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## RTOS Debugger for MTOS-UX

- Terminal Emulation for System Console and MTOS-UX Dynamic Debugger
- Real time, non-intrusive display of MTOS-UX system resources
- MTOS-UX specific display of analyzer 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
- PRACTICE functions for OS data
- MTOS-UX related pull-down menu

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 MTOS-UX Real Time Kernel from Industrial Programming Inc.

In close cooperation with IPI we built a special multitask support for MTOS-UX on Motorola 68k processors. This leaflet will guide you through the additional implemented features in TRACE32, to do an effective debugging on MTOS-UX systems.

RTOS-MTOS-UX is a trademark of Industrial Programming, Inc.

## Multitask Debugging on TRACE32 with MTOS-UX

### Terminal Emulation Window for System Console

MTOS-UX provides a system console together with a kernel debugger called Dynamic Debugger, which runs on the target. TRACE32 provides an interface to this system console (SYSC). I.e. you can control the target and view its outputs inside the TRACE32 surface. The communication is set up via the emula-

tor's dual port memory, substituting the serial interface routines of MTOS-UX. This technique provides high speed, transparent communication with the target without the use of any serial hardware or other target resources.

```

*** MTOS-UX Diagnostic Program #1 Vsn 130494 ***

IGNORE ERRORS due to the lack of a timer interrupt

Test:
  (M) Mailboxes           (B) Benchmarks          (G) Signals
  (T) Task Management     (W) Formatted Write    (P) Pause
  (O) Common Memory Pools (I) Physical I/O      (C) Clock/Calendar
  (S) Semaphores         (E) Event Flags       (F) Fixed Block Pools
  (U) Round Robin Tasking (V) Controlled Shared Variables
  (X) Exit

MTOS-UX/68K Dynamic Debugger, v3.1, 22Jun93      addr/pid/value/lines in HEX
DD>dt
Key Pr Entry pt Addr id Addr ud Btm stk Stk ptr Pgm ctr Status
INIT g1 419186 0 0 439200 43A134 41FB82 ready
.SYE g1 416EA0 0 0 438F00 0 416EA0 dormant
.SVD g1 4150B6 0 0 438A00 438C30 41FC42 running
DD>

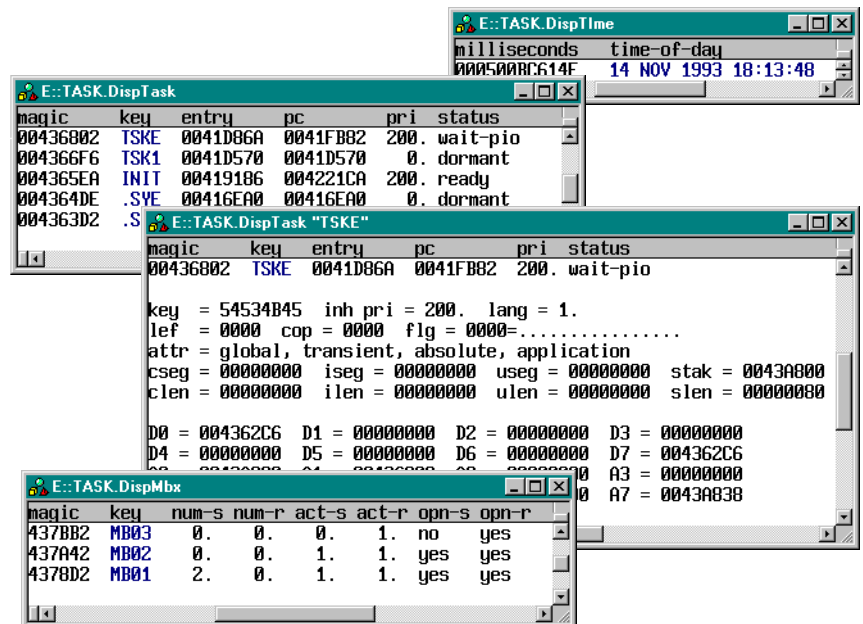
```

Terminal window to the MTOS-UX System Console

### Real time, non-intrusive display of MTOS-UX system resources

The TRACE32 multitask debugger for MTOS-UX provides display functions, closely mirroring the command set of the Dynamic Debugger. The system resources tasks, time, events, common pools, fixed pools, message buffers, mailboxes, semaphores, shared variables and peripheral I/O Units can be displayed. In addition, by using the

