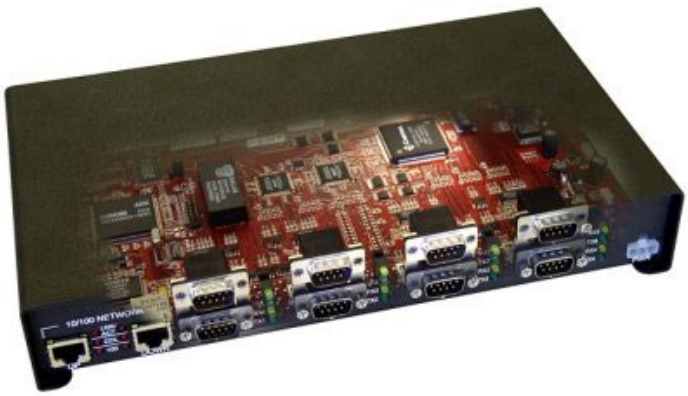
DeviceMaster Software Development Kit - Single File Version

Introduction

The DeviceMaster Software Developer Kit includes the basic tools required to develop eCos applications for the following Pepperl+Fuchs Comtrol, Inc. DeviceMaster platforms:

- DeviceMaster PRO
- DeviceMaster RTS
- DeviceMaster UP



It is assumed that the reader has some experience with embedded software development and is familiar with software development tools under the host environment (Windows/ Cygwin or Linux).

If you are unfamiliar with the tools mentioned in the SDK documentation, you may want to locate information about Cygwin, bash, make, and tar.

You can browse the CD (left) to locate software and documentation to install and configure the SDK or use this version. The single file version (this page) and the pages in the navigational bar contain the same content.

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Kit Contents

The DeviceMaster SDK distribution contains the following:

- Application sources for several sample DeviceMaster applications:
    - SocketServer: A simplified version of the Pepperl+Fuchs Comtrol, Inc. SocketServer application, which also includes the GoAhead web server. See Building the SocketServer Sample Application for information about the sample application. In addition, you can use the SocketServer Extension Guide for information about how to add functionality to the sample SocketServer.
    - Webserver: A GoAhead web server demonstration application with minimal changes required to build and run on the DeviceMaster platform. See Building the GoAhead WebServer for information about this sample application.
    - Sources for sample eCos applications that demonstrate how to use the Pepperl+Fuchs Comtrol, Inc. serial (SerEcho) and Ethernet (NetEcho) drivers.

      Note

      The DeviceMaster Installation and Configuration Guide contains a section titled, ***RedBoot Procedures***, that you can use to upload the application using RedBoot.
- eCos source and object distributions of eCos.

- eCos Documentation contains RedHat eCos manuals in PDF format.
- Binaries for both Linux and Windows (command-line) eCos configuration utilities.
- GNU Documentation for the GNU development tools:
- Cygwin binary distribution and binaries for arm-elf cross-development tools for Cygwin.
- Binary for arm-elf cross-development tools for Linux.
- Cross-platform arm-elf toolchain source files for eCos under either Linux or Cygwin.
- Utilities in the event you do not want to use the RedBoot load command to upload applications into the DeviceMaster:
    - PortVision DX is the easiest way to upload applications into the DeviceMaster.

      Note
      PortVision DX supports Windows XP through Windows 10 operating systems.
    - RTS Command-line Updater
    - Burn-wrapper files, source files used to wrap the SocketServer application for installation on the DeviceMaster
- Miscellaneous documentation, including the following:
    - DeviceMaster Installation and Configuration Guide, which contains procedures to update Bootloader and SocketServer using Bootloader in the ***RedBoot Procedures*** section.
    - Memory Map

Note
If you ordered the Software Development Kit or purchased the DeviceMaster PRO, you will have the JTAG interface that uses RDI protocol over UDP/IP.

Hints and Tips

- ***line-endings***

  Do not convert source or configuration files to MS-DOS line endings. Cygwin users: use a text editor that preserves UNIX line endings (jed, vim, PFE, textpad, VisualStudio, Wordpad, etc.). Do not use Notepad to edit source files or configuration files.
- ***printf()***

  The **stdio printf()** function is not currently supported by the DeviceMaster HAL package. Use **diag_printf()** instead.
- ***Disabling Auto-Load***

  If you want to prevent the bootloader on the DeviceMaster from loading and running the default application on start-up, follow the steps in Disabling Auto-Load.
- **WinZip**

  When unpacking **.tar.gz** files, ***disable smart or automatic handling of line endings for text files***. Otherwise, WinZip will cause breakage by adding carriage returns to line endings.

Installation Overview

The complete SDK requires about 800Mb of disk space. The original development of the DeviceMaster and the samples in the SDK was done under RedHat Linux 8.0.

In order to develop eCos applications for the DeviceMaster, you must install at least the arm-elf tools and the pre-compiled eCos libraries. The Windows arm-elf tools require that Cygwin be installed. If you would like to modify the eCos configuration, then the eCos sources must be installed. Changes in eCos configuration require that the eCos libraries and include files be rebuilt from the eCos source tree.

Building at least one of the included sample applications is also suggested as a way to insure that the tools and libraries are operational. See Verifying the Installation for information about how to install, build, and run the **serecho** program that is included in the **Sample_Apps** directory.

GNU cross development tools (compiler, linker, assembler, debugger) are included for IA32 hosts running either Cygwin/Win32 or Linux. A complete Cygwin distribution is also included.

The following illustrates the steps to using this SDK effectively.

1. If you are working on a Windows system, install Cygwin.
2. Install the arm-elf tool for your operating system (Linux or Windows):

Note

Windows developers will need to install Cygwin before installing the arm-elf tools.

3. Install the eCos library (pre-compiled eCos object libraries or eCos source libraries)
4. Build a program (discussed in Sample Programs)
5. Download the application to the DeviceMaster.

Installing Cygwin

Note

If you are working on a Windows system and you have Cygwin installed, go to Installing arm-elf Tools.

If you have not previously installed Cygwin, you will need to do so before installing the arm-elf tools. The SDK provides all the files that you need for installation, which includes:

- Installation files for the Cygwin UNIX environment for Windows DLL and associated programs
- Compressed **tar** file that contains the executable binaries for the **arm-elf** cross platform GNU tools **GCC**, **GDB**, **AS** and **LD**.

Use the following procedure if you need to install Cygwin.

1. Double-click on the setup.exe file in the **Windows_Tools\cygwin directory**, which will launch a series of dialog boxes.
2. Select **Next** in the **Cygwin Net Release Setup Program** dialog box.
3. Select the **Install from Local Directory** radio button in the **Cygwin Setup** dialog box and click **Next**.
4. Verify that the **\Windows_Tools\Cygwin** directory is listed in the **Local Package Directory** dialog box or enter it into the text entry box and click **Next**.
5. In the **Select install root directory** dialog box accept the default installation directory **C:\Cygwin** or enter the path name of an alternate directory in the **Select install** root directory text field..
6. Allow **Default Text File Type** to default to UNIX and **Install For** to default unless you must restrict access to yourself and click **Next**.
7. Make no changes in the **Select packages** to install dialog box and click **Next**.

   The **setup.exe** will begin copying files.

   Note

   This may take awhile depending on your system. One machine took 10 - 12 minutes.
8. When file copying is complete you will be prompted to select a Cygwin icon on your desktop and/or in your **Start Menu**. Select your preference and click **Next**.
9. Select **OK** when the **Installation Complete** dialog box appears.

   You now have the full power of the **bash** shell available on your Windows computer. For more information, see the Cygwin User's Guide.
10. You are ready to install the eCos library (pre-compiled or source eCos library).

Installing arm-elf Tools

The complete SDK requires about 800Mb of disk space. The original development of the DeviceMaster and the samples in the SDK was done under RedHat Linux 8.0.

Use the appropriate procedure for your system:

- Linux
- Windows

Linux: Installing arm-elf Tools

The Linux binaries for the Gnu ARM-elf toolchain are provided in a compressed tar archive. When un-tarred, a directory called **gnutools** will be created and the directory **gnutools/bin** will need to be added to the **PATH** variable. You can place the **gnutools** directory anywhere you like. In this example, we will install the tools under **/usr/local**, so **/usr/local/gnutools/bin** will need to be added to the user's **PATH** environment variable.

1. Change to the **usr/local** directory.

   # cd /usr/local

2. Unpackage the arm-elf-3.4.3-linux.tar.gz file in **Linux_Tools** directory.

   # tar xf arm-elf-3.4.3-linux.tar.gz

3. Verify that the arm-elf tools installed on your system.

   # tree gnutools

```
gnutools
|-- arm-elf
|   |-- bin
|   |   |-- ar
|   |   |-- as
|   |   |-- c++
|   |   |-- g++
|   |   |-- gcc
|   |   |-- ld
|   |   |-- nm
|   |   |-- objcopy
|   |   |-- objdump
|   |   |-- ranlib
|   |   `-- strip
|   |-- include
|   |   |-- _ansi.h
|   |   |-- _syslist.h
|   |  ...  ...
|   |   |-- wchar.h
|   |   `-- wctype.h
|   `-- lib
|       |-- be
|       |   |-- crt0.o
|      ... ...
|       |   `-- redboot.specs
|       |-- crt0.o
|       |-- iq80310.specs
|      ...  ...
|       |-- redboot.specs
|       `-- thumb
|   `- ...
|-- bin
|   |-- arm-elf-addr2line
|   |-- arm-elf-ar
|   |-- arm-elf-as
|   |-- arm-elf-c++
|   |-- arm-elf-c++filt
|   |-- arm-elf-cpp
|   |-- arm-elf-g++
|   |-- arm-elf-gcc
|   |-- arm-elf-gcc-3.4.3
|   |-- arm-elf-gccbug
|   |-- arm-elf-gcov
|   |-- arm-elf-gdb
|   |-- arm-elf-gdbtui
|   |-- arm-elf-gprof
|   |-- arm-elf-insight
|   |-- arm-elf-ld
|   |-- arm-elf-nm
|   |-- arm-elf-objcopy
|   |-- arm-elf-objdump
|   |-- arm-elf-ranlib
|   |-- arm-elf-readelf
|   |-- arm-elf-run
|   |-- arm-elf-size
|   |-- arm-elf-strings
|   |-- arm-elf-strip
|   |-- tclsh8.4
|   `-- wish8.4
|-- include
|   |-- itcl.h
|   |-- itclDecls.h
|   |-- itclInt.h
|   |-- itclIntDecls.h
|   |-- itk.h
|   |-- itkDecls.h
|   |-- tcl.h
|   |-- tclDecls.h
|   |-- tclPlatDecls.h
|   |-- tk.h
|   |-- tkDecls.h
|   `-- tkPlatDecls.h
|-- info
|   |-- annotate.info
```

```
|   |-- as.info
|   |-- bfd.info
|   |-- binutils.info
|   |-- configure.info
|   |-- cpp.info
|   |-- cppinternals.info
|   |-- dir
|   |-- gcc.info
|   |-- gccinstall.info
|   |-- gccint.info
|   |-- gdb.info
|   |-- gdb.info-1
|   |-- gdb.info-2
|   |-- gdb.info-3
|   |-- gdb.info-4
|   |-- gdbint.info
|   |-- gdbint.info-1
|   |-- gdbint.info-2
|   |-- gprof.info
|   |-- ld.info
|   |-- stabs.info
|   `-- standards.info
|-- lib
|   |-- gcc
|   |   `-- arm-elf
|   |       `-- 3.4.3
|   |   |-- be
|   |  ...
|   |-- insight1.0
|   |   `-- plugins.tcl
|   |-- itcl3.2
|   |   `-- pkgIndex.tcl
|   |-- itk3.2
|   |   `-- pkgIndex.tcl
|   |-- libarm-elf-sim.a
|   |-- libiberty.a
|   |-- libitcl3.2.a
|   |-- libitclstub3.2.a
|   |-- libitk3.2.a
|   |-- libitkstub3.2.a
|   |-- libtcl8.4.a
|   |-- libtclstub8.4.a
|   |-- libtk8.4.a
|   |-- libtkstub8.4.a
|   |-- tclConfig.sh
|   |-- tk8.4
|   `-- tkConfig.sh
|-- libexec
|   `-- gcc
|       `-- arm-elf
|           `-- 3.4.3
|               |-- cc1
|               |-- cc1plus
|               |-- collect2
|               `-- install-tools
|                   |-- fixinc.sh
|                   |-- fixincl
|                   `-- mkheaders
|-- man
|   |-- man1
|   |   |-- arm-elf-addr2line.1
|   |   |-- arm-elf-ar.1
|   |  ...  ...
|   |   |-- tclsh.1
|   |   `-- wish.1
|   |-- man3
|   |   |-- 3DBorder.3
|   |   |-- Access.3
|   |  ...  ...
|   |   `-- panicVA.3
|   |-- man7
|   |   |-- fsf-funding.7
|   |   |-- gfdl.7
|   |   `-- gpl.7
|   `-- mann
|       |-- Archetype.n
|      ...  ...
|       |-- winfo.n
|       `-- wm.n
|       `-- share
|-- insight1.0
|   |-- about.tcl
```

```
|  ...  ...
|   `-- watch.tcl
|-- itcl3.2
|   `-- itcl.tcl
|-- itk3.2
|   |-- Archetype.itk
|  ...  ...
|   `-- tclIndex
|-- iwidgets4.0.1
|   |-- demos
|   |    ...
|   |-- iwidgets.tcl
|   |-- license.terms
|   |-- pkgIndex.tcl
|   `-- scripts
|       ...
|       `-- watch.itk
|-- locale
|   |-- be
|  ...  ...
|   `-- zh_TW
|       `- ...
|
|-- redhat
|   `- ...
|-- tcl8.4
|   |-- auto.tcl
|  ... ...
|   `-- word.tcl
    `-- tk8.4
|-- bgerror.tcl
...  ...
|-- button.tcl
`-- xmfbox.tcl

121 directories, 2520 files
```

Windows: arm-elf Tools

If you did a default installation of Cygwin from the snapshot in the **cygwin** directory (Installing Cygwin), then you already have the arm-elf toolchain installed in **/usr/local** and you do not need to install the files in **arm-elf-3.4.3-cygwin.tar.gz**, and you do not need to modify your **PATH** variable.

Note

The files in **arm-elf-3.4.3-cygwin.tar.gz**, which are used in the following procedures are provided for users who already have a Cygwin installation and are not installing Cygwin from this SDK.

While Pepperl+Fuchs Comtrol, Inc. is happy to provide such users with a copy of the toolchain binaries, Pepperl+Fuchs Comtrol, Inc. will be unable to provide technical support for toolchain-related problems that occur on Cygwin systems that were not installed from the SDK Cygwin snapshot.

To perform the following procedure, you must have installed Cygwin, which provides the Cygwin UNIX environment for Windows DLL and associated programs; including the arm-elf toolchain required for use with eCos for the DeviceMaster.

You can use the one of the following procedures to install the arm-elf tools using Cygwin.

- ***Experienced Users:***

  All you need to do is **untar** arm-elf-3.4.3-cygwin.tar.gz somewhere. That will create a directory called **gnutools**. Add the location of **gnutools/bin** to your **PATH**.

- Detailed procedures are provided in the following subsections.
  - You can install the arm-elf tools using Cygwin or with Windows.
  - Updating PATH

Installing arm-elf Tools with Cygwin

Use the following procedure to install the arm-elf toolchain for Windows with Cygwin.

1. Move the arm-elf-3.4.3-cygwin.tar.gz file **$/Windows_Tools/arm-elf-tools/tools.tar.gz** to the Cygwin root directory.

   '**$**' designates the root directory of the Pepperl+Fuchs Comtrol, Inc. DeviceMaster Developer Kit distribution disk. The Cygwin root directory is **C:\Cygwin** unless you chose to override the default **Cygwin** installation directory during Cygwin installation.

2. Open a Cygwin window by clicking the Cygwin icon on the desktop or selecting **Start\Programs\Cygnus Solutions\Cygwin**

Bash Shell from the **Start** menu

3. Change the directory to the location of the arm-elf-3.4.3-cygwin.tar.gz file. In this example, the file is located in the root directory of a CD ROM that is drive D.

   cd /cygwin/d

4. Unpack the file, instructing tar to do so in the root "**/**" directory.

   tar -xzvf arm-elf-3.4.3-cygwin.tar.gz -C / &> /tar.out

5. Open the file **tar.out** with **vi** or **emacs** in a Cygwin window or with **Wordpad**.

   cd /
   emacs tar.out

   Note

   Do not use Notepad. Files created in the Cygwin environment have UNIX line endings, **Notepad** does not display files legibly.

