

TekMagic 4060T aka Ultrasound accelerator [EN]

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There are plenty of accelerators for big-box Amigas, some fits fine to all Amiga models such as Cyberstorm MK2 and 3, some are especially designed for A3000 (G-Force 040), another ones only for A4000 (Cyberstorm MK1) and some only for A4000T (QuikPak 4060). Amiga 4000T is big and spacious so ideal for any kind of cpu accelerator. I thought QuikPak is the only one accelerator designated for A4000T only. Until now!

Its well known that Motorola m68k CPUs were used in personal computers like Apple Macintosh, Amiga, Sharp, gaming consoles like Sega, ... but not many people know that very same CPU were used in non-gaming areas (printers, telephone exchange, avionics (Eurofighter, Boeing), rails (TGV) and last but not least in space industry , ...). Many 68060 CPUs on the market have been serving on these devices before they were removed and in many cases used to upgrade our Amiga 040 accelerators.

Friend of mine discovered ATL HDI 1000 Ultrasound machine (ATL was later acquired by Phillips) is not just powered by Motorola CPU, but in fact its built on Amiga hardware platform and the software appliance runs on AmigaOS! Machine contains original Commodore mainboard A4000T, special 060 accelerator and Zorro slots full of special cards. Some machine configurations were equipped with Ariadne Ethernet card.



According to Amiga History Guide web, around 2000 of Amiga 4000T model have been produced, but based on the serial numbers of this ultrasound machines we saw, we should count with probably 2000 additional A4000T motherboards more produced. Maybe you have met this machine already when you visited pregnancy check with your wife and maybe it was this “Amiga” who showed you your pre-natal baby state on the screen. Or you met this machine personally when used as prostate scanner ;o)



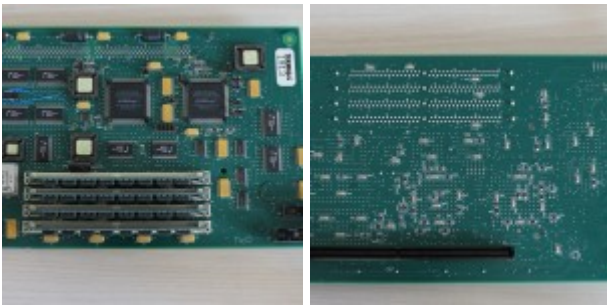
Before I focus on the accelerator, let me describe what actually “amigish” in the Ultrasound machine. The Ultrasound machine contains original A4000T motherboard (rev4 = the only revision of the original C= motherboard) with additional wired modification to Zorro slots on the bottom side populated with untouched Kickstart 3.1 ROM chips. CPU slot contains TekMagic special accelerator board which I will describe later on. I also noticed there is no motherboard RAM populated so all RAM is on the accelerator. I did not have a chance to see the machine completed, but what is obvious the first zorro slot + video slot is occupied by special video card. Its very large one and it is also connected by two data cables directly to the accelerator. Other Zorro slots are used to connect DSP board and some other board (for example board taking care of the ultrasound beam).



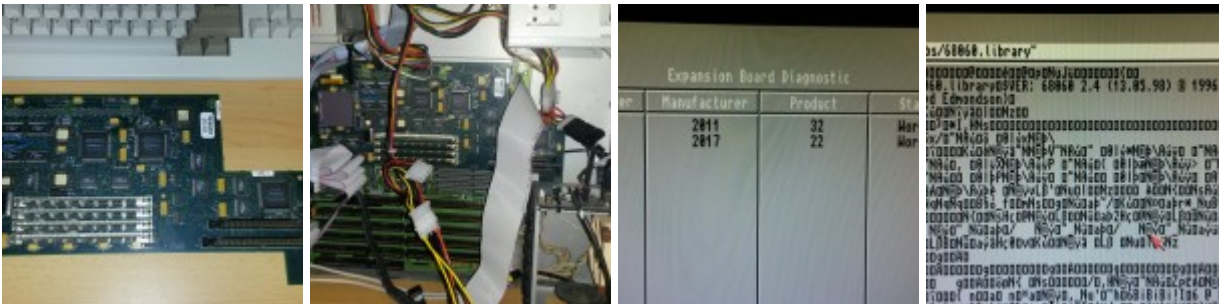
Ultrasound machine uses 50pin SCSI disk connected to on-board SCSI2 controller. Disk is split into 4 FFS partitions and uses original Amiga OS 3.1. But Startup-Sequence is re-written to launch the application from the beginning, so Workbench is not loaded at all. OS contains special 68040 and 68060 libraries, special DSP.device drivers and it also Turboprint application installed (via parallel device). Other stuff is then stock OS3.1.



