STACK
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DVR2-130, DVR2-240, DVR2-440, DVR2-540.

Users Guide

Preface

Congratulations

Thank you for choosing the Stack DVR2. This solid-state recorder will give you many opportunities to make video recordings in environments where *ordinary* video recorders cannot be used.

Purpose of this manual

This manual will help you install and use the Stack DVR2. It explains how to set up and configure the system for your vehicle.

Related Products From Stack

If you need information about other Stack motor sport products, these can be obtained from Stack or from your local Stack dealer. Products available from Stack include:

- Intelligent Tachometers
- Auxiliary Gauges
- Analogue and Digital Sensors
- Data Logging Systems
- Display and Logging Systems
- Radio Telemetry Systems
- Display and Analysis Software
- Video Overlay Systems
- Solid-state Video Recorders
- Tyre Pressure Monitoring Systems

Contents

Chapter 1. Introduction

The DVR2 is part of Stack's second generation professional video recorder range. It provides the optimum solution and is specifically designed for use in harsh environments.
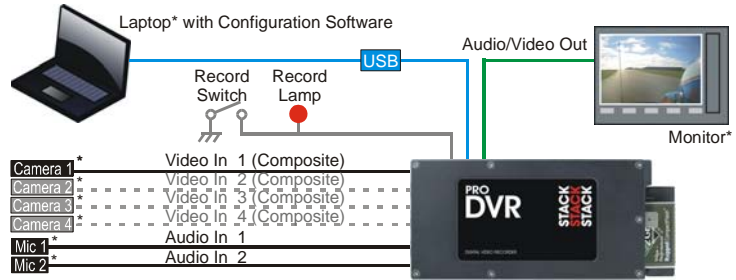
Typical DVR2 Application

Stack DVR2 digital video recorders employ broadcast standard MPEG-2 video compression to record high quality real-time video and audio direct to a Compact Flash (CF) card. The card can be removed with ease and played on a PC or laptop using a standard media player application. Recordings can be copied direct to DVD for playback on either a PC or a DVD player. A data overlay feature is available so that date, time and GPS Data may be stamped onto the recorded video.

Stack DVR2s feature a rugged machined aluminium housing specifically designed and manufactured to protect the unit in harsh and extreme environments. The unit is compact and durable with no moving parts (other than the sealed CF card access door) and is capable of operating where normal VCRs or DV recorders cannot. Recording in harsh environments, such as continual shock and vibration, and extreme climate conditions is now entirely possible, making it ideal for all demanding recording applications. Its anti-vibration and shock-resistant abilities are perfect for consideration as commercial off the shelf (COTS) equipment. Stack DVR2s have been successfully used in many demanding applications

such as land-based military vehicles, aerospace, marine and many more.

The new Stack range of DVR2s has a model to suit your needs: choose from variants offering up to four camera inputs, higher bit-rate options for broadcast quality recordings, models offering completely sealed units to IP67, extended operating temperature ranges and extended recordings capacity.

Stack DVR2s provide superior high-quality video recording in real time over a wide range of bit rates suitable for different applications - up to 20 Mbps is available, quality equivalent or better than DV tape.

Chapter 2. Essential User Information

Please read the important information in this chapter before using the Stack DVR2.

DVR2-130

The DVR2-130 is supplied with the following standard components:

Quantity	Description
1	ST990066 DVR2 Module
1	ST918109 DVR2-130 System Harness
1	ST918105 Switch and Lamp Harness
1	ST169049 USB DVR2 to PC Lead
1	ST169021 Audio/Video Lead
1	ST920039 DVR2 Configuration Utility Software

DVR2-2/4/5

The DVR2-240/440/540 are supplied with the following standard components:

Quantity	Description
1	ST990063 DVR2 Module
1	ST918101 DVR2 System Harness (red)
1	ST918107 DVR2 Input Harness (yellow)
1	ST918114 DVR2 Audio/Video Harness (blue)
1	ST918105Switch and Lamp Harness
1	ST920039 DVR2 Configuration Utility Software

Optional Components

DVR2s may be supplied with the following optional components:

Quantity	Description
1	DVR to VS Adapter Harness (ST900144)
1	Bullet Camera & Microphone Kit (ST8390 PAL or ST8391 NTSC)
1	CAM plug to BNC & Power lead (ST918106)
	Compact Flash (CF) Card
1	GPS Receiver (ST995)

Video Standard

The DVR2 can be configured to either the PAL or NTSC video standard to match the camera which is connected.

! *Only PAL and NTSC are currently supported.*

Using a New Compact Flash Card

The DVR2 will only operate with a Compact Flash card formatted with a FAT32 File System. Before using a new card, check its File System by inserting it into a PC running Windows XP or Vista and display the disk properties by right clicking the disk icon in "My Computer". If supplied as FAT16, reformat to FAT32 (see page 17).

Playing a Recording

The files produced by the DVR2 are fully MPEG-2 compliant. They may be played directly from the card by inserting it into a PC with a suitable Compact Flash card slot or adapter. However, better replay results are usually obtained by transferring the file to the PC's hard drive (see page 15).

