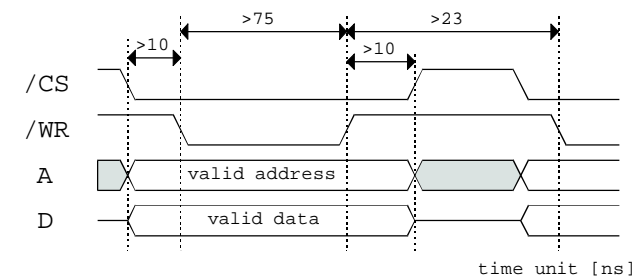


**USB Controller  
for AMIGA**

**SUBWAY**

# SUBWAY



[Fig. 8] Write access timing for **SUBWAY**.

## Legal notes

- Information in this manual has been assembled and checked with all possible accuracy. Anyhow, we cannot be made responsible for errors or missing parts.
- We cannot be made responsible for damages which are caused by using any information given in this manual.
- Technical specification of hardware and / or software may be changed by E3B and Chris Hodges without further notification.
- This manual may not be copied or reproduced in any way and by any means, including optical and electronic proceedings without prior written permission of E3B. This also applies to translations into other languages.
- E3B and Chris Hodges cannot be made responsible for damages due to erroneous or lost data caused by malfunction or wrong application of the *HIGHWAY* / *SUBWAY* and / or the software Poseidon included in this package.
- Damages caused by misaligned plugging and static discharges at the expansion module and / or the computer it was installed are explicitly not covered by guarantee.

## Trademarks

- *HIGHWAY*, *SUBWAY* and *NORWAY* are trademarks of E3B.
- Names and products used in this manual may be registered trademarks or products of the corresponding company, even if they are used in this manual without further notice.

## Contact

- Hardware: Michael Böhmer, Fa. E3B | Riemerfeldring 5 | 85748 Garching | mboehmer@e3b.de
- Software: Chris Hodges | Kennedystr. 8 | 82178 Puchheim | chrisly@platon42.de

The **SUBWAY** is located on memory addresses **0xd80000 - 0xd8ffff** when installed in an Amiga 1200. The whole clockport address space is needed; it is not possible to use additional clockport cards together with the **SUBWAY**.

Memory regions for third party products should be available from the corresponding manufacturer.

## A.3.2 Register definition

Information on register mapping of the **SUBWAY** is available for interested programmers on request. We will support any efforts like driver development for NetBSD or Linux.

# SUBWAY

## A.1.3. JTAG interface

The JTAG interface on the bottom side of the **SUBWAY** is intended for bus interface logic upgrades. Upgrades are only available by authorized support. This connector is not intended for use by customers.

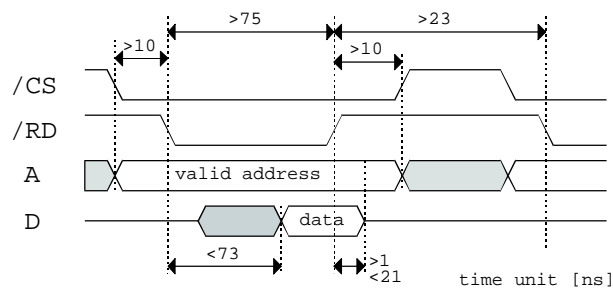
**WARNING:** Do not connect any cable to this port !  
Your **SUBWAY** can be rendered unusable by doing so.  
You have been warned.

## A.2. Clockport timing

As modern ICs are used on the **SUBWAY** it is possible to access the hardware ways faster than the original clockport in the Amiga 1200 can. If the timings required by the **SUBWAY** are kept by third party clockports you will benefit from this advantage. Please consult your third party board manufacturer if his product is compatible with these requirements.

## A.3. Programming information

### A.3.1 Memory map



[Fig. 7] Read access timing for **SUBWAY**.

# SUBWAY

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# SUBWAY

Thanks for choosing our SUBWAY module !

By acquiring the SUBWAY you have chosen a high quality product. SUBWAY allows you to connect many USB peripheral devices to your Amiga. Depending on driver availability you can use standard USB devices from the PC market on your Amiga.

Your package contains Poseidon - a very powerful USB stack. As a Software Developer Kit (SDK) is available (containing all information needed on how to program USB drivers) you can expect software development also from third party companies.

