
# PCI Adaptor

## for the Atari Falcon

Fmax the way forward...

cortex design

# Fmax

# SECTION 1
## HARDWARE

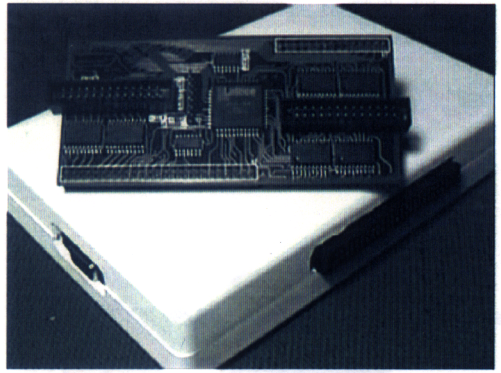
eclipse

PCI adaptor

## INTRODUCTION

Eclipse is part of the ***Fmax*** strategy from Cortex Design which provides powerful hardware and software designed specifically for Atari Falcon030 computers. Eclipse is an adaptor allowing standard PCI cards (commonly used on PC & Macs) to be interfaced directly with the Atari Falcon030 computer.

This opens up all sorts of expansion possibilities with future support for Graphics, Network, Sound, Ultra-Wide SCSI, etc. While Eclipse is primarily designed for use with the ATI 3D Charger graphic card (incorporating the powerful Ragell 3D chipset), other PCI cards would rely upon suitable software support.



As a graphic card adaptor Eclipse opens up a new dimension for Atari Falcon users. Rather than be constrained to a maximum 640x480 with 256 colours, Eclipse offers up to 1600x1200, 16-bit colour or 1152x864, 32-bit colour! While higher resolutions are dependant on a suitable monitor, they still provide high speed operation with high refresh rates.

The software to drive Eclipse is called ***f***VDI (=***F***enix/***F***ree/***F***ast **VDI**) which includes specific drivers to power the ATI Ragell chipset.

## INSTALLATION

**PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE DISMANTLING. We cannot be held responsible for any damage caused due to improper fitting.**

Eclipse is a two-part design--the main interface board plugs onto the Falcon expansion connector and interfaces to the PCI Adaptor via two 25-way ribbon cables, which is mounted in an external box.

Users with recased Falcons can fit the PCI Adaptor internally—space permitting. This means removing it from the case.

### DISMANTLING THE FALCON

Remove all external connectors and peripherals from the Falcon, including the mouse and, ***MOST IMPORTANTLY***, the power cable. Remove any floppy disk from the drive.

Turn the computer over and remove the seven screws located in the square recesses, leaving the three screws in the round recesses. While holding the assembly together, turn the computer to the normal position. Lift the plastic case remove the keyboard by lifting it slightly from the back and unplugging the connector from the motherboard.

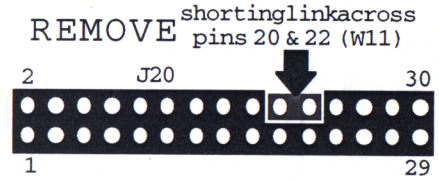
The top metal shielding is secured by nine screws, plus a further three which are located at the rear above the power switch and inlet socket. In addition there is a single metal tab.

Remove the twelve screws and straighten the metal tab. Carefully lift the metal shielding but before removing it entirely, unplug the 2-pin speaker connection which is situated between the floppy and hard disk drives.

*Right: Eclipse located on the Falcon expansion slots with the ribbon cable in position.*

### EXPANSION CONNECTOR

Located to the left side of the motherboard, immediately in front of the PSU. Locate the two 'double-pin headers'—J20 has 30 pins and J16 has 50 pins. Remove the jumper located across J20 (marked W11) and plug Eclipse into J16 and J20. Ensure the pin headers are aligned correctly!