6. Scan the file for error messages. If there are no error messages the installation was successful and you may delete **tar.out**.
7. Update the **PATH** environmental variable for the tools to function properly.
8. You can test your Cygwin and **arm-elf tool** installations by building the Sample Programs.

Windows Installation Method

This procedure requires WinZip. Verify that the WinZip version you have supports **tar.gz** file expansion.

1. Open WinZip.
2. Under the **Options** menu, select **Configuration**. On the **Miscellaneous** tab, make sure that **TAR file smart CR/LF** handling is not checked.

   Click **OK** to save the configuration.

3. Double-click arm-elf-3.4.3-cygwin.tar.gz file to use the file on the SDK CD (or the location to which it was downloaded).

   WinZip will present a dialog box reading:

   ```
   Archive contains one file:
   arm-elf-3.4.3-cygwin.tar
   Should WinZip decompress it to a temporary folder and open it?
   ```

4. Click **Yes**.
5. In the WinZip **Actions** drop down menu select **Extract**.
6. WinZip will present an **Extract** dialog box. Enter **C:\Cygwin** or your Cygwin root directory path in the **Extract to:** text entry field.
7. Click the **Extract** button.

   WinZip will create the **C:\Cygwin\gnutools** directory and populate it with the contents of **tool.tar.gz**.

8. Go to Updating PATH to continue the installation.

Updating PATH

After the tool executables are installed you must add their location to the **PATH** environmental variable. This allows the system to find them. Use one of the following methods.

- The simple method is to add the fully qualified path name of the tool executables to the existing **PATH** statement. Assuming that you allowed **tar** to place the tools in their default path, type the following at the Cygwin prompt:

  PATH=$PATH":/gnutools/bin"

  Unfortunately using the simple method means that additions to the **PATH** variable are lost at log off.

- Optionally, you can edit the **.bash_profile** file to add the GNU tools to the **PATH** variable every time you login.

  Note

  The **.bash_profile** file resides in you **home** directory, i.e. **/home/yourusername**. If it does not exist in your installation create it with your favorite text editor and add the above **PATH=** statement to it. If it does exist open it with your favorite text editor and add the above **PATH=** statement. When you are done, logout and login to invoke the **PATH=** command.

DO NOT USE NOTEPAD. **Notepad** ends lines with the DOS CALF instead of the UNIX new-line.

Bash supports both **vi** and **emacs**, but **emacs** is the default. However, all text editing of bash text files can be done with **Wordpad** if you prefer a GUI editor. **WordPad** seems to have a problem with creating a new file with a leading period in it's name. **WordPad** also wants to append a suffix on a new file when it creates it. Consequently you may have to store your new file as **bash_profile.txt** or something similar. You can rename the file using the **bash mv** (move) command. The following syntax should work: **mv -i bash_profile.txt .bash_profile**

If you use **vi** or **emacs** you won't have this problem.

You are ready to install the eCos library (pre-compiled or source eCos library).

Note

You can refer to the GNU Documentation for more information.

Installing eCos

You can install one of the following eCos libraries for the SDK:

- Pre-compiled version of eCos configured for the DeviceMaster. You may use this library to develop eCos applications without having to build eCos from its sources.
- Optionally, you can install eCos sources and build the complete eCos libraries from the sources. The complete sources used to build the pre-compiled eCos binaries and the configuration file that was used to build the pre-compiled eCos binaries are in the eCos\Source directory. The eCos/Source/ecos.tar.gz file contains eCos source tree including Pepperl+Fuchs Comtrol, Inc. serial and Ethernet drivers. The eCos/Source/ecos.ecc file is the eCos configuration used to build binaries included in the SDK distribution.

Installing the Pre-Compiled (Binary) eCos Libraries

The install.tar.gz file contains the pre-built eCos files needed to build applications for the DeviceMaster.

To install the pre-built eCos libraries and include files, un-tar them to a desired location. The following example represents the procedure if the **install.tar.gz** file is in the user's **home** directory and they are to be installed in **/home/my-proj/ecos**.

```
$ mkdir -p /home/my-proj/ecos
$ cd /home/my-proj/ecos
$ tar xzf ~/install.tar.gz
```

This will create an **install** directory that contains lib and include directories that contain the eCos library and included files, respectively.

You can go to Sample Programs to build one of the provided sample applications.

Installing eCos Sources

Install the eCos sources on your system. This example uses **/opt** and assumes that the eCos sources are in the user's **home** directory, which will create a directory tree under **/opt/ecos**:

```
$ cd /opt
$ tar xzf ~/ecos.tar.gz
```

If you are planning on building eCos from source you will need to install an eCos configuration tool.

Installing the eCos Configuration Tool

Use one of the following sections to install an eCos configuration tool for your system, which is required if building eCos source.

- Linux
- Cygwin GUI
- Cygwin command line

Linux

To install the tool (**ecosconfig**), a Linux/i386 binary executable of eCos configuration utility, copy the ecosconfig file to a directory present in your **PATH**.

Before attempting to build eCos, you should read the eCos User's Guide (A4 version available). To install the eCos source files and build a new eCos configuration, see Installing eCos Sources and Building eCos.

Cygwin Configuration GUI Utility

Due to the rapid rate at which the Cygwin Configuration GUI is being developed, the GUI eCos **configtool** is no longer included in the Pepperl+Fuchs Comtrol, Inc. DeviceMaster SDK. If you wish to use the GUI configtool, please download it from eCosCentric.

Before attempting to build eCos using **Configtool** you should read the eCos User's Guide (A4 version). To install the eCos source files and build a new eCos configuration, see Installing eCos Sources and Building eCos.

Cygwin Command Line Configuration Utility

The **eCos_Config_Tool\Cygwin\cmd_line** directory contains the **ecosconfig.exe** file, a Cygwin binary executable of eCos configuration utility, which provides a command line user interface.

In the following procedure all paths are from the Cygwin root.

1. Delete the **ecosconfig** file from **\opt\ecos\tools\bin**, which is the Linux **ecosconfig** tool that is replaced in this example.
2. Execute the ecosconfig.exe file and set the target directory to **\opt\ecos\tools\bin/**.
3. Add the configuration tool directory to your path by executing the following command at the Cygwin command line.

   PATH=$PATH":/opt/ecos/tools/bin"
4. Add the above command to your **.bash_profile** to enable it's execution each time you start Cygwin. If you need more information on how to do that see Updating PATH.

Before attempting to build eCos using ecosconfig you should refer to the eCos User Guide (A4 version).

Building eCos

The following steps provide an example of how to build eCos.

1. Verify that the previously installed eCos configuration tool is somewhere in your path. The following command shows the current PATH.

   $ echo $PATH
2. Install the eCos sources somewhere. In this example, the source tar file is in the user's **home** directory and it installs the eCos sources in the users **home** directory as well.

   $ cd ~
   $ tar xzf ecos2src-sdk.tar.gz

   This creates a directory tree under **ecos2src-sdk**.
3. Install the eCos configuration utility **ecosconfig** somewhere in your path.
4. Create an empty directory for the build tree (ecos-build and in the user's **home** directory).

   $ cd ~
   $ mkdir ecos-build
   $ cd ecos-build
5. If you need to add an eCos configuration tool to your path, you can do so with the following command, which shows a what path would look like using the Linux configuration tool.

   $ export ECOS_REPOSITORY=~/ecos2src-sdk
6. Create a new eCos configuration for the DeviceMaster target platform using the **newTree-2.0** script. If desired, you can add the line from Step 5) to the top of the **newTree-2.0** script.

   $ ../newTree-2.0

```
U CYGBLD_ISO_DIRENT_HEADER, new inferred value <cyg/fileio/dirent.h>
U CYGBLD_ISO_OPEN_MAX_HEADER, new inferred value <cyg/fileio/limits.h>
U CYGBLD_ISO_NAME_MAX_HEADER, new inferred value <cyg/fileio/limits.h>
U CYGBLD_ISO_BSDTYPES_HEADER, new inferred value <sys/bsdtypes.h>
U CYGBLD_ISO_NETDB_PROTO_HEADER, new inferred value <net/netdb.h>
U CYGBLD_ISO_NETDB_SERV_HEADER, new inferred value <net/netdb.h>
Settings:
cdl_option CYGPKG_IO_NFILE {user_value 256}
cdl_option CYGNUM_FILEIO_NFILE {user_value 256}
cdl_option CYGNUM_FILEIO_NFD {user_value 256}
cdl_option CYGPKG_NET_MAXSOCKETS {user_value 256}
cdl_component CYGSEM_KERNEL_SCHED_TIMESLICE {user_value 0}
cdl_option CYGNUM_MEMALLOC_FALLBACK_MALLOC_POOL_SIZE {user_value 0x20}
cdl_option CYGPKG_NET_MEM_USAGE {user_value 0x260000}
cdl_option CYGPKG_NET_NUM_WAKEUP_EVENTS {user_value 40}
```

```
cdl_option CYGPKG_DEVS_ETH_ARM_DMRTS_PHY_ADDR {user_value 1}
cdl_option CYGPKG_NET_BUILD_HW_TESTS {user_value 1}
cdl_option CYGSEM_HAL_DIAG_MANGLER {user_value None}
cdl_option CYGPKG_NET_FREEBSD_INET6 {user_value 0}
cdl_option CYGPKG_NET_FREEBSD_SYSCTL {user_value 1}
cdl_component CYGPKG_DEVS_ETH_ARM_DMRTS_SWTXCRC {user_value 1}

# set IP configuration for test/devel purposes.  These settings
# are ignored by socketServer and devmast apps
cdl_component CYGHWR_NET_DRIVER_ETH0_BOOTP        {user_value 0}
cdl_component CYGHWR_NET_DRIVER_ETH0_DHCP         {user_value 0}
cdl_component CYGHWR_NET_DRIVER_ETH0_ADDRS        {user_value 1}
cdl_option CYGHWR_NET_DRIVER_ETH0_ADDRS_IP        {user_value "10.0.0.101"}
cdl_option CYGHWR_NET_DRIVER_ETH0_ADDRS_NETMASK   {user_value "255.0.0.0"}
cdl_option CYGHWR_NET_DRIVER_ETH0_ADDRS_BROADCAST {user_value "10.255.255.255"}
cdl_option CYGHWR_NET_DRIVER_ETH0_ADDRS_GATEWAY   {user_value "10.0.0.1"}
cdl_option CYGHWR_NET_DRIVER_ETH0_ADDRS_SERVER    {user_value "10.0.0.1"}

$
```

This creates a directory tree and makefiles. The top level of the build directory now looks like this.

7. Enter the following command.

   $ ls -l

```
total 564
drwxr-xr-x 4 grante users   4096 Jan  1 14:35 devs
-rw-r--r-- 1 grante users 518641 Jan  1 14:35 ecos.ecc
drwxr-xr-x 3 grante users   4096 Jan  1 14:35 error
drwxr-xr-x 4 grante users   4096 Jan  1 14:35 hal
drwxr-xr-x 3 grante users   4096 Jan  1 14:35 infra
drwxr-xr-x 4 grante users   4096 Jan  1 14:35 install
drwxr-xr-x 8 grante users   4096 Jan  1 14:35 io
drwxr-xr-x 3 grante users   4096 Jan  1 14:35 isoinfra
drwxr-xr-x 3 grante users   4096 Jan  1 14:35 kernel
drwxr-xr-x 3 grante users   4096 Jan  1 14:35 language
-rw-r--r-- 1 grante users   6282 Jan  1 14:35 makefile
drwxr-xr-x 5 grante users   4096 Jan  1 14:35 net
drwxr-xr-x 3 grante users   4096 Jan  1 14:35 services
```

