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# **OS-9<sup>®</sup> for PowerPC<sup>™</sup> MVME Board Guide: Series 2**

**(MVME3100, MVME5500, MVME6100)**

## **Version 4.9**



**RadiSys.**  
THE POWER OF WE

[www.radisys.com](http://www.radisys.com)

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# Chapter 1: Installing and Configuring

## OS-9®

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This chapter describes installing and configuring OS-9® on the following Motorola® MVME reference boards: 3100, 5500 and 6100. The following sections are included:

- **Development Environment Overview**
- **Requirements and Compatibility**
- **Target Hardware Setup**
- **Connecting the Target to the Host**
- **Building the OS-9 ROM Image with the Configuration Wizard**
- **Transferring the ROM Image to the Target**
- **Creating a Startup File**
- **Optional Procedures**

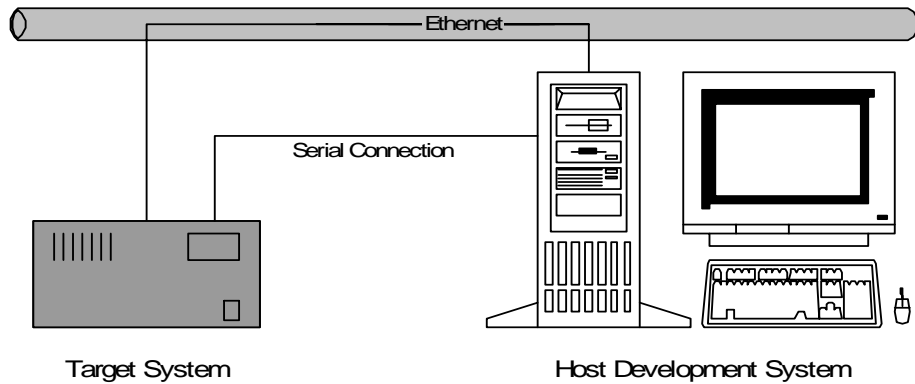


# Development Environment Overview

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**Figure 1-1** shows a typical development environment for the MVME boards. The components shown include the minimum required to enable OS-9 to run on the supported boards.

**Figure 1-1 MVME Development Environment**





# Requirements and Compatibility

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## Host Hardware Requirements (PC Compatible)

Your host PC must meet the following minimum requirements:

- Windows 2000 or XP
- 500 MB of free disk space
- An Ethernet network card
- One free serial port

## Host Software Requirements (PC Compatible)

Your host PC must have the following applications

- A terminal emulation program (such as Hyperterminal, which comes with Microsoft® Windows).
- A TFTP server application for downloading the OS-9 ROM image to the MVME target. `TFTPSEVERPRO` is included with Microware OS-9 for PowerPC and may be loaded onto your host PC during the CD-ROM installation process.

## Target Hardware Requirements

Your reference board requires the following hardware:

- Enclosure or chassis with power supply
- An RS-232 null modem serial cable
- A rear transition module, if Ethernet and serial ports are not provided on the front panel of your board
- Optional disk drives

# Target Hardware Setup

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## For More Information

Refer to the appropriate *Installation and Use* and *Programmer's Guide* documents from Motorola for information about board setup. You can access these documents from your web browser at:

<http://www.motorola.com/computing.jsp>

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## Connecting the Target to the Host

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This section describes connecting the target board to the host PC via serial and Ethernet connections.

Complete the following steps to connect the target to the host:

- Step 1. Use an RS-232 null modem cable to connect the target to the serial port of your host system. Depending on your host system, you may need either a straight or reversed serial cable.
- Step 2. With the target system powered off, connect the serial cable to the COM1 port on the reference board. You must also connect the host and target systems to a network to use TFTP.
- Step 3. Connect the other end of the serial cable to the desired communication (COM) port on the host system.
- Step 4. On the Windows desktop, click on the **Start** button and select **All Programs -> Accessories -> Communications -> Hyperterminal**.
- Step 5. Enter a name for your Hyperterminal session.
- Step 6. Select an icon for the new Hyperterminal session. A new icon is created with the name of your session associated with it. You can select this icon the next time you establish a Hyperterminal session.
- Step 7. Click **OK**.
- Step 8. From the **Phone Number** dialog, select **Connect Using** and then select the communications port to be used to connect to the target system. Click **OK**.

Step 9. In the **Port Settings** tab, enter the following settings:

Bits per second = 9600  
Data Bits = 8  
Parity = None  
Stop bits = 1  
Flow control = XOn/XOff

Step 10. Click **OK**.

Step 11. From the Hyperterminal window, select **Call -> Connect** from the pull-down menu to establish your terminal session with the target board. When you are connected, the bottom left of your Hyperterminal screen displays *connected*.

Step 12. Turn on the target system. A power-on banner and MOTLoad firmware prompt should appear on the display terminal.



---

## Note

If your target system already has an OS-9 ROM image installed, you can get a MOTLoad prompt by pressing the **Esc** key during the target system bootup. You can then rebuild the ROM image as desired.

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# Building the OS-9 ROM Image with the Configuration Wizard

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## For More Information

For general information on the OS-9 ROM image and how it works, refer to the ***Getting Started with OS-9*** manual.

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Motorola MVME reference boards enable you to boot from a number of devices, including:

- Flash ROM
- IDE hard disk
- SCSI floppy
- SCSI hard disk
- SCSI tape
- floppy disk
- Ethernet (you will have to supply your own BOOTP server)

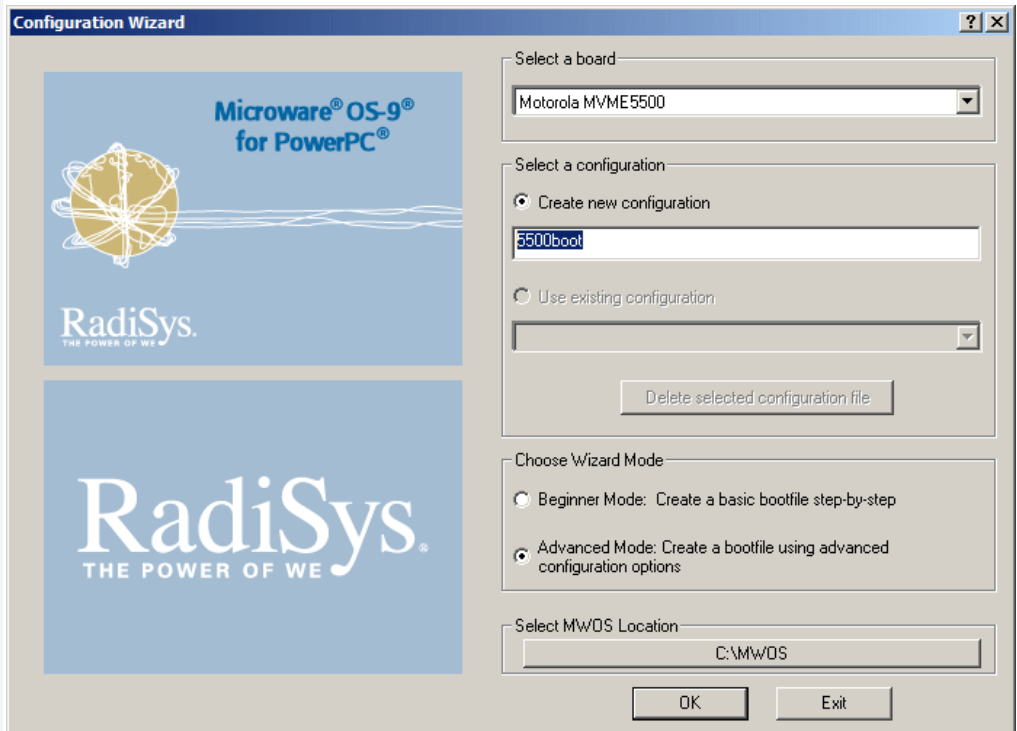
Regardless of what device you use for booting, the basic booting process is the same. You need to create a ROM image using the OS-9 Configuration Wizard and then place the ROM image on the boot device.

## Starting the Configuration Wizard

The Configuration Wizard is the application used to build the coreboot, bootfile, or ROM image. To start the Wizard, perform the following steps:

- Step 1. From the Windows desktop, select **Start -> RadiSys -> Microware OS-9 for <product> -> Configuration Wizard**. You should see the following opening screen:

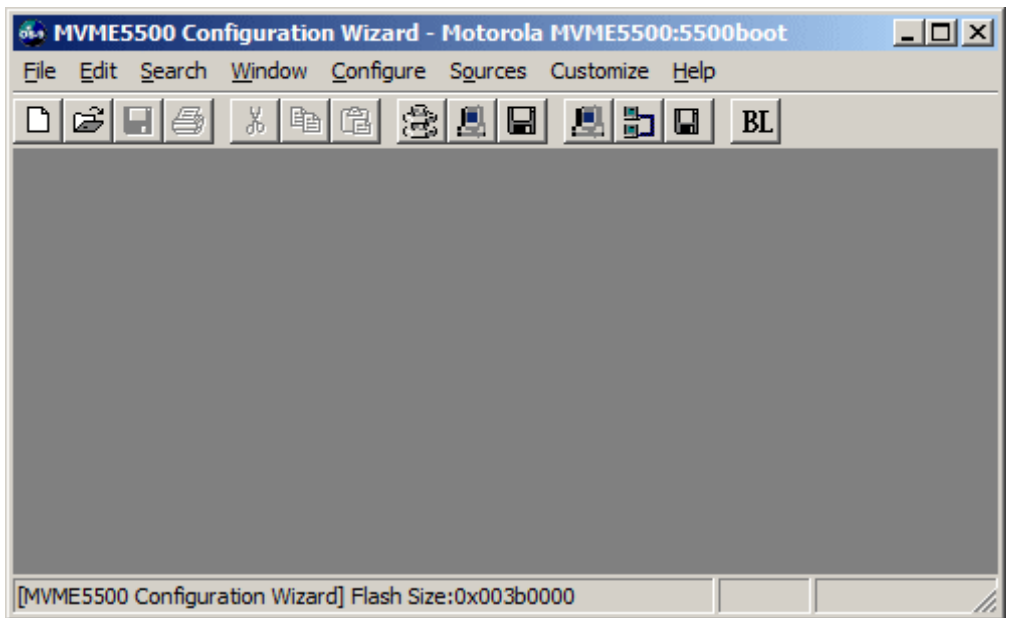
**Figure 1-2 Configuration Wizard Opening Screen**



- Step 2. Select your target board from the **Select a board** pull-down menu. We are using the Motorola MVME5500 for these examples.

