TRACE32 NEWS

Issue1 1998

CD

now with product information and evaluation software

The New Fully Integrated RISC Emulator

The high speeds of RISC processors and their complex bus and cache logic call for totally new technologies for in-circuit emulators. In order to match up to these requirements Lauterbach is expanding its product range at the beginning of '98 with a second emulator line. The new fully integrated RISC emulator TRACE32-FIRE will now provide a powerful development tool also for complex RISC designs.

Although some development tool vendors offer new solutions for the embedded RISC market, Lauterbach will continue to fully concentrate on the further development of its emulator technology. Because only an in-circuit emulator provides all the debugging and analysis capabilities needed for efficiently testing the functionality and reliability of even the most complex embedded designs.

TRACE32-FIRE

PowerPC **V850** **ARM7** **TriCore**

ColdFire **Super H** **H8S**

Since embedded RISC processors of the latest generation operate at frequencies of 100MHz or higher, totally new approaches need to be found for the design of development systems. With pulse leading edges in the sub-nanosecond range and access times of less than 10 ns any additional capacitance or lead length can call the system function into question. The powerful RISC processors also conceal a large part of the information behind their bus and cache logic so that a trace performed in the usual way no longer contains all the important information needed for real-time analysis.

A number of advanced innovations have been introduced for the RISC emulator TRACE32-FIRE that guarantee complete emulation transparency, even at high frequencies:

- New system architecture for the emulator
- Use of state-of-the-art technology
- Optimized emulator functions for RISC-specific features

The modularity of the TRACE32 systems and the ease with which they can be converted to support different CPUs, however, has been retained.

What's Inside

LAUTERBACH
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With the existing system architecture used for Lauterbach emulators, only the CPU to be emulated and certain CPU-specific hardware components are located on the emulation pod. All emulator functions are carried out by the so-called basic system. These include:

- Run time control
- Provision of all system resources for the emulator (dual-ported emulation memory, memory for the hardware breakpoints, trace memory, trigger unit, etc.)
- Processing and analysis of the runtime information for statistical evaluation and performance measurements

In this architecture all data and control information must be exchanged between the basic unit and the emulation pod via the connecting cable. However, owing to the long signal delay times, the fast reaction times required of RISC processors for run time control and for accessing memory, are not attainable.

All active system components for the RISC emulator TRACE32-FIRE have therefore been transferred to the emulation pod (see Fig. 1).

With this expanded emulation pod, known as the TRACE32-FIRE Probe, a great deal of emphasis has been placed on making the hardware components universal as well as modular.

The TRACE32-FIRE probe is made up of the following components:

FIRE-SYSCON (universal)

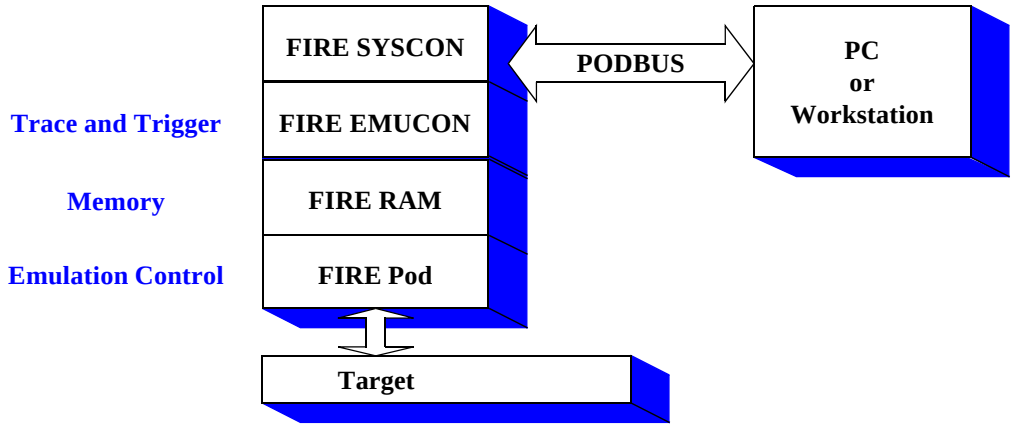
- The FIRE-SYSCON contains its own subcontroller for fast transfer and reaction times
- PODBUS interface for direct connection to the host system (see Fig. 1)
- Trace bus interface for connection to the FIRE backend (see Fig. 2)

