

FireStore DR-DV5000 and Disk Based Acquisition Technology

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Introduction

There is nothing new about recording video to disk drives. The first products appeared on the market in the late 1960's for use in television production environments for applications such as instant replay or still storage – both fairly specialized areas. With the advent of non-linear editing (NLE) in the early 1990s, the editing and post production process moved to disk based video production and more recently, DVD and video servers are beginning to dominate video distribution.

What is new with video disk recording is the reality of disk based acquisition – the final step in converting to a world of tape-less video production. Disk based acquisition allows video professional's to record directly to disk while they shoot, then edit on a disk based non-linear editing system (NLE) and output to a disk based distribution media such as DVD. The entire process takes place without having to use tape.

Tape and Disk Technology Co-existing

Disk based acquisition is a relatively new concept. Many video professionals have relied on tape for years to record their productions. Some new disk based products require you to drop tape altogether in order to take advantage of disk based acquisition. Many video professionals however want to transition into this new concept and also make use of existing tools. The FireStore DR-DV5000 disk recorder from JVC Professional and Focus Enhancements was designed to co-exist with tape. Video professionals can add the power of this new technology to existing JVC DV camcorders.



FireStore DR-DV5000 docked to the rear of a JVC GY-DV5000 camcorder.



FireStore DR-DV5000 conveniently mounts between the camcorder and battery system on JVC GY-DV5000 series camcorder.

With AV/C control via FireWire, it is possible to control FireStore DR-DV5000 via the DV in/out port on JVC camcorders. In this application, record and record pause can be triggered by the camcorders record button to allow for simultaneous recording to tape and disk. The advantage here is that the videographer does not need to change the way he or she works. Two exact copies of footage are recorded to disk and tape – both with the same video, audio and timecode information. The tape can be archived for later use while the disk becomes the working raw footage master for editing. The other advantage is if there is a problem with the disk, the tape acts as a back up and vice versa. If desired, it is also possible to record to disk only.

When DR-DV5000 is used with JVC GY-DV5000 series camcorders, DV input/output, power, control information and disk recorder status is passed between the two devices via an integrated 52-pin connector. This eliminates the need for any external cables between the devices and also allows disk recorder status information (such as record mode and time remaining on disk) to appear in the camcorder's viewfinder.

Storage Technologies

One of the first questions many people ask regarding disk based video acquisition is what type of storage medium is used. Many different solutions are available including standard DVDs, high performance DVDs, IDE disk drives, FireWire disk drives, custom fixed disk drives and even some technologies that are based on solid state memory. All have their advantages and disadvantages which usually are aspects of cost, storage capacity and performance. If cost is low, storage capacity and performance can suffer while with higher costs comes better capacity and performance. One big advantage of most of the technologies listed above is that their primary market application is the computer industry – which requires improved storage capacities, performance and low costs.


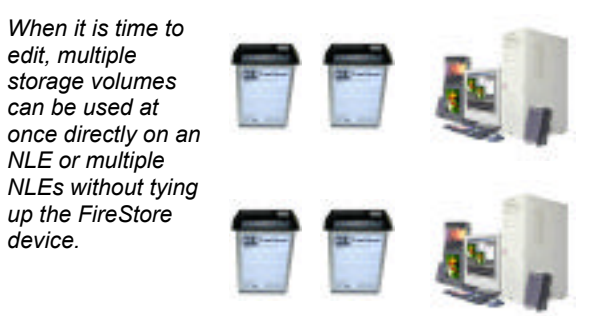
One major aspect to consider when evaluating storage technologies is whether the disk recording technology is separate from the actual storage medium. For instance, if a video disk recording device has a fixed or internal disk drive, in order to use the recorded video later in an edit session, it is necessary to transfer the footage to an NLE system. This typically results in a time consuming process. Products with this solution are usually only able to transfer at 2X real time (e.g. 2 hours of video takes 1 hour to ingest into the NLE system). Some devices get around this issue by allowing the videographer to use the disk recording technology and its fixed internal disk drive as a direct source to the NLE itself. This however results in a fairly costly storage solution.

These problems are avoided by solutions where the recording technology is separate to the actual removable storage medium. This allows multiple, relatively inexpensive, storage volumes to be used in production sessions. When a fixed or internal video disk recording solution has reached its recording capacity, it is not possible to continue recording without first transferring or

deleting footage from the device. By using removable storage it is possible for unlimited recording times.



