

AVID GUIDE for  
AMA Workflow

# Panasonic P2

Media Composer 6.5  
Symphony 6.5  
NewsCutter 10.5

# Avid Editing Systems

## Panasonic P2

Features in Media Composer 6.5,  
Symphony 6., NewsCutter 10.5 and later.

### ACKNOWLEDGEMENTS

I wish to acknowledge the advice, feedback and support of the following people who have given freely of their time and advice. I am responsible for the accuracy of the content, and any errors or omissions are mine alone.

David Craig  
Panasonic Canada

Robert Russo  
Avid, Burlington, US

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### CORRECTIONS AND SUGGESTIONS

Feedback, advice and corrections are always appreciated.  
P2@paul-sampson.ca

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Be sure to visit  
[WWW.AVID.COM/AMA](http://WWW.AVID.COM/AMA)

Version 6

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# Contents

- INTRODUCTION ..... 4**
- PANASONIC P2 PLUGIN SUPPORT ..... 5**
- P2 FORMATS ..... 6**
- WHATS ON YOUR P2 CARD ..... 7**
- PREPARING FOR THE EDIT ..... 10**
  - INSTALLING P2 SUPPORT FOR YOUR AVID EDITING SYSTEM ..... 13
  - BACKING UP YOUR MEDIA ..... 14
  - EDITING FROM P2 CARDS ..... 16
- P2 PROXIES ..... 17**
  - AVID P2 OFF-LINE WORKFLOW ..... 18
- OUTPUTING A P2 SEQUENCE ..... 20**
- P2 FORMAT DETAILS ..... 22**

# INTRODUCTION

AMA (Avid Media Access) is the Avid architecture for linking to file based media rather than ingesting it. This document is specifically about linking to Panasonic P2 files in your Avid Editing Environment.

This is the *second* Workflow guide you should consult. AMA is described and its workflows and features explored in the AMA Master Guide. This current document assumes you have read that guide, which contains most of the detail about how to perform AMA operations. The Guide you are reading now covers the specifics of P2 within the AMA architecture.

This is not a full P2 workflow guide, it explores the feature of Avid Media Access which itself is a part of many complete Panasonic workflows.

## OTHER AMA RESOURCES

You have many other resources for AMA information. Apart from the AMA Master Guide and this document, you may consult:

- **Panasonic P2 PLUGIN GUIDE**  
The PLUGIN, which you must install, has an accompanying guide with details for its use.
- **Avid Editing Guide for your Editing System**  
This came with your editing system, or can be downloaded from the Avid Knowledgebase, [www.avid.com/support](http://www.avid.com/support)
- **Avid Editing Application HELP**  
This is, in effect, the Avid Application manual online at your editing computer. The HELP contains all the information in the official manual, and is easily accessible to answer your questions.

## WHO AM I?

I am Paul Sampson, a freelance trainer, an Avid Certified Instructor (ACI) and an Avid Certified Support Rep (ACSR) living in Canada. I have experience with many clients, different environments and a variety of hardware. Every week I am at a different facility assisting with training and workflow within the Avid environment.

# PANASONIC P2 PLUGIN SUPPORT

Avid has been supporting the file-based P2 format for many years. It has a well-established, well-integrated workflow that has changed and become easier over the years.

Avid has always offered *native* P2 support. This means that the files recorded on the P2 cards can be read directly by Avid editing products. You could insert a P2 card into an Avid editing system, and begin editing with its contents immediately. For many workflows, such as News, there may be no need to actually copy the files onto an Avid storage device - you can edit directly off the P2 card.

P2 is supported through the installation of an external codec supplied by Panasonic. This is added to your system by installing the Panasonic P2 AMA Plugin, available from the link at [www.avid.com/AMA](http://www.avid.com/AMA).

You may link to P2 material using `Link To AMA Volume` but not using `Link To AMA File(s)...`, as we shall describe shortly. You may Consolidate and also Import P2 material, and render into P2. In many Avid dialogues such as the `MEDIA CREATION` settings, P2 is referred to as AVC-Intra.

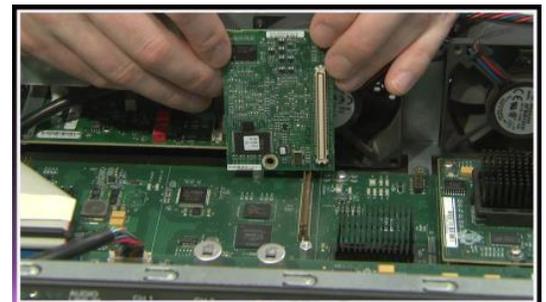
You can Transcode P2 content. In some cases, given the demands of P2 playback, this is done to increase editing performance at the Post Production stage.

