



ERCOSEK^{EK}

RTOS Debugger for ETAS ERCOSEK

PowerPC 555

- Real time, non-intrusive display of OSEK system resources
- OSEK specific display of analyzer listing
- Statistic evaluation and graphic display of task run times
- Statistic evaluation and graphic display of service run times
- Task related evaluation of function run times
- Task stack coverage
- PRACTICE functions for OS data
- OSEK related pull-down menu

The TRACE32 System includes a multitask debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the OSEK/VDX conform Real Time Kernel ERCOSEK from ETAS.

Based on the ORTI (OSEK Runtime Interface), all informations of the OSEK RTOS and its configuration can be explored. This leaflet will guide you through the additional implemented features in TRACE32, to do an effective debugging on OSEK systems.

Multitask Debugging on TRACE32 with ERCOS^{EK}

Real time, non-intrusive display of ERCOS^{EK} system resources

The TRACE32 multitask debugger for OSEK provides special display functions. The system resources such as task list, app modes, counters, alarms, stacks and resources can be displayed. In addition, by using the emulators

dual-port memory, the display of all these regions can be viewed non-intrusively in real time. The tables are updated permanently (“On The Fly”), without affecting the application at all.

The screenshot displays four overlapping windows from the TRACE32 multitask debugger:

- B::TASK.DTASK**: A table listing tasks with columns for task name, id, priority, max activations, activations, and task state.
- B::TASK.DRESOURCE**: A table listing resources with columns for resource name, id, ceiling, and priority.
- B::TASK.DAPPMODE**: A table listing application modes with columns for appmode, inittask, for appmode, timetable, and for appmode.
- B::TASK.DALARM**: A table listing alarms with columns for alarm name, id, notified task, callback function, and period.

Task list window, resource window, appmode window and alarm window

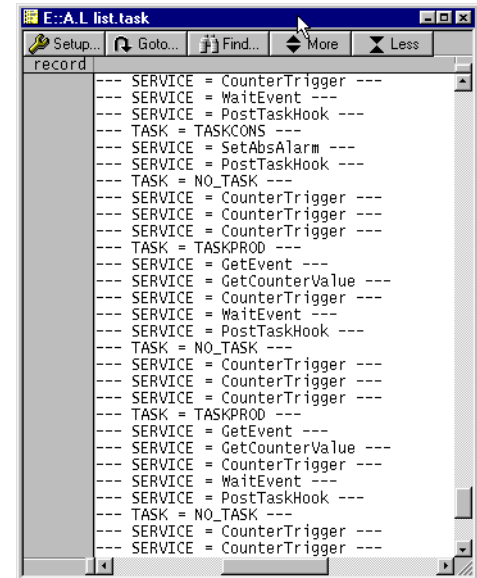
The screenshot displays the **B::TASK.DOS** configuration window, which shows the configuration of the OSEK operating system. It includes columns for OS, running task, identification, OS process, watch, application mode, next timetable, and task.

OS	running task	identification	OS process	watch	application mode	next timetable	task
Ercosek	idleMode_bg		0x0000457C		idleMode	0x48000002	

Configuration of OSEK operating system window

ERCOS^{EK} specific display of analyzer listing

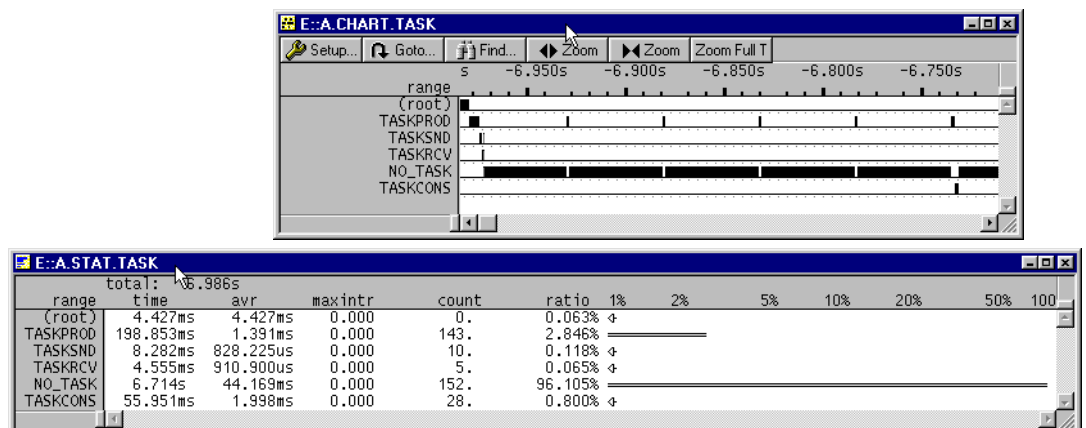
The data recorded in the analyzer can be displayed and interpreted specific to the operating system. Task switches and service calls are displayed symbolically.