Before Making a Recording

Before a recording session clear the Compact Flash card so that maximum space is available. Deleting files can cause the write/read speed of the removable Compact Flash card to degrade but a format will restore its performance. A format can be achieved using a PC running Windows XP or Vista. Right-click on the disk icon in "My Computer" and select "Format". Ensure the "File system" is set to "FAT32", choose the "Quick Format" option and then click "Start" (see page 17).

Alternatively click on the "Information" tab in the DVR Configuration Utility and select "Format". (see page 23)

Deleting Files

Whilst it is possible to delete files from the CF card, that won't necessarily restore full performance due to file fragmentation. The restore performance once a recording has been made, transfer the files to your PC's hard drive and then perform a format.

! *Ensure any useful recordings have been archived before performing a format.*

Chapter 3. Installation

Before installing the DVR2, take a few moments to plan the installation. First identify all the components which came with your system. You may like to perform a *dry run* by connecting the components together to get a feel for how the final installation will be accomplished.
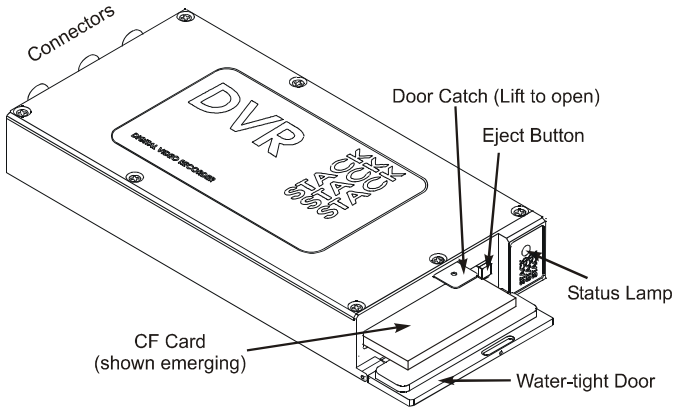
The DVR2 Module
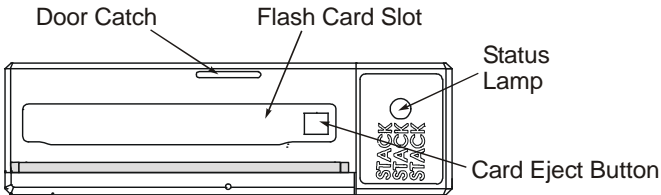
The Front Panel showing the Card Slot
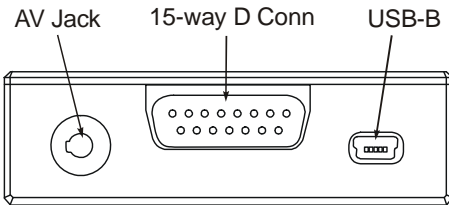
DVR2-130 Rear Panel showing the Connectors

Input   System   Monitor
(yellow)   (red)   (blue)
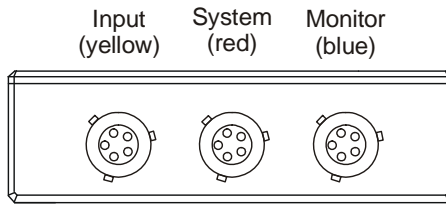
DVR2-240, DVR2-440 & 540 Rear Panel

Now identify a suitable location for the DVR2. It can be mounted in any orientation but, when looking for a location, please bear in mind that there must be approximately 50mm (2") clearance for the wiring harnesses at the back of the unit to ensure that the cables will not be bent too sharply. There must also be enough space to remove the Compact Flash card at the front.

The module can be mounted by various means including using double-sided tape or Dual-Lock™. A rigid mounting can be made to a suitable bracket using the six M3 tapped holes in its underside (see Appendix A for dimensions).

Once a mounting position has been determined, the components should be connected using the wiring harnesses supplied. The figures below show the standard electrical connections to the unit.

If you are using the DVR2 with a Stack Video Overlay system, an adapter harness is available for that system. The differences are described at the end of this chapter. Please contact your Stack distributor if you need to purchase the adapter wiring harness.

! *The wiring harnesses supplied by Stack are terminated with the most commonly used connectors. If your equipment uses different connectors, you will need to obtain appropriate adapters from your Stack dealer.*

DVR2-130 Wiring
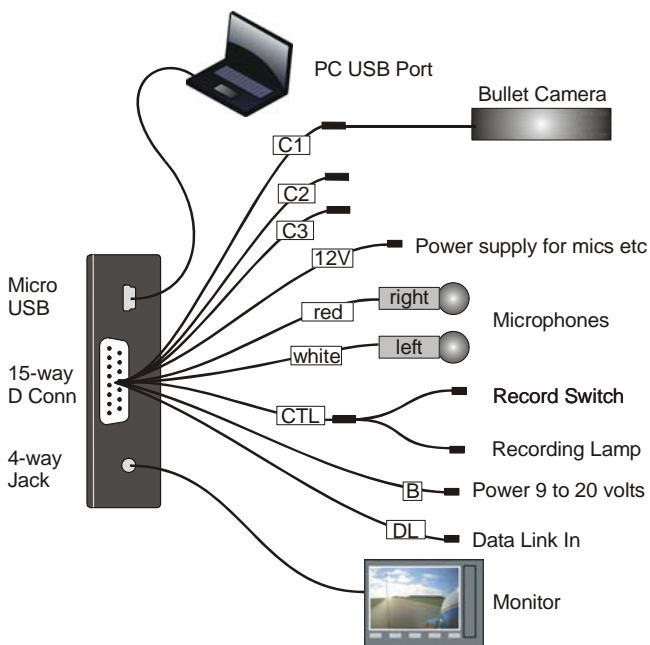
Connect a camera to the 4-way CAM plug on the wiring harness.