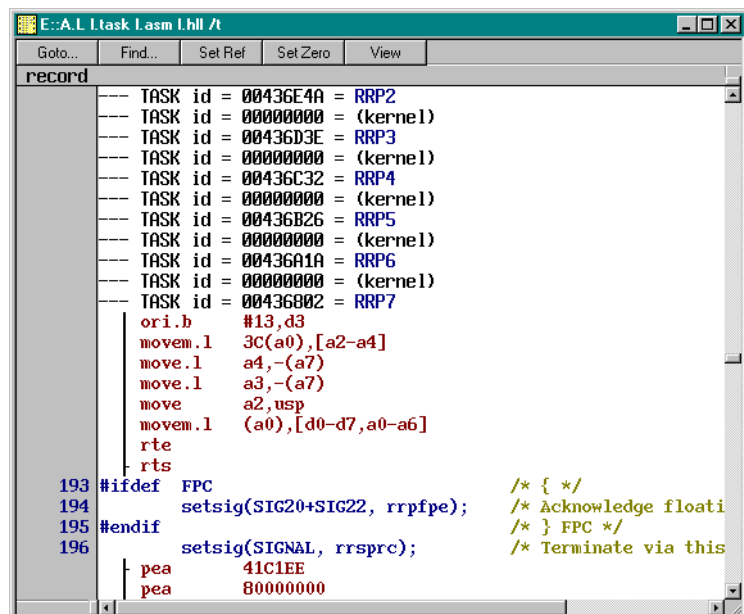
emulators dual-port memory, the display of all these regions can be viewed non-intrusively in real time. The tables are updated permanently ("On The Fly"), without affecting the application at all. Moreover, these functions are still available, when the dynamic debugger is not linked to your software.



Time display, task list window, detailed view of one task and mailbox list window

## MTOS-UX specific display of analyzer listing

The data recorded in the analyzer can be displayed and interpreted specific to the operating system. The task switches can be displayed symbolically.

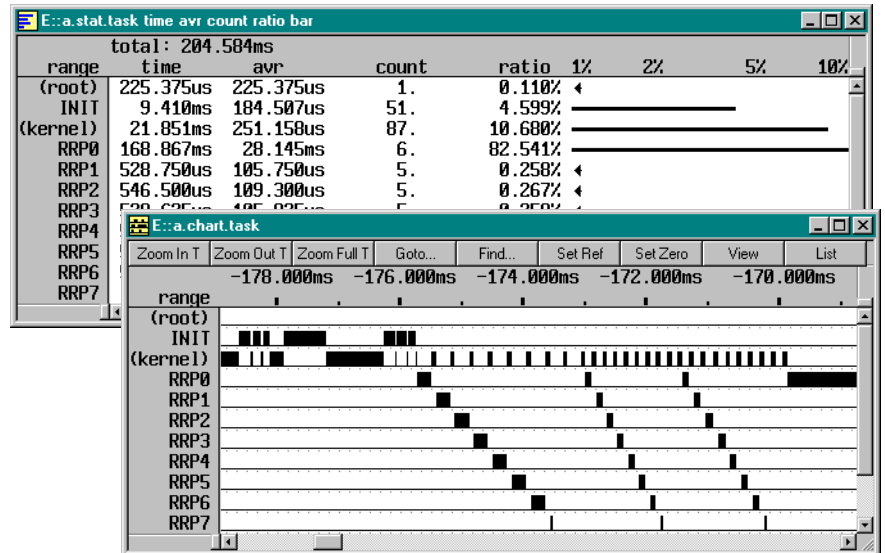


Analyzer listing, task selective recording, display of task switches, assembler mnemonics and C source

## 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.

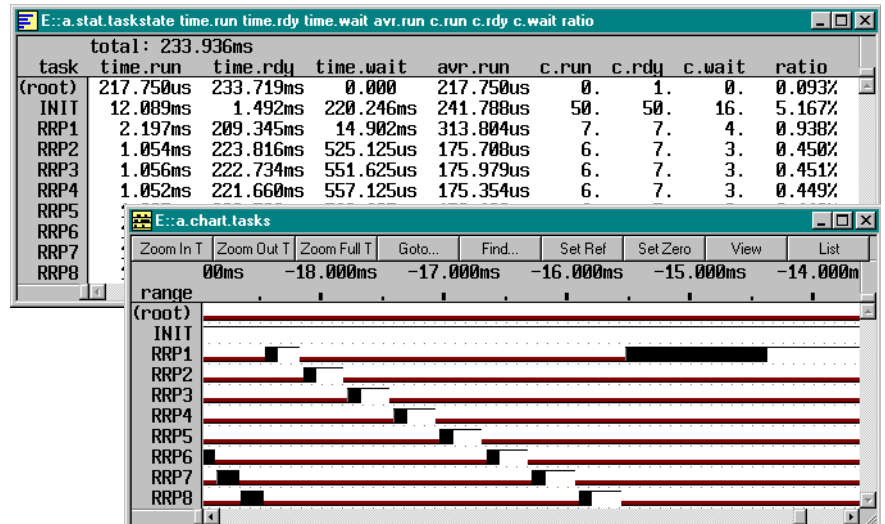


Statistics and flow of tasks

## Statistic evaluation and graphic display of task states

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.