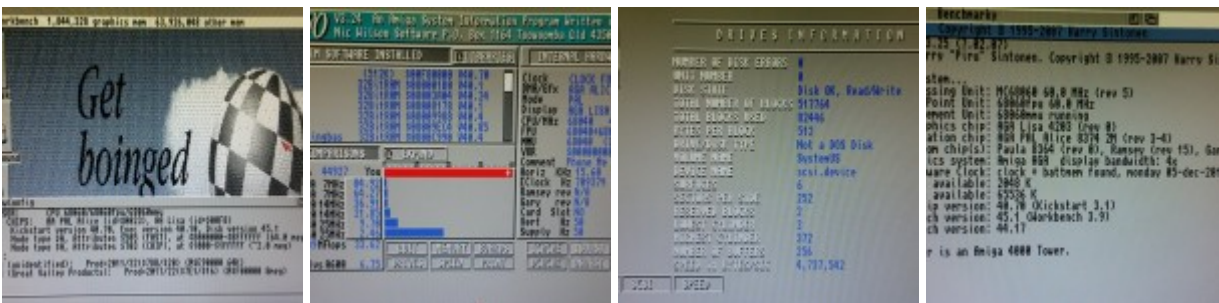
Now moving back to the accelerator topic. TekMagic 060 aka Ultrasound turbo is pretty much undiscovered land on the Amiga world. Despite the other 060 accelerators this one has standard clock 60 MHz and CPU is pure 68060RC60 in revision 5 (= native 60 MHz version). It has 4 SIMM 72 slots, most probably with 64bit access (will get to that in benchmarks) and they can be populated with maximum 16 MB SIMM each = 64 MB of RAM (unfortunately 128 MB does not work). Card has few jumpers which are not documented and two data cable connectors 50 and 80 pin which connects accelerator directly with the video board.



TekMagic accelerator installation is easy I just had to prepare basic empty IDE disk, put OS on it (used stock OS3.9 without BB) and copied special 68040 and 68060 libraries to Libs. Once I removed CybersStorm PPC from my Amiga I had to change INT/EXT jumpers both to INT on the motherboard. Then accelerator got detected and in the Boot menu / Board listed as two items 2017-22 (recognized as GVP) and 2011-32 (recognized as Resource Management Force Australia). OS booted quickly and nicely (I used OS3.9 without boing-bag) and I could start benchmarking.



First what I noticed was the amount of fast RAM, it was 64 megabytes, so it proved functionality and compatibility with the OS3.9. Unfortunately any attempts to populate 32 MB SIMM modules were not successful, card accepts only 16 MB modules. But 64 megs isnt that bad, right? I noticed the work with IDE disk is very fast, so I started Sysinfo. First I checked CPU speed test (which just showed usual result for 060/60 MHz) and then I checked Disk speed (old 4 GB IDE disk, 5400 RPM, connected to on-board IDE, PFS3AIO, 256 buffers) and it resulted with 4,7 MB/s. Wow, what a surprise, how is that possible? I have to mention I dont have PIO2 modded GALs, just the stock PIO0 and the usual result on other phase5 accelerators is usually around 2,5 MB/s. I had to verify this result in other benchmark. I opened Syspeed benchmark, run disk speed tests and it showed 4,6 MB/s. So TekMagic somehow boosts the IDE which is very nice finding.