! *If you are using your own camera, you may need to obtain the optional CAM plug to BNC and Power lead (ST918106) from your Stack distributor.*

Connect the Record Switch and Recording Lamp lead to the CTL connector. Extender cables are available from Stack's dealers.

The Recording Lamp output can be used to drive an input on some other equipment to indicate the DVR2 is recording. This is an open collector output and must not be used to drive more than 25mA max.

Connect a permanent DC supply of between 9 and 20 volts (or 20 to 50volts for the High Voltage Option ST9399) to the Power (B+ and B-) connectors. You must provide a 5 amp

fuse in the B+ connection to protect the DVR2. An independent switch can be added to isolate the module.

! *A permanent power supply is required to ensure that recording finishes cleanly when the Record Switch is turned off. If the supply is obtained from a vehicle's ignition switch, the DVR2 could switch off before the recording has finished and the last few seconds may be lost (see page 18).*

The following connections are optional:

If audio recording is required, connect your microphones to the white (left) and red (right) microphone inputs. Microphone gain can be adjusted using the DVR Configuration Utility (see page 30). A Regulated 12 volt 2.1 mm power connector has been provided for powering microphones. *Note: The regulated 12 volt power also supplies the cameras, maximum total load is **1.0Amps**. If the current required is greater than 1.0A, you must provide a separate power supply.*

! *If audio recording is not required, it may be disabled to extend the recording time (see page 30).*

Connect a GPS receiver into the DL (Data Link) connector input for GPS video overlay *(see page 25)*

A composite video output is provided via the 4-way AV jack socket. This can be used to connect to an external monitor to help align the camera, etc. The video monitor output is the same as the input. Connect the yellow phono plug to the video input on your monitor.

Stereo audio monitor outputs are also provided to aid the set-up of the microphone levels (see page 30). Connect the white and red phono plugs to the audio inputs on your monitor or speakers.

DVR2-240\440\540 Wiring
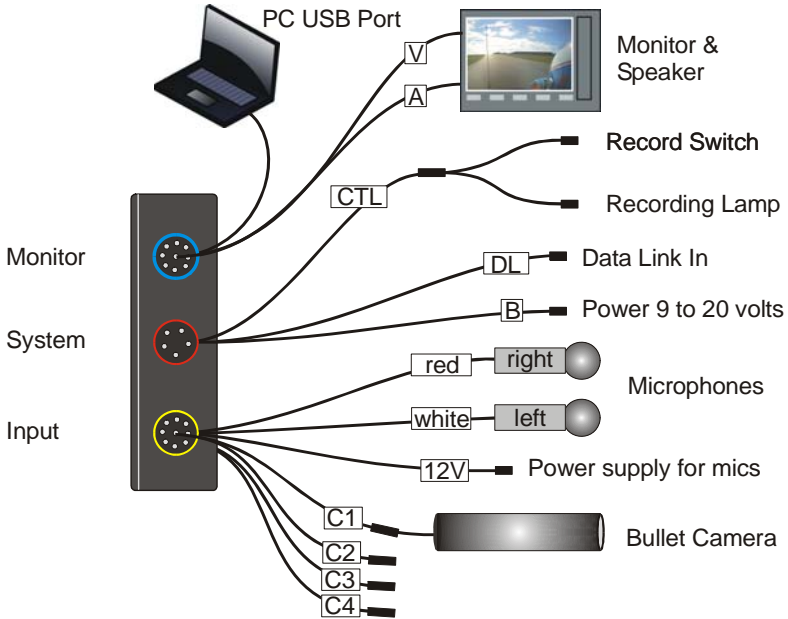
Connecting the Components

Plug each harness you have into the appropriately coloured connector on the rear panel of the DVR2.

Input Harness (yellow)

Starting from C1, connect a camera to each of the 4-way CAM plugs on the wiring harness.

! *If you are using your own camera, you may need to obtain the optional CAM plug to BNC and Power lead (ST918106) from your Stack distributor.*

The following connections are optional:

If audio recording is required, connect your microphones to the white (left) and red (right) microphone inputs. Microphone gain can be adjusted using the DVR Configuration Utility (see page 30).

A Regulated 12 volt 2.1 mm power connector has been provided for powering microphones.
*Note: The regulated 12 volt power also supplies the cameras, maximum total load is **1.0Amps**. If the current required is greater than 1.0A, you must provide a separate power supply.*

! *If audio recording is not required, it may be disabled to extend the recording time (see page 24).*

System Harness (red)

Connect the Record Switch and Recording Lamp lead to the CTL connector. Extender cables are available from Stack's dealers.

The Recording Lamp output can be used to drive an input on some other equipment to indicate the DVR2 is recording. This is an open collector output and must not be used to drive more than 25mA max.

