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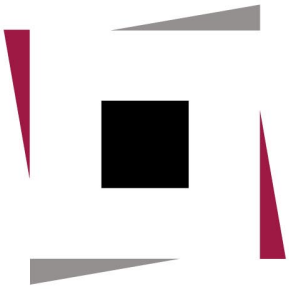
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Getting Started Manual for the IXA7 Quad PowerPC Board

Version 2.5
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TABLE OF CONTENTS

1. INTRODUCTION ____ *1*

2. ASSEMBLING THE PARTS ____ *1*

3. INSTALLING IXATools ____ *3*

3.1. Start the CD ____ **3**

3.2. Selecting Components ____ **4**

3.3. Selecting Destination Directory for Development Software ____ **5**

3.4. Selecting The HostAPI Directory ____ **6**

3.5. Selecting The HostAPI Target ____ **7**

3.6. Selecting the Destination Directory for VxWorks Kernel Files ____ **8**

3.7. Selecting the Board Configuration Utility Destination Directory. ____ **9**

3.8. Finishing Touches ____ **10**

4. HARDWARE SETUP ____ *12*

4.1. VME64x Chassis ____ **12**

4.2. JUMPERS ____ **12**

4.2.1 IXA7 Default Jumper Settings: ____ 12

4.2.2 Transition Module Default Jumper Settings ____ 13

4.2.3 PMC-ENET1 Jumper Settings ____ 13

4.3. Inserting and Connecting the Boards ____ **13**

5. STARTING THE SYSTEM ____ *15*

5.1. Setting the Routing Table on the Host ____ **15**

5.2. Start the FTP Server ____ **15**

5.3. Starting the Serial Console ____ **17**

5.4. Powering up the IXA7 ____ **17**

5.5. Displaying the VxWorks Boot Parameter Screen ____ **18**

5.6. VxWorks Environment Information ____ **19**

5.6.1 Boot Parameter Table ____ 19

5.6.2 IP Addresses for SPEs and IOPlus ____ 21

5.6.3 Kernel File Types for IOPlus and SPEs ____ 21

5.6.4 User's Parameter Input Table ____ 22

5.7. Setting VxWorks Boot Parameters ____ **23**

5.7.1 The VxWorks Configuration Display ____ 23

5.7.2 Rebooting with New VxWorks Parameters ____ 23

5.7.3 Error Loading VxWorks Kernel from Host ____ 24

5.7.4 Starting VxWorks with FTP Server Running 25
6. SERIAL TEST DRIVE 29
7. TORNADO 2.0 TEST DRIVE 30
8. CONCLUSION 32

1. INTRODUCTION

This document offers a systematic introduction to the use of the IXA7 CHAMP-AV in a Tornado 2.0 development environment. It is intended to serve as an aid in bringing the system up to a functional state where development can begin.

The following assumptions will be made with regard to user experience and equipment:

1) The user is familiar with the Tornado 2.0/VxWorks IDE.
2) The host system is PC based, as opposed to Unix/Solaris based.
3) The network used is isolated to this environment only.
4) Tornado 2.0 has already been installed. Note: If needed, please refer to the Ixthos, Inc. document. "*Tornado Installation Guide*", for assistance installing the Tornado tools.

The information given here is offered as a condensed compilation of the IXA7 CHAMP-AV User Manual information and the Tornado 2.0 User's Guide together with problems and fixes noted in actual setup trials.

Throughout this manual, there will be references to "***BTW***" items. ***BTW***'s are "by the way" hints and tips that should prove helpful during the environment setup and have been gathered over time from Dy 4 Systems lab trials and training sessions.

2. ASSEMBLING THE PARTS

Here is checklist of the necessary parts that will complete the development environment. To avoid unnecessary frustration please make sure you have everything on hand before starting the setup process. Use the table check off boxes to keep track of items.

HARDWARE

QTY	DESCRIPTION	√
1	VME chassis 64x	
1	CHAMP-AV IXA7 card	
1	IXA-EOS Ethernet transition module (TM) for the IXA7 with P2 connector and RS232 Serial Port, or PMC-ENET1 module for front panel serial and Ethernet access	
1	serial cable with standard DB-9 female connector and micro mini DB-9 male connector (connection mode is DTE to DCE)	
1	ethernet cable with RJ-45 connectors	
1	Host computer or laptop	

SOFTWARE

QTY	DESCRIPTION	√
1	IXATools CD for CHAMP-AV	
1	WindRiver Tornado 2.0 for PowerPC	

3. INSTALLING IXATools

3.1. Start the CD

Insert the IXATools CD. Setup will automatically start, however, if you want to install at a later time simply cancel the install. *Setup* can be run from Explorer or the Start Run window at any time to either perform a fresh install or add a component.

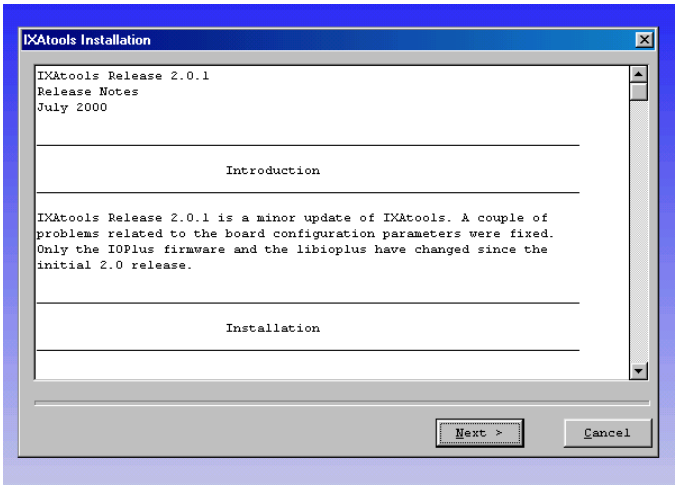
The *Welcome* screen will appear as shown below.



Click *Next* to continue.

A ***readme*** file pops up which should be read as it contains last minute update and anomaly information that does not appear in the User's Manual. It is also stored on the local drive during installation.

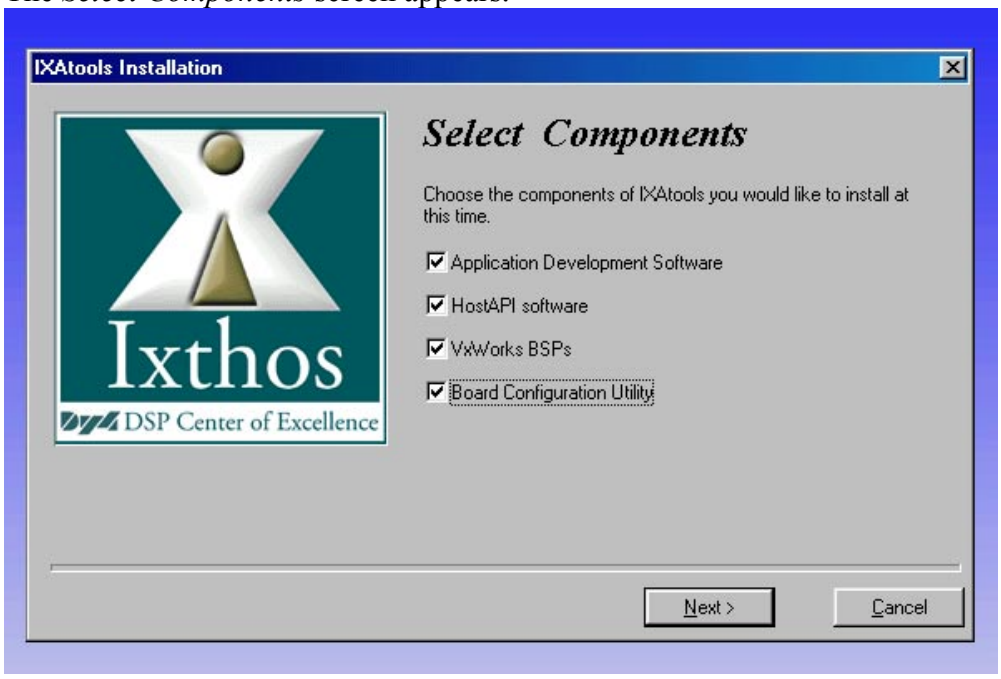
IMPORTANT: Take a few minutes to read this document. It contains last minute information not included in the User Manual that may well address problems or questions as you encounter them.