- Step 3. Select the **Create new configuration** radio button from the **Select a configuration** menu and type in the name you want to give your ROM image in the supplied text box. This names your new configuration, which can later be accessed by selecting the **Use existing configuration** pull down menu.
- Step 4. Select the **Advanced Mode** radio button from the **Choose Wizard Mode** field and click **OK**. The Wizard's main window is displayed. This is the dialog from which you will proceed to build your image. An example is shown in **Figure 1-3**.

**Figure 1-3 Configuration Wizard Main Window**



## Creating and Configuring the ROM Image

This section describes how to use the Configuration Wizard to create and configure your OS-9 ROM image.



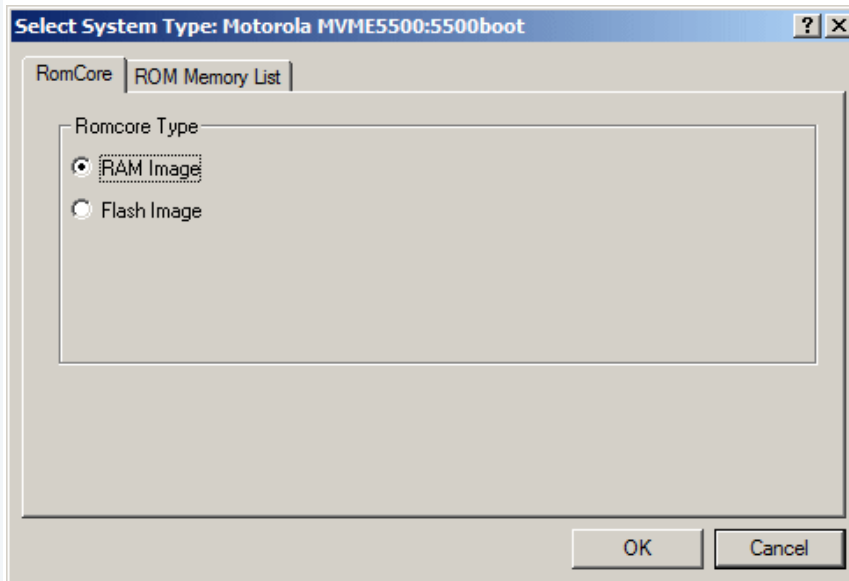
### Note

This section provides an example of an OS-9 ROM image successfully built on a Host PC and transferred to an MVME5500 target board. You may have to modify your selections depending on your application.

## Configure Coreboot Options

Step 1. From the Main Configuration window, select **Configure** -> **Select System Type...** The following window is displayed.

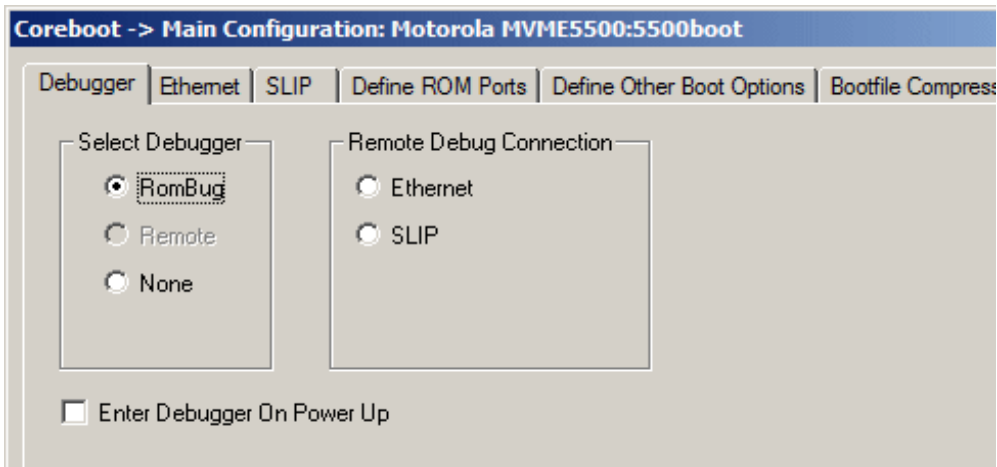
**Figure 1-4 Select System Type**





- Step 2. Select the RAM Image option. Depending on the board type you may find it on another tab in the window.
- Step 3. From the Main Configuration window, select **Configure** -> **Coreboot** -> **Main configuration**.
- Step 4. Select the **Debugger** tab. The following window is displayed.

**Figure 1-5 Coreboot Configuration—Debugger Tab**



- Step 5. Under **Select Debugger**, select **RomBug**. This sets Ethernet as the method for user state debugging. Select **None** if you do not want to debug your system.



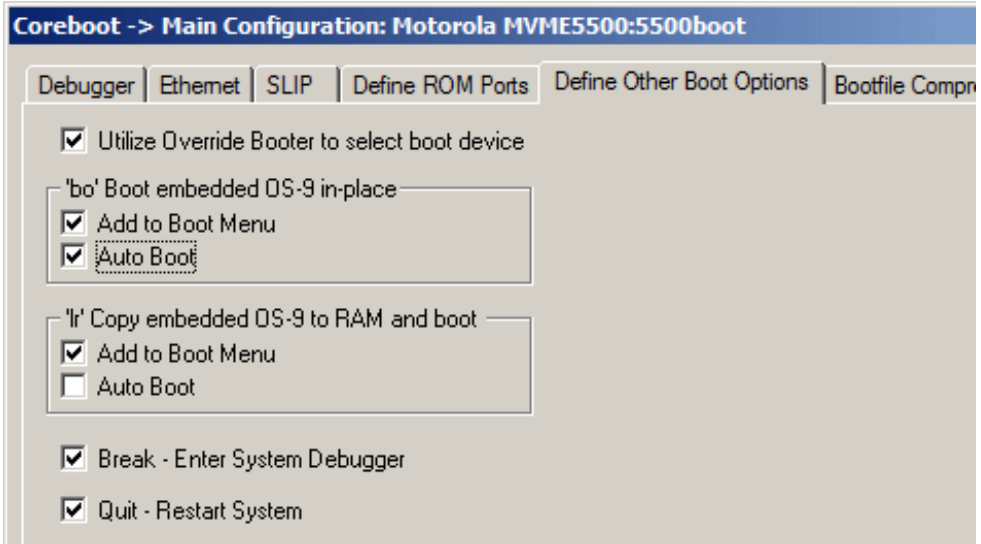
### Note

To perform system-state, source-level debugging, select **Ethernet** under **Remote Debug Connection**. If you set Ethernet as the method for system state debugging, you will not be able to use normal, high-level networking (such as FTP and telnet).

For system state debugging, you must also set the parameters in the **Ethernet** or **SLIP** tab of the coreboot configuration.

Step 6. Select **Define Other Boot Options**. The following window is displayed.

**Figure 1-6 Coreboot Configuration—Define Other Boot Options Tab**



Step 7. Select **Break-Enter System Debugger**.

Step 8. Click **OK** and return to the **Main Configuration** window.

## Network Configuration

To use the target board across a network, complete the following steps:

Step 1. If you want to use the target board across a network, you will need to configure the Ethernet settings within the Configuration Wizard. To do this, select **Configure -> Bootfile -> Network Configuration** from the Wizard's main menu.

- Step 2. From the **Network Configuration** dialog, select the **Interface Configuration** tab. From here you can select and enable the interface. For example, you can select the appropriate Ethernet card from the list of options on the left and specify whether you would like to enable IPv4 or IPv6 addressing.



---

## For More Information

To learn more about IPv4 and IPv6 functionalities, refer to the **Using LAN Communications** manual, included with this product CD.

---



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## For More Information

Contact your system administrator if you do not know the network values for your board.

---

- Step 3. Once you have made your settings in the **Network Configuration** dialog, click **OK**.

- Step 4. Select the **DNS Configuration** tab.

More than one DNS server can be added in this dialog box. If your network does not use DNS, click **Disable DNS**, and move to the **Gateway** tab.

If you have DNS available, click **Enable DNS** and type your host name and domain.



---

## Note

You add DNS IP addresses by clicking on the box directly under **DNS Server Search Order** and typing the IP address. Click the **Add** button when complete.

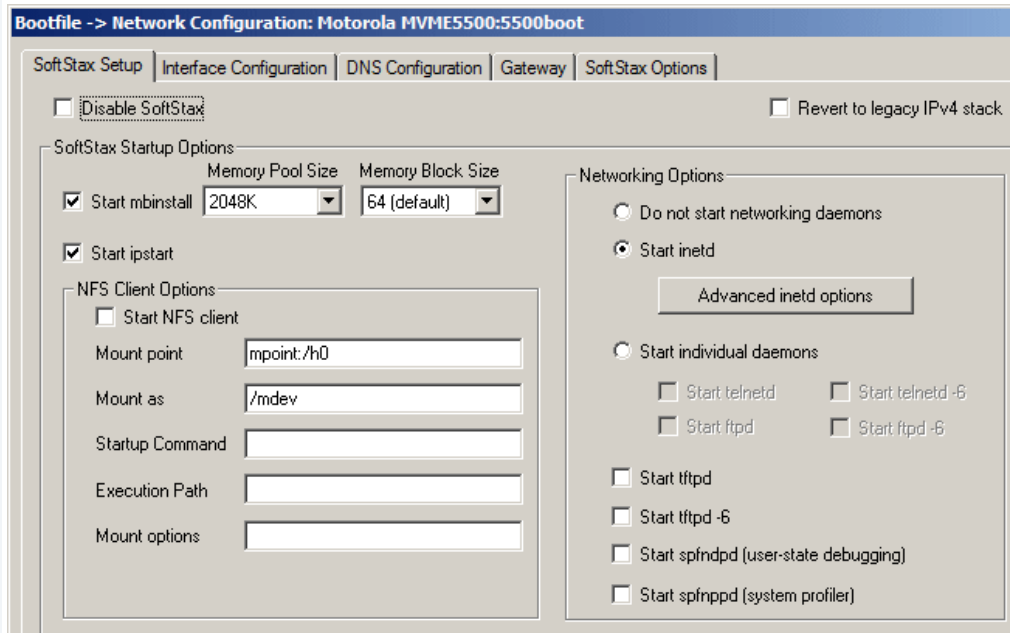
---

More than one DNS server can be added by repeating these steps.

