



Z i L O G

## ZiLOG Developer Tools

# ZPAK II Debug Interface Tool

PUG001506-0906

Product User Guide

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## Overview

The ZPAK II Debug Interface Tool provides a complete debug package for ZiLOG microprocessors equipped with on-chip emulation support hardware. It provides the physical link between ZiLOG Developer Studio II (ZDS II) and the user's target system. In conjunction with ZDS II, the user can download code directly to the target system for editing and debugging purposes. ZDS II and ZPAK II communicate over TCP/IP sockets.

ZPAK II firmware is shipped as an Intel hex file that resides in Flash memory on the ZPAK II Debug Interface Tool.

- ▶ **Note:** Though the examples in this Product User Guide refer to the eZ80190 microprocessor that controls the ZPAK II unit, the content of this document applies to all ZiLOG devices equipped with on-chip emulation support hardware.

## Configuring ZPAK II For A Network

ZPAK II launches for the first time using default values for the IP address, subnet mask, IP gateway, and other parameters. All of these values can be tailored to your network.

Although ZPAK II offers a number of configurable parameters, not all of these parameters must be changed to accommodate the network. However, for proper TCP/IP communication with a host application, such as ZDS II, the values for the IP address, subnet mask, gateway, and port must be modified to operate correctly on the network. Please consult your system administrator for the appropriate values.

## Ethernet Configuration and Serial Configuration

There are two methods for changing the default settings on the ZPAK II debug interface tool. One method is via the ZPAK II embedded web page using a web browser over an Ethernet connection. The other method is via the ZPAK II console port. The next section describes the console method. See the section titled [Configuring ZPAK II via an Ethernet Port](#) on page 9 to review the web page method.

## Configuring ZPAK II via a Serial Port

1. Using a straight serial cable, connect the COM port of the host PC to the serial connector on the ribbon cable (PN 99C0079-001) attached to the ZPAK II unit.



2. On the host PC, launch a terminal emulation program. In this document, **HyperTerminal** is used. In the **Connect To** dialog box of **HyperTerminal**, select the COM port that the ZPAK II unit is connected to. In the **Properties** dialog for the COM port, set the parameters to:
  - 57600 baud rate
  - 8 data bits
  - No parity
  - Stop bits 2
  - Flow-control none
3. Use the **Connect** command in the **Call** menu to open a **HyperTerminal** connection to ZPAK II.
4. Toggle the power on the ZPAK II unit—or reset the unit—and observe the current settings in the **HyperTerminal** window. These settings should appear similar to the following:

```
IPWorks y.y.y
```

```
Copyright (C) 1995-2002 Metro Link Incorporated  
All Rights Reserved
```

```
clock enabled  
Created buffer pool 1524 32  
Created buffer pool 4096 8  
IP Address: 192.168.1.50  
IP Subnet: 192.168.1.00/255.255.255.00  
IP Gateway: 192.168.1.254  
netstart exiting, stack extent 379/2048
```

```
ZPAKII version x.x  
Copyright © 2001-2002 ZiLOG, Inc.  
All Rights Reserved.  
main exiting, stack extent 300/1024
```

- **Notes:** To locate the Reset button, view the ZPAK II debug interface tool with the XTools® logo reading right-side up. The Reset button is recessed within the side of the unit facing you. Use a toothpick, paper clip, or similar narrow object to press the Reset button.

In the example output above, *y.y.y* denotes the current version of IPWorks and *x.x* denotes the current version of ZPAK II. The console prompt is not case-sensitive.

5. While holding down the *z* key on the host PC, reset the ZPAK II unit a second time. A banner, followed by a prompt, appears in the **HyperTerminal** window, displaying the following message:



```
ZPAKII Console version x.x
Type 'H' for help
ZPAKII:>
```

- **Note:** In the example output above, x.x denotes the current version of ZPAK II. The console prompt is not case-sensitive.

6. To view the list of available options, enter `h` at the prompt. The available options are displayed as shown below.

```
ZPAKII:> H

H display this Help
I change Ipaddress
S change ipSubnet mask
G change ipGateway
P change Portnumber
V change dtli Variable count
B change dtli Buffer size
F load deFault settings
C display Current settings
A toggle pAssword
D toggle Dhcp option
W change passWord
R Reset zpakii

ZPAKII:>
```

7. To view the current settings, enter `C` at the prompt. ZPAK II displays all of the settings that are currently being used. A sample output is shown below.

```
ZPAKII:> C
Current Config settings:
**Note: IP Address, Subnet mask, Gateway are not obtained from
DHCP**
IPAddress: 192.168.1.50
IPSubnet Mask: 255.255.255.0
IPGateway: 192.168.1.254
PortNumber: 4040
DTLi Variable Count: 255
DTLi Buffer Size: 4096
Password authentication: Enabled
DHCP option: Disabled
```

8. To change any of the parameters, enter the letter of the alphabet that denotes the option. For example, to change the IP address, enter `I` at the prompt. The following message appears:



Enter the IP address (ex. 192.168.1.50):

Enter the IP address appropriate for the network and press the Enter key. Press the Escape key to exit this option without modifying the value. The subnet mask and default gateway values can be similarly changed, as appropriate for the network.

