



Socket1  
inc.



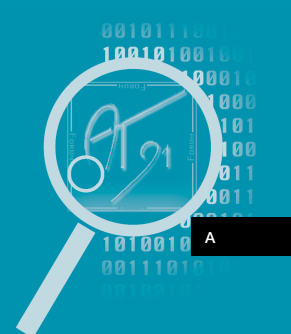
AT91  
Third Party  
Development  
Tools



interniche  
technologies, inc.



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## Chapter I

# Compilers, Assemblers & Debuggers

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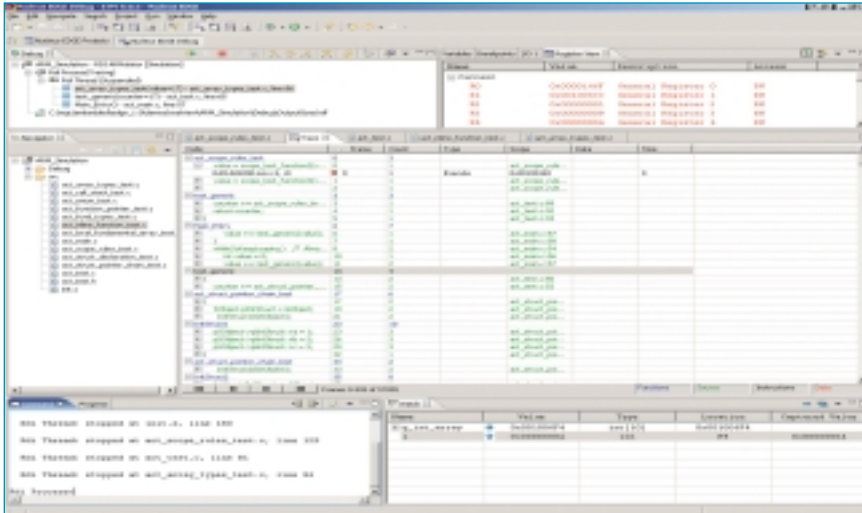
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Based on the Eclipse platform, **Nucleus EDGE** is an integrated development environment that assembles project manager, source editors, compiler tools, debugger, simulator and profiler into one easy-to-use environment. **Nucleus EDGE** supports various compilers for Atmel's microcontrollers.

The **Nucleus Debugger** component is a robust debugger that can be configured to many different areas of embedded software development. **Nucleus Debugger** provides a comprehensive feature set for basic debugging operations, has support for multi-core debugging, and will support RTOS awareness for commercial or proprietary operating systems. **Nucleus Debugger** provides hardware-assisted debugging through a variety of connections.

Instruction Set Simulators are also available in the **Nucleus EDGE** environment, allowing programs generated for the target core to be debugged and run on the host computer without requiring a real target.

Adding the **Nucleus Profiler** system-level analysis tool to the environment lets you capture, store and analyze information about the kernel objects in your application, as well as the application-specific data you decide to collect. The target agent is designed to

be minimally intrusive as it buffers target event data and transmits it to the host application. **Nucleus Profiler** then stores the captured data in a database for later analysis.

For information on additional products available for **Nucleus EDGE**, visit our website.

- Multi-Core Debug
- Real-Time Trace
- Advanced Scripting
- Code Coverage Analysis
- Kernel Awareness

## WEB SITE

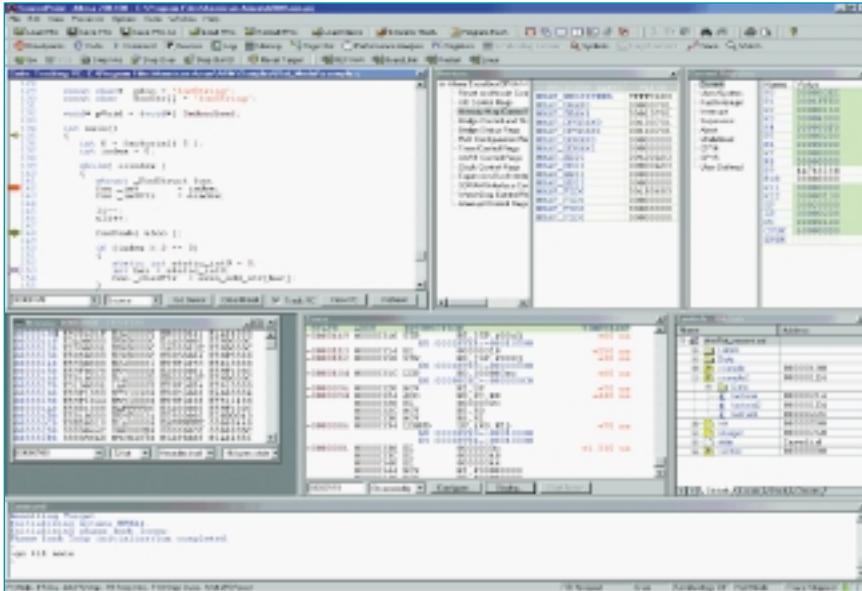
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AMERICAN ARIUM

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American Arium offers **SourcePoint™**, the company's flagship debugger, developed specifically for SoC design and debug. The 32-bit application runs on Microsoft® Windows® 2000/XP and Linux hosts and supports ARM7™ and ARM9™ processors.

**SourcePoint** and an Arium emulator together provide outstanding run control and ETM or execution trace, giving the embedded developer unsurpassed visibility to and manipulation of code via a series of intuitive screens and dialogs with numerous viewing and customization options.

**SourcePoint** debug solutions support industry-standard input file formats and include a robust C-like command language. **SourcePoint** operates in real time with all core frequencies and works with today's most popular compiler tool chains.

With **SourcePoint**, Arium offers an exceptional Linux OS aware debug solution, including full symbolic, source-level debugging of Linux kernel code and source-level debugging of Linux embedded applications. Users can launch or attach to processes with seamless transitions to and from the

kernel and each process. In addition, Arium commands two industry firsts - relocatable and dynamically loaded kernel module debugging and debug on initial target bring-up immediately from board reset.

Arium also makes available SourcePoint™ IDE, powered by Visual SlickEdit®, one of the most powerful and flexible code editors for embedded application development. Developers can move easily between the IDE and debugger, editing their source code "on the fly".

- ARM7 and ARM9 processor support
- Full ARM® and Thumb™ instruction set support
- Full source-level Linux kernel and application debug
- Gigabyte trace (ARM9) availability
- SourcePoint IDE for code editing "on the fly"

**WEB SITE**

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



ARM®

**REALVIEW® DEVELOPER SUITE**


**RealView**®  
ARM® Tools by ARM

ARM® RealView® Development Tools provide a superior solution for all current requirements and already have features required to support complex system-on-chip, MCU and ASSP devices that integrate multiple cores, each running full operating systems. RealView development tools are unique in being able to provide solutions to all the software development tasks required to get from conception of complex devices, to delivering well supported products to the market, based on those devices.

ARM RealView Developer Suite 2.2 runs on Windows, Linux and Solaris host platforms. It has a number of important new features, which have been requested by a significant number of ARM Partners and have been eagerly awaited.

*For a free RVDS evaluation copy please visit [www.arm.com/products/DevTools](http://www.arm.com/products/DevTools)*

- Interworking with gcc 3.4 to build Linux applications and shared libraries
- CodeWarrior IDE v5.6 now included (with a conversion utility for ADS. 1.2 CodeWarrior project files)
- RealView Debugger 1.8 can now debug images built with gcc 3.x

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ASHLING

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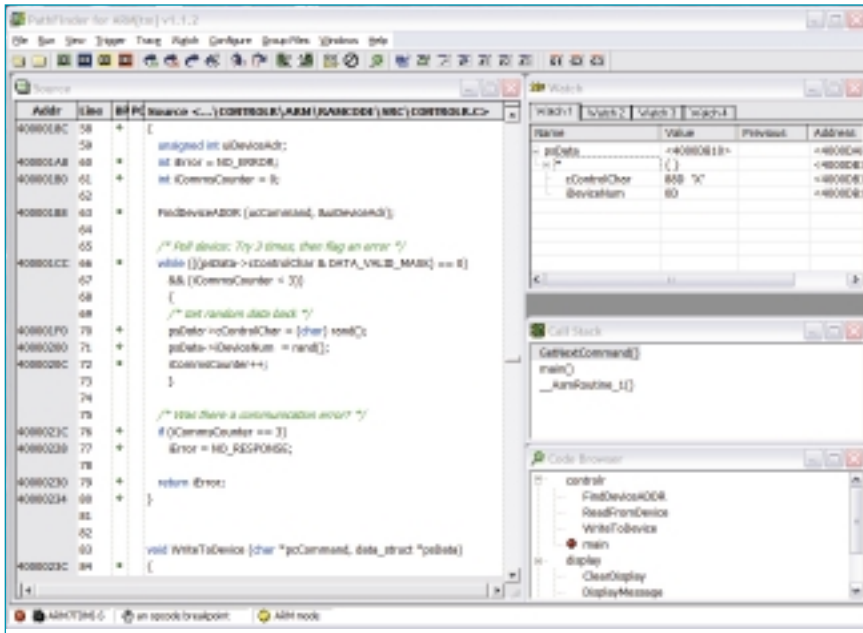
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PathFinder is Ashling's C/C++ **Source-Level Debugger** for AT91 devices, with multiple user-configurable windows, point-and-click, drag-and-drop, hover help and hover data display, splitter windows, right-mouse menus, tabbed dialogs, and menu-bar, button, hot-key and script (macro)-file controls. PathFinder runs on all 32-bit versions of Windows. PathFinder's Object-Oriented Monitoring and Editing System provides tree-structured "click to expand" access to all memory-areas, register sets, registers and bits of the ARM™ Core and co-processors with a logical and friendly Windows-XP-style display.

PathFinder is the user Interface for all Ashling products including the Ashling OPELLA, GENIA and VITRA Emulators. PATHFINDER also supports the ARMulator™ Instruction Set Simulator, which is supplied by ARM™ Ltd. PATHFINDER uses the ARM™ Remote Debug Interface (RDI) for all target communication.

- C/C++ Source-level debugger
- Support for all Ashling Emulators
- Support for ARMulator Instruction Set Simulator
- Multiple user-configurable windows and powerful script language
- Support for all popular compilers and RTOS

## WEB SITE

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





EMBEST INFO&amp;TECH Co., LTD.

**ATMEL ARM DEVELOPMENT TOOLS****CONTACTS****CHINA**

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Embest provides a full suite of **Atmel ARM Development Tools**. It includes the Embest IDE, emulator and evaluation boards. Embest IDE for ARM is a complete solution for embedded ARM development. It provides a simple and versatile graphical user interface and tools for creating applications for the ARM architecture. It is an Integrated Development Environment that facilitates managing and building projects, establishing and managing host-target communication, running and debugging applications. It provides an efficient way for developing embedded ARM applications. Embest supports ANSI C and ARM assembler language.

**Support Chips:** All chips based on ARM7 and ARM9 core:

- ATMEL: AT91 series (AT91M40800, AT91FR40162, AT91R40807, AT91M63200, AT91M55800A, AT91RM9200)

Embest provides three kinds of emulators (Embest Emulator, Embest PowerICE and Embest UNetICE). Embest Emulator and Embest PowerICE are enhanced parallel-JTAG Emulators for ARM Processors.

They are powerful, fast, easy to use and low cost tool for better performance. They will greatly speed up your development work. The Embest UnetICE is the new JTAG Emulator which is developed by Embest. It is used easily when connected to a PC by the Ethernet or USB interface.

Embest also provides Atmel evaluation boards. The board of the Embest ATEB40A is based on the AT91FR40162, AT91R40807, AT91R40008 or AT91M40800. The AT91RM9200-EK board is based on the AT91RM9200. Embest will provide the powerful support to cusotmers in hardware and software.

- An integrated development environment
- Full-function evaluation boards for Atmel processors
- Powerful Emulator for ARM
- Source code examples for Atmel processors
- Powerful and full-scale support

**WEB SITE**

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## GREEN HILLS SOFTWARE

# MULTI<sup>®</sup> INTEGRATED DEVELOPMENT ENVIRONMENT AND OPTIMIZING C AND C++ COMPILERS



### Optimizing Compilers

Green Hills Optimizing C, C++ and EC++ compilers have a well-earned reputation for producing very high-quality code for ARM 7, ARM 9, and Thumb. Code written in different languages can be mixed into a single executable. Green Hills compilers use the same global optimizer and code generator. Code may be optimized for maximum speed or for minimum code size on a module-by-module basis and even at the function level.

### MULTI Integrated Development Environment and TimeMachine Debugger

The MULTI<sup>®</sup> integrated development environment is a comprehensive suite of tools for embedded applications. MULTI provides a direct graphical interface with all Green Hills compilers and supports development and debugging using multiple programming languages. MULTI tools include a Project Builder, Source Debugger, Performance Profiler, Run-Time Error Checker, Graphical Browser, Text Editor, and Version Control System.

The TimeMachine<sup>™</sup> Debugger eliminates the need for traditional, time consuming process of "trial-and-error debugging." TimeMachine lets developers debug and optimize their

application from trace data as though they were interacting with a live target. TimeMachine is an extension to the MULTI tools, so developers can continue to use familiar MULTI interfaces. TimeMachine combines the horsepower of the SuperTrace<sup>™</sup> probe with the MULTI IDE's newest features to deliver a revolutionary debugging system.

