

Acorn Replay DIY capture system



The DIY kit for making your own Replay movies
Developed in association with Acorn Computers Ltd

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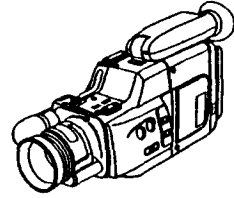
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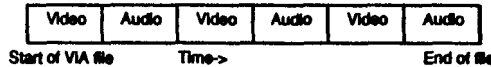
Introduction

Nowadays video is not simply confined to your TV set. Video is appearing all over on computers and telephones. This is because we live in a dynamic full colour world that computers are now catching up with. Virtually any form of communication can be enhanced using video especially training and education.



Video recording at normal speed involves huge amounts of data that exceed the bandwidths of current computer architectures including the Archimedes expansion bus and disc system. So previously Replay movies have been captured at much slower speeds than real-time, using sophisticated frame grabbers and costly professional video equipment. This requires considerable expertise and expense. Third party professional compression services have been set up to create Replay files and typically cost the user £100 per minute of video compressed. Whilst these costs are reasonable for commercial organisations requiring the highest quality, schools, colleges and individuals find them prohibitive.

The Acorn Replay DIY kit now allows anyone to capture colour video and stereo audio at low-cost onto hard disc using standard equipment. Hardware on the expansion card reduces the video and audio bandwidth to allow capture in real-time from ordinary domestic VCRs, camcorders and videodiscs.



The Movie clips are stored in 'ViA' files. 'ViA' stands for Video interleaved with Audio and indicates that a single file contains both video and audio for the movie. VIA files allow extremely fast transfer from hard disc to memory since the disc head can move continuously. This also means that the movie can be previewed in real-time after capture for editing/checking.

VIA files are uncompressed. Acorn's own Replay compression software may be used to reduce the disc space required from 21 Mb of disc space to typically 4.5Mb per minute (for 12.5 images per second). This may seem a lot, but a minute of movie contains a lot of information, and most applications require video clips that only last a few seconds.

The hardware was designed for the A5000 (with standard IDE disc drives) and A540. However the hardware may work successfully on previous Archimedes models providing you have 2Mbyte RAM (4Mbyte for compression) a fast hard disc and ARM3. Some disc drives and third party disc interfaces may not be able to support the sustained data throughput required for real-time recording.

Installation

This manual assumes you are familiar with the use of RISC OS and the Applications suite. If not then you should read the Welcome guide that comes with your machine now. Installing Replay DIY only takes a few minutes. Learning how to use the application supplied is also fast because it has the same user interface as all the other RISC OS applications you use. There are three stages to setting up Replay DIY:

1. Fitting the capture card.
2. Installing the Application.
3. Connecting your video source to the capture card.



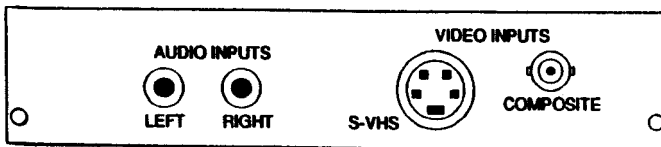
Install the capture card according to the Expansion card installation instructions supplied with the card. Installing software on RISC OS machines is very simple. The best way to do it is by using the RISC OS desktop. First, insert the ReplayDIY disc into a floppy drive, and click on that drive's icon to display the disc's contents.

If you see a file called 'readme' on the disc then double click on this, or drop it into Edit before doing any software installation. It is important to read this, since it may contain descriptions of extra features that you will miss, or other information that is not included in this manual.

To install the software on your hard disc, drag the IReplayDIY application from the Filer Window displaying the floppy's contents into a directory on your hard disc. As with all RISC OS applications, this copies everything that the application requires to run. You must install the software onto your hard disc, no other media has the speed to keep up with the video recording process.

Once you have followed the procedure outlined above, place your original ReplayDIY disc in a safe place.

Connections

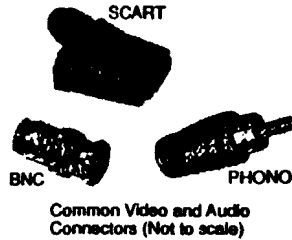


Rear of ReplayDIY showing connectors for input video and audio.

