

# Parallax Internet NetBurner Kit (#30013)

## General Description

The Parallax Internet NetBurner Kit (PINK) is an Embedded Web Server which enables your BASIC Stamp<sup>®</sup>, SX or Propeller Microcontroller to communicate over a network or even the Internet. The PINK Module allows your microcontroller to send e-mail or UDP messages to alert you to events or provide status messages. Communication with the host controller is done using a simple TTL serial interface.

## Features

- Embedded Web Server with 256K Flash Memory for web pages and files
- FTP interface for uploading web pages and files
- Telnet interface for debugging serial communication
- Send/Receive UDP Packets on any port
- Send E-Mail with or without authentication
- Password protection of configuration, FTP and selected web pages and files
- Over 100 web-accessible variables, allowing for dynamic web pages
- Over 20 variables can be written to flash memory for default values
- Serial access to PINK IP Address, Network Mask, Default Gateway and DNS Server info

## Application Ideas

- Remote monitoring and control of projects or applications
- Short or long distance communication between multiple networked microcontrollers

## Kit Contents

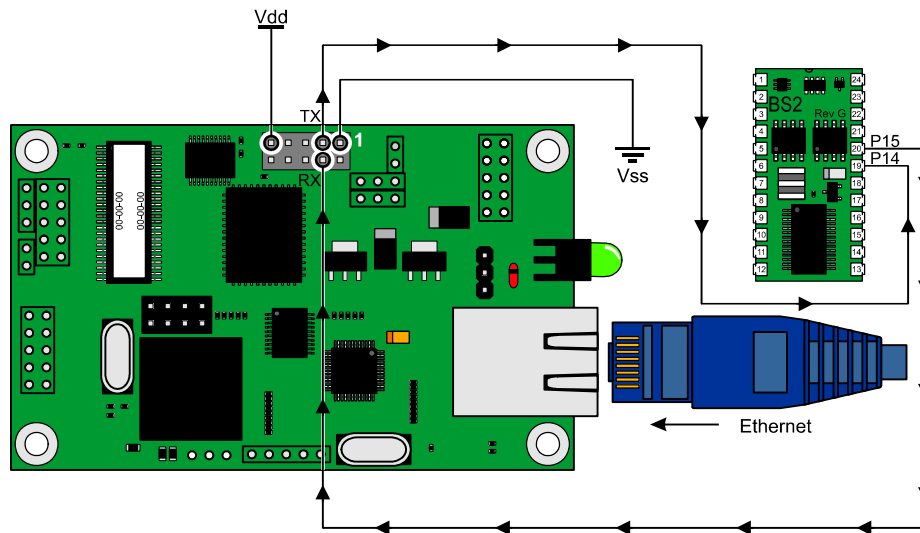
- (1) PINK Ethernet Module
- (1) Blue CAT5 Patch Cable
- (1) Red CAT5 Cross-over Cable
- (6) Hookup Wires
- (1) Software CD
- (1) Printed Documentation



## Important Information

Before connecting the PINK Module you should have a good understanding of computer networks and how to set up your local network. You should also understand firewalls and functionality of any router or switch in your network as well as how the settings may affect network traffic with the PINK. You may need to configure your network not only to set up the PINK, but for it to be seen on the internet as well. Due to the complexity of various computer networks, hardware and software installed, Parallax Tech Support will not be able to troubleshoot network issues. The Quick Start Circuit on the next page shows how the PINK Module gets power and connects to the BASIC Stamp 2 Microcontroller. Be sure to read everything on the next two pages before connecting the PINK Module. Some common troubleshooting tips are listed on the last pages of the documentation.

## Quick Start Circuit

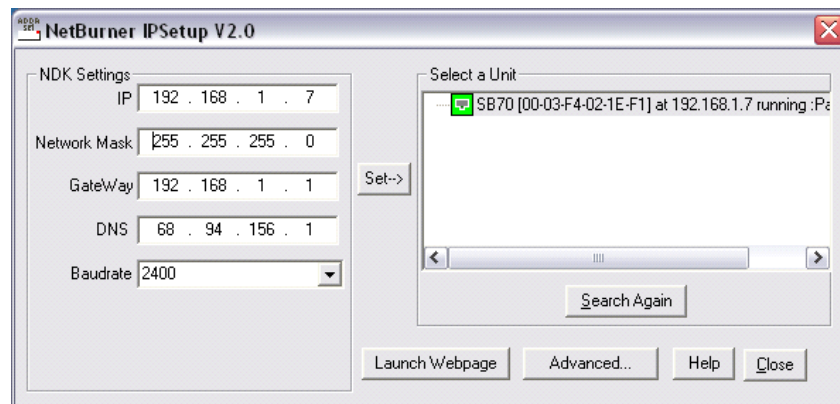


### Connection Notes

Please be sure to read the following sections before using your PINK Module. The connection diagram above shows the connections used by the test code. Be sure to observe the Serial Out (TX) and Serial In (RX) connections on the 2x5 header. Double check all connections before applying power!