9. Enter **P** at the prompt to set the port number for the TCP/IP socket on the host. A message appears, as shown below.

```
ZPAKII: > P
Enter the PortNumber within range (4000 - 65535):
```

A valid port number can be any number within the range 4000–65535. The default port number is 4040; it does not require modification.

- **Note:** While changing the ZPAK II parameters, ensure that these values are correct for your network. Incorrect values can cause malfunctions and yield unacceptable results.

The user can select option **D** to display a short list of options for enabling or disabling DHCP. Enter **E** to enable DHCP and prompt ZPAK II to query the DHCP server for an IP address, a subnet mask, and a gateway. Upon ZPAK II reset, and after successful communication with the DHCP server, the following dynamic configuration information is displayed on the console (depending on network parameters):

```
IPWorks y.y.y

Copyright (C) 1995-2002 Metro Link Incorporated
All Rights Reserved

clock enabled
Created buffer pool 1524 32
Created buffer pool 4096 8
Attempting to contact a DHCP server
DHCP ok.
IP Address: 172.16.6.81
IP Subnet: 172.16.6.00/255.255.255.00
IP Gateway: 172.16.6.1
bootp_recv exiting, stack extent 330/4096
netstart exiting, stack extent 385/2048

ZPAKII version x.x
Copyright © 2001-2002 ZiLOG, Inc.
All Rights Reserved.
```



```
main exiting, stack extent 300/1024
```

- **Note:** In the example output above, *y.y.y* denotes the current version of IPWorks and *x.x* denotes the current version of ZPAK II. The console prompt is not case-sensitive.

If, after a few seconds, a DHCP server cannot be contacted, the following information is displayed on the console, wherein ZPAK II is configured to static network parameters:

```
IPWorks y.y.y

Copyright (C) 1995-2002 Metro Link Incorporated
All Rights Reserved

clock enabled
Created buffer pool 1524 32
Created buffer pool 4096 8
Attempting to contact a DHCP server
** DHCP failed; using default values.
IP Address: 192.168.1.50
IP Subnet: 192.168.1.00/255.255.255.00
IP Gateway: 192.168.1.254
netstart exiting, stack extent 385/2048

ZPAKII version x.x
Copyright © 2001-2002 ZiLOG, Inc.
All Rights Reserved.
main exiting, stack extent 300/1024
```

- **Note:** In the example output above, *y.y.y* denotes the current version of IPWorks and *x.x* denotes the current version of ZPAK II. The console prompt is not case-sensitive.

By default, the DHCP option is disabled. The user can also disable the DHCP option by entering **D** to cause ZPAK II to use static network parameters. After reset, the following information is displayed on the console:

```
IPWorks y.y.y

Copyright (C) 1995-2002 Metro Link Incorporated
All Rights Reserved

clock enabled
Created buffer pool 1524 32
```



```
Created buffer pool 4096 8
IP Address: 192.168.1.50
IP Subnet: 192.168.1.00/255.255.255.00
IP Gateway: 192.168.1.254
netstart exiting, stack extent 379/2048
```

```
ZPAKII version x.x
Copyright ©2001-2002 ZiLOG, Inc.
All Rights Reserved.
main exiting, stack extent 300/1024
```

- **Note:** In the example output above, *y.y.y* denotes the current version of IPWorks and *x.x* denotes the current version of ZPAK II. The console prompt is not case-sensitive.

10. Reset ZPAK II by selecting the Reset option, *r*, at the prompt. ZPAK II resets itself with the new values. Ensure that the IP address and port number for ZPAK II match the ZPAK II settings in the **Project Settings** dialog box in ZDS.

## Configuring Other ZPAK II Parameters

ZPAK II menu features a number of other options that allow the user to control how ZPAK II works, as described in this section.

### DTL Parameters

Data Transfer Language (DTL) is the mechanism by which the host application, ZDS II, and ZPAK II transfer data over a communication channel. There are two DTL-related settings: *DTLI variable count* and *DTLI buffer size*. ZDS II self-configures with these two values before communicating with ZPAK II. These values are optimally set and, for the most part, do not require changing. Please see the [Definitions and Acronyms](#) section on page 17 for the definitions of these terms.

To change the DTLI variable count value, enter *v* at the **HyperTerminal** prompt. The following message appears:

```
ZPAKII:> V
Enter DTLI Variable Count within range (8 - 255):
```

The default DTLI value is 255. To modify this value, enter a new value and press the Enter key. Press the Escape key to exit this option without modifying the value.

