QC A2D and QC HD
OPERATION MANUAL

Revision 2.1 February 2007

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CONTENTS

OUTLINE AND FEATURES

- Portable recorder with fixed media. The media is a rugged, industry standard, 2.5-inch hard disc drive mounted in a shock protected housing.
- Features 9 hours of storage in DV and HDV at 1080i, and nearly 13 hours at 720p.
- Record and Playback as you would a tape recorder with familiar operational settings.
- Connects to a computer as a standard Hard Disk Drive (HDD) with all recorded content appearing as files inside folders for immediate download in a “drag and drop” fashion in faster than real time and ready to edit. No more wasted capture time.
- Record and playback using rugged internal Transactional File System technology and data presented in HDD mode through emulation of standard file systems compatible with Windows and Mac.
- Firmware update via simple file transfer in HDD mode.
- **Enhanced VTR type features**
    - External time code record.
    - 99 Bins, independent of each other.
    - Automatic clip marking, up to 97 per bin.
    - Playback in fast or slow motion, forward or reverse.
    - RS232 control via the Sony 422 protocol **(A2D2 only)**.
    - Selected bin is remembered when power is interrupted.
- **HDD features**
    - Records popular *.avi, *.mov, *.mxf and *.m2t file formats for use with most NLEs (non-linear editing suites) presently on the market.
    - Selectable NTFS or FAT32 file system compatibility.
    - Every bin appears as a folder, every clip as a file.
    - Unique volume names so multiple HDDs can be mounted at the same time, very useful for multi-camera shoots.

WARNINGS

- When using an nNovia 12V NiMh battery, do not connect the AC adaptor to the battery while it is connected to the recorder.

- Use the supplied AC adaptor to charge the battery. Alternately use a charger specifically designed to charge a 12 Volt NiMh battery.

SERVICE, SUPPORT & WARRANTY

nNovia Inc. warrants your equipment to be free from defects in material and workmanship under normal use from the date of purchase for a period as follows:

QC A2D2 or QC HD: 1 year-Parts/90 days Labor.

ACCESSORIES AND BATTERIES: Respective manufacturers warranty to extent transferable to customers.
Such defects will be corrected, by repair or replacement at the option of nNovia, provided the equipment is returned prepaid to our franchised service agency, and prior thereto, you make a request for instructions to your closest nNovia regional office.

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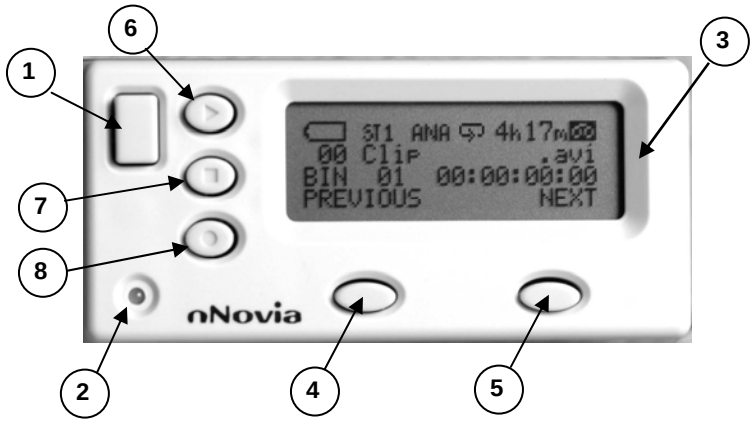
Service and adjustments for normal use will be made without charge within the warranty period. Thereafter, repairs will be made at established factory prices.

THE NNOVIA WARRANTY APPLIES ONLY TO THE FIRST CUSTOMER PURCHASE FROM NNOVIA OR ITS DEALER, AND DOES NOT APPLY TO EQUIPMENT SHOWING ABUSE OR DAMAGE, OR TO BATTERY OR BATTERY CASE, OR TO PARTS WHICH IN THE JUDGMENT OF NNOVIA INC. ARE NOT DEFECTIVE. NOR DOES IT EXTEND TO ANY EQUIPMENT WHICH MAY HAVE BEEN TAMPERED WITH, ALTERED OR REPAIRED OUTSIDE OUR FACTORY OR AUTHORIZED SERVICE DEPOT.
Your unit must be returned properly packed to an authorized nNovia Service Station. Any damage caused by failure to observe proper packing or to observe instructions for installation, operation and maintenance as contained in this Operation Manual furnished with each unit, by accident in transit or elsewhere, will not be covered by the Warranty. Shipment to authorized nNovia Service Stations must be prepaid. This Warranty is in lieu of all other Warranties expressed or implied, and no one is authorized to assume any liability on behalf of nNovia Inc or impose any obligation on it in connection with the sale of any equipment other than is outlined above. In no event will responsibility be assumed or implied for consequential damages arising from interrupted operation or other causes. Register your product within fourteen (14) days of purchase. Failure to register will not affect your rights under the warranty so long as you can otherwise substantiate the date and place of purchase. You may register your product and sign up for product support and update mailings by filing out a Product Registration form on the nNovia website.

Weight:	16oz (450g)
Temperature	
Operating:	+40°F to +104°F (+4°C to +40°C)
Non-Operating:	-40°F to +149°F (-40°C to +65°C)
Vibration:	
Operating:	1.0G (5-500 Hz)
Non-Operating:	5.0G (10-500 Hz)
Shock:	
Operating:	250G (2ms)
Non-Operating:	5,000 (0.5ms)

DESCRIPTION OF CONTROL PANEL



1. **Menu Navigation Menu key** – Use this button to start navigating as well as exiting the various options offered by the recorder. The functions are called out in the bottom two rows of the LCD. Stepping through options is done by following the directions set in the LCD annotations. At any time, an option can be exited by pressing this key.
Note: Main menu selection can be accessed from a Stop or Idle mode. Specialized menu selections are accessed while playing.