Click *Next* to continue.

3.2. Selecting Components

The *Select Components* screen appears.



Application Development Software is a collection of development files, which include source code for the common boot code (CBC), include files and library files, and the IXA7 User Manual.

HostAPI software supplies source code for VMEhost routines that can be used to access flash, memory, etc., when the system uses a VME host card.

VxWorks BSPs supplies the files needed to build the VxWorks kernels for the IOPLUS and the SPEs.

Board Configuration Utility provides the *BurnUtil.exe* used to burn flash.

Select the desired components. This manual will perform a complete installation.
Click *Next*.

3.3. Selecting Destination Directory for Development Software

Now the *Select Destination Directory* screen appears.



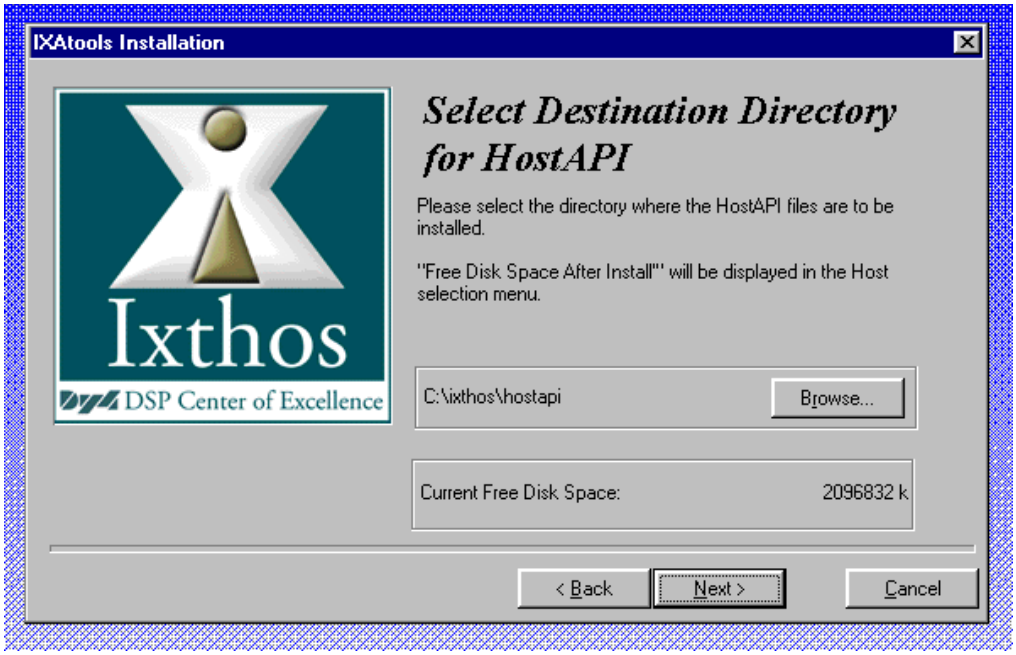
The default directory is C:\IXTHOS but this can be changed to anything else by clicking on the browse button and finding or typing in the desired path. This manual will use the default, C:\ixthos.

BTW- the install software appends *\ixthos* to whatever has been selected but this can be removed in the text entry box at the top of the screen. It's easy to not notice this and wind up with unexpected paths.

Click *Next.*

3.4. Selecting The HostAPI Directory

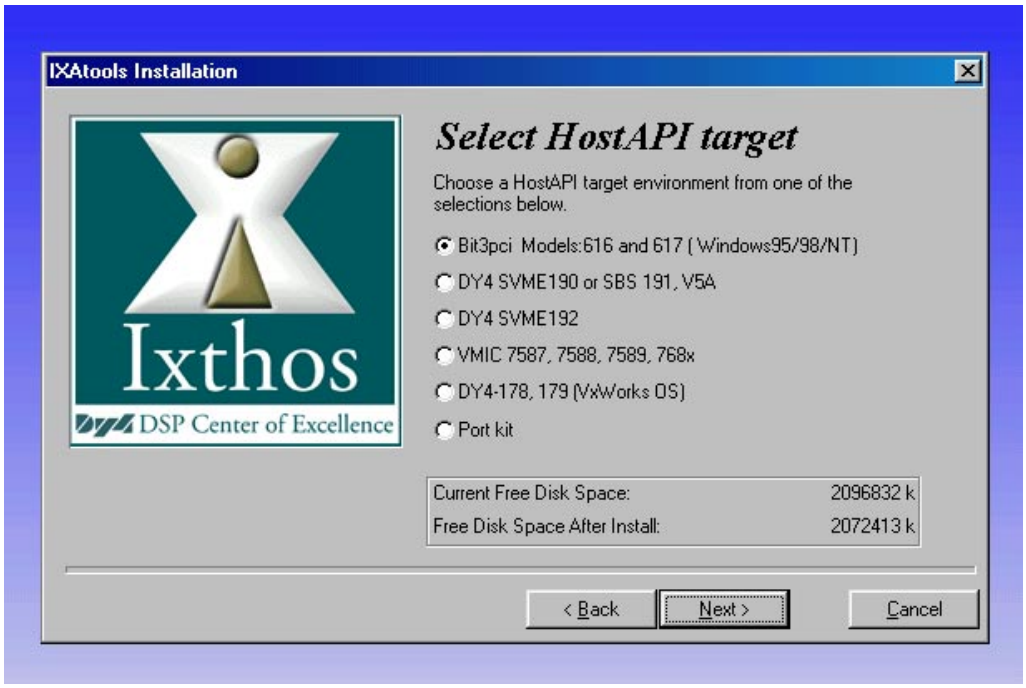
The next screen asks for the *HostAPI* directory. It is recommended that each component is installed in its own subdirectory under the main install directory. Enter something such as *C:\ixthos\hostapi* for the *HostAPI* component.



Click *Next*.

