

Issue 1 May 1995

ATARI *Pro*

Sound **n** Vision

**Falcon
Special**

Find out what the Falcon
is *really* capable of...

Inside

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EXCLUSIVE!

**C-Lab unleashes
the
Falcon
music
workstation**





Airborne again...

Atari computers appear to have nine lives. Just when you lose all hope, something else happens to revive interest in our favourite system. The latest news is that C-Lab, the German company behind the successful MIDI sequencers Creator and Notator, has announced plans to manufacture the Falcon Mk II. The new machine is specifically designed for the professional musician with improved audio and a built-in SCSI hard drive.

This is great news for all Atari enthusiasts because it promises further sales of the Falcon, encouraging ongoing development of programs like Apex Media and Cubase Audio. The additional sales may even revitalise the general Atari market. Digital Awareness, the UK distributor for C-Lab products has expressed interest in all aspects of Atari computing, from word processing to Internet access and beyond.

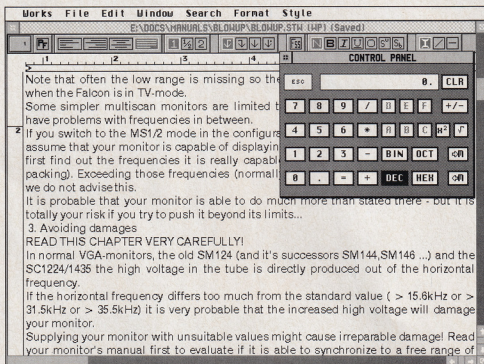
The real problem lies, in my opinion, with TOS. The operating system has not seen development for a while now and is quickly falling behind the likes of Windows and System 7.5. Apart from the obvious need for hardware development, a serious attempt must be made to bring TOS up to date. A possible solution might be to include Magic with every new Falcon. Magic has already proved itself as an ideal multi-tasking system for Atari computers. If C-Lab takes the plunge and appreciates that there is more to the Falcon than MIDI, the future for Atari computing will be bright...

OFIR GAL, technical editor

Flaunting



Ofir Gal unravels the truth about the Falcon's many display modes.



The standard VGA mode consists of a 640*480 pixels. Normally VGA means a 16 colour display as shown here.

If there's one aspect of the Falcon that has confused even the most hardened Atari veterans, it has to be the video display. Many new users – this one included – have been confused by the ambiguous description of the video hardware in the manual. Indeed some three years after the Falcon's first appearance, there is still no complete explanation of

which resolutions are possible with the various monitor types.

The Falcon features a fully programmable graphics board, but its capabilities are well hidden from the casual user. In fact, without additional software, the choice of screen resolutions is rather limited and dependent on the connected monitor.

In principle, the Falcon can generate all ST resolutions for compatibility. These are ST High (640*400 monochrome), ST Medium (640*200*4 colours) and ST Low (320*200*16 colours). In addition, there are VGA compatible modes, VGA resolutions are all 640*480 pixels, ranging from monochrome to true colour. However, how

well these resolutions are displayed and which ones are actually available depends on which monitor you have connected to your Falcon.

You can use almost any monitor type, but only flexible multiscan

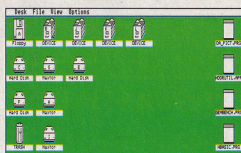
"Only flexible multi-scan monitors can produce the entire range of Falcon resolutions."

monitors can produce the entire range of Falcon resolutions. The basic choice is between the VGA and RGB varieties. You can also connect

a standard SM124 or compatible monochrome monitor and even a TV set.

Atari monitors

Colour RGB monitors are already in use for producing medium and low res on standard STs. They are mainly used for games that run at low resolution. A TV



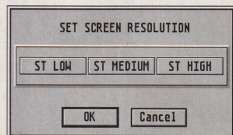
ST Medium res was created to allow users of colour monitors to use word processors and other applications.

set can be used instead of an RGB monitor, although the image is not as clear.

On a Falcon, an RGB monitor like the Atari SC1224 can display low and medium resolutions. By using a technique called interlacing, resolutions up to 640*400 are possible, ranging from monochrome to true colour.

Interlaced display is fine for viewing photographic images, but is almost unusable for text or drawing due to screen flicker.

The resolution can be stretched even further by using overscanning. This method uses the black border area



You can run in ST compatible modes if old programs refuse to work otherwise.

Resolutions like 880*656 via a screen expander are useful for DTP work.

around the display and therefore extends the resolution to 768*480. The overscan mode is not available from the desktop, but can be enabled by using a small Auto folder program.

RGB colour monitors are therefore best suited for games and image viewing using the high resolution true colour display despite it being interleaved. Apart from the Atari models, several manufacturers like Philips (with the popular 8833) and Commodore have also produced good quality RGB monitors.

The trusty SM124 or a compatible monochrome monitor (like the older SM125 or the newer SM144) can also be connected to the Falcon. Not surprisingly, only one resolution is possible with this monitor - ST High at 640x400 monochrome.

VGA and beyond

For most purposes, a good quality VGA monitor is ideal for use with a Falcon. All VGA monitors can produce the three ST compatible resolutions, but go much further than that.

VGA is a loose term that normally describes a screen resolution of 640*480. When connected to a Falcon, a VGA monitor will display this resolution using 2, 4, 16 and 256 colours. Because of the limitation of the Falcon graphics board, only 320*480 and 320*240 are possible in true colour mode, the first of which is pretty useless. Apart from this and the lack of overseas facilities, a VGA type monitor will let you get a lot out of the Falcon video hardware.

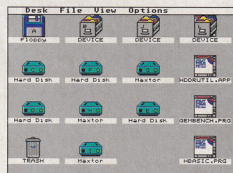
Most VGA monitors these days are in fact Super VGA (SVGA) compatible. This means that they can happily display a screen resolution of 800*600 in addition to the standard VGA modes. The Falcon is capable of generating these screen modes but not without the help of additional software or hardware.