FIRE-EMUCON Controller (universal)

- Dual-port controller
- 64K frames trace memory,
  160 channels
  100 MHz
- Trigger unit with 4 trigger levels
- Cycle- or clock-synchronous and selective tracing

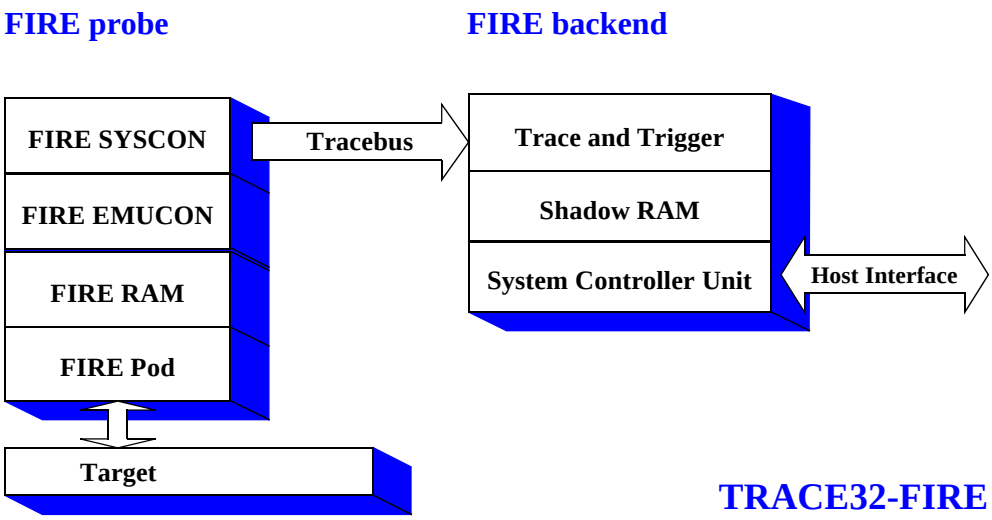
FIRE-RAM (universal)

- Up to 8 MByte dual-port emulation memory
- Up to 8 MByte memory for hardware breakpoints



TRACE32-FIRE Probe

Figure 1



TRACE32-FIRE

Figure 2

FIRE POD (CPU-specific)

- Emulation CPU
- Run time control
- Exception control
- Mapper

The FIRE probe has all the system components needed for emulation and can therefore be used as a stand-alone development tool using its own host interface.

Available host interfaces include Ethernet, PC parallel port, or an ISA-bus PC card.

The FIRE backend adds more complex system functions to the FIRE probe. In this new architecture the primary function of the FIRE backend is to process and analyse the run time information. Therefore it has the following components:

- Flag memory for software analysis and code coverage
- Complex trace and trigger unit
- Shadow RAM

The run time information is transferred in this architecture from the FIRE probe to the FIRE backend via the tracebus.

In the full capacity stage of the TRACE32-FIRE the connection to the host is also made via the backend (see Fig. 2).

Like all TRACE32 systems TRACE32-FIRE offers full freedom as regards the selection of the programming language, the compiler and the real time kernel. At the same time the high degree of modularity guarantees that new RISC processor types can be integrated rapidly.

TRACE32-FIRE will be launched in two stages. At the beginning of 1998 the FIRE Probe will be available initially for the PowerPC, the ARM7 and Hitachi's SH-704x/SH705x series. Shortly afterwards it will be able to support the ColdFire, the Siemens TriCore, the NEC V850 and the Hitachi H8S family.

The development of the FIRE backend will then be completed somewhat later.

