MonSTerbo

Thanks for purchasing the MonSTerbo STE. A natural evolution of the original MonSTer board.

I hope this brings much needed performance & compatibility to the Atari STE computer.

The goal of the accelerator is to maintain compatibility as much as possible, and I've tested many demos to ensure that 8MHz 68000 mode still works as it did when the accelerator is not present. Still, with this goal there are possibilities that some demos or games may not work. If you find any, please get in touch, as I'd love to know where problems remain.

But, welcome to the faster world. The MonSTerbo sports both a 68SEC000 CPU for compatibility with 68000 programs and a 68EC020 for higher performance. The MonSTerbo has full 32bit ROM, RAM & FPU when operating in 68EC020 mode. Jumpers are available to switch the 68EC020 into 16bit mode for each of the ROM, RAM & FPU modes for even greater compatibility.

In addition to the powerful CPUs, the MonSTerbo has 16MB of FlashROM providing the ability to flash up to 16 x 1MB ROM images, and be selectable via the jumpers for powerup control, or via software control after the initial boot.

Features of the board are…..

MC68SEC000 up to 48MHz (see **IMPORTANT** below)
MC68EC020 up to 40MHz (see **IMPORTANT** below)
8MB ALT-RAM
16MB FLASH ROM
68881/2 support (PGA type FPU not supplied)
Expansion Socket, compatible with the MegaST and 32bit capable.
SPI Master to control up to 4 devices, using the SCL/SDA lines if no RTC connected.
RTC clock module support via SCL/SDA
No soldering required

Additional features…

Cartridge Emulation. The FlashROM can also store up to 16 cartridges when using ROMs less than 1MB. Cartridge Emulation can also be done via FastRAM without the need to use FlashROM.

MapROM where fast RAM is used to emulate the ROMs. This speeds up ROM access, but can also be used to test ROMs before flashing.

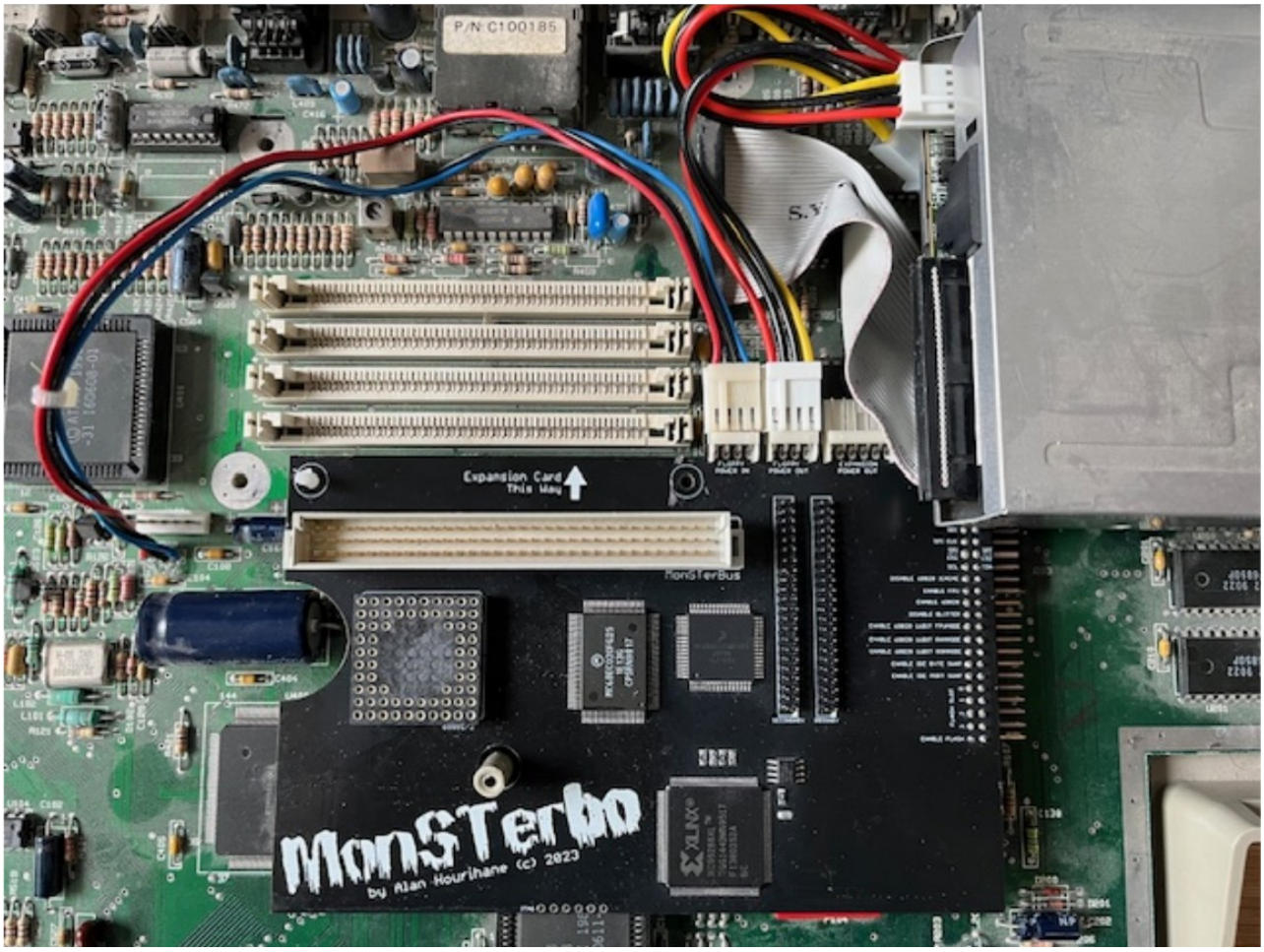
IMPORTANT – CPUs are overclocked at high speeds