### PINK Network Setup

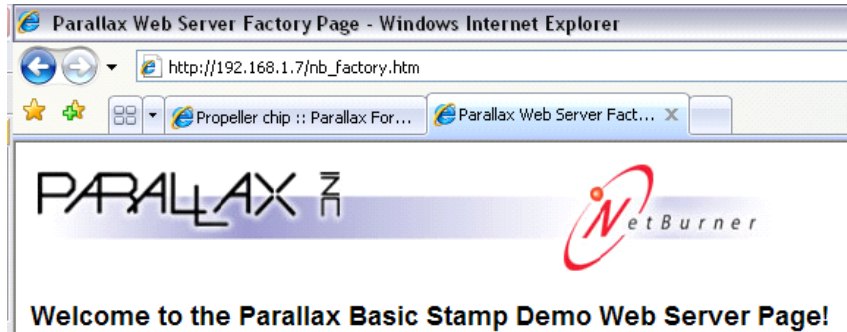
Connect the PINK Module to your network using the appropriate CAT5 cable. The Blue Cable is a standard patch cable which would be used if you are connecting to a hub, switch or router. The Red Cable is a cross-over cable which you would use if you are connecting directly to your PC. Once the PINK Module is connected to the same network as your PC and powered on, run the IPSETUP program (located on the CD) to set an *IP Address* and *Serial Port Baud Rate* for it. The address can be static (manually assigned) or dynamic (assigned by a DHCP server). Which option you use will depend on your network configuration.



When you run the IPSETUP program your PINK Module should appear in the top right window (if it does not, see troubleshooting). Select your PINK Module by clicking on the SB70 entry in the window. To set a Static IP, enter the IP Address, Subnet Mask, Gateway and DNS Server into the appropriate fields. For Dynamic addresses set all four fields to 0.0.0.0. Set the baud rate to 2400 bps (for BS2sx, BS2p or BS2px use 9600 bps) and then click the Set→ button. If your PINK Module does not reappear in the list, click the Search Again button. Be sure your device is selected then click the Launch Webpage button to open a browser window to the newly assigned address of the PINK Module.

## Web Configuration

When the web browser opens you should see the default Factory Page. Whenever you browse to the address of the PINK Module and there are no custom pages uploaded you should see this screen. The address of this page is **XXX.XXX.XXX.XXX/nb\_factory.htm** where the **XXX.XXX.XXX.XXX** is the IP Address of the PINK Module. From this page you can access the network settings, serial data port settings, variables, diagnostic and FTP functions by clicking on various links on the page.



The Factory Page lists, "5 quick things you should try out NOW!" Items 1 and 2 can be done from the configuration page so click either of the first two links to get there.

### 5 quick things you should try out NOW!

1. Change the web server's network settings via a [web form](#).
2. Configure the [Serial Data Port Settings](#)
3. Familiarize yourself with the web server's [diagnostic functions](#).
4. Upload a file via [ftp to webserver](#)
5. [Download a file via ftp](#) using a web browser

Once you're on the configuration page be sure to set the IP Mode to *Static* or *Dynamic* matching how you set it up in the IPSETUP program. Address information will be displayed just below for either mode.

IP Mode  (static or dynamic)

|              | DHCP Assigned Settings | Static Settings |
|--------------|------------------------|-----------------|
| IP Address   | <input type="text"/>   | 192.168.1.7     |
| Network Mask | <input type="text"/>   | 255.255.255.0   |
| Gateway      | <input type="text"/>   | 192.168.1.1     |
| DNS Server   | <input type="text"/>   | 68.94.156.1     |

Next you'll want to set the Serial Port to match IPSETUP as well. For the sample code (and for most BS2 usage) set the baud rate to 2400. For BS2sx, BS2p or BS2px use 9600 bps. Data bits should be set to 8, Parity to None and Stop Bits to 1. For now, click the Submit New Settings button to save these changes.

## Serial Data Port Settings

Baud Rate

Data Bits

Data Parity

Stop Bits

You should now be able to run the **PINKTestV1.0.BS2** program (available on the PINK Product page on our website) which will test serial communication with the PINK Module. While we're on the configuration page we'll cover the last two sections.

Setting the Configuration and FTP Password will prevent anonymous FTP connections and it also password-protects the configuration, modify variable and diagnostic pages. Be sure to choose a password you will remember. If you forget it you will be locked out of the PINK Module! If this happens you will need to contact Tech Support. The password must be typed in twice for verification. This also prevents accidentally setting the password since both entries must match.

## Configuration and FTP Password Settings

|                               |  |                       |
|-------------------------------|--|-----------------------|
| Configuration user name       | <input type="text" value="username"/>  |                       |
| Configuration password        | <input type="password" value="*****"/> | Blank for no password |
| Configuration password(again) | <input type="password" value="*****"/> |                       |

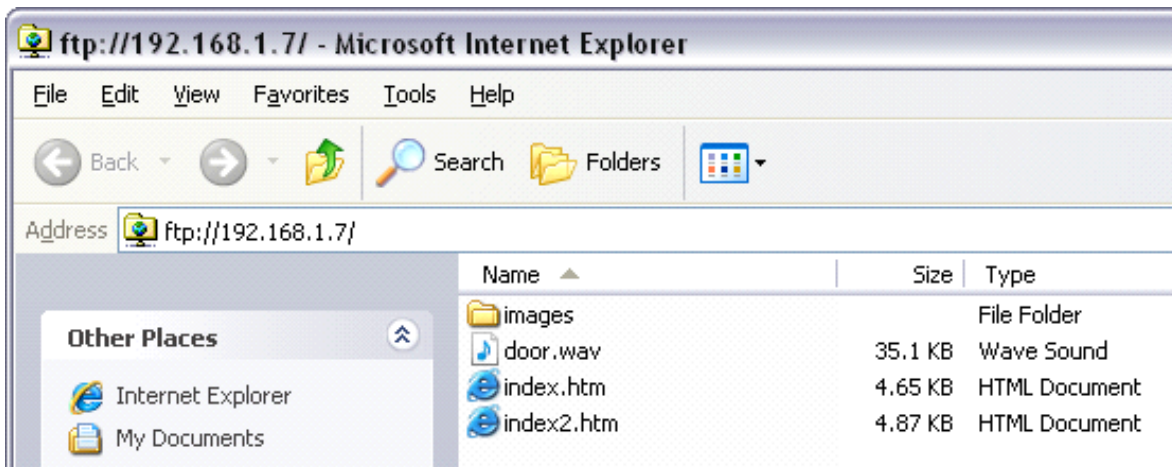
Setting the Web Access Password will protect any files that contain the password filter word. The password must be entered twice for verification. For example, if the filter word is "lock", then files containing that word, such as, "locktest.htm" or "iconlock.jpg" will prompt for the correct username and password. Setting a username and password while leaving the filter field *blank* will protect *all* files.