This documentation is intended to guide you through the installation process of the SUBWAY module. Moreover it contains basic information on operation of USB devices. Please read this documentation carefully **BEFORE** trying to install software or hardware on your own. You will avoid problems - and in a worst case scenario - hardware damage to your Amiga and / or your new SUBWAY module.

The AmigaGuide file "ReadMe" enclosed on the disk in your SUBWAY package contains last minute information which couldn't be added in this printed documentation.

Please check this file for latest information before starting installation !

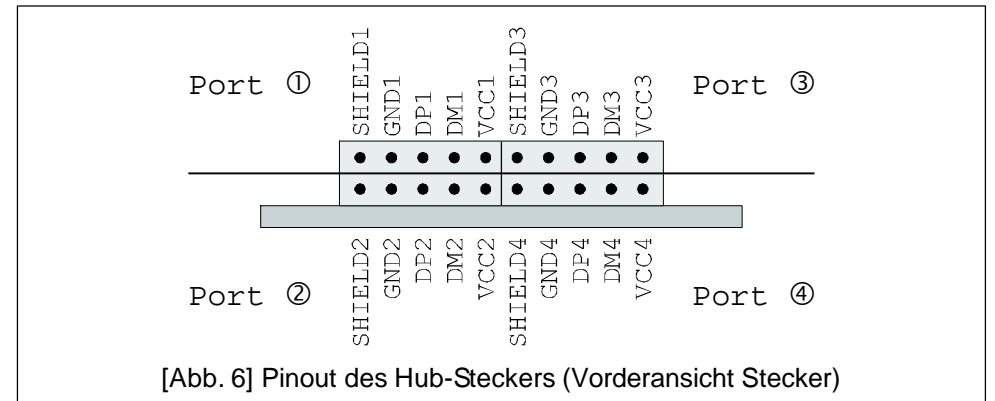
Most recent information as well as software updates can be found on our web site: <http://www.e3b.de/usb/>

# SUBWAY

The color code of USB wires is given by the USB specification and is defined as follows:

red . . . . . Vcc  
white . . . . . DataMinus  
green . . . . . Data Plus  
black . . . . . GND  
(black) . . . . . Shielding

USB motherboard cables with a 10 pin connector (often found in computer stores) are usually **not** compatible with the SUBWAY!



# SUBWAY

## Appendix A

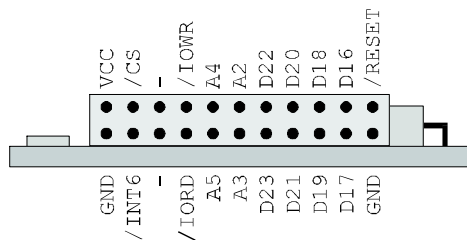
### A.1. Connector pinout

#### A.1.1. Clockport

The SUBWAY uses the standard Amiga 1200 pinout for the clockport. Signals are connected 1:1 over the flat ribbon cable.

Using longer cables instead the original one can lead to data transmission problems.

The interrupt line /INT6 used by SUBWAY is driven by an open collector driver. If connected to a third party board a pullup resistor should be present on this line (value should not be smaller than 470 Ω).



[Fig. 5] Pinout of clockport connector of SUBWAY. (front side view)

#### A.1.2. Hub ports

The four USB ports of the SUBWAY are contacted by cables containing five wires each. These cables usually are standardized. If you want to use cables from a different manufacturer please check carefully if these cables are 100% compatible with the SUBWAY.

Each hub port has five pins which are connected to one adaptor cable. The two black wires are to be connected to **SHIELD<sub>n</sub>** and **GND<sub>n</sub>** (**n** corresponds to the number of port).

# SUBWAY

## 1. Unpacking

Your SUBWAY package should contain the following items:

- one SUBWAY module (clockport version)
- one flat ribbon cable (22 wire version)
- two holding plates with two USB adapter cables each
- one disk with Poseidon USB software
- this manual
- one registration card

Please check your SUBWAY package after unpacking for missing parts ! Missing parts should immediately be reported to your dealer.

Please fill out the registration card completely and return it to us. Support and software updates will be available for registered customers only.

Moreover, you help us making our products better.

