

THE DOMESDAY DEVICE

Interactive video used to be slow and cumbersome, but laser technology has changed all that

Joe Telford

My previous experience of interactive video (IV) had come from building a VHS video tape interface in 1981, and writing software to

make an early Beeb fast-forward to frames and fast-rewind to the start of passages. This was an inaccurate and feeble attempt, which only served to convince me that interactive video was at that stage both cumbersome and boring.

The chance to play with an early Acorn IV system in 1985 amused me further, as the only available disc seemed to be a BBC wildlife programme about birds. The operating system for the IV disc was quite tedious to integrate into any sensible language, though the few children to whom I showed the disc felt that the way ahead for them was Logo, interfaced to the service ROM in the machine.

Why interactive video?

One of the activities I really enjoy is messing with an applications based package, to see what makes it tick. You can imagine how I felt when news of the Domesday System filtered through and I, with many others, watched demonstrations, asked key questions and tried to imagine what I could do with it. Several months later, I can drive the beast from its applications based software, and from my usual languages. The question of what to do with it is still hard to answer, possibly because I think it's essentially a historical archive. Also, it has gaps, and although it won't go far enough into detail over some things, it goes into far too much depth over others.

We desperately need more experience of using interactive video, so I ask readers of this column to write in with their suggestions for and experiences of using Domes-



The hardware: Laserdisc player and Master

day in particular and IV in general. Try to group the uses under three headings: educational uses, industrial uses, and public uses. Let's see what we can come up with, but remember to test your application with some simple rules:

- Can it be done in another way more economically or more effectively?
- Will using it encourage interaction between people?
- Does it matter that the information is not first hand or up to date?
- What sort of thinking is the system supporting? Revision? Problem solving? Explorative?

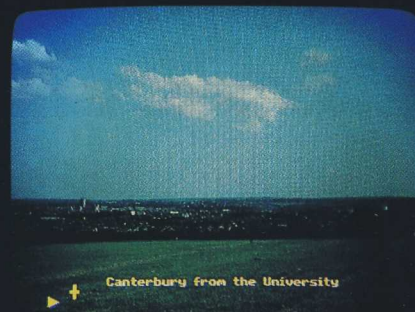
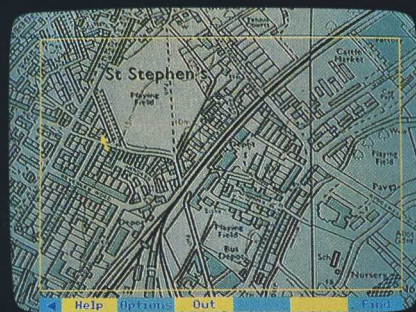
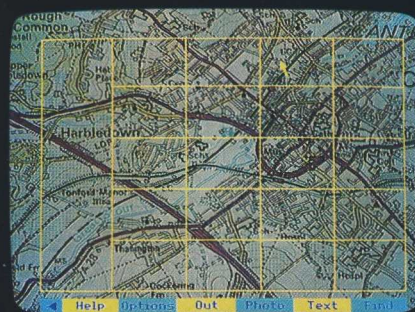
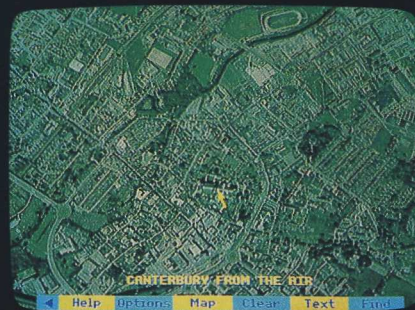
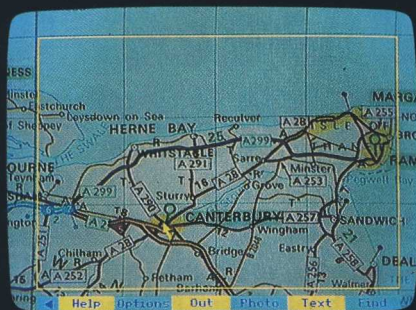
The system itself

The Master AIV system comes as a five part package which includes the Master 128 with 65C102 'Turbo' co-processor, an Acorn trackerball, a Philips RGB colour monitor, a Philips LV-ROM player, the Domesday discs and all connecting cables and manuals.