Enter *B* to change the DTLI buffer size. The following message appears:

```
ZPAKII:> B
```



Enter DTLI Buffer Size within range (64 - 8192):

The DTLI buffer size value determines the size of the communication buffer between ZDS II and ZPAK II. The default value is 4096, which works well for most networks. A low buffer size value can cause slower communication between ZDS II and ZPAK II.

### Password Parameters

The password feature of ZPAK II provides a way to control access to the ZPAK II settings via the web page. The web page features of ZPAK II are explained in the section titled [Configuring ZPAK II via an Ethernet Port](#) on page 9. The **HyperTerminal** console provides two options related to passwords, as follows.

**Password authentication.** To enable or disable password authentication, enter A at the **HyperTerminal** console prompt. The following menu is displayed:

```
ZPAKII: > A
Enable/Disable authentication checking (e/d):
```

Enter e to enable or d to disable password authentication. The change takes effect the next time ZPAK II is launched.

**Change password.** When ZPAK II starts for the first time, the password field does not display a value. To create or change a password, enter w at the **HyperTerminal** console prompt. The user is prompted for a new password, as shown below.

```
ZPAKII: > W
New password:
Confirm new password:
```

Key in the new password and press the Enter key. When prompted for the confirmation of the new password, enter the same password again and press the Enter key. A confirmation message appears if the two passwords match; otherwise, an error message is reported. The new password takes effect the next time ZPAK II is launched.

- **Note:** The password can be a combination of alphanumeric characters. However, it must not exceed 20 characters.

When password authentication is enabled, the number of hosts allowed concurrent access to ZPAK II is restricted to one. When password authentication is disabled, any number of users can gain access to ZPAK II. Additionally, when password authentication is disabled, ZPAK II does not display a login page.



**Loading default settings and viewing current settings.** All of the ZPAK II settings can be reinitialized to factory settings at any time using the **F** menu option.

Enter **F** at the **HyperTerminal** console prompt. The following message is displayed.

```
ZPAKII: > F
Following default values will be set:
IPAddress: 192.168.1.50
IPSubnet Mask: 255.255.255.0
IPGateway: 192.168.1.254
PortNumber: 4040
DTLI Variable Count: 255
DTLI Buffer Size: 4096
Press Enter to continue or ESC to cancel...
```

Press the **Enter** key to set the indicated default values or the **Escape** key to cancel.

**Resetting ZPAK II.** Changes to any ZPAK II parameters take effect when ZPAK II is restarted. ZPAK II provides a menu option that can be invoked by entering **r** at the **HyperTerminal** console prompt.

```
ZPAKII: > r
Press Enter to continue or ESC to cancel.
```

As indicated, pressing enter restarts ZPAK II, thus forcing any new values to take effect.

**Managing a ZPAK II session.** As explained above, enabling the password option allows only one user to control the ZPAK II debug interface tool. In essence, there can be only one active user session at any time. Termination of the session (also called *logout*) can occur due to any of the following reasons, each of which is described in the following paragraphs.

- The user ends the session
- The user session expires
- A second user logs in
- The user ends the session without graceful logout
- The ZPAK II unit is reset

#### **The user ends the session**

The user clicks on the logout link of the web page, and the session terminates. In this case, the user performs a *graceful logout* from ZPAK II.



### The user session expires

The user session expires if there is no transaction with ZPAK II for 5 minutes after a successful login. Every session is allowed a maximum of 5 minutes idle time, after which the user is automatically logged out. Further communication with ZPAK II requires that the user login again.

### A second user logs in

If a user tries to connect to ZPAK II when another user is already connected, ZPAK II displays a warning message to the new user indicating that there is an active user. If the new user continues the login process, the new user becomes the active user by implicitly logging out the current user.

### The user ends the session without graceful logout

If the user closes the browser window without logging out, or if the browser window terminates unexpectedly before the user logs out, ZPAK II automatically ends the user session. Further access to ZPAK II requires the user to reinitiate password authentication.

### The ZPAK II debug interface tool is reset

When the user updates any of the ZPAK II values and commits the changes, ZPAK II resets itself with the new values, and the existing connection is invalidated.

## Configuring ZPAK II via an Ethernet Port

ZiLOG embedded webserver devices host a number of web pages that aid in configuring most of the settings explained in the previous section. Additionally, these web pages allow the user to communicate with the target via DTLI algorithms.

The main advantages to the web-based mechanism are that access to the ZPAK II unit is controlled by an optional password authentication routine, and that password authentication can be turned OFF or ON at any time, as described in the section titled [Configuring ZPAK II via a Serial Port](#) on page 1.