2. **Tally LED** – Indicates unit is recording when lit red, playing when lit green. Flashes red when there is less than 5 minutes of capacity while recording.

3. **LCD Display** – There are four lines in the LCD Display. The first line is used to display icons that reflect some of the current settings of the unit. These settings include:

- Battery Level
- ANA / DIG (Video Source is Analog / Digital) /HDV (Unit is set for HDV mode) **(A2D2 only)**
- Loop Play enabled
- Time Remaining

The second line will display the recording file type set for the selected bin (.MOV e.g.). While playing or recording it also displays the current clip number and the total number of clips in the bin.
The third line will display the bin number (01-99) and a time number (Hr:Min:Sec:Frame). The time number will represent the absolute time address or the time code of the frame being recorded or played. When selecting a new bin, the time number will be the length of the content in this bin. The fourth line annotates the significance of the soft keys.

4. **Menu Navigation Left soft key** – The functions of the two Soft Keys found below the LCD are
dependent upon the current operation mode. Each function changes with each different operation
mode. The Soft Key's current functions are displayed on the bottom line of the LCD panel, directly
above each respective left / right Soft Key.

5. **Menu Navigation Right soft key** – (same as above)

6. **Play/ Pause** – From the Stop or Idle mode, pressing the 'PLAY' button plays back video from the selected bin. While playing, pressing the 'PLAY' button will toggle between 'PLAY' and 'PAUSE'.

7. **Stop** – In PLAY Mode, pressing the 'STOP' button will end play back and enter the Stop mode. In RECORD Mode, pressing the 'STOP' button will end recording and enter the Stop mode.

8. **Record** – In Idle Mode, pressing the 'PLAY' while the 'REC' button is held down will make the unit ready to record.

SPECIFICATIONS

Analog Video Inputs: **(A2D2 only)**	
Composite and S-video	1.0Vp-p, 75 Ohms internally terminated
Analog Video Outputs: **(A2D2 only)**	
Composite and S-video	1.0Vp-p, must be terminated
Audio Inputs and Outputs: **(A2D2 only)**	2 L/R channels, Unbalanced, RCA connector, +2dBU Full Scale, 10K Ohms input impedance
Audio Sampling Rate: **(A2D2 only)**	2 modes user selectable: ▪ 48KHz, 16-bits ▪ 32KHz, 12-bits
Time Code In: **(A2D2 only)**	SMPTE, 0.5V to 5.0V p-p, BNC
GPI Trigger **(A2D2 only)**	1.65V Threshold, 100K Ohms input, contact closure.
Tally Output **(A2D2 only)**	1K Ohms to +5V (On)/0.0V (Off)
Digital Video In/Out	IEEE-1394, 400Mbps max, 6-pin
Recording and Playback Formats	
Analog Inputs and Outputs:	DV25
Digital Input and Output:	DV25, HDV
Recording time (minutes per 10GB)	
DV25: 46.3	
HDV: 49.4 at 1080i, 64.3 at 720p	
Media File Format	
DV25: *.avi (Type II, Microsoft, Canopus), *.mov, *.mxf (OP1A)	
HDV: *.m2t	
Operating File System Compatibility	FAT32, NTFS
Input Voltage Requirement	12V typical, 8V min , 24V max
Power Consumption @ 12V mode: 5.3W	Idle: 4.3W, Play/Record: 6W, HDD
Size (W x H x D): x 155mm)	4.0” x 1.9” x 6.1” (101.6mm x 48.3mm

with the current frame being played, in the record state, the time code returned represents the elapsed time recorded in the present bin.

61h, 20h, OL **Status Sense**

Requests the status of the unit. The status is mapped onto 16 bytes. A variable number of bytes can be requested by specifying the offset (O) byte within this map and the length (L) of bytes wanting to be return. The offset ranges from 0 to F and the length ranges from 1 to F. The sum of O and L cannot exceed 15. The map is bit significant and is tabulated below. Data 8 is the present Bin Number binary encoded.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Data 0	Busy	0	0	0	0	0	0	Local Enable
Data 1	0	0	Stop	0	Rewind	Fast Forward	Record	Play
Data 2	0	0	0	0	0	Reverse	Pause	0
Data 3	0	0	0	0	0	0	0	0
Data 4	0	0	0	0	1	0	0	0
Data 5	0	0	0	0	0	0	0	0
Data 6	0	0	0	0	0	0	0	0
Data 7	0	0	0	0	0	0	0	0
Data 8	BIN7	BIN6	BIN5	BIN4	BIN3	BIN2	BIN1	BIN0
Data 9	0	0	0	0	0	0	0	0
Data 10	0	0	0	0	0	0	0	0
Data 11	0	0	0	0	0	0	0	0
Data 12	0	0	0	0	0	0	0	0
Data 13	0	0	0	0	0	0	0	0
Data 14	0	0	0	0	0	0	0	0
Data 15	0	0	0	0	0	0	0	0

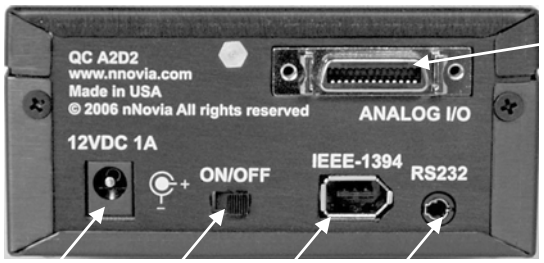
61h, F0h, 04h **Current Frame Offset**

Requests the current Frame Offset number. Unit responds with 4 bytes indicating the present frame offset in Binary-Coded format with the least significant byte first.