8. Perform the build.

   $ make

```
make -r -C hal/arm/arch/current headers
make[1]: Entering directory `/home/grante/ecos-build/hal/arm
/arch/current'
make[1]: Leaving directory `/home/grante/ecos-build/hal/arm
/arch/current'
make -r -C hal/arm/dmrts/current headers
[...]
headers finished
make -r -C hal/arm/arch/current arm.inc
make[1]: Entering directory `/home/grante/ecos-build/hal/arm
/arch/current'
arm-elf-gcc -finline-limit=7000 -mcpu=arm7tdmi -mbig-endian
-Wall -Wpointer-arith
-Wstrict-prototypes -Winline -Wundef -Woverloaded-virtual
-g -O2 -ffunction-sections
-fdata-sections -fno-rtti -fno-exceptions
-I/home/grante/ecos-build/install/include
-I/home/grante/ecos2src-sdk/hal/arm/arch/current -I/home/grante
/ecos2src-sdk/hal
/arm/arch/current/src -I/home/grante/ecos2src-sdk/hal/arm/arch/
current/tests -I. -Wp,
-MD,arm.tmp -o hal_mk_defs.tmp -S /home/grante/ecos2src-sdk
/hal/arm/arch/current/src/hal_mk_defs.c
fgrep .equ hal_mk_defs.tmp | sed s/#// > arm.inc
make[1]: Leaving directory `/home/grante/ecos-build/hal/arm/
arch/current'
make -r -C services/memalloc/common/current
heapgeninc.tcl
make[1]: Entering directory `/home/grante/ecos-build/
services/memalloc/common/current'
arm-elf-gcc -finline-limit=7000 -mcpu=arm7tdmi -mbig-endian
-Wall -Wpointer-arith
-Wstrict-prototypes -Winline -Wundef -Woverloaded-virtual
-g -O2 -ffunction-sections
-fdata-sections -fno-rtti -fno-exceptions    -I/home/grante/
ecos-build/install/include
-I/home/grante/ecos2src-sdk/services/memalloc/common/
```

```
current -I/home/grante
/ecos2src-sdk/services/memalloc/common/current/src
-I/home/grante/ecos2src-sdk
/services/memalloc/common/current/tests -I. -Wp,
-MD,heapgen.tmp -E /home/grante
/ecos2src-sdk/services/memalloc/common/current/src/
heapgen.cpp -o heapgeninc.tcl
make[1]: Leaving directory `/home/grante/ecos-build/
services/memalloc/common/current'
make -r -C services/memalloc/common/current
heaps.cxx
make[1]: Entering directory `/home/grante/ecos-build/
services/memalloc/common/current'
XPWD=`pwd` ; cd /home/grante/ecos2src-sdk/services/
memalloc/common/current/src ;
sh heapgen.tcl "/home/grante/ecos-build/install" "$XPWD"
make[1]: Leaving directory `/home/grante/ecos-build/
services/memalloc/common/current'
make -r -C hal/arm/arch/current build
make[1]: Entering directory `/home/grante/ecos-build/
hal/arm/arch/current'
arm-elf-gcc -c  -I/home/grante/ecos-build/install/include
-I/home/grante/ecos2src-sdk
/hal/arm/arch/current -I/home/grante/ecos2src-sdk/hal/
arm/arch/current/src
-I/home/grante/ecos2src-sdk/hal/arm/arch/current/tests -I.
-I/home/grante/ecos2src-sdk
/hal/arm/arch/current/src/ -finline-limit=7000 -mcpu=arm7tdmi
-mbig-endian -Wall
-Wpointer-arith -Wstrict-prototypes -Winline -Wundef  -g -O2
-ffunction-sections -fdata-sections
-fno-exceptions   -Wp,-MD,src/hal_misc.tmp -o src/hal_arm
_arch_hal_misc.o /home/grante
/ecos2src-sdk/hal/arm/arch/current/src/hal_misc.c
arm-elf-gcc -c  -I/home/grante/ecos-build/install/include
-I/home/grante/ecos2src-sdk/hal
/arm/arch/current -I/home/grante/ecos2src-sdk/hal/arm
/arch/current/src -I/home/grante
/ecos2src-sdk/hal/arm/arch/current/tests -I. -I/home/grante/
ecos2src-sdk/hal/arm
/arch/current/src/ -finline-limit=7000 -mcpu=arm7tdmi
-mbig-endian -Wall -Wpointer-arith
-Wstrict-prototypes -Winline -Wundef  -g -O2
-ffunction-sections -fdata-sections  -fno-exceptions
-Wp,-MD,src/context.tmp -o src/hal_arm_arch_context.o
/home/grante/ecos2src-sdk/hal
/arm/arch/current/src/context.S
[...]
arm-elf-gcc -c  -I/home/grante/ecos-build/install
include -I/home/grante/ecos2src-sdk/net
/snmp/agent/current -I/home/grante/ecos2src-sdk/
net/snmp/agent/current/src -I/home/grante
/ecos2src-sdk/net/snmp/agent/current/tests -I.
-I/home/grante/ecos2src-sdk/net/snmp/agent/
current/src/mibgroup/mibII/ -finline-limit=7000
-mcpu=arm7tdmi -mbig-endian -Wall
-Wpointer-arith -Wstrict-prototypes -Winline
-Wundef  -g -O2 -ffunction-sections -fdata-sections
-fno-exceptions   -D_KERNEL -D__ECOS
-DIN_UCD_SNMP_SOURCE=1 -I/home/grante
/ecos-build/install/include/ucd-snmp -Wp,
-MD,src/mibgroup/mibII/vacm_vars.tmp -o src
/mibgroup/mibII/net_snmp_agent_vacm_vars.o
/home/grante/ecos2src-sdk/net/snmp
/agent/current/src/mibgroup/mibII/vacm_vars.c
arm-elf-ar rcs /home/grante/ecos-build/install/
lib/libtarget.a src/net_snmp_agent_agent
_read_config.o src/net_snmp_agent_agent_
registry.o src/net_snmp_agent_agent_trap.o
src/net_snmp_agent_kernel.o src/net_snmp_
agent_mib_modules.o src/net_snmp_agent_
snmp_agent.o src/net_snmp_agent_snmp_vars.o
src/net_snmp_agent_snmpd.o src/net_
snmp_agent_snmptask.o src/mibgroup/mibII/
net_snmp_agent_helpers.o src/mibgroup
/mibII/net_snmp_agent_system_mib.o src/
mibgroup/mibII/net_snmp_agent
_sysORTable.o src/mibgroup/mibII/net_snmp_
agent_snmp_mib.o src/mibgroup
/mibII/net_snmp_agent_icmp.o src/mibgroup/
mibII/net_snmp_agent_interfaces.o src/mibgroup/
mibII/net_snmp_agent_ip.o src/mibgroup/mibII/net_
```

```
snmp_agent_tcp.o src/mibgroup/mibII/net_snmp_
agent_udp.o src/mibgroup/net_snmp_agent_util_funcs.o
src/mibgroup/mibII/net_snmp_agent_dot3.o src/mibgroup/
snmpv3/net_snmp_agent_usmStats.o src/mibgroup/
snmpv3/net_snmp_agent_usmUser.o src/mibgroup/
snmpv3/net_snmp_agent_snmpEngine.o src/mibgroup
/mibII/net_snmp_agent_vacm_vars.o
make[1]: Leaving directory `/home/grante/ecos-build
/net/snmp/agent/current'
make -r -C hal/common/current /home/grante/
ecos-build/install/lib/extras.o
make[1]: Entering directory `/home/grante/
ecos-build/hal/common/current'
arm-elf-gcc -finline-limit=7000 -mcpu=arm7tdmi
-mbig-endian -Wall -Wpointer-arith -Wstrict-prototypes
-Winline -Wundef -Woverloaded-virtual -g -O2
-ffunction-sections -fdata-sections -fno-rtti
-fno-exceptions   -nostdlib -Wl,-r -Wl,--whole-archive -o
/home/grante/ecos-build/install/lib/extras.o /home
/grante/ecos-build/install/lib/libextras.a
make[1]: Leaving directory `/home/grante/ecos-build/hal/common/current'
make -r -C hal/arm/arch/current /home/grante/ecos-build/install/lib/vectors.o
make[1]: Entering directory `/home/grante/ecos-build/hal/arm/arch/current'
arm-elf-gcc -Wp,-MD,vectors.tmp  -I/home/grante/ecos-build/
install/include -I/home/grante/ecos2src-sdk/hal/arm/arch/
current -I/home/grante/ecos2src-sdk/hal/arm/arch/current/src
-I/home/grante/ecos2src-sdk/hal/arm/arch/current/tests -I.
-finline-limit=7000 -mcpu=arm7tdmi -mbig-endian
-Wall -Wpointer-arith -Wstrict-prototypes -Winline
-Wundef -Woverloaded-virtual -g -O2 -ffunction-sections
-fdata-sections -fno-rtti -fno-exceptions   -c -o /home/
grante/ecos-build/install/lib/vectors.o /home/grante/
ecos2src-sdk/hal/arm/arch/current/src/vectors.S
make[1]: Leaving directory `/home/grante/ecos-build/hal/arm/arch/current'
make -r -C hal/arm/arch/current /home/grante/ecos-build/install/lib/target.ld
make[1]: Entering directory `/home/grante/ecos-build/hal/arm/arch/current'
arm-elf-gcc -E -P -Wp,-MD,target.tmp -xc  -I/home/grante/ecos-build/
install/include -I/home/grante/ecos2src-sdk/hal/arm/arch/current
-I/home/grante/ecos2src-sdk/hal/arm/arch/current/src -I/home/
grante/ecos2src-sdk/hal/arm/arch/current/tests -I. -finline
-limit=7000 -mcpu=arm7tdmi -mbig-endian -Wall -Wpointer-
arith -Wstrict-prototypes -Winline -Wundef -Woverloaded-virtual
-g -O2 -ffunction-sections -fdata-sections -fno-rtti -fno-exceptions
-o /home/grante/ecos-build/install/lib/target.ld /home/grante/
ecos2src-sdk/hal/arm/arch/current/src/arm.ld
make[1]: Leaving directory `/home/grante/ecos-build/hal/arm/arch/current'
build finished
```

You should now have an **install** directory containing include and library files. This directory is all that is needed to compile and build eCos applications.

The install directory tree should contain a large **include** directory tree and a **lib** directory containing a handful of files:

$ tree install

```
install
|-- include
|    |-- arpa
|    |   ....
|    |   `-- tftp.h
|    |-- assert.h
|   ...
|    |-- dhcp.h
|    |-- dirent.h
|    |-- dlfcn.h
|    |-- errno.h
|   ...
|    |-- string.h
|    |-- sys
|   ...
|    `-- unistd.h
`-- lib
     |-- extras.o
     |-- libextras.a
     |-- libtarget.a
     |-- target.ld
     `-- vectors.o

32 directories, 364 files
```

Verifying Installation

This discussion is an overview of how to build all three samples included in the SDK. Detailed instructions are provided for each of the examples in Sample Programs.

1. Copy the sample program files to your hard disk. In this example, they were copied to the user's **home** directory
2. Create a work directory. In this example, **ecos-demo** is the name of the work directory.

   $ mkdir ecos-demo
   $ cd ecos-demo
3. If you have not done so, unpack and install the pre-compiled eCos libraries.
4. Modify the **Makefile** to point to the location of the eCos install directory.
5. Unpack the **demo** sources

   $ tar xzf ~/demo.tar.gz
6. Go to the **demo** subdirectory where you unpacked the source files.

   $ cd demo
7. Remove all previously complied components and object files.

   $ make clean
   $ rm -f netecho.elf serecho.elf netecho.bin serecho.bin netech . .
   $ touch srcdeps
8. Compile source dependencies.

   $ make depend
9. Compile the Sample Program.

   $ make

Sample Programs

The SDK contains several sample application sources. The sample programs are intended to illustrate how you can write programs to use the DeviceMaster. In some cases, you may be able to take portions of the sample source and implement in your application..

Two of the sample applications include web servers.

- The **demoSocketServer.tar.gz**: file is the source tree for SocketServer, a simplified version of the default DeviceMaster application (including the GoAhead web server). See Building the SocketServer Sample Application for instructions on how to build the sample SocketServer server.
- The **goahead.tar.gz** file is the source distribution for the GoAhead web server version 2.1. The source files have been modified in order to fix bugs, add features, and build/run on the DeviceMaster. See Building the GoAhead Webserver for instructions on how to build the webserver sample application.

The third sample application program, **demo.tar.gz**, contains two example eCos applications that demonstrate the use of the DeviceMaster serial driver and the DeviceMaster Ethernet driver. You can review documentation for the Pepperl+Fuchs Comtrol, Inc. serial and Ethernet drivers, and information on the two small sample applications **netecho** and **serecho**. See Building the eCos Sample Applications (Serial and Ethernet) for the build procedures.

Building the SocketServer Sample Application

The **demoSocketServer.tar.gz** file contains the source tree for SocketServer, which is a simplified version of the default DeviceMaster application (including the GoAhead web server).

Use the following procedure to build the sample SocketServer application.

1. If you have not done so, unpack and install the pre-compiled eCos libraries. See Installing the Pre-Compiled (Binary) eCos Libraries.

   Note

   If you already have the eCos libraries installed, or if you built them from sources, you can skip this step, but you must modify the **Makefile** to point to the location of the eCos **install** directory.
2. Copy the gzipped tar files containing the SocketServer source files to your hard disk. In the following example, they were copied to the user's home directory.
3. Create a work directory. This example uses the **ss-demo** directory.

   $ mkdir ss-demo
   $ cd ss-demo
4. Unpack the SocketServer sources.

$ tar xzf ~/demoSocketServer.tar.gz

5. Modify the **Makefile** so that the **ECOS** variable points to the **install** directory containing the eCos object libraries. In this example you should use **ECOS = ../install**.

6. Build SocketServer.

$ cd demoSocketServer
$ make clean

```
rm -f  socket.srec socket.bin socket.elf  *.o *~ *.lst *.map
\#*\# *.bin *.elf10 core *.bak .*~ for d in snmp socketServer webserv
webpages admin ; do make -C $d clean; done
make[1]: Entering directory `/WORK/demoSocketServer/snmp'
rm -f  *.o *~ *.lst *.map \#*\# *.bin *.elf10 core *.bak .*~
make[1]: Leaving directory `/WORK/demoSocketServer/snmp'
make[1]: Entering directory `/WORK/demoSocketServer/socketServer'
rm -f  *.o *~ *.lst *.map \#*\# *.bin *.elf10 core *.bak .*~
make[1]: Leaving directory `/WORK/demoSocketServer/socketServer'
make[1]: Entering directory `/WORK/demoSocketServer/webserv'
rm -f  *.o *~ *.lst *.map \#*\# *.bin *.elf10 core *.bak .*~
make[1]: Leaving directory `/WORK/demoSocketServer/webserv'
make[1]: Entering directory `/WORK/demoSocketServer/webpages'
rm -f  *.o *~ *.lst *.map \#*\# *.bin *.elf10 core *.bak .*~
make[1]: Leaving directory `/WORK/demoSocketServer/webpages'
make[1]: Entering directory `/WORK/demoSocketServer/admin'
rm -f  *.o *~ *.lst *.map \#*\# *.bin *.elf10 core *.bak .*~
make[1]: Leaving directory `/WORK/demoSocketServer/admin'
make -C goahead/ECOS clean
make[1]: Entering directory `/WORK/demoSocketServer/goahead/ECOS'
rm -f webs libwebs.a ../asp.d ../balloc.d ../base64.d ../default.d
../ejlex.d ../ejparse.d ../form.d ../h.d ../handler.d ../mime.d ../misc.d
../page.d ../ringq.d ../rom.d ../sock.d ../sockGen.d ../security.d
../sym.d ../uemf.d ../url.d ../value.d ../webs.d ../websuemf.d
../websda.d ../md5c.d main.d webserv.d websupp.d
../asp.o ../balloc.o ../base64.o ../default.o ../ejlex.o
../ejparse.o ../form.o ../h.o ../handler.o ../mime.o ../misc.o
../page.o ../ringq.o ../rom.o ../sock.o ../sockGen.o
../security.o ../sym.o ../uemf.o ../url.o ../value.o
../webs.o ../websuemf.o ../websda.o ../md5c.o ../*.lst
rm -f main.o webrom.c webcomp web_files .depend *.lst
make[1]: Leaving directory `/WORK/demoSocketServer/goahead/ECOS'
```

7. Compile the source dependencies.

$ make depend

```
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -M -I/WORK/
demoSocketServer/../ecos-build/install/include -D__ECOS
main.c watchdog.cxx commands.c portmon.c >.srcdeps
for d in snmp socketServer webserv webpages admin ;
do touch $d/.srcdeps; make -C $d depend; done
make[1]: Entering directory `/WORK/demoSocketServer/snmp'
gcc -M -I/WORK/demoSocketServer/../ecos-build/install
/include -D__ECOS  snmp.c >.srcdeps
make[1]: Leaving directory `/WORK/demoSocketServer/snmp'
make[1]: Entering directory `/WORK/demoSocketServer/socketServer'
gcc -M -I/WORK/demoSocketServer/../ecos-build/install/
include -D__ECOS  server.c flash.c >.srcdeps
make[1]: Leaving directory `/WORK/demoSocketServer/socketServer'
make[1]: Entering directory `/WORK/demoSocketServer/webserv'
gcc -M -I/WORK/demoSocketServer/../ecos-build/install
/include -I/WORK/demoSocketServer/goahead -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DOS="eCos"
-DECOS -D__NO_FCNTL=1 -DDIGEST_ACCESS_SUPPORT
websupp.c webserv.c  telnetserv.c >.srcdeps
make[1]: Leaving directory `/WORK/demoSocketServer/webserv'
make[1]: Entering directory `/WORK/demoSocketServer/webpages'
gcc -M -I/WORK/demoSocketServer/../ecos-build/install/include
-I/WORK/demoSocketServer/goahead -D__ECOS  -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DOS="eCos" -DECOS
-D__NO_FCNTL=1 -DDIGEST_ACCESS_SUPPORT
webcomp.c >.srcdeps
make[1]: Leaving directory `/WORK/demoSocketServer/webpages'
make[1]: Entering directory `/WORK/demoSocketServer/admin'
gcc -M -I/WORK/demoSocketServer/../ecos-build/install
/include -D__ECOS  tadmin.c madmin.c >.srcdeps
make[1]: Leaving directory `/WORK/demoSocketServer/admin'
```

