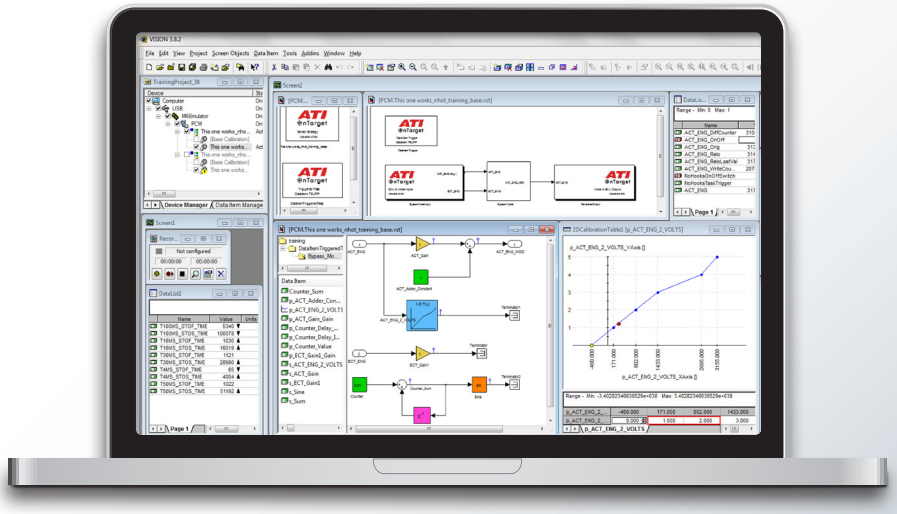
ATI ACCURATE TECHNOLOGIES

No-Hooks
Advanced ECU RP



BYPASS ECU INSTRUCTION CODE

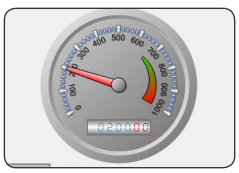
VERSATILE

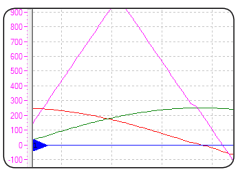
FAST & COST EFFECTIVE

Simulink Models SUPPORTED

ATI offers an innovative, patented software-centric method for rapid prototyping ECUs that functions with our VISION Calibration and Data Acquisition Software to make a complete development solution. The base product, No-Hooks, allows users to bypass control variables in the ECU's RAM (that are normally only viewable or measurable) with calibratable parameters. The OnTarget toolkits add another level of prototyping to bypass ECU control variables with model outputs inline with the production ECU executables. In both cases, the bypasses are implemented without any modifications to the ECU source code and the new algorithms are run on the production-intent ECU.

No-Hooks is the foundation of ATI's Rapid Prototyping product. With only the information needed for traditional calibration and using an ECU interface, Base No-Hooks allows the user to control and adjust global RAM variables in the ECU. Use Base No-Hooks to select variables and convert them to calibratable variables, and use ATI's VISION software interface to easily make changes. There is no need for access to or modification of the ECU source code; all that is needed is the ECU executable and description files. Inputs may be forced to simulate specific conditions for testing without modifying or adding expensive hardware. Previously fixed values may be adjusted without the need for expensive code changes. Simplify and expedite tasks, enable creativity, and lower costs using ATI's Base No-Hooks.





No-Hooks is fully integrated within ATI's VISION Calibration and Data Acquisition Software

DATA ACQUISITION | ECU CALIBRATION | ECU RAPID PROTOTYPING | ECU INTERFACES

No-Hooks Rapid Prototyping Software

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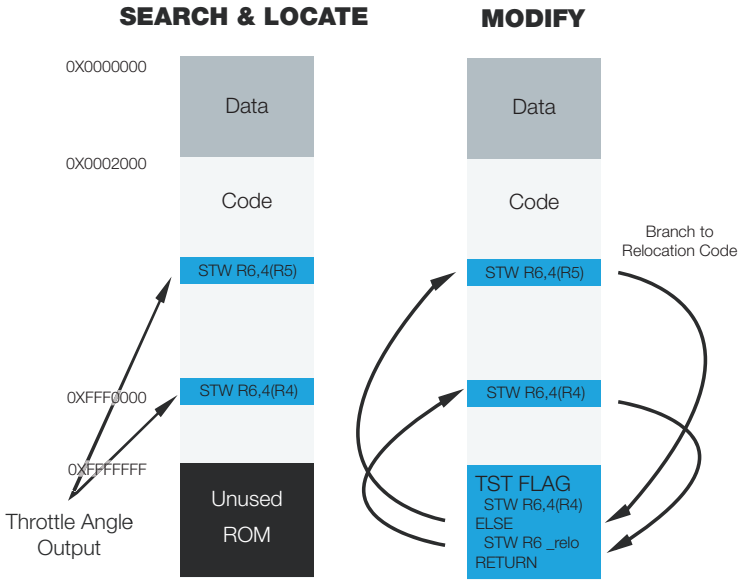
No-Hooks is simply the addition of a software switch that allows the bypass of an existing ariable with a manually controlled alternative ariable defined by the user. The code to bypass the existing variable runs in-line with the rest of the original code on the target ECU. No-Hooks replaces a variable assignment (or “write”) instruction in the existing ECU code with a branch instruction to a small bypass algorithm placed within the ECU code space.

