Sound from Vision.

A few years ago I started using a home DVD Videorecorder along with a DTTV tuner. I like to record 'Classical' and Jazz concert broadcasts, and also some radio plays – for example the recent 'Sherlock Holmes' series on BBC Radio 4. My main interest is often in the sound, with any video being a bonus. One of the advantages of making sound recordings using a DVD recorder is that it can allow recordings for up to 4, 6, or even 8 hours onto a single disc. For long events, or series of programmes, this is more convenient than recording onto Audio CD which limits you to 80 mins per disc. This set me wondering: Was it possible to extract the audio and keep that without the video? Would I be able to then use the audio in 'data compressed' format and store more on a CDR or DVD+/-R?... Since I'm writing this article you can guess already that the answers to the above questions are 'yes!'. To explain how, it's useful to start with a basic explanation of how video recordings are stored on DVD.

Figure 1 shows the kind of display you get if you load a home-recorded DVD into the DVD drive of a RO machine like my Iyonix. You can see a variety of filetypes.
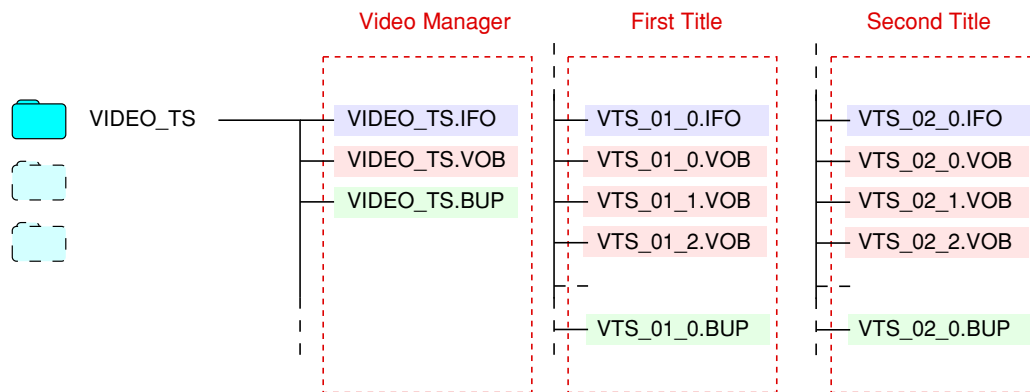

Figure 2 shows the nominal logic of how these files are organised for a Video recording. The 'VOB' files contain the audio and video data. In addition there are a series of other files with the file extensions 'BUP' and 'IFO'. These control the access to the VOB data and determine how the player interacts with the actual data. In principle the system is very flexible as it allows the DVD to reprogram the player controls, and determines the order in which the video is played, chapter and title locations, etc, etc. The snag is that the relationship between the files and the titles or chapter isn't always the same. Fortunately, there are a few basic rules which usually apply.

The maximum permitted size for VOB files is 1GB. So any recording which requires more than 1GB of audio and video data will be broken into a set of files. These will usually be played in the order indicated by their numbering – but that isn't mandated, so may not always be true. Similarly, although the titles are numbered there is no strict requirement for them to be shown in

that order in any onscreen menu, etc. However in my experience home DVD videorecorders tend to use a simple numbering system. The 'VIDEO_TS/VOB' file contains the audio and video you are presented with when you load the disc into a player and are shown the starting or 'top' menu. The operation of any navigation at that point is determined by how the details of the 'VIDEO_TS/IFO' file. Once you make a selection the relevant VOB file starts to play, and the associated IFO file alters the navigation control as appropriate. (These mechanisms are also exploited in commercial discs to do irritating things like block access to some navigation – to make you sit through adverts or 'nag screens' that threaten to cut your legs off if you make illegal copies, etc.) The IFO file also tells the player where any 'chapter' marks may be, and controls what happens when that the player reaches the end of the VOB file. For example, it may then pass control to another IFO file which plays its associated VOB file with no break. Or it may return you to the VIDEO_TS/IFO file and the 'top' menu.

