

MVME147
MVME147S
Installation and
Configuration Guide

101427-013

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Preface

This guide describes how to install the MVME147/S Board Support Package (BSP) for use with the Spectra development environment on SunOS, Solaris, and HP-UX versions of UNIX, and Windows NT.

Spectra BSP Installation and Configuration Guides do not supply technical information about a target board beyond what may be needed to run the Spectra development environment on properly configured hardware. Consult the board manufacturer's documentation provided with your target board for details about issues such as serial communication, power lines, memory modules, placement in a card cage, switch settings, daughterboards, port configurations, and start-up procedures.

If you must set up the target board in an unconventional manner to suit your application, you are expected to investigate the consequences for hardware and software.

Package Contents

Your BSP contains a CD-ROM, one or more Spectra boot PROMs, and this guide. Manufactured PROMs are not supplied for hosts that do not support the Reverse Address Resolution Protocol (RARP). If your host cannot support RARP, you must create PROMs containing your target's Ethernet address.

Establishing the Spectra Connection 1

This chapter provides information about the procedures you need to perform to successfully start using your board support package (BSP).

Creating Boot PROMs

Your BSP may include one or more Spectra boot PROMs containing a bootstrap program and communication software for your target board.

If boot PROMs are not supplied, or if you wish to make new boot PROMs, use Xconfig to create the boot image using the command line:

```
xconfig boot.def mo147.def microtec.def
```

For more information on creating boot PROMs, see the Microtec *Board Support Package (BSP) Developer's Guide and Reference*.

Installing Boot PROMs Into the Target Hardware

Set the jumper settings and install the PROMs as described in the section *Hardware Setup* in Chapter 2, *Configuration Information*. Where necessary, also consult the board manufacturer's documentation.

Install the board in the backplane (if any) and apply power.

Configuration Information 2

This chapter provides configuration information for the Motorola MVME147 and MVME147S boards.

Software Configuration

This section describes the memory map, default files, device driver configuration parameters, and Xconfig variables.

Memory Map

The following memory map (Figure 2-1) uses default **mo147** boot PROMs. The map is defined in **mo147.def**. If any inconsistencies exist, **mo147.def** supersedes this map. This map includes shared memory addresses. If your application does not use shared memory, use Xconfig to configure the mapping of your own system.

short I/O addresses	FFFF FFFF	
Unused (reserved)	FFFF 0000 FFFE FFFF	
I/O addresses	FFE0 5000 FFE0 4FFF	
Unused (reserved)	FFE0 0000 FFDF FFFF	
Boot Code [for Bank 2]	FFC0 0000 FFBF FFFF	
Boot Code [for Bank 1]	FFA0 0000 FF9F FFFF	
	FF80 0000 FF7F FFFF	
VME BUS ADDRESSES		
	0400 0000 03FF FFFF	Space for Kernel
BOOTOS_MEMORY_UNUSED_TARGET	0020 0000 001F FFFF	
BOOTOS_MEMORY_UNUSED_HOST	0010 0000 000F FFFF	Space to Load Programs
Shared Memory		
Unused	0003 0000	
Boot Data	000A 8000 000A 7FFF	
Unused Low Memory [small model VRTX area]	0000 8000 0000 7FFF	
Unused	0000 1000	
	0000 03FF	
Exception Vector Table	0	

Figure 2-1. Memory Map

Default File

Use the **mo147.def** default file to configure the system for the bridge in boot PROMs.

Bridge

The *logio* device to be used as a bridge is **logio_ether_1_id** (MVME 712 / Ethernet).

Console

By default, the console is **logio_serial_1_id** (MVME 712 / Serial Port 1).

Device Driver Configuration Parameters

This section describes the timer, serial, Ethernet, and VME device driver configuration parameters.

Timer

Table 2-1 and Table 2-2 list the timer device driver configuration parameters for the MVME147/S board.