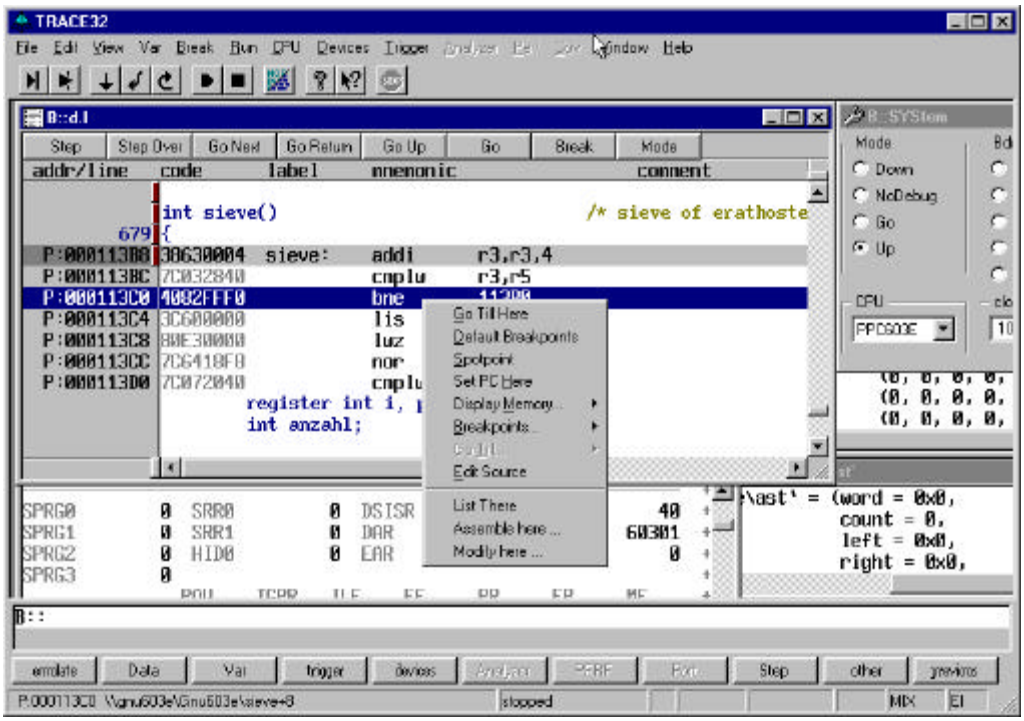
TRACE32-FIRE completes Lauterbach's tool chain and means that Lauterbach can now offer the following development tools for RISC processors:

- In-circuit debugger TRACE32-ICD
- In-circuit debugger with trace TRACE32-ICD TRACE (see page 6)
- TRACE32-FIRE probe
- Full TRACE32-FIRE in-circuit emulator

The user interface for all development tools is fully compatible so that tools of different complexity can be used side by side without problem.

At the same time the in-circuit emulator TRACE32-ICE will be expanded to support additional CISC processors. Information about new features of the TRACE32-ICE is given on page 9.

TRACE32-ICD for PPC603e/PPC604e



Lauterbach's in-circuit debugger TRACE32-ICD is now also available for the 64-bit RISC processors PPC603e and PPC604e.

A new debug module, the *Power Debug Module*, has been developed for debugging the two RISC processors PPC603e and PPC604e. The new development was necessary because the on-chip debug interface of both processors is realized with the so-called COP architecture.

This architecture uses the JTAG interface that is also used for the processor test to shift scan chains through the processor. As it enters the processor the scan chain is used to load the data and the debugging instructions. When it leaves the processor the scan chain then contains the data to be read out. Scan chains can be from 2,500 to 25,000 bits long.

The Power Debug Module contains a separate, high-performance RISC controller making it possible to design a debugger that is both powerful and, more important, fast. The main job of this controller is to convert incoming debug instructions from the host into scan chains, shift them into the processor, evaluate the scan chains leaving the processor and to transfer the data back to the host. In this way the Power Debug Module saves the host interface the burden of transmitting large volumes of data.

The TRACE32-ICD in-circuit debugger for the PPC600 family naturally supports all features provided by the on-chip debug interface, all standard compilers for C and C++, and a number of realtime kernels.

