C-TAC® Plus

Application Note:

Tartan AdaScope™ Interface

Introduction

ITCN has added an interface to its C-TAC Plus real-time monitor that allows the AdaScope™ symbolic debugger from Tartan to access and control a 1750A microprocessor for source code debugging. The interface connects AdaScope non-intrusively to the target via ITCN's C-TAC Plus. ITCN's AdaScope Interface bridges the gap between software development, integration, and validation making it a versatile real-time debugging tool for commercial, military, and aerospace applications.

The C-TAC Plus is a real-time, non-intrusive monitor for embedded processor and data buses. By combining the power of a source code debugger like AdaScope with the non-intrusive capabilities of C-TAC Plus, you can debug application code on its target without compromising the software structure.

C-TAC Plus applications include complex Embedded Systems Support for weapons systems or space applications where the project mission is critical, the schedule is important and quality control is paramount. The C-TAC Plus incorporates multiple channels into the support facility design with some product customization required for each new design. C-TAC Plus, integrated with software toolsets, supports the entire life cycle of an embedded application as indicated in the Figure 1.
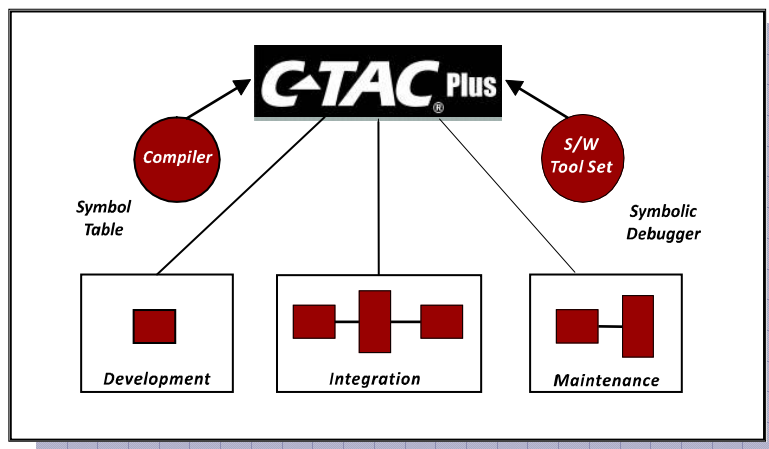

Figure 1: C-TAC Plus supports the entire life cycle of an embedded application.

Overview

Debugging by its nature is an intrusive operation. The debugger must be able to start and stop the processor, set and trap on breakpoints, and read/write to the memory and registers. These functions are necessary and intrusive, yet the way they are implemented need not be. Most debuggers require the installation of special software or hardware to support their operation.

The C-TAC Plus provides AdaScope a new path into the microprocessor that doesn't require modifications to the system under test. This non-intrusive approach is less likely to disturb the testing and provides higher fidelity results.

Problem (Challenge)

Most debuggers require the installation of software kernels, the use of an interrupt line, and/or the addition of a serial data bus to the processor board. These intrusions, although minor, can affect the testing and integration of your software.

The introduction of a software kernel in the processor's memory raises the potential of your software interacting unfavorable with the kernel. Your application software corrupting the kernel can cause the debug session to end just when it's needed the most. By not loading a kernel, the entire memory area is available for application software. You do not need to worry about loading over the kernel or linking it into your application.

Communication with the debugger is normally done through a serial data bus such as RS-232 or EtherNet. To provide this data port, hardware must be added to the processor board and an interrupt line is required to signal the processor of activity on the bus. The additional hardware may not cause a problem on laboratory boards, yet adding extra circuitry to an operational board that is not required during normal operation is not cost effective. The extra complexity adds nothing to the operational functionality of the product yet increases the cost and reduces the reliability. Also, an interrupt removes a resource that your application may require.

Solution

C-TAC Plus's AdaScope interface provides a non-intrusive connection to the target 1750A processor, requiring no added software or hardware. The connections to the processor produce minimum electrical load on the circuits, and no slowing of the clock and no injection of wait states. Depending on the target board, the connections are made either directly to the processor or through existing onboard test points.

While debugging functions are not running, there is no intrusion into the processor's domain. The C-TAC Plus does not require the modification of the target processor board. It allows the application full access to all memory and interrupts and does not require extra hardware to support a serial communication channel.

The C-TAC Plus connects to the 1750A processor through the backdoor. When it needs to be intrusive it obtains control of the processor. This halts the processor and allows the C-TAC Plus to perform the required operations. At the completion of the intrusive function, the processor is free and unencumbered by foreign hardware or software and performs as it would in its final system.

When the initial software debugging is complete, the C-TAC Plus becomes a real-time, non-intrusive monitor of your application. In this phase of testing, the C-TAC Plus supports both instruction tracing and data tracing. Instruction tracing, where every instruction is recorded as it is executed, is used to verify the software's structure. Data tracing records only user selected variables when they are accessed. Data tracing makes it easy to follow information flow between modules and systems, showing the software's response to its environment.

In addition to the 1750A channel, the C-TAC Plus also supports the following processors and data busses: AYK-14, Z8002, 68020, MIL-STD-1553 data bus, H009 data bus, and SCRAMNet™ reflective memory data bus.

Contact ITCN's sales staff for detailed information about our test equipment and engineering services at 800-439-4039, or visit our website at www.itcninc.com.

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