## Edition history

<table>
<thead>
<tr>
<th>Date</th>
<th>Changes</th>
<th>Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>020407</td>
<td>Transferred from MWOS14 for 565</td>
<td>WBA</td>
<td></td>
</tr>
<tr>
<td>030226</td>
<td>All Changes in standard docs applied</td>
<td>WBA</td>
<td></td>
</tr>
<tr>
<td>031116</td>
<td>Add HAWK update info</td>
<td>WBA</td>
<td></td>
</tr>
<tr>
<td>031130</td>
<td>Include help files</td>
<td>WBA</td>
<td>From Download Area</td>
</tr>
<tr>
<td>040118</td>
<td>Adapt to HAWK 4.2 / MWOS16</td>
<td>WBA</td>
<td></td>
</tr>
<tr>
<td>0402 15</td>
<td>Add IPV4 / IPV6 stuff</td>
<td>WBA</td>
<td></td>
</tr>
<tr>
<td>050226</td>
<td>Review for multithreaded OS9</td>
<td>WBA</td>
<td></td>
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</table>
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Preface and Warnings

Preface

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This document is edited and printed by:

BALS HW & SW
Wielinger Str. 20
82340 Feldafing
Germany
Phone: +49 8157 900491
Fax: +49 8157 900492
mailto: sba@werner-bals.de

W.B.
## Scope of delivery

### Content:

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS-9000 V2.1 Prof. OS-9000 Board</td>
<td>GER-99991-000</td>
<td>Only available with OAKEMUF HW</td>
</tr>
<tr>
<td>package OAKEMUF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS-9000 V2.2 Prof. OS-9000 Board</td>
<td>GER-99992-000</td>
<td>Only available with OAKEMUF HW complete Hawk 2.4/ PPC 1.5</td>
</tr>
<tr>
<td>package OAKEMUF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Options:

There are different OAKEMUF Board Versions available. They are reflected in different HW-Manuals and also in different directories in the OS-9000 ports.

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAKEMUF</td>
<td></td>
<td>Standard BSP for 4MB Versions new SMSC LAN-driver</td>
</tr>
<tr>
<td>555</td>
<td></td>
<td>Standard BSP for 4MB Version old SMSC LAN driver</td>
</tr>
</tbody>
</table>

### Related products:

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware and freeware OAKEMUF</td>
<td>GER-99993-000</td>
<td></td>
</tr>
<tr>
<td>4MB RAM, 4MB ROM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual OAKEMUF</td>
<td>GER-99994-000</td>
<td></td>
</tr>
</tbody>
</table>
Conventions

If not otherwise specified, addresses are written in hexadecimal notation and identified by a leading 0x.

Signal names preceded by a slash (\n\n) indicate that this signal is either active low or that this signals becomes active with the trailing edge.

General

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>„b“</td>
<td>Bit</td>
<td></td>
</tr>
<tr>
<td>„B“</td>
<td>Byte</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Kilo, means the factor 0x400 = 1024</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Mega, means the factor 0x100000 = 1048576</td>
<td></td>
</tr>
<tr>
<td>MHz</td>
<td>1 000 000 Hertz</td>
<td></td>
</tr>
</tbody>
</table>

Software-specific abbreviations:

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;BS&gt;</td>
<td>Back Space (0x8)</td>
<td></td>
</tr>
<tr>
<td>&lt;CAN&gt;</td>
<td>Control-X (0x19)</td>
<td></td>
</tr>
<tr>
<td>&lt;Ctrl&gt;</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>&lt;CR&gt;</td>
<td>Carriage Return (0xd)</td>
<td></td>
</tr>
<tr>
<td>&lt;ESC&gt;</td>
<td>Escape Character (0x2b)</td>
<td></td>
</tr>
<tr>
<td>&lt;LF&gt;</td>
<td>Line Feed (0xa)</td>
<td></td>
</tr>
<tr>
<td>&lt;SP&gt;</td>
<td>Space (0x20)</td>
<td></td>
</tr>
<tr>
<td>NMI</td>
<td>Non maskable interrupt</td>
<td></td>
</tr>
</tbody>
</table>
How to use this manual

Documentation conventions:

<table>
<thead>
<tr>
<th>Font</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Courier New”</td>
<td>C-Sources or defines or assembler files</td>
<td></td>
</tr>
</tbody>
</table>

Other Conventions
Basic features of OS-9 on MPC555 on OAKEMUF

1. Full implemented .h-structure of processor internals
2. Full implemented .h structure for all internal peripherals like Serial interface, RAM, FLASH, ADC, CAN, TPU, MIOS, SCI, SPI, ...
3. Full support of internal serial peripherals for standard OS-9 interface (term)
4. Complete OS-9000 modules for irq, vector, timer
5. Interrupt level assignment through “piclib” functions in OS9000
6. Using internal decremener for fast ticker
7. Full support of mpc555 internal ram
8. Init process initializing all internal features like chip select, bus interface
9. Coreboot-SW for booting without any additional software
10. Board support package fitting to standard PowerPC support package structure (Hawk 2.1 / PPC1.5) on OAKEMUF board from KANIS
11. HW recommendation list to fit to OS-9000 requirements (vectors in RAM, external RAM and ROM, …)
12. Full Multithread support with new OS-9 PPC 4.2 (new kernel and csl library)

The MPC555 is part of the PowerPC – device family with internal Flash. It also contains all automotive peripherals like Serial, CAN, Timer, … Due to the fixed memory layout and the vector table requirements BALS HW & SW found a special solution for OS-9000. The coreboot created by BALS HW & SW can boot directly without additional Software. The SIU IRQ module supports all internal peripherals. The HW recommendation list contains a description to connect external peripherals (f.e. ethernet controller) to use correct bus access and irq model.
Getting started

This manual contains information about the implementation dependant part of OS-9000-PPC/555
BALS Hardware & Software Systems on KANIS OAKEMUF.

