Active, Red = OFF/Inactive)
Clicking on the “Momentary” checkbox will enable momentary mode. When activated, the relay will turn on for 1 second (close the contacts) then turn off (open the contacts). This is ideal for applications such as resetting a computer.

OPTO INPUTS

The status of the 4 Optocoupled Inputs is displayed on the rectangular LED indicators. (Green = ON/Active, Red = OFF/Inactive)

By enabling the “Alarm” checkbox in the Input 1 field, a WAV file will be played every poll period when Input 1 is active. The user can record a customized Wave file for the alarm annunciation. Simply record a WAV format audio clip, name it “Input1.wav” and place it into the directory where the EIO Control Panel is installed. The duration of the WAV file must not exceed the polling period otherwise there will not be enough time for it to be played completely.

** Note: The Relay and Opto-Input labels can be customized by the user. Move your cursor over the label you would like to change, delete it and enter your own label (up to 11 characters in length). The new label will automatically be saved upon exiting the program.*

ADDRESSING

Enter the remote WAN address of the router to which the board is connected in the “ADDRESSING” field.

** Note: Polling must be stopped in order to make changes to the addressing by clicking on the “Stop” button in the “POLLING” field.*

POLLING

The current status of the EIO board can be polled by the EIO Control Panel and the results will update the Relay and Opto-Input LEDs. Polling is initiated by clicking the START button in the “POLLING” field. The polling period is selectable in varying steps from 1 to 60 seconds. Polling must be disabled in order to change the period by clicking the “Stop” button. Select a polling duration in the drop-down list as desired.

** Note: Frequent polling comes at the expense of bandwidth. Select a faster polling period if frequent status updating is desired and bandwidth is not an issue. If frequent status updating is not necessary or it is desirable to use less bandwidth, select a slower polling period. (The actual amount of data is quite small. See “Data protocol” for a description of the data that is sent and received.)*

UDP Diagnostics

The “UDP Diagnostics” window displays the status word as it is updated at the period selected in the “POLLING” window. The Input status is shown in the 4 bits following the letter “P” (1=OFF/Inactive, 0=ON/Active) and the Relay status is shown in the 4 bits following the letter “R”. (1=ON/Active, 0=OFF/Inactive). For the Opto-Inputs, the most significant bit (P1xxx) represents Input 1 while the least significant bit (Pxxx1) represents Input 4. Note that the order of the status word for the Relays reversed, that is, Relay 1 is the least significant bit (Rxxx1) while Relay 4 is the most significant bit (R1xxx).

3.0 DATA PROTOCOL

This information will be useful to anyone wishing to write their own custom application software to communicate with the EIO Board.

The **UDP** ethernet datagram protocol is used.

1. Use the following commands to control the relays:

01 = Relay 1 ON
A1 = Relay 1 OFF
02 = Relay 2 ON
A2 = Relay 2 OFF
03 = Relay 3 ON
A3 = Relay 3 OFF
04 = Relay 4 ON
A4 = Relay 4 OFF

Example: To turn on Relay 3, send the command 03.

2. To poll the status of the EIO Board, the following UDP string is sent (all upper case):
SEND INFORMATION NOW

When this polling command is received, the board will respond with the status of the relays and optocoupled inputs as: PxxxxRyyyy.

The x characters represent the status of the Optocoupled Inputs as
P IN1,IN2,IN3,IN4. (Inverse Logic...1= Inactive, 0= Active)

The y characters represent the status of the Relays as:
R Rly4, Rly3, Rly2, Rly1 (Normal Logic...1= Active, 0= Inactive)

Example:

P1100R1011

would indicate that Inputs 1 and 2 are inactive while Inputs 3 and 4 are active and relays 1,2 and 4 are on while relay 2 is off.:

The Ethernet I/O board is offered as a kit and intended for hobby, educational and non-critical use. There are many technical variables between the Client (remote computer) and server (EIO Board). Although testing has proven the Ethernet I/O board to be very reliable, DRF Technologies/VA3TO cannot and does not make any claims to the integrity of communications between the client PC and Ethernet I/O board, or operation of any devices connected to the board due to the sometimes unknown quality of signal or loss of data over the Internet. DRF Technologies/VA3TO endeavors to provide as much technical assistance as we can however it is impossible for us to resolve every conceivable networking issue from afar. The purchaser/user should be knowledgeable in networking principals and is ultimately responsible for all applications of the Ethernet I/O board. The Ethernet I/O board does not have an IEEE assigned MAC number so it must reside behind a router or other network device which does, in order to operate on the Internet. The Ethernet I/O board is not U/L or CSA approved.