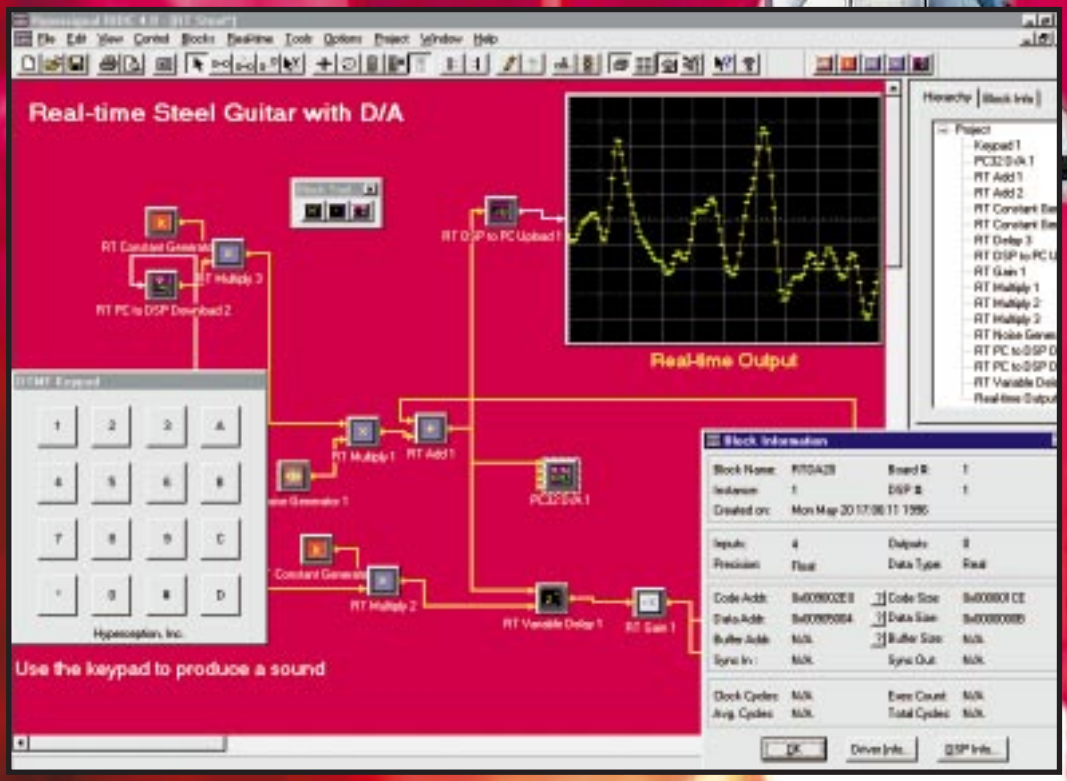
Hypersignal®

RIDE™

Real-time Integrated Development Environment



Next-generation Visual Design tool for advanced Real-time DSP development - with support for high performance industry-standard DSP Hardware

Product Document: HSMK8050

Hyperception

The Leader in DSP

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Hyperception, Inc. was founded in 1984 to provide advanced engineering software which combined the power and cost effectiveness of the IBM PC with software methodologies focused on providing drastic improvements in the way many engineering projects are developed.

Hypersignal RIDE represents exciting new technology for use in developing real-time applications. Over a decade of experience in real-time development and visual design has gone into into our 32-bit Hypersignal RIDE. This product represents the future of visual real-time design.

We hope you take time to see the difference visual real-time design tools can make in your applications.

