

HDV / SD CF CARD VIDEO RECORDER

DN-60



Instruction Manual

www.datavideo-tek.com

Contents

Warnings and Precautions	4
Warranty.....	5
Standard Warranty	5
Two Year Warranty.....	5
Disposal	5
Packing List	6
Product Overview.....	6
Features.....	6
Connections & Controls	7
Front Panel	7
Rear Panel.....	7
CF Card Slot	8
Powering On	9
DN-60 Power Sources.....	9
DN-60 Status LED and Error Messages	9
DN-60 Menus	10
Main Menu.....	10
Setup Mode.....	11
Play Setup Options.....	11
Record Setup Options	11
System Set Up.....	12
Save Set Up	12
Recall Set Up.....	12
DN-60 General Setup Notes.....	13
Choose a file operating system, FAT32 or NTFS.....	13
Set the CF card volume ID	13
Set the Signal Type	13
Set File Type	13
Format the CF card	13
Select which time code to display	13
Set up Synch to Tape	14
Set the Audio Sampling Rate in the source equipment.....	14
Set the record date (optional).....	14
Before starting to Record.....	14
Starting the Record Process	14
Pausing the Record Process	14
Marking the Recording	15
Stop a recording before powering off	15
Power on auto record	15

Time Lapse Recording.....	15
Using Pre-trigger Set Up.....	15
Playback.....	16
Set up loop play.....	16
Play out.....	16
DN-60 Payout to a Camera LCD Panel.....	16
Before transferring the CF card to a computer	16
CF Card Connection to a Computer.....	16
DN-60 File naming scheme	16
Qualified DN-60 CF Cards and Max Recording Times	17
Updating DN-60 Firmware	18
DN-60 RS-232 Controller Command Set.....	19
Connector Pin Assignment.....	20
System Control.....	20
Sense Request.....	21
Transport Control.....	22
Specifications	24
Service and Support	25

Disclaimer of Product and Services

The information offered in this instruction manual is intended as a guide only. At all times, Datavideo Technologies will try to give correct, complete and suitable information. However, Datavideo Technologies cannot exclude that some information in this manual, from time to time, may not be correct or may be incomplete. This manual may contain typing errors, omissions or incorrect information. Datavideo Technologies always recommend that you double check the information in this document for accuracy before making any purchase decision or using the product. Datavideo Technologies is not responsible for any omissions or errors, or for any subsequent loss or damage caused by using the information contained within this manual. Further advice on the content of this manual or on the product can be obtained by contacting your local Datavideo Office or dealer.



Warnings and Precautions

1. Read all of these warnings and save them for later reference.
2. Follow all warnings and instructions marked on this unit.
3. Unplug this unit from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a slightly damp cloth for cleaning.
4. Do not use this unit in or near water.
5. Do not place this unit on an unstable surface, cart, stand, or table. The unit may fall, causing serious damage.
6. Any slots and openings on the case top, back, and bottom are provided for ventilation. To ensure safe and reliable operation of this unit, and to protect it from overheating, do not block or cover these openings. Do not place this unit on a bed, sofa, rug, or similar surface, as the ventilation openings may become blocked. This unit should never be placed near or over a heat source or radiator. This unit should not be placed in a built-in installation unless proper ventilation is provided.
7. This product should only be operated from the type of power source indicated on the marking label of the AC adapter. If you are not sure of the type of power available, consult your Datavideo dealer or your local power company.
8. Do not allow anything to rest on the power cord. Do not locate this unit where the power cord will be walked on, rolled over, damaged or otherwise stressed.
9. If an extension cord must be used with this unit, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord's rating.
10. Make sure that the total amperes of all the units that are plugged into a single wall outlet do not exceed 15 amperes.
11. Never push objects of any kind into this unit through the case ventilation slots, as they may touch dangerous voltage points or short out parts that could result in risk of fire or electric shock. Never spill liquid of any kind onto or into this unit.
12. Except as specifically explained elsewhere in this manual, do not attempt to service this product yourself. Opening or removing covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks, and will void your warranty. Refer all service issues to qualified service personnel.
13. Unplug this product from the wall outlet and refer to qualified service personnel under the following conditions:
 - a. When the power cord is damaged or frayed;
 - b. When liquid has spilled into the unit;
 - c. When the product has been exposed to rain or water;
 - d. When the product does not operate normally under normal operating conditions. Adjust only those controls that are covered by the operating instructions in this manual; improper adjustment of other controls may result in damage to the unit and may often require extensive work by a qualified technician to restore the unit to normal operation;
 - e. When the product has been dropped or the case has been damaged;
 - f. When the product exhibits a distinct change in performance, indicating a need for service.

Care must be taken when connecting a 6pin DV/IEEE-1394 cable into the DN-60 when the other end is already connected to a computer. Do not attempt to insert the connector backwards as DC power from the computer is present on the cable and can damage the receiver circuits in the DN-60.