Analyzer listing, display of task switches and service calls

Statistic evaluation and graphic display of task run times

The analyzer can calculate statistic tables of task run times and task switches. A graphical diagram shows which task was active at a specific time, giving a clear view of the behaviour of the system.



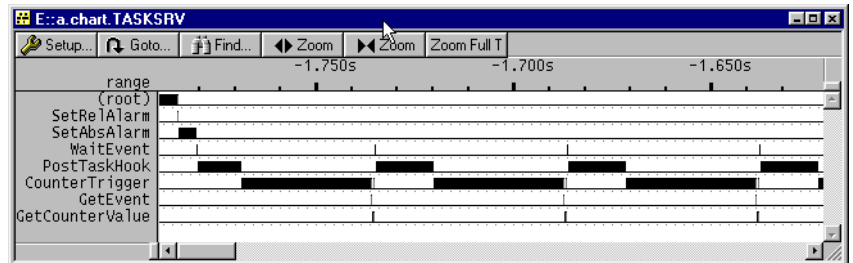
Statistics and flow of tasks

Statistic evaluation and graphic display of service run times

The statistic and graphic evaluation of service calls and service run times can be done. This is necessary, if one ser-

vice need much time and is called very often the performance of the operating system goes down..

range	time	avr	maxintr	count	ratio	1%	2%	5%	10%	20%	50%
(root)	4.700ms	4.700ms	0.000	0.	0.262%						
SetRelAlarm	179.500us	179.500us	0.000	1.	0.010%						
SetAbsAlarm	5.901ms	737.685us	0.000	8.	0.329%						
WaitEvent	11.318ms	305.905us	0.000	37.	0.632%						
PostTaskHook	547.444ms	12.165ms	0.000	45.	30.579%						
CounterTrigger	1.200s	16.215ms	0.000	74.	67.026%						
GetEvent	6.538ms	181.613us	0.000	36.	0.365%						
GetCounterValue	14.229ms	395.256us	0.000	36.	0.794%						



Statistics and flow of services

Task related evaluation of function run times

The statistic and graphic evaluation of function calls and function run times can be done dependant to the actual running task. This is necessary, if dif-

ferent tasks call one single function at the same time, or if a task switch occurs in between the function.

range	total:	tree	max	avr	ratio
\OSSetInterruptMask+0x0C@TASKCONS	260.000us	260.000us	0.000%		
\OSSetInterruptMask+0x0C@TASKCONS	240.250us	240.250us	0.004%		
\OSSetInterruptMask+0x0C@TASKCONS	120.745us	120.745us	0.001%		
\OSSetInterruptMask+0x0C@TASKCONS	93.495us	93.495us	0.003%		
pLe\sample\PreTaskHook@TASKCONS	0.000	0.000	0.000%		
(root)@TASKPROD	85.344ms	85.344ms	0.690%		
smmsg\OSSendMessage+0x13F@TASKPROD	68.797ms	68.797ms	0.610%		
\OSSetInterruptMask+0x0C@TASKPROD	54.164ms	54.164ms	0.012%		
msg\OSSignalMessage+0x47@TASKPROD	53.860ms	53.860ms	0.013%		
_ChangeTaskStateVoid+0xB5@TASKPROD	53.578ms	53.578ms	0.013%		
\OSSetInterruptMask+0x0C@TASKPROD	53.252ms	53.252ms	0.001%		
e\osmsg\OSMsgInLock+0x12@TASKPROD	53.226ms	53.226ms	0.006%		
le\sample\PostTaskHook@TASKPROD	0.000	0.000	0.000%		
stsk\OSortRunningTaskId@TASKPROD	52.833ms	26.540ms	0.012%		
\OSSetInterruptMask+0x0C@TASKPROD	52.790ms	52.790ms	0.001%		
\OSSetInterruptMask+0x0C@TASKPROD	52.746ms	52.746ms	0.003%		
\OSSetInterruptMask+0x0C@TASKPROD	52.651ms	52.651ms	0.002%		
\OSSetInterruptMask+0x0C@TASKPROD	52.588ms	52.588ms	0.000%		