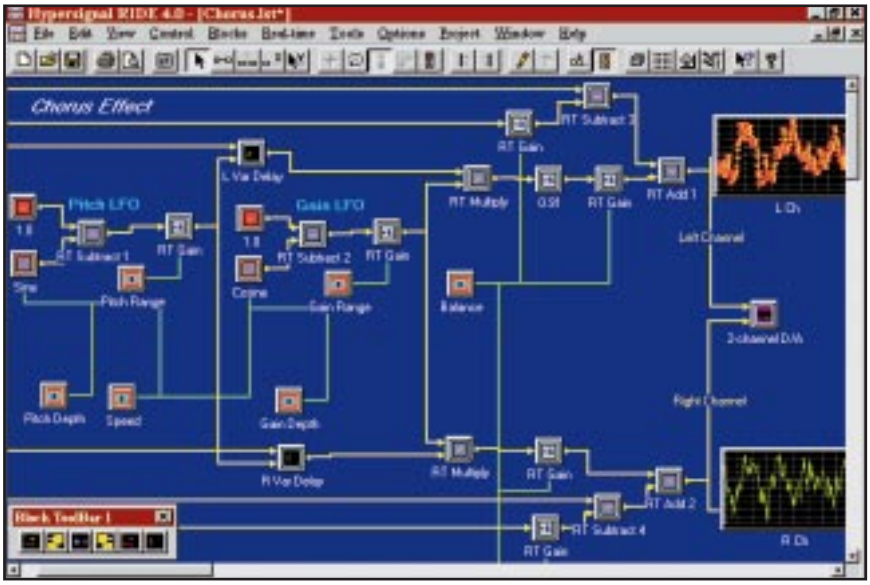
"Hypersignal RIDE is the most powerful and flexible development tool I've ever used. The capabilities of RIDE and the Hyperception support staff reduced the development time and effort of my 24 axis Real Time DSP Servo Controller. The combination of a cutting edge tool and a fantastic staff makes Hyperception the true leader in DSP Technology!"

Mike Amorelli,
Electro Optics System Group Manager
Diversified Optical Products, Inc.

Hypersignal RIDE

Real-time Integrated Development Environment

Visual Real-time Design - the exciting new way to quickly design, test, and implement your real-time system



Hypersignal RIDE is used to design a chorus effect for a pro-audio application; with appropriate choice of DSP/Acquisition hardware, virtually any real-time application may be designed.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. This tool can be used for a variety of exciting applications which range from low-level DSP systems design & implementation to application specific projects such as real-time instrumentation, data acquisition, control systems, and more.

Hypersignal RIDE is based upon the mature Hypersignal Block Diagram product which has been shipping since 1990. RIDE is actually a superset of Block Diagram, and as such represents a robust product which contains all of Block Diagram's capabilities and features. RIDE includes provisions for extensibility, efficiency, portability, and rapid development cycles.

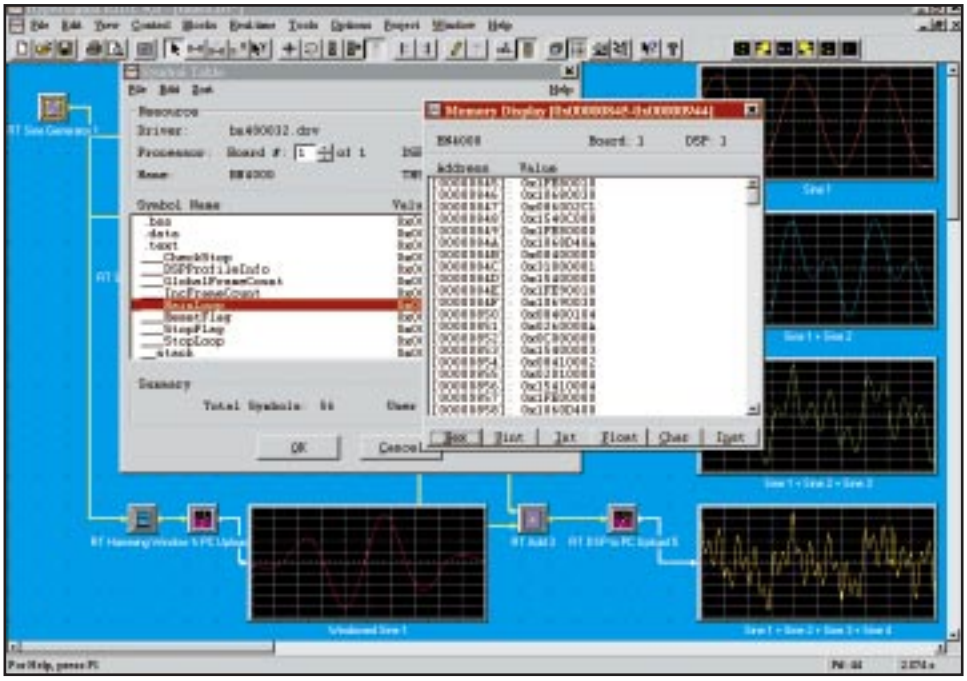
Because Hypersignal RIDE supports a wide range of industry standard DSP/acquisition boards directly, an application specific target is easy to find for your project. Migrating designs from one DSP/acquisition board to a different one (or to a different DSP) is very easy. In addition to the large base of hardware which is already supported, more are being added by Hyperception all of the time.