8. Perform a make to build the demo applications.

$ make

```
make -C snmp
make[1]: Entering directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/snmp'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o snmp.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk
/DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -D__ECOS  snmp.c
cp snmp.o app.o
make[1]: Leaving directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/snmp'
make -C socketServer
make[1]: Entering directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/socketServer'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o server.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk
/DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -D__ECOS  server.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o flash.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -D__ECOS  flash.c
arm-elf-ld -EB -i -o app.o server.o flash.o
make[1]: Leaving directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/socketServer'
make -C webserv
make[1]: Entering directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/webserv'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o webserv.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer
/goahead -D__ECOS  -DWEBS -DUEMF -DWEBS_PAGE_ROM -DOS="eCos"
-DECOS -D__NO_FCNTL=1 -DDIGEST_ACCESS_SUPPORT webserv.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o websupp.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer
/goahead -D__ECOS  -DWEBS -DUEMF -DWEBS_PAGE_ROM
-DOS="eCos" -DECOS -D__NO_FCNTL=1 -DDIGEST_ACCESS
_SUPPORT websupp.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o telnetserv.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer
/goahead -D__ECOS  -DWEBS -DUEMF -DWEBS_PAGE_ROM
-DOS="eCos" -DECOS -D__NO_FCNTL=1 -DDIGEST_ACCESS
_SUPPORT telnetserv.c
arm-elf-ld -EB -i -o app.o webserv.o websupp.o telnetserv.o
make[1]: Leaving directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/webserv'
make -C webpages
make[1]: Entering directory `/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/webpages'
gcc -o webcomp -O2 -I ../goahead -DWEBS -DUEMF  -DUNIX  webcomp.c
webcomp.c: In function 'compile':
webcomp.c:121: warning: comparison of distinct pointer types lacks a
cast echo root/images/blackbanner.gif root/images/DMLogo.jpg root/images
/ecos-logo.gif root/images/goahead-logo.gif root/images/DMAirLogo.jpg
root/editPort.asp root/home.asp root/netCfg.asp root/netSaved.asp
root/portSaved.asp root/resetUnit.asp root/style.css | tr ' ' '\n'
> web_files
./webcomp root web_files >webrom.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o webrom.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/DeviceMaster_Apps
/SocketServer/Source/demoSocketServer/../ecos-build/install/include
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/Source
/demoSocketServer/goahead -D__ECOS  -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DOS="eCos" -DECOS -D__NO_FCNTL=1
-DDIGEST_ACCESS_SUPPORT webrom.c
cp webrom.o app.o
make[1]: Leaving directory `/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/webpages'
make -C admin
make[1]: Entering directory `/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/admin'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o tadmin.o
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/DeviceMaster_Apps
/SocketServer/Source/demoSocketServer/../ecos-build/install/include
-D__ECOS  tadmin.c arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o madmin.o
```

```
-fverbose-asm -Wall -O2 -I/home/grante/comtrol/sdk/DeviceMaster_Apps
/SocketServer/Source/demoSocketServer/../ecos-build/install
/include -D__ECOS  madmin.c
arm-elf-ld -EB -r -o app.o tadmin.o madmin.o
make[1]: Leaving directory `/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/admin'
make -C goahead/ECOS
make[1]: Entering directory `/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/goahead/ECOS'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../asp.o
-fverbose-asm -Wa,-ahlsn=../asp.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I..
-Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include -ffunction-sections
-fdata-sections -Wp,-MD,../asp.d ../asp.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../balloc.o
-fverbose-asm -Wa,-ahlsn=../balloc.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_
ACCESS_SUPPORT -DOS="eCos" -DECOS -D__
ECOS -D__NO_FCNTL=1 -I.. -Wall -I/home/grante/comtrol/
sdk/DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -ffunction-sections -fdata-sections
-Wp,-MD,../balloc.d ../balloc.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../base64.o
-fverbose-asm -Wa,-ahlsn=../base64.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS
_SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_
FCNTL=1 -I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps
/SocketServer/Source/demoSocketServer/../ecos-build/install/
include -ffunction-sections -fdata-sections -Wp,-MD,
../base64.d ../base64.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../default.o
-fverbose-asm -Wa,-ahlsn=../default.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_
SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build
/install/include -ffunction-sections -fdata-sections -Wp,-MD,
../default.d ../default.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../ejlex.o
-fverbose-asm -Wa,-ahlsn=../ejlex.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_
SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install
/include -ffunction-sections -fdata-sections -Wp,-MD,../ejlex.d ../ejlex.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../ejparse.o
-fverbose-asm -Wa,-ahlsn=../ejparse.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS
_SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install/
include -ffunction-sections -fdata-sections -Wp,-MD,../ejparse.d ../ejparse.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../form.o
-fverbose-asm -Wa,-ahlsn=../form.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_
ACCESS_SUPPORT -DOS="eCos" -DECOS -D__ECOS
-D__NO_FCNTL=1 -I.. -Wall -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer/
../ecos-build/install/include -ffunction-sections -fdata-sections
-Wp,-MD,../form.d ../form.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../h.o
-fverbose-asm -Wa,-ahlsn=../h.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_
SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install
/include -ffunction-sections -fdata-sections -Wp,-MD,../h.d ../h.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../handler.o
-fverbose-asm -Wa,-ahlsn=../handler.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS
_SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install/
include -ffunction-sections -fdata-sections -Wp,-MD
,../handler.d ../handler.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../mime.o
-fverbose-asm -Wa,-ahlsn=../mime.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
```

```
SocketServer/Source/demoSocketServer/../ecos-build/install
/include -ffunction-sections -fdata-sections -Wp,-MD,../mime.d ../mime.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../misc.o
-fverbose-asm -Wa,-ahlsn=../misc.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS
_SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install/
include -ffunction-sections -fdata-sections -Wp,-MD,../misc.d ../misc.c
../misc.c: In function `gstrtoi':
../misc.c:662: warning: implicit declaration of function `atoi'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../page.o
-fverbose-asm -Wa,-ahlsn=../page.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I..
-Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install
/include -ffunction-sections -fdata-sections -Wp,-MD,../page.d ../page.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../ringq.o
-fverbose-asm -Wa,-ahlsn=../ringq.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../ringq.d ../ringq.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../rom.o
-fverbose-asm -Wa,-ahlsn=../rom.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_
ACCESS_SUPPORT -DOS="eCos" -DECOS -D__ECOS
-D__NO_FCNTL=1 -I.. -Wall -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer
/../ecos-build/install/include -ffunction-sections -fdata-sections
-Wp,-MD,../rom.d ../rom.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../sock.o
-fverbose-asm -Wa,-ahlsn=../sock.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_
ACCESS_SUPPORT -DOS="eCos" -DECOS -D__ECOS
-D__NO_FCNTL=1 -I.. -Wall -I/home/grante/comtrol/sdk/
DeviceMaster_Apps/SocketServer/Source/demoSocketServer
/../ecos-build/install/include -ffunction-sections -fdata-sections
-Wp,-MD,../sock.d ../sock.c
../sock.c: In function `socketDoOutput':
../sock.c:506: warning: implicit declaration of function `inet_addr'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../sockGen.o
-fverbose-asm -Wa,-ahlsn=../sockGen.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer
/Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../sockGen.d ../sockGen.c
../sockGen.c: In function `socketOpenConnection':
../sockGen.c:134: warning: implicit declaration of function `inet_addr'
../sockGen.c: In function `socketAccept':
../sockGen.c:359: warning: passing arg 3 of `accept'
from incompatible pointer type
../sockGen.c: In function `socketSelect':
../sockGen.c:704: warning: unused variable `len'
../sockGen.c:704: warning: unused variable `nwords'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../security.o
-fverbose-asm -Wa,-ahlsn=../security.lst -I -O2 -D__ECOS
-DWEBS -DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS
_SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I/home/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../security.d ../security.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../sym.o
-fverbose-asm -Wa,-ahlsn=../sym.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
 -I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer
/Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../sym.d ../sym.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../uemf.o
-fverbose-asm -Wa,-ahlsn=../uemf.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../uemf.d ../uemf.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../url.o
-fverbose-asm -Wa,-ahlsn=../url.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
```

```
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../url.d ../url.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../value.o
-fverbose-asm -Wa,-ahlsn=../value.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../value.d ../value.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../webs.o
-fverbose-asm -Wa,-ahlsn=../webs.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../webs.d ../webs.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../websuemf.o
-fverbose-asm -Wa,-ahlsn=../websuemf.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../websuemf.d ../websuemf.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../websda.o
-fverbose-asm -Wa,-ahlsn=../websda.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../websda.d ../websda.c
In file included from ../websda.c:24:
./md5.h:48:20: warning: no newline at end of file
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../md5c.o
-fverbose-asm -Wa,-ahlsn=../md5c.lst -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I.. -Wall
-I/home/grante/comtrol/sdk/DeviceMaster_Apps/SocketServer/
Source/demoSocketServer/../ecos-build/install/include
-ffunction-sections -fdata-sections -Wp,-MD,../md5c.d ../md5c.c
In file included from ../md5c.c:26:
./md5.h:48:20: warning: no newline at end of file
arm-elf-ar rv libwebs.a ../asp.o ../balloc.o ../base64.o
../default.o ../ejlex.o ../ejparse.o ../form.o ../h.o ../handler.o
../mime.o ../misc.o ../page.o ../ringq.o ../rom.o ../sock.o
../sockGen.o ../security.o ../sym.o ../uemf.o ../url.o ../value.o
../webs.o ../websuemf.o ../websda.o ../md5c.o
a - ../asp.o
a - ../balloc.o
a - ../base64.o
a - ../default.o
a - ../ejlex.o
a - ../ejparse.o
a - ../form.o
a - ../h.o
a - ../handler.o
a - ../mime.o
a - ../misc.o
a - ../page.o
a - ../ringq.o
a - ../rom.o
a - ../sock.o
a - ../sockGen.o
a - ../security.o
a - ../sym.o
a - ../uemf.o
a - ../url.o
a - ../value.o
a - ../webs.o
a - ../websuemf.o
a - ../websda.o
a - ../md5c.o
make[1]: Leaving directory `/home/grante/comtrol/
sdk/DeviceMaster_Apps/SocketServer/Source/
demoSocketServer/goahead/ECOS'
make binaries
make[1]: Entering directory `/home/grante/comtrol/
sdk/DeviceMaster_Apps/SocketServer/Source/
demoSocketServer'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c -o main.o
-fverbose-asm -Wall -O2 -D__ECOS  -I/home/grante/comtrol
```

```
/sdk/DeviceMaster_Apps/SocketServer/Source/
demoSocketServer/../ecos-build/install/include main.c
arm-elf-as --gstabs -EB -m arm7tdmi -amhlsnd=boot.lst
-o boot.o boot.s
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o watchdog.o
-fverbose-asm -Wall -O2 -D__ECOS  -I/home
grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/../
ecos-build/install/include watchdog.cxx
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o commands.o
-fverbose-asm -Wall -O2 -D__ECOS  -I/home
/grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer/
../ecos-build/install/include commands.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o portmon.o
-fverbose-asm -Wall -O2 -D__ECOS  -I/home/
grante/comtrol/sdk/DeviceMaster_Apps/
SocketServer/Source/demoSocketServer
/../ecos-build/install/include portmon.c
echo "char linkTimeStamp[] = \"`date`\";"
>linkTimeStamp.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian  -c linkTimeStamp.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-Wl,-Map,socket.elf.map -nostartfiles -L/home/grante/
comtrol/sdk/DeviceMaster_Apps/SocketServer/Source
demoSocketServer/../ecos-build/install/lib -Wl,--gc-sections
-o socket.elf main.o boot.o watchdog.o commands.o
portmon.o snmp/app.o webserv/app.o webpages/app.o
 goahead/ECOS/libwebs.a socketServer/app.o  admin
/app.o linkTimeStamp.o -Ttarget.ld -nostdlib
arm-elf-objcopy -O srec socket.elf socket.srec
arm-elf-objcopy -O binary socket.elf socket.bin
make[1]: Leaving directory `/home/grante/comtrol/
sdk/DeviceMaster_Apps/SocketServer/Source/
demoSocketServer'
```

9. Verify that the installation files copied.

$ ls -l

```
total 9324
-rwxr-xr-x 1 grante users    2428 Jan  1 11:07 Makefile
drwxr-xr-x 2 grante users    4096 Jan  1 11:10 admin
-rwxr-xr-x 1 grante users     843 Jun  3  2004 assert.h
-rw-r--r-- 1 grante users     323 Jan  1 11:10 boot.lst
-rw-r--r-- 1 grante users     828 Jan  1 11:10 boot.o
-rwxr-xr-x 1 grante users     138 Jun  3  2004 boot.s
-rwxr-xr-x 1 grante users   16555 Jun  3  2004 commands.c
-rwxr-xr-x 1 grante users     768 Jun  3  2004 commands.h
-rw-r--r-- 1 grante users   37292 Jan  1 11:10 commands.o
-rwxr-xr-x 1 grante users    4030 Apr  7  2004 dbgthreads.cxx
-rwxr-xr-x 1 grante users    2089 Apr  7  2004 dm.README
-rwxr-xr-x 1 grante users    2153 Jun 29  2004 dm.h
drwxr-xr-x 9 grante users    4096 Jan  1 11:10 goahead
-rwxr-xr-x 1 grante users     562 Jun  3  2004 ident.h
-rw-r--r-- 1 grante users      55 Jan  1 11:10 linkTimeStamp.c
-rw-r--r-- 1 grante users    1704 Jan  1 11:10 linkTimeStamp.o
-rw-r--r-- 1 grante users       0 Jan  1 11:11 ls.out
-rwxr-xr-x 1 grante users   14505 Jun 29  2004 main.c
-rw-r--r-- 1 grante users   50952 Jan  1 11:10 main.o
-rw-r--r-- 1 grante users   18060 Jan  1 11:10 make.out
-rwxr-xr-x 1 grante users     198 Apr  7  2004 memconfig.ld
-rwxr-xr-x 1 grante users     997 Apr  7  2004 memconfigDRAM0_Flash100.s
drwxr-xr-x 2 grante users    4096 Jul  2  2004 myextension
-rwxr-xr-x 1 grante users    4130 Jun  3  2004 portmon.c
-rw-r--r-- 1 grante users   35084 Jan  1 11:10 portmon.o
drwxr-xr-x 2 grante users    4096 Jan  1 11:10 snmp
-rwxr-xr-x 1 grante users  639076 Jan  1 11:10 socket.bin
-rwxr-xr-x 1 grante users 5627800 Jan  1 11:10 socket.elf
-rw-r--r-- 1 grante users 1133670 Jan  1 11:10 socket.elf.map
-rwxr-xr-x 1 grante users 1835046 Jan  1 11:10 socket.srec
drwxr-xr-x 2 grante users    4096 Jan  1 11:10 socketServer
-rwxr-xr-x 1 grante users    3247 Jun  3  2004 state.h
-rwxr-xr-x 1 grante users     447 Jun  3  2004 watchdog.cxx
-rwxr-xr-x 1 grante users     112 Jun  3  2004 watchdog.h
-rw-r--r-- 1 grante users    5392 Jan  1 11:10 watchdog.o
drwxr-xr-x 3 grante users    4096 Jan  1 11:10 webpages
drwxr-xr-x 2 grante users    4096 Jan  1 11:10 webserv
```

You may download the resulting ELF binary (the file named **socket.elf**) using GDB, or use RedBoot to load the binary (**socket.bin**) or S-Record (**socket.srec**) versions of the file. See Downloading a Program to locate procedures for downloading files into the DeviceMaster.

Building the GoAhead WebServer

The goahead.tar.gz file contains the source distribution for the GoAhead web server version 2.1. The source files have been modified to:

- Fix bugs
- Add features
- Build/run on DeviceMaster

Use the following procedure to build the sample demo server.

Note

Before you perform this procedure, you should closely review the GoAhead WebServer License.

1. If you have not done so, unpack and install the pre-compiled eCos libraries. See Installing the Pre-Compiled (Binary) eCos Libraries.

   Note

   If you already have the eCos libraries installed, or if you built them from sources, you can skip this step, but you must edit the **Makefile** and change the value of **PKG_INSTALL_DIR** so that it contains the path of the eCos **install** directory.

2. Copy the GoAhead source files to your hard disk. In this example, they were copied to the user's home directory.
3. Create a work directory, in this example, we-demo.

   $ mkdir ws-demo
   $ cd ws-demo

4. Unpack the GoAhead sources.

   $ tar xzf ~/goahead.tar.gz

5. Build the demonstration web server.

   $ cd goahead/ECOS

6. Compile the sample program.

   $ make

```
arm-elf-as --gstabs -EB -m arm7tdmi   -o boot.o boot.s
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../asp.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../asp.d ../asp.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../balloc.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../balloc.d ../balloc.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../base64.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../base64.d ../base64.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../default.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../default.d ../default.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../ejlex.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../ejlex.d ../ejlex.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../ejparse.o -fverbose-asm -I -O2 -D__ECOS
```

```
-DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../ejparse.d ../ejparse.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
 -o ../form.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../form.d ../form.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../h.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../h.d ../h.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../handler.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../handler.d ../handler.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../mime.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../mime.d ../mime.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c -o ../misc.o
-fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../misc.d ../misc.c
../misc.c: In function `gstrtoi':
../misc.c:662: warning: implicit declaration of function `atoi'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../page.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../page.d ../page.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../ringq.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../ringq.d ../ringq.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../rom.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../rom.d ../rom.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../sock.o -fverbose-asm -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_
SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_
FCNTL=1 -I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../sock.d ../sock.c
../sock.c: In function `socketDoOutput':
../sock.c:506: warning: implicit declaration of function `inet_addr'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -c
-o ../sockGen.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../sockGen.d ../sockGen.c
../sockGen.c: In function `socketOpenConnection':
../sockGen.c:134: warning: implicit declaration of function `inet_addr'
../sockGen.c: In function `socketAccept':
../sockGen.c:359: warning: passing arg 3 of `accept' from
incompatible pointer type
../sockGen.c: In function `socketSelect':
../sockGen.c:704: warning: unused variable `len'
../sockGen.c:704: warning: unused variable `nwords'
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../security.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
 -I.. -Wall -I../../install/include -ffunction-sections
```

```
-fdata-sections -Wp,-MD,../security.d ../security.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../sym.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
 -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../sym.d ../sym.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../uemf.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../uemf.d ../uemf.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../url.o -fverbose-asm -I -O2 -D__ECOS
 -DWEBS -DUEMF -DWEBS_PAGE_ROM
-DDIGEST_ACCESS_SUPPORT -DOS="eCos"
-DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../url.d ../url.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../value.o -fverbose-asm -I -O2 -D__ECOS
-DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../value.d ../value.c
gcc -o webcomp -O2 -DWEBS -DUEMF -DUNIX -I.. ../webcomp.c
../webcomp.c: In function 'compile':
../webcomp.c:121: warning: comparison of distinct pointer
types lacks a cast
find ../web -name "*.*" >web_files
./webcomp ../web web_files >webrom.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o webrom.o -fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
 -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,webrom.d webrom.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../webs.o -fverbose-asm -I -O2 -D__ECOS
-DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
 -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../webs.d ../webs.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../websuemf.o -fverbose-asm -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_
SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../websuemf.d ../websuemf.c
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../websda.o -fverbose-asm -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../websda.d ../websda.c
In file included from ../websda.c:24:
../md5.h:48:20: warning: no newline at end of file
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian
-c -o ../md5c.o -fverbose-asm -I -O2 -D__ECOS -DWEBS
-DUEMF -DWEBS_PAGE_ROM -DDIGEST_ACCESS_
SUPPORT -DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1
-I.. -Wall -I../../install/include -ffunction-sections
-fdata-sections -Wp,-MD,../md5c.d ../md5c.c
In file included from ../md5c.c:26:
../md5.h:48:20: warning: no newline at end of file
arm-elf-ar rv libwebs.a ../asp.o ../balloc.o
../base64.o ../default.o ../ejlex.o ../ejparse.o ../form.o ../h.o
../handler.o ../mime.o ../misc.o ../page.o ../ringq.o ../rom.o
../sock.o ../sockGen.o ../security.o ../sym.o ../uemf.o ../url.o
../value.o webrom.o ../webs.o ../websuemf.o ../websda.o ../md5c.o
a - ../asp.o
a - ../balloc.o
a - ../base64.o
a - ../default.o
a - ../ejlex.o
a - ../ejparse.o
a - ../form.o
a - ../h.o
a - ../handler.o
```

```
a - ../mime.o
a - ../misc.o
a - ../page.o
a - ../ringq.o
a - ../rom.o
a - ../sock.o
a - ../sockGen.o
a - ../security.o
a - ../sym.o
a - ../uemf.o
a - ../url.o
a - ../value.o
a - webrom.o
a - ../webs.o
a - ../websuemf.o
a - ../websda.o
a - ../md5c.o
arm-elf-gcc -g -mcpu=arm7tdmi -mbig-endian -o webs.elf
-fverbose-asm -I -O2 -D__ECOS -DWEBS -DUEMF
-DWEBS_PAGE_ROM -DDIGEST_ACCESS_SUPPORT
-DOS="eCos" -DECOS -D__ECOS -D__NO_FCNTL=1 -I..  \
boot.o main.o libwebs.a -nostartfiles -L../../install/lib -Wl,
--gc-sections -Ttarget.ld -nostdlib

$
```

The ROM image of the website directory tree is constructed in a portable but inefficient manner: The webcomp program traverses the tree and generates a C-language file (webrom.c) containing a set of initialized byte arrays containing the directory tree's entire image. Compiling webrom.c may take a long time (several minutes).