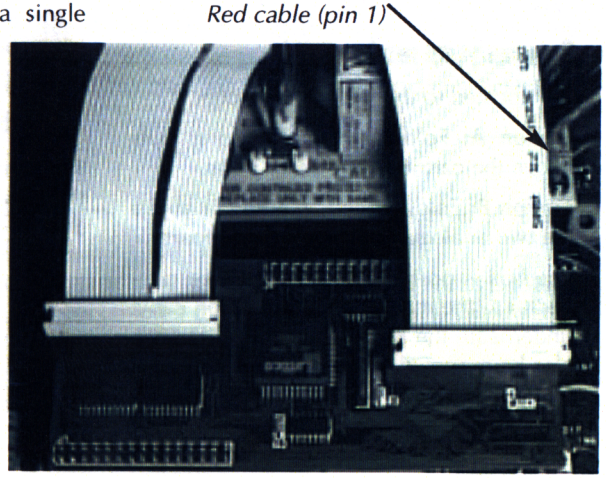



If an expansion board is already plugged into the Falcon, fitting Eclipse depends on the availability of 'through-port' expansion on the existing expansion board. If they exist simply plug Eclipse onto these headers after removing the jumper.

### RIBBON CABLE CONNECTION

The interface cable has two 26-way headers at one end and a 50-way header on the other. Both have 'lugs' corresponding to the moulding in the box headers on Eclipse.

Pin1 has a red stripe. Looking at the front of the Falcon, with the Eclipse card plugged in, the cable with the red stripe plugs into the ***right*** socket.



### 12V Supply (Get this RIGHT!)

The separate lead from the ribbon cable needs soldering onto the 12V line of the PSU. Locate the seven power cables (**1xblue**, 4xblack, 3xred) leading from the PSU and solder or crimp the single cable to the ***blue lead*** of the PSU.

DO NOT CONNECT THIS LEAD TO THE BLUE MAINS (230V) LEAD!!!

## Cable Routing

The ribbon cable can take different routes, depending on the Falcon case in use. Where necessary a slot deep enough to allow the ribbon cable to pass under the top plastic cover needs filing. The cable measures about 1mm x 55mm.

***Note:*** Ensure no part of the PCI Adaptor of the graphic card comes into contact with metal parts of the Falcon.

### 1. Straight

**Standard Falcon case:** Allows the box to be sited on the top plastic cover (not recommended if the internal fan has been moved above the PSU), or behind the Falcon.

***Note:*** As this positions the Eclipse PCI case above the PSU, it is ***MOST IMPORTANT*** to ensure that adequate ventilation is available, otherwise damage to the PSU could occur.

### 2. Folded to the left (Preferred)

Box located to the left of the Falcon.

**Option A:** Folding the cable so it exits above the cartridge and MIDI ports.

**Option B:** Folding the cable to exit above the two analogue ports (left of keyboard).

The box is positioned with the video connector to the rear, routing the ribbon cable underneath the Eclipse case. The case can also be mounted vertically.

### 3. Folded to the right

Intended for recased Falcons or if no IDE drive or PSU are present in the standard Falcon case. The PCI Adaptor and ATI card need from the Eclipse case.

***Note:*** Brackets are not supplied, but those inside the Eclipse case could be adapted.

#### Dismantling the Eclipse case

Unplug the cables from the box and remove the four screws from the base. Remove the two screws retaining the PCI Adaptor to the two metal brackets.

***Note:*** **Handle the card by the edges. We cannot be held responsible for damage due to improper handling or misuse.**

**a) Standard Cases (no IDE drive or PSU)**

The PCI interface board can be mounted in the space intended for the IDE drive or PSU. Brackets not supplied for this purpose.

***Note 1:*** Ensure the graphic card components are 'on top' to ensure adequate ventilation.

***Note 2:*** A rectangular hole measuring 32mm x 12mm needs cutting to allow the VGA socket to protrude.

**b) Recased Falcons**

The Eclipse PCI interface card and ATI graphic card can be removed from the case and mounted into recased Falcons. C-Lab MK.X cases can have the interface and graphic card fitted behind the floppy drive providing no other device is fitted there.