Hundreds of both real-time and simulation functions are available for visually designing your system, and you can easily add your own additional custom functions. This unique open architecture approach to Hypersignal RIDE lowers your technical risk for real-time development. Virtually any real-time design which can be done through use of conventional means may be accomplished quickly within Hypersignal RIDE.

We invite you to look over some of the powerful capabilities of Hypersignal RIDE in the following pages. We think that you'll be favorably impressed with what you can accomplish with this innovative visual design tool!

Next Generation Real-time Development

Visual Real-time design . . . In no time!



Hypersignal RIDE is a high-performance, high-level visual design environment that also provides easy access to low-level detail when you need it for real-time implementation.

Hypersignal RIDE's object oriented visual design environment provides you with a powerful setting in which to create your system, analyze data, and perform many types of real-time applications and simulations.

Overview

Hyperception's Real-time Integrated Development Environment (RIDE) is a superset of the Hypersignal Block Diagram visual environment which adds support for the design, implementation, and analysis of real-time DSP algorithms and systems. The power of this environment lies in its visual nature and support for industry-standard plug-in DSP/acquisition boards. Hypersignal RIDE allows DSP applications to be generated very quickly with little or no software coding required. RIDE's support of several different DSP chip families from different semiconductor companies, as well as support for different DSP board vendors, makes its use attractive for many real-time DSP projects. **In fact, this device-independent approach even allows different types of DSPs to be used in the same design.** The ability to move designs from one DSP technology to another in the same environment means that users don't have to learn multiple tools, and they can easily upgrade their designs in the future for more performance.

The RIDE environment was created by combining DSP hardware with the popular Hypersignal Block Diagram application and powerful Windows DSP board drivers from Hyperception. The driver handles all communication and control of the DSP hardware from the PC environment. The Block Diagram application doesn't even need to know what DSP hardware is being used. The hardware can actually be "virtual", which eliminates the requirement for a plug-in DSP board. It simply communicates with an installed board driver without having to deal with the DSP-specifics; the RIDE driver handles all board and DSP-specific matters. It links DSP COFF object files, downloads code, data and parameters to the DSP memory, controls the execution of the DSP, and monitors activity on the DSP - your application is linked in the same fashion as a dedicated DSP Compiler(Assembler)/Linker. **There is no special real-time kernal or operating system** on the DSP target to constrain you or to increase design complexity.

A useful feature of Hypersignal RIDE is that the user interface is the same for both simulated and real-time DSP block functions, and in fact, the user may combine both real-time (work done by DSP board) and simulated (work done by PC) functions in the same design, allowing for convenient conversions between design simulations and real-time implementations.

The RIDE development process is a very simple one. Block functions are selected from a pull-down menu and connected to establish a data flow. Run-time parameters are then adjusted from pop-up dialog boxes, and the entire algorithm is executed on the DSP with the press of a single button. RIDE provides complete control and observation of your DSP designs. For more detailed information regarding the full set of features and capabilities of this powerful product, contact Hyperception, or visit us at www.hyperception.com.

Low-risk design method

With the open software architecture, virtually any real-time application may be designed visually!

Hypersignal RIDE is a visual design environment which provides a low-risk approach to real-time development. Engineers who are familiar with the traditional assembler/linker and C cross-compiler should be very comfortable with RIDE. Anything which can be done through the traditional methods can easily be accomplished within the graphical environment of RIDE. In addition to the large library of real-time functions, users can quickly create their own custom functions which is made easier with the included Block Wizard tool.