Table 2-1. Timer 1 Device Driver Configuration Parameters

Component	Parameter
ID	logio_timer_1_id
Name	Motorola Peripheral Chip Controller (PCC)
Port	timer 1
Module name	mopcc147
Interface	timer_1 interface
Vector	0x48
Default interrupt rate	10 ms

Table 2-2. Timer 2 Device Driver Configuration Parameters

Component	Parameter
ID	logio_timer_2_id
Name	Motorola Peripheral Chip Controller (PCC)
Port	timer 2
Module name	mopcc147
Interface	timer_1 interface
Vector	0x49
Default interrupt rate	10 ms

Serial

Table 2-3, Table 2-4, Table 2-5, and Table 2-6 list the serial device driver configuration parameters for the MVME147/S board.

Table 2-3. Serial 1 Device Driver Configuration Parameters

Component	Parameter
ID	logio_serial_1_id
Location	MVME 712 Transition Module / Serial Port 1
Name	Zilog Z8530 SCC Serial Communication Controller
Port	A
Module name	zi8530
Interface	serial_1 interface
Vector	Tx — 0x78, Rx — 0x7C, RxError — 0x7E
Packet/tty	tty
Baud	9600
Bits	8
Parity	None

(cont.)

Table 2-3. Serial 1 Device Driver Configuration Parameters (cont.)

Component	Parameter
Stop bits	1
Ctrl_port	0xFFFE3002
Data_port	0xFFFE3003

Table 2-4. Serial 2 Device Driver Configuration Parameters

Component	Parameter
ID	logio_serial_2_id
Location	MVME 712 Transition Module / Serial Port 2
Name	Zilog Z8530 SCC Serial Communication Controller
Port	B
Module name	zi8530
Interface	serial_1 interface
Vector	Tx — 0x70, Rx — 0x74, RxError — 0x76
Packet/tty	packet
Baud	19200
Bits	8
Parity	None
Stop bits	1
Ctrl_port	0xFFFE3000
Data_port	0xFFFE3001

Table 2-5. Serial 3 Device Driver Configuration Parameters

Component	Parameter
ID	logio_serial_3_id
Location	MVME 712 Transition Module / Serial Port 3
Name	Zilog Z8530 SCC Serial Communication Controller
Port	A
Module name	zi8530
Interface	serial_1 interface
Vector	Tx — 0x79, Rx — 0x7D, RxError — 0x7F
Packet/tty	tty
Baud	9600
Bits	8
Parity	None
Stop bits	1
Ctrl_port	0xFFFE3802
Data_port	0xFFFE3803

Table 2-6. Serial 4 Device Driver Configuration Parameters

Component	Parameter
ID	logio_serial_4_id
Location	MVME 712 Transition Module / Serial Port 4
Name	Zilog Z8530 SCC Serial Communication Controller
Port	B
Module name	zi8530
Interface	serial_1 interface

(cont.)

Table 2-6. Serial 4 Device Driver Configuration Parameters (cont.)

Component	Parameter
Vector	Tx — 0x71, Rx — 0x75, RxError — 0x77
Packet/tty	tty
Baud	9600
Bits	8
Parity	None
Stop bits	1
Ctrl_port	0xFFFE3800
Data_port	0xFFFE3801

Ethernet

Table 2-7 lists the Ethernet device driver configuration parameters for the MVME147/S board.

Table 2-7. Ethernet Device Driver Configuration Parameters

Component	Parameter
ID	logio_ether_1_id
Location	MVME 712 Transition Module / Ethernet
Name	AMD 7990 Ethernet Controller
Module name	am7990
Interface	ether_1 interface
Vector	0x44

VME

Table 2-8 lists the VME device driver configuration parameters for the MVME147/S board.

Table 2-8. VME Device Driver Configuration Parameters

Component	Parameter
ID	logio_shmem_1_id
Location	P1 & P2 VME connector
Name	VMEchip
Module name	mo147sm
Interface	shmem_1 interface
Vector	0x65

Xconfig Variables

Table 2-9 lists the Xconfig variables for the MVME147/S board.

Table 2-9. Xconfig Variables

Variable	Default Value	Description
board.target	m68030	68030 target
board.name	mo147	MVME147/S
board.boot.code		Start of CODE section either in ROM or RAM
board.boot.data		Start of BSS section in RAM

Hardware Setup

This section describes hardware setup for the MVME147 and MVME147S boards.