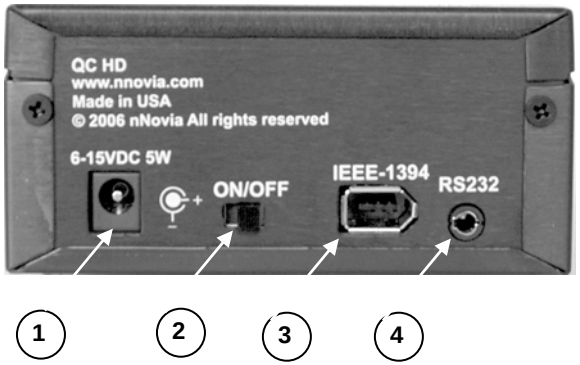
61h, F1h, 01h **Current Bin**

Requests the current bin number. The single byte answer is in Binary-Coded format.

DESCRIPTION OF QC A2D2 REAR PANEL



QC HD REAR PANEL



1. **DC Power In** – 2.1mm connector for 12V input. The connection is used for the battery or the AC adapter.

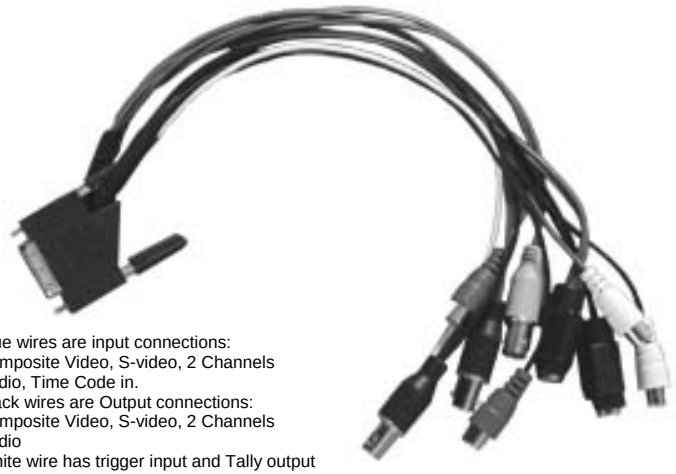
2. **Power switch –** Turns the unit on and off.

3. **Firewire Input/Output connector** – Six-pin IEEE1394B (400Mbps) connector used to send and receive digital signals as well as to connect as an HDD to a computer. Power is not accepted from this connector.

4. **RS232** – 3.5mm 4-pin connector used to remotely control the QC A2D2. Not operational in the QC HD.

5. **Analog I/O (A2D2 only)**– The breakout cable connects to this 26-pin connector. It holds the analog video in and out signals, the audio in and out signals, the time code input and the remote trigger and Tally signal.

DESCRIPTION OF BREAKOUT CABLE



Blue wires are input connections:
Composite Video, S-video, 2 Channels Audio, Time Code in.
Black wires are Output connections:
Composite Video, S-video, 2 Channels Audio
White wire has trigger input and Tally output

OPERATION PROCEDURES

Providing Power

The QC can be powered by a battery or an AC Adapter. Plug the output of either one into the DC Power connector located on the Rear Panel. Move the power switch to the ON position. The QC will turn on and will wait for 5 seconds for you to press the Menu key to go into HDD mode, after the wait period it will go into the VTR mode.

24h, F1h, nn Play Offset nn
Frame Offset number nn is played. The number nn is made up of 4 binary encoded bytes and sent out with the least significant byte first. This command may be issued from the Idle state or any other Play state.

Note: Frame Offset are represented in absolute frame numbers where the first frame of the bin is 0.

24h, F2h, nn Play from Offset nn
Content of the present bin is played at 1x speed starting at Frame Offset nn. This command may be issued from the Idle state or any other Play state.

24h, F3h, bb, nn Select Bin and Play Offset
Bin number bb is selected and Frame Offset number nn is played. . This command may be issued from the Idle state or any other Play state.

24h, F4h, bb, nn Select Bin and Play from Offset
Content of the bin number bb is played at 1x speed starting at Frame Offset nn. This command may be issued from the Idle state or any other Play state.

24h, F5h, nn Play to Offset nn
Content of the present bin is played at 1x speed starting from present Frame Offset until Frame Offset nn at which point it pauses. Frame Offset nn is 4 bytes and starts with the LSB. This command may be issued from the Idle state or any other Play state.

25h, F5h, bb, nn Select Bin and Play to Offset
Content of the bin number bb is played at 1x speed starting at Frame Offset 0 to Frame Offset nn then pause. Frame Offset nn is 4 bytes and starts with the LSB. This command may be issued from the Idle state or any other Play state.

29h, F5h, bb, nn, ee Select Bin and Play from Offset to Offset
Content of the bin number bb is played at 1x speed starting at Frame Offset nn to Frame Offset ee then pause. Frame Offsets nn and ee are 4 bytes and start with the LSB. This command may be issued from the Idle state or any other Play state.