7. You may download the resulting ELF binary (the file named **webs.elf**) using a GDB, or convert it to binary or S-Record format for downloading via RedBoot: See Downloading a Program for more information about downloading programs to the DeviceMaster.

   $ arm-elf-objcopy -O binary webs.elf webs.bin
   $ arm-elf-objcoyp -O srec webs.elf webs.srec

Building the eCos Sample Applications (Serial and Ethernet)

The \DMDK\Sample_Apps\Source directory contains two example eCos applications that demonstrate the use of the DeviceMaster serial driver and the DeviceMaster Ethernet driver.

In the example below we'll assume that the user's **home** directory contains the demo.tar.gz and install.tar.gz files.

1. If you have not done so, unpack and install the pre-compiled eCos libraries. See Installing the Pre-Compiled (Binary) eCos Libraries.

2. Install the demo.tar.gz files. This example uses a directory named **ecos-samples** in the users **home** directory:

   $ cd
   $ mkdir ecos-samples
   $ cd ecos-samples
   $ tar xzf ~/demo.tar.gz

3. If the **install** directory is somewhere else, edit the **Makefile** so that the **ECOS** variable points to the location of the **install** directory. The **makefile** in the **demo** directory assumes that the eCos **install** directory is in the same directory as the **demo** directory. For example:

   ECOS = /home/my-ecos-build-dir/install

4. If the **install** directory is somewhere else, edit the **Makefile** so that the **ECOS** variable points to the location of the **install** directory. The **makefile** in the **demo** directory assumes that the eCos **install** directory is in the same directory as the **demo** directory. For example:

   ECOS = /home/my-ecos-build-dir/install

5. Perform a **make depend** to fill in the **srcdeps** files.

   $ cd demo
   $ make depend

```
Generating source dependencies
arm-elf-gcc -mcpu=arm7tdmi -mbig-endian -fverbose-asm -g -Wa,-
ahlsn=.lst -O0 -D__ECOS -I../install/include -M netecho.c
serecho.c >>srcdeps
```

6. Perform a make to build the demo applications.

   $ make

```
arm-elf-gcc -mcpu=arm7tdmi -mbig-endian -c -o netecho.o -fverbose-asm -g
-Wa,-ahlsn=netecho.lst -O0 -D__ECOS -I../install/include -Wall  netecho.c
arm-elf-as --gstabs -EB -m arm7tdmi -amhlsnd=boot.lst  -o boot.o boot.s
```

```
arm-elf-gcc -mcpu=arm7tdmi -mbig-endian -Wl,-Map,
netecho.map -g -Wl,--gc-sections -nostartfiles -L../install/
lib -o netecho.elf  netecho.o boot.o -Ttarget.ld -nostdlib
arm-elf-gcc -mcpu=arm7tdmi -mbig-endian -c -o serecho.o
-fverbose-asm -g -Wa,-ahlsn=serecho.lst -O0 -D__ECOS
-I../install/include -Wall  serecho.c
arm-elf-gcc -mcpu=arm7tdmi -mbig-endian -Wl,-Map,
serecho.map -g -Wl,--gc-sections -nostartfiles -L../install/lib -o
serecho.elf  serecho.o boot.o -Ttarget.ld -nostdlib
arm-elf-objcopy -O binary netecho.elf netecho.bin
arm-elf-objcopy -O binary serecho.elf serecho.bin
arm-elf-objcopy -O srec netecho.elf netecho.srec
arm-elf-objcopy -O srec serecho.elf serecho.srec
```

The file **raw.py** is an example program that may be run on a Linux host that has Python 2.0 or later. It sends Ethernet frames to a DeviceMaster that is running the **netecho** demo application.

If you want to use eCos applications with the custom version of RedBoot, it's convenient if you build your image so that it has an entry point at address 0. That way you can download binary images and used the default start address of 0. Linking with **boot.o** (generated from boot.s) adds that entry point.

If you are downloading S-Record images with RedBoot, or using ELF images with a debugger, then you don't need an entry point at 0 and don't have to include **boot.[so]** in your build process. See Downloading a Program for information about downloading programs to the DeviceMaster.

SDK Procedures

You can use the following list to locate procedures throughout the SDK.

- Installing arm-elf Tools
- Locating Documentation for the SDK: (DeviceMaster, eCos, Cygwin, GNU, bash, make, tar)
- Installing eCos Libraries
- Verifying the Installation
- Using the Diagnostic Serial Port
- Testing Serial Ports
- Downloading a Program
- Saving a Program to Flash ROM
- Default Application
- Using the RedBoot Bootloader

Using the Diagnostic Serial Port

The DeviceMaster circuit board has two diagnostic serial ports. Each port is accessed via 4-Pin header near one end of the board. The signal levels on the headers are not RS-232, and a converter cable is required to convert them to RS-232 levels for use with a standard serial port.

The DeviceMaster circuit board has two diagnostic serial ports. Each port is accessed via 4-Pin header near one end of the board. The signal levels on the headers are not RS-232, and a converter cable is required to convert them to RS-232 levels for use with a standard serial port.

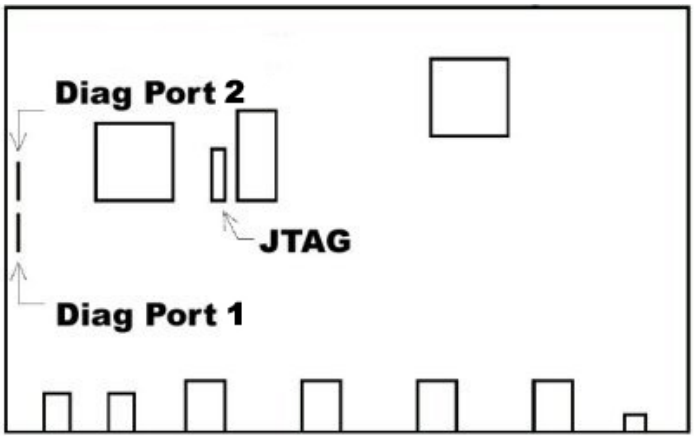
Note

The converter cable is included with the Software Development Kit.

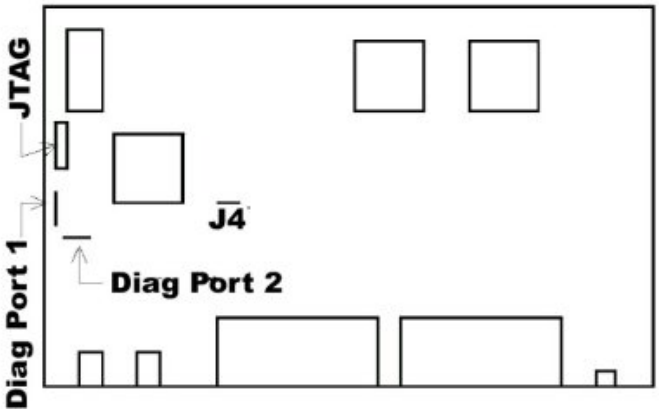
The first diagnostic port is used for diagnostic output from calls to diag_printf(). It is also used by RedBoot as a command console.

The second diagnostic port also functions as a RedBoot console port. The second port can be used for a serial remote GDB connection, see Using GDB with Diagnostic Port 2 . The positions of these connectors are shown in the figures below.

4/8-Port Board (Top View)

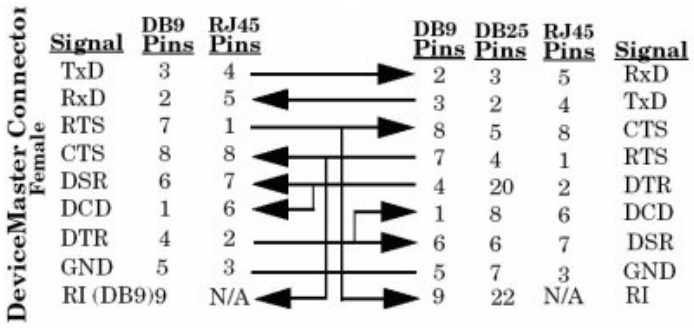


16-Port Board (Top View)



Use the following procedure to set up the diagnostic serial port:

1. Plug the diagnostic cable into the first diagnostic port (Diag Port 1) and connect it to a serial port configured for:
    - 57600 baud
    - 8 data bits
    - no parity
    - 1 stop bit
    - No flow control
2. Connect a null-modem cable from an available COM port on your PC to serial Port 1 on the DeviceMaster.



Note

You may want to purchase or build a straight-through cable and purchase a null-modem adapter.

3. If you monitor the data from that port and cycle power on the DeviceMaster, you should see startup messages from the bootloader and then a prompt:

```
RAM OK
Sum OK
+
```

```
Pepperl+Fuchs Comtrol, Inc. DeviceMaster Boot Version 1.06
RedBoot(tm) debug environment - built 14:18:19, Jul 18 2001
Platform: Pepperl+Fuchs Comtrol, Inc. DeviceMaster (ARM 7TDMI)
Portions Copyright (C) 2000, Red Hat, Inc.
Portions Copyright (C) 2001, Comtrol Corp.
FLASH: 0x05030000 - 0x05400000, 61 blocks of 0x00010000 bytes each.
ks32c5000_eth_init()
found MAC address 00:C0:4E:0B:FF:F9
ks5000_ether: installInterrupts()
EthInit(00:C0:4E:0B:FF:F9)
ks32C5000 eth: 00:C0:4E:0B:FF:F9  Hardware CRC
ks32c5000_eth_start()
IP: 192.168.250.250, Mask: 255.255.255.0, Gateway: 192.168.250.1,
Server: 0.0.0.0
RedBoot>
```

4. At this point you can type bootloader commands. If a default application is configured in flash, and the default application time-out is set (15 seconds), you will see the default application start up after the time-out period:

```
 ARM DeviceMaster HAL (no virtual vectors)
AIOPIC serial driver: 16 channels
ks32c5000 old_init_handler()
Network stack using 262144 bytes for misc space
262144 bytes for mbufs
524288 bytes for mbuf clusters
ks32c5000_eth_init()
found MAC address 00:C0:4E:0B:FF:F9
ks5000_ether: installInterrupts()
EthInit(00:C0:4E:0B:FF:F9)
ks32C5000 eth: 00:C0:4E:0B:FF:F9  Hardware CRC
SocketServer 1.13
Copyright Comtrol Corp. 2001
Build date: Tue Jun 19 12:21:54 CDT 2001

Free RAM at 280700,  Len = 53F900
starting madmin
Bg started
madmin running
madmin MyMacAddr=00:C0:4E:0B:FF:F9
ks32c500 old_set_config_handler()
ks32c5000_eth_start()
IP = 0A000005
Mask = FF000000
Gate = 0A000001
Net init complete.
Net init done
socket server init
socket server active config: 05002000
TcpRx0: waiting on semaphore
TcpTx0 started
[...]
```

Testing Serial Ports

There are two commands that run loopback (internal, RS-232, or RS-422) or port-to-port (RS-485) serial tests.

Loopback Tests (loop)

With a loopback plug connected to a port, the loop command may be used to run a loop-back test in either internal loop-back mode, RS-232 mode or RS-422 mode. In RS-232 mode, modem control lines are also tested. In RS-422 mode and internal loop-back mode, only data paths are tested. If the test fails, a hexadecimal error code is displayed. The first digit of the error code indicates what portion of the test failed. Loop-back error codes are shown in the table below.

Examples of loopback test commands are shown below.

- RS-232 loopback test on Port 2:

  RedBoot> loop 232 2

  ```
  Loopback pass
  ```

- RS-232 loopback test on Port 3:

  RedBoot> loop 232 3

  ```
  - Loopback failed RS-232: 10680
  ```

- Internal loopback test on Port 1:

RedBoot> loop int 1

```
Loopback pass
```

Loopback Error Codes	Code Description
0x1ssss	No data was present in the receive FIFO when there should have been. The channel status register is displayed in the lower 4 digits (ssss).
0x2ssss	An error flag was present when receive data was read.
0x3ttrr	Receive data byte did not match transmit data byte. The transmit data byte is tt and the receive data byte is rr.
0x40000	Receive data was present after the expected last byte.
0x5ssss	CTS signal did not match expected value.
0x6ssss	RI signal did not match expected value.
0x7ssss	DSR signal did not match expected value.
0x8ssss	CD signal did not match expected value.

Port-to-Port RS-485 Test (t485)

Some DeviceMaster models have internal loopback hardware for use by the **loop** command.

For models that do not support the **loopback** command for RS-485 ports an RS-485 cross-over cable must be connected between two different ports on the DeviceMaster.

The **t485** command is used to perform a bi-directional, half-duplex, data-transfer test between two ports. If ports 0 and 4 are connected with an RS-485 crossover cable, the command to perform the test is:

RedBoot> t485 0 4

```
485 pass
```

Testing ports not connected to each other results in a failure:

RedBoot> t485 0 1

```
 - Failed 485 test: 1220008
```

Downloading a Program

There are several methods available for downloading and running a DeviceMaster application:

- RedBoot
  - TFTP via Ethernet (binary file or S-record)
  - X-Modem via RS-232 (binary file or S-record)
- DeviceMaster Utilities
  - PortVision DX (binary, Windows XP through Windows 10)
  - RTS Command-line Updater utility (binary file)
  - **nslinkadmin** program (binary file, Linux only)
- GDB
  - GDB via JTAG interface
  - GDB via remote protocol on Diagnostic Port 2

Each of these will be described. It is also possible to download a program and save it in flash ROM so that it is executed automatically when the DeviceMaster starts.

Using RedBoot

Use the following discussions to download a program using RedBoot. Use Disabling Auto-Load if you want to disable or remove the default application

Disabling Auto-Load

When shipped, the DeviceMaster will be configured so that RedBoot waits for 15 seconds after start-up before loading and running the default application from flash ROM. Since several of the download methods require that RedBoot be running, it may be convenient to disable auto-loading of the default application. You may configure RedBoot to not load a default application from flash ROM either of two ways.