- **Note:** Before using the web page features, ensure that your browser supports active scripts and that they are enabled in your browser. For example, in Internet Explorer 6.0, scripting can be enabled by navigating via the Tools menu to **Internet Options**. Click the **Security** tab, then the **Custom Level** button. Scroll to the **Scripting** icon and select the **Enable** option for **Active Scripting**.

## Launch The ZPAK II Web Page

To view the ZPAK II web pages, ZPAK II must be accessible from the host system. Therefore, it must be configured to be on the same network as the host system.

► **Note:** This method requires that the user already know the current ZPAK II IP address. Use the serial port method described in the [Configuring ZPAK II via a Serial Port](#) section on page 1 if the IP address is unknown.

1. Using a crossover Ethernet cable, connect ZPAK II to the network interface card of the PC running ZDS II. If a hub is used in your configuration, connect the PC and the ZPAK II unit to the hub using Ethernet cables.
2. Apply power to the ZPAK II unit.
3. Launch a web browser, such as Internet Explorer, on the PC.
4. Enter the IP address of the ZPAK II debugger in the web browser's URL bar (e.g., <http://192.168.1.50>).

If the password option is enabled, The **ZPAK II Login** page appears. See Figure 1.

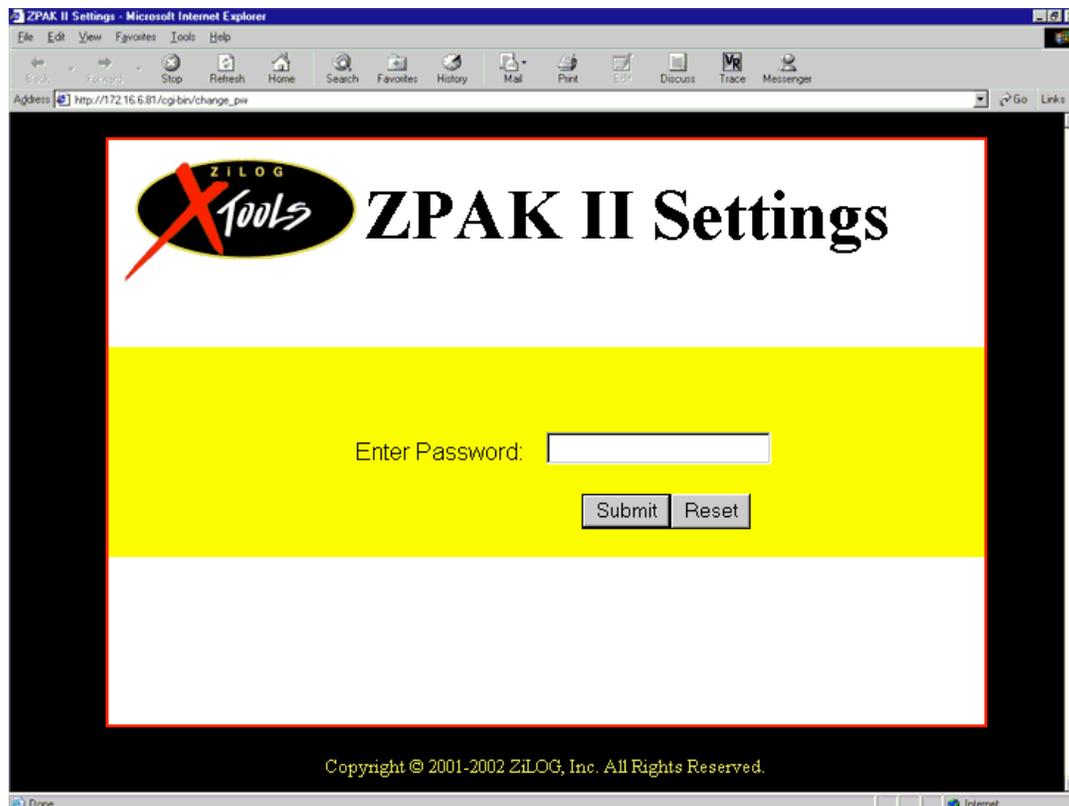


Figure 1. The ZPAK II Login Page

Enter the correct password in the **Password** field and click the **Submit** button. If the web page is being accessed for the first time, or if no password has been set, click the **Submit** button without entering a password. The **ZPAK II Settings** web page appears. See Figure 2.

If the password option is disabled, the **ZPAK II Login** page is bypassed and the **ZPAK II Settings** page is displayed.

After a successful login, ZPAK II displays the **ZPAK II Settings** page, which allows the user to change ZPAK II parameters. See Figure 2.