Sense Request

61h, 0Ch, 04h Current Time Sense
Requests the Time code data. The unit responds with 4 bytes indicating the present time code in Binary-Coded-Decimal. The first byte hold the frame number, the second byte holds the seconds, the third the minutes and the fourth the hour. In the play state, the time code returned is the time associated

Transport Control

20h, 00h, Stop
The unit enters the Idle state. In the A2D, the outputs reflect the video source as selected by the Front Panel.

20h, 01h Play
Content of the present bin is played at 1x speed. This command may be issued from the Idle state or any other Play state.

20h 02h Record
The video is recorded from the selected source onto the current Bin. This command may be issued only from the Idle state.

20h, 10h Fast Forward
A play state where video is played at the highest speed of 32x in the forward direction.

20h, 20h Fast Rewind
A play state where video is played at the highest speed of 32x in the reverse direction.

NOTE: When receiving one of the following commands (JOG, VARIABLE or SHUTTLE), the unit will play forward or backward according to the speed data. The first data byte may only be a maximum of 80:

$$\text{Play Speed} = 10^{(nn/32-2)}$$

Note that setting nn to 0 will result in pausing the unit.

21h, 11h, nnh Jog Forward
21h, 12h, nnh Variable Forward
21h, 13h, nnh Shuttle Forward
A Play state where video is played at the commanded play speed as described above in the forward direction. **Note: Setting the speed to 0 causes the play to pause.**

21h, 21h, nnh Jog Reverse
21h, 22h, nnh Variable Reverse
21h, 23h, nnh Shuttle Reverse
A Play state where video is played at the commanded play speed as described above in the reverse direction. **Note: Setting the speed to 0 causes the play to pause.**

21h, F0h, nnh Select Bin and Play
Content of the bin number nn is played at 1x speed from the begining. This command may be issued from the Idle state or any other Play state.

VTR MODE

Organize your shoot

A recorded length of video between its start point and following pause or stop point is called a clip. A clip can be as short as one frame or as long as the whole storage capacity. Clips are stored in bins; a bin is analogous to a tape. 99 bins are made available; Clips can be added to any bin at any time as long as there is room available. The QC always displays the clip number as well as the bin number.

Menu Navigation
Main Level

From the Idle or Start-up display, pressing the Menu key will enter the first level of options, these options are the most commonly used ones. The lower three lines will look as below:

```
[MENU TO EXIT]
 Menu option here
 ENTER       NEXT
```

There are 8 options and they are :

```
MAKE MEDIA FILES
EMPTY THIS BIN
SELECT DV SOURCE
EMPTY ALL BINS
RECORD SETUP
PLAY SETUP
SYSTEM SETUP
FIRMWARE REVISION
```

Pressing the Next key will bring up the next option down on the list and will return to the top option from the bottom. Table 1 details the actions for each option.

Menu Option	Action taken
MAKE MEDIA FILES	Prepares the content to be seen by the computer in the HDD mode. The operating system environment is previously set to either FAT32 or NTFS. This action is taken once before connecting as an HDD and is done for all the recorded content.

EMPTY THIS BIN	Empties or erases the content within the presently selected bin, this step is irrevocable once the final question has been asked.
SELECT DV SOURCE (A2D2 only)	When in DV mode, the signal to be recorded can be chosen to come either from the Firewire input (DIG) as a digital signal or come from the breakout cable as an NTSC or PAL compatible analog signal (ANA)
EMPTY ALL BINS	Empties or erases the content in ALL of the bins. This step is irrevocable once the final question has been asked.
RECORD SETUP	Enters the Record Setup Menu group detailed in the named section
PLAY SETUP	Enters the Play Setup Menu group detailed in the named section
SYSTEM SETUP	Enters the System Setup Menu group detailed in the named section
FIRMWARE REVISION	Displays the current revision of the recorder's firmware

Table 1 Menu Main Level

61h, 0Ch, 04h, 71h	Current Time Sense	74h, 00h, TC(3:0), csum	Time Code
Command	**Name**	**Response**	**Name**
61h, 20h, OL, csum	Status Sense	7Lh, 20h, Stat(L), csum	Status
61h, F0h, 04h, 55h	Current Frame Offset	74h, 00h, FO(3:0), csum	Frame Offset
61h, F1h, 01h, 53h	Current Bin	71h, 00h, nn, csum	Bin Number

System Control

00h, 11h Device Type request
The response is 00, 00 indicating QuickCapture

00h, F1h Next Bin
When this command is issued from the Idle state the next bin is selected. If the present bin is 99 then the next bin is 1.

00h, F2h Previous Bin
When this command is issued from the Idle state the previous bin is selected. If the present bin is 1 then the next bin is 99.

00h, F4h Disable Loop Play
When this command is issued from the Idle state the Loop Play feature is disabled. Loop Play is where the the last play command is repeated from its beginning when the end is reached.

00h, F4h Enable Loop Play
When this command is issued from the Idle state the Loop Play feature is enabled. Loop Play is where the the last play command is repeated from its beginning when the end is reached.

01h, F0h, XXh Select Bin XX
When this command is issued from the Idle state bin XX is selected. XX varies between 1 and 99. Illegal bins are ignored.

01h, F3h, XXh Select and Empty Bin XX
When this command is issued from the Idle state bin XX is selected and **all of its content is permanently deleted**. XX varies between 1 and 99. Illegal bins are ignored.