We recommend that you are familiar with the following documentation:

- OAKEMUF HARDWARE Documentation
- OS-9000 User Manual
- OS-9000 PPC specific manual
- OS-9000 Network and Installation manual
- Using standard editor or HAWK for PowerPC
- EBDI-light / EBDS-Software or any other BDM tool
- BDM debug port for Motorola PowerPC on 56x

Preinstalled System

Normally customer orders a complete OAKEMUF system. This system comes up with a preinstalled OS-9000 on Onboard-Flash. You do not need to program the flash before starting.

If you want to use serial line, configure your terminal as follows:
- 9600 baud
- 1 start bit
- 8 data bits
- 1 stop bit
- no parity

After connecting power to the right connector (see HW-Manual) you should see a boot message from the OS-9 Boot loader and after entering a “shell”-prompt from OS-9000 on your terminal.

You can also use Ethernet interface, but watch out the correct IP-Address. (for changing IP-address you should read chapter [IP-Address] “install correct IP-Address” in installing OS-9000.

No Preinstalled System

To install OS-9000 on a new board, not preinstalled by BALS HARDWARE & SOFTWARE you should first bring the software into Onboard-Flash. Therefore you should use EBDI-lite BDM-interface and EBDS-SW (see description on EBDS-disk).

You should do the following steps:
- connect BDM-connector to you OAKEMUF board
- connect EBDI-lite interface with your PC (LPT-connector)
- start EBDS-SW (“ebds.exe”)
- configure EBDS to fit to your application (target 55x, LPT-port, …)
- start Macro OAKEMUF.do to initialize hardware
- use Macro intflash.do to program internal flash
- enter file name of OS-9000 boot image (standard file name is “intflash” from $MWOS\os9000\555\ports\OBK4MBMT\boots\install\portboot-directory
- use Macro extflash.do to program external flash
- enter file name of OS-9000 boot image (standard file name is “rom” from $MWOS\os9000\555\ports\OBK4MBMT\boots\install\portboot-directory) for 555 board version
- disconnect bdm and ebdi lite, restart the system
- connect terminal (OS-9000 should be complete installed now)
Installing OAKEMUF BSP

**Preparation**
Before you install OAKEMUF BSP you must install a standard HAWK for PowerPC CD from Microware/Radisys.

**Install**
OAKEMUF-BSP contains all board related files and tools and also all enhancements to use 555-specific Software on your HAWK system.
If you are ready with HAWK-installation, just copy the complete OAKEMUF-BSP-CD from your CD-ROM-drive to your hard disk. Watch out base directory!

| Attention: All files copied from a CD-ROM are read only! So we recommend to copy the files first to a temporary location and to setup the files to read/write. |

**Help files**
On the OAKEMUF-BSP-CD are also help files, which includes full Radisys documentation for HAWK and C-Compiler use. These files can be found in the $MWOS/DOS/BIN directory.

**Installing EBDS / BDM-SW**
To program onboard-flash and to debug your hardware/software you can also order a BDM-interface and the related software EBDS from MOT-CONSULTING.
You should install this software to your harddisk. We recommend, using this software in a DOS-box of Windows95/98. Under W2000/XP-Workstation EBDS, a special NT-Version is required.
Read the help file for Ebds before use and watch out of hardware-connections with the ebdi-lite interface.
Installing OS-9000

This chapter contains installation instructions for new OS-9000 on OAKEMUF. OS-9000 always contains two parts of software, the coreboot-part and the OS-9000-part.

The coreboot-part is located in:
:\MWOS\OS9000\555\Ports\OBK4MBMT\BOOTS\INSTALL\PORTBOOT directory.
The name of the file is “coreboot”

The OS-9000 part is split into two parts and located in:
:\MWOS\OS9000\555\Ports\OBK4MBMT\BOOTS\INSTALL\PORTBOOT directory.
The name of the system file is rom, the name of the second part is intflash.

The final name depends on the processor-derivative used on the OAKEMUF.

Generating new ROM bootfile

See Microware/Radisys Wizard description on page 14.

Prepare Hardware for OS-9

To run OS-9 you have to use the correct “Reset-Status-Word”.

The complete value is: 0x40000008
The bits in this register are
Installing OS-9000 by

BDM / EBDS

The installation process is done by EBDS-SW using BDM-interface of 555-processors. The board-support-package is supplied with EBDS-SW and EBDI-lite BDM-interface.

To run EBDS compliant to OAKEMUF, you need 3 support files. All of these files are text-files and simply contain commands for EBDS command line interpreter. The three files are:

<table>
<thead>
<tr>
<th>File name</th>
<th>Content</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>555_ini.DO</td>
<td>Initialisation</td>
<td>Init OAKEMUF to run; after OAKEMUF.do you only need to enter “go”</td>
</tr>
<tr>
<td>555ext.do</td>
<td>Program external FLASHROM</td>
<td>Bootrom… ; calls flash555.d5x</td>
</tr>
<tr>
<td>555int.do</td>
<td>Program internal flash of MPC555</td>
<td>Option to put high speed applications and OS-9 parts into internal flash</td>
</tr>
<tr>
<td>xxxxx.do</td>
<td>Program reset status word</td>
<td></td>
</tr>
</tbody>
</table>

To install a complete new board you should do the following steps:
- connect BDM-connector to you OAKEMUF board
- connect EBDI-lite interface with your PC ( LPT-connector)
- start EBDS-SW ( “ebds.exe”)
- configure EBDS to fit to your application ( target 55x, LPT-port, …)
- start Macro OAKEMUF.do to initialize hardware
- use Macro intflash.do to program internal flash
- enter file name of OS-9000 boot image (standard file name is “intflash” from $MWOS/os9000/555/ports/OBK4MBMT/boots/install/portboot-directory
- use Macro extflash.do to program external flash
- enter file name of OS-9000 boot image ( standard file name is “rom” from $MWOS/os9000/555/ports/OBK4MBMT/boots/install/portboot-directory) for 555 board version
- disconnect bdm and ebdi lite, restart the system
- connect terminal (OS-9000 should be complete installed now)

Attention:
With EBDS there is no way to program only part of the external flash.
With the current EBDS macros the rom-image must be less than 1 Mbyte.
To install additional Modules in the external flash use the macro for 2ndmeg

Floating point support:

OS-9000 support floating point in all tasks.
Be careful with floating point in IRQ-service-routines; OS-9000 on OAKEMUF do not support floating-point in IRQ-service-routines in this version.
Microware/Radisys

HAWK

We recommend using the updated HAKW environment supported with this BSP in the directory $MWOS\DOS\BIN.