Both CPUs are being overclocked and may become hot, especially the 68EC020 running at 40MHz. You may need additional cooling, such as a heatsink or fan to cool the chips to run at the high speeds. If you get intermittent crashes at high speeds then please check the cooling or lower your speeds, also see the troubleshooting section below. You may find that a lower speed is more stable due to the differences in CPUs capabilities and overclocking them.

Remember the 68SEC000 is rated at 20MHz, and the 68EC020 is rated at 25MHz.

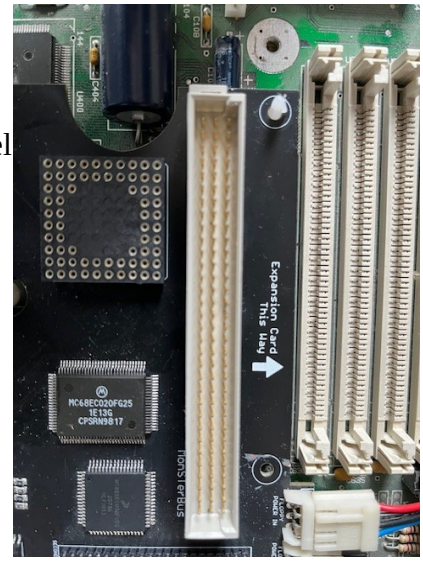
MonSTerbo Installation

1. Remove the 68000 CPU from the PLCC socket, preferably with a PLCC extraction tool.
2. Remove the TOS ROM chips.
3. Install the MonSTerbo into the CPU socket.
4. You will need to cut the shielding for the expansion port, or leave the shielding off completely.
5. Done :-)



Well, maybe not quite. If you intend to use the onboard IDE controllers or an expansion card then unplug the floppy power from the floppy drive and attach it to the MonSTerbo port labelled “Floppy Power IN”. Next, attach the provided floppy power splitter to the “Floppy Power OUT” and the other floppy connector into the floppy drive, as seen in the above photo. Expansion card power will plug into the 6 pin power plug, just like any MegaST card.

Additionally, two 9mm spacers are provided to ensure when installing expansion cards that pushing down doesn’t move the MonSTerbo board. This should be placed at the two holes on the MonSTerbo near the PSU. The spacers don’t need the sticky label removing and can be left floating to aid in removal of the MonSTerbo if required. The spacers may need trimming depending on the legs of capacitors and resistors.