Command	Name	Response	Name
01h, F3h, XXh, csum	Select and Empty Bin	10h, 01h, 11h	ACK
	Transport Control		
20h, 00h, 20h	Stop	10h, 01h, 11h	ACK
20h, 01h, 21h	Play	10h, 01h, 11h	ACK
20h, 02h, 22h	Record	10h, 01h, 11h	ACK
20h, 0Dh, 2Dh	Eject	10h, 01h, 11h	ACK
20h, 10h, 30h	Fast Forward	10h, 01h, 11h	ACK
20h, 20h, 40h	Fast Rewind	10h, 01h, 11h	ACK
20h, 14h, 34h	Frame Step Forward	10h, 01h, 11h	ACK
20h, 24h, 44h	Frame Step Reverse	10h, 01h, 11h	ACK
21h, 11h, nnh, csum	Jog Forward	10h, 01h, 11h	ACK
21h, 12h, nnh, csum	Variable Forward	10h, 01h, 11h	ACK
21h, 13h, nnh, csum	Shuttle Forward	10h, 01h, 11h	ACK
21h, 21h, nnh, csum	Jog Reverse	10h, 01h, 11h	ACK
21h, 22h, nnh, csum	Variable Reverse	10h, 01h, 11h	ACK
21h, 23h, nnh, csum	Shuttle Reverse	10h, 01h, 11h	ACK
21h, 11h, 00h, 32h	Play Pause	10h, 01h, 11h	ACK
21h, F0h, nn, csum	Select Bin and Play	10h, 01h, 11h	ACK
24h, F1h, nn (4 x), csum	Play Offset	10h, 01h, 11h	ACK
24h, F2h, nn (4 x), csum	Play from Offset	10h, 01h, 11h	ACK
24h, F3h, bb, nn (4 x), csum	Select Bin and Play Offset	10h, 01h, 11h	ACK
24h, F4h, bb, nn (4 x), csum	Select Bin and Play from Offset	10h, 01h, 11h	ACK
24h, F5h, nn (4 x), csum	Play to Offset	10h, 01h, 11h	ACK
25h, F5h, XXh, YYh, YYh, YYh, YYh, csum	Select Bin and Play to Offset	10h, 01h, 11h	ACK
29h, F6h, XXh, YYh, YYh, YYh, YYh, ZZh, ZZh, ZZh, ZZh, csum	Select Bin and Play from Offset Y to Offset Z	10h, 01h, 11h	ACK
	Sense Request		

Record Setup Level

Entered from the Main Level, this set of options enable various record related parameters and modes to be setup. The lower three lines will look as below:

```
[MENU TO EXIT]
 Menu option here
 ENTER        NEXT
```

There are 5 options and they are :

```
SET RECORD FILE TYPE
SYNCtoTAPE CONTROL
SET RECORD DATE
RECORD PRE-TRIGGER
SET DEFAULT DV AUDIO
```

Pressing the Next key will bring up the next option down on the list and will return to the top option from the bottom. Table 2 details the actions for each option. Pressing the Menu key will return to the Main Level.

Menu Option	Action taken
SET RECORD FILE TYPE	Where the choice of file type is made for all unrecorded bins. File types cannot be mixed within a bin. Choices are .mov, 2 types of .avi, .mxf and for HDV, .m2t only. Note that the current type chosen will be marked with an asterisk.
SYNCtoTAPE CONTROL	Where the recorder will look to the time code changing to indicate the need to record. If the time code pauses then the recording is paused. With this setting turned off, the record process will continue regardless of the time code behavior. Note that the current selection will be marked with an asterisk.
SET RECORD DATE	This option modifies the date attribute of the created file when the source is analog always, and when the source is digital if the date in the digital source is invalid.
RECORD PRE-TRIGGER	When enabled, the last 8 seconds of video prior to the record trigger are captured ahead of the video

	following the trigger. Note that the pretrigger is not remembered across power cycles.
SET DEFAULT DV AUDIO	When the source is analog, this option sets the audio sampling frequency. When the source is digital, this option helps the recorder make a correct guess for the incoming audio sampling frequency. Note that the current selection will be marked with an asterisk.

Table 2 Record Setup Level

Play Setup Level

Entered from the Main Level, this set of options enable various play related parameters and modes to be setup. The lower three lines will look as below:

```
[MENU TO EXIT]
 Menu option here
 ENTER       NEXT
```

There is one option :

SET LOOP PLAY

Pressing the Next key will bring up the next option down on the list and will return to the top option from the bottom. Table 3 details the actions for each option. Pressing the Menu key will return to the Main Level.

Menu Option	Action taken
SET LOOP PLAY	When enabled and the last frame has been played, the recorder will start playing all over from the start. Note that the chosen mode is indicated by an asterisk as well as the presence or absence of the loop play icon on the first line.

Table 3 Play Setup Level

System Setup Level

Entered from the Main Level, this set of options enable various system related parameters and modes to be setup. The lower three lines will look as below:

APPENDIX B

nNovia 232 Controller Command Set

Rev 3.1 July 29, 2006

Communication format :

Mode : no synchronization
Character Length : 1 start bit + 8 data bits + 1 parity bit + 1 stop bit
Data Rate : 38,400 BAUD
Parity : Odd parity

Command Format :

CMD1, CMD2, DATA bytes …., Checksum Byte

A command is made up of two address bytes, CMD1 and CMD2, a variable number of data bytes, DATA, from 0 up to 15 and a checksum byte. The checksum byte is the modulo 256 sum of all preceding bytes.
The most significant nibble of the CMD-1 byte represents the command group. The least significant nibble represents the number of data bytes to follow the CMD-2 byte.