Integrated Object Linker

RIDE includes an integrated DSP object linker which links all the real-time blocks' DSP object modules and support library functions that are referenced. The linker builds the complete DSP application and dynamically loads it into the DSP memory space for execution. The DSP object linker performs the same function as the DSP semiconductor companies' linkers, except that it links a complete system that may consist of several DSP's in parallel, and it writes directly to DSP memory rather than to a file. During the linking process, the RIDE linker maintains information about each block in the system such as the location and size of allocated memory, hooked interrupts, and synchronization flags.

Conventional Basis for Design

Just as in traditional DSP design methods where source files representing algorithms/functions are assembled/compiled into object files, then linked together to create the target application's final object code, Hypersignal RIDE uses the same basic approach, with object code for each visual object (block), and allows the user to visually combine them to create the overall algorithm. Users are even able to create their own functions with low risk, using conventional tools, just as they would with traditional design methods!

Symbolic Debugging

RIDE creates and maintains a symbol table for each DSP resource when a block diagram worksheet is compiled. The symbol table provides important symbolic information that allows you to analyze and debug your applications using RIDE's low-level capabilities and third-party debuggers.

DSP Code Profiling

RIDE provides the ability to profile code at both the block and DSP levels. You have access to the number of times that the block has executed, the number of clock cycles for a single execution and the total number of clock cycles that it has executed since reset.

Application Export

A powerful capability of RIDE is that it can export the complete application to a DSP executable COFF file. This COFF file can be used in many ways, including creating a PROM, host-loadable module, or used with a DSP simulator or emulator.

DSP Memory Operations

RIDE supports several types of memory operations that can be useful during the testing of real-time DSP algorithms. RIDE allows user control of each DSP resource's memory map. Each DSP resource can have a unique memory map, or all resources can use the same map.

System-Level Statistics

RIDE will provide a system summary for any selected DSP resource including block, symbols, profiling and memory information. These statistics provide visibility into a real-time design including memory analysis, processing performance, and other important DSP resource information.

Multiprocessor Support

RIDE supports heterogeneous multiprocessing which allows quick visual implementations of multiprocessing systems.

Synchronization Support

RIDE provides the ability to synchronize real-time blocks that execute at different rates. This synchronization is required in multi-rate applications where one process executes at a different rate than a subsequent process, but both processes need to be synchronized to pass data.

DSP Interrupt Support

RIDE includes DSP interrupt support that allows any real-time block, or even a complete block diagram, to be associated with a particular DSP interrupt. This is a very powerful feature because it allows interrupt handlers to be designed visually without having to deal with DSP intracacies at all.

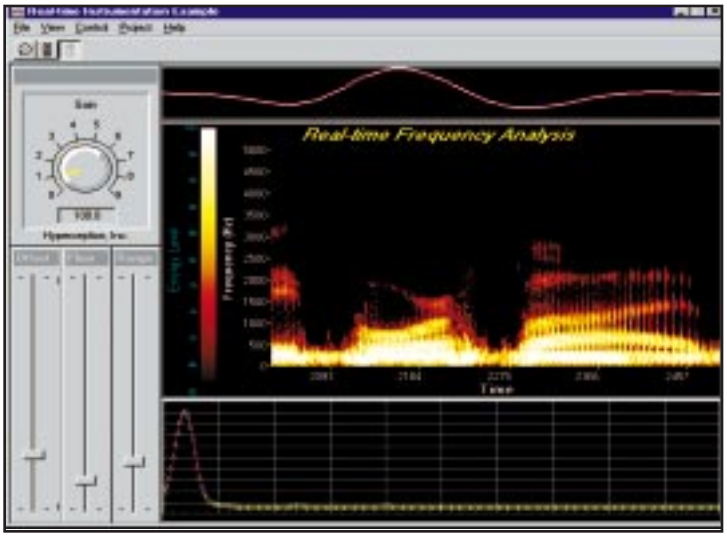
Third-party Library Support

RIDE real-time blocks can easily take advantage of C-compatible, optimized assembly libraries offered by several third-party companies. The ability to link in these optimized libraries can improve execution performance.

For more RIDE capabilities, please refer to the summary on last page.

