

In-Circuit Emulator for MC68040/60

- Support for 3.3 and 5 Volt derivatives
- Interface with all compilers
- C++ support
- MMU Support
- FPU Support
- Hidden Wait System
- Dual ported memory
- Support for Companion Mode MC68360
- CASE tools interface
- RTOS support
- Windows9x, NT and Motif interface

MC68040
MC68040V
MC68060
MC68EC040
MC68EC040V
MC68EC060
MC68LC040
MC68LC060

TRACE32-ICE68040 supports MC68040/MC68040V up to 40 MHz bus speed and MC68060 up to 40 MHz in half-speed bus mode and up to 45 MHz in full-speed bus mode. The LC and EC versions of both CPUs are also supported.

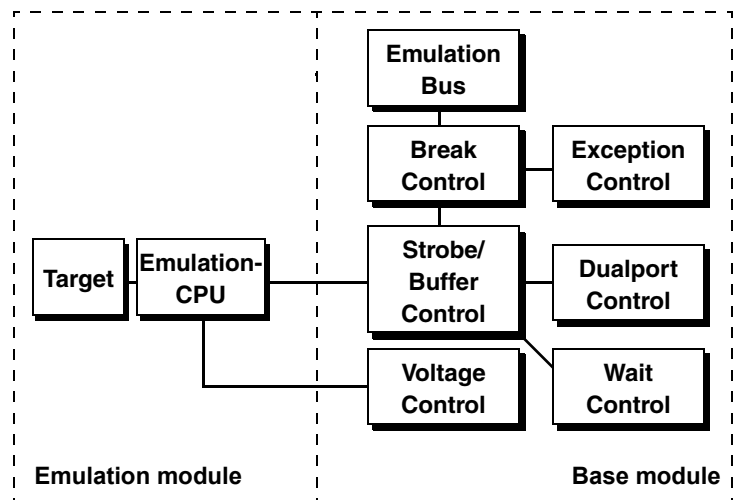
The modular and open technology of the system allows the fast integration of new chip designs.

TRACE32-ICE is a state of the art In-Circuit Emulator, which offers unlimited hardware breakpoints and up to 16MByte dual-ported emulation memory. The real-time trace and trigger work up to the max. speed of the CPU. The analyzer offers selective trace as well as performance analysis and statistic functions.

TRACE32 works with the highest variety of host interfaces. The communication link to the host is done by the printer port, a fibre optic interface or ethernet allowing a high-speed transfer.

Features

Basics of Operation



The ICE-68040 is a high-performance emulation system for the 68040 and 68060 from Motorola.

Operating Modes

The Emulator can work in stand-alone mode with internal clock or in active mode with internal or the target clock. On power-down of the target system the emulator tristates its output buffers and isolates its internal emulation circuits.

The operation modes are as follows:

- Reset Down
- Reset Up
- No Probe
- Alone Internal
- Alone External
- Emulation Internal
- Emulation External

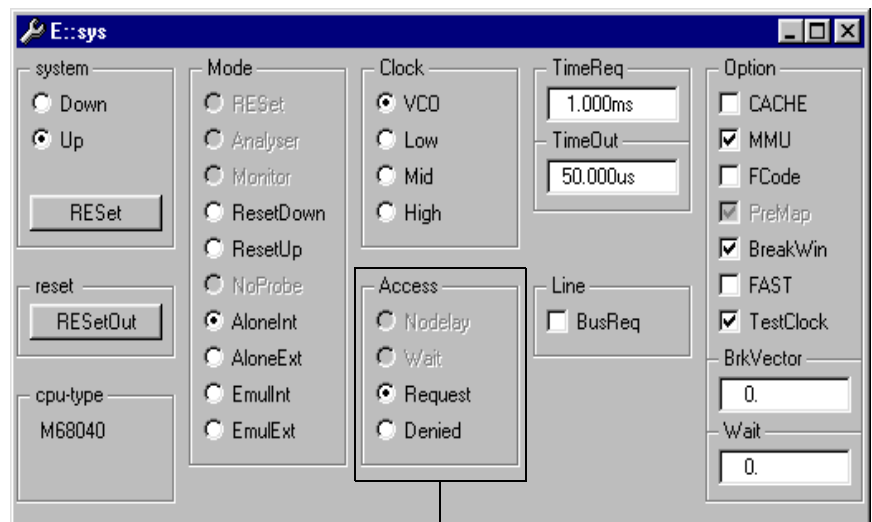
Wait System

- Additional wait cycles (1-15) may be specified
- Hidden Wait System (0-5).