Appropriate leads are required to connect your video source to the capture card. There are three sockets on the rear panel of the basic capture card - two phono sockets for left and right audio channel inputs and one BNC socket for video input.

Video Inputs

You may have the optional S-VHS or S-Video connector fitted to your card in which case there is also a 4-pin mini-DIN socket for separate chrominance and luminance signals (Important: Do not connect video to both the BNC and S-VHS inputs at the same time).



Many modem domestic video sources have SCART connections, and a SCART lead kit is available. If you have the SCART kit follow the instructions supplied with it. Otherwise it is normally a simple matter to obtain leads with connectors that match the capture card and your video source. If you have difficulty with this then please contact us.

You can use any domestic or professional composite or S-Video source with ReplayDIY including; video cameras, video cassette recorders, camcorders, videodisc players and still video equipment.

Audio Inputs

Usually the audio outputs from the video source will be used. However, tape players, compact discs, mixers etc can also be connected to the audio inputs. These inputs are set up by us for line levels (nominally 1 volt peak-to-peak). You can adjust these levels if necessary over quite a wide range using the two trimmers on the Replay card. See the reference guide for details of how to do this.

Measuring your disc bandwidth

The Replay DIY kit was designed for standard A5000 and A540 machines, these machines are certain to have the processing power and hard-disc speed required for capture. If you are installing ReplayDIY on a machine other than these then you need to measure the disc bandwidth to ensure that the capture process will work. A5000 and A540 users can ignore this section (providing the machine is unmodified e.g does not have a third party disc drive installed etc).

Install !DiskBW on your hard disc. The best way to do this is by using the RISC OS desktop. First, insert the ReplayDIY disc into a floppy drive, and click on that drive's icon to display the disc's contents. Drag the !DiskBW application from the Filer Window displaying the floppy's contents into a directory on your hard disc.

Double click on IDiskBW. This will save large chunks of data onto your hard disc and inform you of its bandwidth which is how much data is saved per second. For the recording process the important value is the minimum disk bandwidth, not the peak. Run the program for 15 seconds or more. If the minimum bandwidth measured in this time is greater than 345600 bytes then you can successfully use ReplayDIY.

The program continues until you press escape or the disc fills up. Once you have completed the test, IDiskBW can be deleted from your disk.

How to use Replay DIY

To load ReplayDIY, double click on its Filer icon in the directory display.

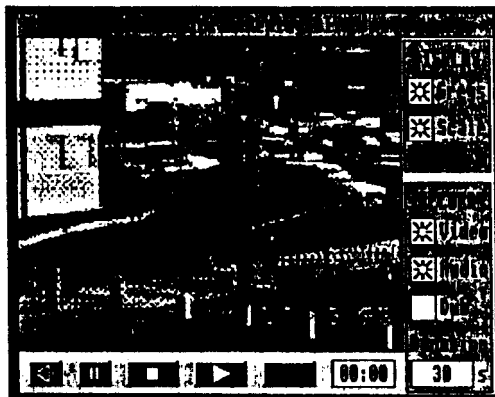


(Note: the display on your computer may be slightly different, depending on which type of directory display you normally use.)

The application will load and install itself, displaying its icon on the icon bar. Click on the icon to open the monitor window. Then start the video source playing.

You can monitor picture and sound without additional amplifiers, speakers or display units which means you can set up your equipment straightforwardly. You use the ReplayDIY window to focus your video camera, as a viewfinder, to adjust iris or simply verify connections.

Beneath the monitor window there are five buttons whose functions are (from left to right) Mute, Pause, Stop, Play and Record just like a cassette recorder.



To start recording, press the Record button. This will start to capture audio and video to your hard disc. The counter beside the buttons will update every 2

seconds as recording proceeds. Recording carries on until either the hard disc runs out of free space or you press **Stop**. During recording the software can not multi-task since most of the computers resources are required. Real-time monitoring will also be suspended temporarily during recording, only the video will update every 2 seconds to indicate what is being recorded.

To save the last recorded VIA file click **Menu** over the monitor window. Choose the **Save** option and drag the file to its destination.

