SCRAMmer

COLLABORATORS			
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ACTION	*NAME*	*DATE*	*SIGNATURE*
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Contents

Chapter 1

SCRAMmer

1.1 SCRAMmer 37.3b Guide 1.1 - Semptember, 16th 1992

1.2 Disclaimer

Disclaimer

The author has no responsibilities for incidents or damages that may result from the correct or incorrect use of this program. If you use it you are on your own risk.

Particular attention has anyway been used during the developing process. The program has also passed perfectly the testing with

Enforcer
and

MungWall
.

This application has been tested on an Amiga 3000, 25 MHz, 136 MB HD, 2+4 MB RAM, with a Janus XT Bridgeboard, under AmigaOS 2.04 and 2.1. It has been designed to work on higher ended Amigas too.

1.3 Beware !

Beware !

This program performs some hardware related operations which may affect the safety of your data and the integrity of your system. When you are about to click over a Gadget, think again, especially if you are not a pretty much experienced user.

Here are some hints:

1. Avoid floppy and hard disk activity while you are using SCRAMmer until you have got a good experience. You are advised.

2. The modification of system parameters allowed by SCRAmer is not well accepted by Commodore. I made this program to have an investigation tool by which I could examine my system and by which I could change parameters to get speed gains. I had NO problems with my A3000. Remember anyway that if Commodore says "Don't do it" there is a valid reason. You are advised. (Look in TheGadgets/Ramsey & Gary)

3. SCRAM operations like Test SCRAM, and Page Detect, will probably hang the system if used with non Static Column RAM ZIPs, or with slow RAMs on A3000s. You'll have to reboot. You are advised.

4. RAM checking is very critical and may cause a lot of trouble to time-critical activities.

5. Turning off Write Allocate will cause trouble.

6. Since there is no way (I suppose) to know if BERR or DSACK is the default timeout, SCRAMmer will set BERR on startup.

7. Read instructions carefully.

1.4 Notes

Notes

1. Owing to its particular functions this program requires for its complete functionality an A3000 (or more) with its 68030 (or more) CPU and its custom chips. Static Column ZIPs are recom-

mended but not needed.

2. The manipulation of special system parameters should be done through the operating system. I've done it when possible.

3. Source code has not been included to avoid too many people know this tricks and make software that changes special modes and so affects future compatibility and system reliability.

4. You may wander why there are a lot of operations very dangerous in this application. This happens because many features are not correctly supported now but I always hope on future better Amigas. For example I think that the owner of a 68040 with CopyBack enabled may safely turn off Write Allocation. Other tools are useful for testing and investigation purposes.

5. Please send me your full configuration and RAM speeds.

1.5 Copyright

Copyright

 Giuliano C. Peritore
Via Amaseno, 6
04100 Latina - ITALY
Phone: (+39) 773 491692
E-Mail: mc6040@mclink.it

Donations of software, hardware, money, postcards, ecc. are very welcomed togheter with comments, suggestions, bug reports, infos, and ideas of new features. Big donations will provide you newer versions of SCRAMmer.

1.6 Developers

Developers

If you are not an Italian, nor an English or American user, it

is a *VERY* good idea to take the file SCRAMmer, translate all the strings contained therein and send me the translated file. This will provide users much more localization.

1.7 Trademarks

Trademarks

Amiga is a registered trademark of Commodore-Amiga, Inc.
Amiga 3000 is a trademark of Commodore-Amiga, Inc.
A3000 is a trademark of Commodore-Amiga, Inc.
Workbench is a trademark of Commodore-Amiga, Inc.

1.8 Introduction

Introduction

The idea of writing SCRAMmer prompted suddendly while I was following a debate on A3000 RAM chips on
MCLink
. I want to thank
Paolo Baliano, Stefano Iacus, Massimiliano Marras, Baldassarre Profeta and Andrea Suatoni for allowing this debate.

Since there are a lot of tricks to get more performance from an Amiga and that there are a lot of tools to do this, perhaps too many ones, I decided to write a unique testing and setting tool to allow users to set crucial system parameters and test their RAM to see speed improvements. SCRAMmer is also a very powerful tool to know much more about your wonderful A3000.