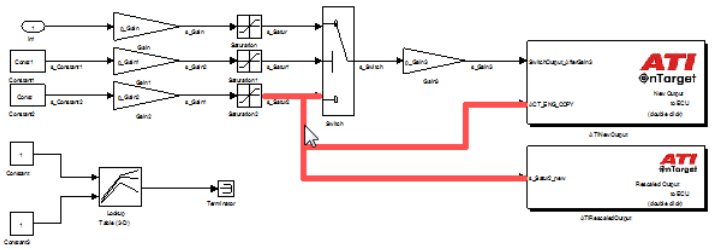
This provides the ability to bypass writing the original value with writing a new, calibratable value to the variable. When the code reaches a write to the variable to be bypassed by No-Hooks and if No-Hooks is turned on, the code branches to the No-Hooks bypass algorithm which writes the replacement value to the variable, and then immediately branches back to resume the original code.



Because No-Hooks identifies every Write instruction to a specific variable, it can generate these branch points to bypass any variable that is written to by the ECU code. When running, the No-Hooks bypass can be turned off and on through a simple software switch. In addition, both the original variable value and the bypassed variable value can be viewed and compared at any time.

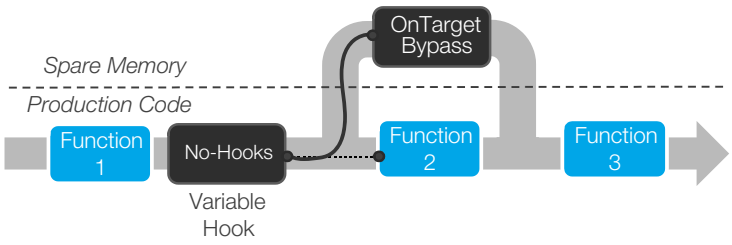
OnTarget Rapid Prototyping Software

Add further functionality and complexity to No-Hooks with OnTarget Rapid Prototyping. OnTarget performs No-Hooks bypassing but with the added capabilities of replacing the calculation of an ECU variable value with alternative code; still without the need for any of the base ECU source code. OnTarget is designed to make use of Simulink® models to develop these alternative bypass control algorithms. Simulink is a platform for simulation and model-based design from The MathWorks.



The unique performance benefit of No-Hooks OnTarget is that the alternative code actually runs in-line with the rest of the original code directly on the target ECU with no latency. OnTarget enables the selection of Data Items as triggers and inputs, then returns the alternative code results when activated by a variable write instruction bypassed by No-Hooks. As with any No-Hooks application, both the base strategy and the bypass model can be fully calibrated and controlled within VISION, and the bypass model enabled and disabled with just a simple mouse click to enable easy comparisons between the base and the prototype strategy. OnTarget is ideal for the prototyping and testing of new closed-loop functions and Function A/Function B comparison testing.

ATI has worked with The MathWorks, Inc. to seamlessly integrate its OnTarget rapid prototyping, data acquisition and calibration capability in VISION with the high-level Modeling language of MATLAB®/Simulink®, and the ability to convert these high level Models into real-time executables with Simulink Coder™ (formerly Real Time Workshop®). No-Hooks OnTarget includes custom Simulink libraries (block sets) and target build files for generating C-code using Simulink® Coder, compiling the code with various compilers, and linking the new No-Hooks and model variables with the existing ECU code. Depending on the target microprocessor, either a free ATI GCC compiler or an integrated user specific compiler may be used for OnTarget code generation.



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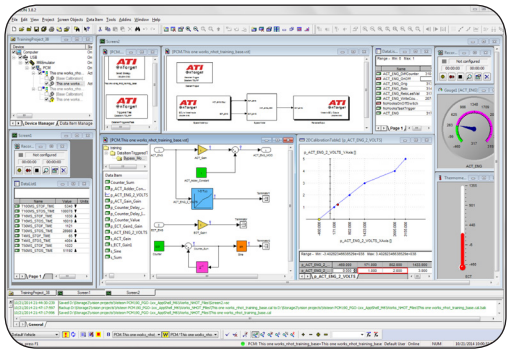
No-Hooks Features and Benefits

No-Hooks offers cost effective flexibility including:



- Bypass variables with calibratable parameters.
- Lower cost than hardware solutions.
- Rapid prototyping functionality is independent of the ECU interface.
- Conduct rapid prototyping on production intent hardware, providing functional confidence that will translate to saved development time and money.
- No need for original ECU code, eliminating delays and cost for iterative changes between groups or companies.
- Allows calibration, data acquisition, post analysis and software rapid prototyping in the same application.