There are two versions:
- HAWK 2.4-20; this is a simple update for the HAWK running with OAKEMUF without other changes in the target

Microware/Radisys WIZZARD

Wizzard configuration file

The Microware/Radisys Wizzard is controlled by many configuration file.

On the SOURCE-CD there are two important locations with files:

<table>
<thead>
<tr>
<th>Filename</th>
<th>Directory</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Os9p.ini</td>
<td>$MWOS\DOS\BIN</td>
<td>Controlls basic features of OS-9000 wizzard, contains entries for last opened files; In this example, the file shows OAKEMUF directory</td>
</tr>
<tr>
<td>555emuf.ini</td>
<td>$MWOS\OS9000\555\PORTS\OAKEMUF\BOOT\INSTALL\OBK4MBMT</td>
<td>Basic features for this board are fixed in this file</td>
</tr>
</tbody>
</table>

IPV4 / IPV6 differences

HAWK 4.2 support now PIV6. The current installation uses IPv4. Please read HAWK technical manual to modify the merge-lists and you can generate easily a new group of files with IPV6-features.

Generating new ROM bootfiles

To generate the complete ROM you must start Microware/Radisys mwWizzard:
- in the wizzard you will see OAKEMUF entries ( do not forget to copy os9p.ini-file from BSP-CD to your $MWOS\DOS\BIN-directory
- to generate the second part call simple batch job in the PORTBOOT directory 2ndmeg.bat
- to generate the third part ( MPC555 internal Flash) call simple batch job flash555.bat

Bootlists

The Bootlist, which contains all selected modules is located in $MWOS\OS9000\555\PORTS\OBK4MBMT\BOOTS directory and is managed by Microware/Radisys Wizzard.

The standard Bootlists contains all files for OS-9 in external flash.
On MPC555 there is also an internal flash, which can be used for high speed applications. User can also put some OS-9 modules in it.
The Bootlists contains all modules related to this part of merging files; Bootlists uses file-extension .ml.

For detailed information please look in Appendix.
Size restriction

**Attention:** With standard OAKEMUF, the complete system "rom" must not be greater than 1015808 bytes = 0xf8000. The size is fixed in the oak2mb.ini file, so mwWizzard will not accept generating larger bootrom file!

The size of the 2ndmeg.rom is currently also restricted to 1 Megabyte.
OAKEMUF is available with different RAM and ROM sizes. User can define these areas by config.des and romcnfg.h files. Normally no changes are required.

Additional memory accesses are driven by additional CS-pins of MPC555. On OAKEMUF CS are connected to the ACTEL FPGA, which is used for accessing SMC Ethernet controller and additional external devices. All these devices can only be accessed by 16bit transfer! For correct use, 128MB space must be available for every sub-CS on this interface.

All MPC555-CS-features are programmed in sysinit.c file in the ROMCORE directory. These features are activated during Rom boot phase of OS9000. User should be careful when changing CS-features in a system level task while OS9000 is running.

**Memory configuration with MemList:**

The RAM-memory size is set to 4MB per default in the systype.des-file located in $MWOS/OS9000:555:Ports/OBK4MBMT directory. Changing memory size will need a new init-module after changing entries in systype.des:

The entry memlist[0] contains definition of an additional memory space for download / reboot use.

The entry memlist[1] contains definition of part of internal SRAM of MPC555; the other part can be used outside of OS-9000.

The entry memlist[2] contains the start and end address of external memory. The user can generate a new init-module by calling the appropriate makefile in the $MWOS/OS9000:555:Ports/OBK4MBMT\init directory. For further details of INIT module refer to the OS-9000-technical manual.
Example of default.des entries

/* external ram for os use */
init memlist[0] { /* Initialize memory list element */
    type = MEM_SYS; /* memory type code */
    prior = 200; /* memory allocation priority */
    access = B_USERRAM; /* access permissions */
    blksz = 0x400; /* search block size */
    lolim = 0x001e0000; /* beginning absolute address */
    hilim = 0x002e0000; /* ending absolute address */
};

/* problem: cannot use IMMVRBASE here !!! */
/* IMMVRBASE = 0x100 0000 */

/* internal ram */
init memlist[1] { /* Initialize memory list element */
    type = MEM_SYS; /* memory type code */
    prior = 220; /* memory allocation priority */
    access = B_USERRAM; /* access permissions */
    blksz = 0x400; /* search block size */
    lolim = 0x13fc000; /* beginning absolute address */
    hilim = 0x1400000; /* ending absolute address */
};

/* internal flash */
init memlist[2] { /* Initialize memory list element */
    type = MEM_SYS; /* memory type code */
    prior = 0x0; /* memory allocation priority */
    access = B_ROM; /* access permissions */
    blksz = 0x800; /* search block size */
    lolim = 0x01000000; /* beginning absolute address */
    hilim = 0x01070000; /* ending absolute address */
};

/* external ram for download use */
init memlist[3] { /* Initialize memory list element */
    type = MEM_SYS; /* memory type code */
    prior = 0x0; /* memory allocation priority */
    access = B_ROM; /* access permissions */
    blksz = 0x800; /* search block size */
    lolim = 0x001e0000; /* beginning absolute address */
    hilim = 0x001fff00; /* ending absolute address */
};

/* external rom */
init memlist[4] { /* Initialize memory list element */
    type = MEM_SYS; /* memory type code */
    prior = 0x0; /* memory allocation priority */
    access = B_ROM; /* access permissions */
    blksz = 0x800; /* search block size */
    lolim = 0xffffe000; /* beginning absolute address */
    hilim = 0xffffffff; /* ending absolute address */
};

/* end of list */
init memlist[5] { /* Initialize memory list element */
    type = 0; /* memory type code */
    prior = 0x0; /* memory allocation priority */
    access = 0; /* access permissions */
    blksz = 0x0; /* search block size */
    lolim = 0x0; /* beginning absolute address */
    hilim = 0x0; /* ending absolute address */
};

1 Blue lines are for 4MB version
**Piclib function**

The piclib functions allow simple use of interrupts by generating OS-9 descriptors.