Use the supplied power adaptor to power the unit reliably. Alternatively use a charger specifically designed to charge the rechargeable AA batteries in use. The DN-60 unit can accept voltages of 6 to 24 volts (Max) via its center positive DC input.

Please choose to switch power sources or insert 4 fresh AA batteries before extended use. Switching between internal battery and external power (or vice versa) may cause the unit to restart and thus interrupt the normal Record or Playback operation already in progress.

Warranty

Standard Warranty

- Datavideo equipment is guaranteed against any manufacturing defects for one year from the date of purchase.
- The original purchase invoice or other documentary evidence should be supplied at the time of any request for repair under warranty.
- Damage caused by accident, misuse, unauthorized repairs, sand, grit or water is not covered by this warranty.
- All mail or transportation costs including insurance are at the expense of the owner.
- All other claims of any nature are not covered.
- Cables & batteries are not covered under warranty.
- Warranty only valid within the country or region of purchase.
- Your statutory rights are not affected.

Two Year Warranty

- All Datavideo products purchased after 01-Oct.-2008 qualify for a free one year extension to the standard Warranty, providing the product is registered with Datavideo within 30 days of purchase. For information on how to register please visit www.datavideo-tek.com or contact your local Datavideo office or authorized Distributors
- Certain parts with limited lifetime expectancy such as LCD Panels, DVD Drives, Hard Drives are only covered for the first 10,000 hours, or 1 year (whichever comes first).

Any second year warranty claims must be made to your local Datavideo office or one of its authorized Distributors before the extended warranty expires.

Disposal



For EU Customers only - WEEE Marking

This symbol on the product indicates that it should not be treated as household waste. It must be handed over to the applicable take-back scheme for the recycling of Waste Electrical and Electronic Equipment. For more detailed information about the recycling of this product, please contact your local Datavideo office.

Packing List

Item No.	Description	Quantity
1	Instruction Manual	1
2	DN-60 Recorder	1
3	12V DC 500mA Switching Adaptor	1
4	IEEE1394 6-4pin cable 50CM	1
5	IEEE1394 6-6pin cable 50CM	1

Product Overview

The DN-60 is a small and portable video recorder/player capable of recording to certified removable Compact Flash (CF) cards. It can record up to 4.5 hours* of video depending on the recording format, settings and CF card size. The unit can easily be set up for FAT32 or NTFS file systems; as well as DV PAL, DV NTSC, DVC Pro 25, DVC Pro 50 and HDV (1280x720p or 1440x1080i) also.

This unit is capable of recording from digital IEEE-1394B sources. It can also be set up to record SD PAL or SD NTSC Time Lapse sequences at a variety of intervals. Set it up to buffer live video and when you press record within 8 seconds of an event you can be confident that you have recorded that must have shot.

Once recorded Drag and Drop your chosen video files directly to the time-line of your Non-Linear Editing program using popular DV file types such as Microsoft AVI type 2, Canopus AVI, QuickTime MOV and MXF (OP 1A) as well as M2T in HDV mode. With this many useful features the DN-60 is ideal for a variety applications within broadcast, education, animation, science, medical, construction and security.

*See page 17

Features

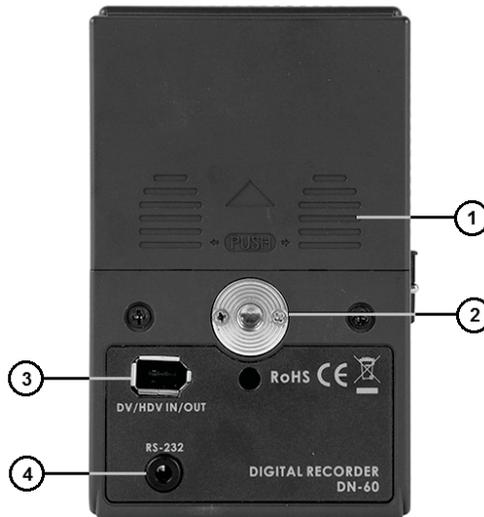
- Small, easy to carry and camera mountable Compact Flash recorder
- **Input Video Connections:**
 - IEEE-1394 supports DV25, DVC Pro 25, DVC Pro 50 and HDV only
- Embedded External or Internal Time Code
- **Output Connections:**
 - IEEE-1394 in playback can supply DV, DVC Pro and HDV signals to the camera
- IEEE-1394 connection supports AVC command set via PC and Mac FW400 connections
- Allows recording to Microsoft AVI, Canopus AVI, QuickTime DV MOV, MXF OP1A and M2T file formats directly (M2T converts to QuickTime via downloaded utility)
- Auto power on of unit when connected camera is switched on
- Default 48KHz (16bit) audio sampling rate for best quality audio recording
- Time-lapse with single or multi frame recording at user defined intervals
- 4 or 8 second pre-trigger buffer, useful in recording unexpected events especially in science research, wildlife recording, Health & Safety or security applications
- Loop playback of video from a selected video bin
- Can be set to Auto record to the current empty video bin when the unit is powered on
- Backlit LCD panel allowing quick confirmation of the recorders status
- RS-232 interface for computer trigger and control

