



## FIRE Fully Integrated RISC Emulator

- High-Speed RISC Emulator
- 64 Bit Data / 32 Bit Address Support
- Scalable 100 MHz Analyzer
- Highspeed Dualport Emulation Memory up to 16 MByte
- Wide Voltage Range
- Passive and Active Emulation Mode
- Controlled by High-Speed RISC CPU
- Fully Compatible with ICE and ICD Debug System

Since high speed RISC processors operate at bus frequencies of more than 100 MHz, a redefinition of the traditional emulator hardware was necessary. The result of this new concept TRACE32-FIRE was developed especially for applications with RISC Processors, Integrated Controllers and DSPs at highest clock frequencies, without losing the capabilities of a traditional In-Circuit Emulator. The INTEGRATED EMULATION guaranties highest reliability in quality and support

**Universal RISC Emulator for 16- to 32-bit**

## Microprocessors

TRACE32-FIRE supports a wide range of microprocessors and microcontrollers at 3.3V or 5V.

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## Open Software Architecture

TRACE32-FIRE works seamlessly with

- Most programming languages (C, C++, Java, ADA, Pearl etc.)
- Most third party compilers in all object file formats
- A wide range of RTOS
- Third party debuggers
- Third party CASE tools

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## Interface to all Hosts

TRACE32-FIRE can be linked to a PC, any workstation or mainframe. Software drivers are available for all standard operation systems and all graphical user interfaces.

- Parallel, USB and ethernet interface
- Same "Look and Feel" on all supported host systems
- Fast download

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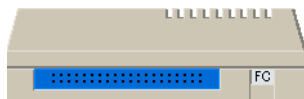
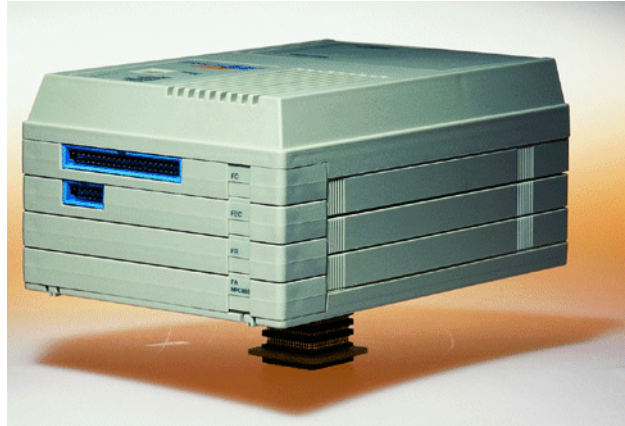
## Scalable Tool Chain

TRACE32-FIRE is the high end tool of Lauterbach's TRACE32 tool chain. We also offer:

- TRACE32-ICD  
ROM monitor based debugger  
Debug interface based debugger (BDM, JTAG etc.)
- TRACE32-ICD TRACE  
TRACE32-ICD enhanced by trace and trigger capabilities

The uniform, compatible GUI for all products of the TRACE32 series makes it easy to migrate to a more complex tool or to use different complex tools side by side in the same project.

## System Architecture



### **FIRE System Controller**

- provides the connection to the host system (LPT, ISA-Card, Ethernet, USB)
- runs the FIRE system software



### **FIRE Emulation Controller**

- provides all CPU independent emulator functions (VCO, Pulse Generator, Universal Counter)
- provides the trace memory (64 k frames)
- provides the trigger unit



### **FIRE Emulation Memory**

- 1, 2 or 4 MByte dual-ported emulation memory
- 1, 2 or 4 MByte address selector/flags memory



### **FIRE Probe**

- provides the CPU dependent debugger, trace and trigger features
- Mapper, Dualport Controller