The MPC555 piclib supports 8 internal (software) interrupts, generated by SIU and 8 external (hardware) interrupts, generated by external lines on MPC555 and also transferred by SIU to MPC555 core.

The vector numbers supported by MPC555 piclib are in the range of 0x40 up to 0x58. Vector numbers from 0x40 to 0x48 are software level interrupts and vector numbers from 0x50 to 0x58 are hardware level interrupts.

Piclib functions will enable and disable mask bits in SIU of MPC555.
Drivers and Descriptors

This chapter describes the available drivers and descriptors for clock, SCF and ISP-devices. All these modules are in the $MWOS\OS9000\555\PORTS\OBK4MBMT\CMDS\BOOTOBJ$-directory.

Clock-Module

OS-9 ticker
For time slicing, OS-9000 needs a real-time clock that periodically interrupts the CPU and an appropriate driver module to handle the interrupt. For the 555-port the standard decrement timer is used. The related files are:

- tk555
  OS-9000 clock driver module
directory: $MWOS\OS9000\555\PORTS\OBK4MBMT\CMDS\BOOTOBJ$

- tk555.c
  Source
directory: $MWOS\OS9000\sysmods\ticker$

- makefile
directory: $MWOS\OS9000\555\Ports\OBK4MBMT\CLOCK$
makefile to produce new ticker

We recommend, to rename ticker source to for example. tk555v1.c and to produce your own ticker for your purpose.

Realtime clock

The realtime clock on OAKEMUF is driven by OS-9 task.
We recommend to start this task in sysgo-module at startup and to read time/date in this task to setup OS-9 time base.
SCF Drivers and Descriptors

For standard serial I/O the serial interface MPC555 QSM_A module is used. The related files are:
- sc555
  - OS-9000 scf driver for serial interface related to motorola QSM interface
  - directory: $MWOS/OS9000/555/PORTS/OBK4MBMT/CMDS/BOOTOBJ
  - term
    - OS-9000 scf descriptor, available as term and t1 descriptor
      - directory: $MWOS/OS9000/555/PORTS/OBK4MBMT/CMDS/BOOTOBJ/DESC/SC555

Baudrate is configured by descriptor.

QSM Channel B is also available for standard use in OS-9. The related files are:
- sc555b
  - OS-9000 scf driver for serial interface related to motorola QSM interface
  - directory: $MWOS/OS9000/555/PORTS/OBK4MBMT/CMDS/BOOTOBJ
  - term
    - OS-9000 scf descriptor, available as term and t1 descriptor
      - directory: $MWOS/OS9000/555/PORTS/OBK4MBMT/CMDS/BOOTOBJ/DESC/SC555B

User can define OS-9 standard terminal interface by selecting the desired interface in Wizard.
For all drivers and descriptor around isp there is a central makefile in the directory directory:
$MWOS\OS9000\555\PORTS\xxxx\SPF

**Descriptor**

- spsmc0
  descriptor for twisted pair / utp interface

**Driver**

- smc91c111

The SMC-driver is delivered as a complete OS-9-modul. All changes needed by customer are made by descriptor.

**IP-Address**

The IP-Address can be changed by Micoware mwWizzard tool.
The MAC-Address can also be changed by using Micorware mwWizzard tool. On the OAKEMUF it is normally fixed and must be changed by recompiling SPF descriptor/inet data modules. Future releases will support changing IP-Address and MAC-Address by using EBDS debug tool.

For all other information’s look in OS-9000 manual “installation and networking”.

**IP-Config**

From shell, user can change ip-address by using “ifconfig”-tool.

**Example:**

```
ifconfig enet0 192.168.2.1
```

will assign new ip-address 192.168.2.1 to the OAKEMUF.
Features and Enhancements

Tools:

Enhanced software packages are available for EBDS to program internal flash of mpc555.

BALS HARDWARE and SOFTWARE also offers source code for OS-9 to program internal flash, TOUCAN module, TPU, QUADC or QSPI.


Installation

The installation of the OAKEMUF is very easy. The power supply must meet the specification described in the chapter „General description, power supply“.

The serial RS232 interface can be used to connect a serial terminal or a standard serial interface from PC. The standard SW on board configures this interface with:
- 9600 baud
- no parity check
- eight data bits
- one stop bit

These specifications can only be changed by software.

For the pin-assignment of the RS232 connector see chapter „connectors, serial“.

If the board is supplied with OS-9®, then the twisted-pair interface can also be connected and used for communication. Communication parameters on tcp/ip can only be changed by software.
Appendix

General source file list

All Source files are fully tested on MPC555 Version G up to Version L
Not all of these source files are included in standard Board support package (BSP). For all source files, portpack license is required.

Include files

All include files are tested and support access of internal registers and bits of these registers.

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siu555.h</td>
<td>$MWOS\OS9000\555\DEFS</td>
<td>Includes for MPC555 internal SIU</td>
<td></td>
</tr>
<tr>
<td>Reg555.h</td>
<td>$MWOS\OS9000\555\DEFS</td>
<td>MPC555 internal register definitions</td>
<td>Like reg505.h</td>
</tr>
<tr>
<td>Uimb.h</td>
<td>$MWOS\OS9000\555\DEFS</td>
<td>Includes for MPC555 internal U2IMB interface</td>
<td>Required for irqs and speed control</td>
</tr>
<tr>
<td>Sram555.h</td>
<td>$MWOS\OS9000\555\DEFS</td>
<td>Includes for MPC555 internal SRAM</td>
<td>Required for access control and internal definitions</td>
</tr>
<tr>
<td>QSMCM.h</td>
<td>$MWOS\OS9000\555\DEFS</td>
<td>Includes for MPC555 internal serial interface</td>
<td></td>
</tr>
</tbody>
</table>