Available host interfaces include Ethernet, PC parallel port, or an ISA-bus PC card.

During the course of 1998 the in-circuit debugger TRACE32-ICD TRACE, with an added trace feature, and the TRACE32-FIRE in-circuit emulator for these 64-bit RISCs will also be launched on the market. This means that for the first time ever Lauterbach will support a 64-bit architecture with its development tools.

Debuggers: Current Information

The in-circuit debuggers available from Lauterbach are known under the collective product name TRACE32-ICD. These in-circuit debuggers are based on:

- ROM monitor solutions
- On-chip debug interfaces such as BDM, JTAG, etc.

Freeware

Lauterbach offers a chargefree debugger for the Siemens 16x family. This debugger can be used via the COM port for the following evaluation boards:

- Siemens KitCON-161
- Siemens KitCON-167
- ERTEC-C167

A free debugger for the Motorola MPC860/ 821 is also available for the ADS board using the ADI interface.

The most current version of both debuggers can be downloaded from our home page http://www.lauterbach.com.

Connection to the printer port

We have recently started offering the option of connecting in-circuit debuggers to PCs via the printer port. In the EPP mode the interface attains a transfer rate of 50KByte/s.

Connection to the Ethernet

Starting in March 1998 a low-cost connection to the Ethernet will be available for the ICD debuggers. The standardized 'look and feel' for all host systems supported will thus enable the ICD debugger to be integrated in PC and workstation networks.

68k ROM monitor for RS232

A pure software debugger for 68K is now available using the RS232 interface.

16x ROM monitor for RS232

A pure software debugger for Siemens's 16x family is now available using the RS232 interface.

Debugger for DSP568xx

The DSP568xx family has now been added to the range of Motorola DSPs supported by TRACE32-ICD.

Debugger for H8S

Lauterbach now offers a ROM monitor-based in-circuit debugger for the H8S which is available immediately.

ROM Monitor for V850

There will shortly be a ROM monitor-based in-circuit debugger for the V850 from NEC before the TRACE32-FIRE in-circuit emulator is available for this processor.

Evaluation Board for ARM7

Since the TRACE32-ICD cannot be used without functioning hardware Lauterbach now also supplies an evaluation board for the ARM7TDMI. The board can be configured both for the AMBA as well as for the 7TDMI bus interface and contains connectors for active, passive or tracking emulation. In addition to the CPU the board also accommodates a 512K RAM and a socket for a 1MB flash. Sockets are already provided for using large memories.

TRACE32 Training

Lauterbach is holding 2-day training courses in Hofolding at regular base.

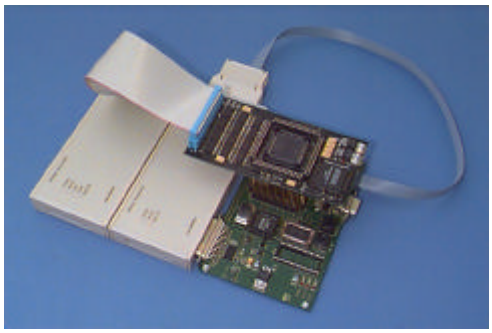
Dates of training courses

Wednesday/Thursday	Wednesday/Thursday
June 9./10. 1998	December 9./10 1998

Applications to Mrs. Schreiber: + +49 8104 8943-0

We also provide in-house training courses on request.

TRACE32-ICD TRACE



At the beginning of 1998 Lauterbach is launching a trace and trigger extension for its in-circuit debugger TRACE32-ICD.

The performance of in circuit debuggers can be considerably expanded by adding on trace and trigger capabilities. The extension now provides program flow information for debugging. This will also facilitate identification of which instructions or system states have caused a particular program state.

Additional hardware modules in the form of a universal trace module and a CPU-specific preprocessor are connected to the PODBUS of the ICD debugger to provide trace and trigger functions.