TRACE32 provides a better timing on high speed target systems by generating internal (hidden) waitstates together with a 'synthetic' target interface.

Clock Fail Detection

Dual port Access



Dual port access mode

All TRACE32 memories are dual-ported. The dual-port access makes it possible to display and modify the contents of the overlay memory, to set or delete breakpoints or use the flag memory while the application is running in real-time.

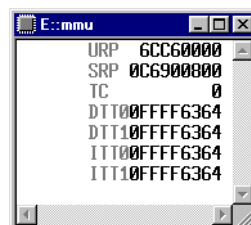
The following dual-port access mode is implemented:

- Request

In the **Request mode** the dual port access is always possible.

In the **Denied mode** the dual port access is switched off.

MMU Support



- Display of register
- Display of translation tables
- Debugging with logical addresses
- Separate logical memory spaces for multitask environments

Cache Support

ICE-68040 supports cache operations for the target memory.

For an effective debugging, the cache can be disabled for certain memory areas, while it is enabled for others.

Support for Burst Cycles

Burst cycles for the target are possible, if they are supported by the target hardware.

For an effective testing, burst cycles can be disabled for certain memory areas, while they remain enabled for others.

HLL Debugging

The screenshot shows a window titled 'E::d.l' with a menu bar (Step, Step Over, Go Next, Go Return, Go Up, Go, Break, Mode) and a table of assembly instructions. The table has columns for 'addr/line', 'code', 'label', 'mnemonic', and 'comment'. The code is for a C function named 'sieve' that implements the sieve of Eratosthenes. The assembly instructions are shown in hexadecimal and include mnemonics like 'link', 'movem.l', 'movea.l', 'register', 'moveq', 'addq.l', 'move.b', 'cmp.l', and 'bge'. Comments in the code include '/* sieve of erathostenes */' and 'register int i, primz, k; int anzahl;'. The current instruction pointer (SP) is 00002614.

addr/line	code	label	mnemonic	comment
				char flags[SIZE+1];
				int sieve() /* sieve of erathostenes */
1479	{			
SP:00002614	4E560000	sieve:	link a6,#0	; a6,#0
SP:00002618	48E73C38		movem.l [d2-d5,a2-a4],-(a7)	
SP:0000261C	287C0003E50		movea.l #3E50,a4	; #flags,a4
				register int i, primz, k;
				int anzahl;
1483				anzahl = 0;
SP:00002622	7A00		moveq #0,d5	; #0,anzahl
1485				for (i = 0 ; i <= SIZE ; flags[i++] = TRUE) ;
SP:00002624	7400		moveq #0,d2	; #0,i
SP:00002626	2042		movea.l d2,a0	; i,a0
SP:00002628	5282		addq.l #1,d2	; #1,i
SP:0000262A	19BC00018800		move.b #1,0(a4,a0.l*1)	; #1,0(a4,a0.l*1)
SP:00002630	7012		moveq #12,d0	; #18,d0
SP:00002632	B082		cmp.l d2,d0	; i,d0
SP:00002634	6CF0		bge 2626	
1487				for (i = 0 ; i <= SIZE ; i++)
SP:00002636	7400		moveq #0,d2	; #0,i

The TRACE32 debugger provides a interface to C, C++, PASCAL, PEARL and ADA for all standard compilers. For more information on the supported compilers refer to the section "Debug Interfaces".