Resolution expanders

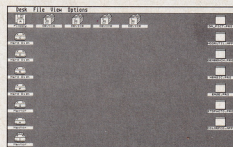
The Falcon video hardware can be programmed to generate almost every conceivable resolution. Standard SVGA monitors can be pushed to display these resolutions and even RGB and monochrome monitors may oblige but the only sure way to expand your view is to get a multiscan SVGA monitor that can

cope with the resulting video signal. Using freeware programs like FalconScreen or commercial products like ScreenBlaster and BlowUp30, screen resolutions of 800*600 are accessed easily. With luck and a very good monitor, 1280 by 960 should be possible.

If you intend to use a resolution expander you should consider buying a multiscan SVGA monitor. This will prevent later disappointment when you realise that your monitor cannot produce the extended resolutions. It is not enough to look at the resolutions quoted in the adverts. The most important factor is known as the Horizontal Scan Frequency. A monitor should have a continuous horizontal frequency range of 30 to 60kHz to be able to cope with all extended resolutions.



True colour mode on a VGA monitor does not stretch beyond 320*240 which is only useful for games. Using a resolution expander, 500*400 or even more is possible depending on the monitor.



ST High resolution is a monochrome display with 640*400 picture elements (pixels).

About screen frequencies...

The number of times the screen display is refreshed each second is referred to as Vertical Scan Frequency. The SM124 was known for its stable and clear display which can be attributed in part to its high refresh rate of 70Hz. This means that the image is updated 70 times a second.

Lower refresh rates produce noticeable flicker with 60Hz considered the absolute minimum for serious use. RGB monitors normally refresh at 50Hz. When using a VGA monitor without any additional software on a Falcon the screen is refreshed at 60Hz. Using a software or a hardware screen expander this rate can be pushed to 70Hz and beyond to give a flicker-free display. Note that vertical and horizontal frequencies are not the same thing!

The down side of pushing both screen resolution and refresh rate is that this puts an extra load on the Falcon's processor and that slows the system down. This is most noticeable when running in colour modes.

Maximum resolutions with each monitor type

	2 colours	4 colours	16 colours	256 colours	True colour
VGA	640*480	640*480	640*480	640*480	320*240/480
RGB	640*200	640*200	640*200	640*200	640*200
SM124	640*400				

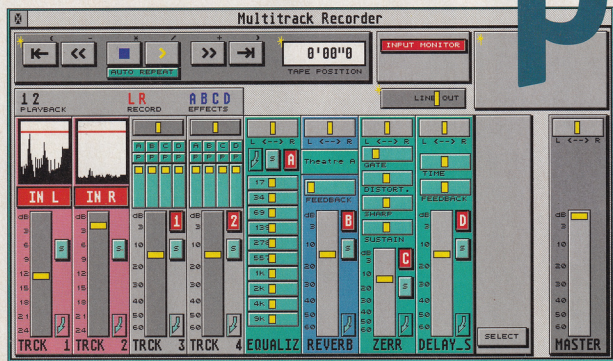
640x400 is possible in interlace mode when using an RGB monitor and can be pushed to 768*480 or 768*240 by enabling overscan mode.

Memory requirement of display modes

	2 colours	16 colours	256 colours	True colour
320*200	8Kb	32Kb	64Kb	128Kb
640*480	37Kb	150Kb	300Kb	600Kb
800*600	58Kb	234Kb	468Kb	

The Falcon does not have separate video memory; it is allocated from the main memory. The more colours and pixels on screen, the less memory for programs.

Record and play



Music maestro
Ian Waugh takes
an in-depth look
at the Falcon's
direct-to-disk
recording abilities.

The Atari ST stood the music world on its head by including a MIDI interface in its design. It brought affordable MIDI control to the masses and

played a major part in the development of sequencers. The Falcon could well do the same for direct-to-disk (d-t-d) recording.

It has a built-in DSP (Digital Signal Processor) chip, the Motorola 56001, which operates at 32MHz and which can be connected to all kinds of external peripherals. Among other functions, the chip can convert analogue audio signals into digital ones and vice versa. Every other computer currently on the market with the exception of the AV Apple Macs require an additional piece of hardware to do this.

The Falcon also has an eight-channel 16-bit digital DMA sound port with up to 50kHz sampling rate plus stereo DMA audio Ins and Outs. Put it

all together and you have the foundation for a very affordable d-t-d computer.

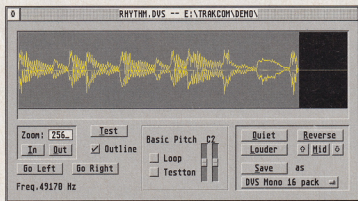
It seems natural, therefore, that cost-conscious musicians are looking to

the Falcon as an affordable d-t-d solution and it's not surprising that many music software companies have produced some quality d-t-d software for it.

Every other current computer requires additional hardware for hard disk recording

Current programs

Current d-t-d software falls into three camps – tracker programs, multi-track digital recording software and programs that combine MIDI sequencing with digital recording.



Aimed at the high end of the market, **DigiTape** offers a modular, dedicated approach to hard disk recording.

Compo's **TrakCom** – up to ten tracks plus an integrated, though basic, sample editor.

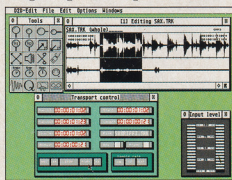
DSD 4T/FX was one of the first d-t-d systems to appear and offers four tracks and built-in FX.

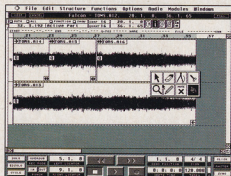
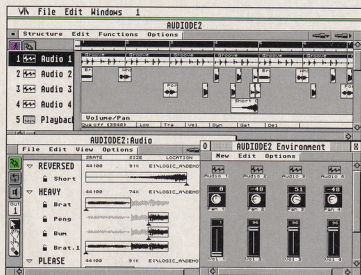
Trackers are great fun and offer an alternative way of making music to MIDI. They use samples which can contain instrument or vocal sounds, and even complete bass and drum loops so you don't have to be a master musician to put a piece of music together.

TrackCom (£79) from Compo supports up to 10 tracks and includes a sample editor. There are also some shareware and public domain trackers such as Stormtracker, which uses music notation, and Octalyser, which supports eight tracks.

The most popular Falcon d-t-d application is digital recording, **Clarity 16 Falcon** (£99) from HiSoft builds upon the success of the ST Replay samplers and is ideal for experimenting and messing about with samples.