ICD-Trace Modul + Preprozessor

This trace module together with the CPU-specific preprocessor expands the ICD debuggers through the addition of a trace memory and simple trigger capabilities.

Trace memory

- 96 channels
- 33 MHz (CPU frequency)
- 16K frames trace memory
- 32-bit timestamp with a resolution of 100ns

Trigger unit

- Selective tracing on address ranges
- Trigger on addresses and/or bus states
- 2 asynchronous breakpoints
- 2 8-bit counters
- Trigger delay

The counters can be used to wait until a breakpoint has occurred a certain number of times before terminating the recording in the trace memory. Alternatively they can be used to specify that a certain number of cycles should continue to be recorded in the trace memory after a particular event has occurred.

The trace module can also be used optionally as a timing analyzer via an additional expansion unit that provides terminals for test clips.

Timing Analyzer

- 32 channels
- 60 MHz
- 32K frames trace memory
- Spike detection
- 2 8-bit counters
- Trigger delay

ICD trace module for RISC + preprocessor

This trace module together with the CPU-specific preprocessor expands the ICD debuggers for RISC processors and DSPs through the addition of a trace memory.

Trace memory

- 72 channels
- 64K frames trace memory
- 60 MHz
- 36-bit timestamp with a resolution of 100ns

Full use can also be made of all trigger options provided by the debug interface of the individual controller.

TRACE32-ICD TRACE also supports the Program Flow Unit for the MPC505 and MPC860. This unit feeds information about the program flow of programs running in the cache to the outside in synchronism with the clock. This information in conjunction with the external bus accesses and the program listing make it possible to understand the entire program flow.

Connection to the target system with TRACE32-ICD Trace is made either via a clip-over adapter or a standardized connector.

You will find an overview of the processors for which a trace expansion is available on the next page.

ICD-Trace Modul

- Preprocessor for 68332
- Preprocessor for C166 family

ICD-Trace Modul for RISC

- Preprocessor for MPC505 with Program Flow Trace
- Preprocessor for MPC860 with Program Flow Trace
- Preprocessor for ColdFire
- Preprocessor for ARM7

New Online Help

Starting in 1998 the online help for all TRACE32 systems will be converted to a windows-compatible help system.

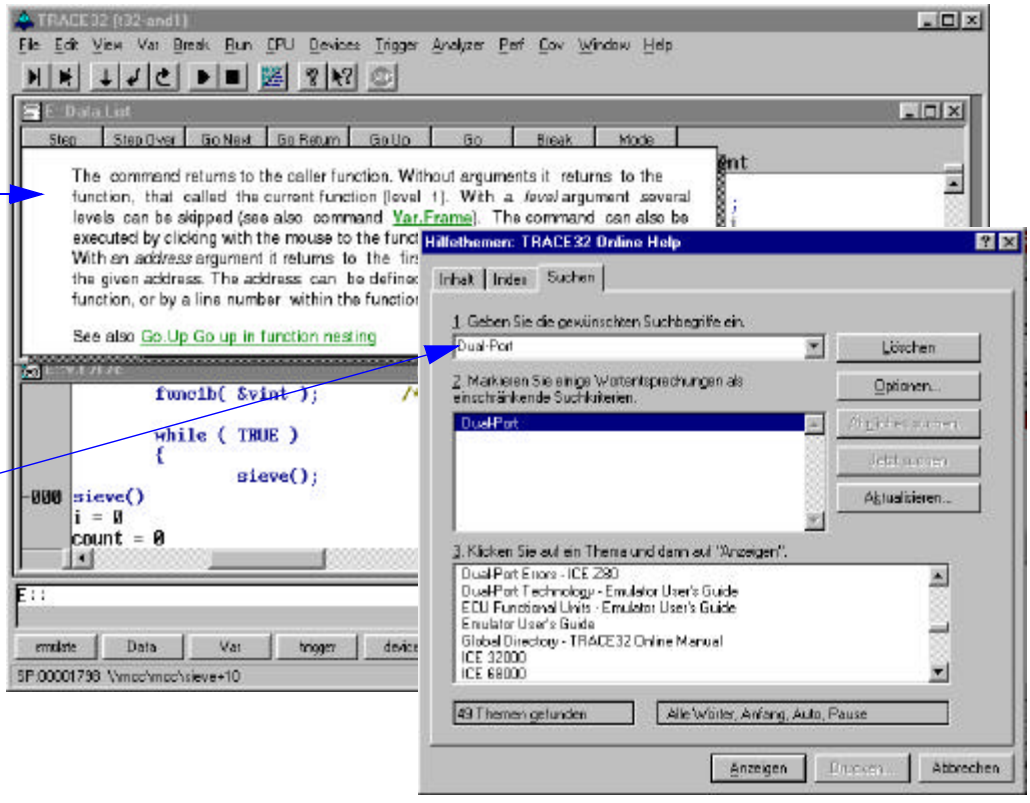
The object of this new help system is to make access to operating and system information even more user-friendly. New features include a summary of contents and index search, as well as, a free text search that considerably speeds selective searching for wanted information.