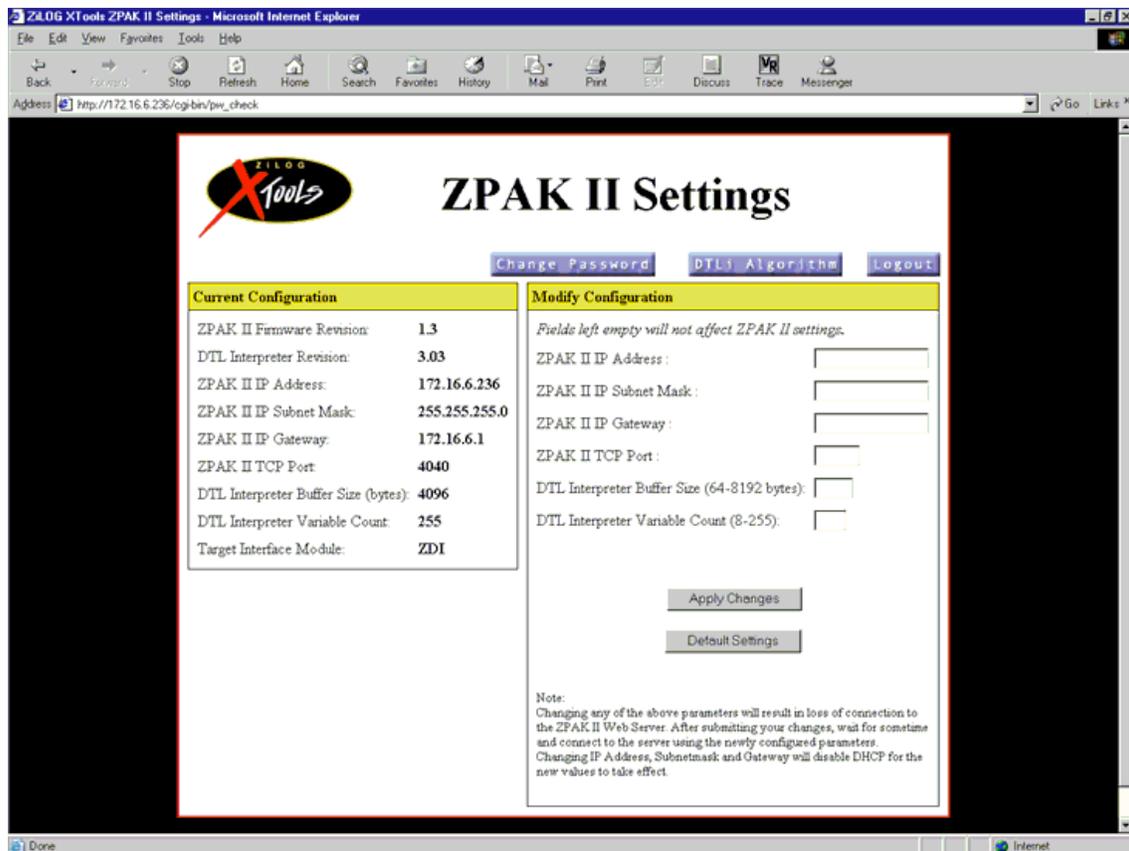


Figure 2. The ZPAK II Settings Page

As Figure 2 shows, the user can change any of the settings and click the **Apply Changes** button. Any changes made to the IP Address, IP Subnet Mask and IP Gateway fields disable the DHCP option, if it is currently enabled. If the session is valid, the settings are updated and ZPAK II restarts with the new values.

► **Note:** The existing connection to ZPAK II is lost upon restart.

If the DHCP option is currently enabled, the **Current Configuration** panel of the **ZPAK II Settings** webpage displays static network values, and does not display the DHCP-obtained values shown in Figure 3.