- Step 5. Select the **Gateway** tab. Add new gateway addresses by clicking on the box and typing in the gateway name. Click the **Add** button when complete.
- Step 6. Select the **SoftStax® Setup** tab. The following window is displayed.

The options below represent daemons that can be automatically started if you want to FTP or telnet from a PC to the OS-9 target. **Start NFS Client** enables you to remote mount the target. For this demonstration, you will telnet to the target and establish a sender window and a receiver window.

**Figure 1-7 Bootfile Configuration—SoftStax Setup Tab**



- Step 7. Click **Start inetd**. Click **OK**.
- Step 8. Select the **SoftStax Options** tab.

The **SoftStax Options** tab enables you to include networking utilities in the ROM image. By default, `ftp`, `hostname`, `ping`, and `netstat` are included. You can add other utilities as desired.

- Step 9. Click **OK** at the bottom of the **Network Configuration** menu to complete network configuration and return to the **Main Configuration** window.
- 

## Disk Configuration

---

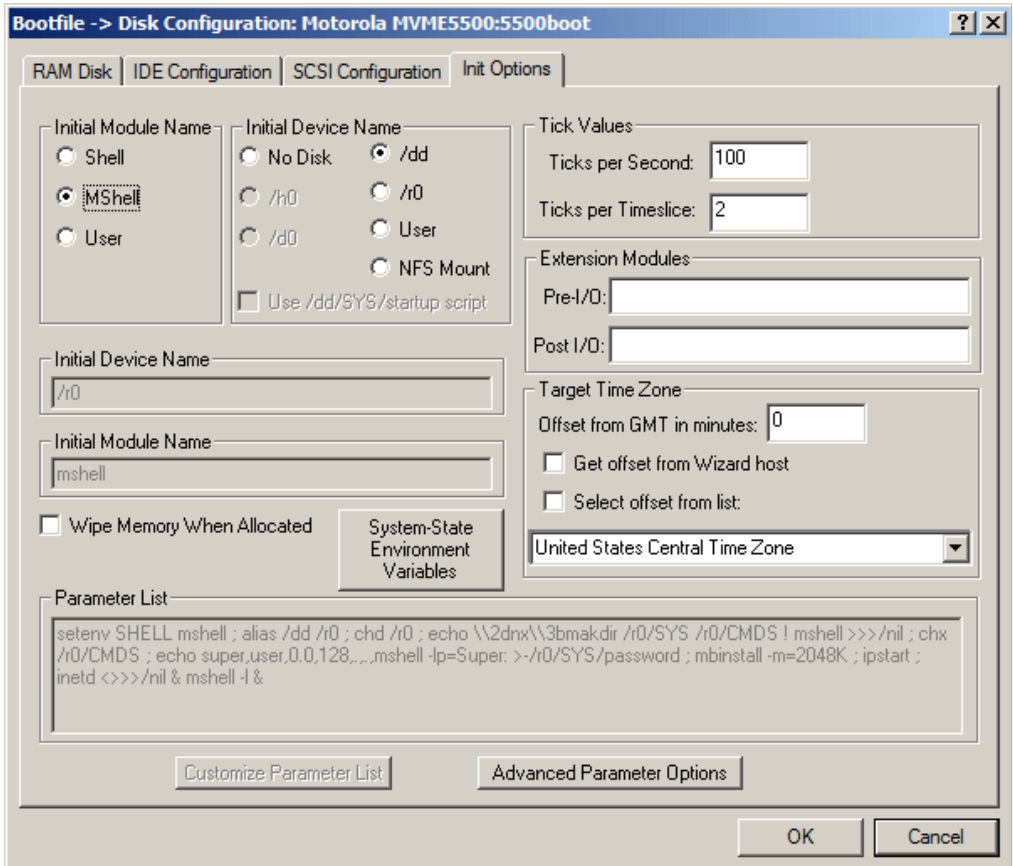
- Step 1. From the Main Configuration window, select **Configure** -> **Bootfile** -> **Disk Configuration**.

The Disk Configuration options may include the following tabs:

- The **RAM Disk** tab enables you to create a RAM disk of any size for loading modules onto the target.
  - The **IDE Configuration** tab enables you to configure IDE drives for the target.
  - The **SCSI Configuration** tab enables you to configure SCSI drives for the target.
  - The **Floppy Configuration** tab enables you to configure a floppy drive for the target.
  - The **Init Options** tab sets the configuration for OS-9 to initialize itself on the target.
- Step 2. Select the **RAM Disk** tab. Click **Map RAM Disk as /dd**.

Step 3. Select the **Init Options** tab. The following window is displayed.

**Figure 1-8 Bootfile Configuration—Init Options Tab**



**Bootfile -> Disk Configuration: Motorola MVME5500:5500boot**

RAM Disk | IDE Configuration | SCSI Configuration | **Init Options**

Initial Module Name:  
 Shell  
 **MShell**  
 User

Initial Device Name:  
 No Disk  
 /r0  
 /d0  
 /r0  
 User  
 NFS Mount  
 Use /dd/SYS/startup script

Tick Values:  
 Ticks per Second: 100  
 Ticks per Timeslice: 2

Extension Modules:  
 Pre-I/O:  
 Post I/O:

Target Time Zone:  
 Offset from GMT in minutes: 0  
 Get offset from Wizard host  
 Select offset from list:  
 United States Central Time Zone

System-State Environment Variables

Parameter List:  

```
setenv SHELL mshell ; alias /dd /r0 ; chd /r0 ; echo \\2dnx\\3bmakdir /r0/SYS /r0/CMDS ! mshell >>> /nil ; chx /r0/CMDS ; echo super,user,0,0,128,...,mshell -lp=Super: >-/r0/SYS/password ; mbininstall -m=2048K ; ipstart ; inetd <>>> /nil & mshell -l &
```

Customize Parameter List | Advanced Parameter Options

OK | Cancel

Step 4. Select the **Mshell** option for the initial module name. This causes OS-9 to start a console shell usable from your terminal window. **Initial Device Name** should be selected as **/dd**.

The tick rate is 100 and ticks per timeslice is set to 2. If you look at the **Parameter List** box, you see the commands that OS-9 executes upon system start-up.

Step 5. Click **OK** to return to the **Main Configuration** window.

## Build Image

Complete the following steps to build the target board image.

- 
- Step 1. From the Main Configuration window, select **Configure** -> **Build Image**. The **Master Builder** window appears.
  - Step 2. Select the **Coreboot + Bootfile** option.
  - Step 3. Select the **ROM Utility Set**, **User State Debugging Modules**, and the **SoftStax (SPF) Support** boxes under the **Include** options.
  - Step 4. Click **Build**. It should display progress information and show the statistics of the image just created.
  - Step 5. Click **Save As**. The `rom` file is created in the following directory:  
`MWOS/OS9000/603/PORTS/MVME5500/BOOTS/INSTALL/PORTBOOT`
  - Step 6. Click **Save**. The Master Builder window is displayed. At this point you can either close the Configuration Wizard or leave it open for use in the **Booting Your Reference Board from Flash** section. If you choose to close it, you can save your configuration settings for later use.
-

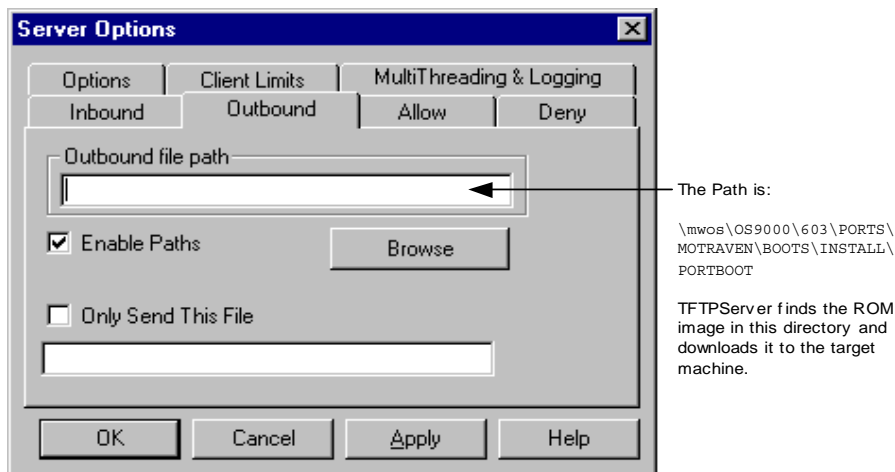
# Transferring the ROM Image to the Target

## Configure the TFTP Server

This section describes setup of the TFTPServer32Pro Trivial File Transfer Protocol (TFTP) server utility that is included on the Microware OS-9 for PowerPC CD-ROM. If you are using a different TFTP server, follow the manufacturer's instructions for setup and use.

- Step 1. On the Windows desktop click **Start -> Programs -> TFTPServer -> TFTPServer32**.
- Step 2. Select **System -> Setup** and click the **Outbound** tab. Indicate the path to where the ROM image is located in the Outbound File Path box.

**Figure 1-9 TFTP Server Options Window**



- Step 3. Use defaults for all other settings.



Step 4. **Apply** the changes and click **OK**.

---



### Note

The TFTPServer32Pro application must remain open for the TFTP server to be active.

---

## Boot the Target from an Ethernet Network

Use the following procedure to set up your board to work on an Ethernet network.

---

- Step 1. Check that your Ethernet network connection is operational. On your host desktop, click on the **Network Neighborhood** icon. If you can see other computers (or at least your own) on the network your Ethernet connection is functional.
- Step 2. From the host system, bring up your Hyperterminal session as described in **Connecting the Target to the Host**.