Connections & Controls Front Panel



1. **LCD Panel** – Shows the status and menu options of the DN-60
2. **Menu Navigation Button** – Rotate to change options and press in to select
3. **DC Power input** – Connect the DN-60 power adaptor here
4. **Status LED**
5. **Power On / Auto / Off switch**
6. **CF Card Protection Cover** – Slide down then lift up carefully to gain access

Rear Panel



1. **Battery Compartment Cover** – Press in gently and slide up to access
2. **Camera Mount screw thread** – Attach DN-60 camera mount here
3. **DV/DVC Pro/HDV i/o Port** – Attach 6pin IEEE-1394 cable connector here
4. **RS-232 Port** – Connect 3.5mm Jack for RS-422 control by computer

CF Card Slot



1. CF Card Protection Cover – Slide down then lift up carefully to open this cover and get access to the CF card slot and the card eject button.

2. CF Card Eject Button – Press in to eject the fitted CF card. When the slot is empty (no CF card inserted), this button is normally in the depressed position. Upon inserting a CF card, the button moves out again.

NOTE: *CF cards need to be inserted the correct way up so that the pins inside the unit marry correctly with the card otherwise damage to the pins may happen.*

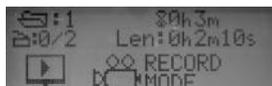
Do not force a card into the slot or force the card protection cover.

See page 17 also.

Powering On

Connect the DN-60's own power adaptor to the right hand side DC In socket. Ensure the power adaptor unit is connected to a suitable mains socket. Switch the power ON/OFF switch on the Left hand side of the unit to one of 3 positions.

1. Manual power ON position
- A. Auto power ON/OFF position (when camera is switched on/off)
0. Manual power OFF position



The LCD display panel will show "Datavideo DN-60 Loading..." after a few seconds the Home Display will be shown. The DN-60 is now ready for set up or use as a recorder or playback device.

DN-60 Power Sources

Use the supplied DN-60 power adaptor to reliably power the unit. Alternatively, you can use AA or rechargeable AA batteries. Use a compatible charger with the rechargeable AA batteries being used. However, please pay close attention to the battery indicator on the DN-60 LCD panel during battery powered operation and change over batteries before they become exhausted.

Please choose to switch to the power adaptor or insert 4 fresh AA batteries before any extended use. Switching between internal battery power and the external power adaptor (or vice versa) will cause the unit to restart and thus interrupt the normal Record or Playback operation already in progress.

The DN-60 unit can safely accept voltages of 6 to 24 Volts DC (Max) via its centre positive DC input socket.

Note: Not all AA labelled batteries are manufactured to the same dimensions so care must be taken when selecting batteries for use with the DN-60. Some batteries because of their non-standard dimensions prove difficult when fitting or removing them from the DN-60 standard AA battery compartment. Care must be shown in order to avoid user related damage to the DN-60.

DN-60 Status LED and Error Messages

The DN-60 has a red status LED just below the Menu Navigation Button. This can be used as a quick way of confirming that the unit is working correctly or is requiring user attention.

LED constantly ON – Indicates the DN-60 unit is recording a camera/source input.

LED Slowly Dimmed OFF and ON – Indicates record pause, formatting card, or making media file.

LED Flashing ON and OFF – The LCD panel will also indicate that there is:

- No Media** - CF card is not detected by DN-60. Check CF card.
- No Input** - Video signal is lost from DN-60. Check cabling and source equipment.
- Bad Input** - Video signal received does not match the DN-60 settings.
- Unsafe Battery level** - usually indicates low battery level. Change batteries or power source.
- Wrong Format Media!!** - CF card does not match the format settings of the DN-60.

User can choose

"RESTORE SETTING": Reset DN-60 configuration to accept the CF card inserted.

Or

"FORMAT MEDIA": Format the CF card according to current DN-60 configuration.

Caution: All content on the CF card will be erased by selecting "FORMAT MEDIA"

LED constantly OFF – DN-60 is idle or the unit is waiting to be powered on.

DN-60 Menu

Pressing the Navigation Button in will select the menu option or confirm a value. Rotating the Navigation Button in either direction will change the menu option or set a value. If all options have been displayed then the menu display will only scroll options in one direction. Choose EXIT to return to a previous menu level or to return to the initial Home screen.



The DN-60 is a menu driven unit; there are several menus which are used to set up the unit. The menu settings are non-volatile (settings are stored even when the unit is switched off). So general settings, such as Signal and File types, may only need to be set once. We will look at specific set ups in more detail later on in this manual, but here is an overview of the available menu options.