Statistics on function hierarchy, task related

record	func	ti	fore	address	cycle	d.1
-011550		1.000us		P:009BEC	rd-word	d.1
-011549		43.500us		P:009BEE	rd-word	d.1
-011548		1.000us		P:009504	rd-word	
-011547		1.000us		P:009506	rd-word	
-011546	OSSetInterruptMask+0	0.250us		P:009508	rd-word	
-011545		0.250us		D:0009EF	rd-word	d.1
-011544		40.500us		AD:00269C	rd-byte	
-011543		1.000us		P:009504	rd-word	
-011542		1.000us		P:009506	rd-word	
-011541	OSSetInterruptMask+0x	0.250us		P:009508	rd-word	
-011540		0.250us		D:0009EF	rd-word	d.1
-011539		64.000us		AD:00269C	rd-byte	
-011538		1.000us		P:00801A	rd-word	d.1
-011537		1.000us		P:00801C	rd-word	
-011536		0.250us		P:00801E	rd-word	d.1
-011535	[PostTaskHook	0.250us		D:0009E6	wr-word	
-011534		22.500us		D:0009E6	rd-word	
--- TASK = TASKRCV ---						
-011533		10.250us		D:000AAC	wr-byte	
-011532		1.000us		P:008018	rd-word	
-011531		1.000us		P:00801A	rd-word	d.1
-011530		0.250us		P:00801C	rd-word	
-011529		0.250us		D:0009E6	wr-word	d.1
-011528	[PreTaskHook	0.250us		D:0009E6	rd-word	d.1

Analyzer listing, function call hierarchy and task switches

Task Stack Coverage

In real time systems it is quite important to know, how much stack space each task consumes. For this purpose

a special window shows the current and the maximum usage of each separate task.

name	low	high	sp	%	low	spare	max	0	10	20	30	40	50	60	70	80	90	100
MAIN_STACK	00000800	0000083F			00000800	00000000	100%											
SCHEDULER_STACK	00000A03	00000A33	00000A33	0%	00000A27	00000024	25%											
ISR_STACK	00000913	00000943			00000930	0000001D	39%											
NODE_STACK_0	00000943	00000973				00000030	0%											
NODE_STACK_1	00000973	000009A3			0000098F	0000001C	41%											
NODE_STACK_2	000009A3	000009D3				00000030	0%											
NODE_STACK_3	000009D3	00000A03				00000013	60%											
Poo11_STACK_0	000008A5	000008D5			000008E6	00000015	56%											
Poo11_STACK_1	000008D7	00000907			000008F1	0000001A	45%											

Task stack coverage window

PRACTICE functions for OS data

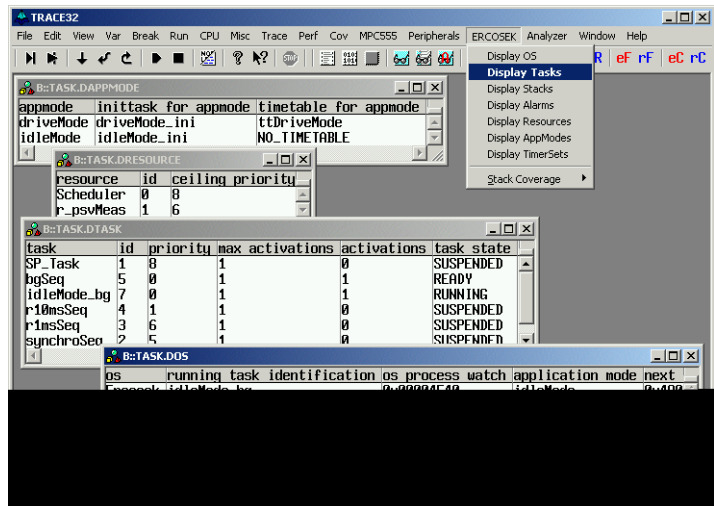
The support includes extended PRACTICE functions for process specific data. E.g. the function "TASK.CONFIG(magic)" returns the address of the

so called magic value, which corresponds to the address of the current running task.

ERCOS^{EK} related pull-down menu

Because the menu bar of the TRACE32 user interface can be fully customized, you can create a new pull down menu, including operating sys-

tem specific commands. We deliver OSEK support with an example for such specific menus, which provides fast access to the OSEK features.



TRACE32 with OSEK menu

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