Virtual Instrumentation and Data Acquisition

Create powerful Virtual Instrumentation applications visually, using a variety of DSP/Acquisition boards



Run-time instrumentation application using HAppI - Real-time Spectrum Anaylzer with spectrogram capability

Customized Virtual Instrument Applications

Use Hypersignal RIDE to create virtual instrument applications customized to your specific design needs. Using the visual environment, quickly select the real-time acquisition and processing functions required, and add the unique user controls and displays for completing your design. With Hypersignal RIDE, a large degree of flexibility is afforded to the engineer for creating very design-specific applications. After visually designing the system, simply load and execute your design from within Hypersignal RIDE, and your design is up and running! And, with Hypersignal HAppI, those visual designs may even be turned into their own self-standing applications for running in standalone mode under Windows 95/NT.

Data Acquisition/Processing

With RIDE's many real-time functions and capability to move data from the DSP/Acquisition hardware directly to the PC's realm, analog data may be captured via an A/D converter, processed in real-time (such as filtering, peak detection, etc.) and then moved to the PC for storage to disk, display, etc. Unlike traditional approaches which often rely on acquisition hardware without DSPs, combining the acquisition with a DSP allows for a variety of on-the-fly processing to be performed in real-time - and all of this programmed in a visual environment!

Optional Capabilities

Many add-ons exist to enhance capabilities, address new projects, and allow for future growth!

ANSI C Source Code Generator

From your visual design, the C Source Code Generator will automatically create ANSI C source code to implement your algorithm.

Standalone Applications

After designing your project visually with RIDE, use Hypersignal HAppI to create a standalone Windows application.

Image Processing Library

A number of 2D image analysis functions are included to facilitate your image processing development.

Advanced Transmission Library

The ATL provides you with a complete set of design and analysis blocks for radio, wireline, and fiber transmission systems.

Other Options

A parallel processing tool, Pegasus, is available for multi-processing and other libraries are being developed for various specialized areas of engineering. Contact us for more details.

Ordering Information

Part Number:
HSWN2000 - Hypersignal Block Diagram (simulation)
HSWN8000 - Hypersignal RIDE (real-time/simulation)

Options:
HSWN2500 - ANSI C Source Code Generator
HSWN2515 - Image Processing Library
HSWN2520 - Advanced Transmission Library
HSWN5000 - HAppI Run-time Application Builder

RIDE Capabilities at a Glance

Many engineers believe that efficient visual environments come at the cost of losing control over low-level design issues. However, Hypersignal RIDE has overcome this limitation and gives the user complete control over the design process and visibility to the results. RIDE provides several exciting new capabilities which extend the environment to address low-level design and analysis issues in addition to high-level DSP algorithm implementation and analysis. RIDE compatible support is available for leading, industry-standard DSP boards. The following is a summary of some of the important development capabilities provided by Hypersignal RIDE.

Full-featured COFF Support

A full-featured COFF (Common Object File Format) linker allows for the creation of DSP applications consisting of Hypersignal blocks' object code, DSP semiconductor company run-time library support, optimized third-party libraries, and user-generated C and assembly code. This new linking capability allows RIDE to be used with any code; not just the provided blocks. One of the most important aspects of this linker technology is that applications are linked just as they would be by the DSP semiconductor company's linker. The resulting application is memory efficient because it only loads code that is used, and only one copy of each block is loaded. Multiple instances of a block are supported with each block allocating its own private data segment.

Heterogeneous Multiple Processor Support

Multiple boards and multiple DSPs on boards can be controlled and observed via Hypersignal RIDE. RIDE maintains all information for all DSP resources and can effectively address parallel processing applications. The visual environment provided by RIDE is a very efficient way to program multiple processors quickly without having to be a parallel programming expert.

Full Environment Information

Full environment information is maintained by the driver at the block, board, and DSP levels. This information includes memory allocation, symbols, interrupt hooks, synchronization, code profile data, file creation date/time, hardware interface specifics, and DSP-specifics. Users have complete visibility into how much memory is being used and where the code and associated data areas are located. This is very important because it allows users to work in tandem with JTAG emulators to debug and analyze their code at the lowest level. Hypersignal RIDE readily provides this important information by clicking on buttons available from every real-time block's parameter box.