## Reassembly

Reassemble the Falcon in the reverse order to the assembly procedure. A 120mm wide x 50mm deep slot needs cutting in the top metal shielding, corresponding with the fitted Eclipse board. Make absolutely sure no part of the metal shielding can touch the Eclipse boards. **We cannot be held responsible for damage caused due to an improper reassembly procedure!**

# fVDI

# Section 2
## SOFTWARE

## INTRODUCTION

The VDI (Virtual Device Interface) is a part of TOS/GEM which acts as an abstraction layer between applications and the various input/output devices such as screens, keyboard, printers, etc. This means programs that use the VDI don't normally have to worry about the hardware that actually performs the input/output operations. On Atari computers, only the parts that deal with the screen and keyboard are included in the ROM, the rest are in an external component called ***GDOS*** (Graphics Device Operating System).

For the VDI to access hardware, it needs ***device drivers***--software that knows how a specific device can be used. These are usually loaded separately as defined by a configuration file. fVDI includes a special device driver optimised for the 'mach64' 2D engine which is at the heart of the RageII chipset, amongst others, from ATI.

The speed of the ATI Charger card is harnessed using new VDI software--fVDI (Fenix/Free/Fast VDI) by Johan Klockars, which like NVDI replaces the Falcon's original VDI. However, unlike NVDI, fVDI is free!

As fVDI is an on-going project covered by the **GNU General Public License**, free updates can be obtained directly from our web or ftp sites (see ***References***). A program covered by GPL essentially means it is 'forcibly free'--it can be sold, but anyone is free to give away copies. The sources must also be available and anything derived from them must be covered by the same license. See ***Appendix 1*** to find out more about GPL software.

### Printer Support

Currently there are no fVDI drivers for printers, so if support is needed a second VDI/GDOS can be used with fVDI.

NVDI is a commonly used VDI replacement and provides printer support*. If NVDI is used just for VDI acceleration, greater benefits will be gained if it is loaded before fVDI. The difference in performance is around ***50% faster*** than when NVDI follows fVDI!

***Note:*** GDOS, FontGDOS (on disk) or SpeedoGDOS (v5 includes TrueType support) can be used for printing instead of NVDI, if the correct drivers are available.

## fVDI Installation

You can boot the Eclipse floppy to initialise fVDI at the default resolution of 640x480, 16-bit colour prior to installation. This does have the advantage of testing the Eclipse hardware, but fVDI can be installed using the standard Falcon video output.

***Note:*** It will be necessary to change the monitor lead from the Falcon video port to the Eclipse video port, once Eclipse is initialised. A switchbox and leads can be supplied to allow access to both video modes. Please contact us.

To install the software, create a folder called **FVDI** on the hard disk and copy the entire contents from the floppy to this new folder. This ensures a backup is always available.

Now copy the following files onto the boot partition of your hard disk (normally C:);

| | |
|---|---|
| PCI_BIOS.PRG | - in the AUTO folder. |
| FVDI.PRG | - in the AUTO folder. |
| FVDI.SYS | - on the root of Drive C: |
| FVDI.ACC | - on the root of Drive C: |
| RAGE.SYS | - inside the GEMSYS folder. |

One point worth noting to increase the speed of Eclipse operation is to change the ***Falcon resolution*** to the lowest possible number of bitplanes, i.e. select 640x480, 2 colours. This also has the advantage of preserving memory.

### Ordering AUTO Files

Files in the AUTO folder must be placed in a specific order. A utility (AUTOS401.PRG) is provided on the disk for this purpose. If another VDI is used (such as NVDI) there are two ways it can be set-up.

***Note:*** '***foreground***' means this VDI is loaded ***after*** the '***background***' VDI.

**Example:**

```
AUTO [folder]
        ... (AUTO programs before NVDI)
    PCI_BIOS.PRG
    NVDI.PRG  ('background' VDI)
    FVDI.PRG  ('foreground' VDI)
        ... (AUTO programs after NVDI)
```

**1. fVDI running as the 'background' VDI with another VDI/GDOS 'on top'.**

Exactly what happens in this case depends on the specific 'foreground' VDI used, but it will be possible to access all drivers (printers, etc.) the VDI is aware of, or NVDI assumes the normal Atari video hardware is used. Screen display is slower with another VDI in the foreground, as all calls, however you may get access to new features supplied by the foreground VDI. E.g. with NVDI in the foreground the complete set of outline fonts would be available on screen.