MVME147 Board Configuration

This section describes the PROMs, switch and jumper settings, and board layout for the MVME147 board.

PROMs

Table 2-10 lists the parameters for PROMs used with the MVME147 board.

Table 2-10. MVME147 PROM Parameters

Component	Parameter
PROM type	27C512
Speed	155 ns or faster Slower PROMs may work but have not been tested.
PROM socket	U1 — MSB, BYTE 0, EVEN BYTE U2 — LSB, BYTE 1, ODD BYTE

Jumper Settings

Use the factory default settings, except as described below. These settings will configure the board for 64KB x 8 EPROMs.

In both jumper blocks J3 and J4, remove all jumpers and then connect:

2-4, 5-7, 13-15, 14-16

Table 2-11 lists the factory default jumper settings for the MVME147 board.

Table 2-11. MVME147 Factory Default Jumper Settings

Jumper	Factory Default Settings
J3	2-4, 3-5, 6-8, 13-15, 14-16
J4	2-4, 3-5, 6-8, 13-15, 14-16
J5	1-2
J6	1-2 (Factory use only)
J7	2-4 (Factory use only)
J8	3-4 (Factory use only)
J9	2-3
J10	1-2

Note

If these settings are different from the board manufacturer's manual, the board manufacturer's manual takes precedence.

Board Layout

Figure 2-2 shows the board layout for the MVME147.

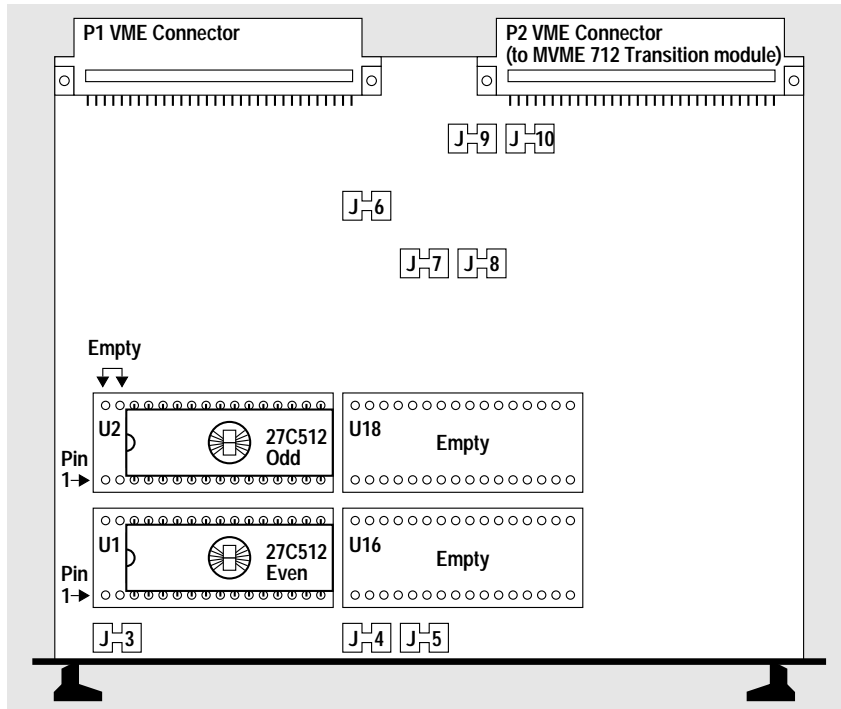


Figure 2-2. MVME147 Board Configuration

MVME147S Board Configuration

This section describes the PROMs, switch and jumper settings, and board layout for the MVME147S board.

PROMs

Table 2-12 lists the parameters for PROMs used with the MVME147S board.

Table 2-12. MVME147S PROM Parameters

Component	Parameter
PROM type	27C512
Speed	155 ns or faster Slower PROMs may work but have not been tested.
PROM socket	U22 — MSB, BYTE 0, EVEN BYTE U30 — LSB, BYTE 1, ODD BYTE

Jumper Settings

Use the factory default settings, except as described below. These settings will configure the board for 64KB x 8 EPROMs.