**Step 3.** At the MOTLoad prompt enter the `netBoot` command. This command transfers the ROM image from the host system to the target system and boots the target. Your screen should display the following:



## Note

Use the following boot file load address for your board (-a option):

**MVME3100: 08000000**

**MVME5500: 04000000**

**MVME6100: 04000000**

```
MVME5500> netBoot -a04000000 -d/dev/enet1 -from-mvme5500 -m255.255.254.0
-s10.20.2.24 -c10.20.3.209 -g10.20.2.1
Network Loading from: /dev/enet1
```

```
Client IP Address      = 10.20.3.209
Server IP Address     = 10.20.2.24
Gateway IP Address    = 10.20.2.1
Subnet IP Address Mask = 255.255.254.0
Boot File Name        = rom-mvme5500
Load Address          = 04000000
```

Network Boot File Load Start - Press <ESC> to Bypass, <SPC> to Continue

Network Boot File Load in Progress - Press <CTRL-C> to Abort

```
Bytes Received =&1170340, Bytes Loaded =&1170340
Bytes/Second   =&585170, Elapsed Time =2 Second(s)
```

Moving File/Image to User Download Buffer (005CB000)

```
Boot Device      =/dev/enet1
Boot File        =rom-mvme5500
Load Address     =005CB000
Load Size        =0011DBA4
Execution Address =005CB000
Execution Offset =00000000
```

Passing control to the loaded file/image.

OS-9 Bootstrap for the PowerPC(tm) (Edition 71)

Now trying to Override autobooters.

Press the spacebar for a booter menu

```

BOOTING PROCEDURES AVAILABLE ----- <INPUT>

Boot embedded OS-9000 in-place ----- <bo>
Copy embedded OS-9000 to RAM and boot - <lr>
Kermit download ----- <ker>
PCI View Utility ----- <pciv>
Enter system debugger ----- <break>
Restart the System ----- <q>

```

Select a boot method from the above menu:

#### Step 4. To autoboot your target, set the MOTLoad `mot-script-boot` environment variable.

```

MVME5500> gevEdit mot-script-boot
mot-script-boot
(Blank line terminates input.)
netBoot -d/dev/enet1 -a04000000 -from-mvme5500 -m255.255.254.0 -s10.20.2.24
-c10.20.3.209 -g10.20.2.1

Update Global Environment Area of NVRAM (Y/N)? y
MVME5500> gevShow
...
mot-script-boot=netBoot -d/dev/enet1 -a04000000 -from-mvme5500 -m255.255.254.0
-s10.20.2.24 -c10.20.3.209 -g10.20.2.1
Total Number of GE Variables =20, Bytes Utilized =755, Bytes Free =2837

```

---

## Creating a Startup File

---

When the Configuration Wizard is set to use a hard drive, or another fixed drive such as a PC Flash Card, as the default device, it automatically sets up the init module to call the `startup` file in the `SYS` directory in the target (For example: `/h0/SYS/startup`, `/mhc1/SYS/startup`). However, this directory and file will not exist until you create it. To create the startup file, complete the following steps:

Step 1. Create a `SYS` directory on the target machine where the `startup` file will reside (for example: `mkdir /h0/SYS` or `mkdir /dd/SYS`).

Step 2. On the host machine, navigate to the following directory:

```
MWOS/OS9000/SRC/SYS
```

In this directory, you will see several files. The files related to this section are listed below:

- `motd`: Message of the day file
- `password`: User/password file
- `termcap`: Terminal description file
- `startup`: Startup file

Step 3. Transfer all files to the newly created `SYS` directory on the target machine. (You can use Kermit, or FTP in ASCII mode to transfer these files.)

Step 4. If the files are still in DOS format, you will be required to convert them into the OS-9 format with the `cudo` utility. The following command is an example:

```
cudo -cdo password
```

This will convert the `password` file from DOS to OS-9 format.




---

## For More Information

For a complete description of all the `cuDo` command options, refer to the *Utilities Reference Manual* located on the Microware OS-9 CD-ROM.

---

- Step 5. Since the command lines in the startup file are system-dependent, it may be necessary to modify this file to fit your system configuration. It is recommended that you modify the file before transferring it to the target machine.
- 

## Example Startup File

Below is the example startup file as it appears in the `MWOS/OS9000/SRC/SYS` directory:

```
-tnxnp
tmode -w=1 nopause
*
* OS-9 - Version 4.8
* Copyright 2007 by RadiSys Corporation
*
* The commands in this file are highly system dependent and should
* be modified by the user.
*
setime -s                ;* start system clock
link mshell csl          ;* make "mshell" and "csl" stay in memory
* in iz r0 h0 d0 t1 p1 term ;* initialize devices
* load utils             ;* make some utilities stay in memory
* tsmon /term /t1 &      ;* start other terminals
list sys/motd
setenv TERM vt100
tmode -w=1 pause
```

```
mshell<>>>/term -l&
```



---

## For More Information

Refer to the *Getting Started with OS-9* manual for more information on startup files.

---

## Optional Procedures

---

The following section provides optional procedures you can perform after installing and configuring OS-9 on your board.

### Preliminary Testing

Once you have established an OS-9 prompt on your target system, you can perform the following procedures to test your system:

---

Step 1. Type `modir` at the prompt.

`modir` displays all the modules in memory.

Step 2. Type `procs` at the prompt.

`procs` displays the processes currently running in the system.

Step 3. Test the networking on your system.

Select a host on the Ethernet network and run the `ping` utility. The following display shows a successful `ping` to a machine called `solkanar`.

```
$ ping solkanar
PING solkanar.microware.com (172.16.2.51): 56 data bytes
64 bytes from 172.16.2.51: ttl=128 time=0 ms
```

Step 4. Test `telnet`.

Select a host machine that allows `telnet` access and try the OS-9 `telnet` utility. The following display shows a successful `telnet` to a machine called `delta`.

```
$ telnet delta
Trying 172.16.1.40...Connected to delta.microware.com.
Escape character is '^]'.
capture closed.
```

```

OS-9/68K V3.0.3 Delta VME177 - 68060 98/12/24 14:41:51
User name?: curt
Password:
Process #101 logged on 98/12/24 14:41:56
Welcome!
*****
*           WELCOME TO DELTA - THE :OS-9 68K: MACHINE *

```

Step 5. Test telnet from your host PC to the reference board.

From the Windows Start menu, select Run and type `telnet <hostname>` and click `OK`. A telnet window should display with a `$` prompt. Type `mdir` from the prompt. You should see the same module listing as on the serial console port.

---

You have now created your OS-9 boot image and established network connectivity with your OS-9 target system.

## Booting Your Reference Board from Flash

Once the ROM image is built and loaded onto the target system, you can copy the ROM image to Flash memory or to a disk. This enables you to boot the target without using a network. This section describes booting the target from Flash.

To boot the target system from Flash, you must return to the configuration wizard and rebuild the ROM image.




---

### WARNING

Follow the steps below carefully. During this procedure it is possible to overwrite the manufacturer's original Flash image. In this event, you will be required to return the hardware to the manufacturer.

---



- 
- Step 1. Open the OS-9 configuration wizard. Be sure to start with the same ROM image that you built in the **Building the OS-9 ROM Image with the Configuration Wizard** section.
- Step 2. Configure Flash booting options.
- Select **Configure -> Select System Type** from the Main Configuration window.
  - Select FLASH Boot from the **Settings Based On** pulldown menu. **Figure 1-10** shows this configuration. If you do not have a ROM Memory List tab, select the FLASH boot radio button on the RomCore tab.

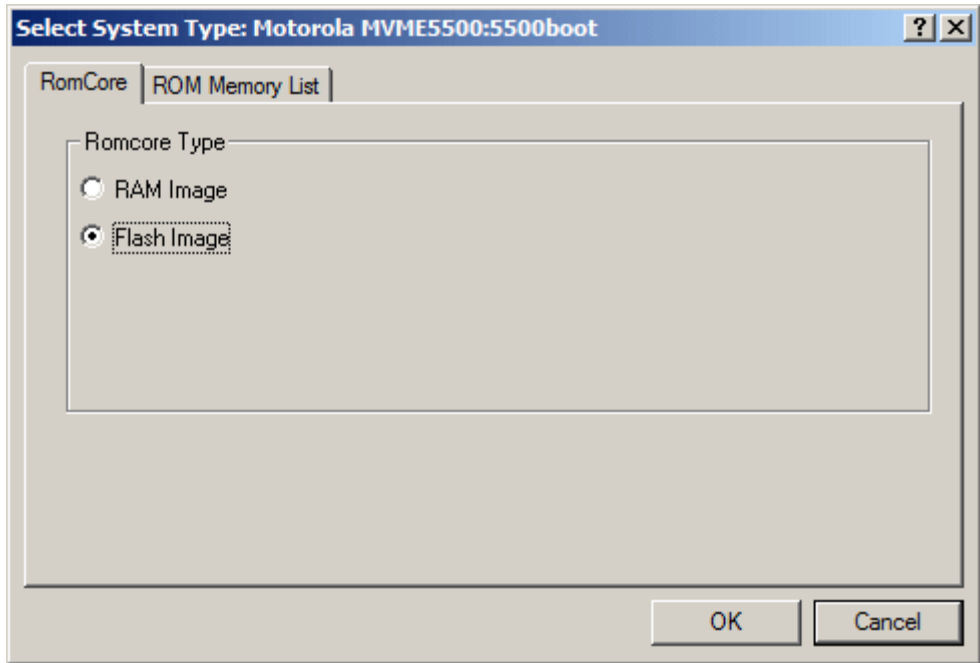


---

### Note

This example uses the MVME5500 as the reference board.

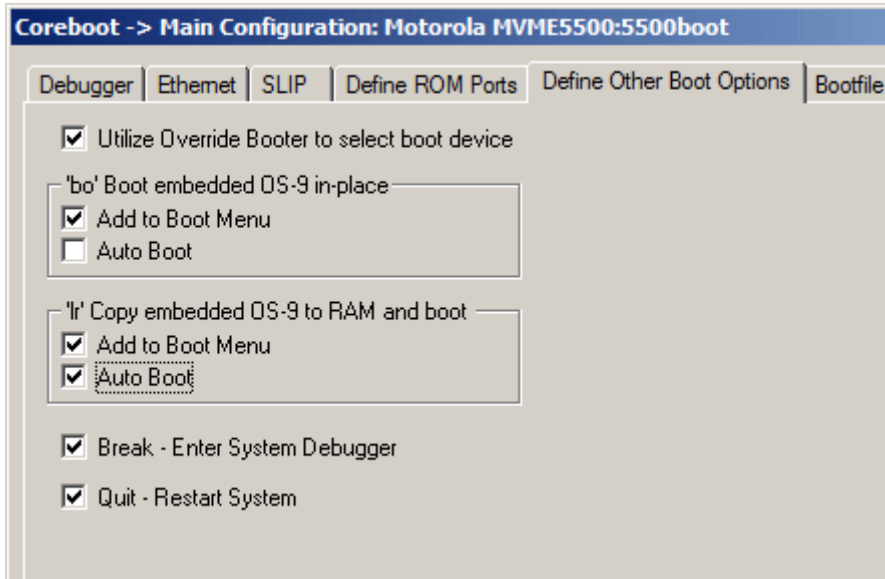
---

**Figure 1-10 ROM Memory List**

Step 3. Set the `lr` option to auto boot.