3.5. Selecting The HostAPI Target

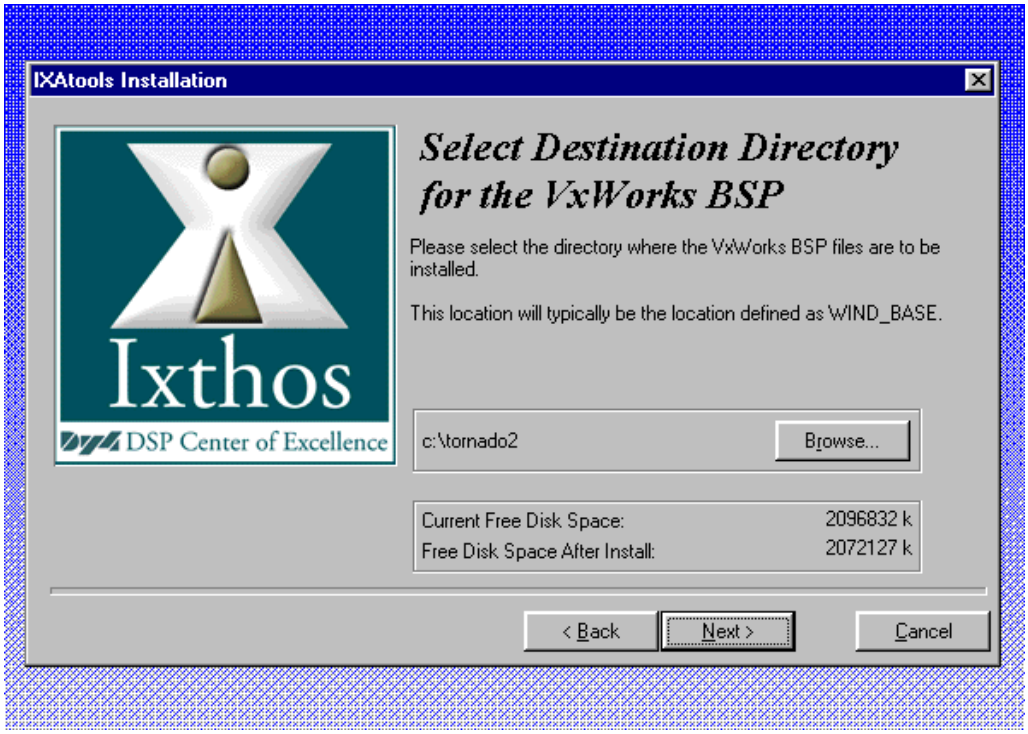
The *Select HostAPI Target* screen appears and provides a list of choices for a VMEbus host card. The cards listed are those that have been supported by Dy 4 Systems to date. Should it be necessary to support a non-listed card the *Port Kit* selection can be made which will make it possible to create a custom target environment. This manual will select the *Bit3pci* environment.



Click *Next* after making a selection.

3.6. Selecting the Destination Directory for VxWorks Kernel Files

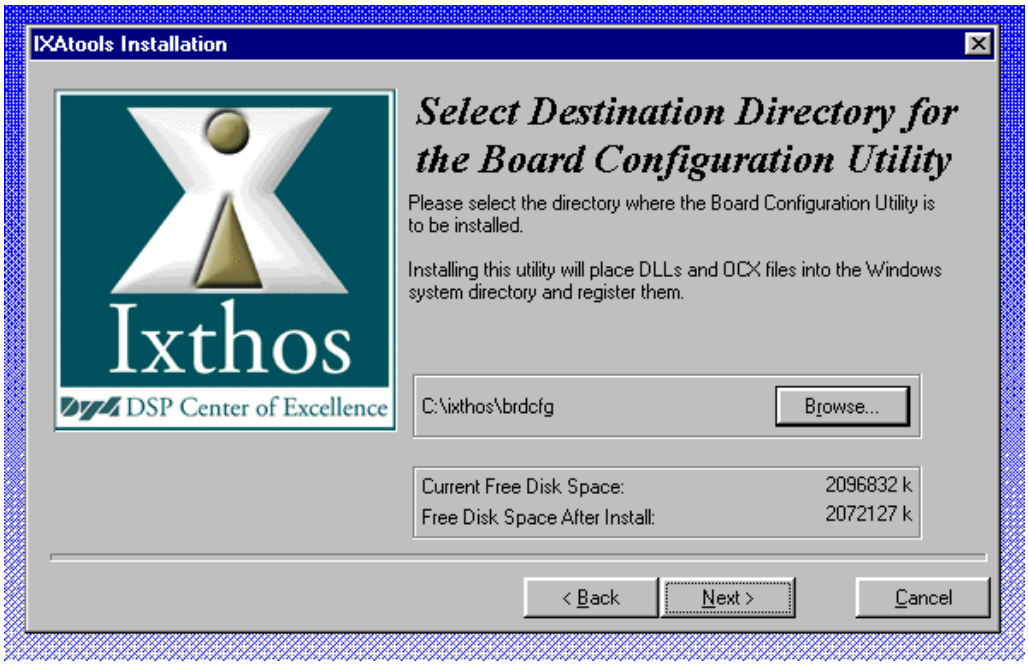
Now the *Select Destination Directory for the VxWorks BSP* screen appears. \tornado2 is the default directory as this is where Tornado will look for them.



Click *Next*.

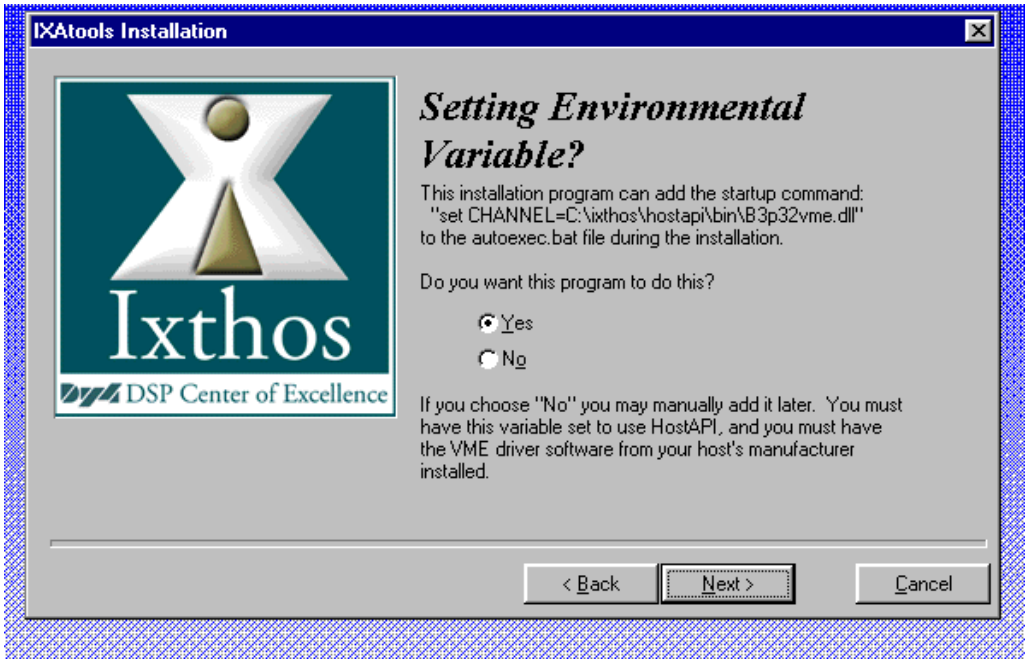
3.7. Selecting the Board Configuration Utility Destination Directory.

Next is the *Select Destination Directory for the Board Configuration Utility*. The subdirectory, *brdcfg*, has been used here for this component.



3.8. Finishing Touches

An environment variable can be included in autoexec.bat that will set a path to library file for the host target environment chosen previously.



Enter an appropriate name for the IXAtools group.



The installation is now ready to copy files to the local drive.



If all selections have been made satisfactorily, click *Next*, otherwise the *Back* button can be used to navigate back and make any changes. The installation will now copy files to the hard drive and upon completion will display the following screen.