**2. fVDI in the 'foreground' and another 'background' VDI/GDOS (as above).**

fVDI will run at maximum speed for all screen operations, and still enable access to other devices recognised by the other VDI.

There is currently no way to use, for example, NVDI outline fonts using this configuration, and there is a slightly higher risk of instability since the other VDI is unaware of ***not*** being the main one.

## PCI_BIOS.PRG

Place before FVDI.PRG in the AUTO folder. This file initialises the PCI BIOS to improve compatibility with certain programs and also enables future compatibility with other PCI cards, providing drivers exist.

## FVDI.PRG

The main file which initialises Eclipse when the Falcon is booted. The positioning of this file is important and can be installed before or after NVDI (if present) depending on your preference. See ***Ordering AUTO files***.

## FVDI.SYS

Can be altered using a text editor. It will be necessary to alter the 'PATH=' line if, say, the GEMSYS folder is located on partition E: the line would then read: `PATH=E:\GEMSYS`. See ***APPENDIX I***.

## GEMSYS folder

GEMSYS contains all fonts and device drivers, including RAGE.SYS. If FVDI.SYS is not set up correctly, and does not find the correct driver, Eclipse will not be initialised.

If a GEMSYS folder does not exist on your system, copy the one from the Eclipse floppy disk directly onto the root directory of C:

### NVDI Installed

If you decide to retain NVDI it will be necessary to disable the NVDI screen drivers (located in GEMSYS folder). These are named NVDIDRVx.SYS, where 'x' is 1,2,4,8 and H. Rename them to .SYX.

## FVDI.ACC

Placed on the root directory of Drive C: This file improves compatibility with some operating systems. In future the .ACC will contain more features, but is currently needed to enable a feature to speed up menu drawing and some dialogs, substantially.

### AES Buffer

The AES keeps an internal buffer where it copies data from the screen before it is overwritten by the menus/dialogs. When they are removed again, the data is copied back from the buffer rather than redrawn.

If told by the ACC where the buffer is, fVDI will handle most such copies (subject to available memory) internally on the RageII card which is ***much*** faster.

***Note:*** The AES buffer (and other similar speed improvements) can allocate large amounts of video memory--up to 1MB is possible. To get maximum effect from this, it is best not to exceed resolutions of 1024x768 (32-bit), or 1280x1024 (16-bit).

## Accelerator Boards

If an accelerator board is fitted it is necessary to change the running order so that any 'speed switch', e.g. NEM_HI.PRG, is the last item in the AUTO-folder.

### Afterburner040

A new version of the AB040 Toolkit is included on the disk to enable PCI BIOS to initialise. Replace your existing AB040 software with this, ensuring PCI BIOS is positioned ***afterwards***.

# SOFTWARE UTILITIES

A few utilities are included on the disk to help get the best from your Eclipse system. Some may not be available at the time of writing but will be posted on our web site once available.

## VDI Bench

Produced by Magnus Kollberg. Enables an accurate profile of the VDI rating for any Atari 680x0 computer. Ideal for comparing the result of various acceleration effects.

## fVDI Mode

Before changing to a higher resolution please make sure your monitor is capable of supporting it! We cannot be held responsible for any damage occurring to your monitor.

Produced by Dave Murphy. Allows resolution and/or colour depth to be changed without manual editing of the FVDI.SYS file.

## ACCfolder

Produced by Dave Murphy. A handy utility which allows all ACCessories to be moved from the root directory of the boot partition to a single folder. See README file on disk.

## Autosort

Produced by Eugene F. Sothan. A handy utility for reordering the AUTO folder. Simply drag AUTO files to a new position using the mouse, then press [**Resort**] button.

## FontGDOS

The entire FontGDOS distribution disk. Install by running GDOSINST.PRG. Not required if using NVDI, but is a considerable improvement over the original Atari GDOS.

# APPENDICES

## 1.FVDI.SYS

Please also refer to the FVDI.SYS files supplied on disk which contain more information on the various switches. Other switchable options will be present in the future.