The `lr` option moves the boot image modules from Flash to RAM before booting begins. This is optional. However, the Flash device is very slow and using the `lr` option is highly recommended.

- Select **Configure -> Coreboot -> Main Configuration** from the **Main Configuration** window.
- Select the **Define Other Boot Options** tab.
- Configure the tab according to **Figure 1-11**.

**Figure 1-11 Setting the 1r Option**

Step 4. Rebuild the ROM image.

- From the **Main Configuration** window, select **Configure -> Build Image**. The **Master Builder** window appears.
- Do not change the settings
- Click **Build**. Progress information is displayed and the statistics of the image just created are shown.
- Click **Save As** to save the image. The file rom is saved in the following directory:

```
MWOS/OS9000/603/PORTS/MVME5500/BOOTS/INSTALL/PORTBOOT.
```

Step 5. From the host system, bring up your Hyperterminal session as described in **Connecting the Target to the Host**.

Step 6. Transfer the ROM image to your target using the `tfftpGet` command.



## Note

Use the following boot file load address for your board (-a option):

MVME3100: 08000000

MVME5500: 04000000

MVME6100: 04000000

```
MVME5500> tftpGet -c10.20.3.209 -s10.20.2.24 -from-mvme5500 g10.20.2.1
-m255.255.254.0 -d/dev/enet1 -a04000000
Network Loading from: /dev/enet1
Loading File: rom-mvme5500
Load Address: 04000000
```

```
Client IP Address      = 10.20.3.209
Server IP Address     = 10.20.2.24
Gateway IP Address    = 10.20.2.1
Subnet IP Address Mask = 255.255.254.0
```

Network File Load in Progress...

```
Bytes Received =&1685452, Bytes Loaded =&1685452
Bytes/Second   =&842726, Elapsed Time =2 Second(s)
```

- Step 7.** Program flash bank 0 with the new ROM image using the `flashProgram` utility. Use the load address from the previous step as the load address (-s option). Use the value displayed for “Bytes Loaded” in the previous step for the -n option below.

```
MVME5500> flashProgram -d/dev/flash0 -o0 -s04000000 -n&1685452
Source Starting/Ending Addresses =04000000/0419B7CB
Destination Starting/Ending Addresses =F2000000/F219B7CB
Number of Effective Bytes        =0019B7CC (&1685452)
```

```
Program Flash Memory (Y/N)? y
Flash Memory Programming Complete
```

- Step 8.** The image is now programmed into flash part 0. Start OS-9.



## Note

Use the following flash address to boot your board (-l option):

MVME3100: FC000000

MVME5500: F2000000

MVME6100: F4000000

```
MVME5500> execProgram -lf2000000
```

```
Load Address      =F2000000
```

```
Load Size         =00200000
```

```
Execution Address =F2000000
```

```
Execution Argument =00000000
```

```
OS-9 Bootstrap for the PowerPC(tm) (Edition 71)
```

```
Now trying to Override autobooters.
```

```
Press the spacebar for a booter menu
```

```
Now trying to Scan SCSI devices.
```

```
Symbios 53C895A @ 0xf0016000 SELFID (07) MAXCNT (0x01000000)
```

ID	Vendor	Product	Rev	Block Size	Total Blks	Disk Size
0x00	CONNER	CFP4207S	4.28GB 2B4B	0x00000200	0x007fffff	4294 (MEG)

```
BOOTING PROCEDURES AVAILABLE ----- <INPUT>
```

```
Scan SCSI devices ----- <ioi>
```

```
Boot from SCSI(SCCS) hard drive ----- <hs>
```

```
Boot embedded OS-9000 in-place ----- <bo>
```

```
Copy embedded OS-9000 to RAM and boot - <lr>
```

```
Enter system debugger ----- <break>
```

```
Restart the System ----- <q>
```

```
Select a boot method from the above menu:
```

Step 9. To autoboot your target from flash, set the MOTLoad `mot-script-boot` environment variable.

```
MVME5500> gevEdit mot-script-boot
(Blank line terminates input.)
execProgram -lf2000000

Update Global Environment Area of NVRAM (Y/N)? y
MVME5500> gevShow
...
mot-script-boot=execProgram -lf2000000
Total Number of GE Variables =19, Bytes Utilized =559, Bytes Free =3033
```



### Note

The `coreboot` file can be placed in Flash without the `bootfile` file. This can be desirable if disk booting or eb BOOTP booting. You must supply your own BOOTP server.

## Booting Your Reference Board from Disk

Once you have booted your system from an Ethernet Network and configured your hard drive, you can use the following procedure to configure your system to boot from the hard drive.



### Note

Not all SCSI hard drives are detected by version 2.0 MOTLoad. Run the `gevShow` command to see if your hard drive is detected. OS-9 device driver do correctly recognize all SCSI drives.




---

## For More Information

Refer to [Appendix B: Partitioning and Formatting Your Hard Drive](#) for hard drive formatting and partitioning procedures.

---

- Step 1. Copy your coreboot and bootfile images to the target hard drive. They may be copied using either FTP or NFS.



### Note

The bootfile and coreboot files are located at:

```
<drive>:\MWOS\OS9000\<processor>\PORTS\<port>\BOOTS\INSTALL\PORTBOOT.
```

They may be copied to your hard drive using either FTP or NFS.

---

- Step 2. At the \$ prompt (the OS-9 prompt), create the boot image by typing the following command:

```
bootgen /hs01fmt -nb400 -el=coreboot bootfile
```

This command places the high and low-level boot images on the system disk.

- Step 3. Run the `diskBoot` command to start OS-9.

```
MVME5500> diskBoot -f/dev/scsi0/hdisk0
Boot Device      =/dev/scsi0/hdisk0
Partition Number =1
Load Address     =005CB000
Load Size        =00050800
Execution Address =005CB800
Execution Offset =00000800
```

Passing control to the loaded file/image.

```
OS-9 Bootstrap for the PowerPC(tm) (Edition 71)
```

```
Now trying to Override autobooters.
```

```

Press the spacebar for a booter menu

BOOTING PROCEDURES AVAILABLE ----- <INPUT>

Scan SCSI devices ----- <ioi>
Boot from SCSI (SCCS) hard drive ----- <hs>
Boot embedded OS-9000 in-place ----- <bo>
Copy embedded OS-9000 to RAM and boot - <lr>
PCI View Utility ----- <pciv>
Enter system debugger ----- <break>
Restart the System ----- <q>

Select a boot method from the above menu: hs

Symbios 53C895A @ 0xf0016000 SELFID (07) MAXCNT (0x01000000)
ID (00) LUN (00) SI (00) EI (03) LSNOFFS (00000804)

Checking Partitions          : 0
Volume Name                  : OS-9 f. PPC v4.8
FD bootfile block offset    : 0x00001543

Booting from partition
Reading Bootfile.....

Boot Address                  : 0x0004a5c0
Boot Size                     : 0x00254e00

OS-9 kernel was found.
A valid OS-9 bootfile was found.
$

```

#### Step 4. To autoboot your system from the hard disk, set the MOTLoad `mot-script-boot` environment variable.

```

MVME5500> gevEdit mot-script-boot
(Blank line terminates input.)
diskBoot -d/dev/scsi0/hdisk0

Update Global Environment Area of NVRAM (Y/N)? y
MVME5500>

```



---

# Chapter 2: Board Specific Reference

---

This chapter contains information that is specific to the Motorola MVME reference boards. It contains the following sections:

- **Boot Menu Options**
- **Vector Descriptions for PowerPC 603/604**
- **Configuring Booters**
- **Port Specific Utilities**
- **PowerPC™ Registers Passed to a New Process**



---

## For More Information

For general information on porting OS-9, see the ***OS-9 Porting Guide***.

---



## Boot Menu Options

---

You select your boot device menu options using the configuration wizard. For each boot device option, you can select whether you want it to be displayed on a boot menu, set up to autoboot, or both. The autoboot option enables the device selected to automatically boot up the high-level bootfile, bypassing the boot device menu.



### Note

When using the Configuration Wizard, you should select only one device for autoboot on your system.

---

Following is an example of the Boot Menu displayed in the terminal emulation window (using Hyperterminal):

```
OS-9000 Bootstrap for the PowerPC(tm)
```

```
Now trying to Override autobooters.
```

```
BOOTING PROCEDURES AVAILABLE ----- <INPUT>
```

```
Scan SCSI devices ----- <ioi>
Boot FDC floppy ----- <fd>
Boot from PC-Floppy ----- <pf>
Boot from Teac SCSI floppy drive - <fs>
Boot from SCSI PC-Floppy ----- <pfs>
Boot from Viper tape drive ----- <vs>
Boot over Ethernet ----- <eb>
Boot from SCSI(SCCS) hard drive -- <hs>
Boot embedded OS-9000 in-place --- <bo>
Enter system debugger ----- <break>
Restart the System ----- <q>
```

Select a boot method from the above menu:

What you select for boot options in the configuration wizard determines what modules are included in the coreboot image. **Table 2-1** lists some of the supported boot devices for OS-9:

**Table 2-1 Supported Boot Methods**

Type of Boot	Description
Boot from RBF hard disk	Boot from a standard SCSI hard disk ( <b>hs</b> ).
Floppy Disk	Boot from floppy disk. You must select if the floppy is controlled by a Random Block File System (RBF) ( <b>fd</b> or <b>fs</b> ) or PC File System ( <b>pf</b> or <b>pfs</b> ).
Boot embedded OS-9 in-place	Boot OS-9 from FLASH ( <b>bo</b> ).
Copy embedded OS-9 to RAM and Boot	Copy OS-9 from FLASH (if stored there) to RAM and boot ( <b>lr</b> ).