Block Wizard Support

The Block Wizard, which is included with RIDE, was enhanced to support Hypersignal's new real-time capabilities. User-generated blocks can be made very quickly, as the Block Wizard generates all the files necessary to create a functional Dynamic Link Library (DLL) that runs under Windows. An important new feature of the Block Wizard is that it additionally creates all the DSP C source files. In most cases, users don't have to even modify the PC code; they just have to compile it with a Windows-compatible compiler. An example routine is produced to show how to use the downloaded parameters and pointers for the input and output data streams. If a user already has C source code, it can typically be made into a real-time block in a matter of minutes.

Initialization, Interrupt, and other function support

The RIDE real-time driver supports special functions for each real-time block including initialization, interrupt, main block functions and others. A normal block will consist of only the main function. However, some functions may need additional support functions for one-time initialization and optional interrupt functions; interrupt hooking is a powerful feature which is also supported. The exciting aspect about these capabilities is that the device-independent DSP driver handles all of the details such as initializing the hardware, setting interrupt vectors and controlling the execution of the design. Users only have to concentrate on their algorithms without having to deal with the intricacies of the hardware, or even the software architecture.

Full Target DSP Memory Map Control

Full user control over the target DSP memory map allows on-chip/off-chip memory performance analysis and memory segments to be allocated to any available system memory. This powerful feature, when combined with "virtual DSP" support, and application export capabilities, allow arbitrary DSP systems (without requiring a plug-in DSP board) to be designed with RIDE.

Interrupt Hooking

Each functional block, a list of several blocks, or even the complete block diagram can be hooked to one of the many interrupts, software traps and signals supported by the DSP. This is a very powerful feature because it allows interrupt handlers to be designed graphically without having to deal with the DSP at all. Each function block has an interrupt selection item located in its parameter box. Multiple blocks can be hooked to the same interrupt by selecting the same interrupt name for each block. In the Real-time menu's Global parameter box, you can select the "Force Int" option to force all blocks to respond to a single interrupt. This option may be useful when the complete DSP algorithm is executed in response to a certain interrupt.

DSP Memory Operations

Several different DSP memory operations are provided by the RIDE driver including copy, dump, fill, load, plot, and search.

Complete System Statistics

Complete system statistics including block summary, execution order, memory map, memory usage, symbol table, interrupt table, sync table, profiling information, DSP target specifics and more can be displayed on screen or saved to a file. This is very useful when debugging code with an emulator.

Access to Symbol Table

A full table of symbolic information is readily accessible. This symbol table allows users to quickly locate important routines and data. Direct access to the symbols memory is provided, so values can be easily observed and modified. User-defined symbols can be entered or imported from an external ASCII or COFF file. This is useful for defining external hardware addresses.

Profiling Capability

Complete algorithms and indvidual block functions can be profiled with Hypersignal RIDE. Each block can display the number of times that it executed, the clock cycles for a single execution, the average number of cycles, and the total number of clock cycles that it executed since reset. Additionally, a display showing the percentage of processing time in each block relative to all other blocks is available. This dynamic profiling capability is even possible while the design is executing, allowing for "on-the-fly" analysis!

Multi-rate Support

Support for data flow control is provided by the RIDE driver. This control is important in applications where data may not always be ready for output at each call to a block's function. If the block is running data at a different rate (multi-rate systems) or provides a decimated rate of output, a synchronization flag can be used to notify subsequent blocks that data is not available yet.

Flexible Memory Dump Capability

Memory dump of memory space or the complete application to an ASCII, binary, or COFF file. This allows data to be displayed on the screen or exported to a file for various reasons. Data can be output in six different formats: hexadecimal, unsigned integer, signed integer, float, character and instruction.

Useful Memory Display Support

Any range of DSP memory can be displayed in six different plotting modes: connected, discrete, text, digital, spectragram, and waterfall. Full user control over plot characteristics is provided, allowing a myriad of plot displays.

Complete Real-time DSP Application Export

A complete real-time DSP application designed with Hypersignal RIDE can be exported in binary format and used for embedded DSP system applications. EPROMs or boot files can be created from output COFF files produced from RIDE visual environment without need for intermediate code generation steps. This may be one of the most powerful capabilities of RIDE for many users!