The Master 128 Turbo is a specially modified model, which has a wide 50-way ribbon cable attached to its rear. This is an SCSI (Small Computer Systems Interface) cable which connects to the LV-ROM player, and allows the Master to take control of the LV-ROM player's functions. But the Master can also be used as a normal micro, running all the packages just like a standard Master 128.

The trackerball, which looks rather like a Marconi trackerball with an added sticker, fits into the Master's User Port and sits easily on the right of the computer. It can also be lap-held so you can use the system from a distance.

The colour monitor is a medium resolution model which is very easy on the eyes. It has full screen control from easily accessible knobs and has a Euroconnector for 'proper' colour — you know, the sort you get on TVs with not just eight colours but the whole range of shades and hues. This is sometimes



The sequence above shows the power of the system. Using the mouse you can zoom in on any area (Canterbury in the example) in both maps and satellite pictures. Many pages of descriptive text are also available written by local school children, and ground-level photographs of each area.

known as 'linear RGB' compared with the 'TTL RGB' of conventional models.

The LV-ROM player is easily the heaviest part of the package, because in addition to being a Laservision disc player, this beast is programmable via an infra-red remote handset, or via an RS232 link, and of course has its SCSI interface built in, which links directly to an onboard computer system. In addition the player has a Gen-lock card onboard, which locks the video signals from the BBC micro and the LVROM player together so that video mixing is possible, and a video mixer card.

The Domesday discs

While the rest of the package is hardware, capable of supporting a number of Laservision discs, the Domesday discs are a new breed called a LV-ROM disc. The ROM part of the title comes from the fact that all Laservision discs are read only, so the information on the disc cannot be altered.

There can be four things on any LV-ROM disc: moving pictures, a soundtrack

(with two channels available), still frames (pictures) or data for text/graphs/program code, etc. The clever idea seems to be that data can exist on an LV-ROM disc in the channels allocated to sound. This means that while the number of picture frames can be of the order of 54,000 frames per side, the amount of computer-readable data can be immense, up to an incredible 350Mbytes per side (the equivalent of about 600 ADFS floppy discs). When you consider that most amateur users would have difficulty in ever filling a 30Mb Winchester hard disc with day to day usage, the size of the LV-ROM disc becomes astonishing. Have you noticed though, how technology is cyclic? Remember when you had to turn tapes over to read the other track? Well, that's just what you have to do with the LV-ROM discs.

The Domesday system comes with a total potential capacity of about 1400Mb, of which about half is filled. Future discs might be expected to be chock-full of data. The Domesday discs also come with a rather good user manual. It's a tribute to

good writing style and a very powerful and friendly system interface that most people can read pages nine, 10 and 11 of the manual then throw it away. Though, to be honest, the remaining 240 or so pages are worth reading, just to improve your confidence that you *are* pressing the right buttons.

The remainder of the pack is made up of leads, which are all sensibly fitted with plugs, and there should be no problem plugging everything together. The one point which has to be made is, look at the diagrams, the RGB lead connects the Master to the LV-ROM player, and the Euroconnector connects the LV-ROM player to the monitor. A further manual, the AIV User Guide, emphasises this, and gives a clear, if more technical, explanation of how the system works.

Starting up

Once the system is plugged together, it can be brought to life by switching on and pressing CTRL-Q-Break. This results in a message indicating that a video filing system

(VFS) is in operating, and this is the route in for the Fraternity of Hackers. More respectable application users will want to continue with Shift-Break and wait the few moments until the start-up message appears. To be honest, the start-up session seems the weakest part of the system. Several times the disc started and ran like a laserdisc player running a movie. It has to do this to begin with, but the computer should stop it. A further CTRL-Q-Break Shift-Break cured this in all but one case, where a total power down was needed.

One old (two months) system which I played with took three minutes to start up, and you can imagine the concern we felt, especially as there was no screen message for most of the start-up time. I eventually put this down to coldness, and it seems that the LV-ROM player must be switched on and allowed time to physically warm up.

The VFS ROM

Everything that happens in the system is controlled by the VFS ROM which, true to Acorn format, is compatible with most other filing systems. I noticed that there were even a few spare bytes for acknowledgements in the ROM, a sure sign that the writers have a degree of pride in their work. Inside the VFS are four major services: the VFS proper, the video control system, the mouse control system and the trackerball control system.

The VFS behaves much like a read only version of the ADFS. Although AIV systems can be organised with pathnames just like ADFS, the Domesday system has everything in one directory.