## Vector Descriptions for PowerPC 603/604

**Table 2-2 Vector Descriptions for PowerPC 603/604**

<b>Vector Number</b>	<b>Related OS-9 Call</b>	<b>Assignment</b>
0	None	Reserved
1	F_IRQ	System reset
2	F_STRAP, F_IRQ	Machine check
3	F_STRAP, F_IRQ	Data access
4	F_STRAP, F_IRQ	Instruction access
5	F_IRQ	External interrupt
6	F_STRAP, F_IRQ	Alignment
7	F_STRAP, F_TLINK, F_IRQ	Program
8	F_IRQ	Floating-point unavailable
9	F_IRQ	Decrementer
10	None	Reserved
11	None	Reserved
12	F_S SVC	System call
13	None	Trace
14	None	Reserved

**Table 2-2 Vector Descriptions for PowerPC 603/604 (continued)**

<b>Vector Number</b>	<b>Related OS-9 Call</b>	<b>Assignment</b>
15	None F_IRQ	Reserved Performance monitoring interrupt (604e)
16	None None	Instruction translation miss Reserved (604e)
17	None None	Data load translation miss Reserved (604e)
18	None None	Data store translation miss Reserved (604e)
19	F_IRQ	Instruction address breakpoint
20	F_IRQ	System management interrupt
21-47	None	Reserved

**Note**

The vector numbers in Table 2-2 are logical vector numbers. The actual processor vectors can be computed by multiplying the logical vector number by 256.

## Error Exceptions: vectors 2-4 and 6-7

These exceptions are usually considered fatal program errors and unconditionally terminate a user program. If `F_DFORK` created the process or the process was debug attached with `F_DATTACH`, then the resources of the erroneous process remain intact and control returns to the parent debugger to allow a postmortem examination.

A user process may use the `F_STRAP` system call to install an exception handler to catch the errors and recover from the exceptional condition. When a recoverable exception occurs, the process' exception handler installed with the `F_STRAP` system call is executed with a pointer to the process' normal static data and the current stack pointer. Also, the process' exception handler will receive as parameters the vector number of the error, the program instruction counter of where the error occurred, and the fault address of the error if applicable. The exception handler must decide whether and where to continue execution. Programs written in the C language may use the `setjmp` and `longjmp` library routines to properly recover from the erroneous condition.

If any of these exception occur in system state during a system call made by the process due to the process passing bad data to the kernel, the process' exception handler is not called. Instead, the appropriate vector error is returned from the system call.

## Vectored Interrupts: vector 5

In general, the PowerPC processor family uses a single interrupt vector for all external interrupts. However, most systems supporting the PowerPC family use additional external logic to support more powerful nested interrupt facilities. Hence, the vector numbers used by OS-9 device drivers are usually logical vectors outside of the range of the hardware vectors listed above. The device drivers install their interrupt service routines, via the `F_IRQ` system call, on the logical vector and the kernel's dispatch code uses the external logic to identify the source of the interrupt and call the associated interrupt service routine. Interrupt service routines are executed in system state without an associated current process.



---

**Note**

The `F_IRQ` system call may also be used to install exception handlers on some non-hardware interrupt vectors. The above table lists the exceptions that may be monitored using the `F_IRQ` facility. The installed exception handler is called just like any other interrupt service routine when the associated exception occurs.

---

## User Trap Handlers: vector 7

This vector is used for dispatching user code into system state trap handlers. The vector provides a mechanism for programs to switch states and dispatch to a subroutine module to execute code in system state.

## System Calls: vector 12

This vector is used for service call dispatching to the OS-9 operating system as well as user services installed using the `F_SVC` service request.

## Configuring Booters

The following booters are available for the MVME target platforms. The abbreviated name and configuration parameters for the booters are listed with recommended values (if any).

**Table 2-3 MVME260X/360X Booters**

Booter	Description	Recommended Values
fdc765	Standard floppy disk booter	
	Abbreviated name:	"fd"
	Configuration parameters:	"port=0x800003f0" "lun=0" "si=0" "ei=3"
fsboot	TEAC SCSI floppy disk booter	
	Abbreviated name:	"fs"
	Configuration parameters:	"port=0xff000000" "device=ncr8xx" "id=6" "si=0" "ei=3"



**Table 2-3 MVME260X/360X Booters**

<b>Booter</b>	<b>Description</b>	<b>Recommended Values</b>
hsboot	SCSI hard disk booter	
	Abbreviated name:	"hs"
	Configuration parameters:	"port=0xff000000" "device=ncr8xx" "id=<default scsi ID>" "si=0" "ei=3" "lsoffs=2052"
ide	Standard IDE hard disk booter	
	Abbreviated name:	"ide"
	Configuration parameters:	"port=0x800001f0" "si=0" "ei=3" "lsoffs=2052"
llbootp	Standard BOOTP booter	
	Abbreviated name:	"eb"
	Configuration parameters	"driver=ll21040"

**Table 2-3 MVME260X/360X Booters**

<b>Booter</b>	<b>Description</b>	<b>Recommended Values</b>
romboot	Embedded system booter	
	Abbreviated name:	"ro" (reconfigured to "bo" and "lr")
	Configuration parameters:	<none>
vsboot	SCSI tape booter	
	Abbreviated name:	"vs"
	Configuration parameters:	"port=0xff000000" "device=ncr8xx" "id=4"
ioi	SCSI Bus diagnostic tool	
	Abbreviated name:	"ioi"
	Configuration parameters:	"port=0xff000000" "device=ncr8xx" "reset=1"

## Port Specific Utilities

---

The following port specific utilities are included:

- `dmppci`
- `mouse`
- `pciv`
- `setpci`
- `testpci`

**dmppci****Show PCI Information****SYNTAX**

```
dmppci <bus_number> <device_number>
      <function_number> {<size>}
```

**OPTIONS**

```
-?                Display help
```

**DESCRIPTION**

dmppci displays PCI configuration information that is not normally available by other means, except programming, using the PCI library.

**EXAMPLE**

```
$ dmppci 0 11 1 0x40
  PCI DUMP Bus:0 Dev:11 Func:1 Size:64
  -----
VID  DID  CMD  STAT CLASS  RV CS  IL IP LT HT BI MG ML SVID SDID
-----
10ad 0105 0005 0280 01018f 05 08 0e 01 00 80 00 02 28 0000 0000

BASE[0]  BASE[1]  BASE[2]  BASE[3]  BASE[4]  BASE[5]  CIS_P  EXROM
-----
01000321 01000331 01000329 01000335 01000301 01000311 00000000 00000000

Offset 00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
-----
0000    ad 10 05 01 05 00 80 02 05 8f 01 01 08 00 80 00
0010    21 03 00 01 31 03 00 01 29 03 00 01 35 03 00 01
0020    01 03 00 01 11 03 00 01 00 00 00 00 00 00 00 00
0030    00 00 00 00 00 00 00 00 00 00 00 00 00 0e 01 02 28
```

**mouse****Show Mouse Library Functions**

---

**SYNTAX**

mouse <opts>

---

**OPTIONS**

-?	Display help
-s	Slow mouse
-f	Fast mouse
-r [n]	Set resolution to n
-p [n]	Set sample rate to n
-c [n]	Set scale factor to n

---

**DESCRIPTION**

mouse displays mouse status information.

---

**EXAMPLE**

```
$ mouse
Opening device /m0
status = 0x08, x = 4, y = 0
status = 0x08, x = 6, y = 0
status = 0x08, x = 7, y = 1
status = 0x08, x = 7, y = 1
status = 0x08, x = 8, y = 1
status = 0x08, x = 7, y = 0
status = 0x28, x = 7, y = 255 Y Negative
status = 0x28, x = 7, y = 254 Y Negative
status = 0x28, x = 5, y = 254 Y Negative
status = 0x08, x = 2, y = 0
status = 0x28, x = 1, y = 255 Y Negative
status = 0x08, x = 2, y = 0
status = 0x28, x = 0, y = 255 Y Negative
status = 0x08, x = 1, y = 0
status = 0x09, x = 0, y = 0 Left Button
status = 0x08, x = 0, y = 0
status = 0x0a, x = 0, y = 0 Right Button
status = 0x08, x = 0, y = 0
```

**pciv****PCI Configuration Space View****SYNTAX**

```
pciv [<opts>]
```

**OPTIONS**

- ?                    Display help.
- a                    Display base address information and size.
- r                    Display PCI routing information.

**DESCRIPTION**

The `pciv` utility allows visual indication of the status of the PCIbus. This utility is port dependent.

**EXAMPLES**

When using the `pciv` command with a Motorola PowerPC board, the following information is displayed:

```
$ pciv

PowerPC 603 Configuration Report

Model: Ultra PowerPC

Board Configuration Reports
[Z85230 ESCC] [PMC] [Graphics] [Ethernet] [SCSI]

BUS:DV:FU  VID  DID  CMD  STAT CLASS  RV CS IL IP
-----
000:00:00  1057 0001 0106 2080 060000 24 00 00 00 MPC105
000:11:00  8086 0484 000f 0200 000000 84 00 00 00 PCI/ISA Bridge
000:12:00  1000 0001 0007 0200 010000 02 00 0b 01 NCR53C810 SCSI
000:14:00  1011 0002 0007 0280 020000 23 00 09 01 DECchip 21040
000:15:00  1013 00a8 0000 0000 030000 8e 00 0b 01 GD5434 Graphics
```

The following configuration registers apply to these DEV columns:

- 12 - NCR53C810 Configuration Register
- 14 - DECchip 21040 Configuration Register
- 15 - GD5434 Configuration Register

The `pciv` command in the previous example reports configuration information related to specific hardware attached to the system. The MVME2600 and MVME3600 series are specific about the PCI devices located on the main board. For this reason, the information displayed is not generic in format.

DETAIL OF BASIC VIEW:

```
BUS          : Bus Number
DEV          : Device Number
VID          : Vendor ID
DID          : Device ID
CLASS       : Class Code
RV          : Revision ID
IL          : Interrupt Line
IP          : Interrupt Pin
[S]         : Single function device
[M]         : Multiple function device
```

When the `-a` option is used address information is also displayed as well as the size of the device blocks being used. All six address PCI address entries are scanned.

```
(C) [32-bit] base_addr[0] = 0x3efefe81 PCI/IO
                        0xbefefe80 Size = 0x00000080
```



The fields in the previous example are, from left to right, as follows:

- prefetchable
- memory type
- address fields
- actual value stored
- type of access
- translated access address used (shown on second line)
- size of block (shown on second line)

When the `-r` option is used, PCI-specific information related to PCI interrupt routing is displayed. If an ISA BRIDGE controller is found in the system, the routing information is used. The use of ISA devices and PCI devices in the same system requires interrupts to be routed either to ISA or PCI devices. Since ISA devices employ edge-triggered interrupts and PCI use devices use level interrupts, the `EDGE/LEVEL` control information is also displayed. If an interrupt is shown as `LEVEL` with a PCI route associated with it, no ISA card can use that interrupt. This command also shows the system interrupt mask from the interrupt controller.



