USER'S MANUAL

TK68030v2

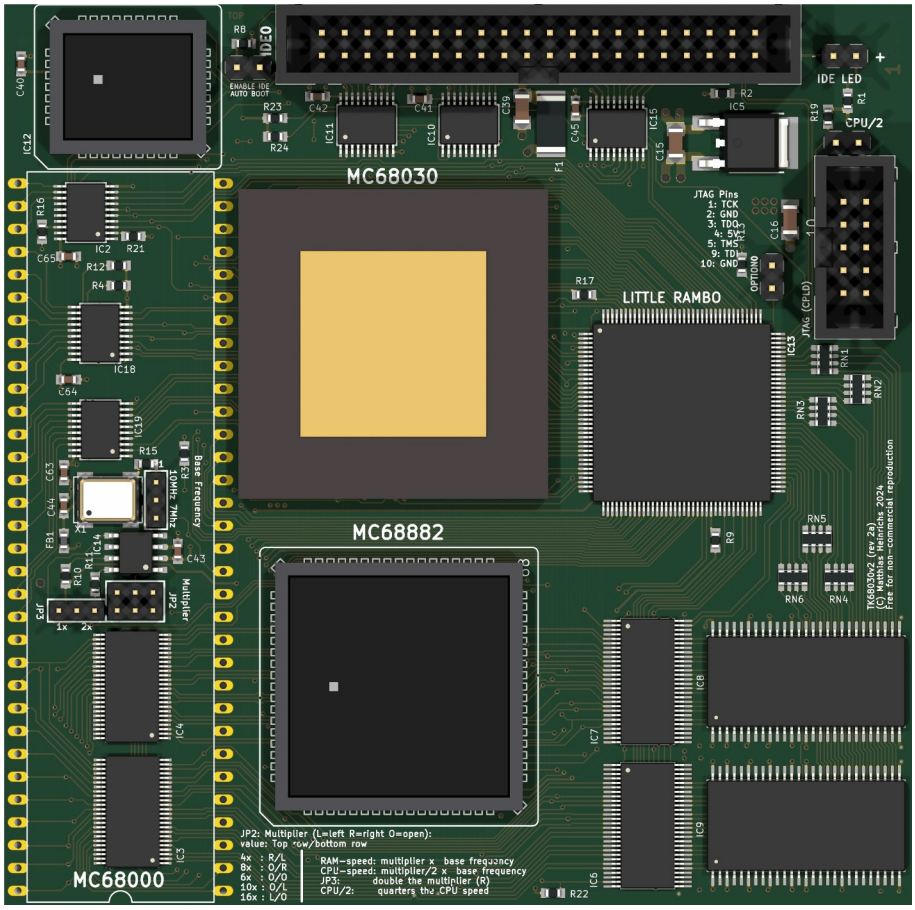
68030 CPU Accelerator for Amiga 500 and 2000

The TK68030v2 is a CPU accelerator for the 68000 CPU socket of the Amiga 500 and 2000. It carries a Motorola MC68030 CPU, an optional MC68882 FPU, up to 128 MB of 32-bit Fast RAM and an IDE interface with boot ROM. An adapter is required for the Amiga 1000 and the Amiga CDTV.

1 FEATURES

* MC68030 CPU (PGA), clock adjustable with jumpers, e.g. 20, 30, 40, 50 or 60 MHz
* Socket for an MC68882 FPU (PLCC68), optionally with an original Motorola FPU
* Up to 128 MB SDRAM as 32-bit Fast RAM, detected automatically from Kickstart 2.0
* IDE interface (40-pin) with boot ROM, booting from IDE drives possible
* Connector for an IDE LED