This decision led to a program, SCRAMmer V37.0, and its successor, SCRAMmer V37.2, which were completely fruit of my mind since I got only ideas from other programs, but I recoded everything from scratch adding many and many new features togheter with AmigaOS 2.04/2.1 full support and a consistent and font-sensitive user interface.

Owing to the large number of people who spoke about SCRAMmer and to the diffusion capability of worldwide networks I hoped to get a lot of support from users. This was not the case. I was afraid that SCRAMmer V37.2 was the LAST SCRAMmer. But some user support received from Baldassarre Profeta, Massimiliano Marras, Alfonso Messeri, Hirsch and Wolf and Nicola Salmoria (thanks all) pushed me to write the last SCRAMmer. Moreover I also had news by some people who uses SCRAMmer in game development and putting animations on tape, because special modes allow smoother playback.

So SCRAMmer 37.3 was born. But time passes and togheter with new functions SCRAMmer has been localized and amigaguided.

I hope you enjoy it.

NOTE: The Page Mode is very unpredictable. Sometimes it may be a win, sometimes a loose. Its efficiency depends from the applications. So better test results doesn't always mean better rendering times. In most cases Page Mode is faster, in others it may slow your processing a bit. Test !

1.9 Running Methods

Running Methods

SCRAMmer may be launched from Workbench of from the Shell. It accepts a wide variety of ToolTypes and Command Line Arguments.

Here is a list:

```
NOGUI            - Don't build up the gui and exit gracefully
ICONIFY          - Put an AppIcon on Workbench (bypasses NOGUI)
PUBSCREEN        - Specify public screen to open on, if available
DATACACHE        - Cache data
NODATACACHE      - Don't cache data
DATABURST        - Use data burst mode
NODATABURST      - Don't use data burst mode
DATAFREEZE       - Freeze data cache
NODATAFREEZE     - Free data cache
INSTCACHE        - Cache instructions
NOINSTCACHE      - Don't cache instructions
INSTBURST        - Use instruction burst mode
NOINSTBURST      - Don't use instruction burst mode
INSTFREEZE       - Freeze instruction cache
NOINSTFREEZE     - Free instruction cache
VBRFAST          - Transfer vectors in FAST memory
VBRCHIP          - Trasnfer vectors in CHIP memory
COPYBACK         - Turn on Copyback mode
NOCOPYBACK       - Turn off Copyback mode
WRITEALLOCATE    - Turn on Write Allocation
NOWRITEALLOCATE  - Turn off Write Allocation
PAGEDETECT       - Switch on Page Detect Mode (Be careful with
NOPAGEDETECT     - Switch off page Detect Mode $0d Ramseys)
BURST            - Select Burst Mode
NOBURST          - Unselect Burst Mode
WRAP             - Turn on Wrap Mode
NOWRAP           - Turn off Wrap Mode
BERRTIMEOUT      - Select BERR timeout
DSACKTIMEOUT     - Select DSACK timeout
KBRSTENON        - Enable KBRSTEN (Don't use on normal $00 Gary)
KBRSTENOFF       - Disable KBRSTEN (Don't use on normal $00 Gary)
```

You can run SCRAMmer clicking on its icon (check the ToolType) or calling it from the Shell. You can put it in your WBStartup drawer (may be with tooltype ICONIFY), or you can use it in your user-startup to turn special modes on at every reboot cycle.

When exiting from SCRAMmer a requester will pop up. It allows

to cancel, to exit and to put SCRAMmer's AppIcon on the Workbench screen.

IMPORTANT NOTES !!

Don't forget to copy with SCRAMmer the following files if you don't want to see annoying requesters:

Shell & user-startup & WB users:

```
SCRAMmer         - In any directory
SCRAMmer.info    - In the same directory
SCRAMmer.guide   - In the same directory or in AGuide's path
catalogs/#? ALL  - In the same directory or in LOCALE:
```

WBStartup users:

```
SCRAMmer         - In WBStartup drawer
SCRAMmer.info    - In WBStartup drawer
SCRAMmer.guide   - In AmigaGuide's path (Use PathEditor)
catalogs/#? ALL  - In LOCALE:
```

1.10 TheGadgets

The Gadgets

Motherboard info

Ramsey & Gary

System RAM info

CPU settings

SCSI info

Battmem Bits

RAM Tests

Battclock

Help

About SCRAMmer

1.11 Motherboard info window

Motherboard info window

It is the first informative window of SCRAMmer. It shows many system carachteristics. First are shown which

CPU
and
FPU
are

installed on your motherboard. This is an important information, since it allows to see if the software recognizes the processors correctly and takes advantages from them. It is also important because it can be used to check if the special 68040 mathematical library has been loaded.