There is a full set of features for working with P2 which are not described in this document. This Legacy support is activated by disabling AMA, which turns on several items in the FILE menus which allow you to work with P2 by copying it into Avid storage. AMA is seen to be a faster, easier method of working with P2 for most people.

## AVC-Intra Acceleration

If you are editing with NITRIS DX hardware, you can outfit it with the optional AVC-Intra codec module. This is a card which is easily inserted inside the NITRIS DX Chassis.

This module allows for baseband video to be captured and encoded as AVC-Intra 50 or AVC-Intra-100. It also accelerates the encoding and decoding of AVC-Intra, so will assist in **playback, (REMOVE THIS WORD)** rendering and mixdowns using this compression.



## P2 FORMATS

P2 is recorded on solid state card using the PCMCIA interface. It offers a variety of formats to choose from (DVCPRO 25, 50 and HD, AVC-Intra 50 and AVC-Intra 100) differing in bit depth (8 or 10 bits); scanning mode (Progressive or Interlaced) and also frame rate. We begin with a survey of the Panasonic® P2 format options.

The AMA Plugin for P2 will support all these formats from Panasonic:

CODEC	CODEC DETAILS	RECORD TIME (approx)	Bit Depth	Raster (frame sizes)
AVC-INTRA 100	100 Mb	1 minute / Gig	10	1920 x 1080 1280 x 720
DVCPRO HD	100 Mb	1 minute / Gig	8	1280 x 1080 960 x 720
AVC-INTRA 50	50 Mb	2 min / Gig	10	1440 x 1080 960 x 720
DVCPRO 50	50 Mb	2.5 min / Gig	8	720 x 480 (NTSC) 720 x 576 (PAL)
DV	25Mb	4 minutes / Gig	8	720 x 480 (NTSC) 720 x 576 (PAL)

The recordings are made on a P2 card, which is a collection of memory chips inside a PCMCIA shell. The architecture is such that the larger the card, the higher the data rate. This accounts for the observation that outputting to a small card takes longer than outputting to a larger capacity card.

Older computers with the correct driver will accept the P2 cards directly. More common, a P2 Card reader is used. These are available as USB-2, USB-3 and PCI Express connected devices, with from one to 6 slots for multiple cards.

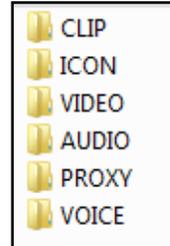


The recordings are what we call OPAtom, with separate Video and Audio files. This has important implications for AMA linking. This is the reason we link only to a Volume on P2, we do not link to individual Files.

# WHATS ON YOUR P2 CARD

If you look at the contents of the P2 card, the system displays two items: a single folder labeled `CONTENTS` and a text file named `LASTCLIP.TXT`. The text file contains the name of the last clip recorded on the P2 card.

The `CONTENTS` folder is quite a bit more interesting. There is no need for you to interact directly with the P2 card or the contents of this folder, but as the following table shows the `CONTENTS` folder does have some interesting possibilities. Here is a description of what you will find in each directory of the `CONTENTS` folder:



FOLDER	CONTENTS
<b>CLIP</b>	<p>This folder contains XML files which contain basic text. There is one XML file for each recorded piece of video. These files contain detailed information about the recording. Frame rate, frame size, aspect Ratio, audio details, shoot date and other information is included.</p> <p>If you have an unknown recording, look at one of these files to determine what the recording format of the clips on the P2 card are. Open the XML files in a text reader or drag and drop it into most web browsers.</p>
<b>ICON</b>	<p>A collection of BMP files which are thumbnail representations for each of the recorded clips. These are small - 60 x 80 pixels in size. They can provide a way for you to see visually what is recorded on the card.</p> <p>There may be more thumbnails than there are clips - this is because a clip, if it's a very long recording, will be made of several P2 files, each with its own thumbnail.</p>
<b>VIDEO</b>	<p>Here you will find the high resolution MXF video files.</p>
<b>AUDIO</b>	<p>This folder contains the high resolution audio for your clips. There is a separate audio file for each audio track you recorded, so you can expect to see many more audio than video files.</p>
<b>PROXY</b>	<p>If you've purchased the optional AJ-YAX800G proxy recording card, you may find proxies for each of your video files in this directory. These are MPEG-4 files, and they will be standard definition regardless of your record format. We will discuss proxies shortly.</p>
<b>VOICE</b>	<p>A user can add voice annotations to the recordings using the Panasonic <i>P2 Viewer</i> and the <i>P2CMS</i> software, as well as with some cameras. If these recorded voice annotations are present, they will be found in this folder.</p>

## P2 File Names

The clip names you find on the P2 card may appear arbitrary at first sight. If you look closer, you will see there is logic. The first four digits are simply increasing numeric values. Here we see a P2 card which contains one clip labeled 0004. It also has appended at the end two seemingly random characters. These help make the file name unique.