- To ***disable*** the default application, do the following:

  At the RedBoot command prompt, disable default application loading by setting the time-out parameter to zero:

  RedBoot> **timeout 0**

  ```
  Timeout 0 seconds
  RedBoot>
  ```

- To ***delete*** the default application from flash, use the **fis delete** command at the RedBoot prompt:

  RedBoot> **fis delete default**

  ```
  Delete image 'default' - are you sure (y/n)? y
  ... Erase from 0x05030000-0x050c0000: .........
  ... Erase from 0x053f0000-0x05400000: .
  ... Program from 0x007a0000-0x007b0000 at 0x053f0000: .
  +
  RedBoot>
  ```

Locating Further Information

The DeviceMaster platform includes a customized version of the RedBoot bootloader from RedHat. RedBoot is described in detail in Using the RedBoot Bootloader. RedBoot can be used to download application programs using either TFTP (via Ethernet) or X-Modem (via serial port). Examples of loading using the RedBoot load command can be found in Default Application. Once the file is loaded, it may be run using the RedBoot **go** command as shown in Default Application. For more information on using RedBoot on the DeviceMaster platform, see the documents listed below:

- DeviceMaster Installation and Configuration Guide
- eCos Reference Manual (A4 version)

Using DeviceMaster Utilities

There are several DeviceMaster utilities (Linux and Windows) that can also be used to download and run a DeviceMaster applications. Instructions for using the utilities to download are found in the help files.

- PortVision DX

  If you are using a Windows XP through Windows 10 system, you can use PortVision DX to load binary files. PortVision DX is the fastest and easiest way to update binary files, as long as you are connected to the same local network segment. For information about using PortVision DX, refer to the PortVision DX help system or the DeviceMaster Installation and Configuration Guide. You can download the latest version.

- RTS Command Line Updater

  This is a Python program that can be used to download an application.

- nslinkadmin tool (Linux)

  The **nslinkadmin** utility that is included with the Linux NS-Link device driver can be used to download and run a DeviceMaster application that has been converted to a binary file with an entry point at Address 0.

Using the RTS Command Line Updater

The **download.py** file is a Python program that can be used to download an application to the DeviceMaster. The program to be downloaded must be a pure binary file to be loaded starting at address 0x00000000. The RTS Command Line Updater is provided in the SDK.

Usage

download.py [-r] [-q] [-s] [-g] [hostname] [filename]

Options

The following table describes download.py options.

Option	Descriptions

Option	Descriptions
-r Reset	Sends a **reset** command to the DeviceMaster before it is downloaded. This is required if the DeviceMaster is running the SocketServer or NS-Link application. This is not required if RedBoot is already running (LED is flashing).
-q	Quiet mode -- do not display address and byte count as program is loaded.
-s	Skip vectors -- skips the first 0x20 bytes in the file. This is required if the downloaded program is to be debugged using GDB.
-g	Go. After downloading start execution of the program at address 0x00000000.

Using download.py with GDB

When debugging with GDB via diagnostic serial port, downloading large applications can take a long time. It is possible to speed up the process by downloading the application binary file via Ethernet before starting GDB. This process uses a small download utility written in Python. The download.py program has been tested under Cygwin and Linux. The procedure is shown below:

1. Connect serial cable to Diagnostic Port 2.
2. Make sure RedBoot is running (status LED should be flashing at about 2 Hz). If necessary, cycle power to reset the DeviceMaster.
3. Use the **download.py** program to download (but not start) the program. Use the **-s** option to tell **download.py** to skip downloading the vector table since overwriting the vector table will confuse RedBoot:

   $ download.py -s 10.0.0.12 socket.bin

   ```
   320:1400
   1720:1400
   3120:1400
   [...]
   564520:1400
   565920:1400
   567320:1120
   downloaded 568440 bytes

   $ _
   ```

   At this point, RedBoot should still be running (status LED flashing).
4. Start GDB.

   $ agdb -b 57600

   ```
   GNU gdb 5.1.1
   Copyright 2002 Free Software Foundation, Inc.
   GDB is free software, covered by the GNU General Public License, and you are
   welcome to change it and/or distribute copies of it under certain conditions.
   Type "show copying" to see the conditions.
   There is absolutely no warranty for GDB.  Type "show warranty" for details.
   This GDB was configured as "--host=i586-pc-linux-gnu --target=arm-elf".
   The target is assumed to be big endian
   0x007c6968 in ?? ()
   (gdb)
   ```
5. Load symbol info:

   (gdb) sym socket.elf

   ```
   Reading symbols from socket.elf...done.
   ```
6. Set the starting address:

   (gdb) set $pc = reset_vector

   ```
   Current language: auto; currently asm
   ```
7. Set a breakpoint:

   (gdb) tbreak cyg_user_start

   ```
   Breakpoint 1 at 0x91c: file main.c, line 70.
   ```
8. Begin execution with the continue command:

   (gdb) cont

   ```
   Continuing.
   ```

```
[New Thread 0]
[Switching to Thread 0]
cyg_user_start () at main.c:70
70        LedOff();
Current language:  auto; currently c
(gdb)
```

To reload the application, exit GDB, reset the DeviceMaster, and repeat the process. It is not possible to download via network while a GDB session is active.

Using nslinkadmin

The nslinkadmin utility that is included with the Linux NS-Link device driver can be used to download and run a DeviceMaster application that has been converted to a binary file with an entry point at Address 0. The **nslinkadmin** program must run as root in order to access an Ethernet interface in raw mode. Therefore, you must be logged in as root or have **nslinkadmin suid** root. There are two ways to run nslinkadmin: interactive mode and command-line mode. For more information, see the **nslinkadmin(8)** manual page.

Interactive Mode

If your DeviceMaster is connected to an Ethernet interface other than **eth0**, use the **-d** option to specify the interface:

 # /usr/sbin/nslinkadmin -d eth1

```
Using network device 'eth1'
Checking network for any possible remotes.
1) 00:c0:4e:0b:ff:f9  DeviceMaster          (idle,free)
q) quit
->_
```

If you have more than one DeviceMaster connected to the Ethernet network, the list shows each DeviceMaster found. Select the appropriate device by entering the corresponding number:

```
->1
Other Pepperl+Fuchs Comtrol, Inc. Hub: 00:c0:4e:0b:ff:f9
IP Utility
?                        Display help information.
ig                       Get/display flash IP config
ic                       Get/display current IP config
is <addr> <mask> <gate>  Set IP info
ie                       Erase IP info
l                        Load the remote.
s                        Start the remote.
z                        Shortcut for l, s
r                        Reset the remote.
x <filename>             Load and start the specified file.
q                        Quit the test.
->_
```

To download and start a DeviceMaster application, enter x followed by the file name of the binary file:

-> x serecho.bin

```
Loading remote
.............................................................
Starting remote
->_
```

While loading, a "**.**? displays for each packet downloaded. Once the file is downloaded, it starts automatically. Once the application starts, NS-Link will no longer be able to communicate with the DeviceMaster. To exit **nslinkadmin**, enter **q** and press the **Return** key.

Command Line Mode

Downloading using nslinkadmin in non-interactive command-line mode is done by specifying command line switches:

NSLINKADMIN COMMAND LINE SWITCHES	DESCRIPTION
-d <ethdev>	Controls the ethernet interface used: eth0 (default), eth1, etc.
-e <macaddr>	Specifies the Ethernet address of the DeviceMaster device in xx:xx:xx:xx:xx:xx format.
-f <binfile>	Specifies the path of the file to be downloaded.
-l	Tells nslinkadmin to load and run the file.

For example:

nslinkadmin -d eth1 -e 00:c0:4e:0b:ff:f9 -l -f serecho.bin

Using GDB

This section discusses the following topics:

- The gdbinit file (next)
- Running GDB

The gdbinit File

The **.gdbinit** file that is included in the **demo** application package assumes that we are using a JTAG interface that uses the RDI protocol over UDP/IP (such as the EPI Jeeni), and that hostname for the JTAG interface is jeeni.

If you are using a serial or serial/parallel connection to your JTAG interface, or the hostname for your JTAG interface is not jeeni, you must edit the **.gdbinit** file and modify the **target** command before running GDB

When GDB is started, it reads an initialization file from the current directory. This file contains GDB commands that are executed just as they would be if they were entered at the GDB command prompt.

Note

Under UNIX, .**gdbinit** is the name of this file. Under Cygwin, GDB with the Insight GUI reads a file named **gdb.ini** instead of **.gdbinit**.

In the examples below, several macros were used that were defined in the **.gdbinit** file contained in the **demo.tar.gz** package:

1. Turn off paging of GDB output:.

```
1  set width 0
2  set height 0
```

2. Turn of RDI/ADP heartbeat feature; it does not seem to work with either the Jeeni or the EmbeddedICE JTAG interface units.

```
3  set rdiheartbeat off
```

3. Tell the debugger that we have ROM at zero to prevent it from automatically setting breakpoints on the interrupt vectors:

```
4  set rdiromatzero on
5
```

4. Define the **resetcpu** macro:

```
6  # macro to "reset" the processor to a known state
7  # mostly just shut of the timers and disable all
8  # of the interrupts
9
10  define resetcpu
11    # map internal SRAM to 3fe0000
12    # map special regs to  3ff0000
13    # cache disabled
14    set *0x7ff0000 = 0x83ffffa0
15
16    # shut off timers
17    set *0x7ff6000  = 0
18
19    # set all port pins to input (disabling WD timer)
20    set *0x7ff5000  = 0
21
22    # disable WD in dallas part
23    set *(char*)0x760800f &= 0xfc
24
25    # shut off Ethernet MAC and BDMA
26    set *0x7ffa000 = 0
27    set *0x7ffa004 = 0
28    set *0x7ffa008 = 0
29    set *0x7ffa010 = 0
30
31    set *0x7ff9000 = 0
32    set *0x7ff9004 = 0
33    set *0x7ff9008 = 0
34    set *0x7ff900c = 0
35
36    # reset UARTS
37    set *0x7ffc000 = 0
38    set *0x7ffc004 = 0
39    set *0x7ffd000 = 0
40    set *0x7ffd004 = 0
```

```
41
42    # disable/clear interrupts
43    set *0x7ff4000 = 0
44    set *0x7ff4008 = 0xffffffff
45    set *0x7ff4004 = 0xffffffff
46  end
47
```

5. Define the **memconfig** macro. The **memconfig** program is linked so that it runs in the 8K SRAM that is built into the Samsung uController. This will not work if the cache is enabled, so do a **resetcpu** first to disable cache.

```
48  # macro to load memory config program into SRAM and run it
49
50  define memconfig
51    delete
52    symbol-file memconfig
53    load memconfig
54    tbreak __memoryConfigDone
55    cont
56    symbol-file
57  end
```

6. Define a macro that loads a program and sets breakpoints on the interrupt vectors. Note the display command at the end of the macro – that will tell GDB to evaluate and display the expression *(char*)0x760800f &= 0xfc every time execution is stopped. That expression disables the watchdog timer in the Dallas DS1511W – thus preventing the board from being reset while you are trying to decide what to do next after a breakpoint has been hit.

```
59  define reload-with-break
60    resetcpu
61    delete
62    symbol-file
63    symbol-file $arg0
64    load $arg0
65    break *0x00
66    break *0x04
67    break *0x08
68    break *0x0c
69    break *0x10
70    break *0x14
71    break *0x18
72    break *0x1c
73    display   *(char*)0x760800f &= 0xfc
74  end
75
The same macro without the breakpoints on the interrupt vectors.
76  define reload
77    resetcpu
78    delete
79    symbol-file
80    symbol-file $arg0
81    load $arg0
82    display   *(char*)0x760800f &= 0xfc
83  end
84
85  # the "display *(char*)0x760800f &= 0xfc" will disable the
86  # watchdog timer in the Dallas Semi part whenever execution
87  # stops (when breakpoint is hit or when the user stops the
88  # program.)  If we don't do this, the board will reset after
89  # a breakpoint has been hit.
90
```

7. Pick which set of register names you like:

```
91  set dis std
92
8.      Make sure the debugger knows we're running big-endian:
93  set endian big
```

8. The **target** command tells the debugger what protocol (rdi) and communications link (ethernet) we are going to use.

```
94  # target rdi /dev/ttyS0 19200
95  # target rdi s=/dev/ttyS0,p=/dev/par0 19200
96  target rdi e=jeeni
```

9. The **target** command tells the debugger what protocol (rdi) and communications link (ethernet)

10. Force the CPU into a benign state using the macro we defined above:

```
98  resetcpu
99
```

Running GDB

This example will show how to use GDB to run a program via the JTAG interface. If you do not have a JTAG interface, please read and understand the differences between using the JTAG (Using GDB with the JTAG Interface) and serial port (Using GDB with Diagnostic Port 2) interfaces.

First we will start GDB in non-Window mode so that we can show the commands and their output.

1. If you are using the insight GUI for GDB, enter the commands shown below in the console window.

   $ arm-elf-gdb -nw

```
GNU gdb 5.0
Copyright 2000 Free Software Foundation, Inc.
GDB is free software, covered by the GNU General Public License,
and you are welcome to change it and/or distribute copies of it
under certain conditions.
Type "show copying" to see the conditions.
There is absolutely no warranty for GDB.  Type "show warranty" for
details.
This GDB was configured as "--host=i586-pc-linux-gnu --target=arm-elf".
JEENI (ADP,ARM7TDI,RST) Rev 2.2
Rebuilt on Jan 12 2001 at 14:22:34
SN=0102J069 ENET=00:80:CF:00:0C:CD IP=10.0.0.100 (255.255.0.0)
Connected to ARM RDI target.
(gdb)
```

2. Run the **resetcpu** macro which will put the CPU into a known state:

   (gdb) resetcpu

3. Load the **serecho** program using the reload macro.

   (gdb) reload serecho

```
Warning: the current language does not match this frame.
Loading section .rom_vectors, size 0x44 lma 0x340
Loading section .text, size 0x27cf4 lma 0x384
Loading section .rodata, size 0x167f lma 0x28078
Loading section .data, size 0x1610 lma 0x296f8
Loading section .boot, size 0x4 lma 0x0
Start address 0x384 , load size 174539
Transfer rate: 465437 bits/sec, 505 bytes/write.
```

4. Set a temporary breakpoint at the **cyg_user_start()** function:

   (gdb) tbreak cyg_user_start

```
Breakpoint 1 at 0x99c: file serecho.c, line 72.
```

5. Start execution with the continue command:

   (gdb) c

```
Continuing.
cyg_user_start () at serecho.c:72
72        diag_printf("Entering cyg_user_start() function\n");
1: *(char *) 123764751 &= 252 = 128 '\200'
Current language:  auto; currently c
We hit the breakpoint and stopped (at Line 72 in serecho.c).
If we were using a GUI, the source window would show
serecho.c with Line 72 highlighted.
```

6. Continue (no breakpoints are set, so it will run until you enter **Ctrl-C** to stop it).

   (gdb) c

```
Continuing.
```

7. Press **Ctrl-C**, and the emulator stops the processor:

```
JEENI: halt request
JEENI: halted
RDI_execute: you pressed Escape

Program received signal SIGINT, Interrupt.
idle_thread_main (data=1040807) at /opt/ecos/ecos-cvs/ecos/
packages/kernel/current/src/common/thread.cxx:1148
1148    /opt/ecos/ecos-cvs/ecos/packages/kernel/current/
src/common/thread.cxx: No such file or directory.
1: *(char *) 123764751 &= 252 = 128 '\200'
```

```
Current language:  auto; currently c++
(gdb)
```

In the example, the program was stopped in the built-in eCos idle task. This is typical, since the program does not do much and will spend most of its time idle. Since we do not have the eCos source files installed, the debugger can not display the source file line and warns us that it can not find the source file.

8. If you had been watching the output from the diagnostic serial port, you should have seen something like this:

```
ARM DeviceMaster HAL (no virtual vectors)
AIOPIC serial driver: 16 channels
ks32c5000 old_init_handler()
Network stack using 262144 bytes for misc space
262144 bytes for mbufs
524288 bytes for mbuf clusters
ks32c5000_eth_init()
found MAC address 00:C0:4E:0B:FF:F9
ks5000_ether: installInterrupts()
EthInit(00:C0:4E:0B:FF:F9)
ks32C5000 eth: 00:C0:4E:0B:FF:F9  Hardware CRC
Entering cyg_user_start() function
0: Beginning execution
2: Beginning execution
3: Beginning execution
4: Beginning execution
5: Beginning execution
6: Beginning execution
7: Beginning execution
8: Beginning execution
9: Beginning execution
10: Beginning execution
11: Beginning execution
12: Beginning execution
13: Beginning execution
14: Beginning execution
15: Beginning execution
1: Beginning execution
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 337263
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 338232
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 338233
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 338232
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 338234
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 338234
Bytes transferred: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  -- Idle Loops/Sec: 338229
```

Using GDB with the JTAG Interface

The example in Running GDB shows how to use GDB to run a program via the JTAG interface.

The main things to make note of the example are:

- Use the **target rdi e=jeeni** command instead of the target remote command. Replace with the device name of the serial port connected to the second diagnostic port (e.g. /dev/ttyS0).
- To use JTAG debugging, make sure that the shorting jumper is placed on Pins 1 and 2 of the three-pin header on the DeviceMaster board (J1 on 4/8-port boards or J4 on the 16-port board that has one Ethernet port). Location of the jumpers is shown in Using the Diagnostic Serial Port.