There are also the main frequencies of the system. The VBlank frequency is the refresh rate of your monitor. On a PAL machine in a PAL country or on an NTSC machine in a NTSC country it should match the Power Supply frequency, which is the frequency of the AC of your wall's outlet. The last is E-Clock, which is the frequency which is used by CIA timers and audio DMA.

Then there are informations about the RAMs installed on your motherboard. Their size and refresh rate are indicated. They are very useful infos which may avoid the opening of your A3000.

In the bottom of the window there is the section of the custom chips. For every chip is shown the name, its type, its code and what it does. The code field is very important because newer chips may have codes unknown to SCRAMmer, so it would have been stupid to write 'unknown chip' and not its code (for example $43), while may be you know (and not SCRAMmer) that $43 stands for 'Enhanced SECAM Agnus !!!'.

1.12 System RAM Info

System RAM Info

This is the second informative window of SCRAMmer and shows, for every kind of memory, the total amount, the unallocated space, and the size of the maximum free segment. Note that 512k are not reported when your Kickstart is in RAM.

There are six kinds of memory. The first kind is 'Any', which means every kind of memory. It is a sort of global pool. The second is 'Chip', which is memory which can be accessed by DMA and by the custom chips. The third kind is 'Fast' which is the fastest because it is accessed only by the processor. The fourth kind is 'Public' which refers to shared memory, which will allow task intercommunication in order to support future Virtual Memory systems. The fifth kind is 'Local', which indicates the memory installed directly on your motherboard. The sixth and last kind is '24BitDMA', which is used to refer to DMAble memory within the 24 bit range, useful to old controllers and cards.

In the bottom of the window there is a ListView gadget, which shows up the memory zones linked in your system. Every board

should have one entry. Normally there are two entries: the chip memory and the expansion memory. This informations are useful to identify which board own some memory addresses, and to verify that boards are properly recognized.

1.13 SCSI Info

SCSI Info

This window shows which units are connected to your local SCSI bus, their size (if available) and their names. It is very useful to identify the IDs of your units and their exact sizes.

The SCSI (Small Computer Systems Interface) is a standard interface protocol to connect peripherals, especially hard disk drives and mass storage devices, such as CDROMS, tape drives, ecc. to computers. It may also be used to connect Scanners, Printers, DATs, and WORMs.

1.14 RAM Tests

RAM Tests

Here you can investigate about your RAM. Your motherboard has four banks, which may contain 16 or 4 MB. The window shows the sizes of the banks and their address. You can use the first gadget, 'SCRAM Test', to check if any of your memory banks is populated by Static Column RAM. Beware, because if you have ANY bank filled with NON-SCRAM chips your system will probably crash. If any bank is empty there will be no problems. Empty sockets are correctly managed. I hope you have
SCRAM
memory.

Now that you have SCRAMmer you would like to know if special modes give you better performance. So through the second gadget, 'Speed Test' you can test the speed of your RAMs. To make comparisons note that my 25 MHz A3000, filled with 80ns SCRAM ZIPs, in NTSC mode gives me a Read factor of 18517-9uS and a Write factor of 17390-3uS. Higher values mean slower RAM.

The speed test disables interrupts and DMA and performs two cycles, one reading from and one writing to memory. The read and write operations consist in 8192 cycles of four longword aligned memory accesses followed by 8192 odd aligned longword memory accesses grouped with two odd aligned byte accesses each. This test should be enough and very general.

There is now the third and last gadget, 'RAM Check'. It allows you to check if all your ZIPs and DIPs are OK, and, if there are some broken chips their socket ID will be reported. If no request appears then your RAM is ok. Don't worry about the disap-

pearance of the display when testing Chip memory. The test takes slight more than one second per chip, so you have to wait slight less a minute to test all the RAM of a 18 MB 25 MHz Amiga.