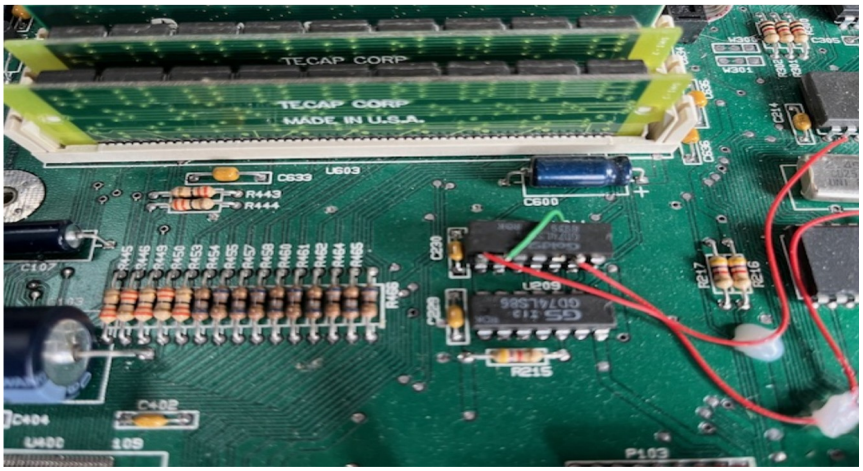
The MonSTerbo comes flashed with EmuTOS 1.3 English, with the FLASHENABLE jumper set, so you can flash any TOS image later with the flash tool.

You may have noticed there are no additional cables :-)

MonSTerbo Installation, continued….

IMPORTANT - STE's with Audio Patch

There are some STE's which have an audio patch with stacked chips that get very close to the MonSTerbo expansion connector pins underneath the board. You'll notice that the expansion connection pins have been specifically cut to aid in them not touching the stacked IC's on the STE. Please check that these do not touch and ensure that you have installed the spacers provided if you have an STE with stacked ICs, as seen in the below image.



MonSTerbo IDE Configuration

The MonSTerbo has four IDE controllers (two are virtual byte swapped interfaces).

The IDE hardware byte swap feature allows the MonSTerbo to swap bytes for compatibility with Windows formatted media to increase performance.

In HDDRIVER/HDDRUTIL you'll have the standard two IDE controllers configured at the following locations.

IDE Primary

IDE 0.0 (Master)
IDE 1.0 (Slave)

IDE Secondary

IDE 2.0 (Master)
IDE 3.0 (Slave)

When using the **port swap** the Primary & Secondary mappings will swap over. e.g.

IDE Secondary

IDE 0.0 (Master)
IDE 1.0 (Slave)

IDE Primary

IDE 2.0 (Master)
IDE 3.0 (Slave)

Now, the virtual ports, are for byte swapping. Without the byte-swap jumper installed the following port configuration are used.

IDE 0.0 (Master) is the same as, but byte swapped, IDE 4.0 (Master/Byte-Swapped)
IDE 1.0 (Slave) is the same as, but byte swapped, IDE 5.0 (Slave/Byte-Swapped)
IDE 2.0 (Master) is the same as, but byte swapped, IDE 6.0 (Master/Byte-Swapped)
IDE 3.0 (Slave) is the same as, but byte swapped, IDE 7.0 (Master/Byte-Swapped)

Enabling the **byte swap** jumper swaps this. e.g.

IDE 0.0 (Master/Byte-Swapped) == IDE 4.0 (Master)
IDE 1.0 (Slave/Byte-Swapped) == IDE 5.0 (Slave)
IDE 2.0 (Master/Byte-Swapped) == IDE 6.0 (Master)
IDE 3.0 (Slave/Byte-Swapped) == IDE 7.0 (Master)

So your HDDRIVER configuration can choose whether to use the IDE ports which maps to your configuration. For example, you may want the IDE Primary port for traditional bootable TOS media, and the IDE Secondary port for byte-swapped media and so you could configure HDDRIVER with the IDE ports, requiring no jumper settings for this example....

IDE 0.0 (Primary/Master)
IDE 1.0 (Primary/Slave)
IDE 6.0 (Secondary/Master/Byte-Swapped)
IDE 7.0 (Secondary/Slave/Byte-Swapped)

But, if you wanted TOS/Windows compatible partitions that you can still boot from and then your second port for traditional TOS not byte-swapped then enable the hardware byte swap jumper and your IDE ports would become.