## Web access Password Settings

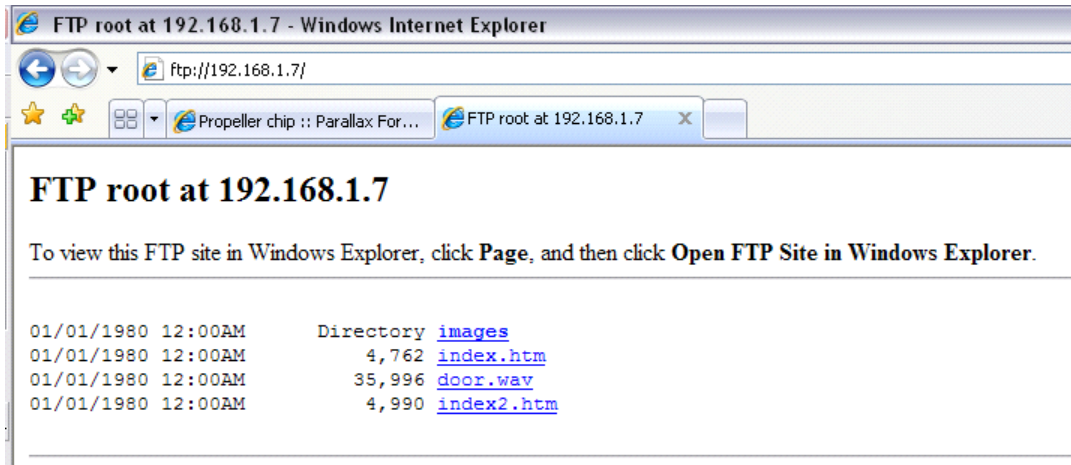
|                          |                          |   |
|--------------------------|--------------------------|---|
| Web file user name       | <input type="text"/>     |   |
| Web file password        | <input type="password"/> | Blank for no password   |
| Web file password(again) | <input type="password"/> |   |
| Web file password filter | <input type="text"/>     | Any web file served that has this text<br>in the file name will be password protected<br>(Blank for password all files) |

## Custom Web Pages

Custom Web Pages can be uploaded to the PINK Module via FTP. Typing **ftp://XXX.XXX.XXX.XXX** (where **XXX.XXX.XXX.XXX** is the IP Address of the PINK) into an Internet Explorer window will open a drag-and-drop FTP window where custom web pages and files can be placed into the PINK Module's on-board flash memory. You can also delete or rename files from within this window.



Internet Explorer 7 requires you to open the FTP window separately but gives you instructions how to do so. Some web browsers do not support drag-and-drop FTP. In this case you will need to use Internet Explorer or an FTP client program. You can also use an HTML Editor such as Front Page to upload files to the PINK Module. The default web page the PINK Module tries to open is "index.htm". If no index.htm file is found then the factory default page (**nb\_factory.htm**) is loaded. Be sure to create an index.htm or you will need to specify the full path to the page you want on the PINK Module when accessing it through a web browser.



## Variables

The PINK Module has 100 general purpose variables and 18 dedicated system variables. Each variable can store up to 64 bytes max. The first 20 general purpose variables (0 through 19) can be written to flash memory as power-on defaults. The remaining general purpose variables (20 through 99) are RAM variables only and the data is lost when power is cycled.

In addition to the 20 general purpose variables which can be written to flash memory, all e-mail and UDP system variables can also be written to flash memory as power-on defaults. The Status Variables are read-only, but some are set by the PINK at power-up and can be read to determine the IP Configuration, including IP Address, Network Mask, Default Gateway and DNS Server.

### Web Variables

Variables 1-20 can be written to Flash memory. The remainder are RAM only.

| Variable name | Current Value | Description     | Update RAM             | Update Flash                      |
|---------------|---------------|-----------------|------------------------|-----------------------------------|
| Nb_var00=     | [WELCOME!]    | Web variable 00 | <a href="#">Modify</a> | <a href="#">Set Default Value</a> |
| Nb_var01=     | [NA]          | Web variable 01 | <a href="#">Modify</a> | <a href="#">Set Default Value</a> |
| Nb_var02=     | [NA]          | Web variable 02 | <a href="#">Modify</a> | <a href="#">Set Default Value</a> |

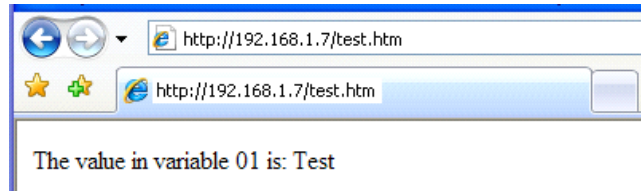
All variables can be accessed and modified through the Modify Variables web interface by browsing to **XXX.XXX.XXX.XXX/vv\_Show.htm** (where XXX.XXX.XXX.XXX is the IP Address of the PINK Module). Only from this page can you set the default values for those variables which can be set to default (written to flash) by clicking the link to the right of the variable (**Set Default Value**).

