

*embOS*

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## RTOS Debugger for embOS

**ARM  
XSCALE**

- Real Time, Non-Intrusive Display of embOS System Resources
- embOS specific Display of Trace Listing
- Statistic Evaluation and Graphic Display of Task Run Times
- Task related Evaluation of Function Run Times
- Statistic Evaluation and Graphic Display of Task States
- Task Stack Coverage
- Task Context Display
- PRACTICE Functions for OS Data
- embOS related Pull-DownMenu

The TRACE32 System includes a configurable multitask debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the embOS Real Time Kernel from Segger Microcontroller Systeme GmbH.

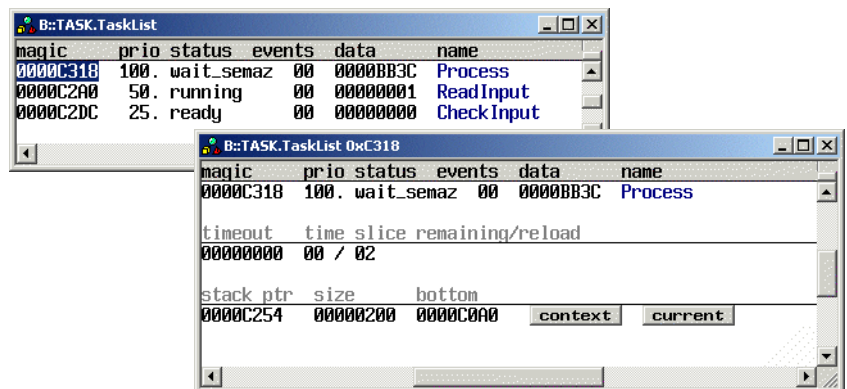
In close cooperation with Segger, we built a special multitask support for embOS on ARM processors. This leaflet will guide you through the additional implemented features in TRACE32, to do an effective debugging on embOS systems.

## RTOS Awareness on TRACE32 with embOS

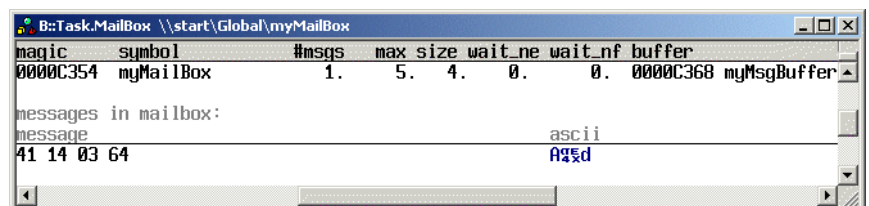
### Real Time, Non-Intrusive Display of embOS System Resources

The TRACE32 RTOS debugger for embOS provides display functions to show the system resources of embOS. All objects, such as tasks, timers, mailboxes and both types of semaphores can be displayed and inspected. In addition, by using the processors capability of reading the target memory

while the application is running, or by using the emulators dual-port memory (if available), 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.



Task list window and detailed view of one task



Mailbox display window

### Task Related Breakpoints

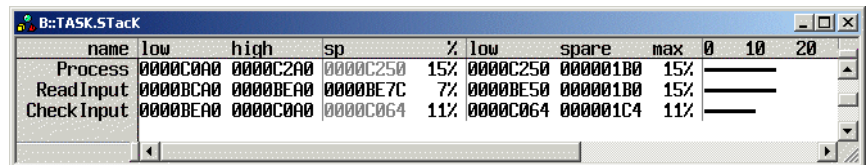
Any breakpoint set in the TRACE32 debugger can be set dependent to a specific task. This means, that the

breakpoint will then only halt, if hit by the specified task. This allows task related debugging even in shared code.

## 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
Process	0000C0A0	0000C2A0	0000C250	15%	0000C250	000001B0	15%			
ReadInput	0000BCA0	0000BEA0	0000BE7C	7%	0000BE50	000001B0	15%			
CheckInput	0000BEA0	0000C0A0	0000C064	11%	0000C064	000001C4	11%			

Task stack coverage window

## Task Context Display

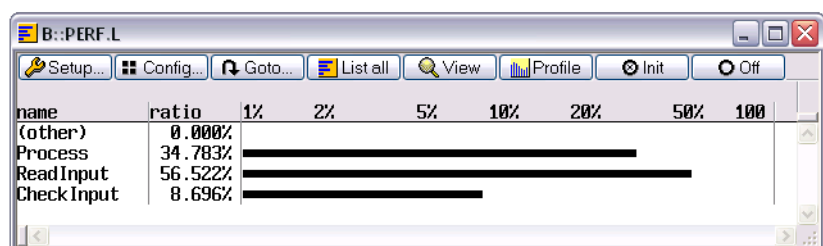
The TRACE32 RTOS Debugger provides an easy way to switch the current displayed context to another task. Usually all register related windows (e.g. listing at current PC, local variables or

function call stack) are displayed to the actual context (i.e. current executed task). You can switch to the context of another task, to see all this information at the time this task was scheduled.