C-source files

$MWOS\SRC\DPIO

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chip.c</td>
<td>$MWOS\SRC\DPIO\SPF\DRVR\SP91C94</td>
<td>SMC91C94 driver</td>
<td>Adapted from Microwave source to MPC555 special bus access</td>
</tr>
<tr>
<td>Smc91c94.h</td>
<td>$MWOS\OS9000\SSRC\DPIO\SPF\DRVR\SP91C94</td>
<td>SMC91C94 driver</td>
<td>Adapted from Microwave source to MPC555 special bus access</td>
</tr>
</tbody>
</table>

$MWOS\SRC\IO

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mpc55pic.c</td>
<td>$MWOS\SRC\IO\PICLIB</td>
<td>Enable / disable SIU interrupts</td>
<td>New piclib functions for MPC555</td>
</tr>
</tbody>
</table>
### File name | Directory | Specification | Comment
--- | --- | --- | ---
Iosci55a.c | $MWOS\SRC\ROM\SERIAL\SCI555 | Low level driver for serial interface in MPC555 internal QSM module |  
Iosci55a.h | $MWOS\OS9000\SRC\ROM\SERIAL\SCI555 | Include file for low level driver for serial interface in MPC555 internal QSM module |  

### File name | Directory | Specification | Comment
--- | --- | --- | ---
Tk555.c | $MWOS\OS9000\SRC\SYSMODS\TICKER | MPC555 decremener ticker routine | Adapted to new base addresses and SIU interface from 50x  
SIU5IRQ.c | $MWOS\OS9000\SRC\SYSMODS\IRQS | MPC555 SIU interrupt decoder |  

### File name | Directory | Specification | Comment
--- | --- | --- | ---
STATUS.C | $MWOS\OS9000\PPC\SRC\IO\SCF\DRVR\SC555 | MPC555 serial interface driver for internal QSM module channel A |  
TERM.C |  |  |  
UTIL.C |  |  |  
WRITE.C |  |  |  
CONFIG.C |  |  |  
DEFSFILE |  |  |  
DRVMAIN.C |  |  |  
IRQ.C |  |  |  
READ.C |  |  |  
SC555.DE5 |  |  |  
SC555.H |  |  |  
STATUS.C | $MWOS\OS9000\PPC\SRC\IO\SCF\DRVR\SC555B | MPC555 serial interface driver for internal QSM module channel B |  
TERM.C |  |  |  
UTIL.C |  |  |  
WRITE.C |  |  |  
CONFIG.C |  |  |  
DEFSFILE |  |  |  
DRVMAIN.C |  |  |  
IRQ.C |  |  |  
READ.C |  |  |  
SC555.DE5 |  |  |  
SC555.H |  |  |  
SC555B.H |  |  |  
Ports file list

All the ports source files are fully tested on OAKEMUF from KANIS with HAWK 2.0 / PPC1.4
The subdirectory structure is fully compliant with other BSP directories. Files not mentioned here are not
modified in compare to other ports-directories.

General files

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systype.h</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT</td>
<td>OAKEMUF definitions</td>
<td></td>
</tr>
<tr>
<td>Config.h</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT</td>
<td>OAKEMUF definitions</td>
<td></td>
</tr>
<tr>
<td>Systype.des</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT</td>
<td>OAKEMUF definitions</td>
<td></td>
</tr>
</tbody>
</table>

Wizzard files

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot.ml</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\boots\install\portboot</td>
<td>OAKEMUF wizzard mergelist file</td>
<td>Modified for special 2 flash regions</td>
</tr>
<tr>
<td>Core.ml</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\boots\install\portboot</td>
<td>OAKEMUF wizzard mergelist file</td>
<td>Modified for special 2 flash regions</td>
</tr>
<tr>
<td>2ndmeg.ml</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\boots\install\portboot</td>
<td>OAKEMUF mergelist file</td>
<td>Spezial batch file and merge list for 2nd flash region</td>
</tr>
<tr>
<td>2ndmeg.bat</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\boots\install\portboot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Os9p.ini</td>
<td>$MWOS\DOS\BIN</td>
<td>Wizzard ini file</td>
<td>New for OAKEMUF</td>
</tr>
<tr>
<td>OAKEMUF.ini</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\boots\install\OBK4MBMT</td>
<td>Wizzard ini file</td>
<td></td>
</tr>
<tr>
<td>Spf*</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\boots\install\spf</td>
<td>Wizzard spf files</td>
<td></td>
</tr>
</tbody>
</table>
## Sysmods

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SYSMODS\ticker</td>
<td>Makefile for MPC555 ticker</td>
<td></td>
</tr>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SYSMODS\irqs</td>
<td>Makefile for MPC555 siu5irq</td>
<td>See siu5irq.c</td>
</tr>
</tbody>
</table>

## SCF

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SCF</td>
<td>Makefile for MPC555 serial drivers and descriptors</td>
<td></td>
</tr>
<tr>
<td>Default.des</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SCF</td>
<td>Descriptor for MPC555 serial drivers and descriptors</td>
<td></td>
</tr>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SCF\SC555</td>
<td>Makefile for MPC555 serial high level driver and descriptors</td>
<td>QSM channel A</td>
</tr>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SCF\SC555B</td>
<td>Makefile for MPC555 serial high level driver and descriptors</td>
<td>QSM channel B</td>
</tr>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\ PORTS\OBK4MBMT\ SCF\SCLLIO</td>
<td>Makefile for MPC555 serial low level driver and descriptors</td>
<td></td>
</tr>
</tbody>
</table>

## ROM\ROMCORE

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Makefile sysinit.c | $MWOS\OS9000\555\ PORTS\OBK4MBMT\ ROM\ROMCORE | Makefile and sources for romcore part | Special solution for booting directly with MPC555; activating chipselects etc..

| Rom cnfg.h | $MWOS\OS9000\555\ PORTS\OBK4MBMT\ ROM\ROMCORE | Include file with address definitions | Set up for all memory areas due to kernel problem with different memory area definitions |
### PICLIB

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makefile</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\PICLIB</td>
<td>Makefile for MPC55 piclib files</td>
<td>See mpc55pic.c</td>
</tr>
<tr>
<td>Config.h</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\PICLIB</td>
<td>Include file for MPC55 piclib files</td>
<td>See mpc55pic.c</td>
</tr>
</tbody>
</table>