Some of the VFS commands are of little use and others appear spurious, because of the way in which users will work with the AIV system. Certainly I could not find much real use for *BACK, *DIR, *BYE, *DISMOUNT, *LCAT, *LIB, *MOUNT and *MAP. Although the VFS does not indicate their availability, users can apply the usual FS commands like: *DUMP, *LOAD, *TYPE, *LOAD and the OPENIN/UP, BGET#, BPUT# and PTR# commands of Basic.

On the track of a mouse

The differences between the mouse and trackerball are apparently cosmetic, except that the internal hardware of a Marconi trackerball differs from that of an AMX mouse. The facilities available would bear use on any desktop, and it's a great pity that Acorn didn't squeeze them into every Master! Table 1 shows the main trackerball

ACORN USER JULY 1987

commands (remember that the mouse commands are identical).

The simplest commands can draw some very powerful graphics. Look at Listing 1 in the Yellow Pages, the mouse drawing program. This allows a mouse or trackerball to move and draw pictures. Notice that the pointer is turned off before drawing happens. This is so the lines aren't drawn over the mouse. Notice too that the pointer is switched back on in each loop.

Listing 1 may seem quite simple, but try calling up one of the video frames and then use the program to draw around the key shapes in the picture and save the result as an outline drawing. Now enter one of the graphics packs currently available and fill in the outlines with various colours and tones,

```
AUDIO <0-3> 0-off, 3-on
CHAPTER <digits> Plays chapter(s)
EJECT
FAST <dir.> Cue or Review
FCODE <string>
FRAME <no.>
PLAY <start>,<end> Plays from start to end
(NB *PLAY <RETURN> plays from current frame)
RESET
SEARCH <no.> As FRAME, but no wait
SLOW <speed>,<dir.> Speed from 5 (slow) to 253 (fast)
STEP <1/0/255> Stop/step player
STILL as FRAME
VOCOMPUTER computer to VDU
VODISC LV to VDU
VDHIGHLIGHT Computer colour highlights LV
VDSUPERIMPOSE Computer over LV
VOTRANSFER LV & Computer mixed
VP <digit>
```

Figure 1. The available video commands

and then display the result. Pictures drawn like this can be quite enthralling and are well worth attempting.

The TMAX command needs a little more explanation. There are four separate pointer shapes, a cross, a magnifying glass, a northwest pointing arrow and a north-east pointing arrow. These exist in four quadrants. The cross over between quadrants can be set anywhere relative to the actual screen. The purpose of the TMAX (x,y) command is to set the point on the screen where the pointer shape changes, without having to continually monitor the position in the current high level language.

The video commands

Figure 1 explains the video commands available which allow control over the AIV player. With the Domesday disc the CHAPTER command seems redundant and in general terms the FCODE command is more useful to specialist applications and

can be ignored in many simple programs. The set of VO- commands are versions of the VP command with different digits, for example *VP 2 is the same command as VOCOMPUTER

Particularly interesting commands include: PLAY, which plays forwards or backwards; STEP, which moves forwards or backwards from one to 50 frames in an instant; and FRAME, which selects a nominated frame.

Interfacing video to Basic

Listings 2 and 3 include a set of Basic library routines (listing 3) and a demonstration program (listing 2) which explores the facilities of the AIV disc. The best way to explore the library routines is to read listing 2 and follow each PROC call to its DEFPROC in listing 3 (apart from PROCm, PROCloop, and PROCdelay, which are all included in listing 2). Notice that PROCaudio and PROCstep require strings of 'ON' or 'OFF' and 'FWD' or 'BWD' respectively. Remember too that PROCstep must have a step parameter of 0 to 50. The procedures are explained in table 2.

I've not used the standard Acorn PROCoscli routine, so users of Basic 1 can't access these commands. All AIV owners will have Basic 4 at least, so the PROCoscli is replaced with OSCLI("...")

Taking control

One of the most valuable computing languages is Logo, and the most widespread version follow the LCSi 'standard', hence the dialect selected in this next section is the Logotron version of Logo.

One concern that people have raised about the Domesday system is that it is archival, and hence the techniques used are more akin to data handling than to programming. But still many teachers have suggested that there would be a lot of value in children exploring AIV discs, and designing 'set pieces' to answer a particular question, or to demonstrate a particular item which needs multiple frames. The whole idea of Logo as a presentation aid for AIV is quite exciting, because a suitable Logo microworld might include tools for exploring the disc, for storing frames by name, for replaying set pieces and for asking questions about still frames.