Full support in real-time for:

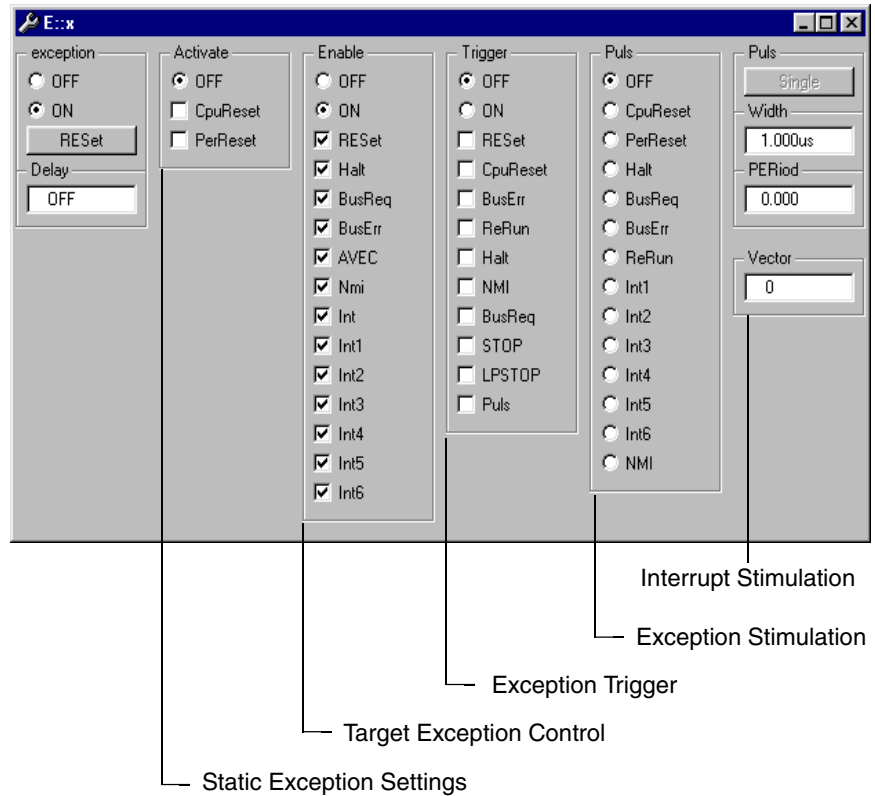
- Break-before-line operation
- HLL single step in real-time
- Trigger and trace on local variables

Background Task

The background task allows:

- To process interrupts
- To maintain the refresh of a target DRAM while the emulation is stopped.

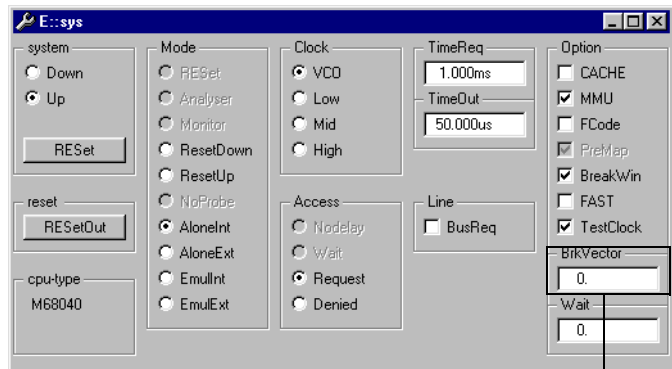
Exception Control



The TRACE32 exception controller allows to permanently activate an exception, to enable or disable specific exceptions, to trigger on specific exceptions or to stimulate an exception.

- Interrupt Stimulation
 - Level-1...7-interrupts
 - All vectors

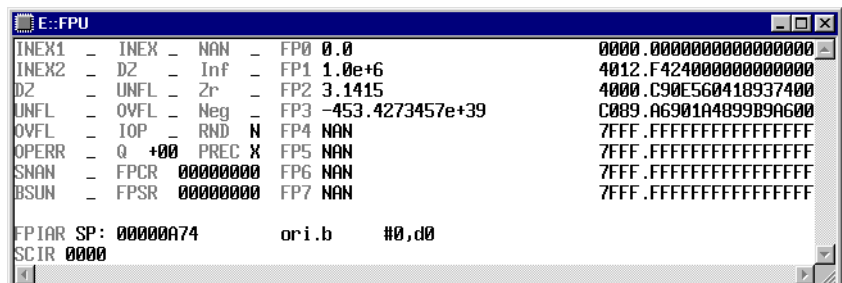
TRAPs used for Emulation



Break Vector

Program breakpoints are installed by a BPT instruction. ICE-68040 offers free selection of the breakpoint vector to avoid conflicts with other applications.