FVDI.SYS can have several options enabled or disabled using a Text Editor, but should not be altered unless you understand what you're doing! Lines preceded with the '#' symbol are ignored by FVDI.PRG.

**Example:**

```
PATH=C:\GEMSYS
01r rage.sys mode key imgcache screencache
#01r rage.sys mode key (# = this line ignored!)
s atss05.fnt
s atss07.fnt
s atss10.fnt
s attr05.fnt
s attr07.fnt
s attr10.fnt
```

The lines prefixed with 's' indicate system fonts. **Not mandatory:** With NVDI installed the lines are named 's monacoxx.fnt', where 'xx' is 08,09,10 and 20. Use these four lines to replace ***all*** the six system font lines used in the example (above).

### Driver Information Line

Other options are contained within the Driver Information line.

**Example:**

```
01r rage.sys mode 4 imgcache screencache
```

### Resolution Setting

**Check your monitor handbook before setting any resolution as it may not be capable of achieving a particular setting!**

**mode [NxNxN@N]** - Sets a specific resolution

**Example:** `mode 1024x768x16@70`
Sets a resolution of 1024x768, with 16-bit colour at a 70Hz refresh rate.

Currently supported resolutions are; 640x480, 800x600, 1024x768, 1152x864, with 8, 16, 32-bit colour and a variety of refresh rates. If an incorrect figure is entered, fVDI uses a lower (safer) setting.

**mode [n]** - Sets a predefined graphics mode, where 'n' is between 0 and 9..

Another method for resolution setting, by using one of ten pre-defined modes.

These can also be accessed using '**keys**' to allow a resolution to be set during the boot process by pressing a single numeric key.

| | |
|---|---|
| **setkey [n]** | Default resolution mode |
| **echo "your message here"** | |
| **waitkey [n]** | Wait [n] seconds for key press |
| **exitkey [x]** | Press [x] to skip fVDI |

Therefore a typical set up could be:

```
setkey 2
echo "Press key to set mode"
waitkey 9
exitkey q
01r rage.sys mode key imgcache
```

This pauses the Falcon during the boot process for up to 999 seconds ('waitkey'), and displays the message quoted in 'echo'. Pressing key [4] before 'waitkey' period has elapsed will recommence booting and use 'mode 4' resolution. If no key is pressed the default 'mode 2' ('setkey') is used. Pressing [q] skips fVDI and reverts to standard Falcon video output.

***Note:*** The 'echo' messages are only visible on the Falcon video output. Any number of 'echo' lines can be inserted, therefore the complete list of available resolutions can be shown.

**Example:**

```
echo "Press key to set
echo "1 - 640x480, 256 cols"
echo "2 - 800x600, 16-bit"
...etc.
```

A utility (**DEFAULT.TTP**) is included on disk to allow default modes to be altered to your own preferences. See README file.

### Other Driver Parameters

Many other parameters can be included within the **Driver Information** line. Please read the FVDI.SYS file for full and up-to-date information.

## 2.TROUBLESHOOTING

**In most cases** software installation could be the cause of problems. **Please,** check this first. If necessary, strip the AUTO folder down to the bare essentials, i.e. FVDI.PRG only, and retry. AUTO programs can be temporarily disabled by renaming to .PRX.

If this works, enable other AUTO programs individually, retrying the new config. each time. If not, insert 'debug' ***before the Driver Information Line***, change the video lead to the Falcon and report any screen messages to us.

**Example:**

```
PATH=C:\GEMSYS
booted
debug
01r rage.sys mode 0
```

ACCessories and CPX utilities can sometimes cause problems so try disabling these if a bare fVDI installation doesn't work.

### Display artefacts

Normally these are associated with certain programs which may require some of the ***Driver Information*** switches either being disabled or enabled. Problems such as incorrect or missing icons are an indication to this problem.

As with disabling programs within the AUTO folder, it is also best to treat the parameter switches in the same way, i.e. start with a basic FVDI.SYS setup and introduce switches individually, rebooting to test the effect each time.

### Fitting Eclipse to another expansion board.

If another board is fitted to a standard Falcon, you will probably need to recase the Falcon.