- RTOS support: *veIOSity*<sup>™</sup>, INTEGRITY<sup>®</sup>, ThreadX, VxWorks, others, in-house, none
- Connection methods: Green Hills Software's SuperTrace Probe, Green Hills<sup>®</sup> Probe and Slingshot<sup>™</sup>; Embedded ICE, Multi-ICE, Angel ROM Monitor, Agilent Probe, Macraigor Systems OCD
- Step your program backward or run backward through time to uncover problems in application code, including complex real-time interactions
- Debug RTOS applications, including virtual address spaces, from trace data

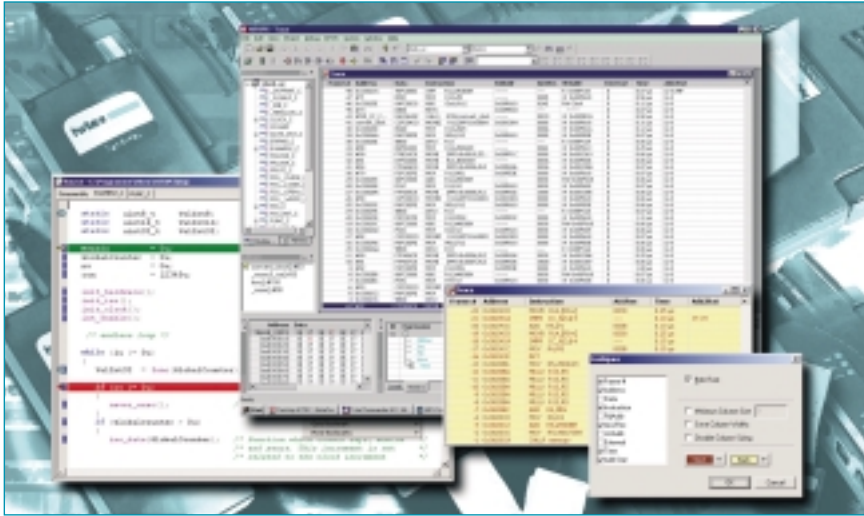
## WEB SITE

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



## HITEX DEVELOPMENT TOOLS

## HiTOP FOR ARM



**HiTOP** is the universal user interface and IDE according to the latest industry standards and is applicable for all Hitex Development Tools, like Tantino and Tanto. This windows based software is the state-of-the-art user interface with the well-known touch&feel from other windows applications. **HiTOP** provides additional functionality like drag&drop of program symbols from the workspace window into the memory window to display the appropriate memory area. **HiTOP** includes support for the most popular compilers.

**HiTOP** allows complete high-level-language debugging and rapid access to all in-circuit emulator resources. Other features include flexible object file handling, a built-in command language and RTOS support. Integration with 3rd party tools like Tessy – the ultimate tool for automated testing of embedded software – is also supported.

- Supports ARM and Thumb instruction set
- Powerful and easy to use high level language debugging including source, watch, real time watch, HLL stack etc.
- Project management
- Built in multi file source editor
- Powerful script and protocol language

**hitex**   
DEVELOPMENT TOOLS

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## IAR SYSTEMS

## IAR EMBEDDED WORKBENCH® FOR ARM



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**IAR Embedded Workbench®** is an easy-to-use, powerful integrated development environment for embedded systems. Based on solid technology, it seamlessly integrates the IAR C/ C++ compiler, assembler, editor and project manager, linker, librarian and C-SPY™ debugger into a comprehensive toolkit, recognized for its efficient code generation and unique debugging properties. It is built on an open architecture and can easily be extended by adding plug-in modules so that embedded developers can benefit from integrated solutions, especially when debugging.

C-SPY, an integral part of the IAR Embedded Workbench IDE, is a state-of-the-art debugger for developing embedded applications. It comes with a multitude of advanced features such as fine-grain smart-stepping, versatile monitoring of registers, structures, call chain, variables and peripheral registers, tracing, advanced code and data breakpoints, a powerful macro system, profiling, code coverage and access to host file system via file I/O.

IAR Embedded Workbench offers RTOS-aware debugging with plugins available for RTOSes from CMX, ThreadX, Quadros, uC/OS-II, Fusion and ORTI.

- Best in class ARM7/ARM9 code generation
- C/C++ compiler with support for MISRA C
- Integrated flash loader for AT91SAM7 devices and EBxx boards
- Support for all major JTAG probes
- Evaluation board and software included in IAR KickStart Kit™ for AT91SAM7

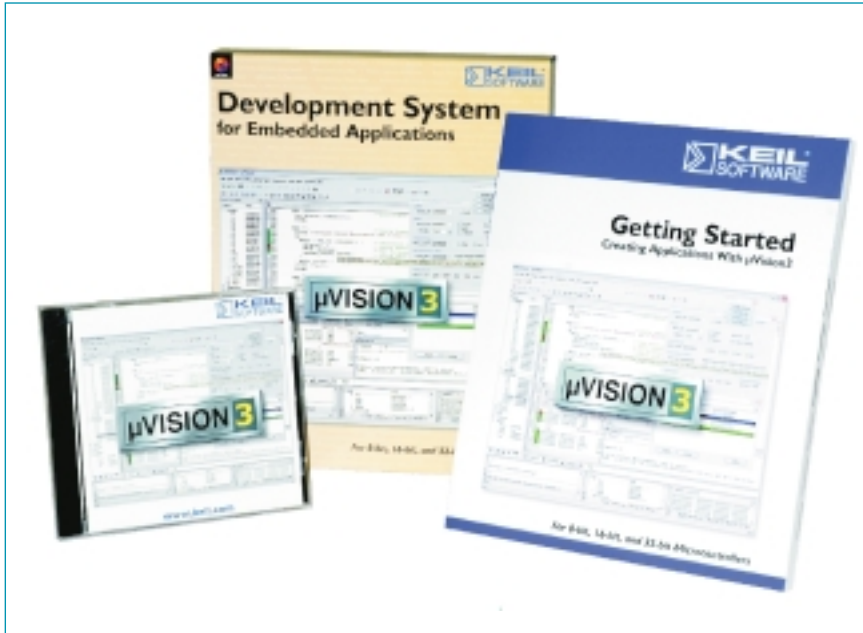
## WEB SITE

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KEIL SOFTWARE

## PK-ARM PROFESSIONAL DEVELOPER'S KIT



The Keil **PK-ARM Professional Developer's Kit** is based on the popular  $\mu$ Vision IDE. It integrates the Keil CARM Compiler, Macro Assembler, and Linker/Locator with JTAG Debugging and Accurate Device Simulation found in the  $\mu$ Vision Debugger. The Advanced Real-Time Kernel makes this a complete development system for ARM-based micro-controllers.

The  **$\mu$ Vision IDE** ensures easy and consistent Project Management. A single project file stores source file names and saves configuration details for Compiler, Assembler, Linker, Debugger, Flash Loader, and other utilities. To start a project, simply select an Atmel device from the Device Database™ and required tool options are set automatically.

The **CARM Compiler** is optimized for the Thumb instruction set. Thumb mode executes faster from on-chip Flash and provides a 30% code size reduction compared to ARM native mode. The C run-time library is coded primarily using Thumb instructions. This allows the CARM Compiler to generate smaller, faster programs for the Atmel AT91 device series.

The  **$\mu$ Vision Debugger** supports the ARM

core's Embedded ICE (providing basic debug capabilities). While other ARM Development Suites rely solely on the Embedded ICE, the Keil  $\mu$ Vision Debugger adds accurate simulation of the instruction set, on-chip peripherals, interrupts, and other characteristics of the AT91 device series. The advantages of complete device simulation include: detailed trace and timing analysis and automated input patterns for regression testing. These extensive simulation capabilities support detailed analysis of complex algorithms that interface to peripherals and help embedded developers overcome challenges unique to embedded systems projects.

- Extremely tight code generation
- Tools Completely Integrated into the  $\mu$ Vision IDE
- Flash Programming & Target Debugging
- Accurate Peripheral Simulation
- Timing and Execution Analysis with  $\mu$ Vision Simulator

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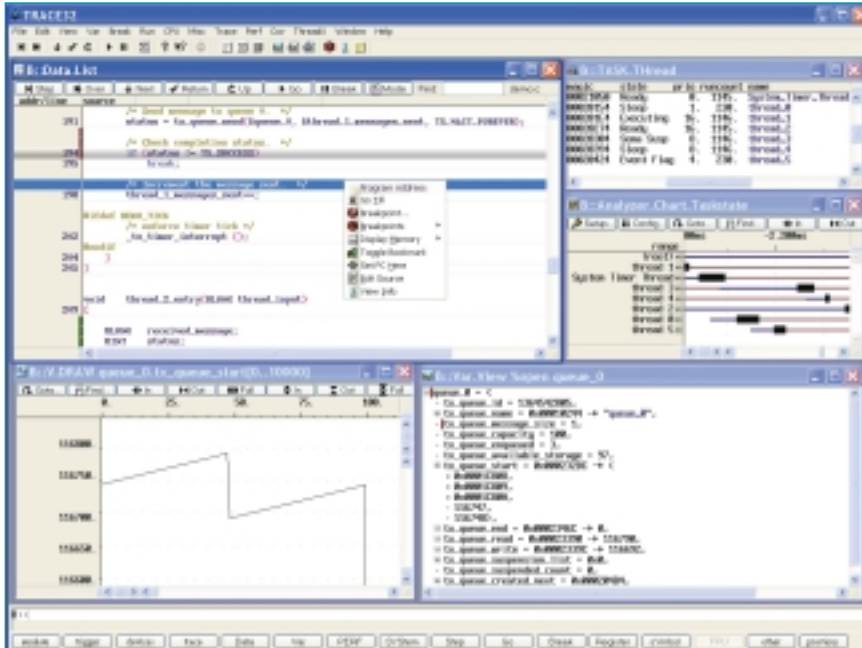
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LAUTERBACH

## TRACE32-POWERVIEW

LAUTERBACH 

The Graphical User Interface (GUI) **TRACE32-PowerView** is the powerful IDE with the same intuitive look and feel as all TRACE32 Tools. It works together with all third party compilers and can be integrated to editors and CASE-Tools. The complete GUI can be customized comfortably to the requirements of each project. A powerful, easy script language supports you to change the GUI, run test programs or automate command sequences. No other system offers more flexibility.

The Instruction-Set Simulator for ARM Cores allows assembler and HLL debugging on C or C++ level also for an optimized code. A unlimited number of software breakpoints is available and advanced breakpoint features make it simple to break on complex conditions.

Further more the TRACE32 IDE provides a trace for the Instruction-Set Simulator to analyze the program-flow after program execution. This way executed source code can be displayed together with data and time information. And after you started

Lauterbachs "Edge of the Art" analysis feature Context Tracking System (CTS) you will see a clear structured display of program flow, function nesting, timestamp and global variables. With CTS you can step your application backwards in addition to reach former states of memory and registers.

- Easy HLL and assembler debugging with Interface to all compilers for C and C++
- Integration to Editors, CASE Tools
- Powerful script language
- Memory allocation Statistics with graphical displays
- RTOS Debugger

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## MQX EMBEDDED, A DIVISION OF ARC INTERNATIONAL

# THE METAWARE® TOOL SUITE FOR ARM



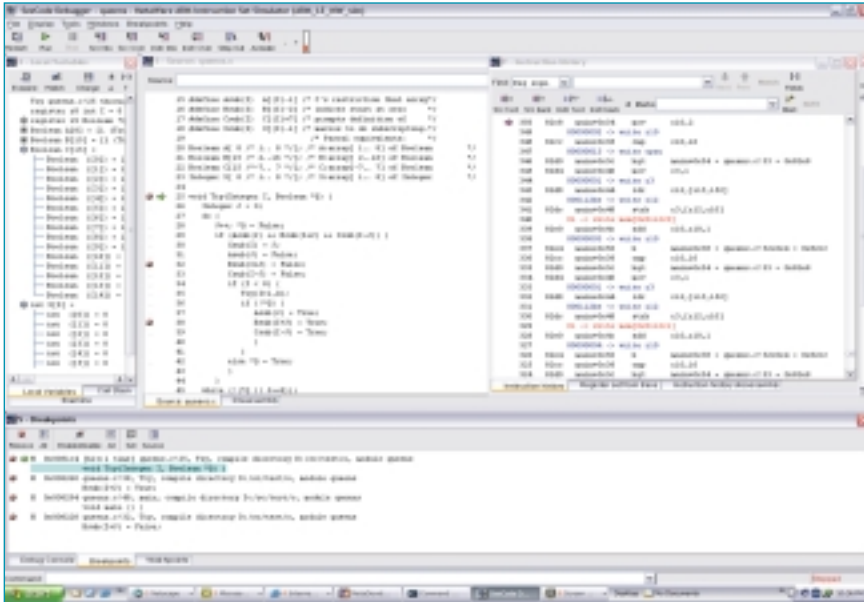
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The MetaWare® Tool Suite for ARM from MQX Embedded offers powerful, flexible, software development tools with ARM-specific optimizations, generating fast, compact code. This full suite of tools provides advanced, customizable debugging, making the most of Atmel's AT91 processor family. MetaWare® High C/C++™ Compiler has dozens of compiler optimizations tuned for performance efficiency for ARM-based processors. Developers can choose among Embedded C++/C++/ANSI C support at compile time. The High C® compiler provides enhanced inline assembly, and advanced interrupt handling. For performance tuning, branch prediction data can be gathered from actual target execution history for further optimization.

MetaWare® SeeCode™ Debugger supports C and C++, including mixed source-and assembly-code debugging with a full set of traditional features: variable windows, breakpoints, watchpoints, call stack display, memory display and register display. Its advanced Instruction Set Simulator (ISS) simulates instruction and data caches, and includes processor reset, instruction and

cache miss count features, and provides instruction history with forward and reverse instruction and statement stepping. SeeCode supports leading JTAG emulators from Abatron, ARM, Ashling, EPI and Macraigor.

In addition, the MetaWare Tool Suite for ARM includes High C, High C++ and I/O Streams run-time libraries with source, an ELF Assembler with full ARM/Thumb support, and an ELF Linker/locator.

- Powerful, comprehensive embedded development suite optimized for ARM instruction sets
- Provides High C/C++™ Compiler, SeeCode™ Debugger, assembler, linker, run-time libraries, and other tools and utilities
- SeeCode Debugger integrates closely with MQX™ RTOS and other leading RTOS
- Extensive, clear documentation
- Host support for Windows and Solaris

## WEB SITE

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



ROWLEY ASSOCIATES LIMITED

**CROSSWORKS FOR ARM**

**CrossWorks for ARM** contains all you'll ever need for AT91 application development.

**CrossWorks for ARM** contains the CrossStudio IDE, C/C++ compilers from the GNU compiler collection, a small footprint embedded C/C++ library with RTOS capabilities, board support and examples for the AT91 family, integrated flash loading and debug support using the AT91 JTAG port.

In the CrossStudio IDE you'll find a powerful syntax colouring source editor, a complete project system with source code control system integration, a source code navigator, disassembly and symbol browsing capability and a fully featured target download and debug system. A built-in html viewer displays the extensive on-line help.

The industry standard C/C++ compilers from the GNU compiler collection are provided and are fully integrated into the CrossStudio IDE to make getting started easy.

The small footprint embedded C/C++ library and startup code means that your application code size is minimised and the supplied C tasking library provides pre-emptive multi-threading and synchronisation capabilities.

Project templates for each AT91 family variant are provided and a collection of example programs simplify getting started.

Flash download and debug is supported via the AT91 JTAG port and the optional **CrossConnect for ARM**. The CrossConnect provides a USB-JTAG interface and supports program download at speeds up to 200 Kbytes per second. The Macraigor Wiggler and Segger J-Link interfaces are also supported.