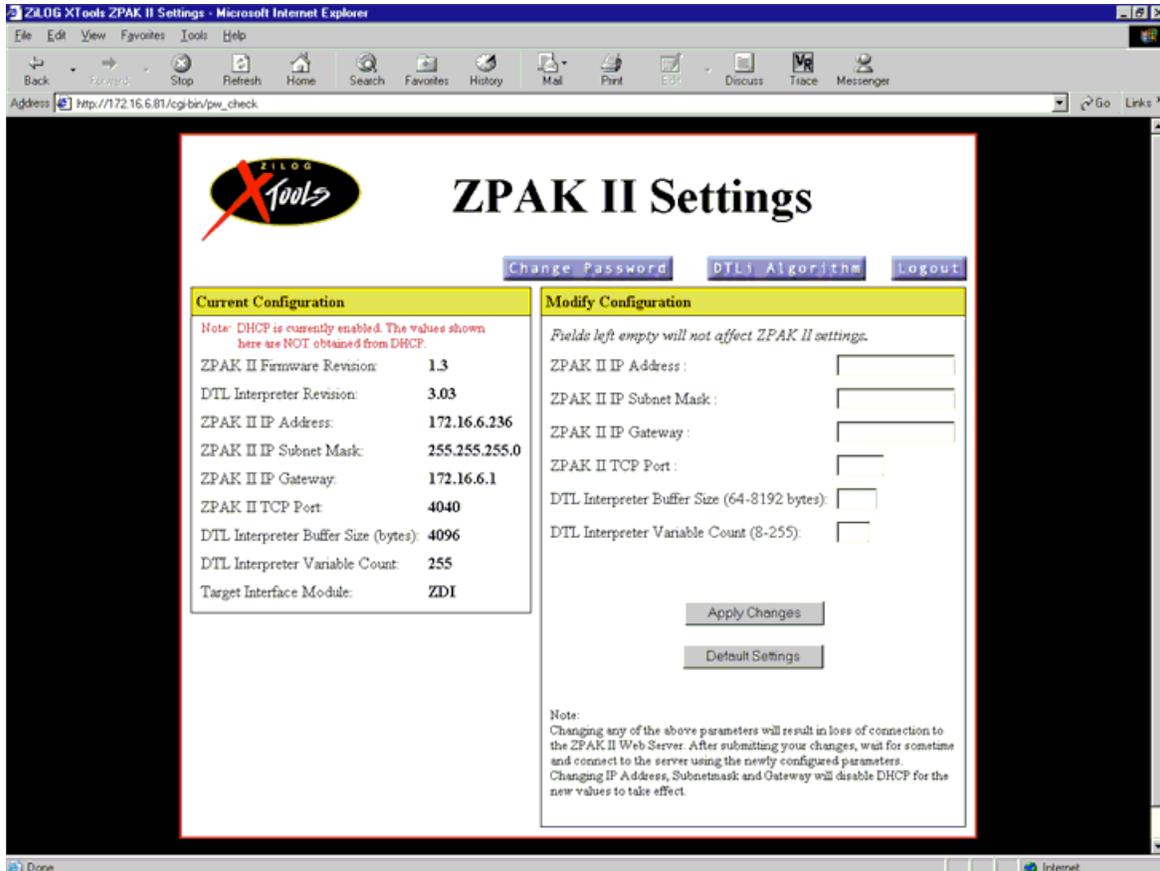


Figure 3. The ZPAK II Settings Page Showing Static Values

## Changing A Password Via A Web Page

With a web page interface, the user can create a password for ZPAK II access, or change a password. Figure 2 shows the **ZPAK II Settings** page, which features a button that hyperlinks to the **Change User Password** page, shown in Figure 4.

