



RTOS Debugger for CMX

68K

8051

ARM

C166/167

H83H

H8S

POWERPC

SH

Z80/180

- Improved support for the CMX debugger CMXBug
- Real time, non-intrusive display of CMX system resources
- CMX 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
- CMX 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 CMX Real Time Kernel from CMX Company.

In close cooperation with CMX Company we built a special multitask support for CMX on Infineon C166/167 controllers, 8051 Derivates, Renesas controllers and Z80 based microcontrollers. This leaflet will guide you through the additional implemented features in TRACE32, to do an effective debugging on CMX systems.

Multitask Debugging on TRACE32 with CMX-RTX

Improved support for the CMX Debugger CMXBug

CMX provides a kernel debugger called CMXBug, which runs on the target. TRACE32 provides an interface to this debugger. I.e. you can control the debugger and view its outputs inside the TRACE32 surface. The communication is set up via the emulator's dual

port memory, substituting the serial interface routines of CMXBug. This technique provides high speed, transparent communication with the target without the use of any serial hardware or other target resources.

```

E::TERM T32OUT T32IN
Your choice? 99

You have exited CMXBug(TM), press <+> (plus key) to enter CMXBug again!

Enter 1 TASKS
Enter 2 RESOURCES
Enter 3 CYCLIC_TIMERS
Enter 4 QUEUES
Enter 5 MAILBOXES
Enter 6 RAM display
Enter 7 STACK information
Enter 8 SYSTEM TICK SCALE
Enter 9 TIME SLICE SCALE
Enter 10 TIME SLICING select
Enter 11 GO and RESUME CMXBug
Enter 12 Quick GO and RESUME CMXBug
Enter 13 TIME ANALYSIS
Enter 14 TIME ANALYSIS reset
Enter 15 ADDITIONAL TASK functions
Enter 99 EXIT CMXBug
Enter P/p to toggle ECHO mode, currently ON
Your choice? 1

TASK dump, enter number, '*' for all, <return> to exit. Choice? █

```

Terminal window to the CMX debugger CMXBug

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.

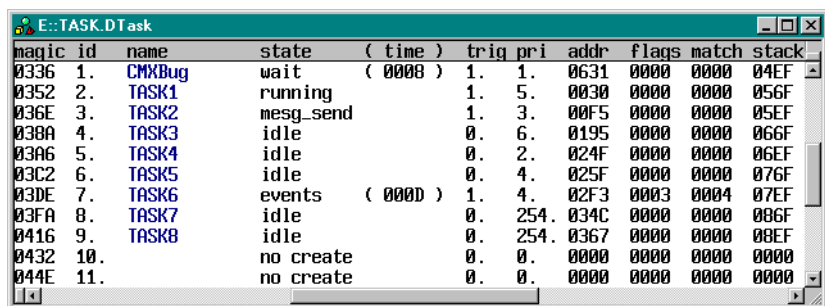
magic	botton	top	sp(stk)	sp(reg)	curr	max	usage	0	10	20
CMXBug	000004EF	000003C8	00000471		42%	000003E2	91%			
TASK4	000006EF	000005C8	00000671		42%					
TASK6	000007EF	000006C8	00000771		42%	00000771	42%			
(other)			00000028							

Task stack coverage window

Real time, non-intrusive display of CMX system resources

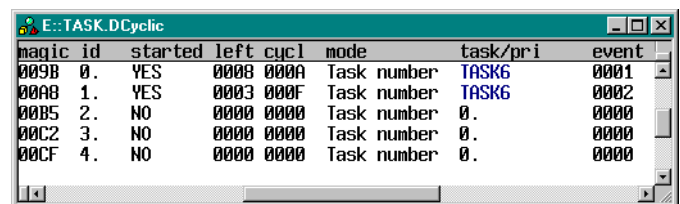
The TRACE32 multitask debugger for CMX provides display functions, closely mirroring the command set of CMXBug. The system resources tasks, resources, cyclic timers, queues and mailboxes can be displayed. In addition, by using the emulators dual-port memory, the display of all these

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 CMXBug is not linked to your software.