**CrossWorks for ARM** is available for Windows and Linux and is sold and supported directly by the manufacturer.

- Professional integrated development environment
- C/C++ compiler from the GNU Compiler Collection
- Small footprint embedded C/C++ library with RTOS
- AT91 flash loading and debug via the JTAG port
- Optional CrossConnect USB-JTAG interface

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SIGNUM SYSTEMS CORP.

## CHAMELEON-ARM MULTI-CORE DEBUGGER



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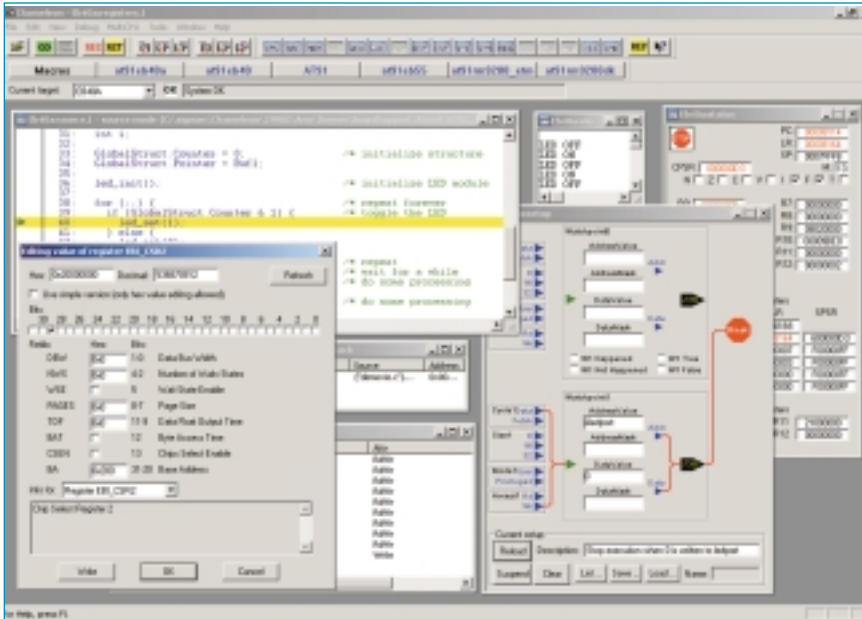
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## Chameleon Multi-Core Debugger

Chameleon Debugger works with JTAGjet-ARM emulation device to provide a consistent GUI interface to an embedded project at all stages of the development cycle.

Chameleon Debugger supports up to 256 homogeneous or heterogeneous CPUs in a single debugging environment. Information about all active CPUs is displayed on the same screen and is CPU context sensitive to make the debugging process faster and easier.

Chameleon is rich in the latest debugging features, such as fly-over variable watch, drag and drop variables, symbol browsing, complex variable implode/explode, script language for automatic testing, ETM set-up and trace windows, and more. Step-into, Step-out and Step-over modes are supported for both C and assembly levels. Our unique schematic like, graphical interface for complex events is quick, intuitive and incredibly easy to use.

With the Virtual I/O feature, all of the PC host file and I/O resources are available to the target for data saving, message printing and console I/O.

Chameleon Debugger may be used remotely over any TCP/IP network where target sharing is required.

## Compilers Supported

- ARM (ADS, AXD and RealView)
- GNU (GCC)
- Green Hills Software (Multi-2000)
- IAR (EWARM)
- Keil (PKARM)
- Mentor Graphics (XRAY, EDGE)
- Metrowerks (CodeWarrior)
- Microsoft (Platform Builder)

An Integrated Flash Programmer is included with Chameleon Debugger which programs dozens of CFI, non-CFI NOR and NAND devices. Production programming may be done by pressing a single button on the menu bar.

- Supports all AT91 ARM devices
- High-speed downloads > 1MByte/sec
- Real-time trace support (ETM)
- Multi-core device support
- Integrated Flash programming

## WEB SITE

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



# Chapter II

## JTAG ICE Interfaces

- **Abatron**
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**BDI1000** and **BDI2000** (BDI Family) add JTAG debugging for the ARM-based AT91 family. With the BDI family, you control and monitor the microcontroller solely through the stable on-chip debugging services. You won't waste time and target resources with a software ROM monitor, and you eliminate the cabling problems typical of ICE's.

This combination runs even when the target system crashes and allows developers to continue investigating the cause of the crash. A RS232 interface with a maximum of 115 kBaud and a 10Base-T Ethernet interface is available for the host interface.

**Debugger Support**

ARM (ADW/AXD), GNU (GDB), IAR Systems (EWB), Mentor Graphics (XRAY), Metrowerks (CodeWarrior), SeeCode (ARC), Wind River (Tornado V2.x).

**Host Support**

Windows, Unix, Linux (depends-on debugger).

- Source level debugging for ARM7/9/9E
- Supports debugging of multiple cores
- Built-in on-board programming of popular flash memories
- Fast download speed up to 340 Kbytes/s
- 3 years hardware warranty

**WEB SITE**

[www.abatron.ch](http://www.abatron.ch)



AMERICAN ARIUM

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American Arium offers several hardware-assisted debug solutions for the embedded developer. The two most popular are the **GT-1000D** and the **LC-500**. Both support ARM7™ and ARM9™ processors. The **GT-1000D**, a trace port analyzer, commands a trace depth of 1 GByte and a half-clock capture rate of 640 MHz. The **LC-500**, a run controller, includes a JTAG rate up to 20 Mbytes. Each offers feature-rich functionality, including superb run control with accurate breakpointing and intuitive stepping features.

Available with the each emulator is Arium's SourcePoint™ and SourcePoint™ IDE debugging software. SourcePoint is part of the company's core technology, developed specifically for SoC design and debug. The 32-bit application runs on Microsoft® Windows® 2000/XP and Linux hosts. SourcePoint IDE, powered by Visual SlickEdit®, lets users debug their code "on the fly", moving seamlessly between code and debugger.

Arium also offers a Linux OS aware debug solution that includes full symbolic, source-level debugging of Linux kernel code and

source-level debugging of Linux embedded applications. Users can launch or attach to processes with seamless transitions to and from the kernel and each process. In addition, Arium introduced two industry firsts - relocatable and dynamically loaded kernel module debugging and debug on initial target bring-up immediately from board reset.

For those needing ETM trace with less trace depth, Arium also offers the **GT-1000** and **SC-1000A**.

- ARM7 and ARM9 processor support
- Full ARM® and Thumb™ instruction set support
- Full source-level Linux kernel and application debug
- Gigabyte trace availability (ARM9)
- Integrated Development Environment (IDE) for code editing "on the fly"

**WEB SITE**

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



ARM®

**ARM REALVIEW® TRACE™ CAPTURE UNIT****ARM REALVIEW® ICE & MULTI-ICE JTAG INTERFACE UNIT****ARM RealView RVT Trace capture unit**

is an add-on for RealView ICE to capture output from the ARM Embedded Trace Macrocell™. ARM RealView ICE supports all ARM processors and can be expanded with additional modules for extended functionality, such as Trace capture.

**Supported Platforms**

Windows® 2000, XP

Note: Cannot be used standalone.

This product is designed to be used in conjunction with a RealView ICE run control unit.

- Deep programmable depth trace buffer.
  - 4 million processor cycles using a 4 bit trace port (with timestamp)
  - 2 million processor cycles using a 8/16 bit trace port (with timestamp)
  - 8 million processor cycles using a 4 bit trace port (no timestamp)
  - 4 million processor cycles using a 8/16 bit trace port (no timestamp)
- Maximum operating frequency
  - Maximum trace clock frequency 250 MHz
- Fast on-the-fly trace data upload
- Fully variable trigger position
- ETM protocols v1.x, v2.x, v3.x for ETM7™ and ETM9™
- ETM trace ports modes supported:
  - Single and doubled edged clocking
  - 4, 8, 16-bit data port widths
- Time stamp (48-bit) 10ns resolution 32 day duration

The **ARM RealView ICE** run control unit provides the software and hardware interface to ARM processor-based system-on-chip (SoC) devices using the industry standard JTAG connection. It is designed for optimum performance with RealView Developer Suite debugger, offering unparalleled depth and breadth of support for ARM processor-based devices and is currently only supported by this debugger.

**ARM RealView ICE** supports all ARM processors and can be expanded with additional modules for extended functionality, such as Trace capture. RealView ICE is an essential tool in the ARM system debug environment for devices that contain the EmbeddedICE® logic and Embedded Trace Macrocell™ components.

For more information please visit [www.arm.com/products/DevTools](http://www.arm.com/products/DevTools)

- High performance debug
- Code download up to 500 KBytes/sec at 10 MHz JTAG clock
- High speed single-stepping
- New differential signal probe for high JTAG frequencies (up to 50MHz) and longer cable lengths
- Low JTAG clock rates (down to 3kHz) support FPGA prototyping (Lower clock rates planned)
- Network connection
- Ethernet 10/100baseT
- USB connection (Windows platforms only) USB 1.1 & USB 2.0

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ASHLING

**OPELLA - GENIA**

Ashling Microsystems offer a range of tools to support debug of AT91 products. The product line offers varying degrees of debug capability according to the embedded systems developer's needs and budget.

**Opella:** The Opella for ARM emulator is an EmbeddedICE emulator and permits run/stop control of AT91 core implementations using JTAGbased control of the target's EmbeddedICE debug control port. Opella for ARM is a standalone unit, small and easy to use, controlled by Ashling's PathFinder debugger, or indeed third party debuggers. Opella is available with either USB or parallel port host connection options. Debug control is non-intrusive and requires no target system resources.

**Genia:** An enhanced EmbeddedICE debug controller, offering serial, USB and Ethernet connection to the host. This has its own embedded processor putting it in the class of 'power debugger'. Its built-in processing power allows much of the debug-port signals' generation overhead be removed from the host debugger, thus freeing it

for other tasks. This embedded power, combined with high speed Ethernet/USB host connection options serve to accelerate the entire target application debug cycle. Remote debug capability is provided over TCP/IP.

- Support for all Atmel AT91 devices and evaluation boards
- Fast code download
- Flash memory programming
- Parallel Port, USB and Ethernet connections
- Compatible with all popular third party compilers and debuggers

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GREEN HILLS SOFTWARE

**GREEN HILLS HARDWARE DEBUG DEVICES**

The SuperTrace™ Probe, Green Hills® Probe and Slingshot™ debug device are advanced hardware debug devices that enable the MULTI® integrated development environment to load, control, debug and test a target system without the need for prior board initialization, an RTOS, or even a ROM monitor.

The SuperTrace Probe can capture one gigabyte of trace data while running at trace port rates beyond 300 MHz. SuperTrace probe's combination of trace depth and speed provides an unprecedented real-time view into the run-time behavior of an embedded application. The probe is completely non-intrusive and captures data from applications running at full speed with no instrumentation by the compiler or underlying operating system. The ability to capture data from production code is essential for accurate evaluation of real-time systems' performance and timing. The SuperTrace Probe is tightly integrated with the TimeMachine Debugger, which extends MULTI tools to support trace data captured by the probe.

The Green Hills Probe offers high-speed downloads of up to 500 KBps, multi-core and multi-processor support and three host interfaces. Slingshot is low-cost with a single USB interface. Both debug devices

provide a complete range of capabilities and are ideal for all stages of product development.

Using a JTAG port, the Green Hills Probe and Slingshot can debug and control the core state (such as CPU internal registers) as well as the system state (external RAM and flash memory). Both devices enable developers to view the state and provide run control and conditional and complex breakpoints in both volatile and nonvolatile memory.

- Easy configuration and setup
- Source-level and multi-core debugging
- Flash programming
- Built-in hardware diagnostics

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## HITEX DEVELOPMENT TOOLS

## TANTINO &amp; TANTO DEBUG TOOLS



**Tantino for ARM7-9** is our compact and cost-effective USB-to-JTAG debug interface. It supports all run-control debug facilities like breakpoints, watchpoints, single-step, register and memory view. Together with the HITOP IDE, you have everything to compile and debug your application including RTOS support.

**Tanto for ARM** is the modular high-end debug tool from Hitex, supporting various ARM microcontroller architectures including the AT91-series from Atmel. The high performance Tanto Base JTAG debugging system, can be expanded with the Tanto PortTrace module to capture program flow information. The Tanto Base unit is equipped with high-speed communication interfaces for USB and Ethernet and a high performance 32-bit microcontroller. The Tanto PortTrace module allows the real-time examination of the application code and data with tracing of program flow and data accesses. It records all trace information transmitted by the Embedded Trace Macrocell (ETM), including details on program flow, branches, accesses to selected variables and information on task switching in real-time operating systems. The Tanto system makes use of the powerful HITOP user interface. This user friendly IDE includes features for

the high-level-language debugging and rapid access to all in-circuit emulator resources. Other features are flexible object file handling and a built-in command language support. Integration with 3rd party tools like Tessy – a professional tool for automated testing of embedded software – is also supported.

- Supports all AT91 derivatives (ARM7™ and ARM9™)
- Full JTAG debug support of the on-chip Embedded-ICE debug logic
- Ethernet and USB
- Fast Flash programming of internal and external Flash
- Supported compilers: RealView, ADS, Keil, Green Hills, GNU, Metrowerks, Metaware, ...

**hitex**  
DEVELOPMENT TOOLS

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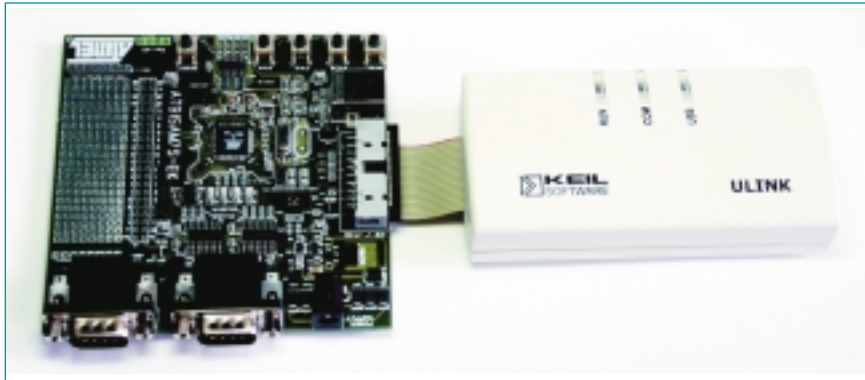
## WEB SITE

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





KEIL SOFTWARE

**ULINK USB-JTAG INTERFACE ADAPTER**

The **Keil ULINK USB-JTAG Interface Adapter** connects the USB port of your PC directly to the JTAG port of Atmel AT91 ARM devices. Using the **µVision Debugger** with ULINK, you can easily create, download, and test embedded applications on actual target hardware.