2 BOARD LAYOUT



Component side of the TK68030v2 with MC68030 and MC68882

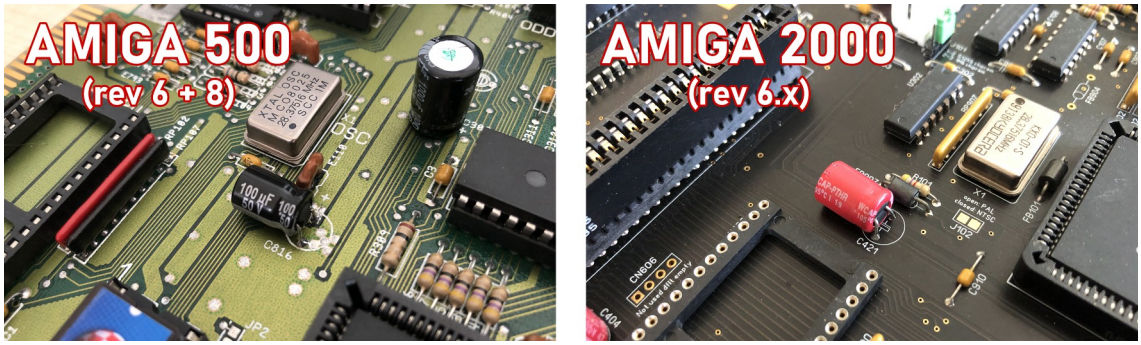
Part	Function
IDE	IDE connector, 40-pin
ENABLE IDE AUTO BOOT	Boot from an IDE drive
IDE LED	Connector for an IDE LED (- left, + right)
CPU/2	Halves the CPU clock
JP1	Base clock 10 MHz / 7 MHz («Base Frequency»)
JP2	Multiplier («Multiplier»)
JP3	Doubles the multiplier (1x / 2x)
JTAG (CPLD)	Programming of the CPLD; not needed in operation
OPTION	Not needed in normal operation

3 INSTALLATION

CAUTION: Electrostatic discharge can damage the board and the Amiga. Grounding is required before touching the components, e.g. on a radiator. Install and remove the board only with the Amiga switched off and disconnected from mains power.

On most Amiga 500 and 2000 models, the board collides with an electrolytic capacitor next to the 68000 socket:

Mainboard	Capacitor	Action
Amiga 500 rev. 3 and 5	C307	None, can be installed right away
Amiga 500 rev. 6 and 8	C816	bend 90 degrees to the side: see below
Amiga 2000 rev. 4.x	-	None, can be installed right away
Amiga 2000 rev. 6.x	C421	bend 90 degrees to the side: see below



Position of capacitor C816 (A500) and C421 (A2000)

1) Open the Amiga and remove the 68000 CPU from its socket, for example by carefully levering it up alternately on the left and right with a screwdriver, or better with a suitable chip puller.
2) Carefully bend the affected capacitor 90 degrees to the side so that it lies flat on the mainboard. **The capacitor leads must not cross - risk of short circuit!**
3) Check the pins of the TK68030v2 and straighten any bent pins with tweezers.
4) Carefully insert the board into the 68000 socket and press it down evenly. It must lie flat and level afterwards.
5) Connect an IDE drive. To boot from this drive, close the ENABLE IDE AUTO BOOT jumper.
6) Close the Amiga and switch it on.

3.1 Software

AmigaOS 3.2 is the best choice. It includes everything needed: the AmigaOS 3.2 installer installs the libraries for the 68030 as an option. With older AmigaOS versions, install MMULib by Thomas Richter instead (Aminet: util/libs/MMULib).

The MuFastRom tool from MMULib copies the Kickstart ROM into Fast RAM, which speeds up the Amiga noticeably. To do so, add the following line to S:Startup-Sequence after SetPatch:

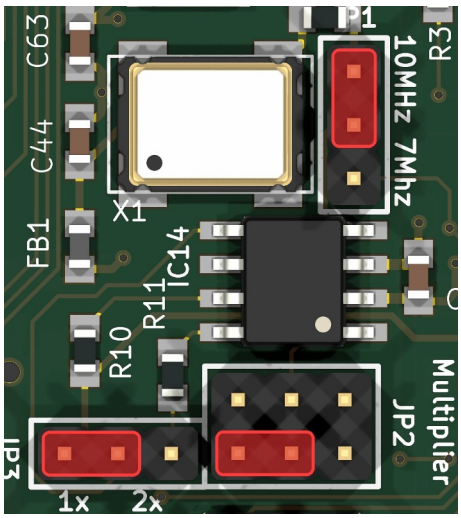
```
C:MuFastRom PROTECT ON
```

4 CLOCK FREQUENCY

CPU and RAM clock are derived from the base clock and a multiplier:

```
CPU clock = multiplier / 2 x base clock
RAM clock = multiplier x base clock
```

* **JP1 – base clock:** 10 MHz from oscillator X1 (factory setting) or 7 MHz from the Amiga.
* **JP2 – multiplier:** two rows of three contacts each. On each row, a horizontal jumper connects the middle contact to the left (L) or right (R) contact, or the row stays open (0). Never fit jumpers vertically.
* **JP3 – doubling:** left 1x (factory setting), right 2x.
* **CPU/2:** closed halves the CPU clock; the RAM clock stays the same.