Command Protocol :

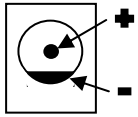
CMD1, CMD2, DATA bytes …., Checksum Byte
Response: ACK

Other than the sense command, the unit will respond to all commands affirmatively by sending the three-byte acknowledge (ACK) if the checksum is valid. If the checksum is not valid, the unit will ignore the command. Most commands will be responded to within 8msec. A Play command from an Idle state will result in a response delay of up to 700msec. During this busy time, all commands will be ignored.

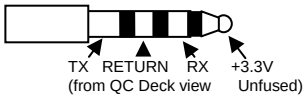
Summary List of Commands :

Command	Name	Response	Name
	System Control		
00h, 11h, 11h	Device Type Request	12h, 11h, 00, 00, 23h	Device Type
00h, F1h, F1h	Next Bin	10h, 01h, 11h	ACK
00h, F2h, F2h	Previous Bin	10h, 01h, 11h	ACK
00h, F4h, F4h	Disable Loop Play	10h, 01h, 11h	ACK
00h, F5h, F5h	Enable Loop Play	10h, 01h, 11h	ACK
01h, F0h, XXh, csum	Select Bin	10h, 01h, 11h	ACK

DC POWER CONNECTOR



RS232 CONNECTOR



Note: Signals are logic levels, not RS232. To get a standard RS232 connection, use the accessory cable QC-RS232


```
[MENU TO EXIT]
 Menu option here
 ENTER       NEXT
```

There are 8 options and they are :

```
SET SIGNAL TYPE
SET FAT32/NTFS
MODIFY HDD VOLUME ID
SETUP HDD PARTITION
SET TIMECODE DISPLAY
SET REMOTE CONTROL
TOTAL SPACE
UPGRADE FIRMWARE
```

Pressing the Next key will bring up the next option down on the list and will return to the top option from the bottom. Table 4 details the actions for each option. Pressing the Menu key will return to the Main Level.

Menu Option	Action taken
SET SIGNAL TYPE	Where the recorder is set to operate with one of three signal types, either in DV, NTSC or PAL, or in HDV, all frame rates. Note that changing between types will require ALL contents to be erased. Note that the current type chosen will be marked with an asterisk.
SET FAT32/NTFS	This option chooses the which computer's file system to emulate, NTFS or FAT32. Note that FAT32 has a 2GB file size limitation so clips longer than 2GB are split into approximately 2GB files with no frames dropped. Note that the current selection will be marked with an asterisk.
MODIFY HDD VOLUME ID	When connecting to a computer in the HDD mode, the disk will have for volume name nNovia xx. This option sets the xx value. A useful feature when connecting multiple volumes at the same time as from a multi-shoot.
SET TIMECODE DISPLAY	During recording and playback, this option chooses to display either the Internal or the External time code. Note that the current selection will be marked with an asterisk.

SET REMOTE CONTROL (A2D2 only)	This option either enables or disables the remote control capability. Note that the current selection will be marked with an asterisk.
TOTAL SPACE	Displays the capacity of the Hard Drive.
UPGRADE FIRMWARE	Allows the user to update the firmware of the recorder, provided a proper file has been loaded on the Hard Drive.
NTSC SETUP LEVEL (A2D2 only)	The setup level is set to 7.5 or 0.0 IRE.

Table 4 System Setup Level

General Setup

Before using your QC A2D2, there are a few basic operational conditions that must be set. These are found under the System Setup Level of the menu tree (see table 4).

Set the signal type
Select HDV or DV. If DV, select between NTSC or PAL. If the format chosen is NTSC then a choice of setup level is given. This level can be 0.0 or 7.5 IRE units and can be set under the **NTSC SETUP LEVEL** menu.
Note: Changing between signal types will erase the content in all bins.

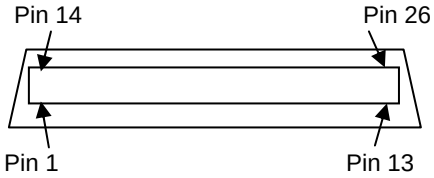
Choose operating system file system, FAT32 or NTFS
This option will set up the file system type seen by the computer in the HDD mode. NTFS does not have the 2GB file size limitation imposed by the FAT32 file system. With NTFS a recorded clip becomes one file no matter its length. Although this choice can be done at any time before the making media file process it is best to simply make it once.

Set the HDD volume ID
When connecting as an HDD the QC A2D2 volume name is *nNovia xx*. If your application calls for multiple QC A2D2s to be connected to the computer at the same time, it becomes helpful to have the volume name be different for each QC A2D2. This option allows *xx* to be set between 00 and 99.

Select which time code to display
With DV, while recording or playing, the time code displayed can be either the externally generated time code or the internally generated one. If the signal is analog and no time code is connected then the External is generated the QC A2D2 and is in the dropped-frame format. The internal time code referred to here is the absolute frame number of the recording in the selected bin and is in

APPENDIX A
I/O CONNECTORS PIN-OUT

26-pin Analog Input and Output



Description	Pin No.
Composite Video Out	1
S-video Y Out	2
S-video C Out	3
Audio Left Out	4
Audio Right Out	5
Audio Right In	6
Audio Left In	7
Record GPI	8
Record Tally	9
Time Code In	10
S-video C In	11
S-video Y In	12
Composite Video In	13
Composite Video Out Return	14
S-video Y Out Return	15
S-video C Out Return	16
Audio Out Return	17
N/C (No Connection)	18
N/C	19
Audio In Return	20
N/C	21
N/C	22
Time Code In Return	23
S-video C In Return	24
S-video Y In Return	25
Composite Video In Return	26

File Organization
After the media conversion is made, all bins that contained video will appear to the computer as folders named BINxx where xx represents the BIN number ranging from 01 to 99. Inside each folder, each clip will be represented as a file with an extension name .avi, .mov e.g. depending on the type chosen prior to recording. Each file will be named **B**xx**C**nnyy where xx again represents the bin
number; nn represents the Clip number ranging from 01 to 97. The number yy is the number of the spilt file caused by the FAT32 limitation

the non-dropped-frame format. The absolute frame number starts at 00:00:00:00 in each bin. When the content is changed to files, the time code presented to the NLE starts with the External value of the first frame of the content, if this value is invalid then 00:00:00:00 is substituted. For HDV, the time code displayed is always the External time code.