ULINK provides direct access to the ARM Embedded ICE and allows you to:

- Download target programs,
- Examine memory and registers,
- Single-step through programs,
- Insert multiple breakpoints,
- Run programs in real-time,
- User I/O via the Debug channel,
- Program FLASH memory.

**Flash Download** algorithms are user-configurable and allow ULINK to be used as a programmer for on-chip and external Flash ROM. Pre-configured programming algorithms for the Atmel AT91 device series and Atmel AT91 Evaluation Boards are included.

ULINK comes ready-to-use with a 16KB Evaluation Version of the **Keil PK-ARM Professional Developer's Kit** which includes the Keil CARM Compiler, Advanced RTX Kernel, and µVision Debugger. Extensive example programs and pre-configured startup code to help you get started are also included.

The **µVision Debugger** supports multiple tool chains including: Keil CARM, GNU, and ARM ADS/RealView. Of course, C source code and assembler level debugging are supported. An integrated editor allows source code corrections while debugging. Dialogs show detailed status information of the on-chip AT91 peripherals and help you quickly find configuration problems.

- JTAG Clock adjustable up to 1MHz
- Stand-alone Flash programmer
- Program debugging with µVision
- Memory load speed > 200kbps
- Flash Write > 150kbps
- User configurable Flash routines
- Fast Single Stepping

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LAUTERBACH

**TRACE32-ICD****JTAG Interface**

The JTAG Debugger **TRACE32-ICD** provides a complete set of development and testing tools for the AT91 microcontrollers which are all based on an ARM7 or ARM9 core. The advanced modularity of **TRACE32-ICD** allows to extend the debugger with an EPROM simulator or an I/O simulator. TRACE32 works with the highest variety of host interfaces. The communication link to the host is done by printer port, USB or Ethernet allowing a high-speed transfer. It is possible to share a TRACE32 in a LAN of PCs and workstations.

**Debugger**

**TRACE32-ICD** is controlled by TRACE32-PowerView the powerful IDE allowing HLL debugging on C or C++ level. It works together with all third party compilers. It is allowed unlimited software breakpoints, but also supports the hardware break- and watchpoints provided by the EmbeddedICE macrocell. A flash programming utility is included. The comfortable windowed user

interface is completely configurable by the user, no other system offers more flexibility.

**Supported RTOS**

AMX, ChorusOS, embOS, Nucleus PLUS, OSE, pSOS+, RealTime Craft, RTX, SMX, Symbian OS, ThreadX, VxWorks.

**Supported Host Systems**

PC (Windows XP, Windows ME, Windows 2000, Windows NT, Windows 95/98, Linux), Workstation (HP-UX, SUNOS, Sun Solaris).

- Easy HLL and assembler debugging with Interface to all compilers for C and C++
- Comfortable support of hardware break- and watchpoints provided by the EmbeddedICE macrocell
- Download speed up to 2MByte/s
- RTOS awareness
- High-speed link via Ethernet or USB

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## SEGGER MICROCONTROLLER SYSTEME GMBH

## J-LINK



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**J-Link** is a small USB to JTAG debug device, designed for ARM cores. It connects via USB to the Windows PC host.

J-Mem, a small (app. 50 kb) stand-alone application for Microsoft Windows 2000 and Windows XP is included. It requires a **J-Link** connected to the USB port and an ARM system connected to **J-Link** via the JTAG interface.

J-Mem displays memory contents of ARM-systems and allows modifications of RAM and SFRs (Special Function Registers) while target is running. It makes it possible to look into the memory of an ARM chip at run time; RAM can be modified and SFRs can be written. The type of access for both read and write access can be selected to be 8/16/32 bit.

It works nicely when modifying SFRs, especially because it writes the SFR only after the complete value has been entered.

J-Flash is a PC software running on Windows 2000/XP systems, which enables you to program your Flash EEPROM devices via the On-Chip Debug connector (JTAG) on your target system.

A **J-Link** device, which connects via USB interface with the PC, is needed. J-Flash

works with any ARM7/9 system and supports all common external flashes, as well as the programming of internal flash of ARM microcontrollers.

It allows you to ERASE, FILL, Program BLANK CHECK, CHECKSUM, UPLOAD flash content, and VIEW MEMORY functions of the software with your flash devices. Purchasing a license will turn off the time limitation.

- Any ARM7/9 core supported, including Thumb mode
- Download speed up to 150kb/s
- No power supply required, powered through USB
- Auto speed recognition
- All JTAG signals can be monitored, target voltage can be measured
- Support for multi core debugging
- RDI flash breakpoints available
- RDI software available

## WEB SITE

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



SIGNUM SYSTEMS CORP.

**JTAGJET-ARM**

**JTAGjet-ARM** is a non-intrusive In-Circuit Debugger for all AT91 ARM7 and ARM9 based devices. It features:

- High-speed USB 2.0 (480 Mbps) interface allows downloading to target RAM at rates exceeding 1 MBytes/sec.
- Chameleon Debugger for ARM7 and ARM9 with integrated NOR and NAND Flash Programmer.
- AT91 Peripheral device register window gives detailed information about register bits, bit fields and their descriptions.
- Based on high-speed logic (FPGA) JTAGjet is optimized for fast downloads, fast window refreshing and instruction stepping.
- Support for all popular (over a dozen) 3rd Party Debuggers & Compilers.
- Up to 30 MHz JTAG clock with Adaptive Clock support (RTCK).
- Virtual-to-physical address mapping support for ARM cores with MMU (essential for WinCE, PalmOS, OSE or Linux operating systems).
- JTAG chain diagnostics for device detection, identification and troubleshooting.
- Active JTAG probes support long and noisy JTAG chains.

- USB 2.0 interface
- Supports all major debuggers
- Integrated Flash programmer
- Multi-core support

**JTAGJET-TRACE**

**JTAGjet-Trace** has the same features as the JTAGjet-ARM but adds real-time trace memory.

- Supports the AT91RM9200 and other devices that contain the ETM (Embedded Trace Macrocell) trace port.
- Non-intrusive trace capture at up to 400 MHz CPU speeds.
- Up to 4M frames deep trace memory (18 MBytes) captures the entire program flow (PC) and all data transactions (variables and CPU registers) in real-time.
- 56-bit, cycle-accurate time-stamp is added to each frame to show detailed execution timing as well as frequency of execution of any function or interrupt.
- Pre- and post-capture trace filtering with simple and intuitive user interface.
- Export trace data to Excel file for further analysis and graphing.
- Quiet operation - no heat problems, no fans.
- One connection to target via the standard 38-pin Mictor connector.
- Single, palm sized unit - both the emulator and the trace are in one enclosure.

- Cycle accurate trace up to 400 MHz
- Up to 4M frame deep trace
- 56-bit time stamp, cycle accurate
- ETB support

*Celebrating 25 years of emulation systems design!*

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SOPHIA SYSTEMS

## EJ-DEBUG JTAG EMULATOR



**Sophia's EJ-Debug JTAG Emulator** has all the same great functions as our popular\_UniSTAC II/J\_Lite series plus so much more. With its low price point and small size, the EJ-Debug is sure to meet any developer's budget and field application needs.

All Sophia ICE includes our own high level language debugger - Watchpoint®. Watchpoint® supports C/C++, Java, and other languages as well as numerous RTOS applications, and operates on Windows 9x/ME/NT/2000/XP platforms. Thumb® state code debugging, flash memory write capability, unlimited software breakpoints, and the ability to view/modify internal peripheral and coprocessor are all standard features of Watchpoint®. Hardware breakpoints can also be set for address/data/status conditions (2 instruction breakpoints, 2 data breakpoints).

#### Also Available:

- EJ-Writer is a low cost Flash ROM writer that has the ability to write directly into Flash ROM via the JTAG port (while already installed on the target board)!
- UniSTAC II/J JTAG emulator with USB and LAN interface offers branch trace capabilities and optional ETM trace of internal memory

with a trace capacity of 512K machine cycles. Features of ETM trace include: instructions and data trace, the start/end address, as well as memory access and data can be specified by the user. This multifunctional trace/trigger easily uncovers hard to find, embedded bugs.

- UniSTAC II ASSP Full ICE offers a powerful and more complete debugging solution!

*Sophia's Watchpoint® Debug Software works in conjunction with Sophia's EJ-Debug emulator and is not standalone software.*

- Supports the CPU's maximum internal clock speed
- JTAG-based ARM Multi-ICE and EmbeddedICE debugging interfaces supported as well as ARM/Thumb mode supported
- High-speed download to external Flash ROM capability
- Automatic script execution via the BATCH button
- Useful for field maintenance AND/OR for automatic writing/upgrading in mass production

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## Chapter III

# RTOS

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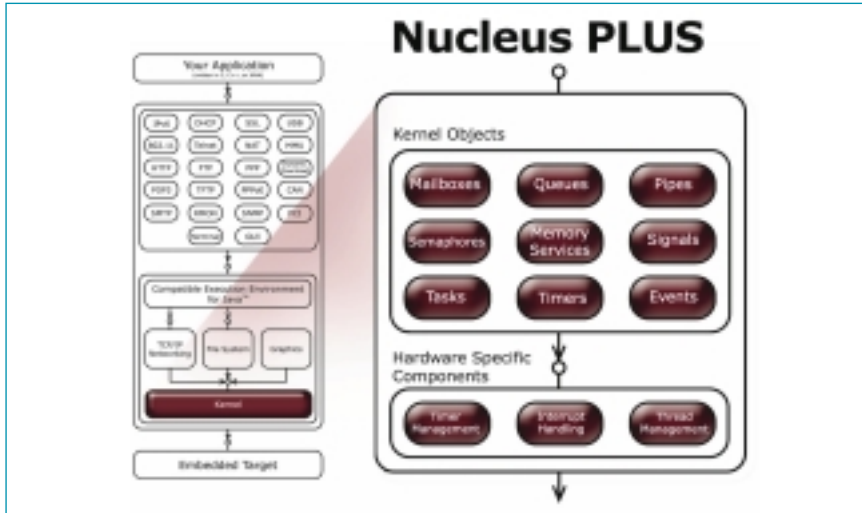


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III-02

## ACCELERATED TECHNOLOGY

# NUCLEUS PLUS



The **Nucleus PLUS** kernel provides efficient, high performance task management, inter-task communication, inter-task synchronization, memory management, and component query features. Optimizations in system clock, interrupt and compiler register usage are only part of the advanced features provided by **Nucleus PLUS**. The scaleable nature of **Nucleus PLUS** tunes size and function, providing the necessary OS support to build complex designs all while keeping the interrupt latency to a few microseconds. **Nucleus PLUS** is renowned for its broad range of facilities for building efficient embedded systems.

Porting **Nucleus PLUS** to new processor families is straightforward and reliable, since it is written primarily in ANSI C. To port **Nucleus PLUS** we need only modify the system initialization, task management, and timer control modules. The portability of **Nucleus PLUS** benefits you by allowing processors to be changed without concern for the new architecture. Further, it allows you to execute your application easily on new hardware (board) designs.

For AT91 devices, we also offer services for networking and Internet protocols, a file system, USB support, services for World Wide Web access, and a data encryption

solution. Our complete family of Nucleus embedded software is designed around a solid micro-kernel architecture; one that maximizes performance, robustness and scalability. All products in the Nucleus RTOS family come with our "source code, no royalty" model.

*For information on additional products available for the Nucleus RTOS, visit our website.*

- Scalable: 4 KB-45 KB, depending on necessary functionality.
- Standard API's such as POSIX,  $\mu$ ITRON and C++ are Available.
- Dynamic creation of all Nucleus PLUS tasks.
- Intertask communication: mailboxes, variable queues, pipes.
- Task synchronization: counting semaphores, events, UNIX-like signals.

ADENEO

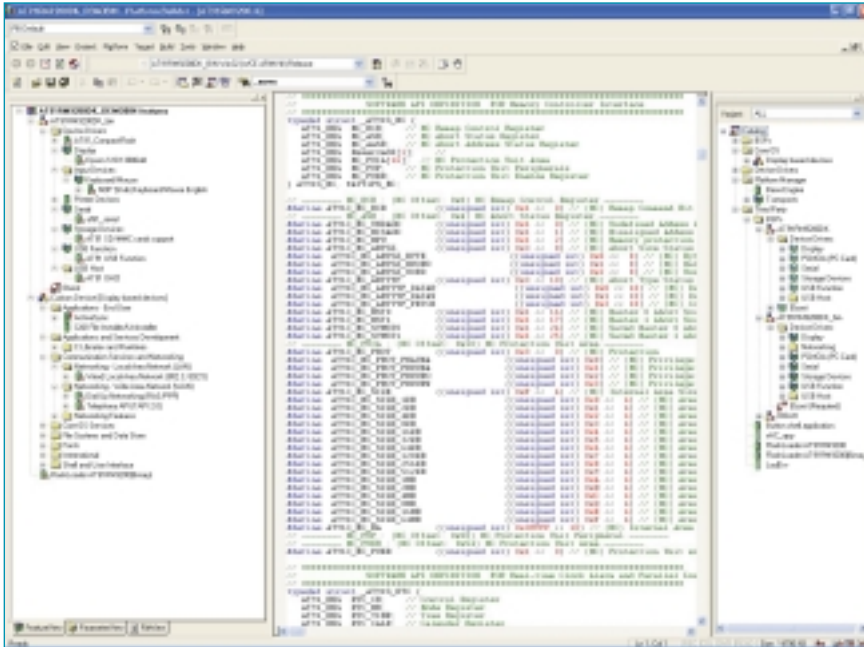
## WINDOWS CE SUPPORT FOR AT91RM9200 BASED DESIGNS



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Integrating drivers for all standard interfaces, this BSP enables application developers to port their Windows CE-based software onto systems based on the AT91RM9200 with minimal development effort and risk.

Additionally, Adeneo can adapt or enhance the BSP to the specific requirements of the client. As a Windows CE-certified training partner, Adeneo also provides training courses based on Microsoft official courses.

The AT91RM9200 Windows CE BSP is available on Atmel's AT91RM9200 development board, AT91RM9200-DK and AT91RM9200-EK. A demo version in binary form of this Windows CE BSP is freely available for AT91RM9200 customers. Its source code can be purchased from Adeneo.