Main Menu

There are 5 initial main menu level options at the Home screen and they are:

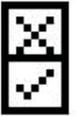
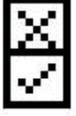
Menu Option	Action taken
 RECORD MODE	This will take the DN-60 into record mode when the menu navigation button is pressed in. At this point the DN-60 checks for the chosen input signal (DV, DVC Pro or HDV) at the IEEE-1394 connector. Use Status mode to check that the unit has the correct settings first. If not, use Setup mode to modify the DN-60 settings before recording.
 PLAY MODE	This will take the DN-60 into playback mode when the menu navigation button is pressed in. At this point the DN-60 checks for existing media files in the currently selected bin or CF card. Note loop playback can be selected from within setup mode.
 TOOLS	Tools mode allows the user to perform selected tasks to prepare files for transfer to an edit system or to erase existing video files on the card. This menu also allows a user to update the DN-60 firmware.
 SETUP	Setup mode enables various record and playback related parameters and modes to be setup, saved or recalled including Sync to Tape, Signal Type, File Type and Battery Type.
 STATUS	Status mode allows the user to confirm the current settings in use. These parameters are displayed across several screen changes using the menu navigation button.

Table 1 Main Menu

Setup Mode

Entered from the Main Menu, this set of options enables various record and playback related parameters and modes to be setup.

Menu Option	Action taken
PLAY SET UP	Here Loop Playback Mode can be switched ON or OFF.
RECORD SET UP	Here settings for File Type, Sync to Tape, Pre-Trigger, Time Lapse, Record at Power ON and Record Date can be changed.
SYSTEM SET UP	Here settings for input Signal Type, File System, Volume ID, Timecode and Battery Type can be chosen.
SAVE SET UP	The DN-60 allows current settings to be saved as USER1 or USER2 to allow time efficient set up of the unit when in the field.
RECALL SET UP	Used to quickly adopt user stored settings in USER1 and USER2 or adopt a factory default for PAL DV, NTSC DV or HDV.

Table 2 Setup Menu

Play Setup Options

Entered from the SETUP Menu, this set of options enable various record related parameters and modes to be setup.

Menu Option	Action taken
Exit	Will return you to the SET UP menu.
SET LOOP PLAY	When enabled the DN-60 will loop play the current clip selected, the playback will continuously loop until stopped. Note that the chosen mode is indicated by an asterisk.

Table 3 Play Setup Menu

Record Setup Options

Entered from the SETUP Menu, this set of options enable various record related parameters and modes to be setup.

Menu Option	Action taken
Exit	Will return you to the SET UP menu.
SET FILE TYPE	The file options change depending on the Signal Type chosen in System Set Up. DV and DVC signals can be recorded to Microsoft avi, Canopus avi, QuickTime mov or MXF OP1A files. HDV signals can only be recorded to m2t files at present. These file options may be expanded in later firmware revisions.
SET SYNC TO TAPE	Allows the feature to be turned ON or OFF. ON allows the unit to record in step with the camera. OFF allows the unit to record independently of the camera.
PRE-TRIGGER SETUP	Allows the feature to be turned ON or OFF. ON allows the unit to constantly hold the latest 4 to 8 seconds of video in its memory until the record action is started. The initial 4-8 seconds of video from memory is stored to the bin first and then the rest of the video after the record trigger is then added to the bin. This feature is NOT available in HDV mode. See page 15
TIME-LAPSE SETUP	Set the Time Lapse interval and then the number of frames to be captured at the interval. Now turn the feature ON or OFF. This feature is NOT available in HDV mode. See Time lapse section on page 15.
RECORD ON POWER UP	Allows the feature to be turned ON or OFF. ON allows the unit to start recording using the current settings at power on provided the incoming signal is correct and the currently selected video bin is empty.

Table 4 Record Setup Menu

System Set Up

Entered from the SET UP Menu, this set of options enable file system, signal and power related parameters and modes to be setup.

Menu Option	Action taken
Exit	Will return you to the SET UP menu.
SET SIGNAL TYPE	Where the recorder is set to operate in one of three modes, DV+DVC 60Hz, DV+DVC 50Hz or HDV 50/60Hz. The current selection will be marked with an asterisk.
SET FILE SYSTEM	This option will set up the CF card file system type seen by the computer as either NTFS or FAT32. The current selection will be marked with an asterisk.
SET VOLUME ID	When reading a DN-60 CF card the volume name is shown on the computer as <i>Datavideoxx</i> . This option sets the xx value between 0 and 99. A useful feature when ingesting multiple CF cards at the same time from a multi-camera shoot.
TIMECODE DISPLAY	During recording and playback, this option allows display of either the Internal or the External time code. Note that the current selection will be marked with an asterisk.
SET BATTERY TYPE	This option allows the proper display of remaining power from Alkaline, NiMH-1, NiMH-2 or Lithium type battery cells.