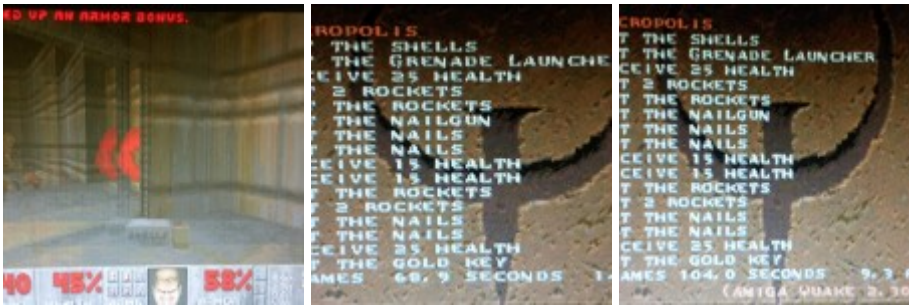
Having Syspeed started I checked also Memory benchmark tests and it was another big surprise for me. The RAM speed test results were similar to results of the Cyberstorm MK3/PPC which is well known for its unique 64bit RAM access (it speeds up the RAM by 20% comparing to other accelerators). So either this one supports the same 64 bit RAM access or uses the EDO technology just like Quikpak accelerators do.

Below is table comparing various accelerators:

	TekMagic 4060/60	CS MK1 040/40	CS MK2 060/50	CS PPC 060/50	CS PPC 060/60	CS PPC 060/66	Apollo 4060/100
Cache Read	230.11	75.22	189.14	190.18	228.91	251.30	381.84
ReadFastb	30.06	8.83	23.22	26.75	28.08	34.23	34.34
ReadFastw	40.71	16.63	30.95	37.49	37.36	47.17	41.92
ReadFastl	49.78	29.48	37.09	46.39	44.95	58.08	46.96
WriteFastb	24.15	9.30	18.57	21.63	23.30	27.69	30.00
WriteFastw	37.22	18.22	24.72	37.06	35.75	42.72	31.20
WriteFastl	37.24	25.38	24.72	37.08	35.72	42.73	31.21
Fast2Fastb	14.14	6.15	10.73	12.55	13.29	15.89	16.75
Fast2Fastw	20.34	10.06	14.88	18.66	18.66	23.40	19.71
Fast2Fastl	22.89	16.33	15.42	22.42	21.27	26.58	19.72
Fast2Fastm	21.14	12.27	14.76	20.51	19.82	24.44	18.76
Fast2Fast16	26.49	21.58	19.59	25.65	27.13	32.59	25.88

I am used to test performance on FPS games. I choose Doom and Quake. Doom (320×200 full-screen High Details) was smooth and run between 20 and 30 fps. For Quake I prepared version AmiQuake (latest from Novacoder) and AmigaQuake (v2.30). AmiQuake is optimized for the best fps result. This is reached by optimization of variables and effects parameters and disabling some of them (particles, light effects, ...). On the other hand AmigaQuake v2.30 shows all the effects and I consider it to be the fastest port. Below I compared TekMagic with Cyberstorm MK3 060/50 (just swapped both cards in the same Amiga setup).

"timedemo demo1" 320×200, sw rend.	TekMagic 4060/60	CS MK3 060/50
AmiQuake	14.1 fps	13.6 fps
AmigaQuake 2.30	9.3 fps	8.1 fps



Lets summarize pros and cons of the newly discovered amiga accelerator TekMagic:

PROS	CONS
68060RC60 => 60 MHz default clock, no active cooling needed	Usable only in A4000T (too large for any other Amiga)
Fast RAM access (same performance as Cyberstorm MK3/PPC)	Only 64 MB maximum RAM can be populated
Boosts IDE somehow (4,7 MB/s)	No SCSI on-board
There are still some cards NOS available for sale	No MAP ROM discovered