Name	Size
0004CG.MXF	1,614,876 KB

**VIDEO File directory**

Name	Size
0004CG00.MXF	10,809 KB
0004CG01.MXF	10,809 KB
0004CG02.MXF	10,809 KB
0004CG03.MXF	10,809 KB

**AUDIO file directory**

Each recording can have up to eight audio files. If you look in the audio directory the file names follow the same convention with the addition of two extra characters at the end of the file name which identify which audio track the file represents.

With some Panasonic cameras it is possible to add human readable file names that contain a plain text beginning followed by a numeric prefix. For example, if you would rather your filenames read “Dubai 0001” or “Space Centre 0007” then you can use the Panasonic User Clip Name. Since this feature is not available on all models and firmware versions of Panasonic cameras, check your documentation to see if it's available.

To set up a User Clip Name, you will create a plain text file with the desired user clip name and load it into the camera. This procedure does not cause the filenames to be different than described above. They will still be created with their semi-cryptic names. Your new *User Clip Name* will become part of the matching XML file for the clip. When you import your P2 clips into your Avid editing system it reads the file name from the clips matching XML file and ignores the P2 file name.

## AMA Linking to P2 Cards

As we have just explained, P2 recordings exist as a collection of separate Video and audio files. Technically, you can link to the Video MXF file but you would have no sound. Linking to the Audio MXF files produces no result.

We only link to P2 Cards using `FILE > AMA LINK TO VOLIME...` and link the entire card, not individual files.

## Spanned Clips

When you install multiple P2 cards in a camera, you are not limited to recording to the length of the free space on a single P2 card. A spanned clip is a clip which has been recorded over more than one P2 card.

Spanned clips are made of several files, at a minimum one set of files per card. If you mount only a single card in a spanned set, the clip will appear with *part* of its media OFFLINE. If you mount all the cards needed by the spanned clip, you will see a complete clip.

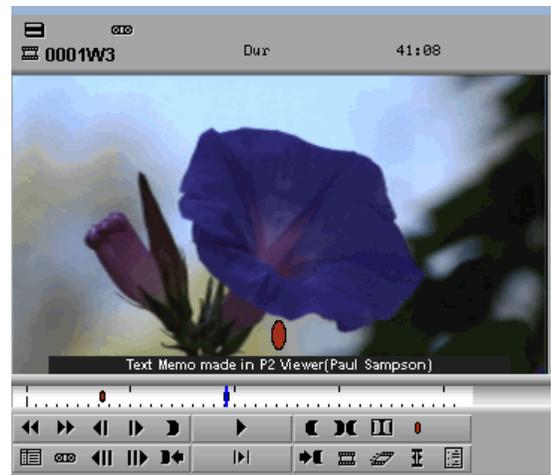
For best results place all the cards into single folder and mount them at the same time using the AMA method.

## P2 Text Memos and Voice Memos

A **Text Memo** on a P2 card is a text note present in the metadata of a P2 clip. A text note contains helpful information you add. For example you could add the name of the guest, their title, or any other type of written note. Text Memos are imported into your Avid editing system as locators, complete with the accompanying text. This data is text searchable in your editing system on a clip by clip basis.

Text Memos can be created, edited and deleted in the Panasonic *P2 Viewer* and *P2CMS* software. You can also create blank Text Memos on the camera (which serve as markers and can have text added to them later). You must assign the TEXT MEMO feature to the User Button on the camera, and press this button during recording.

A **Voice Memo** is a .wav file placed in a separate directory on the P2 card. This is not recognized (or supported) by your Avid editing system, but can be created, deleted and played in the Panasonic *P2 Viewer* and *P2CMS* software packages.



A **Text Memo** made in the Panasonic *P2 Viewer* as it appears when the clip is imported to an Avid Editing System

## PREPARING FOR THE EDIT

One of the advantages of file-based media is the low cost of the “screening machine.” Using free software available from Panasonic you can screen your files on your own computer. You can screen the P2 cards if you have a card reader attached to your computer, or you can screen copies of the cards which have been made on another type of storage media, such as an external hard drive.

The following software is available for download at:

<http://www.panasonic.com/business/provideo/support/resource-center/software-downloads.asp>

### **P2 Viewer Software**

This is a simple player for screening your P2 content, supported up to Windows 7. It can screen from the original cards, or from copies of your cards on removable media. These are mounted as “Virtual P2” cards.

P2 Viewer supports the DVCPro codecs, both SD and HD. You must download and install additional codecs for AVC-Intra and MPEG-4 (Proxy video) if you want to play these file formats. These are all available on the Panasonic download Web Site.