Table 5 System Setup Menu

Save Set Up

Entered from the SET UP Menu, this set of options enable file system, signal and power related parameters and modes to be setup.

Menu Option	Action taken
Exit	Will return you to the SET UP menu.
SAVE AS USER #1	The current user settings will be stored for later Recall as USER1
SAVE AS USER #2	The current user settings will be stored for later Recall as USER2

Table 6 Save Setup Menu

Recall Set Up

Entered from the SET UP Menu, this set of options enable easy recall of previous and standard DN60 configurations.

Menu Option	Action taken
Exit	Will return you to the SET UP menu.
USER #1	USER1 saved settings will be adopted by the unit
USER #2	USER2 saved settings will be adopted by the unit
FACTORY HDV 50/60Hz	The factory HDV settings will be applied
FACTORY DV NTSC	The factory DV/DVC 60Hz settings will be applied
FACTORY DV PAL	The factory DV/DVC 50Hz settings will be applied

Table 7 Recall Setup Menu

DN-60 General Setup Notes

Before using your DN-60 for the first time, there are a few basic operational settings that must be chosen. These are found under the **Setup Mode** options (see Tables 3, 4 & 5 on pages 11 and 12).

Choose a file operating system, FAT32 or NTFS

Set up the file system type seen on the CF card by the computer when transferring files. The FAT32 file system is compatible with both Macs and PCs. However, this format limits the size of a file to a maximum of 2GB, in DV25 that translates to approximately 9 minutes of video. A clip or recording that lasts longer than 9min is broken into multiple files, each 2GB long, with the last file in the sequence making up any remainder time. If this sequence of 2GB files are placed in the correct order and end to end on an editing time line the recording will play through as one whole take again.

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 DN-60 files resulting in one file per take.

***Note:** When using 64GB cards, if you plan on shooting one continuous take greater than 3 hrs (using NTFS setup) please note that some Non-Linear Editing Software cannot accept file sizes greater than 40GB, please make sure your NLE is not one of them before you plan to shoot.*

Set the CF card volume ID

When transferring files the DN-60 CF card volume name is shown as **Datavideoxx**. If your application calls for multiple DN-60 CF cards to be connected to the edit computer, it becomes helpful to have a unique volume name for each CF card. This option allows the xx value to be set between 00 and 15.

Set the Signal Type

Select between **DV+DVC 60Hz**, **DV+DVC 50Hz** or **HDV 50/60Hz**. If the standard chosen is **DV+DVC 60Hz**, then the **NTSC IRE LEVEL** is dictated by the source equipment or camera.

Set File Type

The choices for file types are dependent on the Signal Type chosen. Types available are Microsoft .avi (Type II), Canopus .avi, both commonly used in PCs. The QuickTime .mov format used in Macs and .mxf (OP1A) files for use with other systems such as Avid. In HDV mode, the only file type available is .m2t and this may need conversion before being edited, depending on your computer's specifications and its editing software.

***Note:** The file System and Type started within one CF card will apply to all subsequent recordings within that card and can only be changed after the content is erased or the card is formatted.*

Format the CF card

The DN-60 is primarily a capture device, as opposed to an archiving device, and it is best to start out with freshly DN-60 formatted CF card(s) on each project. Formatting your card in another device may cause issues later on. If you are re-using your CF cards just remember to backup any existing content already on the card(s) to computer first before formatting the card(s). Formatting will not only clear the DN-60 CF card but it will also reset the file system to FAT32.

Select which time code to display

With DV or HDV, whilst recording or playing, the time code displayed can be either externally or internally generated. If the input signal is External and no time code is supplied then the External Time Code generated by the DN-60 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 the non-dropped-frame format. The absolute frame number starts from 00:00:00:00 in each bin. When the content is changed to files, the time code presented to the editing system starts with the External value of the first frame of the content; if this value is invalid then 00:00:00:00 is substituted.

Set up Synch to Tape

DN-60 recording sessions can be synchronized to the camera's record button by turning Sync to Tape ON. Whenever the tape deck in the camera is rolling, so will the DN-60 time code. The DN-60 recognizes this information and will record along with the camera deck. When the deck stops, the DN-60 will pause the recording automatically. To record continuously without regard for tape or deck motion, switch Sync To Tape off. Some cameras control the DN-60 directly through the IEEE-1394 interface and in these cases use Sync To Tape off and let the camera control the DN-60 unit.

Set the Audio Sampling Rate in the source equipment

The DN-60 can only record audio at the 48KHz (16bit) audio sampling rate. Please ensure the source camera or equipment is set to output at the 48KHz (16bit) rate as the 32KHz (12bit) setting is not supported by the DN-60.

Set the record date (optional)

As the source is digital the record date from the cameras digital stream can be used. This feature is available in non HDV modes under Setup mode, Record Set up, Record Date.