The IXATools installation is now complete.

4. HARDWARE SETUP

4.1. VME64x Chassis

The VME64x chassis provides +5 V, 3.3 V, +12 V, -12 V voltage levels. Check that your chassis is compliant with these voltage levels, as the IAX7 will not work without them. Refer to Tables 3.4 and 3.5 in the IXA7 User's Manual 2.0 for P1 and P2 voltage pinouts if needed.

BTW- It is a good idea to check the chassis backplane connectors for bent pins before inserting cards.

4.2. JUMPERS

The jumpers are preset at the factory for default values on both boards. The jumpers should be checked before inserting the boards for the first time.

4.2.1 IXA7 Default Jumper Settings:

```
JM1-4    : off-on-on-on     ;sets the base VME board address to 0x80000000
JM5      : on               ;selects standard boot code at startup
JM6      : on               ;selects flash as source of VME base address
JM7      : on               ;selects to load SPEs from flash upon reset
JM8      : on               ;selects whether VxWorks enabled
JM9      : off              ;selects normal reset operation
JM10     : off              ;selects to disable board driven VME reset
JM11     : off              ;reserved
JM12     : off              ;select disabled JT1 IOPlus JTAG header
JM13-14  : x-x              ;selects which SPE the JTAG2 header is routed to
                            ; on-on=A, on-off=B, off-on=C, off-off=D
```

Accepting the defaults will place the board in the following state:

→ VME base address = 0x80000000 as set by the factory in flash.

BTW- as long as J6 is set to *on*, the base address will be set according to parameters stored in flash and jumpers 1-4 will be ignored. Boards are shipped with base address 0x80000000.

→ standard startup or runtime code will execute
→ user program/vxWorks bootrom will load into SPEs from flash upon reset
→ board reset does not drive VME reset
→ JTAG1 header disabled(when enabled, access to the IOPlus processor is available)

4.2.2 Transition Module Default Jumper Settings

The TM has 19 jumpers, however only the first six are used. 7 through 19 are reserved and should always be off.

The default settings are:

JM1	: off	;reserved
JM1	: off	;selects RS232 operation
JM3	: off	;reserved
JM4	: off	;reserved
JM5-6	: on-off	;selects 9600 baud
JM7-19	: off	;reserved

4.2.3 PMC-ENET1 Jumper Settings

If the PMC-ENET1 will be used, the jumpers default settings are as follows:

JM1	:off	;reserved
JM2	:off	;selects RS232 mode
JM3-4	:off	;reserved
JM6-6	:on,off	;selects 9600 baud

4.3. Inserting and Connecting the Boards

1) Insert the IXA7 CHAMP-AV card into an available slot from the front of the chassis. Firm force should be applied to make sure the board is completely seated. There are no insertion tabs so one must push on the front panel of the card to insert it. As simple as it seems, many times a malfunctioning system can be traced to improper card insertion.

2a) If using the Transition Module (TM), insert the card into the rear of the chassis. Make sure the slot chosen matches the one the IXA7 uses. The TM uses the P2 connector, which is the one at the bottom of the chassis.

BTW- it's good practice to use the front panel faceplate screws and secure the board to the chassis

BTW-on a VME64bus there are three connectors. Ordered from the top are connectors P1, P0, and P2. P1 is left open while the TM occupies P2 and/or P0 depending on which TM model is in use.

2b) If using the PMC-ENET1, plug the module into either PMC slot 1 or 2. Screws are shipped with the module to secure it to the IXA7.

3) Connect the mini DB-9 serial cable end to the port on the TM (or. PMC-ENET1).

4) Connect the other end of the serial cable to the host computer.

5) Connect the Ethernet cable from the TM (or PMC-ENET1) to the network (if the user setup is isolated then the connection would be to the host computer itself).

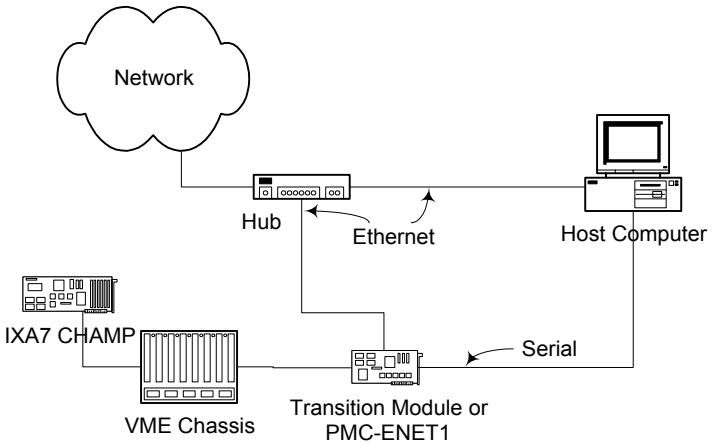


Figure 1 Block Connection Diagram

5. STARTING THE SYSTEM

With all connections made and jumpers set, the system is now ready to be powered on.

5.1. Setting the Routing Table on the Host

The VxWorks host PC must establish a routing table for IP addresses to enable Ethernet communications between the host and the IXA7 board. The route commands look like the following:

route add 192.99.22.100 192.168.2.63

route add 192.99.22.101 192.168.2.63

route add 192.99.22.102 192.168.2.63

route add 192.99.22.103 192.168.2.63

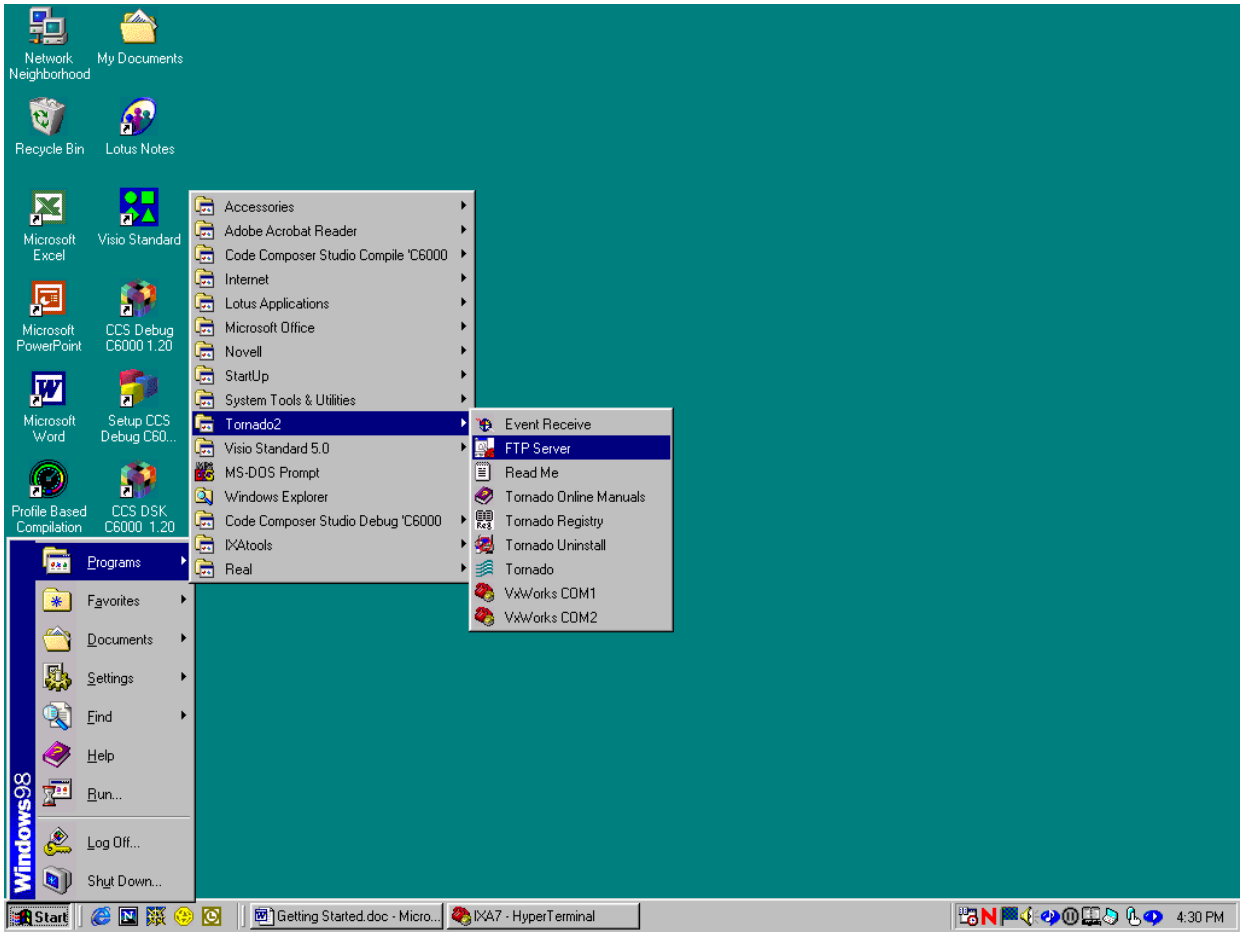
route add 192.99.22.104 192.168.2.63

where in this example 192.99.22.10x is the *inet on backplane* IOP address and SPE addresses, and 192.168.2.63 is the host PC address (*inet on Ethernet)*. These commands can conveniently be run from a DOS batch file.

5.2. Start the FTP Server

Before files can be moved over the Ethernet, a FTP file server must be started on the host. A server called *wftpd32.exe* was installed as part of the Tornado 2.0 package. It should be started now. Refer to the Tornado 2.0 User's Guide, page 20, for more detailed information.

The FTP server can be run from the Start menu (as shown below) or from Explorer. From Explorer the path will be something like *C:\Tornado2\host\x86-win32\bin\wftpd32.exe.* The Start menu dialogs are shown below.



BTW- The FTP server needs to be configured with the same *user* and *password* values that were entered in the IXA7 VxWorks boot parameters above.

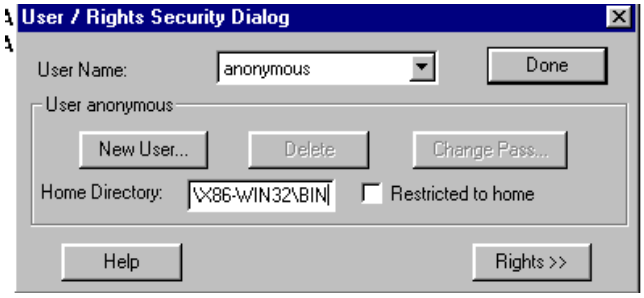
It's also possible to log on anonymously. To do this, use *anonymous* for the *user* entry. A password is still required which the host can recognize.

In the FTP window, click on *Security>Users/Rights* and configure the server to your settings.

Be sure to set the Home Directory to the location of the *wftpd32.exe* file. The path should look like *C:\Tornado2\host\x86-win32\bin*. The server will not be called if this path is not correct.

The FTP *User/Rights Security* dialog is shown below.

→



5.3. Starting the Serial Console

Start a serial console program (such as HyperTerminal) on the host computer.

The serial parameters are : **9600, N, 8, 1**.

Activate the com port.

5.4. Powering up the IXA7

1) Power on the VME chassis.

2) Observe the IXA7 front panel LEDs as power is applied.

The LED portion of the panel is shown in Figure 2 below:

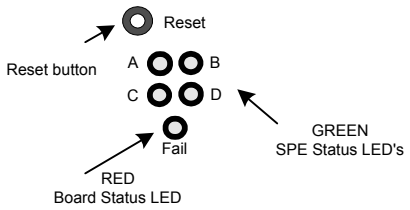


Figure 2, IXA7 Front Panel LEDs

If all is well, the LEDs should follow this sequence:

-All will light at first power
-Greens will go off while Red stays on.
-If the common boot code self-tests pass, Greens will blink in a rotating pattern and Red goes off.
This whole process takes about 2 seconds.

BTW-the rotating pattern signals that the board is ready to accept a load from the host.

If a self-test error occurs, Red will blink four SOS patterns (3 short-3 long-3 short). Red will then flash rapidly. Greens will display an error code pattern that can be looked up in table 2.5 of the IXA7 User's Manual.

3) Following a successful boot, press the reset button on the IXA7 front panel to reboot the board.

4) Watch for output to the serial console screen. When the message "Press any key to stop auto-boot…" appears after the opening credits, hit any key before the countdown expires. This will stop the boot loader from trying to load a file on the IOP from the host and place the user at the "[VxWorks Boot]:" prompt. The following output should be seen.

```
                    VxWorks System Boot

Copyright 1984-1998  Wind River Systems, Inc.

CPU: Dy 4 Systems IOP
Version: 5.4
BSP version: 1.2/9
Creation date: Jul  2 2001, 08:36:54


Press any key to stop auto-boot...
 2
[VxWorks Boot]:
```

At this point, the system is ready to have VxWorks Boot Parameters for the IOP configured.

5.5. Displaying the VxWorks Boot Parameter Screen

At the prompt, type “p<CR>”. This will display the existing configuration settings for the IOP, an example of which is shown below.

```
Press any key to stop auto-boot…
2
[VxWorks Boot]: p

boot device          : fei
unit number          : 0
processor number     : 0
host name            : james
file name            : /export/home/tornado2/target/config/iop/vxWorks
inet on ethernet (e) : 192.168.2.203:ffffff00
inet on backplane (b): 192.99.23.11
host inet (h)        : 192.168.2.86
user (u)             : release
ftp password (pw)    : release1
flags (f)            : 0x8
target name (tn)     : whatever
other (o)            : /export/home/tornado2/target/config/spe/vxWorks

[VxWorks Boot]:
```

BTW-A list of console commands can be seen by typing “?<CR>” or “h<CR>” or “help<CR>” at the prompt. Here’s what the command list looks like.

```
[VxWorks Boot]: h

?                       - print this list
@                       - boot (load and go)
p                       - print boot params
c                       - change boot params
l                       - load boot file
g adrs                  - go to adrs
d adrs[,n]              - display memory
m adrs                  - modify memory
f adrs, nbytes, value - fill memory
t adrs, adrs, nbytes  - copy memory
e                       - print fatal exception
n netif                 - print network interface device address
$dev(0,procnum)host:/file h=# e=# b=# g=# u=usr [pw=passwd] f=#
                          tn=targetname s=script o=other

Boot flags:
  0x02  - load local system symbols
  0x04  - don't autoboot
  0x08  - quick autoboot (no countdown)
  0x20  - disable login security
  0x40  - use bootp to get boot parameters
  0x80  - use tftp to get boot image
  0x100 - use proxy arp

available boot devices:Enhanced Network Devices
 fei sm
[VxWorks Boot]:
```

5.6. VxWorks Environment Information

5.6.1 Boot Parameter Table

Before actually editing the boot parameters, some information needs to be gathered about the environment. Table 1 gives a list of the parameters and an explanation of each. Items designated *user defined* are those for which you must provide values.