To playback the VIA file just recorded, press **Play**. The Monitor window will be updated from the VIA file and you will hear the audio played with it. When the end of the VIA file has been reached, the window will return to monitoring the video and audio inputs.

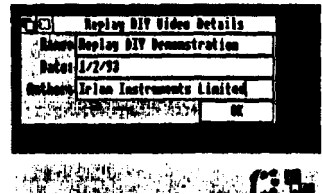
You can also play a previously recorded VIA file by dragging it onto the Monitor window, followed by a press of the **Play** button.

The picture in the monitor window may seem a little jerky during monitoring and playback. This is an artefact due to our display routines, which we may improve in a later version of the software. We can assure you that the recorded material has all its data recorded properly, so that when converted into a Replay file it will play smoothly.

Compressing ViA files

To turn a VIA file into a Replay file you need to use the Acorn Replay Compressor. This is supplied as a utility called **!ViAtoRepl**. To install this, drag the **!ViAtoRepl** application, from the floppy supplied, into a directory on your hard disc.

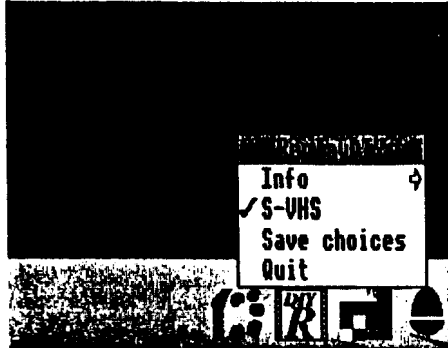
Start the compressor by double clicking on the **!ViAtoRepl** Filer icon. The application will load and install itself, displaying its icon on the icon bar. Drop the ViA file onto the **!ViAtoRepl** icon. Fill in the name, date and author fields. Then press **OK** to compress.



The compressor does not multi-task and runs outside the desktop. Each frame in the VIA file will be shown on screen as it is compressed. The right hand image is the original with the compressed on the left. Compression takes a while (5-10 seconds per frame). Once complete the compressed video is automatically 'joined' with the audio, and a Replay file is produced. At this point you will be returned to the desktop, where the Replay file can be named and dragged to its destination. Note: You will require about the same free-space on your hard disc as the original VIA file size to successfully complete the compression process.

ReplayDIY references guide

The rest of the manual describes the ReplayDIY application in more detail, and at the end is a glossary of words used in desktop computer video which may be useful if some of the terms are unfamiliar.



Icon Bar menu

The icon bar menu has four selections; *Info*, *S-VHS*, *Save Choices* and *Quit*.

Info

The Info box shows which version of ReplayDIY you have, and the version number should be quoted in any correspondence you may have with us concerning the ReplayDIY system.

S-VHS

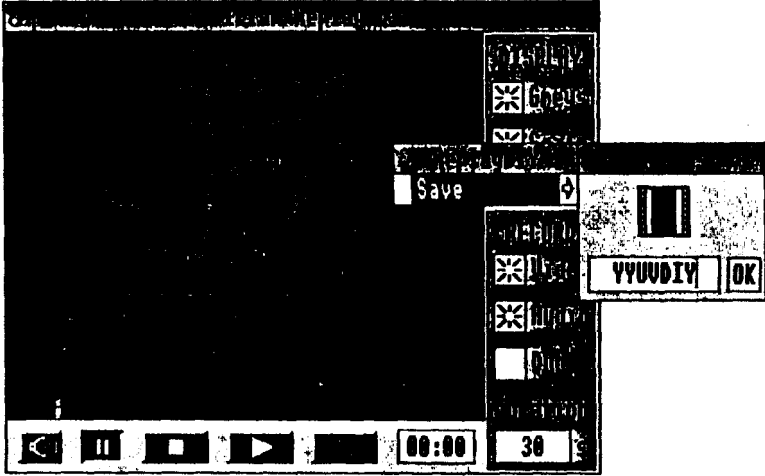
If S-VHS is ticked then this option is switched on. By clicking S-VHS you can turn this option on or off. It is only sensible to turn it on if your card has the S-VHS upgrade fitted. Also you will only obtain a colour picture when using S-VHS, providing you are using S-VHS equipment connected to the Replay capture card's mini-DIN connector. Do not connect both S-VHS and composite sources at the same time.