Before starting to Record

Select an empty Bin. An empty Bin will display as 00:00:00:00 on the DN-60. Before using your DN-60 for the first time, there are a few basic operational settings that must be chosen. These are found under Setup Mode (see Tables 3, 4 & 5 on pages 11 and 12).

Starting the Record Process

Common ways of starting to record with the DN-60 are:

- 1) Manually, by switching the units Sync to Tape feature off and selecting Record mode whilst connected to a camera that is already switched on.
- 2) Automatically, the camera or device connected to the IEEE-1394 port controls the record action either through the AV command set or because the Sync to Tape feature is switched on.
- 3) Issue a record command via the Remote Serial interface or RS-232 port. The DN-60 RS-232 command protocol is listed in this manual from page 19 onwards.

NOTE: *The IEEE-1394 output signal on the camera/source device must match the DN-60 input Signal Type for the recording to start. If the DN-60 or source device do not match then the DN-60 will stay at 00:00:00:00 as it cannot automatically recognise the signal presented to it.*

Pausing the Record Process

The DN-60 will automatically pause recording if time code from the tape deck is not moving and Sync to Tape is ON.

It is also possible to pause a manual recording by pressing in the Menu Navigation key when Pause is shown on the DN-60 LCD panel. Manual recording is resumed by pressing in the Menu Navigation key when Record is selected on the DN-60 LCD panel and a new clip is then created within the same bin.

Warning: *If power is interrupted whilst the recording is paused, all clip numbers added during the current record session may be lost. No content however will be lost. Future firmware upgrades may fix this behaviour.*

Marking the Recording

Whilst recording to the DN-60 an option labelled MARK is available. Selecting this option whilst recording will start a new clip number within the current bin, no frames are lost in doing this. Each time a recording is Marked a new clip is created within the same bin. A single recording can be marked up 99 times within the current bin.

Note: Recording is started in an empty bin. A clip is automatically started at the beginning of recording to the bin. A clip can never be inserted in between other clips already in the bin. Marking or Pausing a recording forces clip numbers to be incremented, each clip is written to the current bin.

Stop a recording before powering off

It is best to stop a recording session before turning the DN-60's power off, otherwise the whole recording or part of it may be lost.

Power on auto record

When this option is enabled and the unit is powered on the DN-60 will attempt to begin recording immediately to the current bin using the latest stored settings for source, file type etc.

NOTE: The IEEE-1394 output signal on the camera/source must match the DN-60 input Signal Type for the recording to start. If the DN-60 or source do not match then the DN-60 will stay at 00:00:00:00.

Time Lapse Recording

In this Record Set Up option a DV recording can be set up using the following flexible settings.

Select **SET TIMELAPSE** and press in the Menu Navigation Button.

Set the **Interval minutes** value between 0 and 59 minutes.

Set the **Interval seconds** value between 0 and 59 seconds.

Set the **Frames to record** value between 0 and 15 Frames.

Once set select **TIMELAPSE ON** and press in the Menu Navigation Button. Now exit to the Main menu and choose **RECORD MODE**. Select an empty bin using the folder icon and then select the **RECORD** option. Press in the Menu Navigation Button and if the connected camera is live then the recording will start. Ensure the Camera is supplying the DN-60 with DV25, DVCPPro25 or DVCPPro50.

The DN-60 display will change from 00:00:00:00 to show the current amount of video hours, minutes, seconds and frames captured after each interval point is reached.

Note: If power is interrupted and then restored the unit will need to be restarted.

Note: A new clip is created only at the beginning of a time lapse recording. Frames are then added.

Note: This recording option is **not** available with HDV sources.

Using Pre-trigger Set Up

When this option is switched ON the DN-60 is always in a record-ready mode when it is not in Play Mode. In this mode it is continuously storing live IEEE-1394 data in its internal buffer which is 4 to 8 seconds in length. 4 seconds in DVC Pro 50 and 8 seconds in DV25 and DVC Pro 25. In this manner, when a recording is started the last 4 to 8 seconds of history prior to the trigger is then captured to CF card and video after the trigger is then added into the file after it in the normal way.

Note: This mode is not saved when power is interrupted and the Pre-trigger video buffer is flushed.

Note: This recording option is **not** available with HDV sources.

Playback

Set up loop play

When loop play is Enabled under Setup mode and the last frame of the clip being played is reached the DN-60 will start over playing from the first frame of the first clip in the same bin seamlessly.

Play out

Play out mode can be entered by one of three ways, the most common is to select the manual Play Mode; the other two are by issuing a PLAY command through the IEEE-1394 interface using the AV command set or via the RS-232 serial port interface if it is connected.

When playing, the timecode displayed is controlled by the **Timecode Display** menu option. When play back is stopped or paused, the time displayed is the time code of the last frame displayed.

DN-60 Playout to a Camera LCD Panel

By placing the connected camera into VCR/playback mode some cameras can accept a video stream from the DN-60 whilst the DN-60 is playing content from a bin. This can be a useful way of confirming the composition of DN-60 captured shots in the field in-between takes.