Audio Tracker (£159) from System Solutions is slightly more upmarket, being an eight-track digital recorder





Notator Logic Audio (above) and Cubase Audio (left) are EMagic's and Steinberg's d-t-d offerings for the Falcon. Both include heavyweight functions at a fraction of the price of a Mac/PC system.

with a mixer and effects unit. The wave editor allows non-destructive editing.

Audio Master (£199) also from System Solutions is a stereo mastering system aimed at the pro end of the business with features such as non-destructive editing, real-time cross fades, loop functions and sophisticated marker handling. You can expand the program by adding Equaliser (£249), Analyser (£199) and MIDI sync (£99) modules although for a more modest £199 you can get a cut-down version of the three modules with Audio Master Lite.

D2D 4T/FX (£299) from D2D Systems was one of the first d-t-d systems to appear and the design is a little chunky. It's a four-track system with built-in FX. DigiTape is another program aimed at the higher end of the market with a price to match - \$499. It has lots of features but it really needs a few more to justify the price.

MUSICOM 2 (£79) from Compo works in mono or stereo and lets you

Mods for rockers

Before you rush out and buy a Falcon, if you haven't done so already, there are one or two things to be aware of.

The original Falcon architecture had a few features that were inconsistent with the computer's d-t-d aspirations. In other words, bugs to you and me.

In particular, modifications need to be made to the CPU clock to prevent distortion and you may want to remove the bass boost and make the audio sockets line level.

Companies such as System Solutions will perform the mods on any Falcon they sell and if you have an unmodified machine the company will fix it up for you.

create a song by assembling sections of recordings in a playlist. It has a handful of effects but these permanently alter the file. version 1 (£49) is still available but you would be doing yourself a favour by paying the extra for version 2.

Cubase Audio supports up to 16 audio tracks, integrated with the sequencer's MIDI tracks

Integration

For many musicians, being able to add digital audio to their MIDI tracks is the ultimate in music production. Steinberg was the first to offer this with Cubase Audio (£799) from Harman which now supports up to 16 audio tracks integrated seamlessly with the sequencer's MIDI tracks. You can mix down any number of tracks into a mono or stereo track and effects. The Time Stretch function can change the length of a recording without changing the pitch.

Emagic's Logic Audio (£508) from Sound Technology is another top-end system and choice between this and Cubase Audio is very much down to personal preference. It has a potential of eight audio tracks and includes an 8 into 2 mixer which mixes the audio tracks into a stereo output. The Digital

Factory lets you change the pitch without changing the length and vice versa and there are functions to help you match the tempo to an audio recording and create a MIDI Groove from the audio data.

The Falcon is well equipped to handle digital audio and there are lots of d-d programs available to suit everyone from the hobbyist to the professional musician. It could well do for d-t-d what the ST did for MIDI.

What's d-t-d?

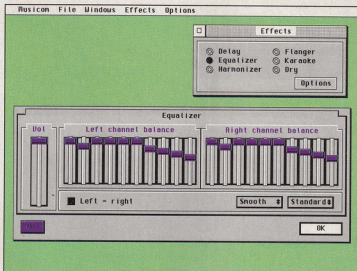
D-t-d or direct-to-disk recording is the process of putting audio signals onto a hard disk. To do this, the signals must be converted into a digital format using an A-to-D (Analogue-to-Digital) converter. A D-to-A converter reverses the process.

The conversion process is similar to that used by modern samplers but whereas samplers store their data in RAM, with d-t-d, data is saved directly to a hard disk. During playback it is read from the disk and converted into an audio signal on the fly. This means that the only limit to the amount of audio you can record is the size of your hard disk, not the amount of RAM in your machine.

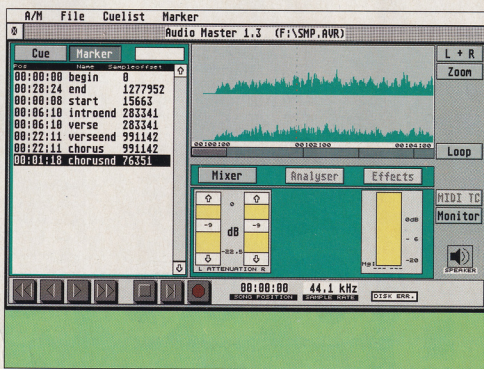
However, digital audio data does consume a lot of disk space. Around 10MB of disk space is required for one minute of CD quality stereo sound recorded with a sample rate of 44.1kHz with 16-bit resolution. You can record at a lower sample rate to save disk space or the number of bits but this brings a noticeable drop in quality.

Contacts

Compo: 01487 773582
D2D Systems: 01223 420252
Harman Audio: 0181 2075050
HiSoft: 01525 718181
Sound Technology: 01462 480000
System Solutions: 01753 832212



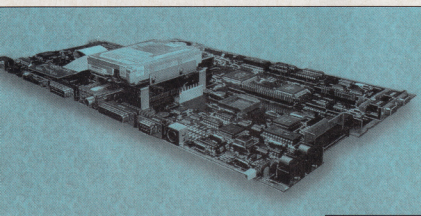
MUSICOM 1 (above) gives you some fancy DSP effects, but no hard disk recording. Audio Master (right) includes non-destructive editing and real-time cross-fading.



Come In Number 2



With Atari showing no sign of further Falcon development, it has taken a German software company to see the potential in the music market. Only a few months after the initial announcement, the Falcon Mk II is now shipping as Ofir Gal finds out...



C-Lab has added a SCSI board to support an internal SCSI drive.

The casing remains the same – but the logo has certainly changed!

The C-Lab Falcon is aimed directly at the MIDI musicians who need a working solution for direct-to-disk recording. C-Lab engineers studied the problems experienced by users of applications like Cubase Audio and soon devised the appropriate solutions. The

audio circuitry and SCSI interface have been improved to ensure high quality audio and fault free disk access.

The new machine is essentially an Atari Falcon that has been customised to meet the demands of the professional musician. The spec is the same – the machine is no faster with the same graphics and casing – and in looks identical to the Atari Falcon except for the C-Lab badge at the top of the keyboard.