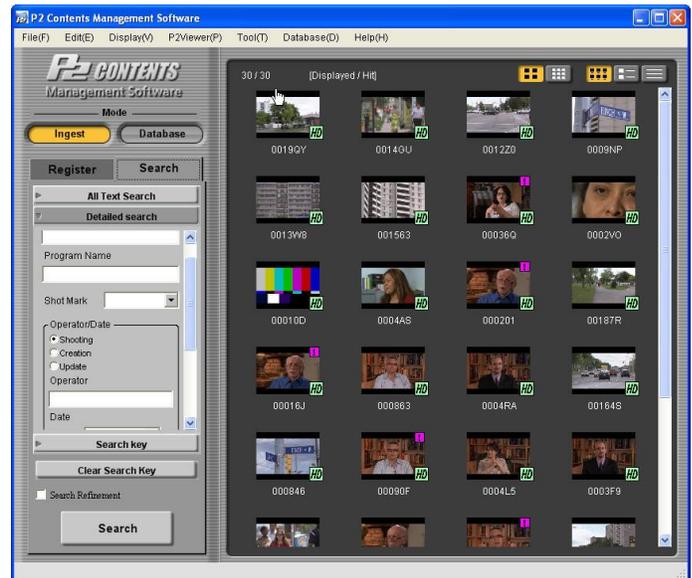
[HTTPS://EWW.PASS.PANASONIC.CO.JP/PRO-AV/SUPPORT/DESK/E/DOWNLOAD.HTM](https://eww.pass.panasonic.co.jp/pro-av/support/desk/e/download.htm)

With this software you can view, add and modify the metadata of your files. You may also add annotations in the form of voice or text memos, and copy the contents of P2 cards to your hard drive.

## P2CMS Software

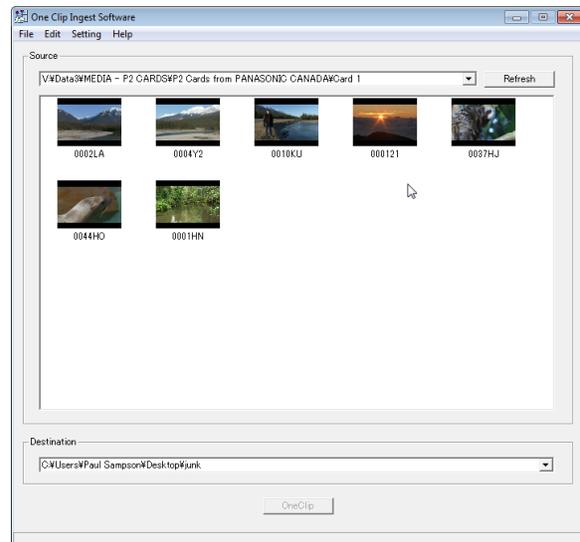
CMS stands for **C**ontents **M**anagement **S**oftware for Windows XP only and Mac 10.6.6. This application ingests P2 cards to a computer and manages the content. This includes creating an index of the P2 card information (the database) that can be searched to quickly access information. It can also restore backup copies, change Metadata, export video, and add annotations.

*P2CMS* includes its own copy of *P2 Viewer*, so it can be used to screen P2 card contents. As with the Viewer, you need to do a separate install of the codecs for AVC-Intra and MPEG-4 (proxy) if you want to screen these files.



## One Clip Ingest Software

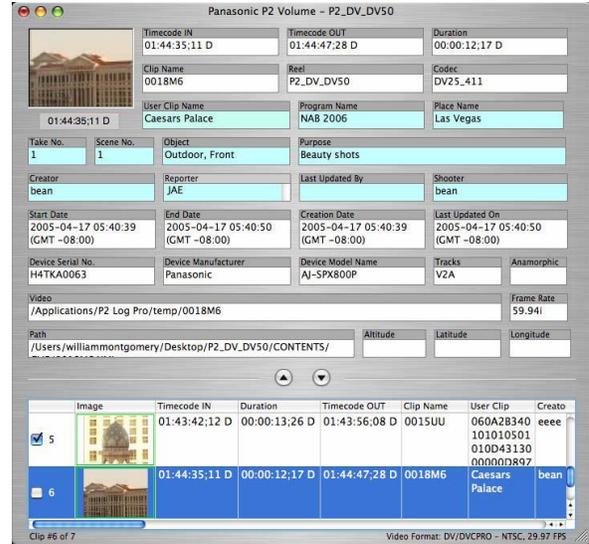
This is a Utility available for Windows (various versions) which allows you to select multiple clips on a card (or a card image on a hard drive) and combine them into a new, single clip inside a separate destination folder. It is a COPY utility which combines all the selected clips into one clip.



