

## In-Circuit Emulator for MC68000 and MC6830X

### KELVIN

**MC68000**

**MC68008**

**MC68010**

**MC68302**

**MC68306**

**MC68307**

**MC68308**

**MC68328**

**MC68EC000**

**MC68EN302**

**MC68HC000**

**MC68HC001**

**MC68HC008**

**MC68HC010**

**MC68LC302**

**MC68LC302\_3.3V**

**MC68PM302**

**MC68PM302\_3.3V**

**MC68SEC000**

**TMP68301**

**TMP68303**

- Support for all family members
- 33 MHz no-waitstate emulation
- 3.3V and 5V support
- Support for single and dual-chip emulation mode
- Address reconstruction unit
- On-Circuit emulation with clip-over adapter
- Interface with all compilers
- C++ support
- CASE tools interface
- RTOS support
- Windows9x, NT and Motif interface

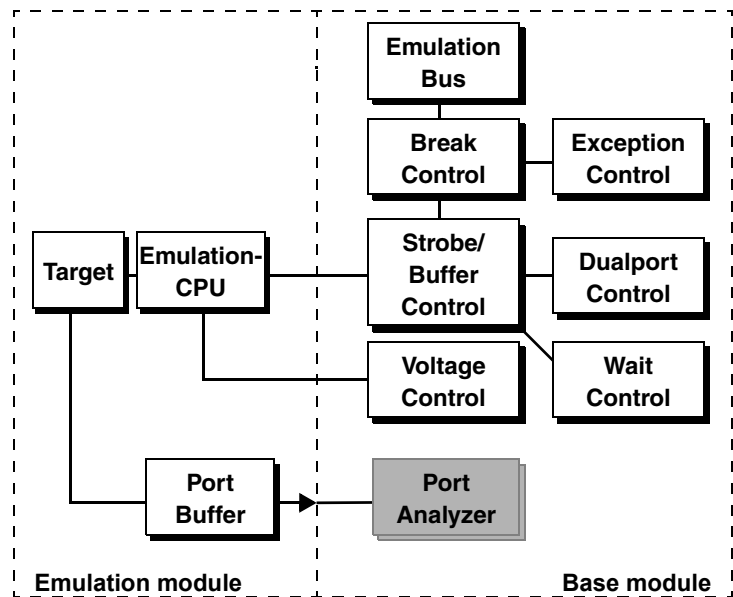
The TRACE32-ICE68300 supports all members of the 68000/683xx-family from Freescale and some members of 683xx-family from Toshiba. The system is designed for bondout and non-bondout controllers. Its modular and open technology allows the fast integration of new chip designs.

A software compatible ROM Monitor is also available.

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

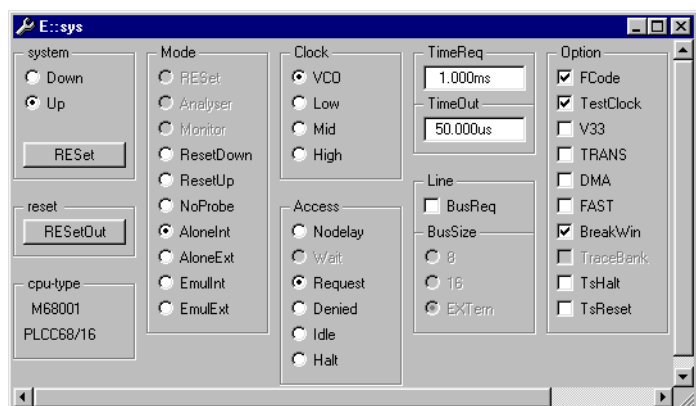
### Basics of Operation



### 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
- Alone Internal
- Alone External
- Emulation Internal
- Emulation External

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## Clock

- Operation with external or internal Clock
- 1..35 MHz internal clock

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## Dual-Port Access

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.

There are 3 modes for dual-port access

- Request
- Nodelay
- Idle
- Halt

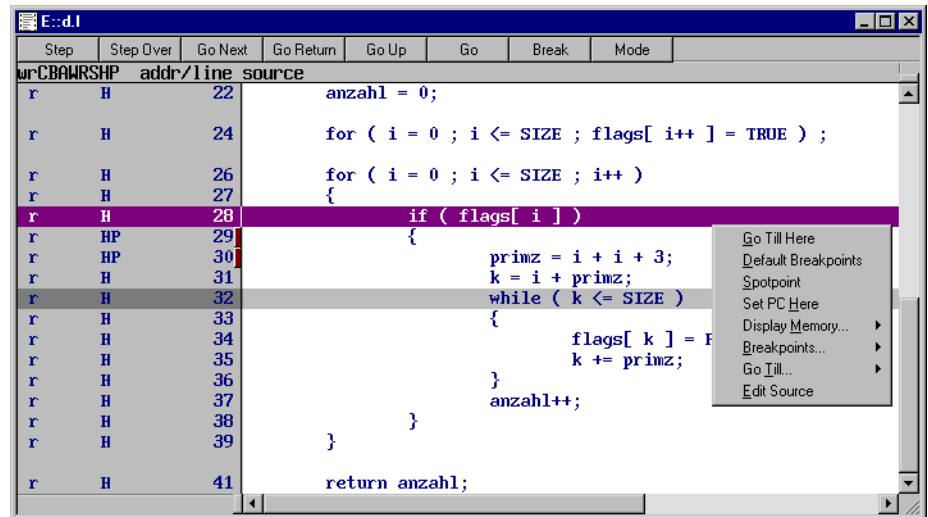
The **REQUEST mode** is the default method accessing memory in real-time. It only works if the Busrequest/BusGrand function is available.