### INIT

<table>
<thead>
<tr>
<th>File name</th>
<th>Directory</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default.des</td>
<td>$MWOS\OS9000\555\PORTS\OBK4MBMT\INIT</td>
<td>Descriptor file for init modules</td>
<td>Special solution due to kernel problem with different memory area definitions</td>
</tr>
</tbody>
</table>
Mergefiles for OS-9 in external flash only

2ndmeg.ml

```plaintext
../../../../../../PPC/CMDS/mbdump
*  
  [PKMAN]
  *  
  ../../../PPC/CMDS/BOOTOBJ/SPF/pkman
  ../../../PPC/CMDS/BOOTOBJ/SPF/pkdvr
  ../../../PPC/CMDS/BOOTOBJ/SPF/pk
  *  
  ../../../PPC/CMDS/arp
  *  
  ../../../PPC/CMDS/bootptest
  *  
  ../../../PPC/CMDS/dhcp
  *  
  ../../../PPC/CMDS/ftp
  ../../../PPC/CMDS/ftpd
  ../../../PPC/CMDS/ftpdc
  *  
  ../../../PPC/CMDS/hostname
  *  
  ../../../PPC/CMDS/idbdump
  *  
  ../../../PPC/CMDS/idbgen
  *  
  ../../../PPC/CMDS/inetd
  *  
  ../../../PPC/CMDS/ndbmod
  *  
  ../../../PPC/CMDS/route
  *  
  ../../../PPC/CMDS/routed
  *  
  ../../../PPC/CMDS/telnet
  ../../../PPC/CMDS/telnetd
  ../../../PPC/CMDS/telnetdc
  *  
  ../../../PPC/CMDS/ping
  ../../../PPC/CMDS/login
  *  
  ../../../PPC/CMDS/spfndpd
  ../../../PPC/CMDS/spfndpdc
  ../../../PPC/CMDS/ndpio
```
**Bootlist for the OAKEMUF Board**

**Pathlists are relative to the:**

- OS-9000 [KERNEL]
  - ../../PPC/CMDS/BOOTOBJS/kernel.fph
  - [INIT] Modules
    - configurer - created by configurer program
    - nodisk - no default device (optional)
    - dd - default device is /dd (optional)
    - vcons - no default device, vcons is the system console (optional)
  - ../../../CMDS/BOOTOBJS/INITS/configurer
  - [INIT_NODISK]
  - ../../../CMDS/BOOTOBJS/INITS/nodisk
  - [INIT_DD]
  - ../../../CMDS/BOOTOBJS/INITS/dd
  - [INIT_VCONS]
  - ../../../CMDS/BOOTOBJS/INITS/vcons
  - [EXCEPTION] Vector Module for PPC55x
  - ../../../PPC/CMDS/BOOTOBJS/vect505
  - [PIC] Handling module for 555 based boards
  - ../../../CMDS/BOOTOBJS/picsub
  - System clock module:
tk555 or 555 - Ticker driver

* [TICKER & OPTION11]
* ../..../CMDS/BOOTOBJS/tk555

* Real Time Clock
* [CLOCK]
* ../..../CMDS/BOOTOBJS/rtc48t18

* Pre I/O modules
* abort - Abort switch handler
  * ravenirq - PIC handler for the Raven MPIC
  * universeirq - PIC handler for the Tundra Universe
  * picirq - PIC handler for the 8259
  * hlproto - Protoman interface trap module for user-state connections
* [OPTION8]
* ../..../CMDS/BOOTOBJS/abort

* [PRE-IO]
* ../..../CMDS/BOOTOBJS/siu5irq
* [HLPROTO]
* ../..../..../PFC/CMDS/BOOTOBJJS/ROM/hlproto
* [IOMAN]
* ../..../..../PFC/CMDS/BOOTOBJJS/ioman

* System [CUSTOMIZATION] modules:
* cache750 - MVME2700/MCP750 cache control module (instruction and data cache)
  * scramble - MVME2700/MCP750/MVME2304/MVME2604/MVME3604/MVME604 system security module
* [OPTION10]
* no cache on mpc555
* ../..../..../PFC/CMDS/BOOTOBJJS/cache555

* [PIPE] Descriptor
* pipeman - file manager
  * pipe - pipe descriptor
* ../..../..../PFC/CMDS/BOOTOBJJS/pipeman
  * ../..../CMDS/BOOTOBJJS/DESC/pipe

* [SCF] Subsystem Modules:
* scf - file manager
  * null - device driver
  * nil - device descriptor
* ../..../..../PFC/CMDS/BOOTOBJJS/scf
  * ../..../..../PFC/CMDS/BOOTOBJJS/null
  * ../..../..../PFC/CMDS/BOOTOBJJS/nil

* [SERIAL] Ports
* sc555 - sc555 driver
  * t1 - term device descriptor for com1
* [OPTION1 || TERM1]
* ../..../CMDS/BOOTOBJJS/sc555
  * [OPTION1]
  * ../..../CMDS/BOOTOBJJS/DESC/SC555/t1
* [TERM1]
* [RBF] Subsystem Modules:
  * rbf - file manager
  * /.../../../../CMDS/BOOTOBJS/rbf
  * ram - RAM disk driver
  * r0 - device descriptor for default RAM disk
  * r0.dd - default RAM disk descriptor as default device (/dd)
  * [RAM]
  * /.../../../../CMDS/BOOTOBJS/ram
  * [R0]
  * /.../CMDS/BOOTOBJS/DESC/RAM/r0
  * [R0.DD]
  * /.../CMDS/BOOTOBJS/DESC/RAM/r0.dd
  * [SHELL]
  * /.../../../../CMDS/BOOTOBJS/shell
  * [MSHELL]
  * /.../../../../CMDS/mshell
  * C Shard Library (CSL) Module
  * [CSL]
  * /.../../../../CMDS/csl
  * System-state debugging modules
  * [SNDP]
  * /.../../../../CMDS/BOOTOBJS/ROM/sndp
  * [ROMBUG]
  * /.../../../../CMDS/BOOTOBJS/ROM/RomBug
  * User-state remote debugging modules
  * [UNDPD]
  * low-level
  * /.../../../../CMDS/undpd
  * /.../../../../CMDS/undpdc
  * User-state remote debugging modules for use with SPF
  * Start it with spfndpd<>>>/nil&
  * [SPFNDPD]
  * /.../../../../CMDS/spfndpd
  * /.../../../../CMDS/spfndpdc
  * /.../../../../CMDS/ndpio
  * The profiler daemons (start with spfnppd<>>>/nil&)
  * [OPTION15]
  * /.../../../../CMDS/spfnppd
  * /.../../../../CMDS/spfnppdsc
  * The hawkeye daemons (start with p21nt slm; router<>>>/nil &)
  * [OPTION15]
  * /.../../../../CMDS/slmPFC
  * /.../../../../CMDS/cmdd
  * /.../../../../CMDS/loggerd
* Utilities we must include
* NFS mount and disk support will not
* function without alias.