IDE 0.0 (Primary/Master/Byte-Swapped)
IDE 1.0 (Primary/Slave/Byte-Swapped)
IDE 6.0 (Secondary/Master)
IDE 7.0 (Secondary/Slave)

MonSTerbo Jumper Configuration.

FLASH ENABLE – This enables the onboard flash ROMs. You don't need to enable the Flash ROM to program the Flash. If this jumper is not on, then the motherboard TOS ROMs are used.

FLASH SLOT – 4 jumpers which are labelled 0-3. These enables which of the 16 x 1MB slots to enable at the 0xE00000 range for booting TOS, EmuTOS or other ROM images. Binary notation here for the 16 slots. EmuTOS is loaded into slot 0 upon shipping.

ENABLE IDE PORT SWAP – This jumper swaps the PRIMARY/SECONDARY IDE ports, so that SECONDARY will become PRIMARY, and PRIMARY becomes SECONDARY. This can be handy to boot from the other IDE port.

ENABLE IDE BYTE SWAP – This jumper swaps the IDE hardware byte swap capability. By default the MonSTerbo will map IDE controller ports 4 – 7 to hardware byte swap ports. This jumper switches the hardware byte swap to port 0 – 3.

ENABLE 68020 16BIT ROMMODE – Turns off the 32bit FlashROM feature for the 68020 and uses 16bit access.

ENABLE 68020 16BIT RAMMODE – Turns off the 32bit ALT-RAM feature for the 68020 and uses 16bit access.

ENABLE 68020 16BIT FPUMODE – Turns off the 32bit FPU feature for the 68020 and uses 16bit access.

DISABLE BLITTER – Disables the use of the BLITTER.

ENABLE 68020 – By default the 68000 CPU is used, and this jumper will switch to the 68020.

ENABLE FPU – If you have installed an FPU, put a jumper on these pins. If you wish to disable the FPU when the FPU is installed, remove the jumper.

DISABLE 68020 ICACHE – This jumper will disable the 68020 ICACHE using CDIS on the 68020. This will probably never need to be used.

SCL/SDA – These are for connecting the RTC module, using the I2C protocol.

SPI CS1/SPI CS2 – These pins are the SPI Chip Select pins. i.e. two chip selects for two SPI devices.

SPI CLK – Two pins that carry the SPI Clock.

SDI – Two pins that carry the SPI SDI. You typically attach the other end SDO to this pin.

SDO – Two pins that carry the SPI SDO. You typically attach the other end SDI to this pin.

RESET – Two pins that carry the RESET signal.

ACSI IRQ – Unused at this time.

GND – Two GROUND pins.

3.3V – Two 3.3v pins.

5V – Two 5v pins

SECONDARY IDE LED – For connection of an external LED for IDE SECONDARY access.

PRIMARY IDE LED – For connection of an external LED for IDE PRIMARY access.

MonSTerbo Software

M_BOOT – Allows selection of the FlashROM or CartridgeROM images for live booting without the need to use jumpers. The jumper would remain the one in-use from a cold boot.

M_FLASH – The FLASH program to flash images to the 16 slots.

M_RTC – The RTC program for setting the RTC clock.

M_ALTRAM – To select the amount of AltRam available to the system.

M_SPEED – To select the CPU and MonSTerBUS operating speed.

UIP.TOS – With a ENC28J60 Ethernet chip attached to the SPI port, this tool allows ethernet communication.

MonSTerbo Troubleshooting

1. Check your PSU to ensure correct voltages. Stable 5V supply ?
2. Check your cooling, especially at 40MHz on the 68020, or 48MHz on the 68000 as the processors may become hot.
3. Does the problem occur at a slower CPU speed, possibly even at 8MHz default speeds ?
4. Disable ALT-RAM. Does the problem still occur ?
5. Clean boot, i.e. disable any AUTO folder, ACCs, CPXs. Does the problem still occur ?
6. If you are in 68020 mode, Enable 16BIT RAM/RAM/FPU mode. Does the problem still occur ?
7. Boot from onboard ROMs by reinserting the ROMs and removing the FLASH ENABLE jumper, does the problem occur ?