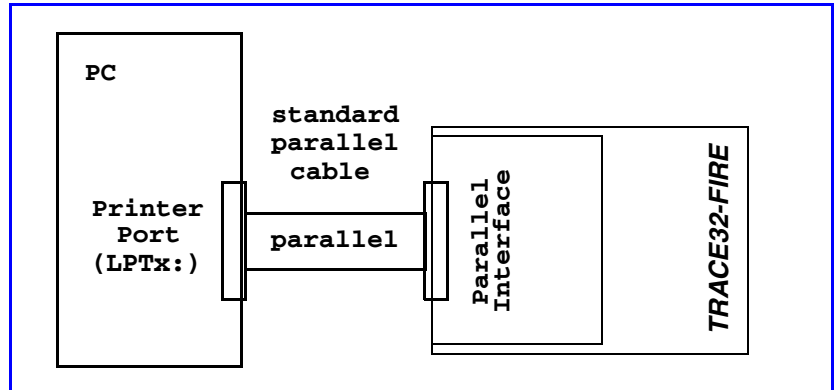


### **Target Adapter**

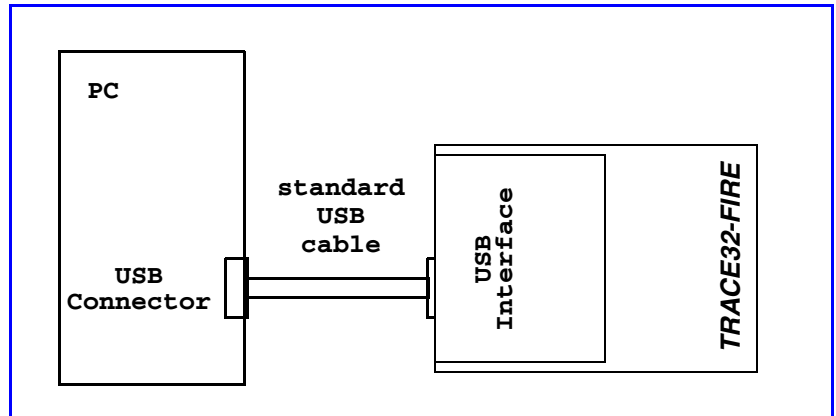
- BGA/QFP adapter

## Host Interfaces

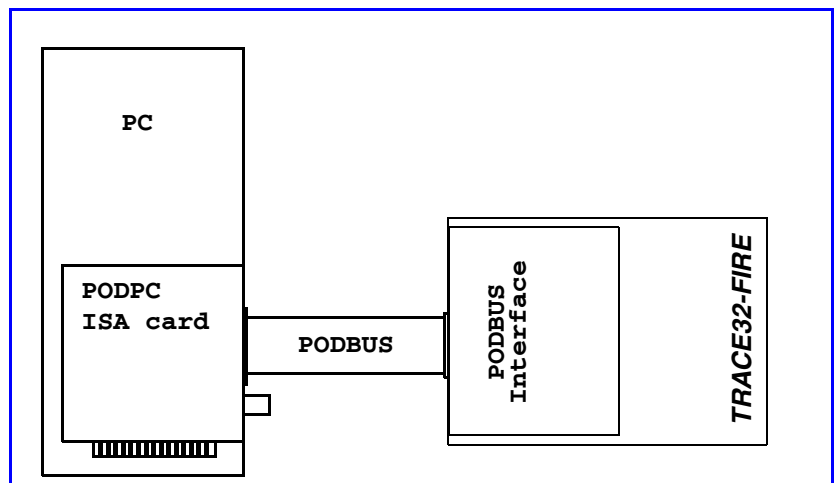
### Parallel Interface:



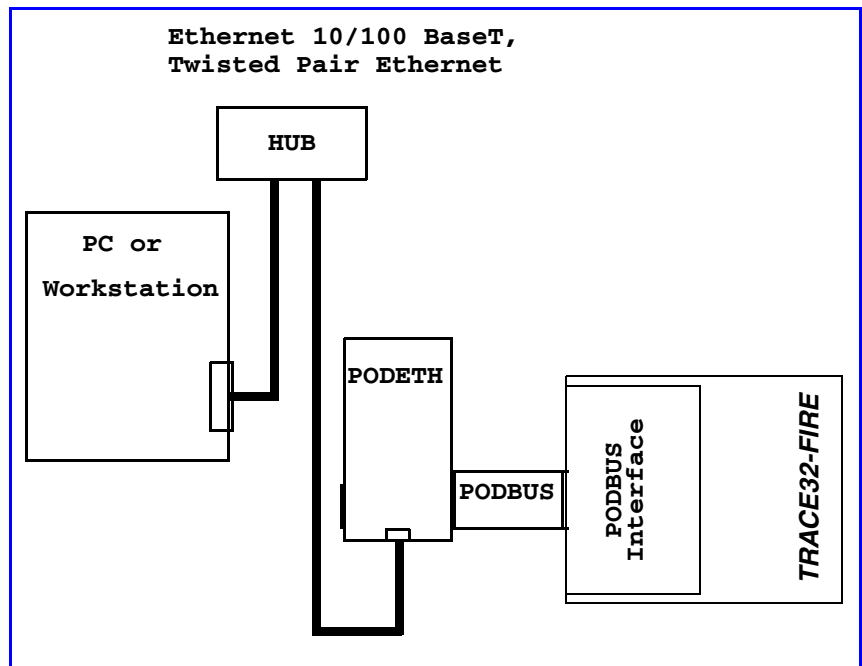
### USB Interface:



### PODBUS Interface (ISA Card):



❑ PODBUS Interface (Ethernet)



### Download Performance

- ❑ Parallel Interface: 50 KByte/s
- ❑ Parallel Interface (ECP): 350 KByte/s
- ❑ USB Interface: 400 KByte/s
- ❑ Isa Card: 350 KByte/s
- ❑ Ethernet 10 BaseT: up to 600 KByte/s
- ❑ Ethernet 100 BaseT: up to 700 KByte/s

## Debugging

Runtime control via the on-chip debug interface or via a debug monitor.

### Breakpoint types

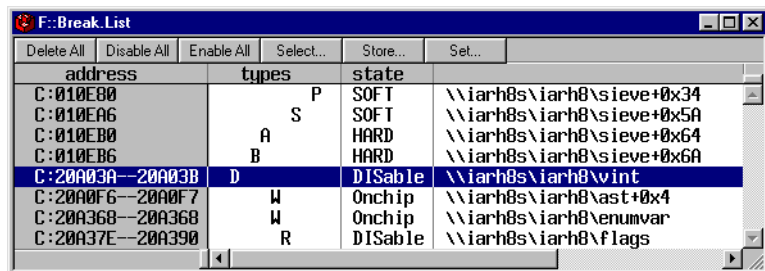
- Program breakpoints
- Spot (watch) breakpoint
- Read, Write, Access breakpoint
- Alpha, Beta, Charly, Delta, Echo breakpoints (for trigger purpose)

### Breakpoint implementation

- Software breakpoints (unlimited)
- On-chip breakpoints (CPU dependent)
- Hardware breakpoints (unlimited)

### Flexible breakpoint handling

- Enable/disable breakpoints
- Store breakpoint settings



address	types	state	
C:010E00	P	SOFT	\\iarh8s\iarh8\sieve+0x34
C:010E06	S	SOFT	\\iarh8s\iarh8\sieve+0x5A
C:010E08	A	HARD	\\iarh8s\iarh8\sieve+0x64
C:010E06	B	HARD	\\iarh8s\iarh8\sieve+0x6A
C:20A03A--20A03B	D	DISable	\\iarh8s\iarh8\wint
C:20A0F6--20A0F7	W	Onchip	\\iarh8s\iarh8\ast+0x4
C:20A368--20A368	W	Onchip	\\iarh8s\iarh8\enumvar
C:20A37E--20A390	R	DISable	\\iarh8s\iarh8\flags

## Powerful, Integrated High Level Language Debugger

### Multitask Debugger

TRACE32-FIRE provides symbolic debugging of complex multitask applications and the detailed analysis of the real time behaviour of the system. It

supports internally developed and a wide range of off-the-shelf realtime kernels.