Products such as FireStore DR-DV5000 have the advantage of removable FireWire disk drive storage. Having the recording technology and storage medium separate allows multiple storage volumes to be used with a single FireStore DR-DV5000, not limiting the video professional to a single, fixed volume.

 <p>In the field, recordings can be made to multiple storage volumes utilizing a single FireStore DR-DV5000 device</p>	<p>When it is time to edit, multiple storage volumes can be used at once directly on an NLE or multiple NLEs without tying up the FireStore device.</p> 
<p>Acquisition</p>	<p>Editing</p>

Another question to consider is, how does the storage technology fit into the existing video production environment? Recording video to disk during acquisition is an exciting new technology, but how does this technology save video professionals time or money? That question is answered in part by how well it enhances the capabilities of other stages of production. For instance, if the existing editing system is able to immediately recognize the disk recording medium (such as a FireWire disk drive on a Mac or Windows based non-linear editing system) and stream clips from it as source material, then the video professional has a large time advantage. In this instance, the ingest stage of the video production process including capturing or file transfer is completely eliminated saving a large amount of time.

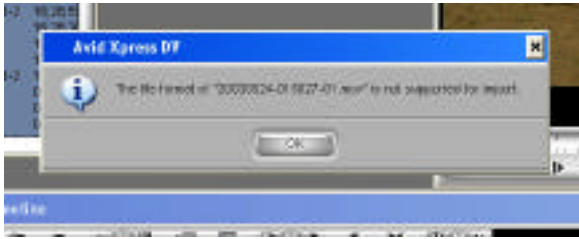


FireStore DR-DV5000 utilizes removable FireWire disk drives as its storage medium. Once removed from the FireStore system, the FireWire disk drive can be connected directly to a Mac or PC based editing system and immediately recognized as a standard FireWire volume. High performance, laptop IDE drives are utilized in the FireWire drive allowing it to be used as the media source for the NLE. In this case, no capturing or file transfer is necessary to begin editing.

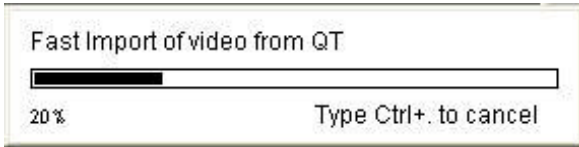
Utilizing Disk Recorded Clips on an NLE

Once DV video has been recorded to a disk based acquisition solution, the next step is to utilize clips in an NLE system. The majority of NLE applications available today are based around the DV (4:1:1 or 4:2:0, 25Mb/s, 5:1 compression) format. These include Apple Final Cut, Avid Xpress DV and Xpress Pro, Adobe Premiere, Canopus DVStorm, Matrox RT2500 and RTX.100 and many others. Even though all these systems are based on the DV format, they actually all use a different type of DV file. When an NLE captures or ingests a DV stream from a camcorder, it “formats” or “packages” the incoming raw DV stream to suit the particular application. For instance, Apple Final Cut Pro captures clips as a QuickTime DV (.mov) file while Avid Xpress DV captures files as an OMF DV file (.omf). While the DV streams are identical to what was recorded on tape and no actual transcoding takes place, different NLE captured files are quite different. For instance, exporting Final Cut Pro captured clips to DV-OMF files for use on an Avid system is quite time consuming).

Most DV based disk acquisition solutions record video to disk in either a proprietary file format or a single file format. Unfortunately, these file formats cannot be instantly compatible with every NLE solution. Many are not directly compatible with any NLE solutions at all. In order to utilize the clip in an NLE, the clip must first be “imported” by the NLE application. In this process, the NLE system converts the file to its native file format, which can be quite a time consuming process and only possible if the NLE actually supports the particular format. In most cases, the conversion process is only two times real time. Therefore, two hours of video, takes one hour to convert. In many cases, it is necessary or economical to transfer the video to the computer’s hard drive, which also is usually a two times real time process. In the end, two hours of video takes two hours to transfer and convert before it can be used by an NLE system. A lot of these solutions recommend that the video is instead captured from the disk recording solution, just as if it was from a camcorder. However, in this case, there is no time advantage over tape.