FPU Support



The display and the modification of the FPU registers is supported.

Support for Companion Mode MC68360

Please contact us for target layout recommendations for the companion mode support.

Emulation Modules

Modules Overview

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Debug Interfaces

TRACE32-PowerView supports most compilers, realtime operation systems and debuggers.

New integrations are mostly done on customers request. If your compiler or RTOS is not supported now, please ask us !

Compiler Support 68040

CPU	Language	Compier	Compan y	Option
68K	ADA	ALSYS-ADA		IEEE
68K	ADA	TELESOFT-ADA	Telesoft	IEEE
68K	ASM	RTOS	IEP GmbH	SYM/LOC
68K	ASM	ASM68K	Mentor Graphics Corporation	IEEE
68K	ASM	VERSADOS-ASM	NXP Semicon ductors	VERSADOS
68K	ASM	OS-9-ASSEMBLER	Radisys Inc.	ROF
68K	ASM	AS68	TASKING	IEEE
68K	C	HP-64000-C		HP
68K	C	ORGANON	CAD-UL Electronics Service s GmbH	BOUND
68K	C	C68K	Cosmic Software	COSMIC
68K	C	GNU-C	Free Software Foundati on, Inc.	ELF/DWARF
68K	C	GNU-C	Free Software Foundati on, Inc.	COFF
68K	C	GNU-C	Free Software Foundati on, Inc.	ELF/DWARF

CPU	Language	Compiers	Company	Option
68K	C	GREEN-HILLS-C	Greenhills Software Inc.	COFF
68K	C	ICC68K	Introl Corporation	ICOFF
68K	C	MCC	Mentor Graphics Corporation	IEEE
68K	C	HT-68K	Microchip Technology Inc.	HITECH
68K	C	HICROSS-68K	NXP Semiconductors	HICROSS
68K	C	CC68K	NXP Semiconductors	COFF
68K	C	ULTRA-C	Radisys Inc.	ROF
68K	C	OS/9-C	Radisys Inc.	ROF
68K	C	CROSSCODE-C	SDSI	SDS
68K	C	SCC68K	Sierra	COFF
68K	C	SUN3-CC	Oracle Corporation	DBX
68K	C	ICC68K	TASKING	COFF
68K	C	ICC68K	TASKING	IEEE
68K	C	TT-68K	TASKING	IEEE
68K	C	TCC68K	TASKING	AOUT
68K	C	TEKTRONIX-C	Tektronix	COMFOR
68K	C	D-CC	Wind River Systems	IEEE
68K	C	D-CC	Wind River Systems	ELF/DWARF

CPU	Language	Compiler	Company	Option
68K	C++	ORGANON-C++	CAD-UL Electronic Services GmbH	BOUND
68K	C++	GNU-C++	Free Software Foundati on, Inc.	DBX
68K	C++	GNU-C++	Free Software Foundati on, Inc.	ELF/DWARF
68K	C++	CCC68K	Mentor Graphics Corporati on	IEEE
68K	C++	HICROSS- 68K	NXP Semicon ductors	HICROSS
68K	C++	CODEWAR RIOR	NXP Semicon ductors	ELF/DWARF
68K	C++	CROSSCO DE-C++	SDSI	SDS
68K	C++	D-C++	Wind River Systems	ELF/DWARF
68K	MODULA	MOD68K	Introl Corporati on	ICOFF
68K	MODULA	MCS2	Multicha nnelsyst ems GmbH	COFF
68K	MODULA	MCDS	NXP Semicon ductors	MCDS
68K	PASCAL	MPC	Mentor Graphics Corporati on	IEEE
68K	PEARL	RTOS	IEP GmbH	SYM/LOC