In **NODELAY mode** the Dualport access is done while the buscycle is not active (AS- is HIGH). This access mode was made for CPU's which have no BR- line (68LC302, 68PM302). With 25ns SRAM this mode works up to 19..20MHz.

In **IDLE mode** the Dualport access is done while the CPU is running an Idle cycle. Like NODELAY mode this access mode was made for CPU's which have no BR- line. It only works if there are idle cycles in the executed program. With 25ns SRAM the speed limit is at 20..21MHz.

**HALT mode** enables dualport access by forcing the HALT-pin. This mode is required if none of the other modes will work. It has no speedlimit but there might be malfunction if the program is using RESET instructions.

## HLL Debugging



## Multitask Debugging

To keep the user application running (Interrupts etc.), while emulation using single steps or watching variables, parts of the user program can still be active.

- One foreground task
- One background task

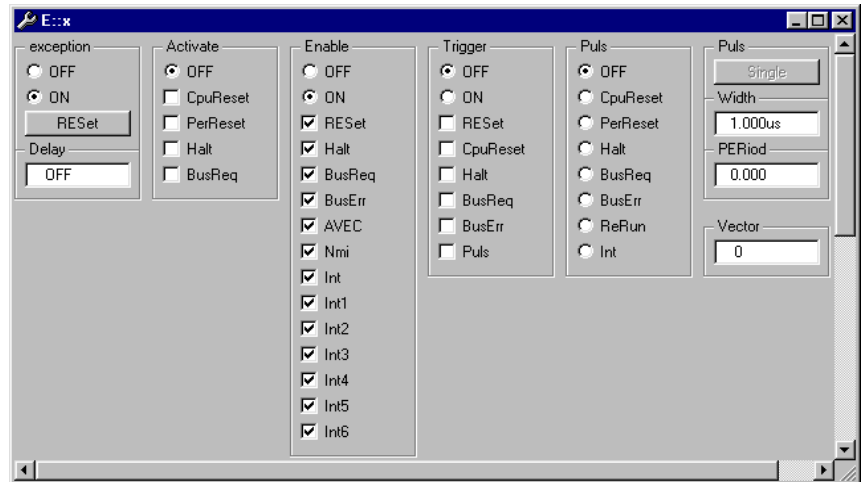
## Target Clock and Voltage Monitoring

This feature prevents failures caused by missing clock or undervoltage.

## Wait System

- Additional wait cycles (1-15) may be specified
- Up to 250 wait cycles (4K blocks global and bitwise)

## Exception Control



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

- Static exception setting
  - CPURESET
  - PERRESET
  - HALT
  - BUSREQ

- Exception Trigger
  - RESET
  - CPURESET
  - HALT
  - BUSREQ
  - BUSERR
  - Simulated Exception

- Exception Control
  - RESET
  - HALT
  - BUSERR
  - AVEC
  - INT1 .. INT6
  - NMI

## Port Analyzer

On the emulation base there is an extra slot for the TRACE32 Port Analyzer. Depending on CPU type various

signals can be traced. Some probes have connectors to trace external target lines.

## On-Circuit Emulation

- Support for Clip-Over adapters

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## Modules Overview

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## Debug Interfaces

### Compiler

CPU	Language	Compiler	Company	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 Semiconductors	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 Electronic Services GmbH	BOUND
68K	C	C68K	Cosmic Software	COSMIC
68K	C	GNU-C	Free Software Foundation, Inc.	ELF/DWARF
68K	C	GNU-C	Free Software Foundation, Inc.	COFF
68K	C	GNU-C	Free Software Foundation, Inc.	ELF/DWARF
68K	C	GREEN-HILLS-C	Greenhills Software Inc.	COFF

CPU	Language	Compiler	Company	Option
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
68K	C++	ORGANON-C++	CAD-UL Electronics Service GmbH	BOUND



CPU	Language	Compiler	Company	Option
68K	C++	GNU-C++	Free Software Foundation, Inc.	DBX
68K	C++	GNU-C++	Free Software Foundation, Inc.	ELF/DWARF
68K	C++	CCC68K	Mentor Graphics Corporation	IEEE
68K	C++	HICROSS-68K	NXP Semiconductors	HICROSS
68K	C++	CODEWARRIOR	NXP Semiconductors	ELF/DWARF
68K	C++	CROSSCODE-C++	SDSI	SDS
68K	C++	D-C++	Wind River Systems	ELF/DWARF
68K	MODULA	MOD68K	Introl Corporation	ICOFF
68K	MODULA	MCS2	Multichannelsystems GmbH	COFF
68K	MODULA	MCDS	NXP Semiconductors	MCDS
68K	PASCAL	MPC	Mentor Graphics Corporation	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

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## Operation Frequency

The maximum operation frequency of TRACE32-ICE68300 depends on:

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

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## Denied, Request and Halt Access

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**Gap Access**

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## Dimensions

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### 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 Technologie, YAMAICHI, AMP etc.

The following table lists the physical dimensions of these half size connectors.  
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### Adapter

Not necessary.

## Available Tool Chain

TRACE32 provides a complete set of development tools for the 16x 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
- Evaluation boards, which can be used until the target hardware is available.

The following list give an overview which development tools are available for the specific derivatives of the 16x-family.  
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## Order Information

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### Module Description

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### Detailed Order Information

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