---

### Note

ISA and PCI interrupts cannot be shared.

---

**setpci****Set PCI Value****SYNTAX**

```
setpci <bus> <dev> <func> <offset> <size{bwd}>
<value>
```

**OPTIONS**

```
-?                Display help
```

**DESCRIPTION**

The `setpci` utility sets PCI configuration information that is not normally available by other means other than programming using the PCI library. The `setpci` utility may also be used to read a single location in PCI space. Parameters include:

<bus>	= PCI Bus Number 0..255
<dev>	= PCI Device Number 0..32
<func>	= PCI Function Number 0..7
<offset>	= Offset value (ie. command register offset = 4)
<size>	= Size b=byte w=word d=dword
<value>	= The value to write in write mode. If no value is included, the utility is in read mode.

**EXAMPLES**

```

$ setpci 0 19 0 0x14 d

PCI READ MODE
-----

PCI Value.....0x3bfedd00 (dword) READ

PCI Bus.....0x00
PCI Device.....0x13
PCI Function...0x00
PCI Offset....0x0014

$ setpci 0 19 0 0x14 d 0x1234500

PCI WRITE MODE
-----

PCI Value.....0x01234500 (dword) WRITE

PCI Bus.....0x00
PCI Device.....0x13
PCI Function...0x00
PCI Offset....0x0014
$
$ setpci 0 19 0 0x14 d

PCI READ MODE
-----

PCI Value.....0x01234500 (dword) READ

PCI Bus.....0x00
PCI Device.....0x13
PCI Function...0x00
PCI Offset....0x0014

```

**testpci****Test PCI Value****SYNTAX**

```
testpci
```

**OPTIONS**

```
-?                Display help
```

**DESCRIPTION**

The `testpci` utility tests all PCI library functions. To use this utility, you must have a graphics card in the system. This utility shows how the PCI library calls can be used.

**EXAMPLE**

```
$ testpci
Test PCI Library Calls Edition 2
_pci_search_device .....ok....
_pci_next_device .....ok....
_pci_get_config_data .....ok....
_pci_find_device .....ok....
_pci_find_class_code .....ok....
_pci_read_configuration_byte .....ok....
_pci_read_configuration_word .....ok....
_pci_read_configuration_dword .....ok....
_pci_write_configuration_byte .....ok....
_pci_write_configuration_word .....ok....
_pci_write_configuration_dword .....ok....
_pci_get_irq_pin .....ok....
_pci_get_irq_line .....ok....
_pci_set_irq_line .....ok....
PCI LIBRARY TEST CONTAINS NO ERRORS.
```

## PowerPC™ Registers Passed to a New Process

---

The following PowerPC registers are passed to a new process (all other registers are zero):

```
r1 = stack pointer
r2 = static storage (data area) base pointer
r3 = points to fork parameters structure (listed in
                                         f_fork)
r13 = points to the constant data of code area of the
                                           module
```



---

### Note

r2 is always biased by the amount specified in the `m_dbias` field of the program module header which allows object programs to access a larger amount of data using indexed addressing. You can usually ignore this bias because the OS-9 linker automatically adjusts for it.

---



---

# Appendix A: Board Specific Modules

---

This appendix contains lists of high and low-level modules. The following sections are included:

- **Low-Level System Modules**
- **High-Level System Modules**
- **Common Modules List**



## Low-Level System Modules

---

The following low-level system modules are tailored specifically for the MVME target platforms. These modules can be found in the following directory:

MWOS/OS9000/<processor>/PORTS/<port>/CMDS/BOOTOBS/ROM

### Configuration Modules

<code>cnfgdata</code>	provides low-level configuration data including configuration of a serial console.
<code>cnfgfunc</code>	retrieves configuration parameters from the <code>cnfgdata</code> module.
<code>commcnfg</code>	retrieves the name of the low-level auxiliary communication port driver from the <code>cnfgdata</code> module.
<code>conscnfg</code>	retrieves the name of the low-level console driver from the <code>cnfgdata</code> module.

### Console Drivers

<code>io16550</code>	provides console services for the external 16550 serial ports.
<code>io8042</code>	provides console services for the VGA display and keyboard interface (when available).
<code>io85x30</code>	provides console services for the 82530 serial ports (when available).

### Debugging Module

<code>usedebug</code>	is a debugger configuration module.
-----------------------	-------------------------------------



## Ethernet Driver

<code>ll21040</code>	provides network driver services for the DEC 21040 Ethernet port.
<code>llgt64260</code>	provides network driver services for the Marvell Galileo Discovery Ethernet controller.
<code>llpro1000</code>	provides network driver services for the Intel PRO/1000 controller.
<code>lltsec</code>	provides network driver services for the Motorola TSEC controller.
<code>llmv643x0</code>	provides network driver services for the Marvell Discovery II controller.

## SCSI Host Adapter Support Booter Module

<code>ncr8xx</code>	provides the booter subsystem with SCSI host adapter services for both the NCR 53C810 and 53C825 interfaces.
---------------------	--------------------------------------------------------------------------------------------------------------

## System Modules

<code>ide</code>	is a low-level IDE booter module.
<code>initext</code>	is a user-customizable system initialization module.
<code>portmenu</code>	retrieves a list of configured booter names from the ROM <code>cnfgdata</code> module.
<code>romcore</code>	is the system bootstrap code.
<code>rpciv</code>	shows information about devices on the PCI bus.

## Timer Module

`swi8timr`

provides polling timer services with a software loop self-calibrated from the 8259-like timer.

## High-Level System Modules

---

The following OS-9 system modules are tailored specifically for MVME series platforms. Unless otherwise specified, each module can be found in the following directory:

MWOS/OS9000/<processor>/PORTS/<port>/CMDS/BOOTOBS

### Interrupt Controllers

These modules provide extensions to the vectors module by mapping the single interrupt generated by an interrupt controller into a range of logical vectors which are recognized by OS-9 as extensions to the base CPU exception vectors.

<code>picirq</code>	provides interrupt acknowledge and dispatching support for the nested 8259 interrupt controllers on the MVME series platforms. Maps the nested PIC interrupts 0-15 to OS-9 logical vectors 64-79 (\$40-\$4f).
<code>universeirq</code>	provides interrupt acknowledge and dispatch support for the Tundra Universe (CA91C042) chip implemented on the MVME series of CPU boards. Use this module together with the proper <code>picirq</code> module, if you require access to VME interrupts on one of these platforms. <code>universeirq</code> maps VME interrupts 64-255 to OS-9 logical vectors 64-255 (\$40-\$ff).
<code>ravenirq</code>	provides interrupt acknowledge and dispatch support.
<code>mv64360irq</code>	provides interrupt acknowledge and dispatch support for the Marvell Discovery II chip.

`tsi148irq`

provides interrupt support for the Tundra Tsi148 chip.

## Real Time Clock Driver

`rtc48t18`

provides OS-9 access to the M48T18 BBRAM real time clock. In this release, `rtc48t18` is the name of the ticker regardless of the CPU in use on your platform.

`rtc48t59`

provides OS-9 access to the ST Microelectronics M48T59 real-time clock chip.

## Ticker

`tk8253`

provides the system ticker through the Intel 8253 programmable interval timer.

`tkdec`

provides the system ticker through the DEC timer.

## Abort Handler

`abort`

provides handler for the abort interrupt which calls into the system-state debugger. If no system state debugger is configured, the system will perform a soft reset.

## Shared Libraries

`picsub`

provides interrupt enable and disable routines to handle platform-specific interrupt controller issues for device

drivers. This module is called by all drivers and should be included in your boot file .

## Serial and Console Drivers

sc16550

provides support for the external 16550 serial ports. This driver is used to drive the console over the COM1 port in the sample boots provided in the package.

The descriptors provided for this driver are named `t1`, `t2`, `term_t1`, and `term_t2` and are located in the following directory:

```
MWOS/OS9000/<processor>/PORTS/  
<port>/CMDS/BOOTOBS/DESC/SC16550
```

sc85x30

provides support for the 82530 serial ports (when available). The descriptors provided for this driver are named `t3`, `t4`, `term_3`, and `term_4` and are located in the following directory:

```
MWOS/OS9000/<processor>/PORTS/  
<port>/CMDS/BOOTOBS/DESC/SC85X30
```

---

## Parallel Driver

scp87303

provides support for the 87303 parallel port. The descriptor provided for this driver is named `p.lp1` and is located in the following directory:

```
MWOS/OS9000/<processor>/PORTS/  
<port>/CMDS/BOOTOBS/DESC/SCP87303
```

## Data Disk Drivers

`rb1003`

Provides support for IDE and EIDE drives up to 4GB. Many descriptors are provided for use with this driver. Among the descriptors provided are several modules named `h0` and `dd`. These descriptors are contained in files of unique names and located in the following directory:

```
MWOS/OS9000/<processor>/PORTS/  
<port>/CMDS/BOOTOBS/DESC/RB1003
```

## SCSI support

The high-level SCSI command set drivers `rbscs`, `rbteac`, and `sbscsi` are available to support the use of SCSI disk and tape devices in the following directory:

```
MWOS/OS9000/PPC/CMDS/BOOTOBS
```

`scsi8xx`

provides SCSI host adapter services for both the NCR 53C810 and 53C825 interfaces. In this release, `scsi8xx` is the name of the ticker regardless of the CPU in use on your platform. This is likely to change in a future release.

## Common Modules List

---

The following low-level system modules provide generic services for OS9000 modular ROM. They are located in the following directory:

MWOS/OS9000/PPC/CMDS/BOOTOBSJ/ROM

**Table 2-4 Common System Modules List**

<b>Module</b>	<b>Description</b>
bootsys	provides booter services.
console	provides high-level I/O hooks into low-level console serial driver.
dbgentry	provides hooks to low-level debugger server.
dbgserv	is a debugger server module.
excp tion	is a service module.
fdc765	provides PC style floppy support.
fdman	is a target-independent booter support module providing general booting services for RBF file systems.
flboot	is a SCSI floptical drive disk booter.
flshcach	provides the cache flushing routine.
fsboot	is a SCSI TEAC floppy disk drive booter.
hlproto	allows user-state debugging.
hsboot	is a SCSI hard disk drive booter.