* [MUST_HAVE]
* ..../.../.../PPC/CMDS/alias
* ..../.../.../PPC/CMDS/iniz
* ..../.../.../PPC/CMDS/pd
* ..../.../.../PPC/CMDS/sleep
* ..../.../.../PPC/CMDS/echo

* Special Disk Utility Set

* [DISKUTILITY]
* ..../.../.../PPC/CMDS/attr
* ..../.../.../PPC/CMDS/del
* ..../.../.../PPC/CMDS/deldir
* ..../.../.../PPC/CMDS/fdisk
* ..../.../.../PPC/CMDS/format
* ..../.../.../PPC/CMDS/dir
* ..../.../.../PPC/CMDS/dssave
* ..../.../.../PPC/CMDS/save
* ..../.../.../PPC/CMDS/list
* ..../.../.../PPC/CMDS/mkdir
* ..../.../.../PPC/CMDS/pd
* ..../.../.../PPC/CMDS/free
* ..../.../.../PPC/CMDS/load
* ..../.../.../PPC/CMDS/copy
* ..../.../.../PPC/CMDS/build
* ..../.../.../PPC/CMDS/bootgen

* [OPTION6]
* ..../.../CMDS/pciv
* ..../.../CMDS/setpci
* ..../.../CMDS/dmppci

* [OPTION13]
* ..../.../CMDS/testpci
* ..../.../CMDS/mouse

* End of bootlist
Mergefiles for OS-9 in internal and external flash

This is an example, to merge the required files into external and internal flash files.
There are 3 mergelists:
- flash555.ml for internal flash in MPC555
- 2ndmeg.ml for 1st Megabyte of external flash
- bootfile.ml for last Megabyte of external flash

**Flash555.ml**

The files are removed from the standard mergelists bootfile.ml and spf.ml.

```plaintext
*** flash555.ml for OAKEMUF with 4MB RAM and 2 MB flash
*** W.Bals, 00 1110
*** -------------------------------------------------
* from bootfile.ml
./..../..../..../PPC/CMDS/BOOTOBJS/kernel.fph
* ./..../..../..../PPC/CMDS/BOOTOBJS/vect505
* ./..../..../CMDS/BOOTOBJS/picsub
* ./..../..../CMDS/BOOTOBJS/tk555
* ./..../..../CMDS/BOOTOBJS/siu5irq
* ./..../..../..../PPC/CMDS/siu5 irq
* * from spf.ml
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/spf
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/sptcp
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/spudp
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/spenet
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/spip
* [ETHERNET_CONTROLLER_0]
./..../..../CMDS/BOOTOBJS/SPF/sp91c94
./..../..../CMDS/BOOTOBJS/SPF/spsmc0
* following files previously in 2nd flash mergelist
./..../..../..../PPC/CMDS/mbdump
* * [PKMAN]
* ./..../..../..../PPC/CMDS/BOOTOBJS/SPF/pkman
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/pkdvr
./..../..../..../PPC/CMDS/BOOTOBJS/SPF/pk
* ./..../..../..../PPC/CMDS/arp
* ./..../..../..../PPC/CMDS/bootptest
* ./..../..../..../PPC/CMDS/dhcp
* ./..../..../..../PPC/CMDS/ftp
./..../..../..../PPC/CMDS/ftpd
./..../..../..../PPC/CMDS/ftpdc
* ./..../..../..../PPC/CMDS/hostname
* ./..../..../..../PPC/CMDS/idbdump
```
<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ idbgen</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ inetd</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ ndbmod</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ route</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ routed</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ telnet</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ telnetd</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ telnetdc</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ ping</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ login</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ spfndpd</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ spfndpdc</td>
</tr>
<tr>
<td>/usr/ LOCAL/ PPC/CMDS/ ndpio</td>
</tr>
</tbody>
</table>
**Edition History:**

<table>
<thead>
<tr>
<th>#</th>
<th>Date</th>
<th>Comments</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>98/07/14</td>
<td>Added edition history.</td>
<td>gdb</td>
</tr>
<tr>
<td>02</td>
<td>98/07/15</td>
<td>Corrected rb1003 descriptors.</td>
<td>gdb</td>
</tr>
<tr>
<td>03</td>
<td>98/08/14</td>
<td>Added MM2300/2600/3600/MTX support.</td>
<td>GbG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added SC8042k mouse keyboard support.</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>98/08/17</td>
<td>Removed rb1003.stb.</td>
<td>GbG</td>
</tr>
<tr>
<td>05</td>
<td>98/08/17</td>
<td>Changed sc8042m options. Added tape utilities.</td>
<td>GbG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>---- OS-9000 MOTRAVEN Sub-component v1.0 Released ----</td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>98/12/02</td>
<td>Added Profiler daemons to SPFNDPD section.</td>
<td>ajk</td>
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<tr>
<td></td>
<td></td>
<td>$$ &lt;RELEASE_INFO&gt;</td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>00/11/10</td>
<td>remove some files fro flash555.ml</td>
<td>WB</td>
</tr>
</tbody>
</table>