The disc may also contain other files in other directories – e.g. for audio if the disc also has DVD Audio format data. And discs recorded on a home DVD recorder also tend to have another directory that contains all the 'temporary' information the recorder uses before the disc has been 'finalised' (or the 'top' menu created for +R/W discs).

The good news is that RO users already have a set of useful applications which allow us to see and hear the contents of the VOB files. !KinoAmp will allow you to play the files. Alas, the hardware of something like an Iyonix isn't up to showing the audio and video in full detail and realtime. That said, the results will vary depending on the datarate of the recording, the DVD drive in your computer, and even the type of disc. For example, with my DVD drive I find that +/-R discs can be read at higher rates than some +/-RW types, and the brand of disc may also affect results. So your experiences may differ from mine.

Despite the problems, !KinoAmp is very useful for checking the contents of each VOB file. For example, when I used it to examine the VOB files on the DVD shown in Fig 1 it confirmed that each of the VTS_XX_1 files actually stored the data for a given recording. I had made five recordings onto that particular disc, each of a sound radio channel (BBC Radio – i.e. 704 on Freeview). Since each recording was less than 1GB long it was made as a single file. The numbers XX = 01, 02, etc where also in the order the recordings where made and displayed in the root menu – which I could view as a still image if I loaded VIDEO_TS into !KinoAmp, so could check the details of each.

The next requirement was to be able to extract the sound from VOB files. To do this I downloaded a copy of !FFmpeg and installed it on my machine. This is a very powerful and flexible utility for mpeg and related AV formats. Probably its most common use is to 'transcode' one AV format into another. Alas, when I tried to use this to save audio I found the relevant icons were greyed out. I asked Christopher Martin about this and he explained that FFmpeg sometimes gets in a muddle when asked to do some operations on some files, so he'd greyed out this option to avoid some of the problems. However he also kindly explained to me how the FFmpeg program can be used to extract ac3 sound – when the file permits! Using this info I wrote a 'helper' application I've called !TrackVOB2AC3. I've given a copy of this to Jim Nagel to make available to accompany this article. As usual, detailed instructions on how to use !TrackVOB2AC3 are in a !Help file in the application. However it is important to note that it will only work if you have already installed !FFmpeg and it has been 'seen' by your filer. All !TrackVOB2AC3 does is issue the instructions to ask FFmpeg to export the audio from a VOB file. In line with Christopher's explanation, please also note that this may not always work as expected. It has worked for the VOB files I've tried that were produced by my videorecorders, but it may not work for yours. You would need to try it to find out.

!TrackVOB2AC3 will try to save the audio from a VOB file as an AC3 file. You can then play this with !DigitalCD. However there are one or two other 'gotchas' to beware of here. Both !DigitalCD and !KinoAmp need the DiskSample module to be able to decode and play sounds in Dolby or AC3. You also need to add the AC3 filetype to the !DigitalCD settings and give the AC3 files the filetype A8F for them to be recognised.