Table 2-13 lists the factory default jumper settings for the MVME147S board.

Table 2-13. MVME147S Factory Default Jumper Settings

Jumper	Factory Default Settings
J1	2-4, 5-7, 13-15, 14-16
J2	2-4, 5-7, 13-15, 14-16
J3	1-2
J4	open
J5	1-2
J6	1-2
J7	open
J8	2-3
J9	1-1

Note

If these settings are different from the board manufacturer's manual, the board manufacturer's manual takes precedence.

Board Layout

Figure 2-3 shows the board layout for the MVME147S.

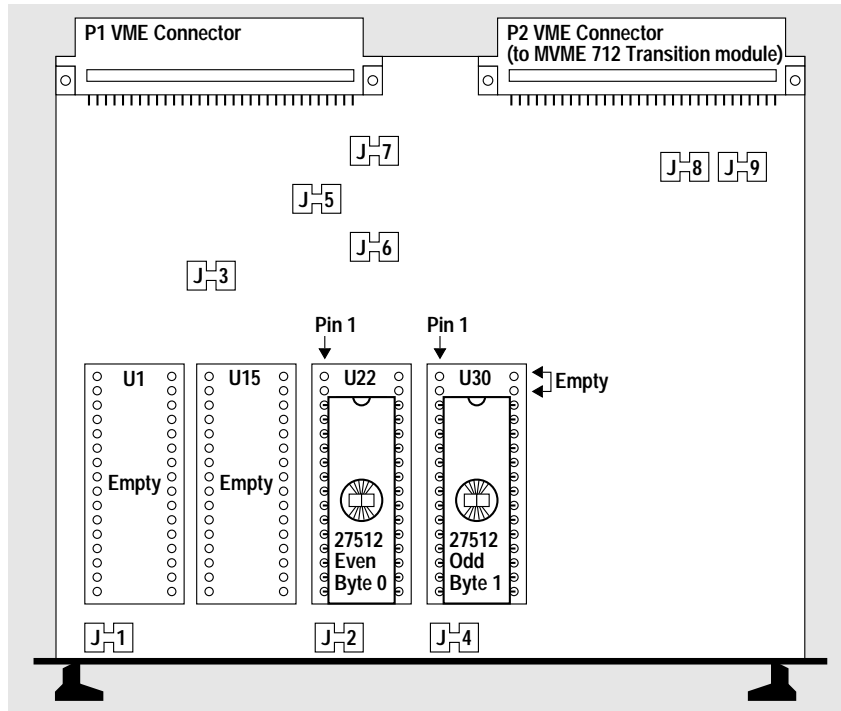


Figure 2-3. MVME147S Board Configuration

Supplementary Notes

Additional Issues

- Install the MVME147 board in a card cage with power to the P2 connector.
- The PROM address is 0xFF800000 (Bank 1) 0xFFA00000 (Bank 2).
- The local RAM is 0x00000000 to 0x003FFFFFFF.
- The RAM size is 0x00400000.

Ethernet Address Failure

If the RAM chip backup battery fails, the board will lose its Ethernet address and revert to the default of 08:00:3E:20:00:00 or 08:00:3E:2F:FF:FF. The correct Ethernet address should be 08:00:3E:2X:XX:XX where X:XX:XX is the last five digits of the Ethernet address.

To correct the failed Ethernet address:

1. Identify the Ethernet address failure.
2. Enter the boot shell.
3. Set the Ethernet address and exit the boot shell.
4. Reset the board.

Identifying the Ethernet Address Failure

The following sequence displays a board with an incorrect Ethernet address of 08:00:3E:2F:FF:FF:

```
Attempting boot via shell
Spectra Boot version 4.1
Copyright (c) 1992-1996 Microtec
Warm reset
Type any key within 2 seconds to get shell prompt
Timeout, exiting shell
Attempting boot via rarp
Ethernet address is 8:0:3e:2f:ff:ff
```

Entering the Boot Shell

Reset the board and press a key at the console prompt to enter the shell:

```
Attempting boot via shell
Spectra Boot version 4.1
Copyright (c) 1992-1996 Microtec
Warm reset
Type any key within 2 seconds to get shell prompt
boot>
```

Setting the Ethernet Address and Exiting the Boot Shell

At the boot prompt, enter the correct Ethernet address for the board and exit:

```
boot> setenv ETHER_ADDR 08:00:3e:2X:XX:XX
boot> exit
```

For example:

```
boot> setenv ETHER_ADDR 08:00:3e:20:18:47
boot> exit
```

Wait for a message similar to the following:

```
Attempting boot via rarp
Ethernet address is 08:00:3e:20:18:47
```

After the RARP program runs, the new board address will be set.