This page is also a good place to debug setting variables through the serial port since clicking refresh on this page will update what is currently in the variables. You can also debug code on your controller by setting values here when you don't yet have your HTML pages ready.

## Web Access to Variables

Accessing any variable within a web page is easy by using an HTML reference to the variable name exactly as it appears in the Modify Variables page. To create an example web page which displays the value of general purpose variable 01, open a text editor such as notepad and enter the following:

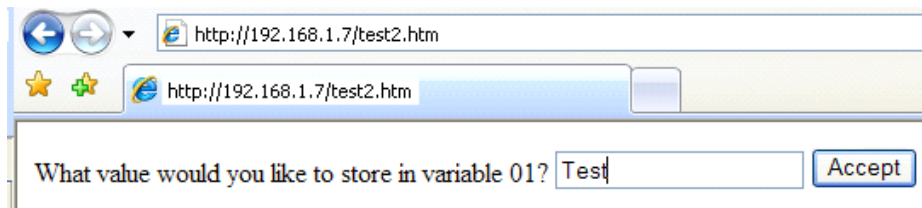
```
<html>
The value in variable 01 is: <Nb_var01>
</html>
```



Save the file as **test.htm**. Open an FTP connection as outlined previously and copy the file to the PINK Module. Browsing to **XXX.XXX.XXX.XXX/test.htm** (where **XXX.XXX.XXX.XXX** is the IP Address of the PINK Module) displays the web page you just created. Using the Modify Variables web page (in another window) you can change the value of variable 01 then refresh the original test browser page to see the results change. If you haven't set the variable it will most likely contain **NA**.

Writing to variables via web page can be accomplished with the HTML POST method. To create an example web page that changes the value of variable 01, open a text editor and enter the following:

```
<html>
<form method="post" action="test.htm"
<p>
What value would you like to store in variable 01?
<input name="Nb_var01" type="text" maxlength="64">
<input type="submit" value="Accept">
</p>
</form>
</html>
```



Save the file as **test2.htm** and copy the file to the PINK Module using the previously discussed FTP methods. Browsing to **XXX.XXX.XXX.XXX/test2.htm** (where **XXX.XXX.XXX.XXX** is the IP Address of the PINK Module) opens a form page that can be used to change the value in variable 01. Once the 'Accept' button is clicked the original **test.htm** page will be loaded to display the new value.

The *name* attribute specifies the variable that will be affected. The *maxlength* attribute can be used to limit the number of characters the form will accept. The *value* attribute allows you to change the text that appears on the submit button. The *action* attribute allows you to specify the page to load on submit.

Several HTML and JavaScript examples are included on the PINK Product web page, including those listed above. Additional examples will be posted as they become available. Keep checking the product page for these AppNotes.

## Serial Access to Variables

To access variables serially via the BASIC Stamp<sup>®</sup>, SX or Propeller, you must refer to the variable name by the last 2 letters used in the Modify Variables web page. To read the contents of a variable you would use the command format: **!NBORXX**

Note that **XX** should be replaced with the 2-letter name of the variable. For example, to read a single byte value from the general purpose variable 01 you would use the command format: **!NBOR01**

```
SEROUT TX, Baud, ["!NBOR01"]      ' Send the command
SERIN  RX, Baud, [nbvar]          ' Get the value back
```

To read the contents of the Current IP Address Status Variable (string) you would use the command format: **!NBORSI**

```
SEROUT TX, Baud, ["!NBORSI"]      ' Send the command
SERIN  RX, Baud, [STR nbvar\16\CLS] ' Input string into array
```

Note that in each of the above examples the **!NB** is followed by the number *zero*, *not* the letter O.

BASIC Stamp 2 program examples for reading variables are included on the PINK Product web page.

To write to variables you would use the command format: **!NBOWXX:DD**

Note that **XX** should be replaced with the 2-letter name of the variable and **DD** should be replaced with the data to be sent to the variable. The command must be followed with a 0 byte (null). This can be accomplished in the BASIC Stamp Editor by using the pre-defined constant **CLS**. The data will be stored as raw bytes so it doesn't matter what format it is in. The manner you send it is how it will be stored.

```
SEROUT TX, Baud, ["!NBOW01:100", CLS] ' Store ASCII string '100' in variable 01
```

In the above example ASCII values for 1, 0 and 0 are stored (string format) using 3 bytes. To store 150 as a raw binary value you would store the value directly as below (notice the value is not in quotes).

```
SEROUT TX, Baud, ["!NBOW02:", 150, CLS] ' Store value 150 in variable 02
```

...or via a variable...

```
SEROUT TX, Baud, ["!NBOW03:", nbvar, CLS] ' Store value in nbvar in variable 03
```

In this example the BASIC Stamp variable *nbvar* would contain a byte value (200 for example) which would be stored in the PINK general purpose variable 03. Had *nbvar* been a word variable, the lowbyte and highbyte would have to be stored as two bytes. BASIC Stamp 2 program examples for writing variables are included on the PINK Product web page. *Important Note* for serial communication with BASIC Stamp modules: The BS2, BS2e and BS2pe are not fast enough to communicate with the PINK Module serially at 9600 bps when transferring string data from the variables. It is for this reason that the default examples use 2400 bps. If you're using a BS2sx, BS2p or BS2px you can safely raise the serial port baud rate of the PINK Module to 9600 bps. Be sure to make the change in IPSETUP program (and click Set) as well as through the configuration web page (and click Submit New Settings).