### Third Party: P2 Log Pro

This application from Imagine Products Inc is MAC only. It allows you to view P2 media, modify the metadata, and export the clips in other formats such as ProRes.

([www.imagineproducts.com](http://www.imagineproducts.com))



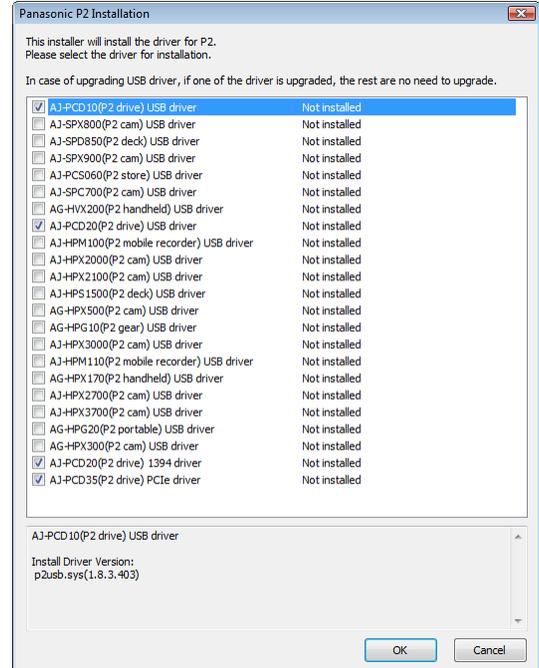
### CARD REPAIR

The content on your recorded P2 cards is valuable, and there is a small chance something could go wrong. Panasonic maintains a recovery service for clients which will attempt to recover individually deleted or damaged recordings from P2 cards. This service is free to their clients, and should be requested through your local Panasonic company.

# INSTALLING P2 SUPPORT FOR YOUR AVID EDITING SYSTEM

AVID editing systems support P2 video formats natively, so there is nothing to install on the Avid editing system to add P2 codec support. You will need to install a P2 driver to access the particular Panasonic device you are connecting. This software allows your computer to see the P2 hardware connected to your computer. If you copy P2 cards to removable media and bring that to your Avid editing system, then the driver is not required.

Driver software is included with all Panasonic P2 products, and the latest versions are available on the Panasonic download web site. This is quite a well organized site with all the software you will need for PC and MAC support. Drivers are available for 32-bit and 64-bit PC systems. The driver varies by product. When you run the installer, you get to choose all the product drivers you want to install at once.



## BACKING UP YOUR MEDIA

P2 cards are relatively expensive, and they're not usually placed on the shelf for storage. Since there is always pressure to reuse a P2 card it's very common to make a copy of its contents. This copy can be made to almost any computer type media. You can copy your P2 cards to other hard drives, Blu-Ray discs, or even a network server. Your Avid editing system works with copies of your P2 media no matter where you place it. We call these full copies of the cards *Virtual Volumes*.

### Copying P2 Cards Before going to the Edit Suite

Before you enter the edit suite, you can make copies of your P2 cards at the operating system level of your computer. This essentially involves making a file copy of the P2 card contents onto the media that you're going to store them on. Be sure to copy every file and folder on the card into a new folder at the copy destination. If you prefer to do this using Utility software, the Panasonic *P2 Viewer* and *P2CMS* software contain tools to copy cards.

Place the contents of each P2 card in a separate folder. Copy the entire cards contents into this folder. Organize your folders in a tree structure, so that by linking to various branches of the tree you can link to one or to multiple volumes. Remember your Avid editing system will find volumes two folders down from the one you select for the link.

In the *AMA MASTER GUIDE*, we describe how the folders can be organized and accessed from several different folder levels. All of the editing methods we will describe will be able to access the files wherever they are as long as they reside on a mounted drive on your computer system.

### Copying P2 Cards In the Edit Suite

If you're in the edit suite, you can use the Avid editing systems `CONSOLIDATE` feature to copy the contents of the P2 card onto your Avid storage. During this copy you can convert them into another format, such as Avid DNxHD if you need to by performing a `TRANSCODE` instead.

## Deleting P2 Media on P2 Cards

You cannot delete media on a P2 card from within the Avid editing application. If you select the clip and choose delete, you'll be given the opportunity to delete the clip in your bin, but not the P2 media on the card. While you could go directly to the card and delete files, it is difficult to manage deletion when you must find similarly named files in multiple directories on the card – at a minimum there are things to be deleted for each clip in four directories - AUDIO, CLIP, ICON and VIDEO. P2 media on a P2 card should be managed by Panasonic products and software.