Note that if your system has Kickstart in RAM then some chips may be not tested, or if your MMU locks some memory from write the test may consider broken good chips.

The reported chip IDs are in the form Uxxxy, where xxx is the chip number and y may be:

D - DIP (Dual in line package)
Z - ZIP (Zig Zag in line package)
- - ZIP *or* DIP

If your bad chip is within the range U259-U266 then I regret since you have hard problems and need a Commodore authorized repair center. This because chips U259D-U266D are soldered onto the motherboard.

1.15 Help

Help

This gadget brings up the Amiga hypertext system, called Amigaguide (tm) and calls this document.

1.16 Ramsey & Gary Window

Ramsey & Gary window

The gadgets in this window allow the control of the special functions that may be performed by Gary and Ramsey. Through the gadgets in this window you can advantage from the presence of SCRAM chips, activating the Page Mode , which improves linear memory access times. You can activate the Burst Mode , which allows the CPU to fill its cache very efficiently, or you can adjust the Wrap Mode , which, depending on the application will optimize burst transfers.

The Page Mode is a special technique which improves linear memory access times leaving the current page open until a different page is required. This avoids page openings and closing at every memory access. But a bug in $0d Ramseys prevents this mode to be used safely. Here's sentences from messages appeared on Usenet in area comp.sys.amiga written by Michael Sinz and Dave Haynie.
...due to a bug in RAMSEY (0d), the DRAM timing messes up when this mode is used in cunjunction with hard disk activity. So dont use it... ...The place that Ramsey fails in page-detect mode causes a violatioin of a critical 80ns DRAM parameter by about 20 ns. If you have 60ns DRAM, or just get lucky with 80ns DRAM

(perhaps on a nice cool day), you won't see this failure. Or you will only see it every million bytes or so. Which should be a warning that it's never safe to use, since you don't know just when it' causing a problem. The lucky ones get it failing all the time, so they aren't tempted to try and use it... ...The mode set by the ROM *does* utilize the SCRAM chips, just not the Page Mode. It is Page Mode that does not work with DMA from the SCSI hardware. (It may work sometimes as the problem has to do with timing of some signals to the RAM chips and some RAM chips can handle the timing and others can not and others sometimes can... ...The mode set by the OS sets the *right* mode for overall best performance...

Moreover you can enable/disable the bus timeout feature, which normally terminates accesses to non existent memory without hanging the system. You can also select to use BERR or DSACK timeouts. DSACK is quicker. Beware of disabling timeout. If you disable it then a single access to non existent memory will hang the system. It may be anyway useful to detect bugs (references to wrong memory zones) or to debug hardware plug in cards, to check if they appear correctly in their addresses.

The last gadget is KBRSTEN, which allows to enable or disable the keyboard reset feature allowed by enhanced Garies.

IMPORTANT The A3000 Ramsey chip (Code $0D) doesn't support the Page Mode correctly. But sometimes it seems to work.
IMPORTANT The A3000 Gary chip (Code $00) doesn't support the KBRSTEN feature. It affects timeout settings.

1.17 CPU Settings

CPU Settings

There are a lot of adjustable parameters regarding the CPU. They are data and instruction caches, which speed up the software reducing memory accesses, the WriteAllocate and the Copyback modes (provided also on the 68040), and the existence of the VBR register. To reach the maximum speed you should enable caches, bursts, Copyback, (I suppose) disable Write Allocate and move your VBR to Fast memory.

Remember anyway that Write Allocate causes a lot of problems on standard A3000s when disabled, that Copyback may cause trouble to bad written programs, togheter with caches and VBR. You are advised.

The Copyback is a special feature of the cache of the 68040 which allows data to be written only in the cache delaying until possible its path to system memory. This enhances the performance a lot.

The VBR is the Vector Base Register. It is the interrupt table of the CPU. Transferring it in Fast RAM will improve system throughput speeding up interrupt driven operations such as serial downloads, vblank processing and so on. It will not improve tests results because interrupts are disabled during the RAM Speed test.

Moreover many old games may have problems, because they expect to find the table in the hard coded position of the 68000:0x00000000.