BTW - not all parameters have to be set for the board to work. The checklist in section 5.6.4 includes the parameters a system might typically use.

Table 1 VxWorks Parameter Listing

Parameter	Value	Description
boot device	dc or fei	dc specifies use of the Transition Module fei specifies use of the PMC-ENET1
unit number	0	always set to zero
processor number	0	identifies a specific processor if the system has multiple targets on the backplane.
host name	user defined	name of the host system
file name	user defined	the full pathname of the VxWorks kernel to be booted
inet on Ethernet	*user defined	internet address of the target system(the IXA7's IOPlus 8240 processor)
inet on backplane	*user defined	internet address of the target's backplane interface. This address is used as a "base" address for the SPEs. Each SPE will then be at an offset address from this base. Refer to Table 2 below for examples.
host inet	*user defined	internet address of the host computer from which the target is booting
gateway inet	n/a	used only if the host is not on the same network as the target
user	user defined	a login which VxWorks will use to access the host
ftp password	user defined	the "user" password. Needed to boot over the network from a Windows host. Do not leave this field blank as the system wants to see some password.
flags	n/a	sets boot configuration options (0x0 for none)
target name	user defined	a name for the target
startup script	n/a	a script file used to automate a sequence of commands following boot up
other	user defined	the full path of the SPE VxWorks kernel to boot on the SPEs

**BTW*- if the system is used on a local corporate network, these addresses must be unique. If the development system is an isolated system then addresses can be arbitrary. Refer to section 5.6.2 for more discussion of these addresses.

5.6.2 IP Addresses for SPEs and IOPlus

As described in Table 1, there are two separate IP addresses used on the IOPlus. One provides the connection to the VME bus, and the other provides the connection to the SPEs.

Table 2 shows an example of IP address mapping for the IOPlus and the SPEs.

Table 2 IP Address Mapping Example

Board	Processor	inet on Backplane IP address	inet on Ethernet IP address
1	IOPlus	192.99.22.100	192.168.2.47
1	SPE A	192.99.22.101	None
1	SPE B	192.99.22.102	None
1	SPE C	192.99.22.103	None
1	SPE D	192.99.22.104	None

The ***inet on Backplane*** address is used by the IOPlus to gain access to the SPEs. This address serves as the base address for the SPEs which are numbered consecutively starting with base + 1. The SPEs are not directly connected to the Ethernet. Thus, when a SPE address comes in off the Ethernet it actually is received by the IOPlus VxWorks operating system, which knows how to route the message to the particular SPE processor. The *inet on Backplane* address can be thought of as a "virtual" Ethernet address.

The *inet on Ethernet* address is the actual IP address assigned to the IOPlus. The IOPlus is directly connected to the Ethernet and receives traffic in the normal manner.

In the example of Table 2 above, the IOPlus has been assigned address 192.168.2.47. The backplane address has been set to 192.99.22.100. The four SPEs are offset consecutively from this base address.

5.6.3 Kernel File Types for IOPlus and SPEs

The VxWorks kernel for the IOP, *vxWorks*, enables both debugging via the serial port and debugging through the Tornado IDE running on the host. The VxWorks kernel indicated by the *filename* field is loaded over the Ethernet from the host.

BTW- The *other* field provides the name of the kernel to be loaded over the Ethernet for the SPEs. The SPE kernel also supports debugging from both the serial port and the Tornado IDE.

5.6.4 User's Parameter Input Table

Use this table to record your user-defined information.

Table 3 User Defined Parameters

host name	
file name	
inet on Ethernet	
inet on backplane	
host inet	
user	
ftp password	
target name	
other	

5.7. Setting VxWorks Boot Parameters

5.7.1 The VxWorks Configuration Display

Type "c<CR>" at the "[VxWorks Boot]:" prompt to open the VxWorks parameter configure display,

Each parameter will be presented one at a time starting with *boot device*.

Begin entering the parameter values. Hit "<CR>" to continue to the next item.

BTW- to clear a parameter, type ".<CR>" (*period* followed by *carriage return*)
- to backup to the preceding parameter, type "-<CR>" (*hyphen* followed by *carriage return*)
- to save and exit at any point, type "Ctrl-d"

BTW- when entering the path names for the *file name* and *other* parameters, use a *forward slash* "/" as this is the convention for NFS based devices.

BTW- it is not necessary to fill in each and every one of the boot parameters to boot the system. Refer to the parameter listing in Table 3 above for the minimum list of defined items.

While in the parameter entry mode, the system will present all of the possible boot parameters. Parameters that are not needed can be left blank. Note that blank parameters will not be displayed when the display all command "p" is entered at the prompt. Only parameters that have been defined are displayed.

5.7.2 Rebooting with New VxWorks Parameters

With parameter entry completed, reboot the IXA7 to reload VxWorks. There are four ways to do this:

1) type "Ctrl-x"

2) or type "@<CR>"

3) or press the reset button on the front panel of the IXA7

4) or cycle power to the board

Restart the board and observe the serial console.

When the 7-second timer expires, the boot code will attempt to load the kernel for the IOP from the host computer. If the IOP boots successfully then the SPE kernel will be loaded from the host computer to each of the SPEs.

Section 5.7.4 illustrates a successful boot.

Section 5.7.3 discusses what to do in the case of an error.

5.7.3 Error Loading VxWorks Kernel from Host

If the VxWorks kernel failed to load, an error message similar to the one below may be displayed. The message may not always print out completely so you may see something more or less than that in the example.

Most problems are caused by one or more of the following.

- Check that *file name* and *other* field entries in the VxWorks configuration are correct.
- Check all the IP addresses.
- Check that the routing table reflects the correct IP addresses being used.
- Make sure the FTP server is running.
- Check the cabling.

Make any corrections and restart the board.

```
CPU: Dy 4 Systems IOP
Version: 5.4
BSP version: 1.2/11
Creation date: Aug  16 2002, 11:21:06


Press any key to stop auto-boot...
 1
auto-booting...


boot device          : fei
unit number          : 0
processor number     : 0
host name            : james
file name            : /export/home/tornado2/target/config/iop/vxWorks
inet on ethernet (e) : 192.168.2.203:ffffff00
inet on backplane (b): 192.99.23.11
host inet (h)        : 192.168.2.86
user (u)             : release
ftp password (pw)    : release1
flags (f)            : 0x8
target name (tn)     : whatever
other (o)            : /export/home/tornado2/target/config/spe/vxWorks

Attached TCP/IP interface to fei0.
Attaching network interface lo0... done.
Loading...
Error loadin

[VxWorks Boot]:
```

5.7.4 Starting VxWorks with FTP Server Running

Below is an example output from a successful kernel download and boot for the IOP and SPEs. If the IOP completes boot successfully the vxWorks banner will be displayed and there will be two messages from the IOP:

Verifying flash……..passed

Burntask() accepting connections…

After that there will be a set of messages, interleaved, for each SPE. Successful boot for the SPE VxWorks kernel is indicated by the *WDB: Ready* message.

```
[VxWorks Boot]:

                    VxWorks System Boot


Copyright 1984-1998  Wind River Systems, Inc.

CPU: Dy 4 Systems IOP
Version: 5.4
BSP version: 1.2/11
Creation date: Aug  11 2002, 11:21:06


Press any key to stop auto-boot...
 0
auto-booting...


boot device          : fei
unit number          : 0
processor number     : 0
host name            : james
file name            : /export/home/tornado2/target/config/iop/vxWorks
inet on ethernet (e) : 192.168.2.203:ffffff00
inet on backplane (b): 192.99.23.11
host inet (h)        : 192.168.2.86
user (u)             : release
ftp password (pw)    : release1
flags (f)            : 0x8
target name (tn)     : whatever
other (o)            : /export/home/tornado2/target/config/spe/vxWorks

Attached TCP/IP interface to fei0.
Attaching network interface lo0... done.
Loading... 984024
Starting at 0x60000...

Attached TCP/IP interface to fei unit 0
Initializing backplane net with anchor at 0x4100... done.
Backplane anchor at 0x4100... Attaching network interface sm0... done.
Attaching network interface lo0... done.
NFS client support not included.
Loading symbol table from james:/export/home/tornado2/target/config/iop/vxWorks
.sym ...done
```



```
                                Development System
                               VxWorks version 5.4
                              KERNEL: WIND version 2.5
                             Copyright Wind River Systems, Inc., 1984-1999

                                CPU: Dy 4 Systems IOP.  Processor #0.
                               Memory Size: 0x1000000.  BSP version 1.2/11.

->
  Validating flash...        passed.

  Burntask() version 6 accepting connections on port 1001...

                              VxWorks System Boot
                              VxWorks System Boot
                              VxWorks System Boot
                              VxWorks System Boot

Copyright 1984-1998  Wind River Systems, Inc.
Copyright 1984-1998  Wind River Systems, Inc.
Copyright 1984-1998  Wind River Systems, Inc.
Copyright 1984-1998  Wind River Systems, Inc.

CPU: Dy 4 Systems Champ SPE
CPU: Dy 4 Systems Champ SPE
CPU: Dy 4 Systems Champ SPE
CPU: Dy 4 Systems Champ SPE
Version: 5.4
Version: 5.4
Version: 5.4
Version: 5.4
BSP version: 1.2/7
BSP version: 1.2/7
BSP version: 1.2/7
BSP version: 1.2/7
Creation date: Aug 16 2002, 16:00:45
Creation date: Aug 16 2002, 16:00:45
Creation date: Aug 16 2002, 16:00:45
Creation date: Aug 16 2002, 16:00:45

Press any key to stop auto-boot...
Press any key to stop auto-boot...
Press any key to stop auto-boot...
Press any key to stop auto-boot...
 0
 0
 0
 0
auto-booting...
auto-booting...
auto-booting...
auto-booting...

boot device          : sm=0xb8004100
boot device          : sm=0xb8004100
boot device          : sm=0xb8004100
boot device          : sm=0xb8004100
unit number          : 0
unit number          : 0
unit number          : 0
unit number          : 0
processor number     : 1
processor number     : 2
```

```
processor number     : 3
processor number     : 4
host name            : james
host name            : james
host name            : james
host name            : james
file name            : /export/home/tornado2/target/config/spe/vxWorks
file name            : /export/home/tornado2/target/config/spe/vxWorks
file name            : /export/home/tornado2/target/config/spe/vxWorks
file name            : /export/home/tornado2/target/config/spe/vxWorks
host inet (h)        : 192.168.2.86
host inet (h)        : 192.168.2.86
host inet (h)        : 192.168.2.86
host inet (h)        : 192.168.2.86
gateway inet (g)     : 192.99.23.11
gateway inet (g)     : 192.99.23.11
gateway inet (g)     : 192.99.23.11
gateway inet (g)     : 192.99.23.11
user (u)             : release
user (u)             : release
user (u)             : release
user (u)             : release
ftp password (pw)    : release1
ftp password (pw)    : release1
ftp password (pw)    : release1
ftp password (pw)    : release1
flags (f)            : 0x8
flags (f)            : 0x8
flags (f)            : 0x8
flags (f)            : 0x8
target name (tn)     : dsp1
target name (tn)     : dsp2
target name (tn)     : dsp3
target name (tn)     : dsp4

Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane inet address: 192.99.23.12
Backplane inet address: 192.99.23.13
Backplane inet address: 192.99.23.14
Backplane inet address: 192.99.23.15
Attaching network interface lo0... done.
Attaching network interface lo0... done.
Attaching network interface lo0... done.
Attaching network interface lo0... done.
Loading... 750388
Loading... 750388
Loading... 750388
Loading... 750388

Starting at 0x20000...
Starting at 0x20000...
Starting at 0x20000...
Starting at 0x20000...

Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane anchor at 0xb8004100... Attaching network interface sm0... done.
Backplane anchor at 0xb8004100... Attaching network interface sm0... done.

Attaching network interface lo0... done.
Attaching network interface lo0... done.
Attaching network interface lo0... done.
Attaching network interface lo0... done.

NFS client support not included.
NFS client support not included.
NFS client support not included.
NFS client support not included.
                VxWorks
                VxWorks
                VxWorks
                VxWorks
Copyright 1984-1998  Wind River Systems, Inc.
Copyright 1984-1998  Wind River Systems, Inc.
Copyright 1984-1998  Wind River Systems, Inc.
Copyright 1984-1998  Wind River Systems, Inc.
           CPU: Dy 4 Systems Champ SPE
           CPU: Dy 4 Systems Champ SPE
```

```
            CPU: Dy 4 Systems Champ SPE
            CPU: Dy 4 Systems Champ SPE
        VxWorks: 5.4
        VxWorks: 5.4
        VxWorks: 5.4
        VxWorks: 5.4
    BSP version: 1.2/7
    BSP version: 1.2/7
    BSP version: 1.2/7
    BSP version: 1.2/7
Creation date: Aug 16 2002
Creation date: Aug 16 2002
Creation date: Aug 16 2002
Creation date: Aug 16 2002
            WDB: Ready.
            WDB: Ready.
            WDB: Ready.
            WDB: Ready.
```

After the last *WDB: Ready* hit the ENTER key to display the "→" prompt.

The system is now fully booted, loaded, and ready to go. The prompt is a Unix like prompt and Unix type commands can now be entered.

Try "*ls<CR>"* to list the directory contents. Reminder: the kernel is accessing the host computer so the directory listing will show the current host directory contents. For a list of all available commands, type "*help<CR>"*.

This completes the steps for assembling the components, setting jumpers, configuring VxWorks boot parameters, starting the system and loading a kernel.

The next portion of the Getting Started Manual will outline how to run the Tornado 2.0 Integrated Development Environment. The Tornado 2.0 IDE is used to write code, compile and build the target image file, and download to the IXA7.