Save Choices

To save you time, S-VHS, Greyscale display and Scaling options can be stored and automatically recalled the next time you use ReplayDIY. By clicking on *Save Choices* the current values of these options will be saved.

Quit

This is used to exit the ReplayDIY application. Before the program finishes you will be prompted with a warning if a file has been captured during the session but not saved.



Replay DIY monitor window

Click on the ReplayDIY icon on the icon bar to open the ReplayDIY window. This window consists mostly of a large monitor area and control button areas at the bottom and on the right hand side. If no video is connected the monitor area will be black.

The monitor window shows what is happening on the video input to allow you to set up your video source. Audio will also be monitored via the computers built-in sound system in real-time. To make the monitor window colourful and quick to update we write directly to the screen. During monitoring we always ensure that our window is brought in front of any overlapping windows which enables us to cut down on processing. If you are using another application it is wise to either close the ReplayDIY window or press the `Pause` button, since otherwise our window may annoyingly obscure other windows you are trying to see.

To save recorded VIA files, click the menu button over the ReplayDIY window. This will open a standard save dialogue box from which you can drag the ViA file to its destination. The *Pause* button is automatically activated by the menu button, so monitoring will stop. To start monitoring again, click on the *Pause* button.

At the bottom of the ReplayDIY window are some buttons whose functions are; *Mute*, *Pause*, *Stop*, *Play* and *Record*.

Mute

If this button is crossed then the audio is silenced or muted. You can click on this button to switch between silent and audible operation. If you have a camcorder near the computer, feedback may occur between the camcorder microphone and the computer loudspeaker. This will make a loud howling sound. You can cure this by muting the loudspeaker.

Pause

If the *Pause* button is depressed then monitoring is suspended and the monitor window will not be painted over any overlapping windows.

Stop

Press this button to stop recording or playback.

Play

Press this button to play back the last ViA clip recorded this session or to play a previously recorded ViA file that has been dropped onto the ReplayDIY window. *Stop* can be pressed during playback.

Record

When you reach a part of the video that you wish to record press this button. Real-time monitoring will stop during recording because there is not enough processing time left during capture. However, as an indication of progress the monitor window will update with a still frame every two seconds. If you press *Stop* during recording then you will capture the video up to the point at which stop was pressed.

"Tape" Counter

Next to the *Record* button is a field (which normally reads 00:00) that updates in

minutes and seconds during recording and playback. You can use this to determine how much material you have captured.

On the right hand side of the ReplayDIY window are two groups of buttons labelled, from the top downwards; *Greys*, *Scale*, *Video*, *Audio*, *Dub* and *Duration*.

Greys

If this button is pressed then the monitor window will be dithered in greyscale only, with no colour. This affects the display during monitoring, any VIA files will still be in colour even if recorded with this button pressed. In a 16 colour mode our software makes a brave attempt to display colours, but there is not much of a palette to play with especially for flesh tones. You may prefer the greyscaled version.

Scale

This is for an upgrade which will become available later in 1993. Look out for details!

Video

Selects the video track to be replaced (see *Dub* below).

Audio

Selects the audio track to be replaced (see *Dub* below).

Dub

Once you have recorded a ViA clip you can replace either the audio or video track in the file using the dubbing facility. This allows you to record some video and then later on add an audio track for narration.

To operate the dub function first record your clip with *Dub* turned off. Then turn *Dub* on and turn on either the *Video* or *Audio* buttons. E.G if you want to add a narration track over the video then ensure the *video* button is off and the *Audio* button is on. Make sure your audio source is connected to the card and you are ready to start. Press Play. If you immediately press the *Record* button then audio input to the card will start to be recorded over the video. You can also wait for any desired portion of the video before pressing the *Record* button. In this case the first part of the VIA file will be unaltered, with your narration starting from the point at which you pressed *Record*. *Stop* can also be pressed so that just a portion of audio in the middle of the

V^oA file is dubbed. Pressing the required buttons takes a little practise so experiment with some non-critical data first and plan what you want to do beforehand.

If both Video and Audio buttons are on then you can replace both the audio and video in a section of VIA file using dub.