Connect a permanent DC supply of between 9 and 20 volts (or 20 to 50volts for the High Voltage Option ST9399) to the Power (B+ and B-) connectors. You must provide a 5 amp fuse in the B+ connection to protect the DVR2. An independent switch can be added to isolate the module.

! *A permanent power supply is required to ensure that recording finishes cleanly when the Record Switch is turned off. If the supply is obtained from a vehicle's ignition switch, the DVR2 could switch off before the recording has finished and that recording may be lost (see page 18).*

Connect a GPS receiver into the DL (Data Link) connector input for GPS video overlay *(see page 27)*

Monitor Harness (blue)

The composite video output can be used to connect to an external monitor to help align the camera, etc. The video monitor output is the same as the input. Connect the yellow phono plug to the video input on your monitor.

Stereo audio monitor outputs are also provided to aid the set-up of the microphone levels (see page 24). Connect the

white and red phono plugs to the audio inputs on your monitor or speakers.

Video Overlay Wiring Harnesses

If connection of the DVR2 to a Stack Video Overlay system is required, an adapter harness can be supplied for that purpose. This harness allows direct connection between the DVR2 and a Stack VS/VSR Module.

With this harness the signal from the camera is first directed to the VS/VSR Module, which overlays vehicle data on to the picture, before that signal is passed to the DVR2.

Connect the various components as described above with the addition of connecting the 15-way MIL connector to the VS/VSR module (see page 42).

! *This adapter harness should be connected to CAM1 on a four-camera input harness.*

Chapter 4. Operation

To make a recording:

Check that video, power and a Record Switch are connected as described in Chapter 3. Check that the Record Switch is set to the open (off) position.

! *A red marker on the Record Switch indicates when it is in the recording position.*

If not already installed, open the waterproof door and ensure the Eject Button is pushed fully home. Insert a Compact Flash card into the slot until it is flush with the opening. Once inserted, close the waterproof door.

! *The Compact Flash card must only be inserted with its manufacturer's label facing downwards and the lip uppermost. If there is resistance, the card is probably upside down. Attempting to insert the card incorrectly will damage the DVR2 and void the warranty.*

Apply DC power and after about a 20 second delay (while the system boots up), the Status Lamp on the front panel will light showing the status of the unit.

If the Status Lamp shows static green the system is ready to record.

If the Status Lamp is not static green, refer to the table below to find out the DVR2's status.

! *Before making a recording, ensure there is enough space available or preferably, clear the Compact Flash card (see page 4). Card space may be checked on a PC or by making a trial recording and viewing the DVR2's Status Lamp (as described below).*

To start recording close the Record Switch. Once recording, the Recording Lamp will illuminate and the Status Lamp will flash green for 3 seconds with a mark space ratio showing the capacity remaining:
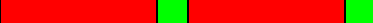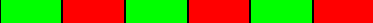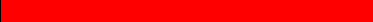
- With an empty Compact Flash card the Status Lamp will flash for approximately 2.7 seconds on : 0.3 seconds off.

- With approximately 50% capacity remaining it will flash 1.5 seconds on : 1.5 seconds off.

- With approximately 10% remaining the Status Lamp will flash for 0.3 seconds on : 2.7 seconds off.

To stop recording, open (switch off) the Record Switch. The Status Lamp will revert to showing static green and the Recording Lamp will be extinguished.

! *Do NOT remove the CF card whilst recording is in progress.*

The Compact Flash card may now be removed and placed into a PC with a suitable Compact Flash card slot card slot.

The table below shows the function of the DVR2's front panel Status Lamp. Green generally indicates the unit is functioning correctly and red indicates a fault or reset condition.

Operation		Status Lamp Operation	Description
Ready		Static green	The DVR2 is ready to record. Video and card OK.
Video OK, No Card		Flashing long red / short green	In stand-by or unable to record with card not present or full. Video input OK. If card present, reformat with FAT32
No Video, Card OK		Flashing long green / short red	In stand-by (or unable to record) with video not present but card OK. Check Camera connection & power or check PAL / NTSC setting OK
No Video, No Card		Fast flashing red	Unable to record. Video and card not present or full, or system fault.
PC Connected		Flashing equally green / red (0.5s red / 0.5s green)	DVR2 is under external control of the Configuration Utility.
Recording 100% Memory 50% Remaining 10%		Flashing green External Recording Lamp also illuminated	Recording OK. The longer the green flash the greater the memory remaining. With a new card the Status Lamp will flash for approx. 2.7 seconds on : 0.3 off. 50% remaining, lamp flashes 1.5 sec on : 1.5 off. 10% remaining lamp flashes for 0.3 sec on : 2.7 off.
Recording, No Video		Fast flashing green / red	Recording but video is not present, audio only is being recorded.
Resetting or Busy		Static red	System reset / preparing to record or card format.

To play a recording:

DVR2 files can be played on a PC using an MPEG-2 media player.

Insert the Compact Flash card into the appropriate slot on your PC. If a slot is not available, there are a number of USB to Compact Flash card adapters available from PC vendors.