RTOS Support

Company	Product	Comment
Atego Ltd.	AdaWorld ARTK	
KadakProducts Ltd.	AMX	
Oracle Corporation	ChorusOS	
CMX Systems Inc.	CMX-RTX	
Synopsys, Inc	MQX	2.40 and 2.50, 3.6
	MTOS-UX	
Mentor Graphics Corporation	Nucleus PLUS	
Radisys Inc.	OS-9	
Enea OSE Systems	OSE Classic	(OS68)
Enea OSE Systems	OSE Delta	4.x and 5.x
	RealTime Craft	(XEC68k)
Quadros Systems Inc.	RTXC 3.2	
IBM Corp.	SDT-Cmicro	
-	uCLinux	Kernel Version 2.4 and 2.6, 3.x
Mentor Graphics Corporation	VRTX32	
Mentor Graphics Corporation	VRTXmc	
Mentor Graphics Corporation	VRTXsa	
Wind River Systems	VxWorks	5.x and 6.x

Debugger Support

CPU	Debugger	Company
	WINDOWS CE PLATF. BUILDER	-
	CODE::BLOC KS	-
	C++TEST	-
	ADENEO	-
	X-TOOLS / X32	blue river software GmbH
	CODEWRIGH T	Borland Software Corporation
	CODE CONFIDENC E TOOLS	Code Confidence Ltd
	CODE CONFIDENC E TOOLS	Code Confidence Ltd
	EASYCODE	EASYCODE GmbH
	ECLIPSE	Eclipse Foundation, Inc
	CHRONVIEW	Inchron GmbH
	LDRA TOOL SUITE	LDRA Technology, Inc.
	UML DEBUGGER	LieberLieber Software GmbH
	SIMULINK	The MathWorks Inc.
	ATTOL TOOLS	MicroMax Inc.
	VISUAL BASIC INTERFACE	Microsoft Corporation
	LABVIEW	NATIONAL INSTRUMENT S Corporation
	RAPITIME	Rapita Systems Ltd.
	RHAPSODY IN MICROC	IBM Corp.

CPU	Debugger	Company
	RHAPSODY IN C++	IBM Corp.
	DA-C	RistanCASE
	TRACEANALY ZER	Symtavigation GmbH
	TA INSPECTOR	Timing Architects GmbH
	UNDODB	Undo Software
	VECTORCAS T UNIT TESTING	Vector Software
	VECTORCAS T CODE COVERAGE	Vector Software
68K	OS68 DEBUGGER	Enea OSE Systems
68K	SDT CMICRO	IBM Corp.
68K	DIAB RTA SUITE	Wind River Systems

Operation Voltage and Frequency

The maximum operation frequency of TRACE32-ICE depends on:

- The max. frequency of the CPU
- The access time of the overlay memory (15ns or 35ns)
- The mapper mode (**Slow** or **Fast**)
- The number of waitstates (W0 = 0 waitstates, W1 = 1 waitstate)
- The dual-port access mode

Denied Access

Operating Voltage

This list contains information on probes available for other voltage ranges.

Probes not noted here supply an operation voltage range from 4.5V to 5.5V. tbd

Dimensions

Module Dimensions

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Connectors

On each emulation module there are half-size connectors to:

- ❑ Connect the emulation module directly to the target by providing the corresponding connectors also on the target hardware

- ❑ Connect a standard adapter from Emulation Technology, YAMAICHI, AMP, TOKYO ELETECH etc.

The following table lists the physical dimensions of these connectors.

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Adapter

The adapters connect in different ways

- With Clip-Over Adapters the CPU can stay on the target board.
- With Solder-ON adapters the CPU must be removed

- YAMAICHI and AMP adapters fit to the CPU socket

The following table lists the physical dimensions of these adapters.

Not necessary.

Available Tool Chain

TRACE32 provides a complete set of development tools for this family. This includes:

- The In-Circuit Emulator TRACE32-ICE
- The high speed RISC Emulator TRACE32-FIRE
- The BDM/JTAG/ONCE etc. based In-Circuit Debugger TRACE32-ICD
- The ROM Monitor based In-Circuit Debugger TRACE32-ICD

- The ICD Trace, a trace extension to the BDM/JTAG debuggers or ROM monitors
- Evaluation boards, which can be used until the target hardware is available.
- The Instruction Set Simulator (SIM), a software tool for code test without any hardware

The following list give an overview which development tools are available for the specific derivatives of this family.

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Order Information

Module Description

Detailed Order Information

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