Empty the current or all bins
The QC is primarily a capture device, as opposed to an archiving device, and it is best to start out with a clear disk. Emptying (erasing) ALL bins will not only clear all the bins at once but it will also conveniently reset the file system.

Updating the Firmware
To update the QC's firmware, do the MAKE MEDIA FILES process and connect it to your computer in HDD mode. Copy the firmware update file to the root directory, level where all bin folders appear, and rename it ***flash.bin***. Next, power the QC in the VTR mode, select the UPDATE FIRMWARE option and follow the instructions.

WARNING: Once the ERASE FLASH option has been selected, DO NOT turn power off until the firmware has been updated. If the update is prematurely ended the recorder will be made inoperable.

Recording

Normal Record Checklist

A few parameters must be set properly for a standard recording and they are mostly grouped in the menu level RECORD SETUP:

Select the DV video source
For DV recordings select the signal source in the Main menu level. It can be from the analog port (ANA) or the 1394 port (DIG). Note that the output analog ports, Composite and S-video, are always live, regardless of the signal source, ANA or DIG. When the source is analog, the signal is converted to DV digital and output on the 1394 port at all times. If Composite and S-video are connected to the analog input port simultaneously, the S-video signal is given precedence. In HDV, the input and output are always the 1394 port and the analog section is made invalid.

Set the file type:
A choice must be made for the eventual file type of choice should you want to connect the QC A2D2 in the HDD mode to your computer and drag and drop your video content as files. The choices for DV are Microsoft .avi type II, Canopus .avi type II, both commonly used in PCs, .mov, the QuickTime format used in Macs and .mxf a new universal file format supported by a growing number of applications, Avid being the most well known. In HDV mode, the file type is fixed at .m2t.
Note: The file format started with one bin will apply to all subsequent recordings in that bin and can only be changed after the bin is erased or emptied.

Synchronize to tape motion
The recording of the QC A2D2 can be synchronized to the camera's record button by turning Sync To Tape ON (**ST1**). Whenever the tape in the camera is rolling, so will the time code. QC A2D2 recognizes the motion and will record along with the tape. When the motion stops, QC A2D2 will pause the recording. To record continuously without regard for tape motion, switch Sync To Tape off (**ST0**). Some cameras control the QC A2D2 directly through the 1394 interface and in these cases, use ST0 and let the camera do the work.

Select the sampling rate of the audio in the DV mode
This option will set the audio sampling rate to 32KHz or 48KHz when the video source is analog. When the video source is digital this setting will be used as the starting guess frequency of the audio portion of the digital stream. If the guess is incorrect then the first two frames of data will be discarded as the QC A2D2 resets itself.
Note: Only one type of audio sampling rate can be used within a bin.

HDD MODE

General

The HDD mode is the mode where the QC appears to the computer as a Hard Disk Drive and not as a VTR. The connection to the computer is done via the IEE-1394 connector. The HDD mode is entered by pressing the Menu key within the 5 seconds after the QC is powered on.
Note: Care must be taken when connecting the IEE-1394 cable in the QC when the other end is already connected to the computer. Do not attempt to insert the connector backwards as DC power from the computer is present on the cable in the cable and can damage the sensitive receiver circuits in the QC.
Note: No software drivers are necessary for the computer to recognize the QC as an HDD.

Preparation

Prior to turning on the QC in the HDD mode and seeing your video as files instead of clips the MAKING MEDIA FILES process must be undertaken.
MAKE MEDIA FILES
This operation prepares the recorded content to be seen by a computer by building the file wrappers around the recorded content and emulating the computer's operating file system. Two choices are available, FAT32 and NTFS and they are chosen by the SETUP FAT32/NTFS option.

Operating File System limitations
The FAT32 format is compatible with both Macs and PCs. This format limits the size of a file to a maximum of 2GB, in DV that translates to approximately 9+ minutes of video. A clip that lasts longer than 9min is broken into multiple files each 2GB long with the last one making up the remaining time. If the split files are strung on the time line of an NLE, no frame is lost over the transition. In addition, FAT32 has a clip boundary has a resolution of 2 seconds so the beginning of a clip other than the first in a bin is most likely to contain the end of the previous clip, up to 2 seconds' worth. Conversely the end of a clip is most likely to be found in the first file of the next clip. For an accurate correlation of clip numbers between the VTR and the HDD mode, it is best to keep each clip longer than 2 seconds and to have fewer than 97 per bin.

The NTFS format is fully compatible with PCs and is read compatible with Macs. Its main advantage is that it does not impose a file size limitation to the QC A2D2 resulting in one file per clip. NTFS' clip boundary is frame accurate and therefore has perfect correlation with clip numbers in the VTR mode.
Note: Some NLEs cannot accept file sizes greater than 40GB, make sure your NLE is not one of them if you plan on shooting one continuous take greater then 3 hours and using NTFS.