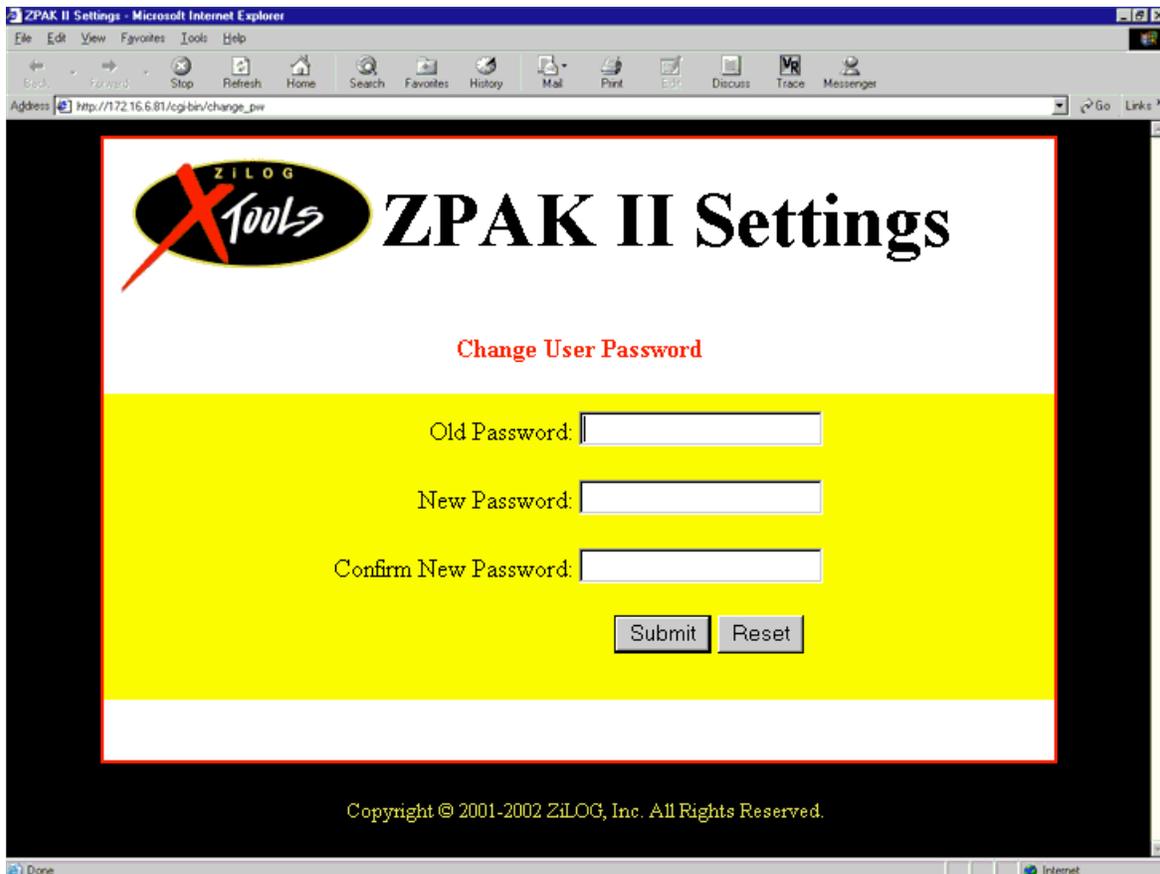


Figure 4. The ZPAK II Change User Password Page

Enter the old password, a new password, and a confirmation of the new password. Click the **Submit** button to immediately update the password.

► **Note:** The password can be changed only if the password option is enabled.

### Communicating With The Target Board Using DTLI Algorithms

The user can communicate with the target board via ZPAK II using DTLI algorithms. A DTLI algorithm is a special protocol by which the target registers are accessed (e.g., eZ80190 on-chip ZDI registers). DTLI algorithms are provided more as a diagnostic tool for debugging purposes. Clicking on the DTLI algorithm button shown in Figure 2 calls an applet which communicates to ZPAK II over TCP/IP sockets. The resulting web page appears similar to Figure 5.

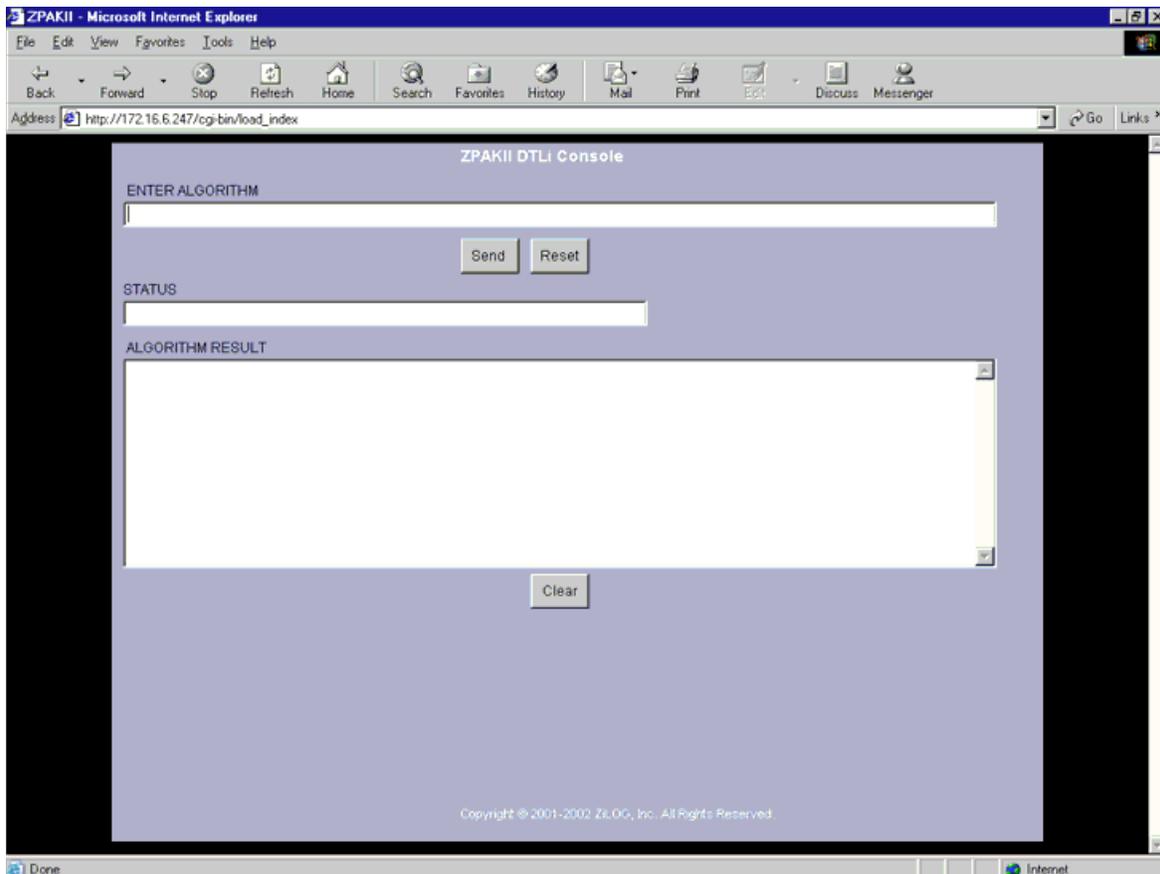


Figure 5. The ZPAK II DTLI Console Page

- ▶ **Note:** Because the applet uses the same mechanism as ZDS II to communicate with ZPAK II, only one of the two can connect to ZPAK II at any time.