Note

Contact Technical Support for information about the DeviceMaster 1-port or DeviceMaster 16 or 32-port devices with one Ethernet port..

Using GDB with Diagnostic Port 2

If you do not have a JTAG interface, it is possible to use the GDB stubs via the GDB remote protocol that is implemented by the RedBoot bootloader. ***Using GDB via Diag Port 2*** is similar to using GDB via JTAG, but changes to the GDB initialization file (**.gdbinit** or **gdb.ini**) will need to be made. The differences are:

- Use the **target remote <dev>** command instead of the **target rdi** command. Replace ***<dev>*** with the device name of the serial port connected to the second diagnostic port (e.g. ***/dev/ttyS0***).
- Start GDB with the command line flag ***\tt -b 57600*** to specify the proper baud rate.
- Do not execute the ***resetcpu*** or ***memconfig*** macros that were shown in the sample ***.gdbinit*** file. The GDB stubs in the Bootloader will insure that the processor and memory controller are in the proper states.
- When starting an eCos program, you must set a breakpoint and stop execution somewhere after the eCos initialization code. The ***cyg_user_start*** function is a good place. If you load an eCos program and do a continue without any breakpoints, you will not be able to stop execution of the eCos application. After you have stopped at a breakpoint and then resumed execution you can

interrupt the eCos application and return control to the debugger at any time by pressing ***Control-C***, sending GDB a ***SIGINT*** signal, or pressing the stop button in Insight.

The easiest way to do this is to add the command tbreak ***cyg_user_start*** if 0 to the end of the ***reload*** macro (or whatever macro you use to load an eCos application). This will place a temporary breakpoint at the ***cyg_user_start*** function, but when that breakpoint is reached, execution will continue immediately because the condition if 0 is not true.

Saving a Program to Flash ROM

Once you have debugged your DeviceMaster application, you may want to save it in the DeviceMaster flash ROM so that it can be automatically executed when the DeviceMaster starts up. If you do this, your application will replace the existing SocketServer application that is present in the DeviceMaster flash ROM when it is shipped from the factory.

Note

You can change back to the SocketServer default application if you want to later.

The procedure for downloading a DeviceMaster application and saving it to flash as the default application is shown in Using RedBoot to Update SocketServer.

Note

Alternative methods for loading applications is available in Using DeviceMaster Utilities

Default Application

The DeviceMaster version of RedBoot will wait for a configured number of seconds after startup for connections from a host. If no connection from a host is made, the bootloader will look for a file named default in the flash file system. If a file named default exists, it will be loaded and executed. If a host initiates a download or if the dis command is entered during the waiting period, the default program will not be loaded.

Here is an example of the commands used to load a program from a TFTP server and save it in flash as the default application:

RedBoot> fis delete default

```
Delete image 'default' - are you sure (y/n)? y
... Erase from 0x05030000-0x050c0000: .........
... Erase from 0x053f0000-0x05400000: .
... Program from 0x007a0000-0x007b0000 at 0x053f0000: .
```

RedBoot> load -v -h 192.168.1.2 socket.srec

```
Entry point: 0x00000384, address range: 0x00000000-0x000718a8
```

RedBoot> fis create default

```
... Erase from 0x05030000-0x050b0000: ........
... Program from 0x00000000-0x000718a9 at 0x05030000: ........
... Erase from 0x053f0000-0x05400000: .
... Program from 0x007a0000-0x007b0000 at 0x053f0000: .
RedBoot>
```

If you wish to permanently disable the default application, use the fis delete command to delete it from the flash file system (example shown in **fis delete**).

To update the bootloader, load and execute the **burn-redboot** program that contains code to update the bootloader flash. This can be done by downloading a **.bin** file using one of the utilities provided with the SDK (PortVision DX, TFTP, the command line **download.py** utility, or the GUI download utility). It can also be done by downloading a **.srec** file using RedBoot.

For example:

RedBoot>load -v -h 192.168.4.3 burn-redboot.srec

```
Entry point: 0x00000000, address range: 0x00000000-0x000228d8/
```

RedBoot>go

```
Diag StartupburnId=0089,8897flash_erase_region(05010000,65536)sector
erase 05010000sector erase 05020000flash_program_buf(05010000,000028D8,65536)ROM
= 05000000done -- resetting...
```

At this point the bootloader has been updated, and the board should reset and run the new bootloader

Using the RedBoot Bootloader

DeviceMasters run a bootloader based on RedHat's RedBoot program. In addition to the DeviceMaster compatible TCP and MAC mode network interfaces RedBoot provides a boot console interface that can be used to perform various functions.

This page provides examples of more commonly used RedBoot commands. Refer to the RedBoot Command Overview or the eCos Reference Manual for additional information about commands.

- View/modify board configuration
- Executing a program
- HTTP authentication method
- Loading a file via (Ethernet TFTP, Ethernet (TCP), or Serial port)
- Load file from flash
- Save file to flash
- Test serial port

Board Configuration Commands

These functions are performed via a command-line interface that is accessible via external serial Port 0, the 4-pin debug header (57.6K, 8, none), or by telnet. When connected to the debug header or telnet you should see a RedBoot> prompt.

Note

The start-up messages are displayed only on the 4-pin diagnostic head and will not be visible via telnet unless the version command is entered.

The external console port will be disabled on power-up. In order to start console services on that port, the string **#!DM** must be the first thing received on that port after power-up. When that string has been seen, the port will be enabled and a prompt will be displayed. A password is required for telnet access, but no password is required for serial port access.

```
Pepperl+Fuchs Comtrol, Inc. DeviceMaster Boot Version 0.01
RedBoot(tm) debug environment - built 17:28:09, Mar  7 2001
Platform: Pepperl+Fuchs Comtrol, Inc. DeviceMaster (ARM 7TDMI)
Portions Copyright (C) 2000, Red Hat, Inc.
Portions Copyright (C) 2001, Comtrol Corp.
RAM: 0-7C0000
Id=0089,8897
FLASH: 0x05030000 - 0x05400000, 61 blocks of 0x00010000 bytes
each.
ks32C5000 eth: 00:C0:4E:0B:FF:FA  Hardware CRC
IP: 192.168.1.23, Default server: 0.0.0.0
RedBoot>
```

To see a list of available commands, type help followed by a carriage-return. Optionally, you can refer to the ***RedBoot Procedures*** section in the DeviceMaster Installation and Configuration Guide.

RedBoot> **help**

The board configuration commands are **auth**, **boardrev**, **ip**, **mac**, **model**, **password**, **telnet**, and **timeout**. Typing the command displays the current value of that configuration item. The command with a parameter will set the configuration item value.

Note

For security reasons, the password command will not display the current password. If the password command is used with no parameters, the password will be set to the empty string.

Flash Image System

RedBoot implements a rudimentary file system that allows program and data files to be stored in flash. The are various **fis** commands that can be used to manipulate this file system. Typing **fis** followed by a carriage-return will display a list of sub-commands:

fis [create **[-b base_address] [-l addr] [-s] [-f] [-e] [-r]] [**delete**] free] [init] [**list**] [**load **[-b] [-c] name]**

```
RedBoot> fis
*** invalid 'fis' command: too few arguments
Usage:
fis create -b  -l [-s] [-f] [-e] [-r]
fis free
fis init [-f]
fis list [-c]
fis load [-b] [-c] name
```

fis create

The **fis create** command is used to store a region of RAM as a file in flash ROM. The basic form of the command is:

RedBoot> fis create -b 0 -l 0x10000 foobar

```
... Erase from 0x05030000-0x05040000: .
... Program from 0x00000000-0x00010000 at 0x05030000: .
... Erase from 0x053f0000-0x05400000: .
... Program from 0x007a0000-0x007b0000 at 0x053f0000: .
```

fis list

RedBoot> **fis list**

```
Name              FLASH addr   Mem addr    Length      Entry
point
FIS directory     0x053F0000   0x053F0000  0x00010000  0x00000000
foobar            0x05030000   0x00000000  0x00010000  0x00000000
RedBoot>
```

It is also possible to specify a program entry point with the **-e** option and a specific location for the file in flash ROM with the **-f** option. If no address or length is specified, it will use the address and length of the S-Record file most recently loaded to RAM via serial port or Ethernet..

fis delete

The **fis delete** command is used to delete a file from flash:

RedBoot> **fis delete default**

Delete image 'default' - are you sure (y/n)? y

```
... Erase from 0x05030000-0x050b0000: ........
... Erase from 0x053f0000-0x05400000: .
... Program from 0x007a0000-0x007b0000 at 0x053f0000: .

Length Entry point 0x053F0000 0x00010000 0x00000000
```

RedBoot> **fis list**

```
 Name              FLASH addr   Mem addr    Length      Entry
point
FIS directory     0x053F0000   0x053F0000  0x00010000  0x00000000
RedBoot>
```

fis list

The **fis list** command displays a directory of the files currently stored in flash ROM:

RedBoot> **fis list**

```
 Name               FLASH addr   Mem addr    Length      Entry point
FIS directory     0x053F0000   0x053F0000  0x00010000  0x00000000
default              0x05030000   0x00000000  0x00080000  0x00000384
RedBoot>
```

The FIS directory entry will always be there and is the file in which flash ROM bookkeeping information is stored. The default file is the program that will be run by RedBoot on startup. This is described further in Default Application. The **list**, **delete**, and **create** commands are the most frequently used.

fis load

The **fis load** command loads a file from flash ROM into RAM:

RedBoot> **fis load foobar**

Executing a Program

The **go** command is used to execute a program. If no starting address is provided as a parameter to the **go** command, the entry address of the last file loaded into RAM will be used.

go [[-w <timeout>] [entry]]

load [[-r]] [[-h ip]] [filename]

```
RedBoot> load -r -h 10.0.0.2 socket.bin
Defaulting to entry point of 0x00000000.
Raw load done: 542101 bytes read
Address range: 00000000-00084594, Entry point: 00000000,
RedBoot> go
```

```
ARM DeviceMaster HAL (no virtual vectors)
AIOPIC serial driver: 16 channels
[...]
```

If you wish to specify an entry point, you may do so:

```
RedBoot>  load -r -h 10.0.0.2 socket.bin
Defaulting to entry point of 0x00000000.
Raw load done: 542101 bytes read
Address range: 00000000-00084594, Entry point: 00000000,
RedBoot>  go 0x384
ARM DeviceMaster HAL (no virtual vectors)
AIOPIC serial driver: 16 channels
[...]
```

Note

eCos application have two entry points: 0 and 0x384. The instruction at address 0 is a jump to 0x384.

HTTP Authentication

Controls the type of authentication required for HTTP access.

auth { [noaccess] [none] [basic] [md5] [invalid] }

HTTP Authentication Types	Description
noaccess	No HTTP access will be allowed; access forbidden error will be returned.
none	No authentication will be required.
basic	Plain text password authentication required
md5	MD5 encrypted password authentication required.
invalid	No HTTP access will be allowed; invalid URL error will be returned.

```
RedBoot>  auth
Auth: none
RedBoot>  auth basic
Auth: basic
RedBoot
```

The value of this setting is not used by RedBoot since it does not contain a web server. This setting is merely saved in I2C EPROM as a service to applications.

Loading a File

load [{-r}] [{-v}] [{-h <host>}] [{-m {TFTP | xyzmodem}] [{-b <base_addr>} <file_name>]

It is possible to load a program or data file into RAM from three sources: serial port (the 4-pin diagnostic header or external Port 0), Ethernet (from a TFTP server or via TCP), or from flash ROM on the DeviceMaster board. Loading from flash ROM is described in fis load. Loading from serial port or Ethernet is done using the **load** command. Files loaded with the **load** command default to Motorola S-Record format (which must end with a single “Entry-Point﷯? record).

It is possible to load a binary file with the **load** command by using the **-r** and **-b** options.

Loading via Ethernet TFTP

Loading a file from a TFTP server is done by using the **-h** option to load:

RedBoot> **load -v -h 192.168.1.2 socket.srec**

```
Entry point: 0x00000384, address range: 0x00000000-0x000718a8
RedBoot>
```

The **-v** option will cause a spinning status indicator to be displayed as the file is loaded. Do not use the **-v** option when connected via telnet. If you are loading a raw binary file, use the **-r** option.

Loading via Ethernet TCP

Loading a file via TCP can be done by connecting to the telnet server (TCP Port 23), logging in, and issuing a **load -m d** command. The telnet server will then expect to read an S-record file as input. Each line read will be acknowledged with a single line feed character. When the last line in the S-record file (which must be an Entry-Point record) has been processed, a load summary prints

Loading via Serial Port

Loading An S-record file via a serial port is done with a **load** command specify either xmodem or ymodem protocol.

RedBoot> **Load -m ymodem**

Start the ymodem transfer program.

```
Entry Point: 0x00000384, Address Range: 0x00000000-0x000718a8
    RedBoot>
```

It is also possible to load a binary file via x-modem. binary download will be approximately 2-3 times faster except for sparse files. the entry point for a binary file will be the base address specified in the **load** command (or a default of 0 if no entry point is specified). For DeviceMaster eCos executables, the base address should be normally 0:

RedBoot> **Load -b 0 -r -m X**

```
Start X-modem Download
Crc Mode, 4085(Soh)/0(Stx)/0(Can) Packets, 2 Retries
    RedBoot>
```

RedBoot Command Overview

The DeviceMaster boards run a bootloader based on RedHat's RedBoot program. In addition to the DeviceMaster compatible TCP and MAC mode network interfaces RedBoot provides a boot console interface that can be used to perform various functions:

REDBOOT COMMANDS	DESCRIPTION

Autoload time-out	Sets the number of seconds after network initialization that the bootloader will wait before starting the default application program from flash ROM. A time-out value of 0 will disable auto-loading of the default application. The maximum value is 255 seconds.
	timeout [{seconds}]
	`RedBoot> timeout`
	`Timeout 9 seconds`
	`RedBoot> timeout 5`
	`Timeout 5 seconds`
	`RedBoot>`

Board revision	Sets or displays the board revision. Do not change the board revision of a DeviceMaster.
	`boardrev`
	`RedBoot> boardrev`
	`BoardRev 7`

Cache	The **cache** command is ignored in the DeviceMaster Bootloader, the Bootloader is always cache disabled. **cache [[ON |] [off]]**
Chassis type	The **chassis** command displays the hardware chassis type (DeviceMaster PRO, DeviceMaster RTS or DeviceMaster UP)
Checksum	The **cksum** command computes and displays the POSIX 32-bit CRC checksum of the specified region.
Disable	Executing the **disable** command will prevent the Bootloader from loading the default application after the initial timeout period (which is set using the **timeout** command). **disable**

dump	The **dump** command is used to display the contents of memory. The starting address of the region to be displayed is specified with the **-b** option (required). The length of the region to be displayed is specified with the **-l** option (defaults to 32-bytes).
	dump [-b <location>] [-l <length>]
	`RedBoot> dump -b 0x10 -l 64`
	`0x00000010: E59F F018 0000 0000  E59F F018 E59F F018`
	`  |.....|`
	`0x00000020: FFFF FFFF 007C 058C  007C 0610 007C 0648`
	`  |.....|...|...|.H|`
	`0x00000030: 007C 06C4 FFFF FFFF  007C 07AC 007C 0794`
	`  |.|.....|...|..|`

REDBOOT COMMANDS	DESCRIPTION

Flash Image System (**fis**)	RedBoot implements a rudimentary file system that allows program and data files to be stored in flash. The are various **fis** commands that can be used to manipulate this file system. Typing **fis** followed by a carriage-return will display a list of sub-commands:
	
	fis [create **[-b base_address] [-l addr] [-s] [-f] [-e] [-r]] [**delete**] free] [init] [**list**] [**load **[-b] [-c] name]**
	
	`RedBoot> fis`
	`*** invalid 'fis' command: too few arguments`
	`Usage:`
	`fis create -b -l [-s] [-f] [-e] [-r]`
	`fis free`
	`fis init [-f]`
	`fis list [-c]`
	`fis load [-b] [-c] name`
	
	See Using the RedBoot Bootloader and Downloading Programs for **fis** procedures.