Resetting the Board

Once the new Ethernet address is displayed, press the reset button on the board to reinitialize the Ethernet chip for the new address. Messages similar to the following will be displayed:

```
Attempting boot via rarp
Ethernet address is 8:0:3e:20:18:47
Attempting boot via shell
Spectra Boot version 4.1
Copyright (c) 1992-1996 Microtec
Warm reset
Type any key within 2 seconds to get shell prompt
Timeout, exiting shell
Attempting boot via rarp
Ethernet address is 8:0:3e:20:18:47
IP address is 138.121.2.171
RARP server is 0:0:8e:6:3:43 138.121.2.248
Attempting boot via xtrace
```

If the battery-backed RAM is operational, this permanently sets the board's Ethernet address.

Using MVME147Bug to Set the Ethernet Address

If the Motorola MVME147Bug PROMs are available, you can also set the address using the **lsad** command. Consult the MVME147Bug documentation for details.

Cabling to a Serial Port

To use serial communication with the MVME147 board, configure the MVME 712 transition module to operate properly with your workstation.

The serial port's signal assignment is determined by the DTE/DCE configuration select headers on the MVME712M transition module, which supplies ports for the MVME147. The default setting for **ttya** (port 1) and **ttyb** (port 2) have the following pin 2 and pin 3 signal assignment:

25-pin DSUB Connector	Description
2	Receive data
3	Transmit data

To connect your target board to a host or terminal whose pin 2 and pin 3 signal assignment is the same as the assignment of the target board, use a serial line with pins 2 and 3 crossed. Alternatively, you can use a straight serial cable with a null modem connector.

Cabling

If a console connection is provided or the bridge is serial, use a serial cable to connect the target and the host. For details, see the section *Cabling to a Serial Port* in Chapter 2, *Configuration Information*.

Configuring Ethernet or Serial Interfaces

Chapter 2, *Configuration Information*, provides details of the serial or Ethernet interfaces.

The **Bridge** for this target is either:

- **logio_ether_xx_id** (default; see the section *Ethernet Connection*)
- or
- **logio_serial_xx_id** (see the section *Serial Connection*)

Ethernet Connection

Assign the board an Ethernet address.

Some boards store the Ethernet address in a nonvolatile or battery backed-up RAM area. This address may require configuration. For instructions on how to configure the Ethernet address, see the section *Supplementary Notes* in Chapter 2, *Configuration Information*.

Assigning the Board an IP Address

If the target board does not have an IP address (this will be the case for new boards), then you or your system administrator must assign one to the board. Consult the network and system administration documentation provided by the workstation vendor for information on this procedure.

Serial Connection

Use the **serial_server** program to communicate with the target using a serial packet interface.

To use the **serial_server** program, perform the following steps:

1. Update the file **etc/remote**.
2. Update the file **\$SPECTRA/host/etc/connconf**.
3. Start the **serial_server** program.

Updating **/etc/remote**

See Chapter 2, *Configuration Information*, to determine the baud rate, parity, stop bits, and number of bits for the serial bridge device.

Generally, these values are:

- Baud: 19200 (9600 on slower boards)
- Parity: none
- Stop bits: 1
- Bits: 8

Edit the file **/etc/remote** to create an entry with the above communication parameters.