### Logout Option

The **Logout** button shown in Figure 2 allows the user to execute a graceful logout from a ZPAK II session. This link works only when the password feature is enabled and the user session is valid. For invalid user sessions, clicking on the link displays the appropriate error message.



## ZPAK II Download Procedure

The ZPAK II debug interface tool is equipped with ready-to-use, factory-installed firmware. This firmware can be reflashed by the customer. To flash the firmware, follow the procedure below.

### Load the Firmware

ZPAK II firmware is available as a downloadable file in hexadecimal format. Loading the firmware onto the ZPAK II unit first requires setting up the proper hardware, as follows.

1. Open a **HyperTerminal** connection to ZPAK II using the same settings listed in [Step 2](#) on page 2.
2. To load the ZPAK II hex file, hold down the space bar and press the Reset button on the ZPAK II unit. A prompt appears in the **HyperTerminal** window, as shown below:

```
eZ80 Flash Loader Utility
Version x.xx eZ80

Type 'H' for help
eZ80190>
```

- **Notes:** In the example output above, `x.xx` denotes the current version of the Flash Loader utility.

If the `eZ80190` prompt does not appear, either the Flash Loader utility is not correctly installed on the ZPAK II unit, or the utility is corrupted. In either case, the user must reinstall the Flash Loader utility. To install the Flash Loader utility, please refer to the [External Flash Loader Product User Guide](#) available on the [ZiLOG website](#).

```
Enter H to display the Help menu:
```

```
C Clear user code
D Display memory
H Display this help
F Identify Flash
W Write memory
L Program Flash from *.hex file
E Read Ethernet MAC address
```

- **Note:** ZiLOG recommends clearing the user code by using option `C` from the above Help menu before programming Flash with option `L`.



3. Enter `L` at the prompt to load the ZPAK II hex file. The following message appears:  
Start sending file via xmodem protocol...
4. From the **HyperTerminal** menu bar, click **Transfer** and select the **Send File** option. The **Send File** dialog box appears.
5. Browse to the location of the ZPAK II hex file, `ZpakII_<version#>.hex`, and select the XMODEM protocol from the drop-down list of protocols.

► **Notes:**

- On ZDS II—eZ80Acclaim! 4.8.0 and earlier, the firmware can be found from:

`C:\Program Files\ZiLOG\ZDSII_eZ80Acclaim!_<version#>\bin\Zpak_II`

- On ZDS II-eZ80Acclaim! 4.9.0 and later, the firmware can be found from:

`C:\Program Files\ZiLOG\ZDSII_eZ80Acclaim!_<version#>\bin\firmware\Zpak_II`

6. Click the **Send** button to download this ZPAK II hex file to Flash memory on the ZPAK II unit. The **Xmodem File Send for filename** dialog box appears (where **filename** is the name of the HyperTerminal connection), indicating the progress of the download.

After the download of the ZPAK II hex file is complete, restart the ZPAK II unit by pressing the Reset button. The ZPAK II firmware is now in operation. The following message is displayed in the **HyperTerminal** window:

```
IPWorks y.y.y

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All Rights Reserved

clock enabled
Created buffer pool 1524 32
Created buffer pool 4096 8
IP Address: 192.168.1.50
IP Subnet: 192.168.1.00/255.255.255.00
IP Gateway: 192.168.1.254
netstart exiting, stack extent 379/2048

ZPAKII version x.x
Copyright © 2001-2002 ZiLOG, Inc.
All Rights Reserved.
main exiting, stack extent 300/1024
```

- **Note:** In the example output above, `y.y.y` denotes the current version of IPWorks and `x.x` denotes the current version of ZPAK II. The console prompt is not case-sensitive.



## Definitions and Acronyms

This section defines certain terms and acronyms used in this document.

### **DHCP**

The Dynamic Host Configuration Protocol allocates unique IP address and other network parameters specific to the network.

### **DTLI**

The Data Transfer Language Interpreter is a program that interprets the communication protocols used by ZDS II and ZPAK II. DTLI is part of the ZPAK II firmware.

### **DTLI buffer size**

The maximum size of the communication buffer between ZDS II and ZPAK II.

### **DTLI variable count**

The number of temporary DTLI variables that can be used by ZDS II during communication.

### **Flash Loader**

A ZiLOG utility used to program ZPAK II Flash memory.

### **ZDS II**

ZiLOG Developer Studio II is an integrated development environment based on client/server architecture that provides full development and debugging support. ZDS II is used on host systems to connect to ZPAK II.



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