Allow the PC a few seconds to recognise the new Compact Flash card and then run "My Computer" or "Windows Explorer" to show the new drive. Double click to display the Compact Flash card contents.

My Computer / Removable Drive   DVR2 Files
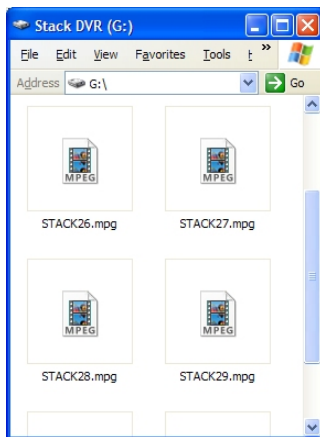
DVR2 video files are MPEG-2 compliant and filenames begin with "STACK" and have a ".MPG" extension. The files are given sequential numbers starting from zero, eg, "STACK24.MPG". With a standard Windows configuration, they will be seen as media files (see above). To play, simply double-click the file and it will be displayed.

Due to the relatively slow read speed of Compact Flash cards, better results are usually obtained by transferring the required files to the PC's hard disk before playing.

With an appropriate DVD burner and software, DVR2 files may also be burnt onto DVD or Video CD for archiving without requiring modification.

Operation with a new Compact Flash Card

The DVR2 will only operate with Compact Flash cards formatted with a FAT32 File System. Before using a new Compact Flash card check its File System by inserting into a PC and displaying the card properties by right clicking the disk icon in "My Computer".

If the Compact Flash card was supplied as FAT16, reformat to FAT32 using Windows XP or Vista's format utility to select the File System (see Formatting a Compact Flash card below).
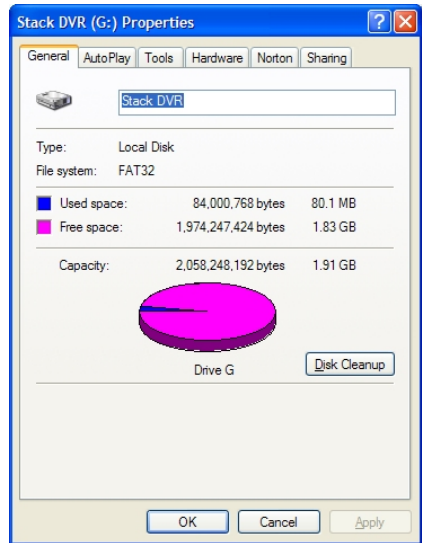
Formatting a Compact Flash Card

If using a new Compact Flash card, please ensure it has a **FAT32 File System** (see Operation with a new Compact Flash card above).

To format the Compact Flash card using Windows XP or Vista, right-click on the disk icon in "My Computer" and select "Format". Ensure the "File system" is set to "FAT32", choose the "Quick Format" option and then click "Start".
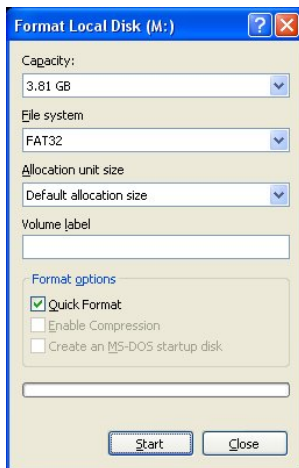
Deleting Files

Whilst deleting files will release space on the removable Compact Flash card, its performance may degrade over time. Only a reformat will restore the maximum write/read speed of the Compact Flash card. So once a recording has been made which you intend to keep, transfer that file to your PC's hard drive and then perform a reformat of the removable card to keep it in top condition.

! *In summary, to keep your Compact Flash card in good condition, do not delete files. Remove files for archiving and then reformat the Compact Flash card as described above.*

Corrupted Compact Flash Cards

If the Compact Flash card is removed, or if power is disconnected from the DVR2 during a recording, it is possible the card may become corrupted or the files could be incomplete. In this case run Windows' Scan Disk routine which will help recover any missing data.

To run Scan Disk, right click on the Compact Flash card icon in My Computer and select "Properties". Select the "Tools" tab and, under "Error-checking", click "Check Now".

If the Compact Flash card is removed, or if power is disconnected from the DVR2 during a recording, it is possible the card may become corrupted or the files could be incomplete. In this case run Windows' Scan Disk routine which will help recover any missing data.

To run Scan Disk, right click on the Compact Flash card icon in My Computer and select "Properties". Select the "Tools" tab and, under "Error-checking", click "Check Now".

The Check Disk dialog will now be shown. Check "Automatically fix file system errors" and click the "Start" button.
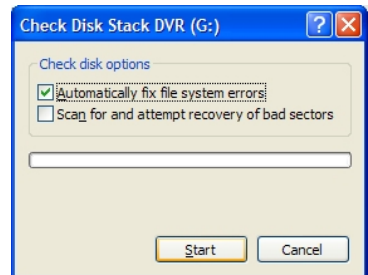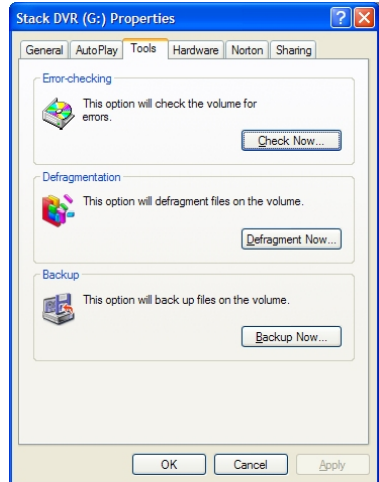
Chapter 5. Compact Flash Cards

The DVR2 is compatible with most fast Compact Flash (CF) cards up to 16 Gbytes (DVR2-130 & DVR2-240) and 32 Gbytes (DVR2-440 & DVR2-540). Stack recommends Pretec and Sandisk Extreme or Ultra cards as they have been shown to give excellent results in harsh conditions.