BS2sx, BS2p and BS2px program examples for reading and writing variables are included on the PINK Product web page. Some of these examples make use of the BS2p Scratch Pad RAM for transferring large strings without using up variable memory. These examples also use 9600 bps.

## System Variables

The PINK Module has 18 System Variables, some of which are read-only. These registers are as follows:

- **Nb\_varET** is the e-mail TO address variable. When using the PINK Module to send e-mail this variable will hold the recipient's e-mail address.
- **Nb\_varEF** is the e-mail FROM address variable. When using the PINK Module to send e-mail this variable will hold the sender's e-mail address. Note: Some ISP's require that this field match the account e-mail address or username for authentication.
- **Nb\_varES** is the e-mail SUBJECT variable. When using the PINK Module to send e-mail this variable will hold the subject of the message.
- **Nb\_varEC** is the e-mail CONTENT variable. When using the PINK Module to send e-mail this variable will hold the message content. Any data stored here (up to 64 bytes) will be sent as the message body.
- **Nb\_varEV** is the e-mail SMTP Server variable. When using the PINK Module to send e-mail this variable will hold the address of the SMTP Server. In the Modify Variables web page there is a link to Send Test Email. This allows you to test your e-mail settings and verify they work. If the PINK Module is unable to send the e-mail you will get a summary of the reason and a log.
- **Nb\_varEU** is the e-mail USERNAME variable. When using the PINK Module to send e-mail this variable will hold the username of the e-mail account. This variable may be optional depending on your SMTP server.
- **Nb\_varEP** is the e-mail PASSWORD field. When using the PINK Module to send e-mail this variable will hold the password for the e-mail account. This variable may be optional depending on your SMTP server.
- **Nb\_varEA** is the e-mail AUTHENTICATION field. When using the PINK Module to send e-mail this variable will determine whether authentication is used. If the variable is blank authentication is not used. Any value/data stored here will enable authentication.
- **Nb\_varST** is the PINK Status Register. This is a read-only variable. Reading this variable clears bits 1, 4 and 5.
  - Bit0 is the Network Status bit. This bit is set if a network connection is detected and cleared otherwise.
  - Bit1 is the Variable Update bit. This bit is set if a variable has been updated via the web page (HTTP POST method) since the last read of the Status Register.
  - Bit2 is the E-Mail busy status bit. This bit is set if the PINK is busy sending e-mail and cleared when it is ready to send. This bit changes automatically but is cleared after the mail is sent or fails. This bit is not affected by the Send Test Email link in the Modify Variables web page.
  - Bit3 is not used.
  - Bit4 is the E-Mail complete status bit. This bit is set when e-mail was successfully sent. This bit will be cleared when the Status Register is read or when the next e-mail fails.
  - Bit5 is the UDP Message received status bit. This bit is set when a UDP Message is received. Reading the Status Register will clear this bit.
  - Bit6 is not used.
  - Bit7 is not used.

## System Variables (Continued)

- **Nb\_varSI** contains the Current IP Address assigned to the PINK Module. This is a read-only variable.
- **Nb\_varSN** contains the Current Network Mask assigned to the PINK Module. This is a read-only variable.
- **Nb\_varSG** contains the Current Default Gateway Address assigned to the PINK Module. This is a read-only variable.
- **Nb\_varSD** contains the Current DNS Address assigned to the PINK Module. This is a read-only variable.
- **Nb\_varSU** contains the Address of the Last Incoming UDP Message to the PINK Module. This is a read-only variable.
- **Nb\_varSV** is the Last Post Variable Number. This is a read-only variable. This variable contains the number of the last general purpose register that was updated via the web (HTTP POST method). You should read this variable whenever Bit 1 of the Status Register is set. The value should be between 0 and 99. This register is set to \$FF after a read or if no variables have been updated.
- **Nb\_varBI** contains the Destination IP Address for sending a UDP Message.
- **Nb\_varBM** contains the UDP Message Content. Setting this prior to sending a UDP Message will send the specified data once the Send UDP Message command has been executed. If a UDP Message is received, its contents will be stored here erasing any previous data. Be sure to store your out-going message again before sending if you have received a UDP Message.
- **Nb\_varBP** contains the UDP Message Port. The factory default value is 10000. This value can be changed to any valid port number. You can also change the default value.

All variables that are not Read-Only can be changed via the serial interface or via the Modify Variables web page. All of the E-Mail variables can also be set to *default* values using the Modify Variables web page, as can the UDP Variables and the first 20 general purpose variables. These variables *cannot* be set to *default* values via the serial interface or via HTML command, only the Modify Variables web page.

Most of the System Variables contain string data and can be read as such using the same format as when reading the general purpose variables as a string. The Status Register and the Last Post Variable can, and should, be read as a binary value by omitting the 'R' from the command.

```
SEROUT TX, Baud, ["!NB0ST"]           ' Send the command (no R)
SERIN  RX, Baud, [nbvar]               ' Get the raw value back (one byte)
```

```
SEROUT TX, Baud, ["!NB0SV"]           ' Send the command (no R)
SERIN  RX, Baud, [nbvar]               ' Get the raw value back (one byte)
```

If you read these registers as string data you will need to use a HEX formatter to decode the incoming value as shown below. NOTE: This method will not clear the Last Post Register.

```
SEROUT TX, Baud, ["!NB0RST"]           ' Send the command (normal read)
SERIN  RX, Baud, [HEX nbvar]           ' Get ASCII string into variable as value
```