OnTarget provides these additional benefits:

- Bypass variables with outputs from a Simulink® model, allowing the addition of an entirely new control algorithm to the existing ECU code without modifying the original ECU source code
- Utilizes a free GNU compiler in many cases.
- Purchase only the functionality needed.
- Cost effective for fleet and durability testing of new algorithms.
- Both the base strategy and the bypass model are calibratable simultaneously.
- Harnesses the modeling abilities of Simulink combined with the calibration support of VISION.

Rapid Prototyping Software Requirements

Requirements	
Calibration Interface	A supported ECU calibration tool interface is required, such as a memory emulator, a serial interface or network communication interface (CCP)
ECU Strategy	The ECU Base Strategy consisting of the software memory image file (hex, s-record, binary or other) and the data-item description file (ASAP2 file or other) for the ECU under test.
Functionality	Ability to re-flash the ECU including the recalculation of any checksums on the code and the calibration space
Memory	Unused RAM and flash memory (including code, calibration and RAM areas) to accommodate new code and/or variables (note: typical ECUs have spare memory Note: ATI Support can help determine initial settings for your application at no cost.
Additional Software	• VISION Calibration and Data Acquisition Software • CPU specific VISION No-Hooks toolkit • CPU specific VISION OnTarget toolkit (OnTarget only) • The MathWorks® MATLAB®, Simulink®, and Simulink Coder™ (formerly known as Real Time Workshop®) software. Stateflow® and corresponding coder are optional. (OnTarget only)* • Compiler suitable for the microprocessor used, such as the free ATI GCC Compilers (OnTarget only)

*Once a model has been created and compiled, the MathWorks products are not needed to work with the ECU prototype code. ATI's Optional Model Browser can be used in the ATI VISION calibration tool to view and interact with images of the Simulink model.

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VISION Browser for Simulink® Models

ATI's Model Browser provides a sophisticated user interface of Simulink models from within VISION software to enhance OnTarget or xPC Target™ calibration and data acquisition functionality.

The Model Browser Screen Object provides a real-time view of the Simulink model in terms of data and control flow rather than the typical list of numbers. The object can show live data on signal lines and parameter values on the blocks in the model. Clicking on the blocks also adds constants, curves, maps, and other calibratable data items to the familiar calibration screen objects of VISION. All of this enables graphical measurement and calibration of the model during development and testing.

Navigation of the model may be accomplished by clicking on subsystems through the model tree view or through the model subsystem views (similar to Simulink). Each subsystem view may also be zoomed and panned. All of this is available within VISION without the need for the MathWorks® MATLAB® or Simulink® software.

All from within one application (VISION), the activity of the entire system including the ECU, the new model (internal to the ECU via OnTarget or external via the xPC Target Software), and data acquisition devices may be viewed and calibrated.

VISION xPC Target™ Interface Toolkit

Accommodate more extensive rapid prototyping models that require more memory and resources than what is available in the target ECU by using VISION with xPC Target Software from The Mathworks.

The MathWorks xPC Target Software enables users to run Simulink models on PC hardware that is specifically equipped to provide a powerful platform for running real-time executable models. These boxes typically include expanded capabilities including additional I/O cards like analog input and CAN communications interfaces.

This Toolbox includes a custom Simulink block library and build environment for interfacing xPC Target software with VISION. The xPC Target model may be opened, built, downloaded, and run all from within VISION. The xPC Target model may be added along with other devices in VISION (like an ECU interface). Once the model is started, data from the entire system may be measured and calibrated using VISION alone.

VISION NHOT File Exporter Toolkit

Enables the use of ATI's powerful No-Hooks or OnTarget applications with other calibration tools by providing the ability to export No-Hooks/OnTarget A2L description and memory image files..

Microprocessor Support

Manufacturer	Processor(s)	Compiler (OnTarget only)
Motorola	PowerPC (5xx)	Diab 4.4A, 4.4B and GNU
Freescale	eSYS (55xx, 56xx) eSYS (VLE)	GNU GNU (NXP S32DS)
Infineon	Tricore Aurix	Tasking and GNU GNU
Renesas	SH2, SH2A	GNU
Renesas (formerly Mitsubishi)	M32R	GNU
Renesas (formerly NEC)	V850 RH850	GNU GNU (Renesas, ATI-V850)
ST Microelectronics	ST10 C167	Keil Keil
Fujitsu	FR60 FR80	Softune Softune

Contact your local ATI Sales representative for any new developments.

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