Versatile COFF File Import

Any DSP COFF object, executable or symbol file can be imported directly into RIDE and loaded into DSP memory. This allows RIDE to be used with applications that were not designed visually. RIDE's powerful control and display capabilities can be used to monitor and debug these external applications.

Direct DSP Control Panel

Direct DSP control is provided with a floating button palette that allows the user to reset, run and interrupt any DSP resource. This feature is useful for controlling imported real-time applications.

Virtual DSP Support

Virtual DSP support allows many of the real-time driver's capabilities to be used without requiring a plug-in DSP board. This allows complete real-time applications targeted for any arbitrary DSP system to be designed with Hypersignal RIDE and be exported to an embedded target system.

DSP Board Self-test

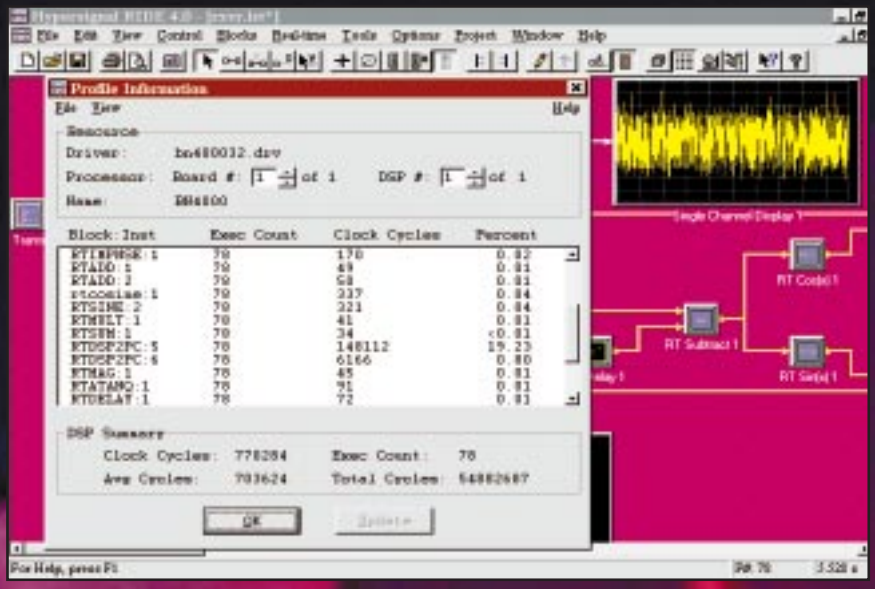
A self-test of the DSP board provides confidence that the driver and hardware are configured properly. Tests include board presence and comprehensive DSP memory tests to verify communication with the board, DSP, and memory.

Extensive Real-time Block Function Library

Hundreds of real-time blocks are included in RIDE. As the entire development architecture is based on a completely open software foundation, you can be sure that more blocks will be available in the future, from Hyperception, third parties, and even other users.

The exciting visual design technology for Real-time DSP applications, **Hypersignal RIDE**, is changing the way real-time engineering applications are developed! Imagine designing a complete real-time application visually, and seeing it work on a DSP/Acquisition board with real-world signals in a matter of minutes. This is the power behind Hypersignal RIDE.

After testing your algorithm ***in real-time***, exporting the DSP object code for use in an embedded DSP application is only a mouse-click away!



Hypersignal RIDE allows quick visual real-time design with a variety of features such as profiling, resource analysis, project export, and symbol referencing.

There are many choices for DSP/Acquisition hardware targets available, with more being added all the time. Some of the supported DSP hardware include PCMCIA type III and II boards, PCI and ISA DSP boards, and even ***standalone DSP hardware for direct embedded use!*** Hypersignal RIDE even supports direct programming of on-board FLASH EPROM memory for some DSP hardware, so completing a stand-alone real-time DSP project is made even easier!

With Hypersignal HAppl, you can ***turn your complete real-time visual design into a stand-alone Windows 95/NT application in minutes***, ready to ship or deliver to your end-user! This is great for high-performance Virtual Instrumentation applications.

If you're not designing your real-time project with Hypersignal RIDE, you are at a definite disadvantage in today's fast moving engineering environment.

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