The Falcon Mk II ships with the full 14.2 Mb of RAM and an internal 514 Mb SCSI drive with ICD software pre-installed. The improved audio board is now properly adjusted to line level suitable for direct connection to -10dB equipment. The analogue signal is now insulated from interference prior to the digital conversion and the D-A converter has a dynamic anti-aliasing filter optimised for higher sampling rates than the Atari original. Compatibility was maintained by using a higher speed board from the same manufacturer used by Atari itself.

I only had a short time in which try out the new Mk II but one thing is immediately obvious – the audio quality is much improved when compared to my Atari Falcon. The bass boost is gone, along with the odd clicks and extraneous dither noise. I tested the system by recording and then playing back eight simultaneous tracks and the Falcon performed faultlessly.

A vision for the Falcon

I spoke briefly with Burkhard Bergerhoff, the man behind C-Lab Germany, about the company's plans for the new Falcon. He explained that at first C-Lab will be looking at musical applications. Its next projects will include various add-ons to provide the Falcon with a SMPTE interface, digital I/O and ADAT compatibility among others.

C-Lab recently decided to co-operate with its long-standing rival, Steinberg, and the two competitors could even be seen sharing a stand at the '95 MusicMesse show in Frankfurt.

"C-Lab will now work together with Steinberg to ensure reliable operation of Cubase Audio," said Burkhard. "We are also looking at the possibility of making the Falcon more ST compatible, so that devices like the Midex will work with it. We will do everything we can to make the Falcon into the ultimate music workstation".

Here in the UK

Digital Awareness is a new company set up to handle the distribution of the new Falcon in the UK. Part of the Digital Village group, Digital Awareness is headed by Paul Wiffen, a long-time Falcon user and highly regarded music journalist.

"I was offered the UK distribution because the idea for the C-Lab Falcon came about through discussions between Burkhard Bergerhoff of C-Lab and myself," explained Paul. "His original plan was to create a PC based music and digital audio workstation. He became disillusioned with the idea because musicians don't really want to worry about AUTOEXEC.BAT files and MIDI drivers. The Falcon had the obvious advantage of being music-ready, with MIDI ports and built-in 16-bit audio."

"When I demonstrated just how powerful the Falcon was when running Cubase Audio, he called it 'The best kept secret in the music industry'," recalled Paul.

Asked about future development of TOS, Paul replied: "To retain 100% backwards compatibility, we are shipping TOS 4.04 on all machines because it works fine with musical applications. The C-Lab licence allows any modifications to both hardware and software and one of the things we are looking at first is how TOS can be improved. We are also looking at adding a second DSP and a separate video card."

"When I became the distributor for the C-Lab machine I knew nothing about non-musical applications and have spent the last six months educating myself. I have become a real fan of programs like Apex Media, Vidi ST and Papyrus. I have also joined CIX, the UK conferencing system, and I look forward to mixing with the Atari on-line community".

FALCON MK II

Specification: 14.2Mb RAM, 514Mb internal Quantum SCSI drive
Manufacturer: C-Lab, Germany
UK Distribution: Digital Awareness
Contact: 0181 597 2513
RRP: £2,344 (optional extras – VGA monitor £198; SyQuest £599)

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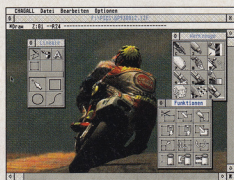
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Bird on a

Ever wondered how far an Atari can take you towards your own publishing empire? Nial Grimes explores the Falcon's colour DTP potential.

Most modern Atari packages support Falcon screen modes, but older software will need to be upgraded.



Very few computer applications rely on colour as heavily as desktop publishing. After all, the computer screen is the only thing that lies between a document and an expensive imagesetting mistake. Much the same goes for all of the other stages along the way: scanning, retouching, graphics design and image processing.

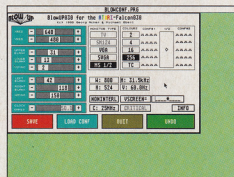
Current pricing means that it's usually cheaper to buy a Falcon than to improve the ST's graphical prowess. And not only does the Falcon

provide improved graphics, but it has the muscle to throw them around too – in terms of raw processing power, it is about four times faster than a standard ST. The built-in digital signal processor (or DSP) can also raise the performance curve when it comes to decompressing JPEG

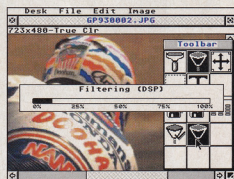
images or working with filters. The immediate advantage of a Falcon is being able to work on colourful images at a pixel level. On paper, the Falcon's 15-bit "true colour" display looks well short of the 24-bit colour used by most colour files (it's the difference between 32,768 and 16.7 million colours).

However, in practice the difference is barely noticeable. Retouching with packages such as Studio Photo, Repro CD and Chagall is more than just possible on a Falcon – it's a pleasure! You'll also find that most retouching packages are faster in true colour because the computer isn't forced to devote precious time to dithering. The only drawback is the limited space offered by Falcon true colour modes; take a look at the "A la mode" box for all of the gory details.

Most of the same advantages are apparent when working with image processing effects. On an ST it's hard to see the results of a speed-blur or contrast adjustment but in 256 colours that situation changes completely. More subtle effects do require a switch to true colour, but by using a magnify tool you can get a good overall idea of what's

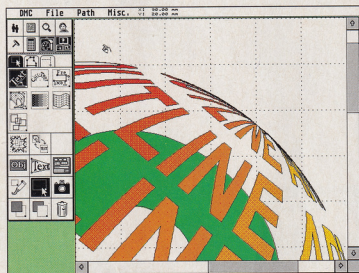


A screen expander is an essential purchase – even the software version of BlowUp can yield some impressive results.



Some packages, such as Floppyshop's soon-to-be-released Positive Image, benefit from the power of the DSP.

wire



going on. Some image processing packages take advantage of the DSP to speed up image loading and filtering – Studio Photo supports the Brainstorm JPEG loader and Positive Image (preview, page 27) uses the DSP in many places.

Colour clash

With perfectly adjusted images sitting on your hard disk, the need for oodles of colours on screen is less intense. Just as well really, because desktop publishers benefit more from extra screen space – BlowUp or ScreenBlaster make a real difference. The best policy when working with colour documents is usually to do the bulk of the work in a 16-colour mode and then make any final adjustments with the full 256. This makes sense from both a speed and memory perspective, because the processor advantage offered by the Falcon is quickly eaten up by colourful screen displays containing many times the data of ST resolutions.