! *Fitting a Compact Flash card with a greater capacity will not be recognised by the DVR2 and the Status Lamp will indicate a "card not present" error (see page 15).*

Compact Flash cards will only operate if formatted as FAT32. Check any new Compact Flash card before using with the DVR2. If supplied as FAT16, reformat to FAT32.

For the highest quality recording it is essential that the Compact Flash card has a sustained write speed of ×16 or faster. If the card is too slow, video will play back with missing frames. This problem can be alleviated by recording at a lower video quality (see page 30).

When changing cards, always remember to follow this procedure:

- Switch off the DVR2
- Shut down the DVR PC configuration Utility.
- Disconnect the USB cable.

Once the card has been changed you may switch the DVR2 back on and reconnect the USB cable.

! *Do not change the card loaded into the DVR2 while it is powered-up or connected to your PC.*

Chapter 6. Configuration

The DVR2 may be configured from a PC when connected via a USB lead.

! *Once you have finished configuring the DVR2, exit the DVR Configuration Utility to update the DVR2 and return it to normal operation. Alternatively, you can upload the new configuration by clicking the "Write Config" button. In both cases you MUST remove the USB cable for the DVR2 to accept the changes.*

PC Connection

Install the DVR Configuration Utility which can be found on the CD-ROM supplied with the DVR2 system.

Once installed, connect the USB cable to a USB port on the PC.

Run the DVR Configuration Utility on the PC.
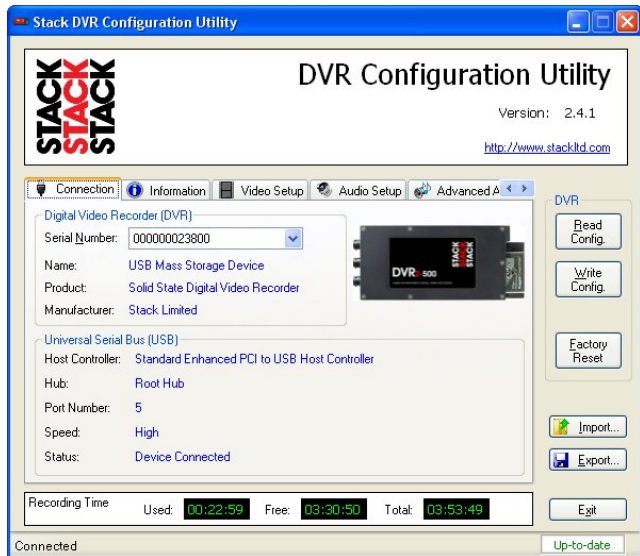
System Connection Screen

The DVR Configuration Utility will now recognise the DVR2 and show that it has established a connection.

Once connected the DVR2 Status Lamp will flash 50:50 red / green to indicate that it is under control of the DVR Configuration Utility.

! *The DVR Configuration Utility is only able to establish connection with the DVR2 when it is powered-up.*

Read Config

Clicking this button causes the current configuration to be uploaded from the DVR2 to the PC.

Write Config

Clicking this button causes the new configuration to be transferred from the PC to the DVR2. The DVR Configuration Utility status will show "Waiting for connection" while the DVR reboots with the new configuration.

Factory Reset

Clicking this button causes the DVR2 to reset back to its manufacturing default settings. It should only be necessary to do this in the unlikely event that the DVR2's internal set-up has become corrupted.

Once you have clicked the Factory Reset button, a dialog box will pop up and you must confirm the reset operation by clicking the "Yes" button.

Finally write this default configuration to the DVR2 using the method outlined above (see page 22).

Exit

Clicking this button closes the DVR Configuration Utility. If the configuration has been modified, you will be prompted to write the new configuration to the DVR2.

System Information

This screen shows the serial numbers of the DVR2 and the DVR Configuration Utility software.
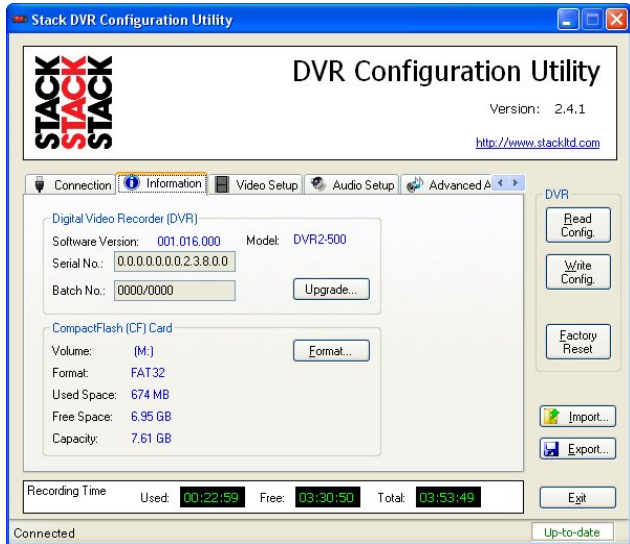
System Information Screen

If a Compact Flash card is fitted, this screen will show details of the card including an indication of the amount of space which has been used.