6. SERIAL TEST DRIVE

This section will demonstrate the use of the serial connection to communicate with the IOPlus. The steps are as follows:

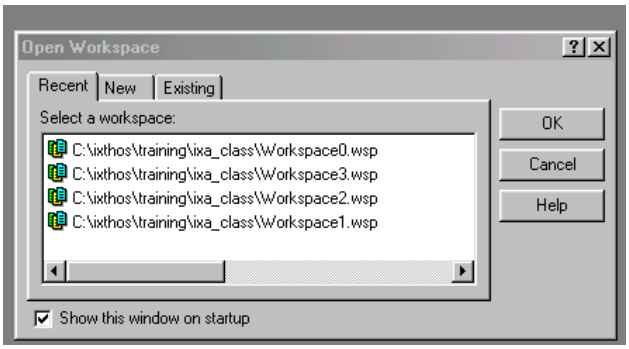
1. The *VxWorks* kernel should be loaded into the IOPlus following the steps outlined above.
2. The arrow "->" prompt should be visible in the serial console window. If it isn't, hit the ENTER key a couple of times. If it still doesn't appear, make sure the complete path to the *VxWorks* kernel was entered in the file name field of the boot parameters; reboot if necessary.
3. It is now possible to do a function call and have the IOPlus kernel respond. We will blink the front panel RED LED.
4. At the prompt, type *ioplus_toggle_led(5, 100000)<CR>*.
   The first argument, 5, sets the number of blinks. The second argument, 100000, sets the length of the blink.
5. The blinking LED means the kernel is running and successfully processed the call.
   BTW- *ioplus_toggle_led()* is one of the IOPlus library functions, which can be found in Chapter 6 of the IXA7 User Manual.

7. TORNADO 2.0 TEST DRIVE

This section will demonstrate the use of the Tornado shell to communicate with the SPEs. The steps are as follows:

1. The *VxWorks* kernel should be loaded into the IOPlus as outlined above.
2. Reboot the IXA7 and wait for the process to complete. No prompt will appear in the serial console window and the IOPlus will not respond to keyboard entries. It is waiting for input from the Tornado shell.
3. Open a DOS window. Execute the *route* command to map the SPE IP addresses to the IOPlus IP address. The *route* command looks like, *route add <a new address> <map to address>*. Five addresses will need to be mapped, *inet on backplane* (the IOPlus backplane), and the four SPE addresses. All the addresses are mapped to the *inet on Ethernet* address (the IOPlus).

   BTW- recall that the SPE addresses are offsets from the base address, which is the *inet on backplane* address.
4. With addresses routed, you should be able to ping all of them. Try it now using *ping <some IP address>*. If ping doesn't work, check the route mappings with *route print* at the DOS prompt and make sure they are correct.
5. Start Tornado. Cancel out of the *Open Workspace* popup, we are not working on a project at this time.

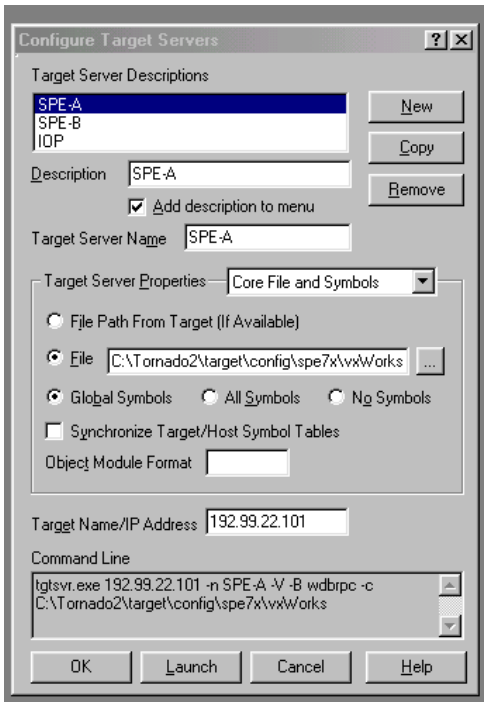


6. In the *Tools->Target Server->Configure* window, create a target service for one of the processors, let's say, SPE A. Under *Target Server Properties*, set *BackEnd* to *wdbrpc*.

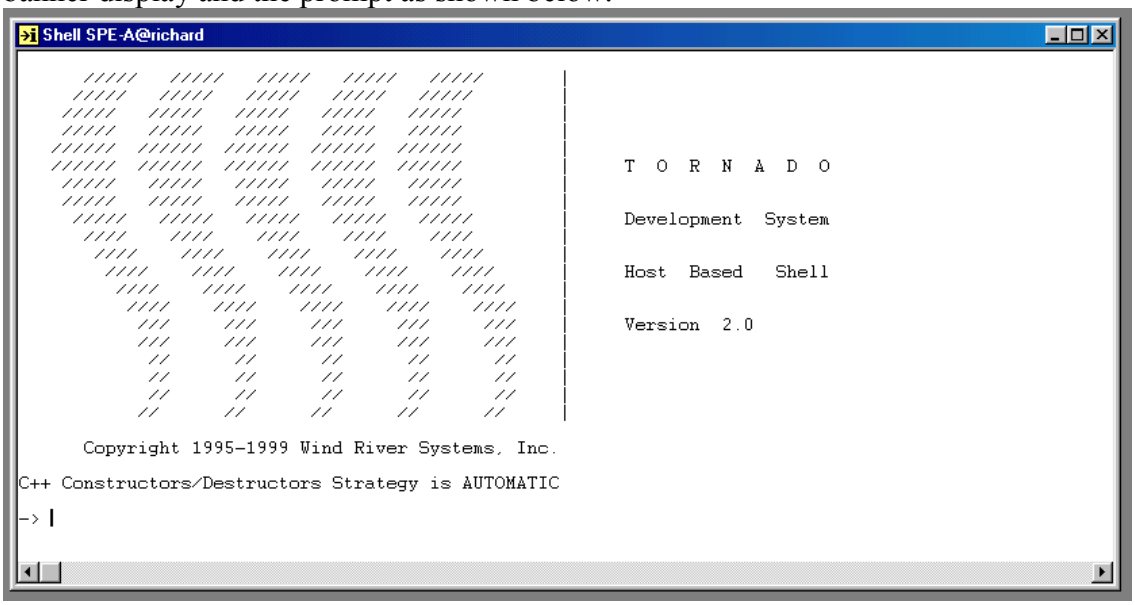
   Also, in *Target Server Properties->Core File and Symbols,* click the *File* button and enter the path and filename of the SPE kernel (refer to the screen shot below).

   Finally, in the Target Name/IP Address box, enter the IP address of the SPE to be connected to. In this example, processor A has been assigned 192.99.22.101.

   BTW- Each processor has its own IP address. You will need to configure a separate target server for each processor you wish to communicate with. Essentially, the SPE configurations will be identical except for the IP address.



7. Now click the *Launch* button to start the server. The target server icon  will appear in the systray at the bottom of the screen. Double click on it to open the target server window and wait for the message, *Attaching elf OMF reader for PPC CPU family... succeeded*\., to appear.
8. Make the server active by clicking on its name in the drop down window in the upper left corner of the Tornado window.
9. Launch a shell by clicking on the Launch Shell icon or clicking on *Tools->Shell*. Look for the banner display and the prompt as shown below.



10. Now test the connection by sending a function call to the SPE. At the prompt, type *ixa_led_blink(10, 10000000)*<CR>. This will blink the SPE A LED 10 times for a duration of 10000000 units each blink.

8. CONCLUSION

This concludes the Getting Started Manual for the IXA7. Upon working through all the steps, the user will be able to:

1. Set up the hardware and cabling
2. Install the IXATools and the Tornado 2.0 tool sets.
3. Configure VxWorks parameters.
4. Start a Tornado Windshell session.
5. Send function calls to the IOPlus via the serial port
6. Send function calls to the any of the processors (IOPlus or SPEs) via the Tornado Windshell.

Compiling and downloading a target build to flash using Tornado 2.0 is covered in the *Getting Started Manual II*.

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