## 2. Specification of SUBWAY

- USB controller for Amiga 1200 clockport
- integrated root hub with four ports
- compatible with USB 1.1 and 2.0 devices (**no** highspeed mode)
- all ports are protected against overcurrent and short circuit
- power saving 3.3V technology
- integrated power management on port-by-port basis
- fully isolated for easy mounting
- fast clockport timing supported

# SUBWAY

## 3. Basic information on the USB

The USB (Universal Serial Bus) has been designed by several large companies to standardize connection of peripheral devices to computers. USB allows data rates of 1.5Mbits/s (low speed) and 12Mbits/s (full speed) in its revision 1.1. Next generation devices designed according to the USB specification 2.0 allow a rate of 480Mbits/s in addition. Upto now only few devices with highspeed support are available.

Your  $\leq$ SUBWAY card connects to USB devices which are compatible with USB specification 1.1 and 2.0; anyhow highspeed mode is **not** supported.

The USB has a bus structure that is organised like a tree: each port allows connecting only one device at a time. More ports can be added by hubs. Devices can be connected and disconnected while power-on (hot plugging). Devices connected to the USB can be bus powered (power is drawn from USB host, up to 500mA) or self powered (own power supply).

Your  $\leq$ SUBWAY has already an integrated hub with four ports: you can start with up to four devices without spending extra money on hub hardware!

### 3.1. General hints

Your  $\leq$ SUBWAY has been designed for the internal clockport of the Amiga 1200. The whole module is isolated by plastic wrapping. Do not remove this isolation ! The  $\leq$ SUBWAY does not contain any user configurable jumpers.

Removing the isolation voids the guarantee !

# SUBWAY

## 5. Setup and first steps

Do not connect any USB device for the first test. After you have completed the hardware installation and closed your Amiga's housing you can switch on your computer.

Should you recognize any unusual behaviour of your Amiga, please switch it off immediately. Please consult chapter 5.2. and 5.3. for trouble shooting instructions.

### 5.1. A first test

Please read the software manual enclosed on the disk in your package and install the USB stack according to the AmigaGuide file.

### 5.2. Troubleshooting the clockport

Should problems occur during the first test, please carefully check if:

- has the clockport cable been mounted the right way ?
- are there any pins left open at the motherboard connector ?
- are there any pins left open on the  $\leq$ SUBWAY connector ?
- has the  $\leq$ SUBWAY isolation been damaged ?
- have any cables been damaged or removed during installation ?

Please check the  $\leq$ SUBWAY cabling according to figure 2 on page 6.

### 5.3. Troubleshooting the USB

For further diagnosis you should also disconnect the USB adaptor cables from the  $\leq$ SUBWAY.

If you don't succeed in getting the  $\leq$ SUBWAY working please contact the support team.

# SUBWAY

## 4.2. Installation on third party cards

Your **SUBWAY** can operate on some third party cards, if certain requirements are fulfilled (see also the compatibility list on our web site):

- ▶ The third party clockport is electrically compatible with the original one implemented in the Amiga 1200.
- ▶ The third party board is able to deliver the maximum current of up to 2 Ampere (see also hints on page 5).
- ▶ The timing of the third party board is compatible to the one in the Amiga 1200 and is not violating the values specified in the appendix of this manual.
- ▶ The third party board is supported by the enclosed software (check also our web site on <http://www.e3b.de/usb/>)

Carefully check these requirements before connecting your **SUBWAY**. The third party's manual should contain the needed information; in case of doubts please consult the manufacturer directly. Third party cards will also differ in the clockport orientation. Please carefully check the right orientation before installation; your **SUBWAY** and / or your Amiga can be destroyed if the expansion module is mounted the wrong way.

Installation is done the same way as described before. Mind the cable orientations as given in figure 2. When installing the **SUBWAY** into a tower case please take special care of the cable connections: they might lose contact if mechanical stress is applied, leading to unreliable operation (hint: you may mount the **SUBWAY** with self-adhesive belt).

# SUBWAY

Be careful: the **SUBWAY** may not be connected to the clockport the wrong way !

Damages caused by incorrectly fitted boards on the **SUBWAY** and / or your Amiga are not covered by guarantee. Refer for page 7 for detailed installation guide.

## 3.2. Power consumption

One **SUBWAY** with four devices connected to her ports can consume up to 2 Ampere of current. Especially fully equipped Amigas (harddisks, turbo cards) can get unstable in this condition.

Please check carefully if your power supply is able to deliver the power needed by external devices before connecting USB devices to your **SUBWAY**.

Especially modern turbo- and graphic cards and fast harddisks may use almost all power resources delivered by Commodore or Amiga original power supplies.

We do not recommend operation of power hungry USB devices directly on the **SUBWAY**. The clockport has not been designed for high current devices.