Fast, comprehensive information about the functionality of individual menus, windows or buttons is available in pop-up windows via the context-sensitive help.

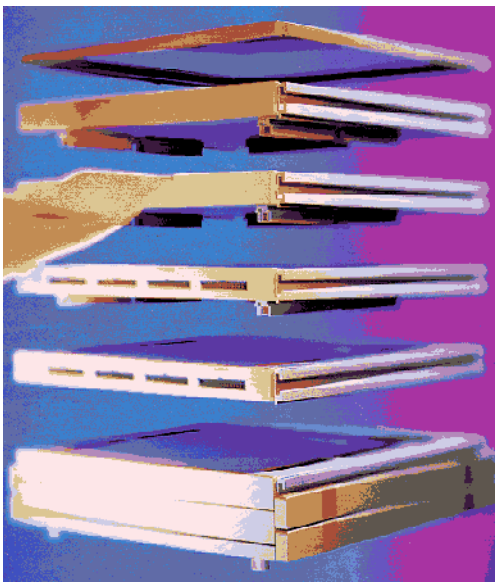
The new online help is available for PCs running WINDOWS 3.1, 95 and NT. SUN/ Solaris and HP-UX 10.2. will be supported initially for workstations. The help will be adapted for other platforms as required.

Pop-Up window (context sensitive help)

Free text search



Lauterbach - Market Leader in Europe



1997 was an extremely successful year for both the recently launched compact emulator TRACE32$_{COMPACT32}$ as well as for the full featured in-circuit emulator TRACE32-ICE .

Annual sales exceeded $ 12 million for the first time while new orders received were considerably higher. Due to the market launch of the FIRE systems we are aiming for sales of $ 15 ... 20 million in 1998.

The increase in sales in 1997 is primarily attributable to the fact that Lauterbach was able to expand its market position for the Siemens C16x family and Intel x86 processors significantly. At the same time we successfully consolidate our strong position for Motorola's processors, particularly the 683xx and the 68040/60.

This success is due to various factors:

- Excellent technical features
- Complete tool chain
- Fast support for new CPUs
- Swift integration of new compilers
- Integration of RTOS, debuggers and CASE tools
- Openness and flexibility of the system
- High quality of technical support
- Close cooperation with the semiconductor manufacturers

All these factors guarantee that Lauterbach systems will retain their excellent position on the emulator market.

As with all high-end products success cannot be measured solely in terms of numbers of units sold. Another particularly important criterion is how well a company is represented in the target market, in this case high-end, innovative embedded design.

As far as the future of emulator technology is concerned, Lauterbach is planning on the one hand to integrate new processor generations for TRACE32-ICE (see next page). For example, Lauterbach was the first development tool vendor to support all derivatives of the 68HC12 family at full frequency which has given us a significant market edge worldwide. At the same time Lauterbach is setting new standards for the development tools of the future with the launch of the fully integrated RISC emulator TRACE32-FIRE (see page 1).