If there is insufficient room between the existing upgrade board and the Eclipse card, we can supply 'bridge blocks' to raise Eclipse higher. Please also check for the clearance between components on both expansion cards.

### Running a non-GEM program

Non-GEM applications, such as APEX Media, rely directly on the Falcon video output. Switch the video lead back to the Falcon. **Contact us if you require switchbox and leads.**

### Programs running incorrectly

fVDI includes several options to speed the Falcon. However, some may have an adverse affect on the operation and these programs may benefit from disabling certain parameters, such as 'screencache' and 'imgcache'.

### Double-clicking on a file to view contents

At the time of writing we are trying to source a '**VT52 Emulator**'. After pressing the [**Show**] button, the video output switches to the Falcon so you will need to switch the monitor lead to view the file. Alternatively use a Text Editor.

### No Video, black screen

Try changing the video lead to the standard Falcon video port to see the current status of the boot process. If the standard Falcon Desktop is visible on the Falcon video output, this means fVDI has not initialised properly.

### No Video, white screen

If a white screen or a boot message is visible on the Falcon video this should mean fVDI has initialised correctly, unless the boot process has locked the Falcon up.
Check monitor is switched on and connected!
Check hardware installation and all connections.
Check software installation.

### Scrambled Video/Loss of Sync.

**Switch your monitor off now!** This is probably due to a higher refresh or resolution setting which is beyond the capability of the monitor.

Check the monitor handbook to see whether it is possible to run this resolution.

Start by using the standard 640x480 resolution and build up to higher resolutions--first 800x600, then 1024x768, etc.

**Do not keep the monitor switched on if the resolution does not synchronise properly.**

If another problem occurs which isn't mentioned here, please contact us. HOWEVER, we urge users to firstly check the hardware and software installations!

# REFERENCES

**ATI Tech. Inc.** http://www.atitech.com

**Cortex Design** http://www.titan-bss.co.uk
tech@titan-bss.co.uk

**Istari Software**
http://www.it.lth.se/users/sven/istari.html

**fVDI updates** http://rand.thn.htu.se
Please check your current version to see whether a new update is available. Links available from http://www.titan-bss.co.uk.

**GPL software**
http://www.gnu.org/copyleft/gpl.html

## ACKNOWLEDGMENTS

**Eclipse** ©1998/99 Cortex Design, England.
**Electronic design and PCB design**
©1998/99 Istari Software, Sweden.
**Fenix OS**
©1997-99 Istari Software and Johan Klockars.
**fVDI** ©1998/99 Johan Klockars.
**VDI Bench** ©1999 Magnus Kollberg.
**fVDI Mode and ACCfolder v1.13**
©David Murphy
**AUTOS401 (Autosort)**
©1988-92 Eugene F. Sothan.
**ATI™, Charger™ & RageII™**
all © and trademarks™ of ATI Technologies Inc.
**NVDI** ©Behne Brothers.
**Falcon™, Falcon030™ & FontGDOS™**
©Atari® Corporation.

All other trademarks and copyrights of products mentioned in this manual are acknowledged as belonging to the persons producing them.

Thanks also extended to Douglas Little and Peter Armitage for their assistance.

## MANUAL TRANSLATION

Thanks to Oliver Heun (Germany) and Alain Champagne ACS Production, France) for their invaluable help and assistance.



## REPRODUCTION



## LIABILITY

Cortex Design and Istari Software make no warranty of any kind with regard to the use of the Eclipse PCI Adaptor, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Cortex Design, Istari Software and Johan Klockars will not be held responsible for any incidental or consequential damages to the computer, the Eclipse hardware or any associated peripheral or software, in connection with the furnishings, performance, or use of the hardware or software.

**Cortex Design reserves the right to insert, remove or change features to the hardware or software without prior notice.**

**E & O.E. - Errors and Omissions Excepted**


6 Witherford Way, Selly Oak
Birmingham B29 4AX. U.K.
Tel: +44 (0)121-693 6669
tech@titan-bss.co.uk
http://titan-bss.co.uk