Possible solutions:

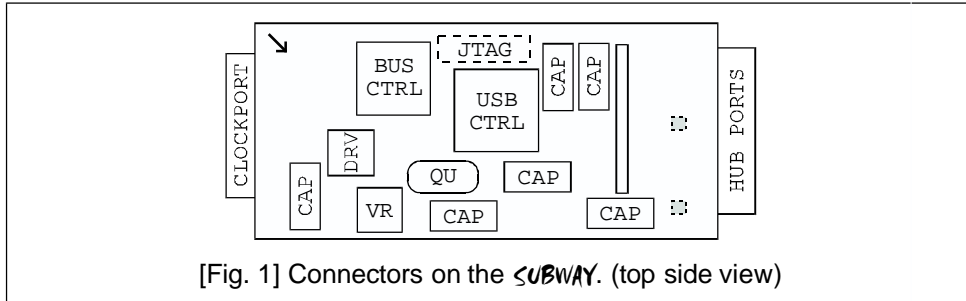
- If possible, use your USB devices "self powered" with their own power supply attached.
- Use an external hub with own power supply ("self powered").
- Replace the original power supply of your Amiga 1200 with a compatible one featuring higher power.
- Operate your Amiga 1200 in a tower housing with a bigger power supply.

# SUBWAY

## 3.3. SUBWAY connectors

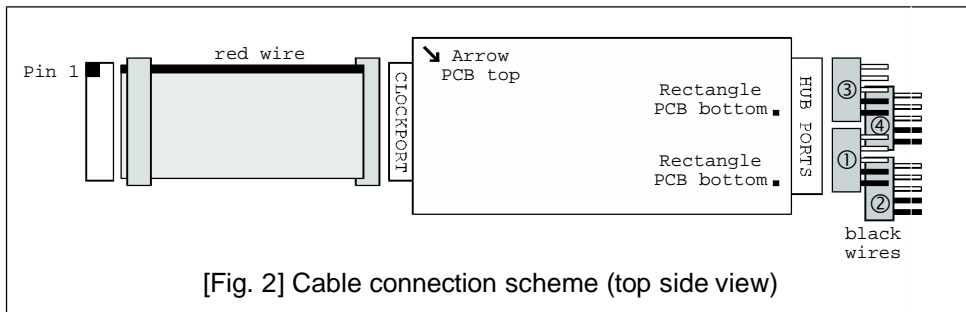
The SUBWAY has two connectors: the clockport (22 pin header, small pitch) and the hub ports (20 pin header).

Please have a look on figure 1; all connector positions and PCB markings can be found there for reference issues.



[Fig. 1] Connectors on the SUBWAY. (top side view)

While installing the SUBWAY, five cables have to be connected to the module. Figure 2 illustrates the connections to be made. Please use this figure as reference, if any doubts arise during installation.



[Fig. 2] Cable connection scheme (top side view)

Connector pinout details are given in the appendix of this manual (page 14).

# SUBWAY

- Don't remount the metal plate over the clockport area. You might severely damage the flat ribbon cable, rendering your SUBWAY unusable.
- Remount your keyboard to the plastic hooks in the bottom part of the case and reconnect the cable to the motherboard (if removed).
- Remount the upper part of case back to its place and close the case by inserting the five screws on their place on the bottom side of the plastic case.

After case reassembly the SUBWAY is ready for operation. Please follow the steps in chapter 5, "Setup and first steps".



# SUBWAY

Further steps depend on the connector mounted on P9B (depending on revision and manufacturer).

- **no connector** mounted: contact your dealer for upgrading this connector.
- **only left part** is equipped:  
contact your dealer for upgrading this connector.
- **complete connector** is equipped:  
align the flat ribbon cable to the right.
- **only right part** is equipped:  
this should be the case with most Amiga 1200.
- Align your flat ribbon cable so that the red wire is facing left (directing to the harddisk) and the attached female connector faces downwards to the male connector P9B on the motherboard. Mount both connectors together (consult figure 2 for right orientation). Make sure the connection is firmly seated.
- Orientate your **SUBWAY** so that SMD components face upwards and the clockport connector is facing towards you.
  - ▶ **Please check:** the small silver arrow left to the clockport connector must be in line with the red wire of the flat ribbon cable.
- Connect the flat ribbon cable with the **SUBWAY** clockport connector.
  - ▶ Check connection according figure 2.
- Install the USB adaptor cables in your computer case.
- Connect the USB adaptor cables to your **SUBWAY** hub port connector. The two black wires of the cables must be aligned to the right side of the **SUBWAY**.
  - ▶ **Please check:** the silver rectangles on PCB bottom side show the correct position for the black wires.
  - ▶ Check figure 2 for correct seating of the USB adaptor cables.
- Before reassembling your Amiga carefully check that the isolating plastic of your **SUBWAY** has not been damaged (risk of shortcircuiting).