## Dynamic Task Performance Measurement

While embOS is running, TRACE32 is capable of recurrently evaluating the current running task and collecting the results. The percentage, each task consumes of the system, is then dis-

played graphically and updated permanently. The longer time you let the measurement run, the more exact are the results. This feature is available even without any hardware trace.



name	ratio	1%	2%	5%	10%	20%	50%	100
(other)	0.000%							
Process	34.783%							
ReadInput	56.522%							
CheckInput	8.696%							

Performance measurement list

## PRACTICE Functions for OS Data.

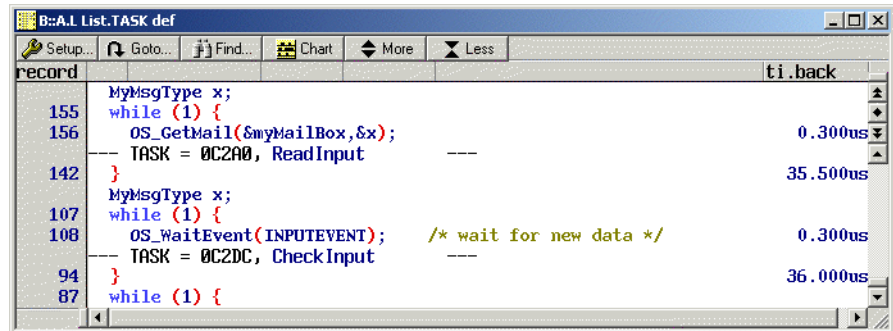
The support includes extended PRACTICE functions for embOS specific data, to be used in setup and test scripts. E.g. the function "task.con-

fig(magic)" returns the address of the so called magic value, which corresponds to the id of the current executing task.

## embOS specific Display of Trace Listing

The data recorded in the real time trace buffer (if available) can be displayed and interpreted specific to the operat-

ing system. The task switches are displayed symbolically, either exclusively or in addition to other information.



```

B::A.L List.TASK def
record
MyMsgType x;
155 while (1) {
156   OS_GetMail(&myMailBox,&x);           0.300us
      TASK = 0C2A0, ReadInput          ---
142 }                                     35.500us
MyMsgType x;
107 while (1) {
108   OS_WaitEvent(INPUTEVENT);          /* wait for new data */
      TASK = 0C2DC, CheckInput        ---
94  }                                     36.000us
87  while (1) {

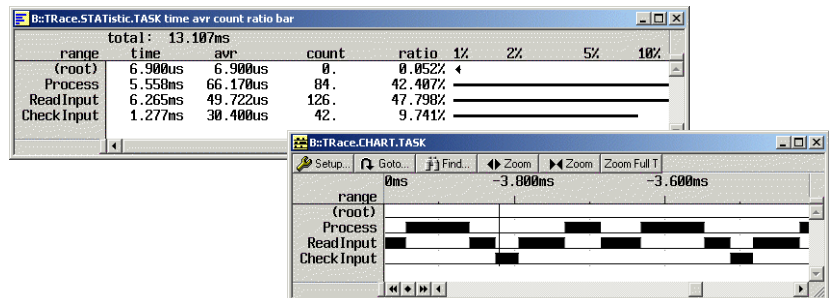
```

Analyzer listing, displaying recorded source, task switches and time span

## Statistic evaluation and graphic display of task run times

Out of the real time trace buffer (if available), 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

## Task related evaluation of function run times

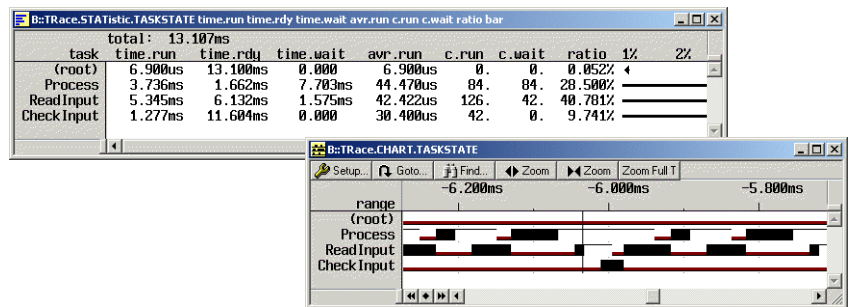
The statistic and graphic evaluation of function calls and function run times (if available) can be done dependant to the actual running task. This is neces-

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

## Statistic evaluation and graphic display of task states

If covered by the real time trace, these tabular and graphical analyses of the status of tasks show the various states (i.e. running, ready, waiting, suspended

and undefined) and times each task spent in each state. A graphical view of the data can help to highlight prioritisation problems, critical paths etc.

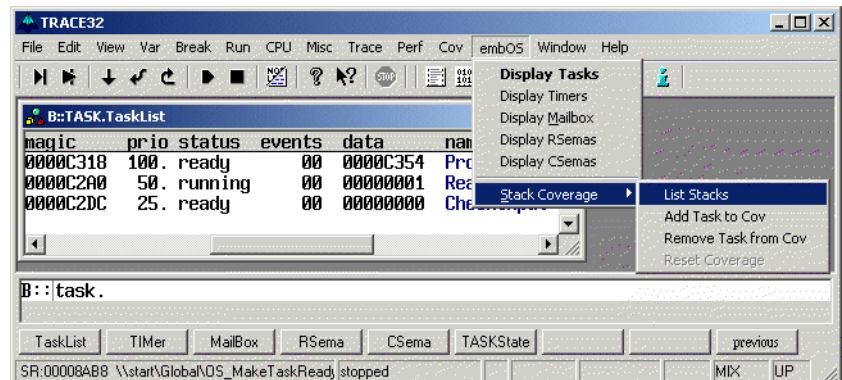


Statistics and flow of task states

## embOS 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 embOS support with an example for such specific menus, which provides fast access to the embOS features.



TRACE32 with embOS menu

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The information presented is intended to give overview information only. Changes and technical enhancements or modifications can be made without notice.