## EDITING FROM P2 CARDS

### Editing with P2 Cards directly

Editing from the P2 card directly saves time because you don't have to capture the media from the card into the Avid system. Performance is good depending on the nature of the connection between the card reader and the editing computer. Currently the fastest connection available is through PCIe direct connection (using an AJPCD35 card reader) to the host motherboard, or by inserting the P2 card directly into a PCMCIA slot in the computer. USB-2, USB-3 and Firewire (400 and 800) card readers are also available. Choose a connection that matches your workflow, for example, USB may be sufficient for news editing, but could prove inadequate if more production level editing is needed.

Editing directly from P2 cards works best for quick turnaround productions, like news and event programming. You are limited to directly editing with only the number of cards you can fit in the connected card reader(s). For larger projects you could certainly have more cards than card reader slots. Performance may be limited by the speed of the card reader connection, especially with USB connected devices.

### Working with Copies of your P2 Cards

When working with large amounts of content or longer production cycles, you will want to copy the contents of the P2 cards into some type of secondary storage.

P2 cards themselves were never intended to be long term storage. In many instances the production plans for the time and cost of having the contents of the cards copied onto one or more external storage devices. It is possible for the Avid editing system to access the recordings while they are on this external storage, again without having to copy the files into Avid storage.

## P2 PROXIES

Proxy or low resolution video can be recorded simultaneously with high resolution video in some of the Panasonic cameras. Avid editing systems *do not* support Panasonic Proxy video directly, but the Proxy video can still be useful for screening and possibly logging in some workflows.

Proxy recording is an option, and requires the installation of the AJ-YAX800 option card into a compatible camera. While the option card is the same form factor as the typical P2 memory card, they are totally different. Do not place a memory card into the special Proxy slot, which is at the top of the cameras.



Proxies are recorded as MPEG-4 video at a frame size of 320 x 240 pixels for both HD and SD recordings. They can be recorded onto your P2 card or to a separate SD memory card, which can be inserted directly into the encoder card on the top of the camera. A 4 GB memory card can record between 6 - 36 hours' worth of proxy video, depending on the quality recorded. Proxy files can be used many different ways. For example the MPEG-4 files can be transferred through iTunes to an iPod to allow for screening of the video on a portable device.

Proxies can be recorded at one of three data rates: 192, 768 or 1500 kb per second. To help in identifying the original recording, the MPEG movies may contain a timecode burn-in. There is no actual timecode track added to the MPEG file.

While this proxy timecode matches the timecode on the high resolution clip, it is only *visually burned-in* to the MPEG proxy file. There is no way to use it in an off-line workflow to automatically trace back to the original recording. This timecode "window burn" allows you to read and write down timecode numbers if you want to find particular shots again.

As useful as the proxies are, they contain no Timecode which the Avid can access and no media identifiers (UMID). This means no typical off-line or on-line workflow is possible using the standard Panasonic proxies.

## AVID P2 OFF-LINE WORKFLOW

Throughout the following discussion “Off-line” does *not* refer to the “Media Offline” error message. Rather, I am referring to a standard industry practice of editing with lower resolution media and then conforming the final product to high resolution media.

This well established “Off-line to On-line” process has no relation to the Avid “Media Offline” error message. I have even hyphenated the term Off-line to try and keep this distinction clear.

Also, in some cases full resolution SD media may be referred to as off-line quality media. This is quite possible in an HD production where the lower resolution media might be an SD copy of an HD original clip. One editor’s on-line is another editor’s off-line.....

### Why an Off-line workflow?

There are still many situations which may require an off-line workflow with P2, even though the P2 proxies (if even available) cannot be used in this way. There may be a well-established production process which is built around editing SD footage. As the move is being made to high definition production, rather than changing some equipment and altering the workflow, it might be better to have SD copies of the footage available to put into the existing process.

Avid editing products do support off-line workflows with P2 media, which will be slightly different for AMA (Avid Media Access) compared to the non-AMA method.

### NON- AMA Off-line Workflow

A Non--AMA (legacy) off-line workflow involves making copies of your high-resolution media at lower quality (using Avid Transcode) and editing with these lower resolution duplicates. When you're done, you relink to the original P2 media and consolidate to a final storage area. This process is almost identical to the AMA process, detailed next, except you use `FILE > IMPORT P2` rather than AMA to access the clips for Transcoding.

In a standalone editing environment this can be done using the `TRANSCODE` command on an Avid editing system. In an Avid ISIS / Avid Interplay shared storage environment larger volumes of transcodes can be done as a background process using the Avid Transcode service if it is installed on those systems.