Example 50 MHz: JP1 at 10 MHz, JP3 at 1x, JP2 top open, bottom L

4.1 Base Clock 10 MHz

Multiplier	JP2 top	JP2 bottom	JP3	CPU clock	RAM clock
3	R	0	1x	15 MHz	30 MHz
4	R	L	1x	20 MHz	40 MHz
6	0	0	1x	30 MHz	60 MHz
8	0	R	1x	40 MHz	80 MHz
10	0	L	1x	50 MHz	100 MHz
12	0	0	2x	60 MHz	120 MHz

4.2 Base Clock 7 MHz

With JP1 at 7 MHz, the base clock comes from the Amiga: 7.09 MHz with PAL, 7.16 MHz with NTSC; the values are then about 1 % higher.

Multiplier	JP2 top	JP2 bottom	JP3	CPU clock (PAL)	RAM clock (PAL)
3	R	0	1x	10.6 MHz	21.3 MHz
4	R	L	1x	14.2 MHz	28.4 MHz
6	0	0	1x	21.3 MHz	42.6 MHz
8	0	R	1x	28.4 MHz	56.8 MHz
10	0	L	1x	35.5 MHz	70.9 MHz
12	0	0	2x	42.6 MHz	85.1 MHz
16	0	R	2x	56.8 MHz	113.5 MHz

Both tables apply with CPU/2 open.

4.3 Notes on Overclocking

* Any clock above the nominal frequency of the CPU is overclocking, e.g. above 25 MHz for the MC68030RC25. The fastest version is the MC68030RC50 rated at 50 MHz; in some cases it can be overclocked up to 60 MHz.
* CPU and FPU run at the same clock, so a poor FPU can prevent higher CPU clocks (see «FPU»).

* For high clock rates, the mainboard should be fitted with new, high-quality capacitors.

> **CAUTION:** Above 50 MHz, check the CPU temperature; active cooling (heat sink with fan) is probably required. Overheating can destroy the CPU!

4.4 FPU

The MC68882 FPU is optional; the board also works without an FPU. The TK68030v2 is supplied with original Motorola FPUs MC68882FN16A, MC68882FN20A or MC68882FN25A. All of them have been proven to overclock up to 60 MHz while staying cool and stable.

> **CAUTION:** Original MC68882FN40A FPUs are hardly available any more. Most FPUs offered today are «refurbished», i.e. relabelled fakes, usually of the lowest quality. They often do not run stably and can prevent higher clock rates.

5 IDE AND BOOT ROM

The boot ROM contains the open-source driver LIDE (github.com/LIV2/lide.device). For HDToolBox to find the IDE drives, set the tooltype SCSI_DEVICE_NAME under «Information» in the HDToolBox icon:

```
SCSI_DEVICE_NAME=lide.device
```

* IDE LED: minus left, plus right. The red wire is usually plus.
* Kickstart 1.3 does not support Zorro III autoconfig. There, the Fast RAM must be added manually at address $40000000, e.g. with AutoAddRAM (Aminet: util/boot/AutoAddRAM); further expansions are not detected. This limitation does not apply from Kickstart 2.0.

6 TROUBLESHOOTING

Symptom	Remedy
No start or crashes	Check the seating of the board and the pins. Select a lower clock; a retrofitted FPU of doubtful origin can limit the clock. Check cooling.
No Fast RAM with Kickstart 1.3	Add the Fast RAM at $40000000 with AutoAddRAM.
No boot from IDE	Close the ENABLE IDE AUTO BOOT jumper and check the device name lide.device in HDToolBox.

7 SOURCES AND LICENSE

Project: gitlab.com/MHeinrichs/68030-tk2 · Forum: a1k.org, thread 78469

Design: Matthias Heinrichs. Non-commercial reproduction is permitted with attribution. Thanks to LIV2 (lide.device) and Thomas Richter (MMULib).