Having spent money on a machine with true colour potential, even the 256 colour limitation may seem annoying but when you see just how well some packages can use those colours, it's really not a major problem. To be honest, you are not going to get much closer to the finished output without thinking about monitor calibration.

No doubt you also use a vector graphics program in tandem with your desktop publisher and these too are improved enormously by a decent colour graphics mode. Most of the

Outline Art users are stuck with a 16-colour display, but the dithering is very effective.

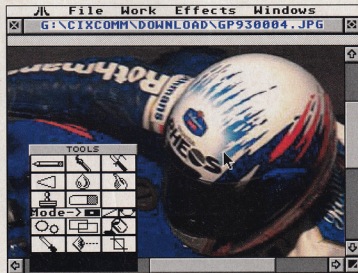
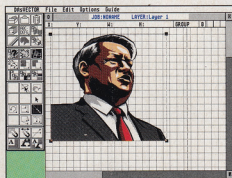
DA's Vector Pro is perfectly at home in most Falcon resolutions, including those from by BlowUp and ScreenBlaster.

Retouche CD makes superb use of the Falcon's 256 colour modes – true-colour can also be used on an RGB monitor.

graphics programs will deliver a colourful display on the Falcon, DA's Vector among them. Outline Art 3 is stuck with 16 colours, but the quality of dithering is good and a big improvement over a mono ST.

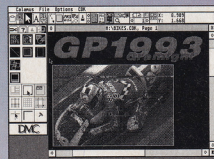
The Falcon also holds other benefits for the desktop publisher, primarily the ability to manage memory effectively. Calamus documents are enormous by nature and a single true colour image can stretch to many megabytes. The Falcon's 68030 processor allows the use of virtual memory – disk space that the computer thinks of as normal RAM. You do pay a speed penalty and the software itself is around £80, but it does open almost limitless horizons in terms of both image processing and DTP.

The Falcon is a remarkably sound proposition for the semi-pro desktop publisher. It's an arm and a leg cheaper than a TT with graphics card and yet provides a reasonable degree of the power. If you already own (or can afford) the software to take advantage of the extra potential it's an excellent upgrade choice.



Choice colour!

Calamus runs in three colour modes on the Falcon. Let's take a look at what you can expect from each.



The standard ST-style display is fine for mono work, but isn't much help when choosing coloured tints.



The basic colour structure is easy to see in 16 colours, but more is needed for a faithful representation of the image.



Given a 256-colour display, Calamus SL can get to work in providing a reasonably accurate display.

A la mode

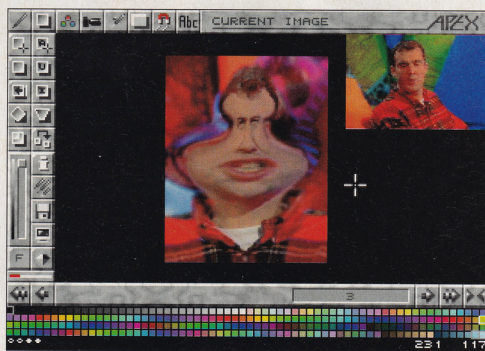
The standard Falcon offers quite a range of different screen resolutions and colour depths, but those of primary interest to DTP are 640*480 in 16 or 256 colours and 320*240 (or 320*480) in true-colour. Higher true-colour resolutions are only possible on an RGB monitor and the flickering, interlaced display makes it less than ideal for professional use.

These modes seem like a huge jump up from ST high resolution, but it doesn't take too long to realise that still more space is useful for colour work. Thanks to the flexibility of the video hardware, software alone can yield some impressive results – Calamus SL runs very nicely in 800*608, and the refresh rate of just under 60Hz is reasonably stable. For higher frequencies and resolutions, you need to look at some hardware. BlowUp and ScreenBlaster are the two premier choices and both can give you a wide range of usable modes for well under a hundred quid.

Another alternative is to use a virtual screen, which provides more pixels without requiring a special monitor or affecting the refresh rate at all. All versions of BlowUp include this facility and some alternatives are also available in the public domain; a nifty little French program called BirdWings is certainly worth a look (Floppyshop disk number F4783).

Follow the DSP code

The Falcon's DSP really can make a difference. Programmer Douglas Little demonstrates its many talents...



The Atari Falcon030 has been around for a few years now and we have seen a number of new programs emerge that claim to be revolutionary in their use of a special chip known as the DSP 56001.

This is all very well for programmers and the technically inclined but what does this really mean? How exactly can one more bit of silicon make a difference to performance or benefit the user in any way?

Before we set about trying to answer this, let's look at the DSP in some

detail. DSP is short for Digital Signal Processor. What's more, it's a 24-bit RISC device for processing digital signals. I'm not going to get into a major

technical discussion about RISC (Reduced Instruction Set Computing) but the idea is that you make a processor's design simpler in order to make it perform operations

a faster – the problem is that you sometimes need more operations to make up for the new simplifications. Catch 22!

The real point is that you don't always need to compensate in this way

"DSP image viewers and converters can even outperform 66MHz PCs."

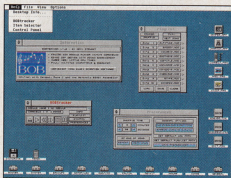


Apex contains a special field-warping engine written entirely in DSP assembler which allows the user to define magnetic lines to distort or even morph images together.

– especially with arithmetic calculations that are needed when processing signals. This is why the DSP has to be RISC – otherwise it would either be too slow to keep up with the incoming information (especially in real-time audio applications) or it would be too expensive to use as a secondary chip.

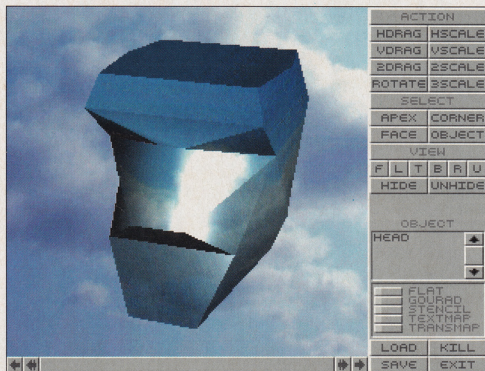
The Motorola 68030 on the other hand, which is the Falcon's central processing unit, is based on a CISC (Complex Instruction Set Computing) design which is quite different. It's a really complex system that is slower as a result. I'm not referring to the fact that the DSP has twice the MHz rating of the CPU – the DSP is still much faster even at 16MHz.