Before transferring the CF card to a computer

Prior to using the DN-60 CF card with a computer and seeing your video as files instead of clips the **MAKE MEDIA FILES** menu process under **TOOLS** mode must be undertaken otherwise the computer may see a blank card.

This menu operation prepares the recorded video content on the CF card to be seen by a computer by building pre-selected file wrappers around the recorded content and emulating the chosen computer file system. It takes roughly 1 minute to prepare 1 hours worth of video.

CF Card Connection to a Computer

When the DN-60 CF card is presented to a computer it appears to the computer as a drive volume and not as a video device. The connection to the computer is via the computers own CF card slot or an attached CF card reader. When the DN-60 CF card is seen the volume name is shown as ***Datavideoxx*** where *xx* is a value between 0 and 99. See Set Volume ID also on page 11.

DN-60 File naming scheme

After the **Make Media Files** conversion is performed, all bins that contained video on the CF card will appear to the computer as folders named BINxx where xx represents the DN-60 BIN number ranging from 01 to 99.

Inside each BIN folder, each clip will be represented as a file with a file extension depending on the type chosen prior to recording (eg .avi, .mov .mxf and .m2t). Each file will be named **BxxCnnyy** where xx again represents the bin number and nn represents the Clip number ranging from 01 to 99. The number yy is the number of the spilt file caused by the FAT32 2GB limitation.

Qualified DN-60 CF Cards and Max Recording Times

Not all CF cards on general sale are optimised for video applications. Certain cards may look to be compatible but may provide un-reliable results when reading or writing DN-60 video data.

Datavideo have tested and recommend using only CF media that has been qualified for use with this product.

For the latest list of qualified cards, see http://www.datavideo.info/specs/CF_Card_Compatibility.pdf

Below for convenience is an initial list of CF media that you may wish to consider.

Brand	CF Card Name	Data Rate	Size	Max Record Time Approx	
				DV25, HDV DVC Pro 25	DVC Pro 50
SanDisk	Extreme III	30MB/sec	2GB	7 mins	3 mins
SanDisk	Extreme III	30MB/sec	8GB	30 mins	15 mins
SanDisk	Ultra	30MB/sec	16GB	1 Hour	30 mins
SanDisk	Extreme	60MB/sec	32GB	2 Hours 15 mins	1 Hour 7 mins
SanDisk	Extreme Pro	90MB/sec	64GB	4 Hrs 30 mins	2 Hrs 10 mins

Example: 133x relates to a transfer speed of $133 \times 150 \text{ KB/sec} = 19,950 \text{ KB/s}$ or approx 20 MB/sec.

For further advice on qualified CF media please contact support at your local dealer or Datavideo office.

Updating DN-60 Firmware

From time to time Datavideo may release new firmware to either add new features or to fix reported bugs in the current DN-60 firmware. Customers can update the DN-60 firmware themselves if they wish or they can contact their local dealer or reseller for assistance should they prefer this method.

This page describes the firmware update process, it should take **approximately 15 minutes total time to complete**.

Once started **the update process should not be interrupted in any way** as this could result in a non-responsive unit.

As well as a working DN-60 you will need:

- The latest Firmware update for the DN-60.
This can be obtained from your local Datavideo office or dealer.
- The DN-60 power supply.
- A blank qualified* CF card with capacity up to 32GB
- A CF card reader if your computer does not already have CF card slot fitted.
- A PC or Mac computer.

**See page 17 also*

The DN-60 formatted CF card appears to the computer as a disk volume and not as a video device. The connection to the computer is done via the CF card slot in the computer or an attached CF card reader. The DN-60 CF card volume name is shown as *Datavideoxx* (**xx** is a value between 0 and 99).

To update the DN-60's firmware:

1. Use a CF card that is smaller than 64GB to update the DN-60.
2. Disconnect any IEEE-1394/DV/HDV cable from the DN-60.
3. Ensure the DN-60 power adaptor is supplying power to the DN-60 during the upgrade process.
4. Unzip the **DN-60 2010.XX.XX.zip** folder and copy the file **flash** to your computer desktop so it is easy to locate.
5. Use the DN-60 to format the CF card to **FAT32**, once formatted switch off the DN-60.
6. Eject the CF card from the DN-60 using the button next to it and attach it to the computer using a CF card reader or slot
7. Copy the file now called **flash** from your computer desktop to the DN-60 formatted CF card.
8. Insert the CF card back into the DN-60 and then turn the unit on.
9. At the DN-60 menu enter the **Tools menu** and choose the **Upgrade Firmware** option.
10. Confirm **yes** at the question **are you sure?**
11. The unit should now update itself. **Please wait** until the process ends and the units display has returned to the Home Screen showing the Record Mode option.
12. Now look at the **Firmware Revision** option under the DN-60 **Tools menu** to confirm the new firmware number is now shown.