## Code coverage

Up to 4 MByte ReadFlag memory traces all opfetches in realtime for comprehensive code coverage.

The screenshot shows a window titled "F::D.L.P:0x10AAE /FLAG NOREAD". The table below represents the data shown in the window:

write	read	addr/line	code	label	mnemonic
		P:010AB8	1096		shl.w r6
	read	451		return x*x;	
		P:010ABA	0065		mov.w r6,r5
		P:010ABC	5265		mulx.w r6,r5
		P:010ABE	0056		mov.w r5,r6
		P:010AC0	5470		rts
READ		P:010AC2	79260002		cmp.w #0x2,r6
READ		P:010AC6	4608		bne 10AD0
				case 2:	
	read	453		return x*x;	
READ		P:010AC8	0065		mov.w r6,r5
		P:010ACA	0965		add.w r6,r5
		P:010ACC	0056		mov.w r5,r6
		P:010ACE	5470		rts
READ		P:010AD0	79260003		cmp.w #0x3,r6
READ		P:010AD4	4608		bne 10AD0
				case 3:	
	read	455		return x-x;	

## Stack depth verification

Up to 4 MByte ReadFlag memory traces all write accesses in realtime for comprehensive stack depth verification.

The screenshot shows a window titled "F::Data.dump Register(sp) /Track /Flag Write". The table below represents the data shown in the window:

write	read	address	0	1	2	3	4	5	6	7	01234567
		D:2104A8	00	00	00	00	00	00	00	00	00
write		D:2104B0	00	00	00	00	00	15	00	01	00000000
WRITE		D:2104B8	07	84	00	01	0B	3A	00	34	00000000
WRITE		D:2104C0	00	00	00	07	00	02	01	3B	00000000
WRITE		D:2104C8	00	01	0B	3A	00	15	00	01	00000000
WRITE		D:2104D0	00	02	00	03	00	2A	00	01	00000000
WRITE		D:2104D8	0B	3A	00	07	00	20	00	00	00000000
WRITE		D:2104E0	00	01	04	34	00	01	61	4E	00000000
WRITE		D:2104E8	00	01	0E	4A	00	00	00	00	00000000
WRITE		D:2104F0	30	3A	00	20	A0	F2	00	00	00000000
WRITE		D:2104F8	00	00	00	09	00	01	03	2A	00000000
		D:210500	00	00	00	00	00	00	00	00	00000000

## Real time trace and trigger

### Up to 64K trace buffer

- Bus trace and clock trace
- Up to 100 MHz
- Up to 160 channels
- 20 ns time stamp

### Real time trigger

The multilevel trigger system allows to use advanced trigger sequences to find even the most complex errors in record time.

### Context tracking system

The context tracking system allows fast, easy-to-follow trace analysis. If all CPU cycles are sampled it can be used for

- Debugging from the trace memory
- High level analysis of the trace with all register and stack variables
- Analysis of the function nesting

record	run	address	cycle	d.w	symbol	ti.back
					flags = (1, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0)	
					k = 6	
					{	
685		+00065402			flags[ k ] = FALSE;	1.600us
					...	
					k = 6	
					primz = 5	
686		+00065410			k += primz;	0.900us
					...	
					k = 11	
					k = 11	
683		+00065414			while ( k <= SIZE )	0.600us

### Performance analysis

TRACE32-FIRE offers comprehensive performance analysis on program, function or module base or on areas defined by the user.



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## Statistic functions

TRACE32 allows detailed analysis of:

- Functions
  - Min. and max. time
  - Passes
  - Include and exclud time
- Link analysis
  - Callers
  - min. and max. times
  - Calls
- Duration
  - Execution time
  - Response time
- Distance

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## Powerful graphical analysis functions

Most statistic and runtime analysis can also be displayed in a graphical way to offer an intuitive interpretation.

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## Powerful batch language

TRACE32-FIRE offers a powerful batch language for automatic set ups and automatic testing. It is supported by its own debugger.

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## Disclaimer

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