Click the "Upgrade" button to upgrade the firmware in the DVR2 (see Appendix C).

Video Setup

This screen allows you to configure the various aspects of the video recorder.
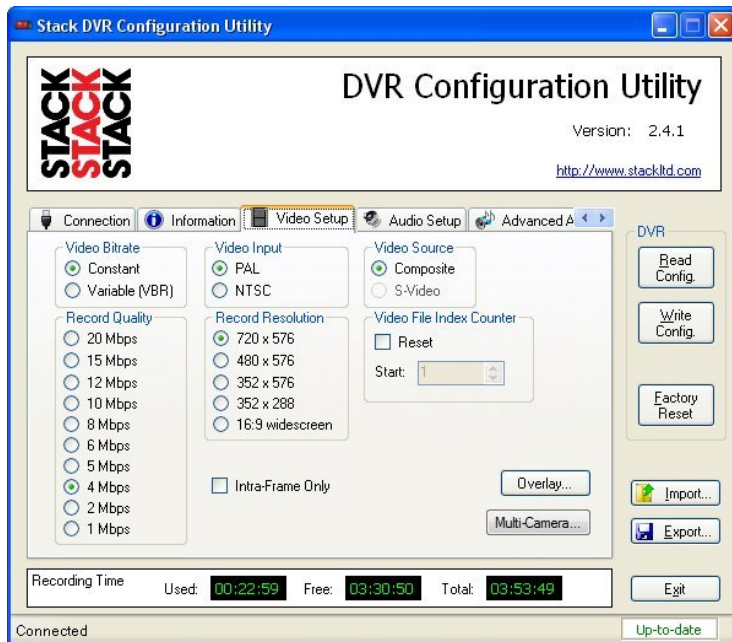
Video Set-up Screen

Record Quality

Allows you to configure the amount of compression employed by the system. The software shows an estimate of the record time at the bottom of the screen, depending upon configuration.

Record Resolution

Allows you to adjust the resolution of the recordings to those shown in the table below. The software shows an estimate of the record time at the bottom of the screen, depending upon resolution.

Resolution		PAL	NTSC
Full	(D1)	720 x 576	720 x 480
Medium	(2/3 D1)	480 x 576	480 x 480
Small	(1/2 D1)	352 x 576	352 x 480
Smallest	(SIF)	352 x 288	352 x 240
16:9 Widescreen		720 x 400	720 x 400

! *Always test that the recordings which are made will play correctly on your video equipment. Many DVD players will not play back correctly unless the recordings were made at the Full (D1) resolution.*

Video Input

Configures the system to either PAL or NTSC.

Video Source

Configures the system to either Composite or S-Video.

! *Only the Composite input is available on the DVR2.*

Video Bitrate

This option is used to enable Constant or Variable Bit Rate support.

! *Variable Bit Rate is only available on the DVR2-440 \ 540.*

Video File Index Counter

Use this to reset the numeric index used in video file names on the Compact Flash card.

Video Overlay

To configure the video overlay select the **Video Setup** tab and then click the **Overlay** button to access the video overlay configuration screen.
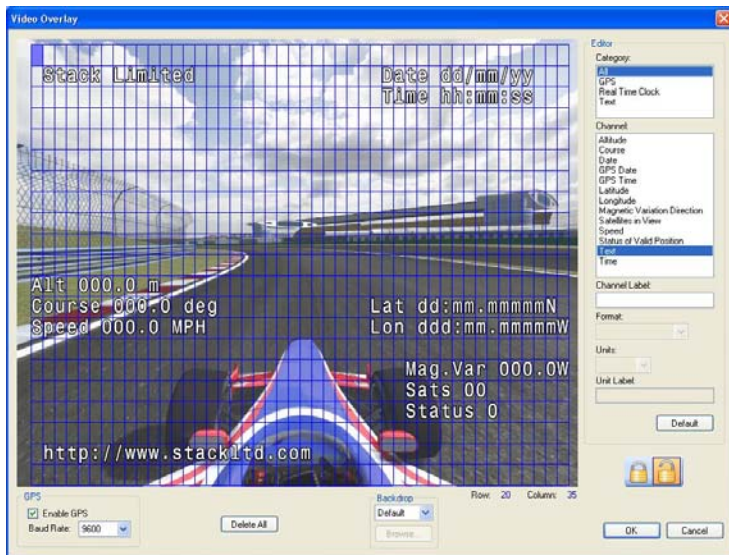
Video Overlay Configuration Screen

To overlay text simply click on any of the blank cells within the display grid and start typing.