BOBTracker, uses the DSP to generate four channels of sampled sound.



Perspected texture-mapping effects at high frame rates mean exciting games like Wolfenstein and Doom.





Little engine

The digital signals we are dealing with here include audio (samples), video (graphics) and communications (modems) as these are the most common types of electronically transmitted information. The DSP processor acts like a little engine, responding to commands from the main CPU (the 32-bit 68030) and carrying out repetitive tasks very quickly indeed. It can effectively receive, dismantle, modify, reassemble and transmit signals one element or "particle" at a time at a horrendously high rate. This makes it ideal for synthesising musical instruments, sound effects and other audio applications.

Unfortunately, many programmers have not been looking outside the boundaries implied by the term Digital Signal Processor and seem to support the device only when it fits the job description exactly. This is a great shame and as a result the Falcon's hardware has been vastly underused.

It is becoming obvious that the exclusively one-way dash programmers have made from native assembly language to C in the last few years has left very few of them with the combined skills required to make efficient use of such hardware. It has nothing to do with how good or bad the C language is as some of the best programs have a balanced mix. It is more to do with the fact that DSP processors cannot be programmed properly without assembly language and it's a diminishing trade.

The DSP excels at 3D graphics. Here we can see a standard Phong-shaded image (with some surface attributes) displayed in one of our model editors. What you can't see is that the image is drawn in real time once every second!

Good news!

The good news (yes, there is good news!) is that programmers are at last beginning to see the light and programs are trickling out which make use of the DSP for other purposes. There are now several JPEG image viewers and converters available that can outperform 66MHz PCs due to the chip's ability to perform the arithmetic required for JPEG decompression so quickly.

Apex Media has 20 or so DSP programs embedded inside the code, more than half of which would not be present otherwise or would at the very least have been irritatingly slow. As a result, images can be morphed together to produce a frame in seconds or a whole animation in minutes, eliminating the need for low-quality preview modes – something even the fastest PCs are hard pushed to manage!

The next big step is the world of 3D graphics. DSP chips can chew up the complex maths involved in 3D calculations at a rate that many programmers will find difficult to believe. In the near future, we can expect to see rendering programs which produce images in seconds – not hours or days. One of the things we have been developing at Black Scorpion is a real-time renderer which can draw light-sourced, texture-mapped images at very high speeds. Small fractions of a second in fact.

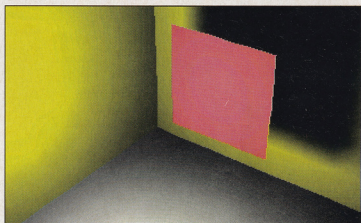
The quality is not what you would expect of a full raytracing or rendering



package but the ability to move around these scenes in real-time is something new – especially for the Falcon. This sort of technology is very useful for games and, to be honest, any 3D Falcon game which does not perform more than 50% of its calculations on the DSP is a sad waste of a good opportunity.

So if you are a programmer, get a reference manual and get cracking! And if you're not, find one and threaten to confiscate their hard disk (or worse) until they agree to learn DSP code. It's definitely worth the effort.

This example demonstrates texture-mapping, simultaneous Gouraud and Phong shading. The image is redrawn once every two seconds in this mode. If the shading is disabled, the frame rate jumps to 20 frames a second!



What the DSP's good at...

Audio

- Synthesis
- FX processing
- Filtering and noise reduction
- Analysis and audio transforms
- Sample compression and decompression

Video and graphics

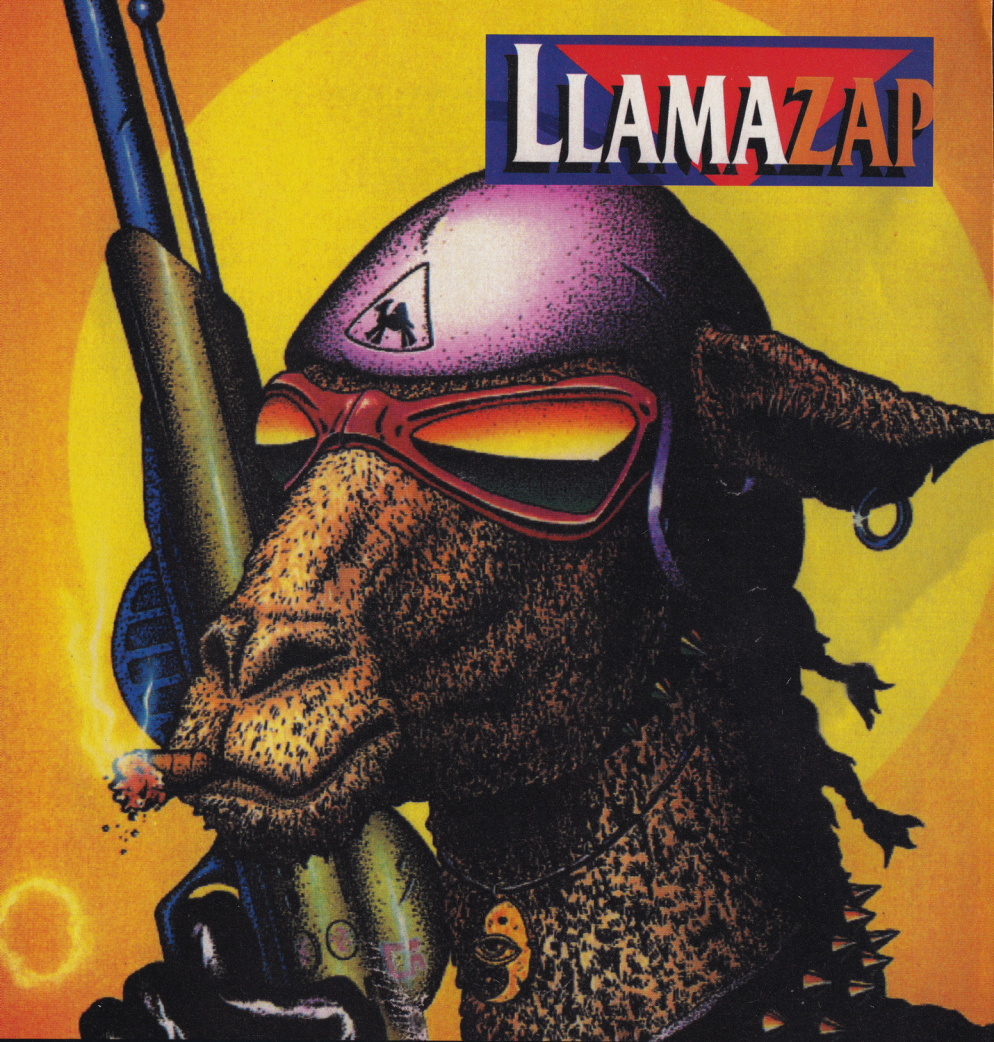
- Bitmap translation into other formats
- Dithering and colour reduction
- LZW type compression and decompression of GIF and TIFF files
- Decoding and encoding compressed JPEG images
- Decoding and encoding MPEG (compressed video) data
- Rotation and scaling of bitmaps
- Morphing and magnetic distortion