**Table 2-4 Common System Modules List (continued)**

Module	Description
ide	provides target-specific standard IDE support, including PCMCIA ATA PC cards.
iovcons	is a hardware independent virtual console driver that provides a telnetd-like interface to the low-level system console.
llbootp	is a target-independent BOOTP protocol booter module.
llip	is a target-independent internet protocol module.
llkermit	is a kermit booter (serial down loader).
llslip	is a target-independent serial line internet protocol module. This modules uses the auxiliary communications port driver to perform serial I/O
lltcp	is a target-independent transmission control protocol module.
lludp	is a target-independent user datagram protocol modules.
notify	coordinates use of low-level I/O drivers in system and user-state debugging.
override	enables overriding of the autobooter.  If the space bar is pressed within three seconds after booting the target, a boot menu is displayed. Otherwise, booting proceeds with the first autobooter.



**Table 2-4 Common System Modules List (continued)**

<b>Module</b>	<b>Description</b>
parser	parses key fields from the <code>cnfgdata</code> module and the user parameter fields.
pcman	is a target-independent booter support module providing general booting services for PCF file systems (PC FAT file systems).
protoman	is a target-independent protocol module manager. This module provides the initial communication entry points into the protocol module stack.
restart	restarts boot process.
romboot	locates the OS-9 bootfile in ROM, FLASH, NVRAM.
rombreak	enables break option from the boot menu.
rombug	is a debugger client module.
scsiman	is a target-independent booter support module that provides general SCSI command protocol services
sndp	is a target-independent system-state network debugging protocol module. This module acts as a debugging client on the target, invoking the services of <code>dbgserve</code> to perform debug tasks.
srecord	receives a Motorola S-record format file from the communications port and loads it into memory.
swtimer	is a software timer.
tsboot	is a SCSI TEAC tape driver booter.

**Table 2-4 Common System Modules List (continued)**

<b>Module</b>	<b>Description</b>
type41	is a primary partition type.
vcons	provides the console terminal pathlist.
vsboot	is a SCSI archive viper tape drive booter.

---

# Appendix B: Partitioning and Formatting Your Hard Drive

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This appendix explains how to partition and format your hard drive with one primary partition on your target system.



## Partitioning Your Hard Drive

---

This section explains how to partition your hard drive using the `fdisk` command. The `fdisk` command displays and alters the partition table. You should format your hard drive after you have partitioned it.



### Note

Although OS-9 can be used without disk partitions, the use of partitions is strongly recommended, even if only one partition is used. You cannot perform hard disk booting if you do not partition your hard disk.

---



### Note

OS-9 uses extended type41 partitions using the Random Block File Manager (RBF) file system. The `fdisk` utility used to create partitions allows a maximum of four primary partitions to be created. For information on how to create more than one primary partition, refer to the *Utilities Reference Manual*, located on the *Microware OS-9* CD.

---

To create a partition on your target system, use the following steps:

- Step 1. Familiarize yourself with the `fdisk` command options and their uses, as listed in [Table B-1](#).

**Table B-1** `fdisk` Command Options

Option	Description
-a [=] <num>	Makes partition <num> the active partition.
-d [=] <dev>	Examines/changes device. Default = /hc.
-c	Forces terminal mode (cursers off).
-e	Includes partition information in display mode.
-s	Displays the partition table.

Step 2. At the OS-9 prompt, type `tmode nopause`. This allows you to view the entire `fdisk options` window after step 3.

Step 3. Create a partition using the `fdisk` utility. You must refer to the SCSI raw drive when using `fdisk`. The following descriptors are available when booting.

```
hs0fmt<----- SCSI ID 0
```

```
hs1fmt<----- SCSI ID 1
```

For example, to partition SCSI ID 1, you would enter the following command at the OS-9 prompt:

```
fdisk -d=/hs1fmt -e
```

Use the `-i` option to clear existing partitions from the board.



## Note

You can determine the appropriate description of your SCSI driver from Wizard by selecting **Configure -> Bootfile -> Disk Configuration -> SCSI Configuration** tab.



## Note

For a complete explanation of related device descriptors, see the **OS-9 Porting Guide**.

- Step 4. The following partitioning options display:
1. Create OS-9000 partition
  2. Set Active Partition
  3. Delete partition
  4. Display partition information
  5. Change extended DOS partition to OS-9000 partition



## Note

If your hard drive already has a partition you want to delete, select 3.



## For More Information

Refer to **OS-9 fdisk Options** later in this Appendix for more information on how to delete a partition.

Step 5. Select **1. Create OS-9000 Partition**. A prompt appears asking you for the size of the partition you want (in cylinders). The default, shown in brackets, is the maximum amount of cylinders available for your partition on the hard drive. (You may have to hit **<return>** to view all the information).



**Note**

If you currently have a partition on the drive (such as DOS), the default size is the total number of remaining cylinders.

```

                Display Partition Information
Current fixed disk device: /hcfmt@
Partition  Status          Type      Start      End      Size

Enter the partition size in cylinders: [ 1022]
    
```



**Note**

It is important to note that one cylinder does not necessarily reflect 1MB. Enter the number of cylinders to allocate for the partition, not the number of bytes.

Step 6. The system determines the maximum amount of cylinders and uses this as the default selection.

If you want the partition to be a portion of the total number of cylinders, enter this number of cylinders instead.

Step 7. Hit **<return>**

Step 8. The following is displayed:

```

1. OS9000/386 type partition
2. Extended Type 41 partition

select partition type (1,2).....: [ ]
    
```

- Step 9. Type **2** for Extended type 41 partition
- Step 10. When the partitioning has completed, the display shows the display partition information screen:
1. Create OS-9000 partition
  2. Set Active Partition
  3. Delete partition
  4. Display partition information
  5. Change extended DOS partition to OS-9000 partition
- Step 11. Hit **<esc>**
- Step 12. The partitioning is now complete. To exit the `fdisk` utility and save the partition to the hard drive, hit the `<esc>` key. The following question is displayed:
- ```
Want to save new partition information (y/n)?
```
- Step 13. Type **Y** to save the partition information to disk. You return to the OS-9 prompt.
- Step 14. Move on to **[Formatting Your Hard Drive](#)**.
-



## Formatting Your Hard Drive

---

Before you format your hard drive, make sure that it is partitioned correctly. See [Partitioning Your Hard Drive](#) in this Appendix for information on how to perform this task. This section explains how to format your hard drive using the `format` command.




---

### For More Information

For a complete description of all the `format` command options, refer to the *Utilities Reference Manual* located on the *Microware OS-9* CD.

---

- Step 1. Format the partitions using the correct descriptor for your hard drive. Descriptor options include the following:

```

hs01fmt---->SCSI ID=0 Partition = 1
hs02fmt---->SCSI ID=0 Partition = 2
hs03fmt---->SCSI ID=0 Partition = 3
hs04fmt---->SCSI ID=0 Partition = 4
hs11fmt---->SCSI ID=1 Partition = 1
hs12fmt---->SCSI ID=1 Partition = 2
hs13fmt---->SCSI ID=1 Partition = 3
hs14fmt---->SCSI ID=1 Partition = 4
hs51fmt---->SCSI ID=5 Partition = 1
hs52fmt---->SCSI ID=5 Partition = 2
hs53fmt---->SCSI ID=5 Partition = 3
hs54fmt---->SCSI ID=5 Partition = 4
  
```

Step 2. Enter the command `format /hs01fmt -np -nv -r -vOS9000` to format the hard drive. The following table shows the format specified device options.

**Table B-2 Format Specified Device Options**

---

|           |                                     |
|-----------|-------------------------------------|
| -be       | create big-endian fs (ie: PPC)      |
| -bo=<num> | use block offset of <num>           |
| -c        | enable command/interactive mode     |
| -dd       | double density disk                 |
| -ds       | double sided disk                   |
| -h=<num>  | disk has <num> heads                |
| -i=<num>  | use interleave of <num>             |
| -le       | create little-endian (ie: x86, ARM) |
| -m=<num>  | put bitmap at block <num>           |
| -np       | no physical format                  |
| -nv       | no physical verify                  |
| -o        | do interleave optimization          |
| -r        | assume ready (don't ask)            |
| -s=<num>  | use spiral skew of <num>            |
| -sd       | single density disk                 |

**Table B-2 Format Specified Device Options (continued)**


---

|           |                           |
|-----------|---------------------------|
| -ss       | single sided disk         |
| -to=<num> | use track offset of <num> |
| -t=<num>  | disk has <num> tracks     |
| -v=<name> | set volume name to <name> |
| -?        | print this help message   |

---

Step 3. Your hard drive is now partitioned and formatted, and the OS-9 prompt returns.

---

## OS-9 fdisk Options

### Create OS-9 Partition (1)

Creates OS-9 partitions. When partitions are created, you are prompted for the size of the partition in terms of cylinders.

### Set Active Partition (2)

Specifies which partition is bootable. If DOS is set as the active partition and the system is reset, then DOS loads. To allow OS-9 to boot, you must use the DOS version of `fdisk` to set the OS-9 partition to active. If a boot manager is used, then set the Boot Manager as active.

### Delete Partition (3)

Deletes partitions. Use the delete option with care. Extended partitions may include any logical drives associated with them.

## Display Partition Information (4)

Displays the partition tables. If the `-e` option is used, additional information about the partition tables displays.

The extended/additional information includes:

**Table B-3 Display Partition `-e` Option**

|                        | Explanation                           |
|------------------------|---------------------------------------|
| <code>st</code>        | Start-flag (if 80 drive is startable) |
| <code>s_head</code>    | Start head (byte)                     |
| <code>s_cyl_blk</code> | Start Cylinder block (word)           |
| <code>type</code>      | Partition type (word)                 |
| <code>e_head</code>    | End head (byte)                       |
| <code>e_cyl_blk</code> | End cylinder block (word)             |
| <code>s_blk</code>     | Start block (LBA) (long-word)         |
| <code>size</code>      | Size of block (LBA) (long-word)       |

## Change Extended DOS Partition to OS-9 Partition (5)

Converts an extended partition to an OS-9 partition. Extended partitions may include logical drives.