## Sending E-Mail

The PINK Module can send e-mail messages to notify you of events or for other purposes. To send e-mail, all the required variables should be set and then the Send Mail command should be sent as shown in the example below. NOTE: You should substitute the actual data below with your own e-mail address and server information.

```
SEROUT TX, Baud, ["!NB0WET:someone@somewhere.com", CLS]
SEROUT TX, Baud, ["!NB0WEP:PINK@parallax.com", CLS]
SEROUT TX, Baud, ["!NB0WES:Test Message From PINK", CLS]
SEROUT TX, Baud, ["!NB0WEC:Message Content Goes Here!",CLS]
SEROUT TX, Baud, ["!NB0WEV:smtp.server.com", CLS]
SEROUT TX, Baud, ["!NB0WEU:username", CLS] ' (Optional)
SEROUT TX, Baud, ["!NB0WEP:password", CLS] ' (Optional)
SEROUT TX, Baud, ["!NB0WEA:1", CLS] ' Turn Authentication On (Optional)
SEROUT TX, Baud, ["!NB0SM"] ' Command To Send E-Mail
```

You can also preset the e-mail variables to *Default Values* in the Modify Variables web page if the data does not need to change. You can then send your message by simply sending the Send Mail command shown below.

```
SEROUT TX, Baud, ["!NB0SM"] ' Command To Send E-Mail
```

Once the Send Mail command has been sent you should immediately start monitoring bit 2 of the Status Register for it to be cleared (set to 0). Once this happens you should immediately check bit 4. If this bit is set (to 1) then the e-mail was sent successfully. If it is cleared (to 0) then the e-mail was not sent (failed). Bit 4 will only be valid on the read where bit 2 was cleared. An additional read will not be correct since the previous read will have cleared the Status Register. BASIC Stamp 2 program examples for sending e-mail are included on the PINK Product web page.

## Sending UDP Messages

The PINK Module can send and receive UDP (User Datagram Protocol) messages. These could be used to send and receive command information, status updates or for other purposes. A UDP Message can be sent or received but unlike e-mail there is no way to know if it was successfully received by the target when sent. The only way to be sure you UDP Message gets to its target would be to have the target acknowledge (ACK) with a return UDP Message. This is relatively easy since the Nb\_varSU register contains the IP Address of the last incoming UDP Message.

To send a UDP message you must first specify the destination IP Address, UDP Port and message content, then send the Send UDP Message command as shown below. In the example below you would replace the BI data with your target IP Address and the BM data with your own message data, which could contain values or ASCII text (up to 64 bytes).

```
SEROUT TX, Baud, ["!NB0WBI:192.168.1.6", CLS]
SEROUT TX, Baud, ["!NB0WBM:Please Send Me A Reply To Port 10000!", CLS]
SEROUT TX, Baud, ["!NB0WBP:10000", CLS]
SEROUT TX, Baud, ["!NB0SB"] ' Send UDP Message
```

These variables could be set to *Default Values* in the Modify Variables page if the data does not change. If the variables are already set, you can simply send the Send UDP Message command as shown below.

```
SEROUT TX, Baud, ["!NB0SB"] ' Send UDP Message
```

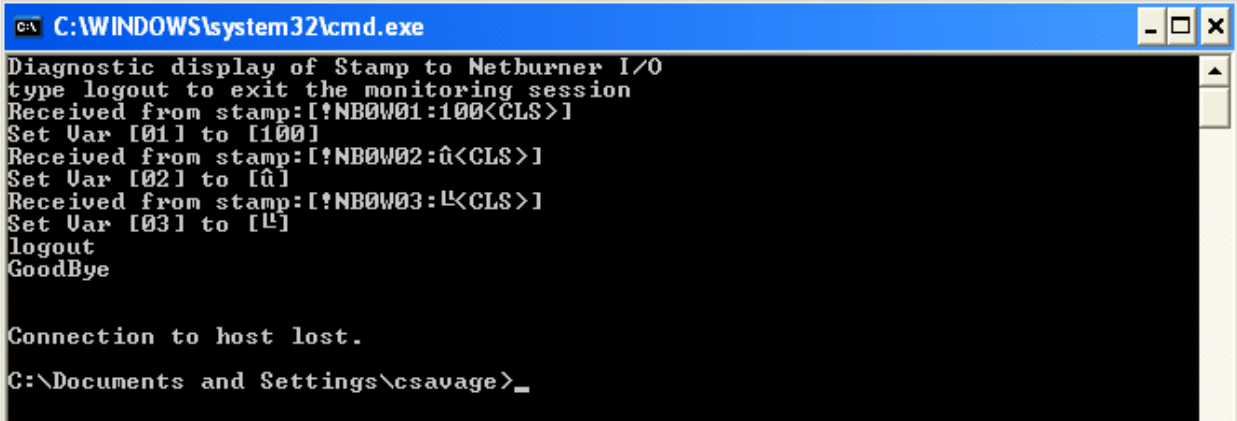
Note that incoming UDP Messages overwrite the outgoing message. Keep this in mind when sending UDP Messages and not setting the Message Content variable.