**Bootlist for the OAKEMUF Board**

**Pathlists are relative to the:**

- MWOS/OS9000/555/PORTS/OK4MBMT/BOOTS/INSTALL/PORTBOOT directory
- OS-9000 [KERNEL]
- removed, now in 555flash.ml
- ../../../CMDS/BOOTOBJS/kernel.fph
- [INIT] Modules
  - configurer - created by configurer program
  - nodisk - no default device (optional)
  - dd - default device is /dd (optional)
  - vcons - no default device, vcons is the system console (optional)
- ../../../CMDS/BOOTOBJS/INITS/configurer
- [INIT_NODISK]
- ../../../CMDS/BOOTOBJS/INITS/nodisk
- [INIT_DD]
- ../../../CMDS/BOOTOBJS/INITS/dd
- [INIT_VCONS]
- ../../../CMDS/BOOTOBJS/INITS/vcons
- [EXCEPTION] Vector Module for PPC50x/PPC55x
- removed, now in 555flash.ml
- ../../../CMDS/BOOTOBJS/INITS/vec505
- [PIC] Handling module for 555 based boards
- removed, now in 555flash.ml
- ../../../CMDS/BOOTOBJS/picasub
* System clock module:
* tk555 or 555 - Ticker driver
* [TICKER && OPTION11]
* removed, now in 555flash.ml
* ../../../CMDS/BOOTOBJS/tk555
* Real Time Clock
* [CLOCK]
* ../../../CMDS/BOOTOBJS/rtc48t18
* Pre I/O modules
* abort - Abort switch handler
* ravenirq - PIC handler for the Raven MPIC
* universeirq - PIC handler for the Tundra Universe
* picirq - PIC handler for the 8259
* hlproto - Protoman interface trap module for user-state connections
* [OPTION8]
* ../../../CMDS/BOOTOBJS/abort
* [PRE-IO]
* removed, now in 555flash.ml
* ../../../CMDS/BOOTOBJS/siu5irq
* [HLPROTO]
* ../../../CMDS/BOOTOBJS/ROM/hlproto
* [IOMAN]
* ../../../CMDS/BOOTOBJS/ioman
* System [CUSTOMIZATION] modules:
* cache750 - MVME2700/MCP750 cache control module (instruction and data cache)
* ssmd604 - MVME2700/MCP750/MVME2304/MVME2604/MVME3604/MTX604 system security module
* [OPTION10]
* no cache on mpc555
* ../../../CMDS/BOOTOBJS/cache555
* [PIPE] Descriptor
* pipeman - file manager
* pipe - pipe descriptor
* ../../../CMDS/BOOTOBJS/pipeman
* ../../../CMDS/BOOTOBJS/DESC/pipe
* [SCF] Subsystem Modules:
* scf - file manager
* null - device driver
* nil - device descriptor
* ../../../CMDS/BOOTOBJS/scf
* ../../../CMDS/BOOTOBJS/null
* ../../../CMDS/BOOTOBJS/nil
* [SERIAL] Ports
* sc555 - sc555 driver
* tl - term device descriptor for com1
* [OPTION1 || TERM1]
* ../../../CMDS/BOOTOBJS/sc555
[OPTION1]  ../../../CMDS/BOOTOBJS/DESC/SC555/t1

[TERM1]

../../../CMDS/BOOTOBJS/DESC/SC555/term_t1

[RBF] Subsystem Modules:
rbf - file manager
../../../CMDS/BOOTOBJS/DESC/SC555/rbf
ram - RAM disk driver
r0 - device descriptor for default RAM disk
r0.dd - default RAM disk descriptor as default device (/dd)

[RAM]

../../../CMDS/BOOTOBJS/DESC/SC555/ram

[R0]

../../../CMDS/BOOTOBJS/DESC/SC555/R0

[R0.DD]

../../../CMDS/BOOTOBJS/DESC/SC555/R0.DD

[SHELL]

../../../CMDS/BOOTOBJS/DESC/SC555/shell

[MSHELL]

../../../CMDS/BOOTOBJS/DESC/SC555/mshell

C Shard Library (CSL) Module

[CSL]

removed, now in 555flash.ml

System-state debugging modules

[SNDP]

../../../CMDS/BOOTOBJS/DESC/SC555/R0D

[ROMBUG]

User-state remote debugging modules

[UNDPD]

low-level

User-state remote debugging modules for use with SPF

Start it with spfndpd<>>>/nil&

[SPFNPD]

The profiler daemons (start with spfnpd<>>>/nil&)

[OPTION15]

../../../CMDS/BOOTOBJS/DESC/SC555/spfnpd
* The hawkeye daemons
  * [OPTION16]
    ../.../.../.../PPC/CMDS/slmPPC
    ../.../.../.../PPC/CMDS/cmdd
    ../.../.../.../PPC/CMDS/loggerd
    ../.../.../.../PPC/CMDS/router
  *
  * Utilities we must include
  * NFS mount and disk support will not
    * function without alias.
  *
  * [MUST_HAVE]
    ...
    ../.../.../.../PPC/CMDS/alias
    ../.../.../.../PPC/CMDS/iniz
    ../.../.../.../PPC/CMDS/pd
    ../.../.../.../PPC/CMDS/sleep
    ../.../.../.../PPC/CMDS/echo
  *
  * Special Disk Utility Set
  *
  * [DISKUTILITY]
    ...
    ../.../.../.../PPC/CMDS/attr
    ../.../.../.../PPC/CMDS/de1
    ../.../.../.../PPC/CMDS/deldir
    ../.../.../.../PPC/CMDS/fdisk
    ../.../.../.../PPC/CMDS/format
    ../.../.../.../PPC/CMDS/dir
    ../.../.../.../PPC/CMDS/dssave
    ../.../.../.../PPC/CMDS/save
    ../.../.../.../PPC/CMDS/list
    ../.../.../.../PPC/CMDS/makdir
    ../.../.../.../PPC/CMDS/pd
    ../.../.../.../PPC/CMDS/free
    ../.../.../.../PPC/CMDS/load
    ../.../.../.../PPC/CMDS/copy
    ../.../.../.../PPC/CMDS/build
    ...
    ../.../.../PPC/CMDS/bootgen
  *
  *
  * [OPTION6]
    ...
    ../.../CMDSCiv
    ../.../CMDSSetpci
    ../.../CMDSDmppci
  *
  * [OPTION13]
    ...
    ../.../CMDSTestpci
    ../.../CMDSmouse
  *
  * End of bootlist