magic id	name	state	(time)	trig	pri	addr	flags	match	stack
0336	1. CMXBug	wait	(0008)	1.	1.	0631	0000	0000	04EF
0352	2. TASK1	running		1.	5.	0030	0000	0000	056F
036E	3. TASK2	mesg_send		1.	3.	00F5	0000	0000	05EF
038A	4. TASK3	idle		0.	6.	0195	0000	0000	066F
03A6	5. TASK4	idle		0.	2.	024F	0000	0000	06EF
03C2	6. TASK5	idle		0.	4.	025F	0000	0000	076F
03DE	7. TASK6	events	(000D)	1.	4.	02F3	0003	0004	07EF
03FA	8. TASK7	idle		0.	254.	034C	0000	0000	086F
0416	9. TASK8	idle		0.	254.	0367	0000	0000	08EF
0432	10.	no create		0.	0.	0000	0000	0000	0000
044E	11.	no create		0.	0.	0000	0000	0000	0000

Task list window



magic id	started	left	cycl	mode	task/pri	event
009B	0. YES	0008	000A	Task number	TASK6	0001
00A8	1. YES	0003	000F	Task number	TASK6	0002
00B5	2. NO	0000	0000	Task number	0.	0000
00C2	3. NO	0000	0000	Task number	0.	0000
00CF	4. NO	0000	0000	Task number	0.	0000

Cyclic Timers 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.

CMX 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.

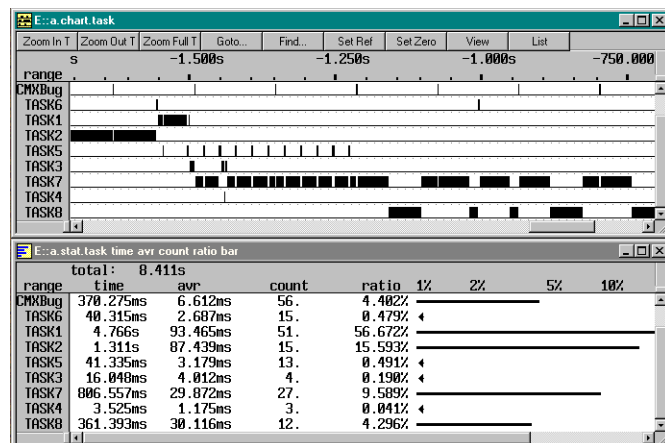
record	run	address	cycle	.b	ti.	fore	symbol
TASK = 0336 CMXBug							
+000002	f	r	X:0002B3	wr-ext	03	10.500us	\\bugsamp\BUG_INIT\activetcb
+000003	f	r	X:0002B4	wr-ext	36	2.197ms	\\bugsamp\BUG_INIT\activetcb+1
TASK = 03DE TASK6							
+000004	f	r	X:0002B3	wr-ext	03	10.500us	\\bugsamp\BUG_INIT\activetcb
+000005	f	r	X:0002B4	wr-ext	DE	0.900us	\\bugsamp\BUG_INIT\activetcb+1
+000006	f		P:004305	opfeth	D0	1.500us	
+000007	f		P:004306	rd-byte	83	1.500us	
pop dph							
+000008	f		P:004307	opfeth	D0	1.500us	
+000009	f		P:004308	rd-byte	82	1.500us	
pop dpl							
+000010	f		P:004309	opfeth	C0	0.750us	
+000011	f		P:00430A	rd-byte	82	2.250us	
push dpl							
+000012	f		P:00430B	opfeth	C0	0.750us	
+000013	f		P:00430C	rd-byte	83	2.250us	
push dph							

Analyzer listing, task selective recording, display of task switches, assembler mnemonics and cpu access cycles

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.