# SUBWAY

## 4. Installation of the **SUBWAY**

The **SUBWAY** has been designed for the clockport of the Amiga 1200. Installation is possible on third parties' clockports if certain standards are followed. You will find more information on this issue on page 12 ("Installation on third party clockports") and in the appendix on page 16.

### 4.1. Installation of **SUBWAY** in the Amiga 1200

You will have to open your Amiga 1200 to install the **SUBWAY** on the internal clockport. You can also ask your dealer to install your **SUBWAY**.

#### 4.1.1. Safety recommendations

Please follow these recommendations  
for your own safety:

- ▶ Switch off your Amiga before installation.
- ▶ Remove the power supply AC cable.
- ▶ Disconnect all external devices.
- ▶ Avoid static charge.

#### 4.1.2. List of required material

- **SUBWAY** expansion module
- flat ribbon cable for clockport connection
- two holding plates with two USB adaptor cables each
- a Philips style screw driver
- small pliers
- Mounting material for hub ports

# SUBWAY

## 4.1.3. Installing the hub ports

Four external hub ports (two on each holding plate) are included in your package. There are several possibilities to get these ports out of your Amiga 1200, differing in the grade your Amiga is already equipped with additional hardware. We can therefore give no general guide on how to install the hub ports or deliver material for this task.

The most common way is to use the expansion port under the disk drive. If installing the **SUBWAY** in a tower mounted Amiga 1200, you can use the counterparts on the backside of your housing directly.

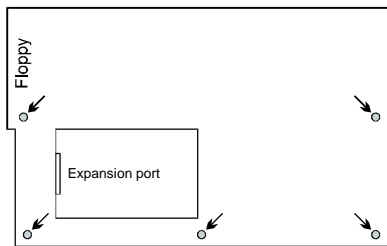
Please follow these recommendations for selecting a mounting place for the hub ports:

- ▶ Use only the included clockport flat ribbon cable. Correct Operation of the **SUBWAY** can not be guaranteed otherwise.
- ▶ Do not extend the USB adaptor cables.
- ▶ Don't damage the cables on sharp edges of your case.
- ▶ Keep cables out of "hot" areas of your computer (processors and their heat sinks)

You will find some pictures of hub port mounting on our website.

## 4.1.4. Connecting the **SUBWAY** to the clockport

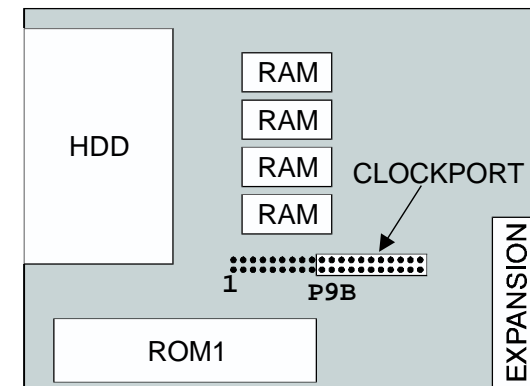
Follow these steps for hardware installation:



[Fig. 3] Bottom side screws on Amiga 1200

# SUBWAY

- ❑ Remove all five screws on the bottom side of your Amiga 1200 (see figure 3).
- ❑ Remove the upper plastic case to the backside.
  - ▶ Take care of the small plastic hooks at the backside of your computer! They tend to break.
  - ▶ Take care of the LED cables in the upper part !
- ❑ Remove the keyboard from the plastic hooks in the bottom part and store it behind the Amiga 1200.
  - ▶ Take care not to damage the flat ribbon cable going from the mainboard to the keyboard. You can also remove this cable by carefully opening the connector on the mainboard.
- ❑ Next to the right edge of the harddisk (if installed) you will find a metal plate covering the clockport area of the mainboard. Carefully bend up the two metal edges holding the plate and remove it.
- ❑ Depending on motherboard revision the connector P9B will be equipped differently (figure 4).



[Fig. 4] Location of Amiga 1200 clockport (motherboard top side view).