Example

In the following example, entries are created for **/dev/ttya** and **/dev/ttyb** (for baud rates of 4800, 9600, 19200, and 38400). The entry name is listed first; its parameters follow on a separate line. The entry name can be anything, but should be descriptive. For instance, the entry name for **/dev/ttya** at 4800 baud is **mo147a4800**.

```
mo147a4800:\
    :dv=/dev/ttya:br#4800:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147a9600:\
    :dv=/dev/ttya:br#9600:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147a19200:\
    :dv=/dev/ttya:br#19200:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147a38400:\
    :dv=/dev/ttya:br#38400:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147b4800:\
    :dv=/dev/ttyb:br#4800:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147b9600:\
    :dv=/dev/ttyb:br#9600:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147b19200:\
    :dv=/dev/ttyb:br#19200:el=^C^S^Q^U^D:ie=%$:oe=^D:
mo147b38400:\
    :dv=/dev/ttyb:br#38400:el=^C^S^Q^U^D:ie=%$:oe=^D:
```

The parameters are named to reflect the real **tty** channel on the workstation.

Updating \$SPECTRA/host/etc/connconf

For each **/etc/remote** entry, create a logical name to be used by XSH as follows:

target_name entry_name host_name port_number baud_rate

<i>target_name</i>	The name you will use when executing serial_server on the host. serial_server is executed on the host for a serial packet-based bridge to the host machine from the target.
<i>entry_name</i>	The name of the specific entry mapped to the <i>target_name</i> in the /etc/remote file. This file sets the parameters for the connection.
<i>host_name</i>	The workstation with a physical serial connection to the target.

Example

The following example shows the notation used by Microtec for a workstation called **sun29**:

mo147a48	mo147a4800	sun29	2000	4800
mo147b48	mo147b4800	sun29	2001	4800
mo147a96	mo147a9600	sun29	2002	9600
mo147b96	mo147b9600	sun29	2003	9600
mo147a19	mo147a19200	sun29	2004	19200
mo147b19	mo147b19200	sun29	2005	19200
mo147a38	mo147a38400	sun29	2006	38400
mo147b38	mo147b38400	sun29	2007	38400

In the first line of the above example, **mo147a48**, the target name for starting **serial_server**, is mapped to the serial parameter **mo147a4800**, as defined by the **/etc/remote** *entry_name* on the host machine **sun29**. The Xtrace Protocol will use UDP port number **2000** to communicate to the target **mo360aa48**, and a baud rate of **4800** will be used to transmit the serial packets to and from the target.

Note

All board names in the **connconf** file must be unique. Do not use the same board name under NIS and in the **connconf** file.

Starting serial_server

Connect a serial cable from the workstation to the target board. Start **serial_server** for the corresponding host port and baud rate.

For example, if the host port on workstation **sun29** is **/dev/ttyb**, and if the serial bridge ID is configured for a baud rate of 9600, invoking:

```
serial_server mo147b96 &
```

lets the **serial_server** program communicate with the target **mo147b96** (assuming the **connconf** and **/etc/remote** files contain entries matching the previous examples).

Connecting to the Target with XSH

The following examples assume a board with an Ethernet name of **foo.eng.mri.com** or **serial_server** name of **mo147b19**.

Ethernet

```
xsh
Spectra Cross-Development Shell; XSH 4.6B
Copyright (C) 1991-1996 Microtec

>connect foo.eng.mri.com
foo.eng.mri.com connected (non-os mode)
foo.eng.mri.com>
Cold reset on target foo.eng.mri.com
FF80AED4 2F02          MOVE.L      D2, -(SP)
foo.eng.mri.com>
```

Serial

```
xsh -t mo147b19
Spectra Cross-Development Shell; XSH 4.6B
Copyright (C) 1991-1996 Microtec

mo147b19 connected (non-os mode)
mo147b19>
Cold reset on target mo147b19
0005A720 9421FFc0stwu          1,0xffffffffc0(1)
mo147b19>
```

Special Notes for Serial Ports

Configure a serial port for either **serial_packet_device** or **serial_tty_device** by manually changing the configuration in the **devcnfg.c** file. A serial port configured as **serial_packet_device** can only be used as a bridge. **vconsole** output can also be directed to this port if a hardware timer provides a tick. A **serial_packet_device** does not accept **tty** output directly since that output is not in packet form.

A serial port configured as **serial_tty_device** can only be used for **tty** input/output. This port cannot operate as an Xtrace bridge.