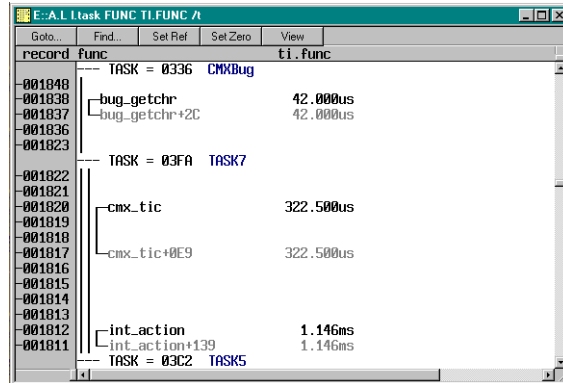


Statistics and flow of tasks

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

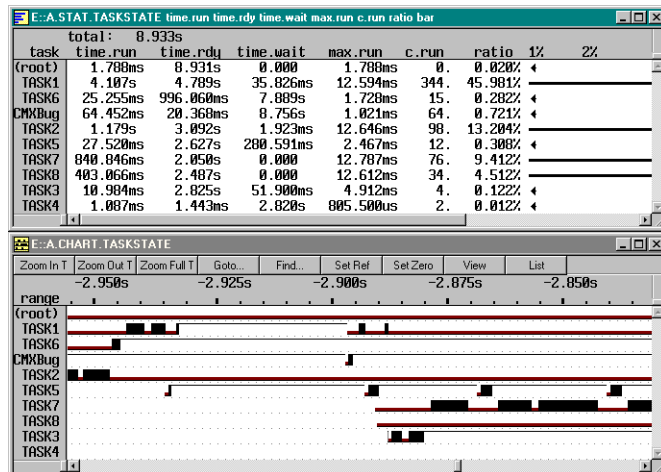
range	tree	time	avr	count	ratio	1%
(root)@TASK4	(root)@TASK4	3.525ms	3.525ms	1.(-2)	0.002%	▲
_task4@TASK4	└─_task4@TASK4	3.390ms	3.390ms	1.(-1)	0.047%	▲
cmx_tic@TASK4	└─└─cmx_tic@TASK4	200.500ms	200.500us	1.	0.003%	▲
(root)@TASK5	(root)@TASK5	41.335ms	41.335ms	1.(-2)	0.001%	▲
_task5@TASK5	└─_task5@TASK5	41.222ms	41.222ms	1.(-1)	0.613%	▲
(root)@TASK6	(root)@TASK6	249.543ms	249.543ms	1.(-2)	3.662%	▲
cmx_tic@TASK6	└─cmx_tic@TASK6	3.645ms	214.411us	17.	0.054%	▲
(root)@TASK7	(root)@TASK7	873.304ms	873.304ms	1.(-2)	0.002%	▲
_task7@TASK7	└─_task7@TASK7	873.167ms	873.167ms	1.(-1)	12.507%	▲
_action@TASK7	└─└─int_action@TASK7	11.460ms	1.146ms	10.	0.170%	▲
cmx_tic@TASK7	└─└─cmx_tic@TASK7	21.904ms	323.294us	68.	0.327%	▲
(root)@TASK8	(root)@TASK8	485.166ms	485.166ms	1.(-2)	0.002%	▲
_task8@TASK8	└─_task8@TASK8	485.031ms	485.031ms	1.(-1)	7.058%	▲
cmx_tic@TASK8	└─└─cmx_tic@TASK8	11.107ms	317.357us	35.	0.165%	▲

Statistics on function hierarchy, task related

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.

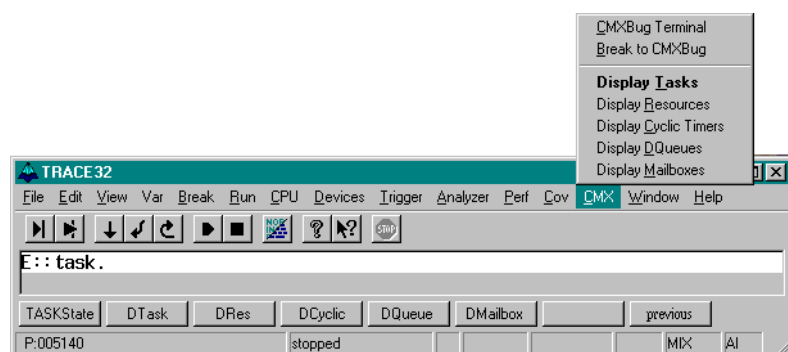


Statistics and flow of task states

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



TRACE32 with CMX 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.