Remote Control of the QC A2D2 and HD

IEEE-1394
The QC accepts the AV command set defined in the IEEE-1394 protocol and as such can be connected to most computers and stand alone editing equipment using that interface. At this stage, this command set does not allow the selection of different bins so this function must be manually made as if a tape were asked to be changed. The AV command set also does not allow random access to the start of the clips but most editors will recognize the clip boundaries sequentially through the time code discontinuity likely to take place at the beginning of each clip.
Note: The acquisition of video in the QC is instantaneous so requires to pre-roll. This limits the random access of an early frame in a batch capture by an editor that is setup to ask for a minimum pre-roll greater than zero. That limit is equal to the number of frames in the minimum pre-roll time.

RS232 INTERFACE (A2D2 only)
This option is enabled through the System Setup Menu. The QC A2D2 can be controlled via the RS232 port. This port requires a special adapter sold separately. The command set is based on the Sony 422 protocol and includes a substantial set of vendor specific commands which allow selection of bins and playing from point A to point B across bins, for example. The protocol can be found in the appendix section of this manual.

GPI (A2D2 only)
Pin 8 of the Analog connector is a record pause and un-pause input. It is a high impedance input internally pulled up to 3.3V. In a record mode, closing a contact between pin 8 and Ground will pause the recording, opening the contact will resume. This pin is inactive outside of the record mode. Pin 9 is the Tally light, while recording it will be pulled up to 5V and while pause or not recording, it will be at ground. The Tally output driver is current limited by a 1K Ohm source resistance. In the breakout cable, Pin 8 is the center conductor of the white wire and Pin 9 is he shield.

Set the record date (optional)
The date attribute of the created file is set to this value when the source is analog. Each file representing a clip gets it own date. If the source is digital then the record date from the digital stream is used. If that date is not valid then the current record date set by this option is used.

Recording

Starting

Select one of 99 Bins by pressing the PREVIOUS or NEXT keys in the Idle menu.
Two common ways of starting to record are 1) by entering the record mode manually by holding the REC button down while pressing the PLAY button. Or 2) the camera or device connected to the 1394 port sends a record command. A third way is to issue a record command from the remote serial interface. See the command protocol in Appendix B.

Pausing

The QC A2D2 will pause recording if time code is not moving and ST1 is set, otherwise it will record. When the video source is digital the time code is embedded in the stream and it is always the time code recorded. When the video source is analog, time code is the SMPTE longitudinal time code at the breakout cable. To cause the recording to pause, that time code must be valid and not moving. If SMPTE time code is not present then a time code is substituted starting at 00:00:00:00 for each bin and incrementing from there in a dropped-frame manner (NTSC only). In this case, ST1 has no meaning. It is also possible to pause a recording by pressing the PLAY key, in this mode, recording is resumed by pressing the PLAY key once more and a new clip is created.
Warning: If power is interrupted while the recording is paused, all clip numbers added during the current record session will be lost. No content however will be lost.
Note: If power is interrupted while recording, up to two seconds of the last video may be lost.

Recording

When recording the right soft key is called MARK. Pressing this key while recording will start a new clip with no frames lost. Each time a recording is started a new clip is created. Up to 97 clips can be numbered in each bin.
Note: Recording is done in a bin. A clip is automatically started at the beginning of the bin if the bin is empty or appended to the last clip in the bin. A clip is never inserted between other clips in a bin.
Note: The minimum length of a clip is 2 seconds.

Stopping

It is best to stop a recording by pressing the Stop key before turning power off.

Special Record Setups

Use Record Pre-trigger
When this option is enabled the QC A2D2 is always in a record-ready mode when it is not playing. In this mode it is continuously storing live data in its internal buffer which is 8 seconds in length. In this manner, when a recording is started 8 seconds of history prior to the trigger already exists and is then captured to disk.
Note: This mode is not saved when power is interrupted.

Playback

Playing setup

Set up loop play
When loop play is enabled and the last frame of the last clip is reached the QC A2D2 will start playing over from the first frame of the first clip with no time lost.

Playing

Play mode can be entered by one of three ways, the most common is to press the PLAY button, the other two are by issuing a PLAY command through the IEEE-1394 interface or the serial port interface if it is enabled. When playing, the time displayed is controlled by the TC DISPLAY FORMAT option. When play is stopped, the time displayed is the time code of the last frame displayed. When entering a play the soft keys will be FREV and FFWD for fast reverse and fast forward respectively. Repeatedly pressing either soft key will cause the play to go repeatedly faster in the chosen direction up to 32x speed. A speed other than 1x is displayed in the bottom line. Also while playing pressing the Menu button will give an alternate set of soft keys; SLOW and FAST. These keys, while keeping the same current play direction, will extend the control of the speed down to the slow motion range of 1/32x. The menu button will toggle between the two sets of keys. The Tally light will glow green while playing. If a play is entered after a recording, the play will start at the beginning of the first clip of the last recording. For example, a record starts with clip 12, during the record the Mark key is used to create clips 13 and 14. Play will start at clip 12. This will remain until another bin is selected or power is turned off.

Pause and Go To Mark

While playing, pressing the PLAY key will pause the image. Pressing Play again will return to 1x play in the forward direction. While in the play-pause mode, the soft keys will be I< and >I. These keys allow direct access to the marks that are the starting and end frames of each clip. Counting the end frame of the last clip, there will always be one more mark than there are clips. In this mode, the clip number display will be substituted with a mark number display. Again, pressing the Menu key will present an alternate set of soft keys, these will be <II and II> for frame stepping reverse and forward respectively. Holding either key down for more than 2 seconds will cause a rapid stepping.