1.18 Battmem Bits

Battmem Bits

This is the gadget which pops up the window which controls the battery backed up memory of your Amiga. It allows you to set the default timeout for SCSI devices, since some Sea.ate and Max.or hard disks seem to have very long power up sequences. Then there is the LUN gadget, which controls if the booting process should test only one unit or all LUNs (Logical Unit Numbers) connected to a single SCSI address. Testing all LUNs on controllers which doesn't support them may cause a little trouble. See the RKM manuals. The third gadget allows to enable (or disable) synchronous SCSI transfers, which may improve disk performance. Then there is the fourth (and most dangerous gadget), the HostID. It is used to specify which Hard Disk unit should be used in your computer booting sequence. You can select units 0-6 or disable the boot from HD. If you disable the boot be *sure* to have a copy of SCRAMmer on floppy disks or it will be *VERY HARD* to reset battmem to a proper value.

The last part of the window shows the 'Amnesias'. If the battery backed RAM looses its contents it will be reported. You can anyway make the RAM remember of forget. Don't play !

1.19 Battclock

Battclock

This gadget brings up a window which allows you to control the battclock of your Amiga. It shows the current settings, which are the decoded date and time and the number of seconds since Jan1978. I didn't add a date setting tool, since there is the preferences editor for this purpose, but I provided a reset gadget which should reset malfunctioning clocks to Jan 1978. Try this if you have problems with your clock.

1.20 About

About

What can I say about this gadget ? It brings up a little window which remembers you my name and that you MUST send me reports, comments, presents and suggestions. In other words I want user feedback (if possible). Bye.

1.21 Enforcer

Enforcer

Enforcer is a very useful debugger supported by CATS, written by Bryce Nesbitt.

1.22 MungWall

MungWall

MungWall is a debugging tool useful to find problems with memory. Its use is encouraged by CATS. It was written by Ewout Walraven and is based on Memmung, written by Bryce Nesbitt and Memwall, written by Randell Jesupp.

1.23 SCRAM

What is SCRAM

SCRAM is an acronym for "Static Column Random Access Memory". It is called so because it can be read specifying one row and then reading the whole column without readdressing the row, like other RAMs. The Amiga can take advantage from this kind of RAM because it can speed up MC68030 burst cycles (Burst Mode), and speed up memory access times leaving the current column 'open' for linear memory access (Page Mode).

It is obvious that Amigas should use Static Column RAMs. You can check if you have SCRAMs via the SCRAMmer program or comparing the numbers of your ZIPs with the following list:

Static Column RAM 1M x 4		Non Static Column RAM 1Mx4	
Oki	MSM514402	Hitachi	HM514400
Toshiba	TC514402	Nec	uPD424400
		Oki	MSM514400
		Toshiba	TC514400

Static Column RAM 256K x 4		Non Static Column RAM 256K x 4	
Hitachi	HM514258	Hitachi	HM514256
Motorola	MCM514258	Nec	uPD424256
Nec	uPD424258	Oki	MSM514256
Oki	MSM514258	Samsung	KM44C256AZ
Sharp	LH 64258	Toshiba	TC514256
Texas	TMS44C258		
Toshiba	TC514258		

1.24 CPU

What is the CPU

The CPU is the Central Processing Unit of your computer. Amiga computers use the Motorola 680x0 family ranging from the MC68000 running at 7 MHz used in A1000s, A500s and A2000s to 16 and 25 MHz MS68030s used in A3000s. Some third party vendors sell fast accelerators based on the MC68040.

1.25 FPU

What is the FPU

The FPU is the Floating Point Unit of your computer. While low end Amigas, such as A1000, A500 and A2000 doesn't sport an FPU, using software mathematical code, the new A3000s and about all the accelerators use an MC68881 or MC68882, generally clocked at 25 MHz. Note that the MC68040 has a built in integer FPU, while uses software routines to emulate the trascendental math operations of the MC68882 and MC68881.

1.26 MCLink

What's MCLINK ?

MCLink is the interactive telematic magazine conceived by Technimedia, the same editor of MC Microcomputer, the computer magazine which sells the highest number of copies in Italy.

There are public and private Mailboxes and Fileboxes and a lot of public conferences. Four are about the Amiga® Computers.

Phone numbers:
+39 6 4180660 1200-9600 MNP5 V42bis
+39 6 4180440 300/1200/2400
NUA ITAPAC: 26500140
NUA EasyWay: 26500259