***WARNING:** Once the 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.

DN-60 RS-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

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 CMD1 byte represents the command group. The least significant nibble represents the number of Data bytes to follow the CMD2 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 a three byte acknowledgement (ACK) if the Checksum is valid. If the Checksum is not valid, the DN-60 will ignore the command. Most commands will be responded to within 8 msec. However, a PLAY command from an idle state will result in response delay of up to 700 msec. During this busy time, all commands will be ignored.

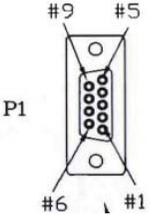
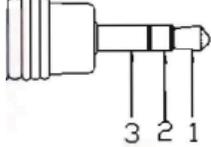
Summary List of Commands

Command	Name	Response	Name
	System Control		
00h, 11h, 11h	Device Type Request	12h, 11h, 00h, 00h, 23h	Device Type
01h, F1h, 01, F3h	Next Bin	10h, 01h, 11h	ACK
01h, F2h, 01h, F4h	Previous Bin	10h, 01h, 11h	ACK
02h, F5h, 08h, 00h, FFh	Disable Loop Play	10h, 01h, 11h	ACK
02h, F5h, 08h, 01h, 0h	Enable Loop Play	10h, 01h, 11h	ACK
01h, F0h, XXh, csum	Select Bin	10h, 01h, 11h	ACK
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, 13h, 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

Connector Pin Assignment

Interface : 9 pin D-Sub female to 3.5mm Jack

The pin assignment of the Controller and DN-60 is shown in the following table:

9 Pin D-Sub	Controller (P1)	DN-60 (P2)	3.5mm Jack
	Pin 2 (Rx)	2 Jack Ring	
	Pin 3 (Tx)	1 Jack Tip	
	Pin 5 (GND)	3 Jack Sleeve	

System Control

00h, 11h Device Type request

The response is 00, 00 indicating Quick Capture

01h, F1h, 01, F3h 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.

01h, F2h, 01h, F4h 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.

02h, F5h, 08h, 00h, FFh 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.

02h, F5h, 08h, 01h, 0h 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.

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

Command	Name	Response	Name
61h, 0Ch, 04h, 71h	Current Time Sense	74h, 00h, TC(3:0), csum	Time Code
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	61h, 00h, nn, csum	Bin Number

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

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:

Play Speed= $10(n/32-2)$

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 beginning. This command may be issued from the idle state or any other Play state

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		
61h, 0Ch, 04h, 71h	Current Time Sense	74h, 00h, TC(3:0), csum	Time Code

Specifications

Digital Video In/Out	IEEE-1394, 400Mbps max, 6-pin
Recording and Playback Formats Digital Input and Output:	DV25, DVC Pro25, DVC Pro50, HDV
Recording time (minutes per 10GB) DV25: HDV:	46.3 49.4 at 1080i, 64.3 at 720p
Media File Format DV25: HDV:	*.avi (Type II, Microsoft, Canopus), *.mov, *.mxf (OP1A) *.m2t
Operating File System Compatibility	FAT32, NTFS
Input Voltage Requirement	12V typical, 8V min , 24V max
Power Consumption @ 12V	Idle: 4.3W, Play/Record: 6W, HDD mode: 5.3W
Size (H x W x D):	4.65" x 3.09" x 1.51" (116mm x 78.5mm x 38.5mm)
Weight:	DN-60: 5.64oz (160g),
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)

Service and Support

It is our goal to make your products ownership a satisfying experience. Our supporting staff is available to assist you in setting up and operating your system. Please refer to our web site www.datavideo-tek.com for answers to common questions, support requests or contact your local office below.

Datavideo Global Website: www.datavideo-tek.com

Datavideo Corporation

Tel: +1 562 696 2324	Fax: +1 562-698-6930	E-Mail: contactus@datavideo.us
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Datavideo Technologies Europe BV

Tel: +31-30-261-96-56	Fax: +31-30 261-96-57	E-Mail: service@datavideo.nl
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Datavideo UK Limited

Tel: +44 1457 851 000	Fax: +44 1457 850 964	E-Mail: sales@datavideo.co.uk
-----------------------	-----------------------	--

Datavideo Technologies Co., Ltd

Tel: +886 2 8227 2888	Fax: +886-2-8227-2777	E-mail: service@datavideo.com.tw
-----------------------	-----------------------	--

Datavideo Technologies China Co., Ltd

Tel: +86 21-5603 6599	Fax: +86 21-5603 6770	E-mail: service@datavideo.cn
-----------------------	-----------------------	--

Datavideo Technologies (S) PTE Ltd

Tel: +65-6749 6866	Fax: +65-6749 3266	E-mail: sales@datavideo.sg
--------------------	--------------------	--

Datavideo HK Ltd

Tel: +852 2833 1981	Fax: +852-2833-9916	E-mail: info@datavideo.com.hk
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