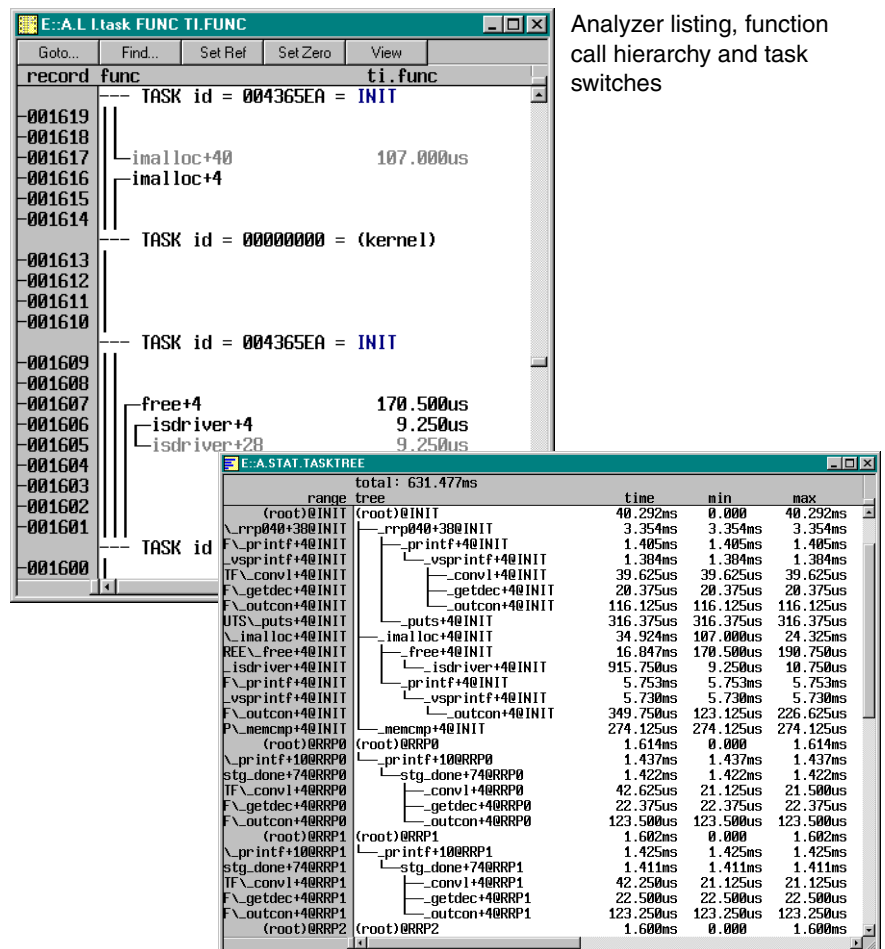


Statistics and flow of task states

## 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.



Analyzer listing, function call hierarchy and task switches

Statistics on function hierarchy, task related

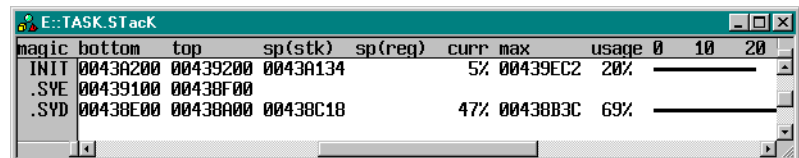
## PRACTICE functions for OS data.

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.

## 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.



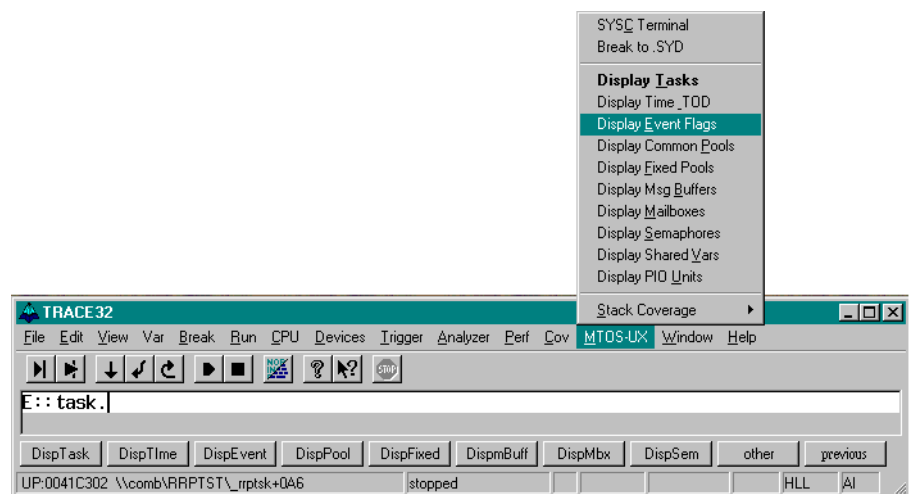
magic	bottom	top	sp(stk)	sp(reg)	curr	max	usage	0	10	20
INIT	0043A200	00439200	0043A134		5%	00439EC2	20%	[Progress bar]		
.SYE	00439100	00438F00						[Progress bar]		
.SYD	00438E00	00438A00	00438C18		47%	00438B3C	69%	[Progress bar]		

Task stack coverage window

## MTOS-UX 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 system specific commands. We deliver

MTOS-UX support with an example for such specific menus, which provides fast access to the MTOS-UX features.



TRACE32 with MTOS-UX menu

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