3D graphics

- Rotating and adding perspective to 3D objects
- X, Y and Z-clipping of polygons
- Generation of curves, polygons and voxels
- Sorting and spatial bounding of objects
- Real-time Gouraud and Phong shading
- Real-time floor and wall mapping (Doom style)
- Real-time FDTM (Free Directional Texture Mapping)

These two snapshots of a strangely lit polygonal room were calculated using a very intensive algorithm known as radiosity. It is normally avoided as it is even slower than raytracing. Here, however, the DSP is displaying the room from the radiosity data in real time at a rate of about 10 frames every second. It's not true real-time radiosity but it's pretty close...

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Q&A

Ofir Gal and his team of experts set about solving your problems...

Upgrading To A Falcon



Q I am a 30-year-old computer programmer on IBM mainframes and married with kids. I have an Atari 5Te upgraded to 4Mb, external floppy drive, Philips monitor, Protar II 120Mb hard drive, switchable TOS 2.06 upgrade, IBM Proprinter and NVDI 2.5. I have built up my system over a three year period and am very happy with it.

I will be totally honest and say that its main use (for the kids and me) is to play games on, although I do all of my home accounts, letters, dabble in the occasional DTP poster, art, and, if my wife would let me spend a bit more time on it,

I fancy trying some games programming. Bearing in mind the system I have at the moment, I would like to know just how much of the equipment I have would work on the Falcon. I am toying with the idea of buying a 1Mb Falcon with no hard drive and then using the four 1Mb SIMMs to upgrade it.

I would also like to connect my external Protar drive to the Falcon, so giving me a 4Mb RAM, 120Mb hard drive Falcon system. I know I should be able to connect my printer as it's an industry standard, but what about my external floppy drive, and finally and really most important, how compatible will my software be? I have heard about the "Backward" utility, but would that work with most of my games? The software that I use most is

Send Us Your Questions

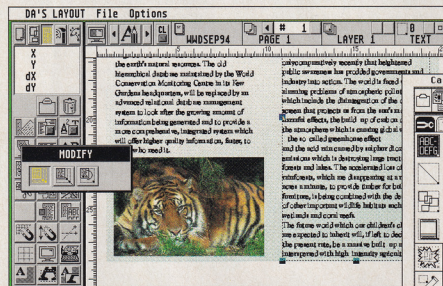
Can't find anyone to answer that nagging question? Then drop us a line. Our team of experts are on hand to investigate and solve almost anything you can throw at them. Just send your letters to:

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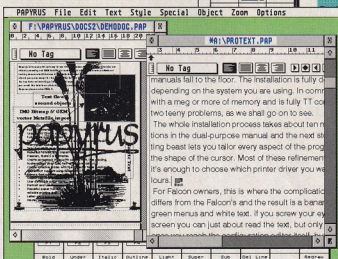
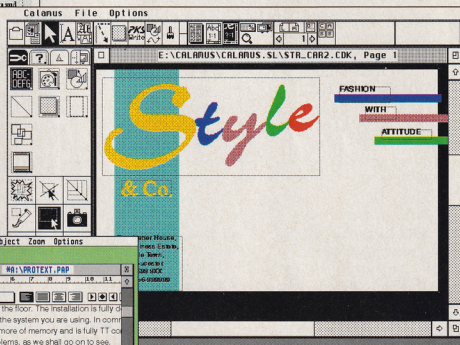
While every effort will be made to answer your question within the pages of either Atari World or Atari Pro, please note that individual correspondence cannot be entered into.

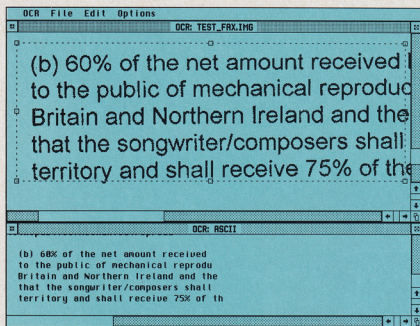


If you want to play games like Frontier Elite then forget about the PC and a Janus card!



While Timeworks 2 has problems on the Falcon, Calamus (far right), DA's Layout (above) and Papyrus (right) are fully compatible.





OCR is a public domain optical character recognition program that works well on the Falcon.

Home Accounts 2, Timeworks 2, Protext 4.5, Write On, Frontier Elite 2, Monkey Island and many other games. Just how good is Backward?

My next question concerns my Protar II hard drive. When I bought it I was told that all the wiring and power supply were already in place for a second drive. Is this true – is a bare hard drive the only thing I need to buy, and if so what sort? Would a second hand one from a PC (for example, via Micro Mart) suffice?

And finally, I have also been toying with the idea of buying a hand scanner with OCR software. What I want to do, and indeed have already started, is to compile a large "hint and tips" database. So far, I've simply typed all the tips in from magazines.

Using OCR software, would it be possible to scan the relevant hints/tips, directly from the pages of your magazine, bearing in mind that there are quite often pictures included in or around the text.