## Telnet Debug Session

To monitor serial traffic between the PINK Module and the microcontroller you can establish a Telnet Session with the PINK Module. To do this in Windows XP, open a command prompt and type:

**telnet XXX.XXX.XXX.XXX** (where **XXX.XXX.XXX.XXX** is the IP Address of the PINK Module)

This will open a window that displays all serial communication between the BASIC Stamp and the PINK Module. Below is a sample telnet debugging session when running the PINKWriteVariable.bs2 program from the PINK Product web page.



```
C:\WINDOWS\system32\cmd.exe
Diagnostic display of Stamp to Netburner I/O
type logout to exit the monitoring session
Received from stamp:[!NB0W01:100<CLS>]
Set Var [01] to [100]
Received from stamp:[!NB0W02:û<CLS>]
Set Var [02] to [û]
Received from stamp:[!NB0W03:¼<CLS>]
Set Var [03] to [¼]
logout
GoodBye

Connection to host lost.

C:\Documents and Settings\csavage>_
```

As you can see the window shows the !NB0W01:100 command sent from the BASIC Stamp and terminated with a NULL (shown as <CLS>) as well as a message showing that Var 01 was set to 100. This information can be useful for debugging as well as other purposes. You can also see that the next two variables were set to binary values and result in strange characters being printed which represent those byte values as a printable ASCII character.

## Resources and Downloads

Check out the PINK product page on our website for example programs, example HTML/JavaScript, utility software and more. Point your web browser to [www.parallax.com](http://www.parallax.com) and search for product # 30013.

## Precautions

- Be sure to observe static precautions and be sure power is off when handling and/or connecting the PINK Module to other equipment.
- Do not refer to the PDF file on the NetBurner CD since it is designed for SB70 firmware development.
- Do not run the AutoUpdate utility included on the CD as it is for SB70 development only.
- Do not set the PINK IP Address to a Multicast Address such as XXX.XXX.XXX.255. Valid IP Address Ranges for Subnet Mask 255.255.255.0 in Class C are 192.168.X.1 through 192.168.X.254. For Class A ranges 10.10.X.1 through 10.10.X.254 are valid.
- The PINK Serial Ports cannot be connected to a PC RS-232 Port without using a line driver IC such as a MAX232. The PINK Serial Ports are TTL level non-inverted whereas the PC uses inverted RS-232 level signals. Direct connection will damage your PINK Module.

## Specifications

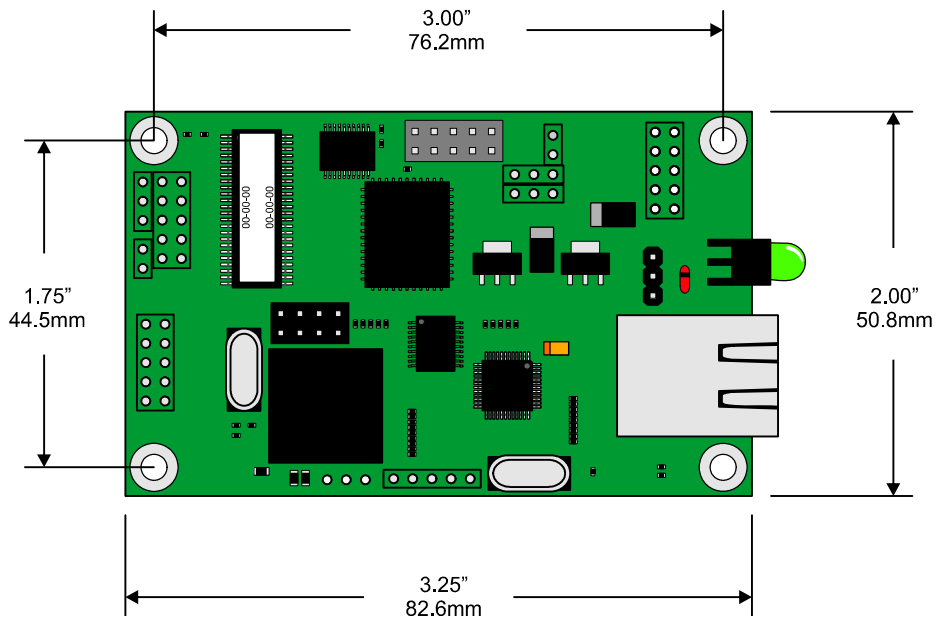
| Symbol | Quantity         | Minimum | Typical | Maximum | Units |
|--------|------------------|---------|---------|---------|-------|
| Vdd    | Supply Voltage † | -5%     | 5.0     | +5%     | V     |

† Suggested Power Supply Current is 350mA

## Pin Definitions and Ratings

| Pin | Name      | Function                                      |
|-----|-----------|---|
| 1   | GND       | Ground (Vss)                                  |
| 2   | CTS1      | TTL Serial Port 1 Flow Control (Debug Port)   |
| 3   | TX1       | TTL Serial Port 1 Transmit Data (Debug Port)  |
| 4   | RX1       | TTL Serial Port 1 Receive Data (Debug Port)   |
| 5   | RTS1      | TTL Serial Port 1 Flow Control (Debug Port)   |
| 6   | RTS0      | TTL Serial Port 0 Flow Control (Serial Port)  |
| 7   | CTS0      | TTL Serial Port 0 Flow Control (Serial Port)  |
| 8   | TX0       | TTL Serial Port 0 Transmit Data (Serial Port) |
| 9   | Vdd (+5V) | +5VDC Power                                   |
| 10  | RX0       | TTL Serial Port 0 Flow Control (Serial Port)  |

## Module Dimensions



## LEDs

The large round right-angle LED is the power LED. On the RJ-45 connector LED1 is 10/100 (lit is 100) and LED2 is data activity.

## Serial Interface Troubleshooting

If you are unable to communicate serially with your PINK Module, please see the list below for the most common problems and solutions to see if you can correct the issue prior to calling Parallax Tech Support.