Exhibitions

Obviously we'd like to give you the opportunity of taking a closeup look at our products. We will be presenting them at the following exhibitions:

Embedded Systems '98

Stuttgart-Sindelfingen
February 18. - 20. 1998
Stand K1

Embedded Systems Conference

Chicago, IL
March 30. - April 2. 1998

TRACE32-ICE: Current Information

Shadow RAM

The dual-port capability of the memories of the TRACE32-ICE in-circuit emulator provides the possibility to monitoring the contents of memory cells or variables in real time. In order to enable all processors to monitor the memory without any restrictions Lauterbach offers the option of equipping the emulator with a shadow RAM. This can be an advantage for the following processor families:

- Siemens 16x
- Intel 196
- Hitachi H8
- ARM7 from ARM

The shadow RAM has a size of 256K and can be mapped dynamically in blocks of 64K; in other words, as long as there are still free blocks in the shadow RAM a block will be mapped automatically when a window for monitoring memory cells or a variable is opened.

The shadow RAM can also be used to determine which memory cells have been accessed for read or write in order to identify non-initialized or unused memory areas or variables.

The shadow RAM can only be used with ECC32 or ECU32 (from 11/97).

Faster parallel interface

New software for the parallel interface of the TRACE32-ICE in-circuit emulator allows considerably higher transmission rates between emulator and PC. A typical transmission rate of 300KB/s can be attained in ECP mode.

A number of new options are available for the configuration file for matching the performance of the emulator interface to the parallel interface of the host system.

68K

More members of the 68K family are now supported by Lauterbach with the addition of new emulation modules for the 68EN302 and the 68328 to its range.

There is also a new ICE base for the 68332. This new base makes it possible to emulate the 68332 up to 33MHz without wait states. Triggers to internal accesses are now possible up to a frequency of 16.7 MHz.

68HC08

Lauterbach now also supports the 68HC08 derivatives 68HC08AB, 68HC08AS, 68HC08AT and 68HC08AZ with the TRACE32-ICE.

68HC12

The TRACE32-ICD in-circuit debugger and TRACE32-ICE in-circuit emulator now both support the M68HC12D60 and M68HC12BC32 at full frequency.

New bondout for C16x

A new bondout is now available for the C167 family. This supports all currently available derivatives including those without XBUS (C161RI, C164CI, C167CS). The new bondout has also eliminated some CPU bugs.

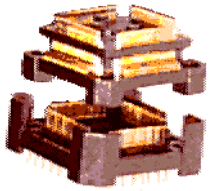
An adapter board is available for upgrading existing emulators. New modules are generally equipped with the new bondout.

Adapters for C164CI, C161RI, C167CS

New adapters are available immediately for these derivatives.

H8/3067

Lauterbach now supports further members of the Hitachi H8 family with the launch of an emulation module for the H8/3065-3067. The emulation of these controllers is supported up to a max. frequency of 20MHz.



TOKYO ELETECH Adapter

From the beginning of the year Lauterbach offers the option of connecting its emulation modules to the target system using adapters from TOKYO ELETECH. This solution offers advantages in terms of the small dimensions of the adapter socket.

Software Highlights

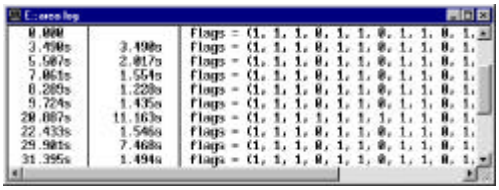
Generating a log for a variable

The VAR.LOG command enables the user to generate a log for all changes of a specific variable while the program is running in realtime. By default the log is displayed in a separate window.

It is possible to specify when the log is to be updated by selecting one of these options:

- Every time the program stops
- At fixed time intervals
- Only when the variable changes

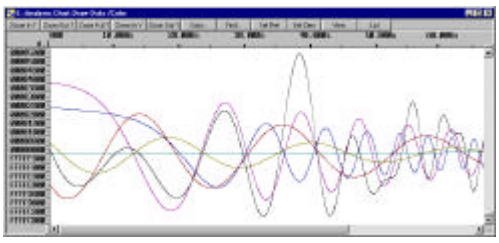
Entries in the log can also be marked with an absolute and relative time stamp. Naturally the log can also be stored in a file.