Duration

This sets the duration of recording. You can enter values in seconds here before recording. After pressing Record, capture will proceed until the value in the duration field is reached (or the disc fills up).

Sprite Saving

It is possible to save still frames from the capture card. To do this start ReplayDIY and make sure you do not do any recording. Ensure that the pause button is not pressed so that the input video is monitored. When you reach an image that you wish to save **click** the menu button over the monitor window. The menu from the ReplayDIY window will then contain a sprite in the save box which can be dragged to other applications etc. Alternatively you can use the Snapshot facility in Paint.

Audio level adjustment

You should only attempt the following if you are confident that you can perform the adjustment safely and without damaging the card i.e you have the correct tools and experience.

We set up the audio inputs so they can cope with 1 volt peak-to-peak signals. These levels are quite common in domestic equipment. If you connect audio sources which do not conform to these levels then the audio monitored/recorded will either be bud and distorted or too quiet. Ideally you should use external equipment (such as a simple mixer etc) to ensure that only 1 volt signals are presented to the capture card. However if absolutely necessary, there are trimmers on the capture card which can be adjusted to cope with a wide range of inputs. They can be identified by the labels VR1 and VR2 on the printed circuit board and are situated next to the audio input connectors. To adjust them you will need to rotate the blue tops clockwise (to increase the input levels i.e cope with loud sources) or anti-clockwise (to reduce the input levels i.e cope with quiet sources).

Glossary

This section is a collection of 'buzzwords' and terms used in television and computer video.

Aliasing

When an image is captured digitally it will be turned into an array of pixels on a rectangular grid. Unless these pixels are very small, noticeable steps will be seen on edges in the image and particularly lines that are not quite horizontal or vertical.

Anti-aliasing

This is a process where the image is filtered prior to capturing to ensure that the jagged edges seen on lines are reduced. This is done by averaging neighbouring pixels together in the raw video stream prior to scaling.

Bandwidth

A measurement of how much data can be transferred per unit time. As an example a Quantum LPS240AT drive in an A5000 has a minimum bandwidth of 700K bytes per second i.e it can save/load more than 700K bytes in one second.

Chrominance

This is the colour component of the video signal. In television the colour information is transmitted at a lower bandwidth than the brightness component since the human eye is not as sensitive to colour detail.

Composite Video

This form of video carries brightness and colour information on the same wire. Televisions and video digitisers etc have to separate the colour and brightness from the video signal. Sometimes fine patterns of brightness get confused with colours leading to some strange effects and poor picture quality. This does not occur with S-Video where the two signals are carried on separate wires and therefore cannot get confused.

Compression

A process where the data required to represent some information is reduced, either by throwing away bits that are not significant (lossy compression) or by collecting identical sequences in the data together (lossless compression).

CUBS

Stands for Composite Video, Blanking and Synchronization. This is an acronym for composite video.

Data Rate

The data rate required for the Replay DIY recording process is 345600 bytes per second. So, your hard disc needs to be able to save at least this number of bytes every second to keep up.

Digitizing

The process where an analog signal is converted into binary form so that it is suitable for processing using digital computers.

Field

In the UK we use the PAL television system which has a resolution of 625 lines vertically. Each picture is transmitted in two fields comprising the odd lines first followed by the even lines. The field rate is 50Hz i.e each field takes 20 milliseconds to transmit.

Frame

A frame is a complete television Image composed of the odd and even fields. It takes 40 mS to transmit one frame i.e the frame rate is 25 Hz.

Hi8 video

This is a domestic video standard which uses 8mm tape and is higher quality than VHS. The tape stores the video information separately in luminance and chrominance channels which enable S-VHS to be produced readily.

Interlacing

A television frame is transmitted in two fields, the first carries the information from the even lines and the second carries the odd lines.

Luminance

This is another name for the brightness or greyscale information in a picture.

NTSC

This is the American television standard, NTSC stands for National Television System Committee. The frame rate is 30Hz and has fewer lines (525 per frame) than the PAL standard, also the colour information is transmitted differently.

PAL

Stands for Phase Alternation Line. PAL is the television standard used to transmit colour pictures in the UK and many other countries. PAL displays frames at 25Hz with 625 lines per frame.