For Microtec BSPs in general:

```
Serial Port #1: tty,          9600
Serial Port #2: packet      19200
Serial Port #3: tty,          9600
.
.
.
Serial Port #n: tty,          9600
```

System Requirements

This section lists hardware and software requirements for the MVME147/S board.

Hardware

Table P-1 lists hardware requirements for the MVME147/S BSP.

Table P-1. Hardware Requirements

Item	Description
Host	Sun-4 workstation running SunOS version 4.1.3 (or later versions) or Solaris 2.4 (or later versions) in SunOS binary compatibility mode
	HP 700 workstation running HP-UX 9.0 (or later versions)
	PC-compatible system running Windows NT 4.0 (or later versions)
Target	Motorola MVME147 or MVME147S board

Software

Before you install this BSP, you must install your Spectra cross-development environment software and the Microtec compiler toolkit specified in the *Release Notes*.

Vital Statistics

This section lists board specifications, on-board devices, supported Microtec components, and minimum target RAM size for the MVME147/S board.

Board Specifications

Table P-2 lists board specifications for the MVME147/S board.

Table P-2. MVME147/S Board Specifications

Board Item	Description
Board name	Motorola MVME147SA-1
CPU type	MC68030
Clock frequency	25 MHz
Floating-point unit	MC68882, 25MHz
Memory Configuration	8 MB
RAM	DRAM dual-ported with parity
ROM/EPROM	Four 32-pin JEDEC (4 MB)
NVRAM	2 KB x 8 SRAM

On-Board Devices

Table P-3 lists the on-board devices found on the MVME147/S board.

Table P-3. MVME147/S On-Board Devices

Devices	Description
Direct memory access controller	MB85030 DMAC
Timers (CIO)	Three 16-bit, MK48T02 real-time clocks
Serial I/O	Four channels, two Z8530 serial communication controllers
Ethernet	AM7990 Lance Ethernet/LAN controller
Parallel I/O	8-bit Centronics compatible
SCSI	WD33C93 (not available)
MMU	Not available
VME	VMEchip

Supported Microtec Components

This BSP supports the following components:

- IFX (I/O and File Executive)
- Remote procedure calls
- RTL (Run-Time Library)
- SNX (STREAMS and TCP/IP Networking Executive)
- Spectra Backplane
- VRTXsa Real-Time Kernel
- VRTX32 Real-Time Kernel
- XRAY Pro debug suite
- XRAY debugger
- Xpert Profiler

Target RAM Size — Minimum Requirement

40 KB (with tuning, Xtrace only)

Notational Conventions

This guide uses the notational conventions shown in Table P-4 (unless otherwise noted).

Table P-4. Notational Conventions

Symbol	Name	Usage
{ }	Curly Braces	Enclose a list from which you must choose an item.
[]	Square Brackets	Enclose optional items.
...	Ellipsis	Indicates that you may repeat the preceding item zero or more times.
	Vertical Bar	Separates alternative items in a list.
	Punctuation	Punctuation such as commas (,) and colons (:) must be entered as shown.
	Typewriter Font	Represents code or user input in interactive examples.
	<i>Italics</i>	Represents a descriptive item that should be replaced with an actual item.
	Bold	Represents elements that need to stand out from the main body of text.

Related Publications

Refer to the following publications for further information about Microtec products:

- *Getting Started (UNIX Hosts).*
- *Getting Started (Windows Hosts).*
- *Spectra Backplane Concepts.*
- *Board Support Package (BSP) Developer's Guide and Reference.*
- *Debug Shell (XSH) User's Guide and Reference.*
- *Configuration Tool (Xconfig) User's Guide and Reference.*
- *I/O and File Executive (IFX) Programmer's Guide and Reference.*

- *STREAMS and TCP/IP Networking Executive (SNX) and SNMP Programmer's Guide and Reference.*
- *Run-Time Library (RTL) Programmer's Guide and Reference.*

Questions and Suggestions

Microtec is committed to providing its customers with quality software development and RTOS tools and support services. Our commitment continues beyond your purchase of the product throughout your development life cycle.

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Revision History

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Revision History