- Bootloader allowing boot from Ethernet, SPI flash and SD Card
- Windows CE 5.0 Kernel with full support of AT91RM9200 core
- HMI drivers (Display, USB keyboard + mouse)
- Communications driver (Ethernet, USB Host, USB Device, Serial, SPI, I2C)
- Storage drivers (SDCard, Serial Data Flash, Compact Flash)

### WEB SITE

[www.adeset.com/srt/en/home](http://www.adeset.com/srt/en/home)





CMX SYSTEMS, INC.

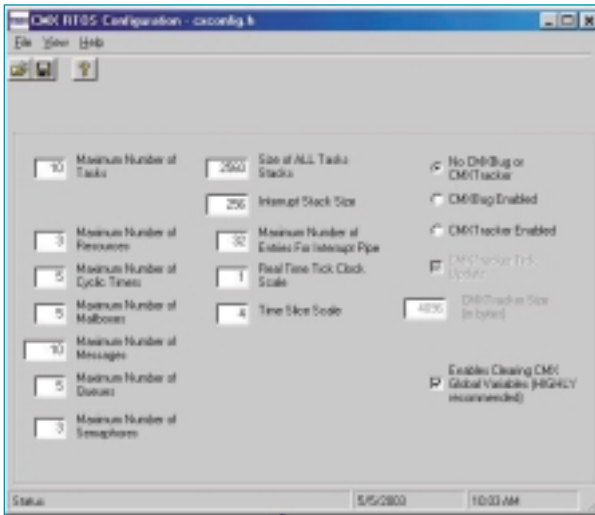
## CMX-RTX™ AND CMX-TINY+™



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**CMX-RTX** and **CMX-Tiny+** are truly preemptive, multi-tasking real time operating systems (RTOS) for the Atmel series of processors. These “lean and mean” RTOSes offer the smallest footprint, the fastest context switching times, and the lowest interrupt latency times available on the market today. While **CMX-RTX** and **CMX-Tiny+** are a fully preemptive RTOS, support is also provided for cooperative scheduling or time-slicing, if desired.

RTOS functionality provided in **CMX-RTX** include functionality for: Task Management, Message Management, Queue Management, System Management, Event Management, Memory Management, Resource Management, Semaphore Management, Timer Management, and RTOS debugging (CMXKAware.)

**CMX-Tiny+** is a real time kernel specially designed for those processors that have a small amount of RAM embedded on the processor’s silicon. This allows the user to develop application code and have it run under an RTOS using only the onboard RAM that the processor provides.

RTOS functionality included in **CMX-Tiny+** are as follows: Task Management, Message Management, System Management, Event Management, Resource Management, Semaphore Management, and Timer

Management.

CMX RTOSes also feature the CMX RTOS Windows Configuration Manager that offers an intuitive and easy to use GUI for configuring the RTOSes. Embedded developers can use the friendly Windows environment to set parameters and other RTOS options, instead of editing source code configuration files, though both options remain available.

CMX RTOSes are currently in use worldwide in a wide range of applications, including: aerospace, automotive, computer electronics, consumer electronics, industrial control, manufacturing equipment, medical equipment, POS, robotics, telecommunications, and more.

CMX RTOSes are also integrated with CMX TCP/IP stacks, flash file systems, and CANopen protocol software products. The CMX RTOSes feature free source code, no royalties on shipped products, free technical support, and a low, one-time fee.

- Smallest Footprint
- Fastest Context Switch Times
- Lowest Interrupt Latency Periods
- Full Source Code
- No Royalties; One-Time Fee

### WEB SITE

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



GREEN HILLS SOFTWARE

# INTEGRITY® RTOS AND VELOCITY™ MICROKERNEL



Green Hills Software has two royalty-free RTOS products. The POSIX conformant **INTEGRITY® RTOS** is memory-protected and securely partitioned for use in embedded systems that require the utmost in reliability and security. The **veLOCITY™ microkernel**, the foundation of **INTEGRITY**, is small and fast, making it a perfect fit for cost-sensitive, high-volume, and resource-constrained embedded applications.

**INTEGRITY** and **veLOCITY** employ common application programming interfaces, device drivers, BSPs, middleware and network stack support, along with a common MULTI® tools integration and debug features. Software developed for the **veLOCITY microkernel** is 100% upwards compatible with the **INTEGRITY RTOS**. In applications that may require virtual memory support, **veLOCITY** can be upgraded to **INTEGRITY** with minimal to no code changes. Should the system design call for partitioned application and device drivers, the existing design can be easily reconfigured to enable applications and device drivers to exist in their own protected virtual address partition.

- Full memory protection for tasks, the operating system, and device drivers
- Secure partitioning with guaranteed memory and processor bandwidth
- Low interrupt latency and fast, deterministic task switching
- Fully integrated with Green Hills Software's optimizing compilers and MULTI IDE
- Support for ARM-based AT91 processors



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KADAK PRODUCTS LTD.

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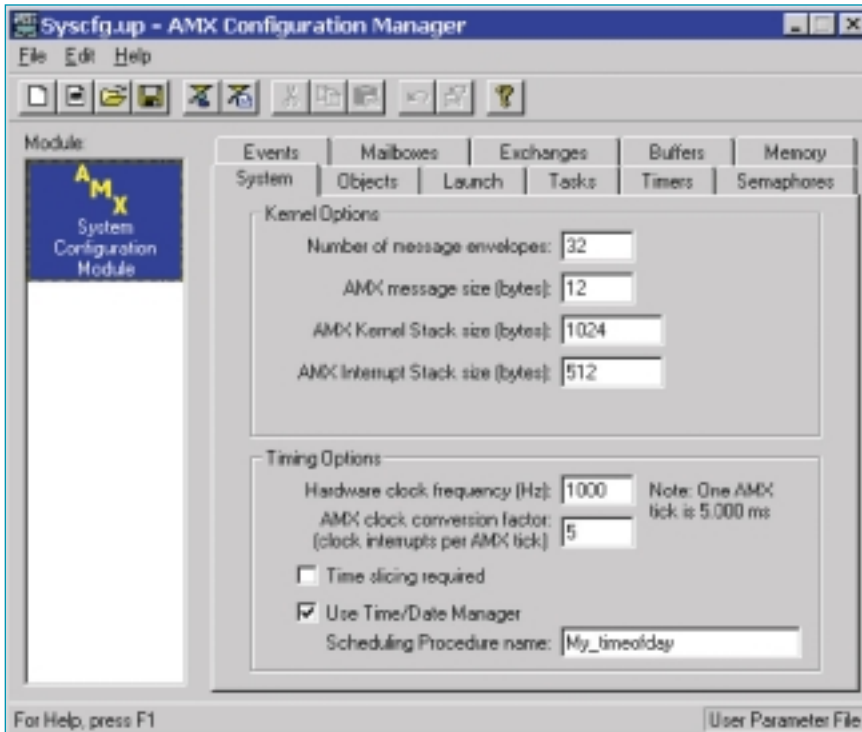
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**AMX** is a full featured real time operating system (RTOS) for the ARM and ARM Thumb microprocessor families. **AMX** has been tested on the Atmel AT91EB40A, EB42, EB63 and AT91SAM7S-EK Evaluation Boards.

**AMX** is a simple, readily understandable software development tool which meets the stringent requirements of all real-time applications. First released in 1980, the **AMX** family of kernels has been used worldwide at more than 2,500 embedded systems development sites.

**AMX** is delivered ready for development on a PC with Windows. Source code of all **AMX** modules is provided with **AMX** to permit **AMX** to be ported to any development platform. A sample program is provided to illustrate the proper use of many of the **AMX** services.

**AMX** is offered with a liberal site license agreement. Executable application modules incorporating **AMX** can be distributed without royalties.

**AMX** documentation is comprehensive and includes tutorial explanations and examples.

- Windows® based Configuration utility eases system construction
- Mailbox, semaphore, resource, event, list, buffer and memory managers
- Clear and comprehensive manuals
- No royalties; source code included
- Enviably track record for reliability and support

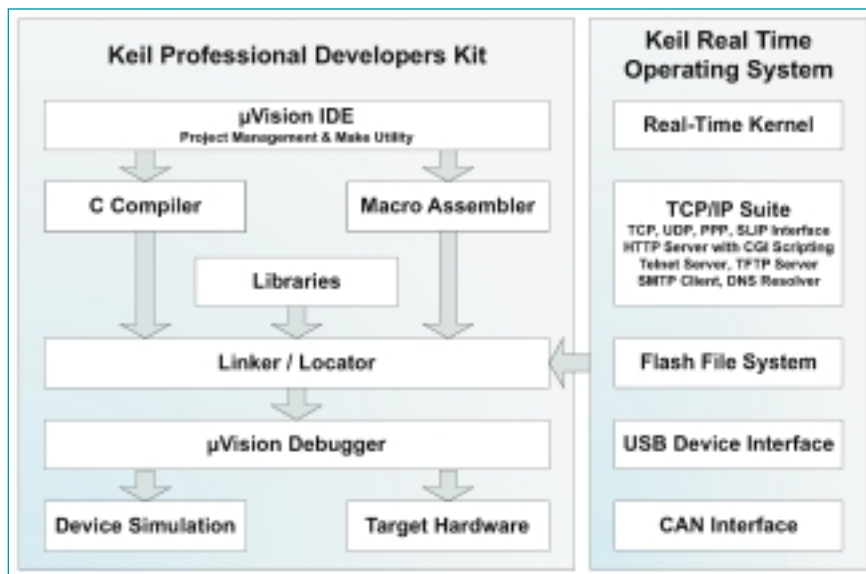
**WEB SITE**

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KEIL SOFTWARE

## ARTX-ARM ADVANCED RTOS



The **Keil ARTX-ARM Advanced RTOS** for ARM-based Microcontrollers is a flexible Real-Time Operating System that includes a Flash File System and TCP/IP Networking support.

ARTX-ARM is designed to solve several common challenges for embedded developers including:

- **Multitasking** which allows you to manage several jobs or tasks on a single CPU,
- **Real-Time Control** which allows you to configure tasks so that operations execute in a defined period of time,
- **Inter-Task Communication** which allows various tasks in your system to communicate with each other,
- **Internet Connection** via Ethernet or Serial (Modem),
- Embedded **Web Server** and CGI scripting,
- E-mail Notification via SMTP.

Driver templates for CAN, Flash, and USB devices are available.

#### Kernel Features

- Kernel routines are provided in a library

that is automatically included by the linker. All you must do is specify the ARTX linker directive or select Advanced RTX for ARM within the µVision IDE.

- Interrupts may trigger tasks or start standard interrupt functions.
  - Several methods of inter-task communication are provided including: events, mailboxes, and semaphores.
  - Supports both ARM and Thumb modes.
- TCP/IP Library supports internetworking on ARM devices
  - Protocols supported: ARP, UDP, TCP, HTTP, TFTP, SMTP, DHCP, Telnet
  - Pre-configured for SMSC LAN91C111 Ethernet Controller. Other Ethernet controllers may be used with user-configured initialization routines
  - Several example projects are included

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MICRIUM

# μC/OS-II REAL-TIME OPERATING SYSTEM

The Real-Time Kernel



**μC/OS-II** is a portable, ROMable, scalable, preemptive real-time, deterministic, multi-tasking kernel for microprocessors, micro-controllers and DSPs. **μC/OS-II** can manage up to 63 application tasks and provides the following services: Semaphores, Event Flags, Mutual Exclusion Semaphores (to reduce priority inversions), Message Mailboxes, Message Queues, Task Management, Time Management, Fixed Sized Memory Block Management and more.

**μC/OS-II** comes with ALL the source code. In fact, the source code is 100% portable ANSI C and is probably the cleanest and most consistent code of any RTOS. The internals of **μC/OS-II** are described in the book *MicroC/OS-II, The Real-Time Kernel* (ISBN 1-57820-103-9) by Jean J. Labrosse.

A validation suite has been developed for **μC/OS-II** and provides all the documentation necessary to prove that **μC/OS-II** is suitable for Safety Critical Systems common to Aviation and Medical products. Although this feature may not be applicable to your needs, it does prove that **μC/OS-II** is a very robust RTOS. You can 'View' the status of your tasks which are managed by **μC/OS-II** with an add-on module called **μC/OS-View**.

A number of popular debuggers provide **μC/OS-II** kernel awareness which allows you to display **μC/OS-II**'s internal data structures in a convenient series of Windows.

- Royalty-Free licensing
- FAA DO178B Level A certifiable
- Scalable footprint
- Preemptive scheduling &- Dynamic priorities
- Timeouts on all task wait calls
- Kernel Awareness Debugger Support
- Source code provided Internals of **μC/OS-II** described in the book: "MicroC/OS-II, The Real-Time kernel"
- Interfaces to other Micrium products:
  - **μC/GUI** (Embedded Graphical User Interface)
  - **μC/FS** (Embedded File System)
  - **μC/TCP-IP** (Embedded TCP/IP stack)
  - **μC/USB** (Embedded USB stack)

# Micrium

Empowering Embedded Systems

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## MICRO DIGITAL

**Smx<sup>®</sup> MODULAR RTOS**

**smx** is a modular RTOS that has been designed with an architecture to meet the needs of small to medium size embedded systems. It features small, efficiently written modules and thus works well on less expensive processors. The modules are highly independent. This permits leaving out those that are not needed, in order to save cost and space. **smx** offers the following services:

- Hard real-time multitasking
- File management
- Networking
- User interface
- Special services
- Debugger and tool support

Extensive drivers are available with **smx** products, and **smx** supports many popular tool chains. This allows you to minimize the time spent writing device drivers and to continue using the tools with which you are familiar.

Micro Digital's objective is to provide each customer with a complete solution that saves programming expense and speeds time-to-market. To further this goal, **smx** products come with complete, well-written manuals. Also, all orders are pre-installed, integrated, and tested with the chosen tool chain, before they are shipped.

This is further backed up by the best support in the RTOS industry. The programmers who wrote the code provide your support. If you find a bug, Micro Digital's support team will fix it NOW. If you do not understand

something, we will explain it clearly. We are here to work with you. We also provide customization and consulting services.

Our goal is to provide products with richness of features and with fast performance in order to provide good solutions for the problems embedded programmers are likely to encounter. These problems often cannot be anticipated. Hence, Micro Digital delivers a kernel that has more than enough capability to prevent costly schedule overruns and missed sales opportunities

*If you are looking for a responsive RTOS company with excellent products, Micro Digital is your solution.*

- Unique, 3- level application structure: Background tasks, Foreground tasks (Isr's) & isr's
- Preemptive, round-robin, and timeslice scheduling. Multiple tasks per priority level
- Dynamic priorities & Scheduler locking
- Small memory footprint & Fast and standard block pools. Better stack sharing model than OSEK & Indirect messaging via exchanges
- Message priorities, priority passing Client/Server messaging, C++ support & Task-aware debugging

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## MQX EMBEDDED, A DIVISION OF ARC INTERNATIONAL

## MQX™ RTOS



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The **MQX™ RTOS** offers leading-edge technology for embedded designs based on the Atmel AT91 family processors.