The Janus card for the PC does sound interesting, and might give me the best of both worlds. So would I be better buying a Falcon or should I get a PC with a Janus card – will this then give me 100% compatibility with my existing software? M. Moore, British Forces

A Although hailed by Atari as a brand new machine, the Falcon is not that different from the STE. It has many new features and it is, of course, faster than your system, but compatibility is surprisingly very good.

The Falcon cannot take SIMMs directly: you will need an adapter in order to tray to use your old memory. There are several such boards on the market including offerings from System Solutions and Gasteiner Technologies. But there is a very real possibility that your SIMMs will be incompatible with such a board as the

120 nanosecond versions are often too slow – make sure you consult the board supplier.

Your Protar hard disk should work, but will have to undergo minor surgery to bypass the SCSI host adapter which is not required by the Falcon. It would also be a good idea to use the Atari hard disk driver (AHD), which is freely available, instead of the Protar one. It should be fairly easy to install a second hard disk in the Protar case, but make sure it's a SCSI unit and not the IDE variety used in most PCs.

The printer port on the Falcon is identical to the STE, so no problems there. Unfortunately, there is no external floppy port on the Falcon, although, according to a message on the Internet, it may be possible to install one as the circuitry appears to exist within the Falcon. But such a modification would certainly invalidate your warranty.

Compatibility is pretty good. Home Accounts 2 works well as does Frontier Elite 2. Timeworks 2 has some problems – it's worth considering a move to Calamus, DA's Layout or, possibly, Papyrus. I do know that Protext v5 and v6 work on the Falcon but I'm not sure about v4.5. That said, the upgrade from Amnir is very cheap.

There are several OCR programs available for the ST and Falcon. The best I have seen is simply called OCR and should be available from public domain libraries. Most OCR packages have facilities to get around the problem of embedded pictures.

As for the Janus card, this is not an ideal solution and compatibility would certainly not be as good as with a Falcon. It is also much slower than a Falcon, so I would not recommend it unless you actually prefer a

PC, especially as it will not run the majority of Atari games for starters. Ofir Gal

Booting From An External Hard Disk



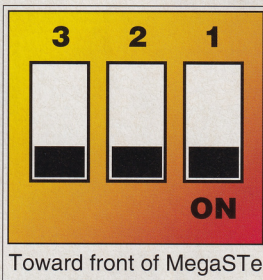
Q I've bought a second-hand MegaSTe 4 with internal hard drive but the drive is both slower and smaller compared with the one I had with my old STE. I'd like to have them both connected, but boot from my external ADSCSI drive.

I have no problem getting them running together, so I know it's nothing to do with parity settings or termination resistors. But whatever I do with the SCSI ID numbers of the drives, either one of them is unrecognised altogether or the internal one boots first. The manual seems to cover everything but this!

D Root, via Internet

A My friends on the Internet have just helped me with a similar problem I was having. The first thing to note is that you cannot set the internal drive itself to anything other than SCSI ID 0 when using the Atari host adapter. However, you can use the red DIP switch block on the host adapter card to reassign the ID to a value between 0 and 3.

Take a look at the accompanying diagram. When all switches are set to the "ON" side, the drive will be assigned an ID of 0. If switch 3 only



Toward front of MegaSTe

is moved away from the ON position, the drive will be assigned and ID of 1. Similarly, switch 2 only will give an ID of 2 while both will give an ID of 3.

Now all you need to do is set the SCSI ID on your external drive lower than the internal and you should have the set-up you want. Harry Sideras

Using Minix-ST



Q I purchased a second-hand Minix-ST (UNIX Clone version 7) operating system written by Prentice-Hall. Could you please tell me if a company or a user group is supporting it? If so, can you give me their address as I would like to upgrade to a newer version. I am running a 520STFM with various modifications: 4Mb RAM, OverScan, Turbo 25 accelerator, NVDI, TOS 2.06, Magic OS, 270MB hard drive and a Star LC-10 9 pin printer. Mark Coulson, Surrey

A Minix is sadly no longer supported on any platform. With the introduction of Linux a couple of years ago, its popularity has dropped rapidly. UK support used to be provided by The Minix Centre in Norfolk but it has now moved on to Linux. They tell me they may still have some odd pieces of ST Minix software such as the Gnu C compiler lying around. Give Ralph Allan a call at Unitech Systems on 01953 788028.

Perhaps you may want to consider MINT as an alternative? It is also very similar to UNIX in many ways and has a good range of shells and utilities. Linux has also been ported to the Atari range, but you need at least a TT or Falcon to run it. Iain Laskey

If all switches are set to ON, the internal drive's ID is set to 0.

Fancy Earning A Tenner?

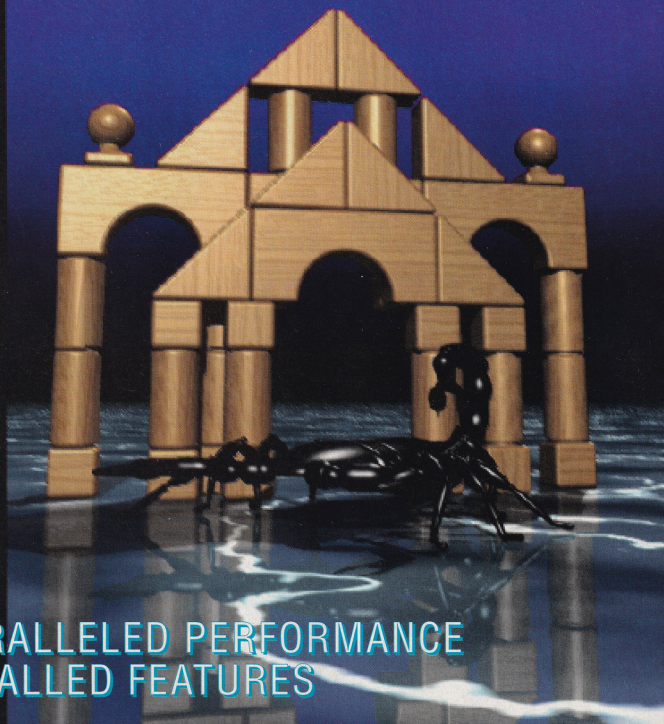
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