In addition, we might consider linking AIV to language, maths and problem solving activities with Logo using branching adventure stories, descriptive writing, eg, catalogues, and turtle graphics for drawing on frames, along with other useful learning

1: THE MAIN TRACKERBALL COMMANDS

* TRACKERBALL (1)	Turns on the trackerball software
* TRACKERBALL 0	Turns it off
* TSET x,y	Sets pointer to location x,y with default at screen centre.
* TMAX x,y	Sets screen location for original of icons
* POINTER (1)	Displays moving pointer
* POINTER 0	Erases pointer
* POINTER 2	Erases and halts pointer
* POINTER 3	Displays and halts pointer
ADVAL 5 ADVAL 6	Returns value of TMAX x,y = 5,6
ADVAL 7 ADVAL 8	Returns current x,y position.
ADVAL 9	Returns state of the 3 buttons Button 1=Return 2=TAB 4=CHR\$192

2: THE BASIC PROCEDURES AND THEIR FUNCTIONS

PROCplay (start, end)	Plays from 'start' to 'end'
PROCframe (no)	Shows Frame 'no'
PROCfwd	Fast-forwards the player until
PROChalt	Halts the player
PROCbwd	Fast-rewinds the player until PROChalt
PROCAudio ("ON/OFF")	Selects sound/turns sound off
PROCsfwd	Slow-forwards the player till PROChalt
PROCsbwd	Slow-rewinds the player till PROChalt
PROCstep ("FWD/BWD", 0-50)	Steps disc shown in direction given
PROCboth	Selects computer and video pictures
PROChighl	Selects video highlighted by computer
PROCcomputer	Selects computer output only
PROCvdisc	Selects video output only

3: THE LOGO WORDS USED

Logo word	Function
SBWD	Slow rewind of player
SFWD	Slow forward of player
SLOW 1/255	Slow fwd/bwd (1/255)
BWD 1-50	Returns 256- (1 to 50)
FWD 1-50	Returns 1 to 50
HALT	Stops player
FFWD	Plays fast forward
FBWD	Plays fast backward
STEP "FWD"/"BWD" (1-50)	Steps in dir (1 to 50) frames
ON	Returns 3
OFF	Returns 0
AUDIO "ON"/"OFF"	Turns audio on/off
FRAME no	Displays frame 'no'
PLAY start end	Plays from 'start' frame to 'end' frame
FINISH	Blanks screen then ejects disc
VDISC	Video from player only
COMPUTER	Video from computer only
HL	Player video highlighted by computer
BOTH	Computer and player equal video

styles available in Logo. Listings 4 and 5 are a simple Logo Microworld which performs the 'set piece' of a trip to Telford Towers using the north side of the Community disc. The annotated journey is in a long procedure called JOURNEY1. Any words which you don't recognise as Logo primitives are defined elsewhere, either as part of the frame database, the general library or in the utility words of listing 5.

Observe particularly the use of the Logo commands:

UKSATPIC BLOCKNORTH

This shows how easily the frame can be overlaid with turtle graphics. If the major tools are provided, then the frames can be created simply by exploring the disc using its onboard software and noting the frame number of any interesting page. For example, the hamlet outside Telford Towers is on frame 13857 so we can store this frame in Logo with a simple procedure:

TO TOWERS

FRAME 13857

END

Even young children are able to build up set pieces in this way, and some can handle text and turtle graphics input to design multimedia displays.

The Logo words used in listing 5 are also shown in table 3. They cover the same procedures as the Basic procedures mentioned earlier, but are much more elegant! These utility words can be easily used to build up your own microworld set pieces like listing 4, or to explore the Domesday discs by entering commands such as FRAME 17337.

The future of AI video

With current costs as high as they are, there must be some concern over the future of AIV. The uptake of Domesday AIV discs has yet to enter the 100,000s and many companies are exploring other avenues of optical data storage, particularly the CD-ROM storage which has tumbled in price because of the mass uptake of CD players. However there are several projects on the way which support AIV players, and these projects should more clearly define the uses to which this newest of new technology can be put. Until then, here is a little problem for you to solve.

Using Logo and the Domesday national disc write a microworld tool which demonstrates a set of colour photographs concerning clothing. Begin your first frame store: TO KNICKERS...

Best of luck in exploring the fascinating world of the Domesday discs.