The **MQX RTOS** with its modern, component-based, microkernel architecture was designed for speed and efficiency in embedded systems. The MQX RTOS delivers true RTOS performance, with context switch and low-level interrupt routines hand-optimized in assembly, and can be configured to take as little as 6Kbytes of ROM, including kernel, interrupts, semaphores, queues, and memory manager.

The **MQX RTOS** includes the MQX Host Tools, a suite of Windows-based prototyping and profiling tools making software engineers productive immediately. These tools (Design Tool, Performance Tool, Task-Aware Debugging, and the EDS client.) save development costs, speed development, and improve finished product quality.

MQX Embedded accelerates projects with embedded software products based on the **MQX RTOS**, provided in source. Our RTCS™ Embedded Internet Stack is among the many proven components that speed MQX RTOS-based products to market.

Field-proven for over 14 years, the **MQX RTOS** has can be found in state-of-the-art embedded devices including IP telephones, digital cameras, routers, cable modems, storage devices, set-top boxes and transportation and industrial control systems. MQX Embedded™ products, tools, and technologies power thousands of successful embedded products shipping in millions of units.

- Powerful Microkernel Architecture designed for embedded systems
- True real-time performance and small footprint
- Includes Precise Host Tools
- Delivered in full source
- Enables MQX Embedded™ Stacks, Networking Components, and Platform Enhancements

## WEB SITE

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## SEGGER MICROCONTROLLER SYSTEME GMBH

## EMBOS



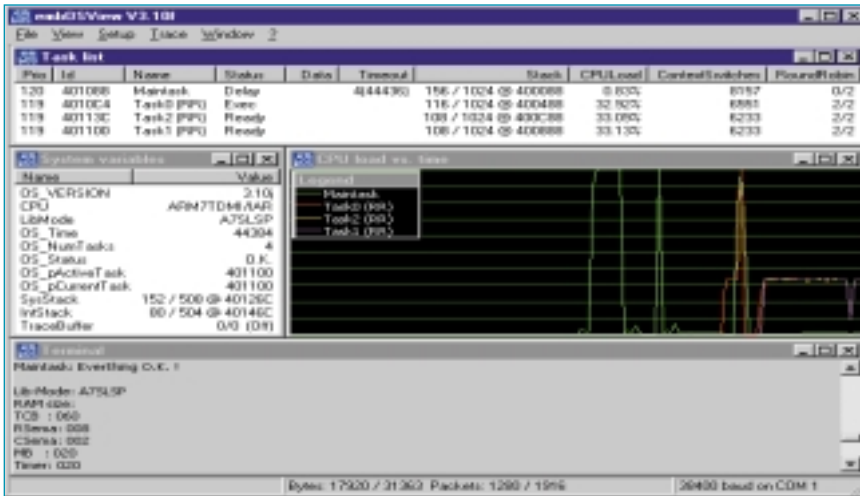
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**embOS** is a real time operating system for embedded applications designed to offer the benefits of a fully featured multitasking system even for hard real time applications using minimal resources.

**embOS** is available in source or object code form. Both come with a ready to go start project: The first multi task program is running within five minutes. The start application and usable samples are supplied in source code form. Libraries for all memory models and initialisation of the controller in "C"-source are included to tailor the system to any application. Check out the free fully functional trial version for the Atmel 91 which can be downloaded at [www.segger.com](http://www.segger.com).

embOSView communicates with the kernel via UART and displays all available information of the tasks and major system variables. All communication is done from within the communication interrupt routines. This means that it is none intrusive if embOSView is not connected and minimum intrusive while embOSView is connected.

On most CPUs a profiling build of the libraries is available. In the profiling build, **embOS** collects precise timing information for every task, which enables embOSView to show the CPU load.

A simulation environment running under MS Windows is available. It can be used to write and test the entire application program on your PC (all routines are 100% identical to your embedded application). This makes debugging and development easy and convenient and saves development time. The simulation is an open environment which also allows adding "C"-code to simulate the target specific hardware. **embOS** Simulation comes with a ready to go start project for MSVC++ but may also be used with other tool chains.

- Preemptive multitasking
- Priority controlled scheduling
- Round robin scheduling
- Zero interrupt latency
- Small footprint
- Easy to use start project included
- Profiling support included
- No royalties

## WEB SITE

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





# Chapter IV

## *Flash Programmers*

### ■ BP Microsystems

Universal Engineering Programmer .....IV-02

### ■ Data I/O

Microcontroller Programming Solutions .....IV-03

### ■ System General

PowerLab Universal Programmer

T9600 Universal Programming System .....IV-04

### ■ Xeltec

Superpro 3000U .....IV-05



BP MICROSYSTEMS

## UNIVERSAL ENGINEERING PROGRAMMER

BP MICROSYSTEMS

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BP Microsystems' newest **Universal Engineering Programmers** are here to meet your programming needs. Designed using the latest technology developed over the past year, the new 1710 and 1610 support more devices, including nearly 1,000 Atmel devices, and offer the industry's best value with software updates and warranties.

The 1710 features improved site hardware that is capable of programming devices with densities up to 4 Gbits. In addition, we have incorporated the industry's widely accepted high-speed USB 2.0 standard bus on the 1710 and the 1610 to provide you with a faster, more reliable communications interface between the programmer and the host PC.

Our engineering programmers use the same algorithms that run on our manual and automated production programmers - which include the largest installed base for fine-pitch automated programming systems. They also come standard with JobMaster™ software, which allows you to easily set up, save and securely transfer job information and programming data between facilities around the country or around the world.

Since 1985, BP Microsystems has set the standard in device programmers and we

back each programmer with the best support in the industry. So no matter what device you're programming, you'll find the right programmer at the right price from BP Microsystems.

- Support for over 21,000 devices including Flash, FPGAs, and Microcontrollers
- Support for devices down to 1.5V (Vdd)
- Up to 4 high-speed programming sockets per site on the 1710 with the use of an FX4 socket module
- Over 1,900 socket modules available to support various package styles from DIP to uBGA
- Offer software support and warranty on all programmers

## WEB SITES

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



## DATA I/O

# MICROCONTROLLER PROGRAMMING SOLUTIONS



Data I/O offers programming solutions from design and engineering programmers to fully automated, off-line systems, to just in time programming systems. In 2005 Data I/O has extended its range of programming solutions with the introduction of the ImageWriter™, an in-system programming solution designed specifically for production.

For over 30 years Data I/O has led the industry with innovative manual and automated device programming solutions supporting emerging device technologies such as Flash Based microcontrollers, *NOR Flash* memories and NAND devices, with solutions such as the **FlashPAK**, **ImageWriter**, **PS288FC**, **RoadRunner**, **3980xpi**, **UniSite-xpi**, and the **Sprint family of programmers**. Data I/O operates in every major country in the world, with subsidiaries and channel partners in Asia and Europe, so support for your design or production requirements is available near your location.

- FlashCORE Technology for shortest programming times
- Global presence in every major world geography
- ImageWriter™ offers production ISP solution
- ProLINE RoadRunner™ for just in time programming
- PS Series for volume programming (low to high volume)

Delivering the World's Best Ideas in Silicon

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## SYSTEM GENERAL

## POWERLAB UNIVERSAL PROGRAMMER

## T9600 UNIVERSAL PROGRAMMING SYSTEM



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e-mail: sales@systemgeneral.com



## PowerLab Universal Programmer

The PowerLab was specifically designed as a low-cost universal programming solution for lab application. With few exceptions, the PowerLab provides an extensive list of silicon support including many of today's cutting-edge parts. The PowerLab dramatically improves device-programming performance at this price point. Additionally, file download speed is improved with USB connectivity.

The PowerLab is constructed using surface-mount components. In so doing, its pin driver circuits are as close to the socket pins as possible. This physical proximity provides the best programming environment for sub-micron devices that demand clean signal waveforms.

Very few device programmer companies are ISO 9001 certified, and System General is extremely proud to be one of them. Your quality assurance of PowerLab starts at the design stage and continues throughout its lifetime. System General programmers follow our stringent requirements of 25% design margin and over-current protection.

- Windows Interface  
- Windows 95/98/ME/2000/XP
- Life-time Free S/W Updates
- Industrial-grade Quality and ISO 9001 Vendor
- AT91 related products

## T9600 Universal Programming System

In 1998, System General was the first programmer company to pioneer High-Speed Programming (HSP) technology for Flash memories. HSP has set the standard for the rest of the industry. Evolving from proven HSP technology, the 9600 programmer supports virtually every type of technology currently available.

The model 9600 is available in two configurations. The T9600 table-top model is designed for manual programming, while the H9600 version performs handler interfacing.

On the T9600, engineers can use the Task Manager software to program the first article. The parameters used for the first article are then saved as a specific task file. Once the first article passes certification, the saved task file can bring up the same programming setup on the T9600 for manual programming, or on the H9600 using any System General automatic handler.

- World's fastest universal programmer
- 112 powerful universal pin drivers, expandable up to 448 pins
- USB port for high-speed data transmission
- Supports 1.2V VCC green devices
- Multi-linkable for gang programming with pipelined throughput

## WEB SITES

[www.sg.com.tw](http://www.sg.com.tw)

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



XELTEK

**SUPERPRO 3000U****XELTEK****CONTACTS****USA**

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 e-mail: info@xeltek-europe.com

**SUPERPRO 3000U****USB Interfaced Ultra-high Speed Stand-alone Universal Programmer**

This high-speed, USB connected programmer provides a scalable programming solution, used singly for development or with up to 4 units, clustered for low volume production. With its 48 universal pin drivers (100 universal pin drivers optional), low voltage device support down to 1.5V and broad universal adapter range, it supports over 20,565 devices.

Full ranges of Atmel devices are supported. Devices include serial/parallel E/EPROMs, Flash memories, PLDs, and ISP and regular MCU devices.

Please try our Device Search function on the web to locate a device, circuit adapter, and programmer supporting it.

**Features:**

- Programs high-density memory devices at near theoretical minimum programming time
- In-System Programming (ISP support)
- Stand-alone operation for manufacturing or service. Built-in keyboard & LCD display provides for local operations
- Microsoft Windows 98/Me/NT/2000/XP compatibility

- Maximum compact flash card capacity is 4Gbytes

**Specifications:**

- Device Supported: EPROM, Paged EPROM, Parallel and Serial EEPROM, FPGA Configuration Serial PROM, FLASH Memory, (NOR & NAND), BPROM, NOVRAM, SPLD, CPLD, EPLD, Firmware HUB, Micro-controller, MCU, Standard Logic.

**Device Updates:**

- Xeltek updates software and device algorithms regularly
- You may download the current software version free of charge at [www.xeltek.com](http://www.xeltek.com)
- Xeltek also adds devices on customers' requests at its discretion

- Supports 20,565+Devices including 1.5V devices
- Ultra fast programming
- Free device updates
- Powerful and Intelligent software
- PC Hosted (USB), Stand-alone & Terminal Modes in one
- Up to 100 Pins Universal Pin-drivers

**WEB SITES**

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



# Chapter V

## *Reference Designs*

- **IniCore**
  - System Design Board SDB-750 .....V-02
- **Phytec**
  - phyCORE® - ARM7/AT91 .....V-03
- **SoftSys**
  - ARMtwister PCMCIA-2 .....V-04



INICORE INC.



## SYSTEM DESIGN BOARD SDB-750/1000



The **SDB-750/1000** is powered by the ARM7TDMI 32-bit RISC processor based AT91R40807. In combination with the 2 Mbytes SRAM and 16 MBytes of program memory (FLASH), the board operates in a standalone mode. It is available with an up to one million gates ProASIC PLUS FPGA from Actel.

The **SDB-750/1000** can be used in a wide range of applications. Whether high performance, compute-intensive applications or industrial applications or systems in need of advanced power management, they are all well supported by the AT91 CPU. The PMC port with the PTMC extension opens the door to the telecom sector.

### Software Support

The **SDB-750/1000** runs the eCos operating system from RedHat. The GCC tool suite running on Linux and Windows platforms supports software design. The JTAG in-circuit emulator (ICE) interface eases system debugging. Also, a serial port can be used to interface to a GDB debugger running on a host computer.

### In-System Programming

The **SDB-750/1000** supports the reprogramming of the FPGA by using a standard

JTAG header or by the on-board RISC-processor.

### Interfaces and Hardware Support

The **SDB-750/1000** is designed to support real System-on-Chip applications. The external CPU can be disabled and replaced with a controller residing inside the ProASIC PLUS device. All external resources such as SRAM and FLASH memory are available to the on-board CPU.

- ARM7TDMI CPU AT91R40807 from Atmel
- eCOS Operating System from RedHat
- 2 MByte SRAM, 16 MByte FLASH
  - 64-bit wide SRAM (PC100)
  - Compact Flash Slot
- PMC Expansion, Supporting
  - IEEE P1386.1
  - PCIMG 2.15 (PTMC)
  - 64-bit PCI

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## WEB SITE

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## PHYTEC TECHNOLOGIE HOLDING

PHYCORE<sup>®</sup>-ARM7/AT91

PHYTEC

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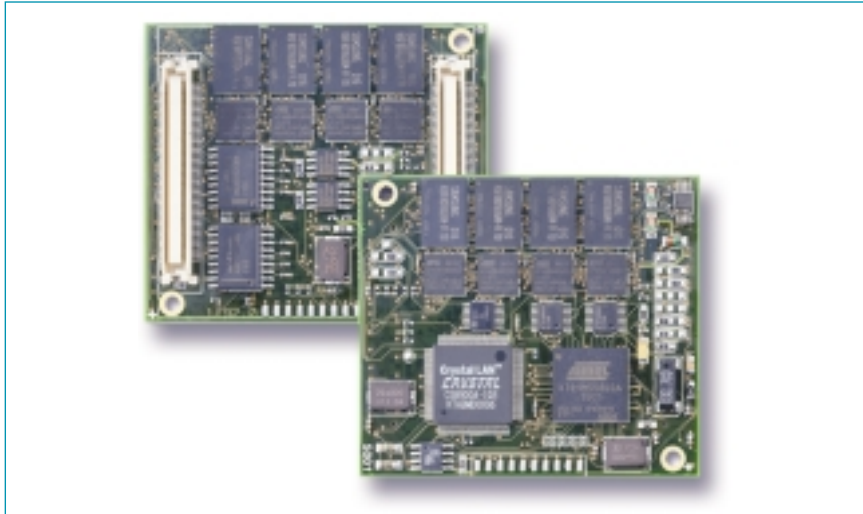
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## Description:

Based on the Atmel AT91M55800A ARM7TDMI controller, the **phyCORE-ARM7/AT91** offers processing power combined with low power consumption in a minimum form factor (60x53 mm). The AT91M55800A has a 32-bit RISC architecture with a high-density 16-bit instruction set. A large number of internal register banks enable very fast command execution, making the controller especially suited for real-time applications. Up to 16 MB Flash and 8 MB SRAM in  $\mu$ BGA-housing populate the module as external memory. The on-board twin CAN controller provides two fully configured 2.0B CAN interfaces, while a CS8900A Ethernet controller supports data transfer up to 10 Mbit/s. The standard module configuration comes complete with a JTAG interface for download of user code and debugging purposes. Other chip-level features include an 8-channel ADC with 10-bit resolution and a 2-channel DAC with 10-bit resolution. All applicable logic signals are broken out at two dual-row high-density (0.635 mm) connectors.