Executing a program	The **go** command is used to execute a program. If no starting address is provided as a parameter to the go command, the entry address of the last file loaded into RAM will be used. It is possible to load a program or data file into RAM from three sources: serial port (the 4-pin diagnostic header or external Port 0), Ethernet (from a TFTP server or via TCP), or from flash ROM on the DeviceMaster board.
Help	The **help** command displays a list of available commands and a short usage specification for each command.
History	The **history** command displays the command history buffer.
HTTP authentication method	Controls the type of authentication required for HTTP access. auth **{ [noaccess] [none] [basic] [md5] [invalid] }**

IP configuration	Setting the IP address to 255.255.255.255 disables IP networking. Setting the IP address to 0.0.0.0 causes the bootloader to use **BOOTP** to request an IP address.
	
	ip [{ip_addr] [ip_mask] [ip_gateway}]
	
	`RedBoot> ip`
	`IP Config: IpAddr=192.168.1.23 IpMask=255.255.255.0 IpGate=192.168.1.1`
	`RedBoot> ip 10.23.4.12 255.255.0.0 10.23.1.1`
	`IP Config: IpAddr=10.23.4.12 IpMask=255.255.0.0 IpGate=10.23.1.1`
	
	If only one parameter is provided to the IP command, the IP address value will be changed and the mask and gateway will be unaffected. Changes to IP configuration will take effect after reset.

Loading a file	The load command loads files into the DeviceMaster. **load [{-r}] [{-v}] [{-h <host>}] [{-m {TFTP | xyzmodem}] [{-b <base_addr>} <file_name>]** It is possible to load a program or data file into RAM from three sources: serial port (the 4-pin diagnostic header or external Port 0), Ethernet (from a TFTP server or via TCP), or from flash ROM on the DeviceMaster board. Loading from flash ROM is described in fis load. Loading from serial port or Ethernet is done using the **load** command. Files loaded with the **load** command default to Motorola S-Record format (which must end with a single "Entry-Point?? record). It is possible to load a binary file with the **load** command by using the **-r** and **-b** options.
Loopback test	The **loop** command runs a loopback test using an external RS232/422 loopback plug or (if supported) using the internal loopback feature of a single port.

MAC address	Sets or displays the MAC (Ethernet) address. Do not change the MAC address of a DeviceMaster.
	
	mac
	
	`RedBoot> mac`
	`MAC: 00 C0 4E 0B FF FA`
	`RedBoot>`

Memory compare	The **mcmp** command compares two blocks of memory.
Memory copy	The **mcopy** command copies a block of memory to a destination address.
Memory display	The **x** command displays (examines) memory contents in hex.
Memory fill	The **mfill** command fills a region of memory with a specified value.

REDBOOT COMMANDS	DESCRIPTION

Model number	The model number is used by applications to determine what hardware features are available on the board. Do not change the model number of a DeviceMaster.
	
	model
	
	`RedBoot> model`
	`Model 5002120`
	`RedBoot>`

Password	Changes the DeviceMaster password used to authenticate telnet and HTTP access. Unlink other commands, the **password** command will not display the current value of the password. The **password** command always sets the value of the password. The password length is limited to 15 characters.
	
	password [{password}]
	
	`RedBoot> password`
	`Password ''`
	`RedBoot>  password FooBar1`
	`Password 'FooBar1'`
	`RedBoot>`

Ping	The **ping** command sends ICMP ping requests to the specified address and displays the results.
Reset	The **reset** command uses the watchdog timer hardware to perform a hardware reset of the DeviceMaster. **reset**
Secure config enable	The **secureconf** command sets/shows the state of the secure configuration flag. If enabled, configuration changes will only be allowed via a secure connection (https, ssl, ssh).
Secure data enable	The **securedata** command sets/shows the secure data enable flag. If enabled, serial port data will only be transferred via secure connection (ssl).
SNMP enable	The **snmp** command enables/disables the SNMP agent in the standard SocketServer and NS-Link applications.

Telnet enable/disable	Allows the user to enable or disable telnet access to the DeviceMaster.
	
	telnet [[disable | enable]]
	
	Accepted values are **enable** and **disable**:
	
	`RedBoot>  telnet`
	`Telnet enable`
	`RedBoot>  telnet disable`
	`Telnet disable`

Telnet timeout	The **teltimeout** command sets/shows the idle timeout setting for telnet connections.
Terse mode	In order to provide a console interface more amenable to programmatic control, the bootloader may be put into terse mode. **terse** The significant features of terse mode are: • No prompt is issued. • Command strings are not echoed • All responses consist of a single line. If the command was successful, the response string begins with "+ ?. If the command failed, the response string begins with "- ?. Pepperl+Fuchs Comtrol, Inc. recommends that supervisory programs written to the interface with the DeviceMaster bootloader ignore lines that do not begin with "+ ? or "- ? in case bugs in some commands improperly display diagnostic information.
Test RS-485 Ports	The **t485** command runs a port-to-port test of two RS-485 ports.

Version	The **version** command displays the bootloader version and build date:
	
	`RedBoot> version`
	`Comtrol DeviceMaster Boot Version 1.11`
	`RedBoot(tm) debug environment - built 11:00:47, Feb 25 2002`

REDBOOT COMMANDS	DESCRIPTION

	`Platform: Comtrol DeviceMaster (ARM 7TDMI)`
	`Portions Copyright (C) 2000, Red Hat, Inc.`
	`Portions Copyright (C) 2001, Comtrol Corp.`

Documentation

The following documentation is available for the SDK:

- Cygwin
- DeviceMaster documentation
- eCos
- GNU

Cygwin Documentation

DOCUMENT	FILES	DESCRIPTION
Cygwin User's Guide Revision 20.1.0; 1999-02-08	http://www.cygwin.com	The User Guide provides overview and installation information. It also includes information about using and programming Cygwin.

DeviceMaster Documentation for the SDK

DOCUMENT	FILES	DESCRIPTION
DeviceMaster Ethernet Device Driver Rev B		This document describes the DeviceMaster Ethernet device driver for eCos. The driver supports the Ethernet controller built in to the Samsung KS32C5000A and S3C4510 ARM micro-controllers.
DeviceMaster SocketServer Extension Guide Rev B		This document describes information about how to add functionality to the sample SocketServer.
DeviceMaster Nserial Device Driver Rev B		This document describes the nserial device driver for eCos. The driver provides a high-level API that user applications can use to access the DeviceMaster serial ports.
DeviceMaster Installation and Configuration Guide Rev F		The DeviceMaster Installation and Configuration guide contains installation and configuration procedures.

eCos Documentation

DOCUMENT	FILES				DESCRIPTION
eCos Component Writer's Guide	2001	Letter size version	A4 size version		This guide discusses eCos architecture. You can download this document from the eCos web site.
eCos Reference Manual	1998-2003 Ed.	Letter size version	A4 size version		The eCos Reference Manual includes information about Redboot. RedBoot can be used to configure or update the DeviceMaster in the event that you cannot use PortVision DX. The DeviceMaster Installation and Configuration Guide provide basic information about using RedBoot with the DeviceMaster. You can download this document from the eCos web site.

Document	Files		Description
eCos User Guide	2003 Letter size version A4 size version		The eCos User Guide contains installation, programming, and configuration information. You can download this document from the eCos web site.

GNU Documentation

Document	Files		Description
GNU: Using as	v2.19		This discusses the GNU assembler.
GNU: bash	http://oreilly.com		You can also locate information about bash from these sites: • http://www.tldp.org/LDP/Bash-Beginners-Guide/Bash-Beginners-Guide.pdf • http://www.tldp.org/LDP/abs/abs-guide.pdf
GNU: libbfd; The Binary File Descriptor Library	1st Edition		This discusses the GNU binary file descriptor library (libbfd).
GNU: Binary Utilities	v2.19: October 2008		This discusses GNU binary utilities.
GNU: The C Preprocessor	April 2001		This discusses the C preprocessor.
GNU: Debugging with gdb	Ninth Edition		This discusses debugging with gdb.
GNU: Using the GNU Compiler Collection	23 May 2004		This discusses using the GNU compiler collection.
The GNU linker	v2.19		This discusses the invocation, linker scripts, .machine dependent features, and bfd.
GNU:make			You can locate information about make from the GNU site.
GNU Coding Standards	July 22, 2007		This discusses the GNU coding standards.
GNU: tar			You can locate information about make from the GNU site.

Troubleshooting

Review the following information before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

The following checklist may help you diagnose your problem:

- Verify that you are using the correct types of cables on the correct connectors and that all cables are connected securely. See the DeviceMaster Installation and Configuration Guide for up-to-date cabling information.

  Note

  Most customer problems reported to Pepperl+Fuchs Comtrol, Inc. Technical Support are eventually traced to cabling or network problems.

- Make sure that you have updated the DeviceMaster with the latest Bootloader version.
- Make sure that the serial device settings have been selected in the NS-Link driver, and if necessary, the DeviceMaster ***Server Configuration*** web page to match the serial device that you are connecting to the port.
- If you have a spare DeviceMaster try replacing the DeviceMaster.

For additional troubleshooting, you can refer to the Pepperl+Fuchs Comtrol, Inc. forum or contact Pepperl+Fuchs Comtrol, Inc. Technical Support . You may want to refer to the SDK Customer Support Policy before calling Technical Support for assistance beyond SDK installation.

SDK Customer Support Policy

Comtrol will provide free of charge, support on the installation of the DeviceMaster Software Developer kit.

Support beyond normal installation is provided on a per hour fee-for-services basis.

The fee for support is $100 per hour with a $200 minimum per case.

Customers wishing support on a fee-for-services basis must be pre-approved by Comtrol prior to receiving support. Please contact Comtrol Customer Service for more information regarding fee based support.

Contact Information

Download Page

Make sure that you installed the latest software. If you have not done so, check the Pepperl+Fuchs Comtrol, Inc. web site.

Customer Forum

If you are connected to the internet, you can view any available FAQs for your product in the support forum.

Online Support

You can access our online support instead of calling Technical Support. If you have not used this page before, you will need to register using your email address. Pepperl+Fuchs Comtrol, Inc. will email you a response within 24 hours (Monday through Friday).

Knowledge Center

If you are connected to the internet, you can view the Pepperl+Fuchs Comtrol, Inc. Knowledge Center.

Phone Support

You can contact Pepperl+Fuchs Comtrol, Inc. by calling 763-957-6000 (8AM to 6PM CST/USA).

Warranty Registration

Register your product online. You will need the model number, serial number, PO number, and purchase date of the product to complete the registration.

RMA Information

Access the RMA web page where you can locate a phone number to call, submit a request, or email a request to return a product. It also provides the procedures and address information.

Pepperl+Fuchs Comtrol, Inc. Software Packages

This discussion explains how to manipulate a device driver package (compressed driver files) downloaded from the Pepperl+Fuchs Comtrol, Inc. FTP/Web site or from the CD to your system for installation.

Note

If the file extension is **`.bin`** (firmware), the file is not compressed.

The file name of the driver package is called ***pkgname*** in the following procedures. Use the appropriate procedure for your operating system:

- Linux with a **`.tar.gz`** extension
- Windows with a **`.exe`**, **`.msi`**, or **.tar.gz** extension

Linux

Use the following procedure to unpackage compressed tar or gnuzip files in Linux.

1. Download ***pkgname*** or locate the ***pkgname*** on the distribution media and copy it to **`/usr/src`** directory. If downloaded to a DOS system, copy it to a DOS formatted diskette, using one of the following methods:
    - Use the mount command to mount a diskette in order to copy ***pkgname*** to the /usr/src directory. For example: mkdir /dos

      ```
      mount -t msdos /dev/fd0 /dos
      cp /dos/pkgname pkgname.tar.gz/usr/src/pkgname.tar.gz
      umount /dos
      ```

    - Use the **`mcopy`** command to copy ***pkgname*** to the **`/usr/src`** directory on your linux system. For example: **`mcopy a:pkgname/usr/src/pkgname.tar.gz`**

2. In the **/usr/src** directory, use the **tar** command to uncompress and extract the driver files.

```
tar xzvf pkgname.tar.gz
```

This creates a subdirectory (i.e. **Pepperl+Fuchs Comtrol, Inc.**) that contains the device driver and associated files.

For installation instructions, see the driver installation documentation for the driver.

Windows

Use the following procedure to extract driver files with an **.EXE** or **.MSI** extension.

1. Download the **.exe** or **.msi** file or locate the ***pkgname*** on the distribution media and copy it to a temporary directory on your system. For example:

```
c:\Pepperl+Fuchs Comtrol, Inc.
```

2. In the Windows Explorer, double-click on the ***pkgname.exe*** and follow the Extract or Installation wizard.

Note

When unpacking **.tar.gz** files, ***disable smart or automatic handling of line endings for text files***. Otherwise, WinZip will cause breakage by adding carriage returns to line endings.

Software Licenses

The software licences are provided for your reference. You may want to review the latest licence at the appropriate site discussed in the software licence. The DeviceMaster software development kit provides software licenses for:

- Cygwin
- eCos
- GNU
- GoAhead Webserver

Cygwin API Licensing Terms

Most of the tools are covered by the GNU GPL, some are public domain, and others have a X11 style copyright. To cover the GNU GPL requirements, the basic rule is if you give out any binaries, you must also make the source available. For the full details, be sure to read the text of the GNU General Public License (GPL).

This is a copy of CYGWIN_LICENSE from the cygwin sources.

```
==========================================================================
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```

See for the precise Open Source Definition referenced above.
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eCos License

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Preamble

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GoAhead
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2.3 Restrictions on Use.

You may sublicense third parties to use Your Modifications if You enter into a license agreement with such third parties that bind such third parties to all the obligations under this Agreement applicable to You and that are otherwise substantially similar in scope and application to this Agreement (without limiting the protections afforded to GoAhead). You may not rent, lease, or loan the software.

2.4 Documentation.

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3. Trademarks and Brand.

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In consideration for the licenses granted by GoAhead to You herein, You agree to notify GoAhead when You incorporate the GoAhead WebServer in Your product and to inform GoAhead when such product begins to ship. You agree to promote the Original Code by prominently and visibly displaying a graphic of the GoAhead WebServer mark on the initial Web page of Your product that is displayed each time a user connects to it. You also agree that GoAhead may identify your company as a user of the GoAhead WebServer by placing your company logo on its Web site. You may further promote the Original Code by displaying the GoAhead WebServer mark in marketing and promotional materials such as the home page of your Web site or Web pages promoting the product.

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3.4 No Modifications to Server Identification Field.

You agree not to remove or modify the Server identification Field contained in the Response Header as defined in Section 1.7 and 1.8.

4. Term.

This Agreement and license are effective from the time You execute this Agreement until this Agreement is terminated. You may terminate this Agreement at any time by uninstalling or destroying all copies of the Original Code including all binary versions and removing any Modifications to the Original Code existing in any products. This Agreement will terminate immediately and without further notice if You fail to comply with any provision of this Agreement. All restrictions on use, and all other provisions that may reasonably be interpreted to survive termination of this Agreement, will survive termination of this Agreement for any reason. Upon termination, You agree to uninstall or destroy all copies of the Original Code, Modifications, and Documentation.

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Any warranties that by law survive the foregoing disclaimers shall terminate
90 days from the date You received the Original Code.

6. Limitation of Liability.

YOUR SOLE REMEDIES AND GOAHEAD'S ENTIRE LIABILITY ARE SET FORTH ABOVE.
IN NO EVENT WILL GOAHEAD OR ITS DISTRIBUTORS OR DEALERS BE LIABLE FOR DIRECT,
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TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY HAVE
OTHER RIGHTS THAT VARY FROM STATE TO STATE.

7. Indemnification by You.

You agree to indemnify and hold GoAhead harmless against any and all claims, losses,
damages and costs (including legal expenses and reasonable counsel fees)
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products, and any intellectual property rights or other rights or interests
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The Original Code is not fault-tolerant and is not designed, manufactured
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and (iv) in all respects is proprietary data belonging solely to GoAhead
(or its licensor(s)).

10. Governing Law and Interpretation.

This Agreement shall be interpreted under and governed by the laws of the

State of Washington, without regard to its rules governing the conflict of laws. You hereby consent to the exclusive jurisdiction of the state and federal courts located in King County, Washington over any disputes arising out of related to this Agreement. If any provision of this Agreement is held illegal or unenforceable by a court or tribunal of competent jurisdiction, the remaining provisions of this Agreement shall remain in effect and the invalid provision deemed modified to the least degree necessary to remedy such invalidity.

11. Entire Agreement.

This Agreement is the complete agreement between GoAhead and You and supersedes all prior agreements, oral or written, with respect to the subject matter hereof.

If You have any questions concerning this Agreement, You may write to GoAhead Software, Inc., 10900 N.E. 8th Street, Suite 1200, Bellevue, Washington 98004 or send e-mail to info@goahead.com.

GoAhead Software Inc., 10900 NE 8th Street, Suite 1200, Bellevue, WA 98004 (425) 453-1900