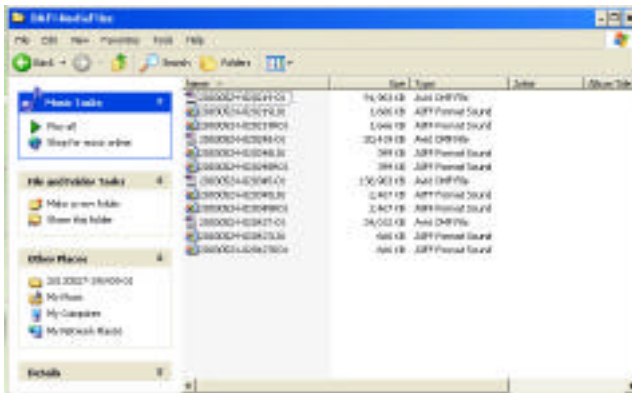


A typical error message from an NLE when a non-compatible file format is imported.



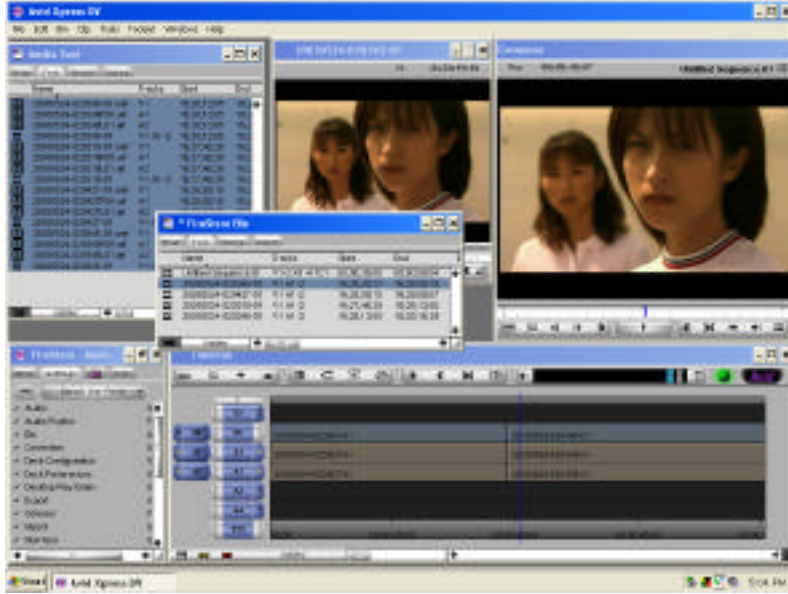
When an NLE is able to import a particular file type, it is usually necessary to convert it to that particular NLE's native format, which can be a very time consuming process.

Focus Enhancements developed a unique approach to this problem known as DTE Technology for its FireStore series of products. DTE or Direct To Edit Technology records the video to NLE native file formats while the video is being shot. The user simply selects the particular file format that is compatible with his or her NLE system before they begin recording. For instance, if a user will be editing his or her production on an Avid Xpress DV system, they would simply select AVID OMF as the file format. Or if the user is editing on Apple Final Cut, they would select QuickTime DV as the file format. In each case, the file that is recorded is identical to that which an NLE would have captured.



A FireWire disk drive on a Windows computer system recorded with Avid OMF files by FireStore DR-DV5000. DTE Technology creates an OMF video file and two AIF audio files per clip during acquisition – identical to Avid's native file format. Clips can be used immediately in the NLE timeline without capturing, transferring or converting files.

Clips recorded in the NLE's native file format can be dragged directly into the NLE's bin and then used immediately in the NLE's timeline. Clips do not require capturing, file conversion or rendering before editing can begin. Because clips are also recorded to hot-pluggable (with Mac and Windows based computer systems) FireWire disk drives, the editor can edit hours of video instantly using the FireWire disk drive as a source volume.



Once the FireWire disk drive from a FireStoreDR-DV5000 recording session is hot-plugged to the computer system, clips can be immediately dragged into a DTE supported NLE's bin and used in the timeline. As the files are identical to those that the NLE captures, no file conversion or rendering is necessary. Hours or even days of footage can be edited seconds after a shooting session is completed.

DTE Technology and FireStore – The Most Complete Disk Acquisition Solution

FireStore DR-DV5000 with DTE Technology is the most complete disk acquisition solution on the market today. No other solution currently allows video professionals to convert their existing JVC DV camcorder into a disk based acquisition solution, with removable media and record in NLE native file formats. If video professionals are going to begin to take advantage of totally tape-less video production, only FireStore with DTE Technology allows them to fully realize the advantages of the benefits of disk based acquisition. Key to these benefits is the elimination of capturing, file transfer and file conversion that allows hours of footage to be edited on an NLE's timeline within seconds after shooting.