- Subminiature SBC module (60 x 53 mm)
- Atmel AT91M55800A ARM7TDMI 32-bit RISC microcontroller
- Flash: 1 to 16 MB  $\mu$ BGA-package In System-Programmable (ISP)
- SRAM: 512 KB to 8 MB  $\mu$ BGA-package
- RS-232, 10 Mbit/s CS8900A Ethernet, JTAG interface

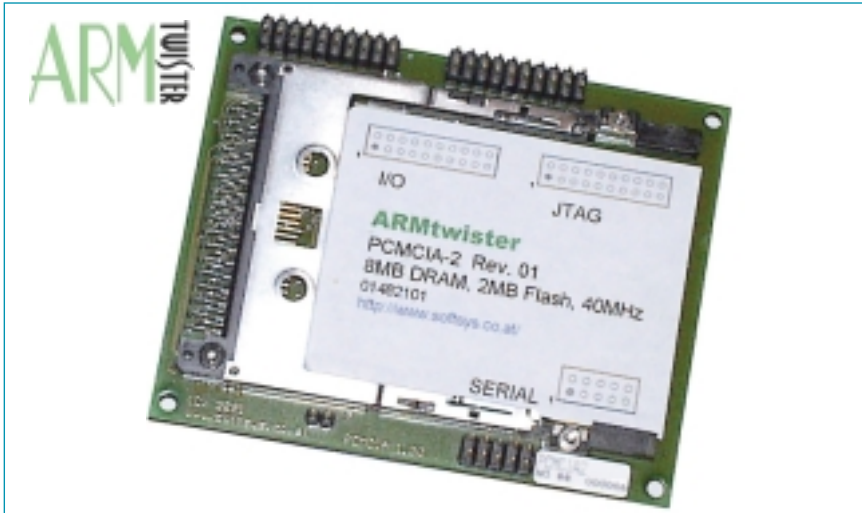
## WEB SITE

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





SOFTSYS

**ARMTWISTER PCMCIA-2**

The **ARMTwister** is a small embedded control board with PCMCIA socket utilizing the Atmel AT91M40800 Microcontroller. With its customized version of uClinux-2.4 it is possible to use IEEE 802.11 Wireless PCMCIA cards, as well as Ethernet cards and most other 16-bit PCMCIA cards.

**Applications**

The board is ideal for developing wireless applications. The onboard flash can be used for data logging systems. The board can be used for development as well as for final products, thereby reducing the effort for hardware development.

**Hardware**

The DRAM controller and the PCMCIA host controller are implemented in a low-cost PLD, and reduce the cost by saving expensive SRAM as well as a dedicated PCMCIA host controller. The PLD design is available as an optional development kit that makes it easy to jump-start your own embedded design.

**In-System Programming**

The **ARMTwister** supports reprogramming of the flash by using a standard 20-pin JTAG header. In addition, PLD firmware upgrades can be done through JTAG.

**Software**

The uClinux source distribution includes the sources for the tool chain, kernel, a large number of applications and libraries. The web based configuration makes it easy to select and customize the modules that are required by the application. New applications can easily be added to the build system.

- AT91M40800 CPU, 8MB DRAM, 2MB/4MB Flash, PCMCIA socket for 3.3v/5v PC cards
- uClinux distribution including complete tool chain and web based configuration on CD
- I/O connector for general purpose I/O, SPI and I2C
- Low cost, no royalty fees
- Schematics are included

SoftSys

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## Chapter VI

# Software IP

- **Accelerated Technology**
  - Nucleus NET .....VI-02
- **CMX Systems**
  - CMX-TCP/IP™ and CMX-MicroNet™ .....VI-03
- **Kadak Products**
  - KwikNet® TCP/IP Stack .....VI-04
- **Micrium**
  - μC/TCP/IP Protocol Stack .....VI-05
- **Micro Digital**
  - smxFile™ File Manager and smxNet™ TCP/IP Network ...VI-06
- **Netbricks**
  - Softmodem Bricks .....VI-07
- **NexGen Software**
  - NexGenIP Portable Embedded TCP/IP Suite
  - NexGenGUI4 Embedded GUI .....VI-08
- **RTJ Computing**
  - simpleRTJ - Java Virtual Machine .....VI-09
- **Segger**
  - EmWin, Graphics software and GUI .....VI-10



## ACCELERATED TECHNOLOGY

## NUCLEUS NET

**Accelerated  
Technology**  
A Mentor Graphics Division

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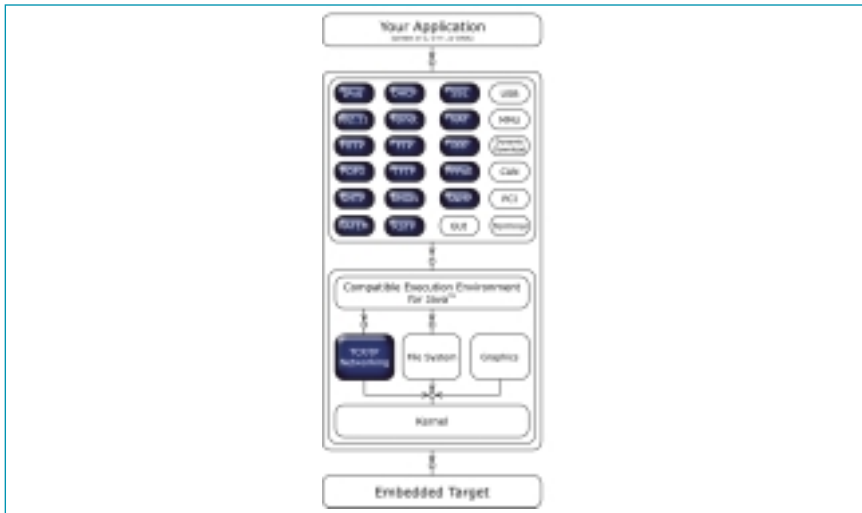
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**Nucleus NET** is Accelerated Technology's fast, compact, and easy to use TCP/IP networking stack. It is the foundation for our networking products, enabling your embedded application to communicate with other hosts on the Internet. A sockets API is provided so that anyone familiar with the simple use of sockets can easily write a **Nucleus NET** application. Protocols provided with **Nucleus NET** include: TCP, UDP, IPv4, ICMP, IGMPv3, ARP, RARP, DNS (resolver), DHCP (client), BOOTP (client), RIP/RIP II, and TFTP (client).

There are Nucleus Ethernet drivers for an extensive list of network interface controllers, and we are constantly adding more. In the remote possibility that you should require a driver for an unsupported MAC device you can implement your own by using our well documented and simple-to-use driver template.

Accelerated Technology provides a complete suite of network protocols that can scale to meet the demands of the embedded market. Our protocols are designed to be modular so that you only use what you need, but when you need them all, they interoperate seamlessly.

*For information on other Nucleus products that support the AT91 family, including our file system, USB support, services for World Wide Web access, and data encryption solution, visit our website. All products in the Nucleus RTOS family come with our "source code, no royalty" model.*

- TCP/IP Protocol Stack.
- Tightly integrated with **Nucleus PLUS** for optimal performance.
- Zero data copies.
- Optional Components include:
  - IPv6, IPsec, SSL, Ethernet, 802.11, PPP, PPPoE, NAT, EMAIL, HTTP, FTP, TFTP, Telnet, SNMPv3, RMON, NAFEM and more.

## WEB SITE

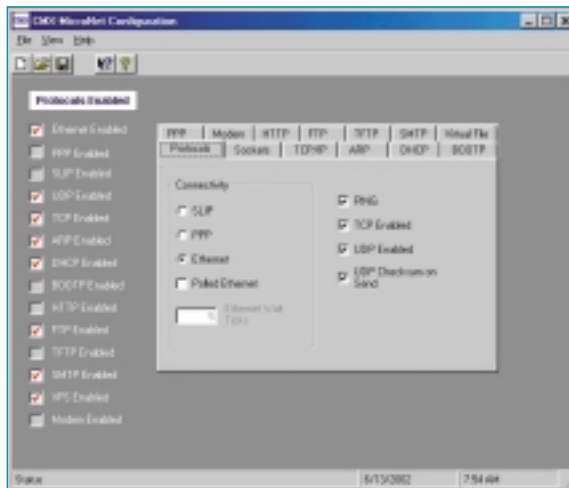
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CMX SYSTEMS, INC.

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**CMX TCP/IP** is a full-featured, 100% RFC compliant, TCP/IP stack. **CMX TCP/IP** provides virtually all of the protocols, link layers, interfaces, and device drivers that are required for embedded networking connectivity applications. **CMX-MicroNet** is a very small TCP/IP stack that has been specifically designed to fit on those embedded processors with limited ROM/RAM resources. As a consequence, **CMX-MicroNet** intentionally offers less functionality than **CMX TCP/IP**, but offers a dramatically reduced footprint for applications in which memory resources are limited.

The basic **CMX TCP/IP** stack includes the following functionality: UDP, TCP, IP, ICMP, IGMP, DNS, ARP, SLIP, Ethernet, an RTOS porting layer, a Standard BSD socket interface and a High Performance Socket Interface. Add On Options that can be purchased for CMX TCP/IP, include: DHCP, IMAP4, FTP, NAT, POP3, PPP, PPPoE, SMTP, SNMP, Telnet Server, TFTP/BOOTP, Web Client, and Web Server. IBM PC Target Drivers and Make Files are also available.

The base **CMX-MicroNet** software package currently includes UDP, TCP, IP, Modem, SLIP, ICMP Echo, IGMP, and Virtual File. Current Add-On Options available are: HTTP Web Server, FTP Client/Server, SMTP, SNMP V1/V2c, DNS, PPP, Ethernet (ARP, BOOTP), Wireless Ethernet, DHCP Client, and TFTP Client.

**CMX TCP/IP** stacks also feature a Windows Configuration Manager that offers an intuitive and easy to use GUI for configuring the stacks. Embedded developers can use the friendly Windows environment to set parameters and other networking options, instead of editing source code configuration files, though both options remain available. CMX networking stacks are currently in use worldwide in a wide range of applications, including: aerospace, automotive, computer electronics, consumer electronics, industrial control, manufacturing equipment, medical equipment, POS, robotics, telecommunications, and more.

Though they can be run standalone, CMX networking software has also been integrated with CMX RTOSes and Flash File Systems, should your application require this additional functionality. CMX software features free source code, no royalties on shipped products, free technical support, and a low, one-time fee.

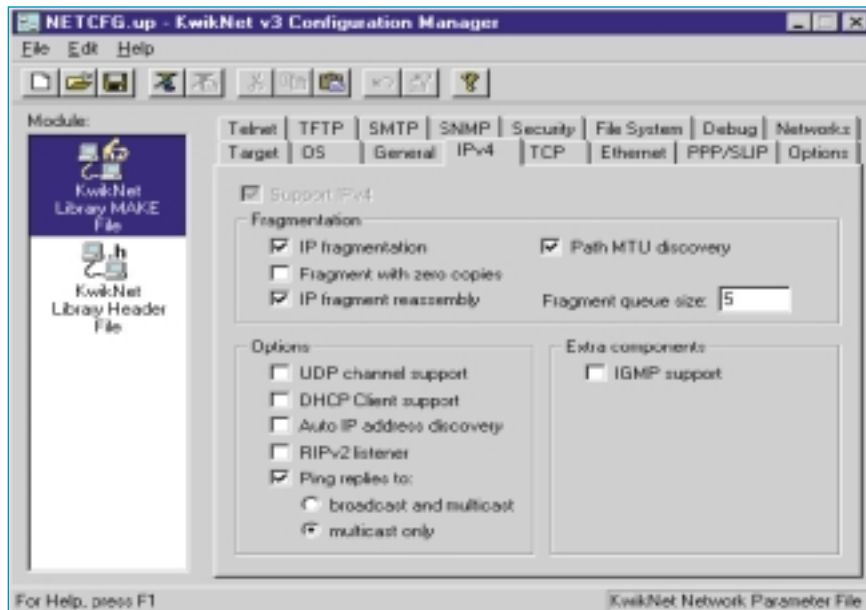
- Small ROM/RAM Requirements
- Run Stand Alone or with an RTOS
- Support for Most Networking Protocols
- Full Source Code
- No Royalties; One-Time Fee

**WEB SITE**

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



KADAK PRODUCTS LTD.

**KwikNet® TCP/IP STACK**

The **KwikNet TCP/IP Stack** and its various options enable you, the embedded system developer, to add networking features to your products with a minimum of time and expense. The KwikNet product line gives you a compact, reliable, high performance TCP/IP stack built with KADAK's characteristic simplicity, flexibility and reliability.

The **KwikNet TCP/IP Stack** includes support for: TCP, UDP, IP, ICMP, ARP, RIP and DHCP client (IPv4 only). Optional components are available for Auto IP, DNS client, DHCP client (IPv4/v6), IPv6, SSL, IPsec, IKE, IGMP, NAT, PPP, FTP, TFTP, HTTP, TELNET, SMTP, POP3 and SNMP v1, v2, v3.

The **KwikNet TCP/IP Stack** includes data link layer network drivers for SLIP (with serial loopback and crossover drivers) and Ethernet (with an Ethernet loopback driver). An NE-2000 Ethernet device driver and an INS8250 serial device driver are included. Ethernet device drivers are available for common Ethernet controllers.

**KwikNet Configuration Manager**

The KwikNet Configuration Manager is a Windows utility which ensures that KwikNet

is always properly configured for your use. The illustration shows the Manager's edit window as it appears while configuring your KwikNet Libraries.