## AMA Off-line Workflow

One AMA off-line workflow for P2 would include the following steps:

### PREPARING FOR THE EDIT

- Copy your P2 card contents into a storage area. This could be to standalone hard drives, or a workspace on an Avid ISIS server. Ensure the folder names are unique and not arbitrary to make it easier to manage your media.
- Using AMA, mount your P2 cards so each link into separate bins. Ensure the bin names match the folder names which contain your P2 cards.
- Set your FORMAT tab (in the Project window) to the format of your offline media – SD or HD. Go to each Avid bin and transcode its contents into your off-line resolution. Create new bins for these lower resolution off-line clips, name these new Bins appropriately, and move the off-line clips into these bins.
- Edit using the off-line video.

### PERFORMING THE REZ UP

- Set your format tab (in the Project window) as appropriate, to HD or SD
- Mount your high-resolution AMA volumes
- Relink your sequence to this high-resolution media using the menu item `CLIP > RLINK`

Adhering to some standard organizational guidelines and naming conventions is going to be essential to keep your footage organized and available during the edit and after.

This process works with media outside an Avid Interplay environment. That is, Interplay **Dynamic Relink** does not allow relinking to AMA mounted volumes.

## OUTPUTING A P2 SEQUENCE

You can output your final P2 sequence as a digital cut to tape, as a file export, or as a P2 device transfer back to a P2 card.

### Digital Cut

This is a transfer to tape using the DigitalCut menu item. Digital cut varies slightly between Avid editing hardware configurations.

- The current Nitris DX hardware will allow you to output a P2 timeline without any further preparation.
- An Adrenaline editing system will require you to Transcode the completed sequence into DNxHD before doing your digital cut.
- A Symphony Nitris Classis will require a transcode like the Adrenaline for a digital cut.

DNxHD is the only codec a Nitris (Classic) or Adrenaline can officially play in full quality. In practice, the later version of the Nitris (Classic) performs well with DVCPProHD and can play a single stream at least in full quality.

### File Export

P2 media can be exported using the Avid `FILE > EXPORT` option. It can be converted to a number of formats during export.

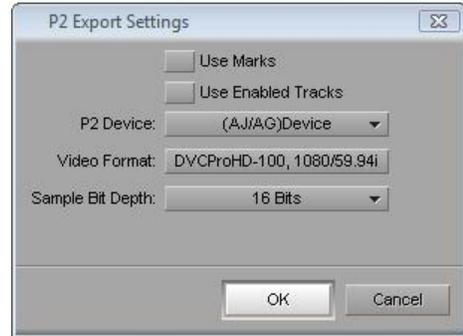
QuickTime reference export is possible, and you should check 'Use Avid Codec'. This tags the QuickTime movie to use the AVID codec rather than the QuickTime Codec when it is played back. If you install the Avid codecs on the target system, the movie will load and playback correctly using the Avid codec.

On export, there is no AVC-Intra QT codec.

## Export to a P2 Card

Exporting to a P2 card is supported on the PC with all the P2 codecs except the AVC-Intra codecs.

You export to a P2 card through a menu item. First, make sure you have a P2 device connected to your computer. If you have more than one device, or if you have a P2 card reader with many cards in it you will have no control over where the exported media is going. Make sure that only one device and one card is available when you perform this operation so you know exactly where the media has gone.



1. Select the Sequence or Clip in the bin.
2. Choose **OUTPUT > EXPORT TO DEVICE > P2**.
3. Select the appropriate options in the P2 Export Settings dialog box.
4. Click OK.

The options in the P2 Export Settings dialog box include:

**USE MARKS:** select this to only export the material between your **MARK IN** and **MARK OUT**

**USE ENABLED TRACKS:** select this to only export the material on the tracks which are turned on

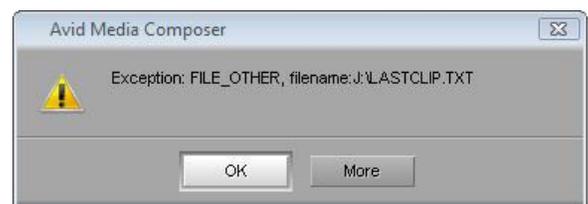
**VIDEO FORMAT:** select the appropriate video format

**SAMPLE BIT DEPTH:** when this is available, select the appropriate sample bit depth

The resulting file is placed on your P2 card or cards. The time code on this clip will begin at zero. The file will receive a Panasonic filename, the sequence name does not transfer with the clip.

## Export To Device Error Message

A very common P2 export error is usually caused by the destination device having its write protect tab turned on. If you get this error, check your P2 card to see if the write tab is enabled.



## P2 FORMAT DETAILS

### AVC-Intra Frame Recording

Many codecs for recording video rely on a type of compression call LongGOP. This provides a compact recording, but at the expense of not actually recording every frame individually. This means extra processing is required for playback, and since each frame is not recorded in its entirety, fast motion can cause artifacts. LongGOP codecs do not record as well as 'full frame' codecs, and they do not hold up as well through post production. This doesn't make them bad – they are very useful for extending recording time on any medium.