Realtime

Term used to describe a system which responds within a guaranteed time period.

SCART

The SCART standard, also known as Peritelevision, was developed by European Committee for Electrotechnical Standardisation (CENELEC), as a means of interfacing a wide range of audio-visual equipment including TV, satellite decoders, video recorders, videodisc players, video cameras and domestic computer equipment etc.

Secam

This is the French television standard. SECAM stands for Sequential Colour with Memory.

S-Video

Otherwise known as Super-VHS or S-VHS. This gets round the cross-colour effects sometimes seen with composite video by separating the brightness and colour information onto two wires. In general higher quality pictures result from using S-Video sources, but you need S-VHS compatible equipment to get the benefit.

Seek time

The time taken to move the read/write head of the disk drive to the data position and start transfer.

Sync

The sync signals in video are used by circuitry on the Replay capture card to determine when the start of a new frame/field/line occurs i.e to tell where in the video frame we are.

VCR

Video cassette recorder.

VHS

VHS (Video Home Standard) is the most popular domestic standard for video cassette recorder.

VHS-C

This is compact VHS which uses the same format as VHS but with a cassette that is much smaller and is therefore more suitable for camcorders. VHS-C can also support S-VHS. The advantage of VHS-C over Hi8 is that adaptors are available which allow the compact tape to be played by standard VHS video recorders.

Video 8

Used in camcorders, this standard uses 8mm tape and offers higher quality than VHS.

Y

This is another name for the brightness or greyscale information in a picture.

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Warranty Registration

Please complete and return this form. This will ensure that you receive update information and warranty coverage.

Position.....

Organisation.....

Address.....

Tel No.....

Fax No.....

Product Purchased.....

Date Purchased.....

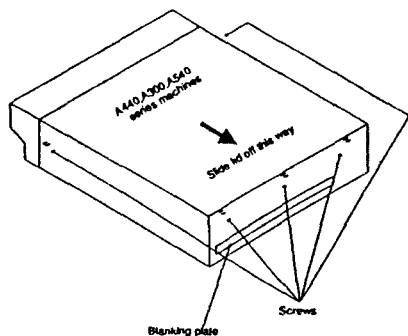
Where was the product purchased?.....

What computer system will the product be used with?.....

Expansion Card Fitting Instructions

First you will need to disconnect your machine from the mains supply for safety. All other peripherals and leads should also be removed to allow easy access to the computer.

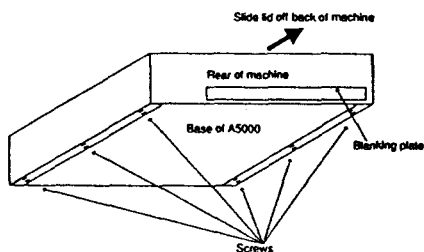
A Phillips or cross head screwdriver is necessary to undo the fixing screws which are located as shown below. Remove the screws and keep them in a safe place.



Once the screws have been removed you should remove the lid by sliding it firmly towards the rear of the machine.

You will now need to unscrew one of the blanking plates from the computer's rear panel to make room for the expansion card.

The expansion card can now be inserted through the rear of the machine, and carefully pushed into a spare expansion slot in the backplane. Make sure that the card is pushed into the backplane socket as far as it will go.



Care should be taken when handling the expansion card as static electricity could damage it. Handle the card by its edges or the rear metal panel only. Leave the card in its anti-static packaging (bag or foam box) until just before you are ready to use it. Keep the packaging in case you need to remove the card at any time.

Once the card is installed you can replace the lid by sliding it back on the machine. Fix the lid back on with its screws and connect up the machine to its peripherals etc.

When the machine is turned on you can check that the podule is fitted by pressing f12 and typing *podules followed the return key. This command will list the expansion cards (or podules) e.g:

```
*podules
Podule 8: 16 Bit Direct to Disc Sampler - Irlan Instruments Ltd
Podule 1: Moving_i-mage
Podule 2: No installed podule
Podule 3: No installed podule
```

This indicates that in slot 0 is a 16 bit Sound Sampler, and in slot 1 is a Moving i-Mage video digitiser. From the rear of the machine the expansion slots are numbered as shown below:

Podule 0	Podule 1
Podule 2	Podule 3