**KwikNet for AMX**

KwikNet for AMX is ready for use with KADAK's AMX RTOS. When used with AMX, no KwikNet porting is required.

**KwikNet Porting Kit**

The KwikNet Porting Kit makes it easy for you to port KwikNet to the target processor of your choice. The kit permits KwikNet to be used with any real-time operating system or stand-alone without an RTOS.

- Windows® based Configuration utility eases system construction
- IPv4/v6 Dual Stack, IPsec, IKE and SSL options are available
- Clear and comprehensive manuals
- No royalties; source code included
- Envable track record for reliability and support

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**WEB SITE**

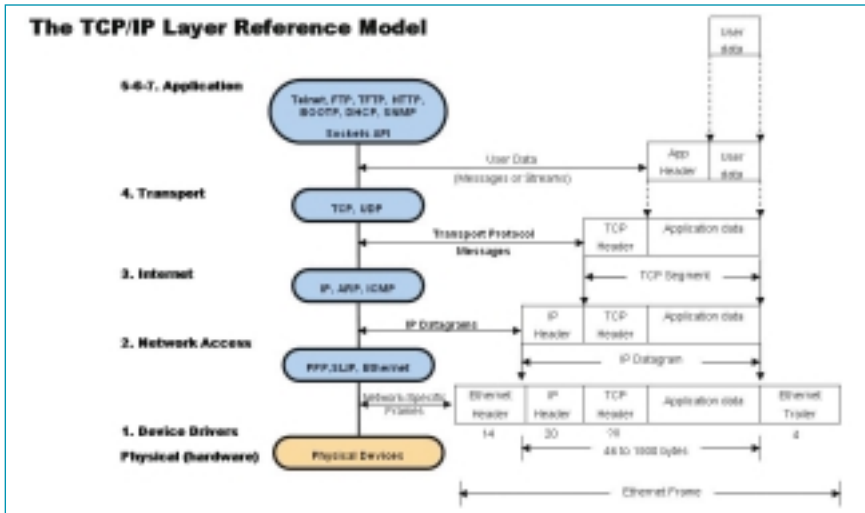
[www.kadak.com](http://www.kadak.com)



MICRIUM

**μC/TCP-IP TCP/IP PROTOCOL STACK**

Protocol Stack



**μC/TCP-IP** is a compact, reliable, high performance TCP/IP protocol stack. Built from the ground up with Micrium's renowned quality, scalability and reliability, **μC/TCP-IP** enables the rapid configuration of required network options to minimize your time to market.

**Cleanest Source Code**

**μC/TCP-IP** provides you with the highest quality source code in the industry. In fact, world renowned embedded systems expert Mr. Jack Ganssle made the following statement in embedded.com, May 2004: *"μC/OS-II is the cleanest code I know and is a joy to peruse. Micrium sent me its TCP/IP stack, and the source is even prettier than μC/OS-II."*

**μC/TCP-IP** is a clean-room design and is not derived from publicly available Unix stacks, yet still maintains compatibility with the Berkeley 4.4 socket layer interface. As with all Micrium products, **μC/TCP-IP** is written in ANSI C enabling its usage with a wide array of best-of-class cross-development tools.

**High Performance**

**μC/TCP-IP** was designed specifically for the demanding requirements of embedded systems. Critical sections were kept to a minimum and selected run-time validations can be disabled to enhance performance.

**μC/TCP-IP** implements zero copy buffer management for highest efficiency.

Additional Ethernet drivers will be added shortly:

- μC/DHCPc** : Dynamic Host Configuration Protocol (client)
- μC/DNSc** : Domain Name System (client)
- μC/TFTP** : Trivial File Transfer Protocol (client/server)
- μC/FTPs** : File Transfer Protocol (server)
- μC/HTTPs** : HyperText Transport Protocol (server)
- μC/TELNET** : Terminal Emulation Protocol (client/server)
- μC/SNTPc** : Simple Network Time Protocol (client)

- Royalty-Free licensing
- Scalable footprint
- Source code provided
- Portable **μC/TCP-IP** can be used on 16, 32 and even some 64-bit CPUs
- Supported Ethernet Drivers:
  - SMSC LAN91C111
  - Atmel AT91RM9200
  - Cirrus Logic CS8900A

**Micrium**

Empowering Embedded Systems

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## MICRO DIGITAL

**smxFILE™ MANAGER AND  
smxNET™ TCP/IP NETWORK**

**smxFile** is a robust, DOS-compatible file system for hard real-time embedded systems. It supports all device types commonly used in embedded systems.

*smxFile* features high-performance file i/o and also provides disk directory management. *smxFile* is written in ANSI C. Source code is provided. The API is similar to POSIX and DOS. The device driver interface is similar to UNIX, but simpler. A portable, standalone version is available.

- FAT 12/16/32 & DOS/Win9x Compatible.
- Extensive drivers: Floppy, IDE Hard Disk, DiskOnChip®, LS-120, PCMCIA-ATA, PCMCIA-linear flash, Ultra DMA, SCSI, Zip®, RAM disk, ROM disk & BIOS devices.
- 20 MByte/sec sustained transfer rate (IDE Ultra-DMA).
- Up to 2 terrabyte disks.
- 55 KB typical code footprint & 20 KB typical data footprint.
- Multitasking & Contiguous file support & source code is included.

This package is the latest in a series of DOS file system software packages that have been marketed since 1987. It and its predecessors have been included in hundreds of commercial embedded applications.

**smxNet** works well for small ROM'ed hosts, as well as larger hosts. No disk services are required. It can configure itself after power up, using BOOTP.ROM requirements are small and configurable to application requirements (see Table to the right). RAM requirements are tunable to the application and vary from about 35KB (PPP) or 60KB (Ethernet) to about 150 KB (including optional packages). Use of *smxNet* with 16-bit processors and small memory is feasible. A no copy operating mode improves UDP and TCP performance.

Optional modules include PPP, FTP, TFTP, NFS, Telnet, SNMP, DHCP, MicroWeb Server, and MicroBrowser. PPP supports autodial/autoanswer and permits connection to an ISP for Internet access. FTP, TFTP, and NFS are used for file transfers. The MicroWeb Server permits obtaining information and controlling an embedded unit via a standard browser running on another computer on the network or via the internet.

MicroBrowser is a nearly complete HTML 4.0 compliant browser, with frames support. It has a very small code footprint (under 250KB). MicroBrowser allows an operator to access remote Web sites via a network to obtain needed information.

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**Contact Person:**

Betty Martin-Danner

**smxNet ROM Requirements (KB)****Function/(KB)**

IP + ARP + UDP: 48KB,  
IP + ARP +TCP/UDP: 73KB,  
DNS: 5KB,  
Fragmentation: 4KB,  
BOOTP: 2KB,  
ICMP: 1KB,  
FTP Client: 15KB,  
FTP Server: 22KB,  
FTP/TFTP/TELNET3: 26KB,

NFS Client, NFS Server, SNMP V2: 40KB,  
DHCP Client: 9KB,  
DHCP Server: 6KB,  
MicroWeb Server: 23KB,  
SMTP: 16KB,  
POP3: 17KB,  
Drivers: PPP + CHAP: 41KB,  
PPP no CHAP: 35KB,  
SLIP + CSLIP + MODEM: 10KB,  
Ethernet: 3KB.

**WEB SITE**

[www.smxinfo.com/atmel.htm](http://www.smxinfo.com/atmel.htm)



## NETBRICKS

## SOFTMODEM BRICKS



Netbricks is a leading developer and supplier of portable software compliant with protocol standards as published by the governing institutions around the world (ITU, ETSI, ANSI, IETF, 3GPP, ...).

Netbricks supplies its source code to over 350 major telecommunications equipment developers, networking manufacturers and OEMs. Netbricks software and hardware enable customers to achieve a low risk, fast time-to-market with reduced development costs while creating leading edge equipment. The company expertise and software products cover SIGTRAN, SIP, MGCP/MEGACO, ISDN, ATM, SS7, SOFTMODEM, V5, LES, X.25, FAX, T.38, H.324M,...

Today, Netbricks has validated solutions in software for the new emerging technologies in VoIP, VoDSL, Voice Gateway, Next generation networks (NGN), IMS, Signal processing for modem and voice...

With offices and representatives in France, USA and Israel and a network of carefully selected partners Netbricks has the ability to provide local support and professional services wherever your location.

- Support of modem modulations for data (ITU-T V.22, V.22bis, V.23, V32, V.32bis, V.34, Bell 212A and 103) and fax (ITU-T V.21, V.27ter, V.29, V.17, V.34Hdx)
- DTMF/Tone generation/detection
- Modem stack option: AT commands, V.42/V.42bis and MNP4/MNP5
- ISDN signalling stack option through ISDN-BRICKS products
- Fax over PSTN (T.30 with ECM) or over IP (T.38)



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## NEXGEN SOFTWARE

**NexGenIP Portable  
Embedded TCP/IP Suite****NexGenGUI4 Embedded GUI****NexGenIP Embedded TCP/IP Suite**

**NexGenIP** is designed to be used “out-of-the-box” in your embedded products.

**NexGenIP** supports TCP, UDP, IP, ICMP, IGMP, ARP, Ethernet and Multicast. A BSD 4.4A socket interface (sync/async) is available. Additional features like SACK and Wireless profiled TCP are implemented. It is compatible with both V4 and V6 (Q3/2005).

**NexGenIP** comes with PPP/PPPoE, BootP, TFTP, FTP, DHCP, Telnet, and a DNS resolver. Additional protocols like SNMP(v1v2v3), HTTP (Client/Server), POP3/SMTP, IPSec and SSL are available.

**NexGenIP** has been ported on  $\mu$ C/OS, Nucleus, ThreadX, RTKernel, emboss, OSE, VxWorks, QNX, Neutrino, VRTXsa, OS20/21, pSOS, RTXC, Linux, Win32, DOS, Integrity and in polling mode (no OS required).

**NexGenIP** is embedded in hundreds of products scoring more than 120 million copies.

- ANSI C, clean source code
- Highly optimised (35-50 KB)
- RTOS or Polling mode
- Fully tested
- No royalties

**NexGenGUI4 Embedded GUI**

Graphical User Interface

**NexGenGUI4** is a modern high-end GUI that includes a complete Graphics library, an event manager, a font manager, an optional WM, a GIF/JPEG/PNG/PMP decoder and a rich set of widgets. **NexGenGUI4** is totally scalable and supports any screen size with resolution of 1/2/4/8/16/24/32 bpp.

**NexGenGUI4** is “themable” and uses a “Skin-system” to customize the appearance of your interface. The memory footprint is between 400-500 KB of code and 50 KB+ of RAM.

**NexGenGUI4** has been ported on  $\mu$ C/OS, Nucleus, ThreadX, VxWorks, VRTXsa, OS20/21, pSOS, RTXC, Linux, Win32, DOS and in polling mode (no OS required).

**NexGenGUI4** architecture is suitable for various embedded devices like phones, printers, STBs, and PDAs. It is currently embedded in consumer’s products like IPPhone, Printers and STBs scoring million copies.

- ANSI C, source code
- RTOS or polling mode
- Scalable
- Fully tested (MLOC)
- Royalty-free

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RTJ COMPUTING PTY. LTD.

**SimpleRTJ – JAVA VIRTUAL MACHINE****CONTACTS****AUSTRALIA**

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 e-mail: info@rtjcom.com



The **simpleRTJ** is a clean room implementation of the Java Virtual machine that has been specially optimized to run on devices with limited amount of memory and without the support of any RTOS.

It has all the key features that are required from any decent VM implementation including multi-threading and garbage collection. The **simpleRTJ**'s customisation options make it ideal to run on a wide range of 8, 16 and 32 bit microcontrollers aft can be easily tailored to suit the target system.

**Performance**

- Uses pre-linked Java application, which significantly reduces the application startup times as no dynamic class loading is required.
- Pre-linked classes allow VM to execute bytecodes at full speed without any delays that are otherwise required to resolve constant pool symbolic references.
- Efficient memory and method frames allocation schemes improve overall VM performance.

**Debugging**

The remote debugger is available for Java source code debugging. Debugging can be performed on the host PC (virtual debugging) or directly on the target device via serial or TCP communication drivers.

**Possible applications**

- Smart cards, smart card readers/writers.

- Electronic payment terminals.
- Factory automation.
- Robotic controllers.
- Small consumer devices - pagers, cellular phones, etc.
- Electronic toys.
- Various embedded devices.

**Requirements**

- A host computer capable of running Java and target processor development tools.
- ANSI C cross-compiler for the target processor or microcontroller.
- JDK 1.2 (or higher) or similar Java IDE for compiling Java applications and running the ClassLinker.
- Additional tools for uploading binary images into the target devices.

- Supports threads, exceptions, interfaces, multi-dim arrays, soft real-time support via javax.events
- Can operate as a mini JavaOS
- Three-color mark & sweep garbage collection
- Java apps can be built for 64KB, banked 64KB and 16MB memory models
- Remote in-device debugging

**WEB SITE**

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



SEGGER MICROCONTROLLER SYSTEME GMBH

## EMWIN GRAPHICS SOFTWARE AND GUI



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**emWin**, probably the most efficient and comprehensive embedded GUI today, is written in ANSI "C". It works on any 8-16-32 bit Microcontroller and supports any b/w, grey-scale or colour display. Drivers for all common LCD controllers are available. All types of graphical displays are supported.

All required graphic routines are part of the software. A variety of fonts are shipped with the software. Additional fonts can easily be generated from PC fonts using the emWin Font Converter. Flicker-free animation with our without antialiasing as well as multiple layer/multiple displays are supported.

The window manager allows creation of windows of arbitrary size at any point of the display. Child windows and the exchange of messages between windows and their children/parents are supported.

Windows may be transparent or overlapping, and can be moved or resized at run time. A variety of widgets come with the window manager module.

A simulation environment is available that can be used to write and test the entire user interface on the PC. emWinView, a separate program, shows the contents of the simulated display even during debugging.

- ANSI "C" source code, no C++ required
- Bitmap converter and PC simulation included
- Multi-lingual support available
- Free PC Evaluation package available
- Royalty free
- Supports b/w, grayscale and color
- 2D graphic library and variety of fonts included

## WEB SITE

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



# Chapter VII

# *Consultants*



Consultants - AT91 ARM Thumb

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PHILOG	www.philog.com	Tel: +33 (0)1-53-34-99-99 info@philog.com	FRANCE / OS & Embedded Firmware, USB
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[www.atmel.com/literature](http://www.atmel.com/literature)

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