The Panasonic P2 codecs are different than LongGOP codecs – P2 codecs record each and every frame as an individual picture. Each image stands on its own, and can act as an edit point without any reference to adjacent frames or further processing. The AVC-Intra-100, AVC-Intra-50 are the newest codecs for P2 available from Panasonic. AVC-Intra-100 provides the highest quality currently available across the P2 product line.

The AVC-Intra codecs are very demanding on your computer's processor. If you find your Avid editing system does not operate with the same level of performance as with AVID codecs (such as DNxHD), you may need a more powerful computer, or convert the AVC-Intra codec video into an Avid DNxHD codec.

### Bit Rates

The more information you preserve as you record each frame, at least in theory the better that frame looks. Bit rates are often considered to be an indication of the quality of your recordings. The higher the bit rate, the more information about the original frame is preserved. A codec like AVC-Intra-100 stores approximately twice as much information about each frame as compared to AVC-Intra-50. The number after the name of the codec actually indicates the bit rate of the codec, in megabits per second (Mb/sec). The lower bit rates are often achieved by recording a smaller frame size and applying higher compression.

### Bit Depth

Video is often described as being an 8 or 10 bit recording. This number indicates the range of tones each pixel can reproduce. Simply speaking, an 8 bit image allows each pixel to have 256 different brightness levels (for each of the three colors). A 10 bit image allows a pixel to have 1024 different brightness levels. A 10 bit image has more detail and more fidelity in its color recording. For chroma keying and color correction in

particular, I prefer 10 bit codecs which perform better under demanding circumstances. Your Avid editing application is capable of processing 10 bit video from P2 and preserves this extra quality.

## **P2 Frame Rates**

Your Avid editing application supports all the standard P2 frame rates, both interlaced and progressive:

23.98; 25i; 25p; 29.97p; 29.97i; 50; 50p; 59.94i; 59.94p

With such a wide range of options it's tempting to experiment with different frame rates. However, while the current Avid editing system handles mixed frame rates, Avid editing systems prior to Media Composer 4.0, Symphony 4.0 and NewsCutter 8.0 cannot *mix* different frame rates in the same project or in the same sequence.

For example, it's not possible to mix PAL (25 fps) and NTSC (29.97) on an Avid Media Composer 3.5 editing system, although it is possible with Media Composer 4.0 and above.

To accommodate those wanting the "film look," it's possible to record at 23.98 frames per second, and in North America have the camera insert extra fields to create a true 29.97 recording. You are doing with the camera what you used to do at the film transfer stage - inserting 2:3 pulldown. In this case it might seem like you are mixing 23.98 and 29.97 frame content, but strictly speaking you are not.

## **Panasonic Native Frame Rate support**

If you want a 24 frames per second file without pull-down, you can use the Panasonic "pN" (progressive Native), or simply called NATIVE formats. These record only the original frames and do not repeat portions of the frames (insert pulldown) to make the recordings compatible with standard frame rate equipment.

As a result, the recordings take much less card space – and consequently you can get more material on a P2 card. However, the recording is incompatible with standard (Broadcast) equipment.

24pN may contain only the 24 frames, but the actual frame rate is a more standard 23.98 frames per second in North America. We would use this media in an Avid 23.976 format project. There are no special "pN" projects, you just select a compatible frame size and frame rate project.

## Interlace / Progressive

Avid editing products support the Panasonic interlaced and progressive formats. With motion pictures interlaced video is less sharp, but offers smoother motion than progressive recordings. Interlaced video has better temporal (time) resolution with its higher field rate, and Progressive has better spatial detail (sharpness) due to its lack of fields and full frame nature. The “film look” is more closely associated with progressive recordings.

In Avid editing products, it is possible to mix interlace and progressive content in the same sequence, which itself can be either Progressive or Interlaced.

## Variable Frame Rate (VFR) Recordings

Some of the Panasonic P2 cameras can record at frame rates other than “normal.” When this happens, it can be said that the camera was *overcranked* or *undercranked* at the time of recording.

Your Avid editing application plays back the recorded file at its “normal” speed. For example, in North America if you overcrank and record at 60 frames per second (nominal) the Avid editing system plays the file back at the 30 frames per second – resulting in playback of the file taking twice as long, and the on screen image running at half speed.

**Overcranking** Recording *higher* than normal frames per second, resulting in slow motion playback of the final recording.

**Undercranking** Recording *lower* than normal frames per second, resulting in fast motion or a time lapse look when playing back the recording.

Your Avid editing system plays back and edits this video, and displays it as a standard video file running at the projects frame rate.