Graphical data evaluation

A new option in TRACE32 now allows the graphical display of the changes in data values over the measuring time. The only requirement is that the data to be analyzed are written to global variables, so that they can be traced in realtime.

In order to collect measurement data, the trace must be set up for selective tracing, so that only write accesses to these global variables are recorded. Each record is marked with a time stamp. The resolution of the time stamp is 25 ns.



If the changes of several variables and their interaction is to be analyzed it is necessary to ensure that the individual variables can be separated again for the evaluation.

For this purpose the records of the individual variables must be marked accordingly in the trace memory. Since there are 3 markers available it is possible to record and graphically analyze up to 7 variables. In the graphical analysis (see Fig.) the measurement data of the individual variables are shown in different colours according to their marking.

Open user interface

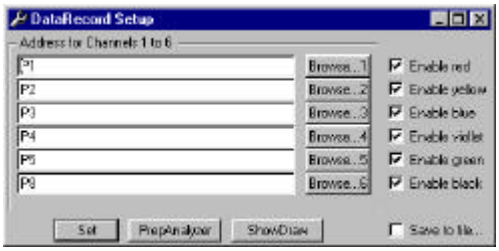
The graphical user interface of TRACE32 enables customers to adapt menus, buttons and dialog boxes to their specific requirements.

New entries for the menu bar or the local menus can be defined by means of the MENU command. The short-cut assignment can also be changed for frequently used commands.

Application-specific buttons can also be defined for the toolbar.

The DIALOG command can be used to generate new dialog windows that can consist of different buttons, checkboxes and text fields to provide a user-friendly method of user prompting. The user inputs are transferred to a PRACTICE program that implements the specific functions of the dialog window.

The dialog box shown below was used, for example, to select the individual variables for a graphical data evaluation, to start the recording and to show the measurement data in suitable form.



The measurement data can also be transferred to the host by a fast file transfer.

Interactive programming with prompting and on-line syntax check is provided for matching the user interface quickly and easily.

Exhibitions 1998

Lauterbach is represented worldwide by qualified representatives. At a number of local exhibitions they would like to give you the opportunitiy of taking a closeup look at our products. They will represent us at the following exhibitions:

Denmark

Teknik & Data

Odense, February 4th - 6th

represented by Nohau Denmark A/S

Italy

RTC

Rome, February 24th
Milan, February 26th

MICROELTTRONICA

Venice, May 14th - 16th

BIAS

Milan, November 24th - 28th

represented by DELO SYSTEMS

Sweden

Real-time Computing

Gothenburg, September 15th

Stockholm, September 17th

Helsinki, October 27th

Oslo, October 29th

Embedded Systems

Helsinki, March 18th - 19th

represented by Nohau Electronik AB

Taiwan

Computer Application Exhibition '98

Taipei, July 31st - August 4th

represented by Superlink Technology

For the most current information on exhibitions in your country, please refer to our web site: *http://www.lauterbach.com.*

New realtime kernels supported

68HC11
OSE Basic, Enea OSE Systems

68K
AMX, Kadak
OSE Delta, Enea OSE Systems
MTOS-UX, IPI

PPC
Nucleus PLUS, Accelerated Technology
VxWorks, Wind River Systems
OSE Delta, Enea OSE Systems

C166
CMX, CMX Company
Nucleus PLUS, Accelerated Technology
proOSEK,3Soft

ARM7
Chorus, Chorus Systems
Nucleus PLUS, Accelerated Technology

386
Chorus, Chorus Systems (planned)
QNX, QNX Software Systems (planned)

Please return by fax or in a window envelope!

To

Lauterbach Datentechnik GmbH
News '98
Fichtenstr. 27
D-85649 Hofolding

Fax: + +49 8104 8943-30

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❒ We work on following host systems:

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❒ We do not use any development tools. Please delete us from your mailing list.

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