- Be sure the Baud Rate has been set to 2400 in the IPSETUP Program and that you have clicked the 'Set' button. Also be sure that the Baud Rate has been set to 2400 in the Configuration Web Page on the PINK Module and be sure to click the 'Submit New Settings' button. Both settings must match. If necessary, power the PINK Module off and then back on to verify that these settings persist.
- The .BS2 programs in the examples use the BASIC Stamp 2 and will work with the BS2e and BS2pe, however if you're using a different module such as the BS2sx, BS2p or BS2px you may have the baud rate parameter in your SERIN/SEROUT set incorrectly. Always be sure you are using the correct baud value for the baud rate and BASIC Stamp model you are using. Alternately you can use the examples provided for these other BASIC Stamp models.
- Try different I/O pins. A previous improper connection may have damaged the I/O pin(s) you are using causing lack of communication. If possible verify the I/O pin using a known working serial device such as a Serial LCD or Parallax GPS Module. Lighting an LED does not necessarily mean the I/O pin works. A pin can fail in different ways.
- Be sure your TX/RX I/O pins are not backward. The I/O pin you are sending (SEROUT) serial data on is the BASIC Stamp TX pin which would connect to the RX0 pin on the PINK Module. Conversely the pin you are receiving (SERIN) on is the BASIC Stamp RX pin and should be connected to the PINK TX0 pin. These connections are shown in the Quick Start Circuit on page 2.
- Be sure the power supply is adequate to power the PINK Module. The PINK Module requires at least a 350mA power supply. If you're using batteries, switch to a wall supply. Batteries are not reliable for troubleshooting, especially on a high current draw device such as the PINK Module. A 9V battery won't have the current capability to run the PINK Module. If you're using a Homework Board prior to Rev D the on-board regulator will be insufficient to power the PINK Module. Likewise the on-board regulator of a BASIC Stamp Module (with the exception of our OEM Modules) would not be sufficient to power the PINK Module.
- Be sure the Serial Baud Rate selected is within the capability of the microcontroller you're using. For example, you should not use a baud rate of 9600 bps for the BS2, BS2e or BS2pe since the module may not be able to keep up with the serial data coming in reliably at that rate when using formatters or dealing with string data. The PINK Module's response time to a serial command is ~2.7ms for compatibility with all BASIC Stamp models.
- Be sure you're using a 0 (number zero) and not an O (letter o) in the commands sent to the PINK. Some commands are terminated with a NULL or CLS and some are not. Some commands use the R or W to designate a Read or Write, while others do not. Verify the command structure if you're not getting the expected results. When in doubt run the test code provided.
- When checking the E-Mail success bit (bit 4), remember that it must be checked during the same read cycle of the status register when the E-Mail busy (bit 2) bit clears. This is because it is cleared during that read so subsequent reads will not be accurate. This is covered in the example program PINKSendEMail.bs2

## Network Interface Troubleshooting

Due to the vast complexity and uniqueness of various computer software, hardware and network configurations, Parallax Technical Support cannot assist with network troubleshooting issues (See Important Information on Page 1). We can however provide some troubleshooting guidelines which may help you to solve common network issues as related to the PINK Module.

- **My PINK Module cannot be seen by the IPSETUP program...**
  - Be sure you are using the correct cable for the connection method. If you are connecting the PINK to a PC then you should be using the Red Crossover Cable. If you are connecting to a Hub, Switch or Router then you should be using the Blue Patch Cable.
  - Be sure the PINK is in the same IP Address range as the PC you are trying to communicate from. If your PC is set to a static IP range of 192.168.X.X and the PINK Module is set to a 10.10.X.X range then you may not be able to access it. Similarly, if the PINK Module is set for DHCP and there is no DHCP server the PINK may not have a valid IP Address. Often you can still see the PINK Module using IPSETUP in these cases.
  - Disable/Turn Off any firewalls you have running. Windows XP includes a built-in firewall. Security Utilities such as Norton Security/Anti-Virus, McAfee, Zone Alarm, etc. can all block network traffic they do not deem as safe. When in doubt disable any such firewall utilities.
  
- **My PINK Module can be seen by my PC but not on the Internet...**
  - Most likely you are using a router. By default and in its very nature a router is a firewall because it prevents the devices connected to it from being seen on the outside since you cannot directly access the local IP Address from the Internet. Most routers have a DMZ Port which will allow all traffic to your ISP Assigned IP Address to go directly through. Bear in mind that this usually allows all ports, including those used by the e-mail and telnet system. Therefore security can be compromised using the DMZ, as telnet traffic could possibly be viewed by anyone who knows your IP Address.
  - Most routers employ 'Port Forwarding' to allow devices to be seen outside the local network. The location and options for this setting can vary from one router to the next. Usually you will have an option to specify the port to be forwarded. You will almost always want to use Port 80 (TCP) and in some cases the Port # used for UDP.
  - Many routers that support Port Forwarding require you to use Static IP Addresses on the Local Network or assign DHCP Device Names to identify the target device. The PINK Module supports a DHCP Device name if your router should require it.
  
- **I cannot send E-Mail from my PINK Module...**
  - In order to send E-Mail from the PINK Module you must have your PINK module set up properly on the network and have access to an SMTP mail server. The SMTP server may or may not require authentication. For PINK Firmware V1.0 authentication is not supported. Your server must either not require it, or it must authenticate based on IP Address. This is common for many high-speed ISP's.
  - PINK Firmware V1.1 supports authentication, however it uses plain text mode and does not support SSL or encryption, so if your mail server requires that then it will be incompatible with the PINK Module. You must have a character in the authentication register to enable authentication. Having anything stored there will enable it.
  - Some SMTP servers require the FROM field to contain either the username or e-mail address associated with the server account. Try your username or e-mail address here.
  - There are free mail server programs you can set up, however we do not have any information on these programs. It is recommended to search Google for such software.