For convenience I also wrote another simple application which I've called !TrackMakerRED. This should also be available from Archive. It works just like !TrackMaker in allowing you to snip up a sound file into a series of 'tracks'. However unlike !TrackMaker it doesn't assume that the data is CD Audio. (For the DVD videorecorders I've tried, the sound is recorded as ac3 at a bitrate of 256kbps. So that is the default rate assumed by the application.) It can also be used to snip up other types of sound data file where the information is stored at a constant bitrate. I did this because although !TrackVOB2AC3 offers to export a selected portion of the VOB sound this doesn't work with every input VOB file. So you may find you have to save the entire duration of the sound from a given VOB file. !TrackMakerRED can then be used to edit this down and select the portion(s) you actually want. To see how all this this works, let's run though an example.
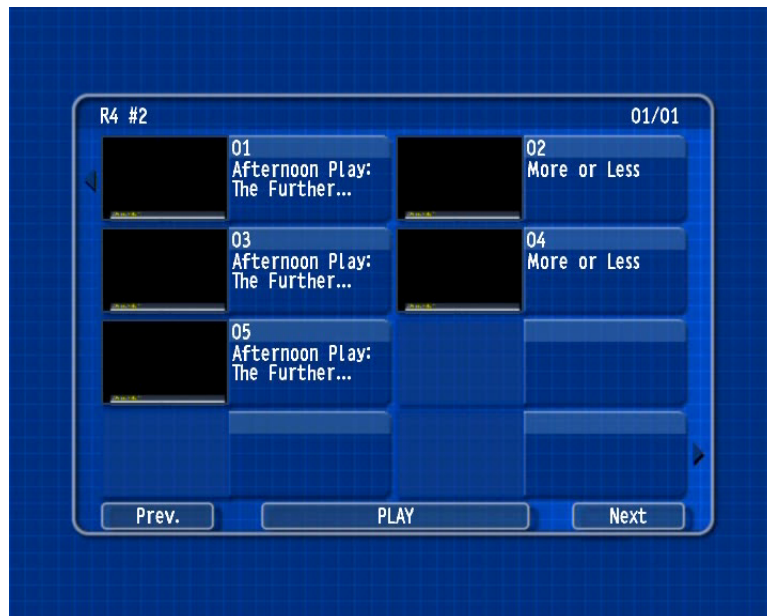

Figure 3 shows the display I get when looking at the 'top menu' of a DVD onto which I recorded 5 different BBC R4 programmes. I obtained this image by dropping the VIDEO_TS/VOB file onto !KinoAmp and then saving the result as a bitmap. Items 01, 03, and 05 are Afternoon Plays in the 'Sherlock Holmes' series. (Items 02 and 04 are from the 'More or Less' series on the use of statistics.) These were all made with the recorded in 'LP' mode (4 hours per disc). Since each recording came to less than 1GB they are all stored as a single VOB file. So, for example, the file 'VTS_01_1' holds the video and audio for the first Afternoon Play shown as item 01 on the menu. This file is 573MB long. Using !TrackVOB2AC3 I obtained the sound from this as a separate file.

When making recordings using a timer it is usually a good idea to set the recorder to start recording a few minutes before the broadcast is meant to start, and to record until a few minutes after it is supposed to end. This is to allow for the tendency for broadcasts to start or finish at times that differ from the published ones! So although each of the plays was said to last 45 mins, the VOB files were all somewhat longer. I therefore listened to the ac3 file with !DigitalCD to determine when the play actually started and finished. Then used !TrackMakerRED to snip the

recording. The result is an 81MB ac3 file that lasts 44mins and just contains the sound of the play. This could then be stored taking up far less disc space than the original VOB. Indeed, this points to one of the advantages of such 'compressed' data formats since you can potentially store many hours of recordings like this on one data CD instead of being limited to just 80 mins for a standard audio CD. Of course, the data reduction inherent in using a 'lossy' compression system like ac3 means the result might not be of such a high quality as LPCM. But in cases like these the original sound as broadcast via DTTV and recorded onto DV is already in these 'lossy' forms. The ac3 file obtained using !FFmpeg should be exactly the same sound data as was present in the VOB, so no extra loss of quality should arise. Indeed, the results sound quite good to me. Even using my Iyonix to play the results via an audio system the play sounded fine. Although I am less happy when the source is something like well recorded Classical music!

URLs for software:

       DigitalCD and DiscSample =
       http://users.skynet.be/Andre.Timmermans/digitalcd/player/download.htm

       FFmpeg =
       http://users.on.net/~belles/software/ffmpeg/

       KinoAmp =
       http://users.skynet.be/Andre.Timmermans/image/kinoamp/kinoamp.htm

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