To overlay the date or time from the DVR's real time clock, click on any of the cells within the display grid and select the **All** or **Real Time Clock** option from the **Category** list. Then select the **Date** or **Time** option from the **Channel** list.

You may customise the selected overlay channel by entering your own text in the **Channel Label** and/or **Unit Label** boxes. You may also select a different **Format** or **Units** option using the dropdown boxes where available.

To reposition an overlay channel simply left-click and drag the channel on the display grid to a new location.

To delete an overlay channel click on the desired channel in the display grid and press the **Delete** key on your keyboard. To delete all the overlay channels click the **Delete All** button.

! *Please note that only one instance of each channel, except the **Text** channel, is allowed on the overlay.*

GPS Receiver Video Overlay Support

! *GPS overlay support is a PINCODE enabled feature. Please see the appropriate section in this guide detailing PINCODE authorisation.*

After successful authorisation, you may tick the **Enable GPS** checkbox at the bottom of the Video Overlay screen to enable the GPS channels in the lists.

The baud rate for your GPS receiver may also be set in the Video Overlay screen.

Camera Configuration

! *New for 2010 models.*

To configure the cameras select the **Video Setup** tab and then click the **Camera** button to access the camera configuration screen.
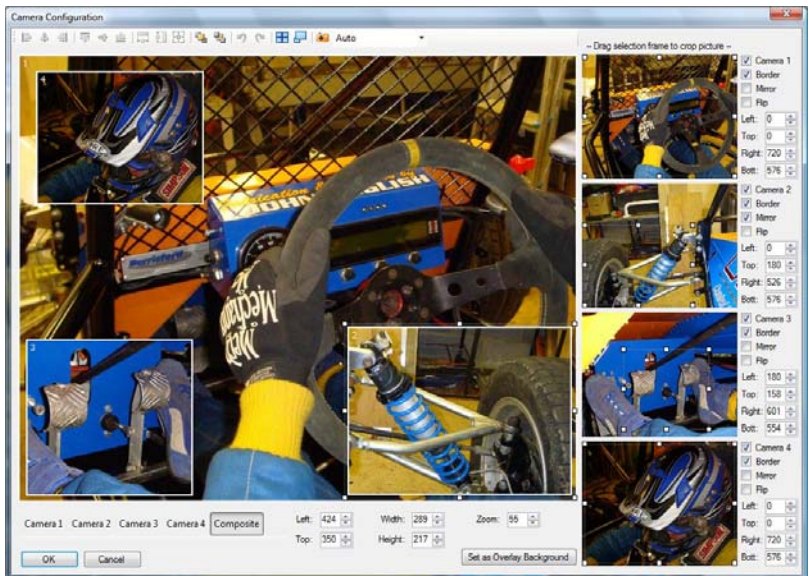
Camera Configuration Screen

To enable a camera check the box on the right of the configuration screen i.e. **Camera 1, Camera 2**, etc. If the **Capture Mode** is set to **Auto**, then the software will immediately start to capture the image on the enabled camera(s).

Once the camera images have been captured you may then modify the configuration.

Use the selection rectangles on the right of the screen to crop the camera image. Click and drag any node on the rectangle to resize the crop area. Click and drag within the rectangle to select a different part of the camera image. Controls for **Border**, **Mirror** and **Flip** are also located on the right of the configuration screen.
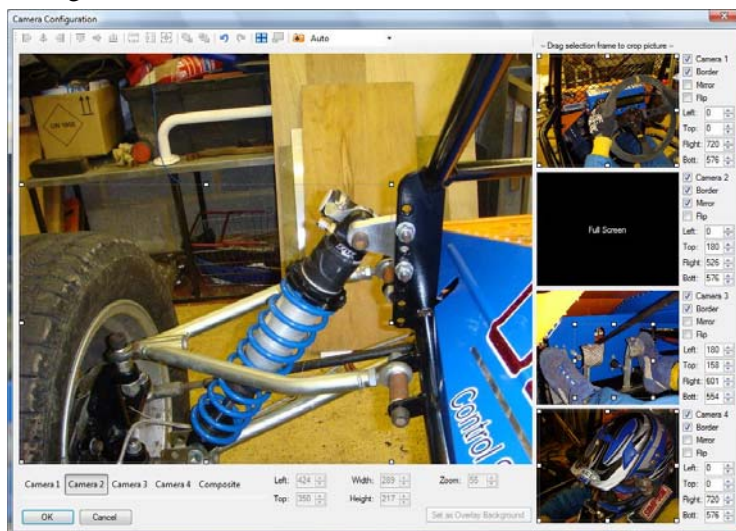
Full Screen Crop Window

You may enlarge the input camera window for more precise positioning by clicking the appropriate Camera 1, Camera 2, etc buttons on the bottom left of the screen. The right side of the configuration screen shows an enlarged video picture. Select "Composite" to display the recorded output image. You can now click and drag any of the individual windows in the composite screen, to reposition them.

Drag a window by its corner to maintain the aspect ratio of the image when resizing.

The system will not magnify camera images so the maximum zoom is 1:1 i.e. 100%.

Use the toolbar buttons **Send to Back** and **Bring to Front** to arrange how the windows overlap each other.

For a quadrant style layout of four equal windows, click the quadrant button on the toolbar as below.
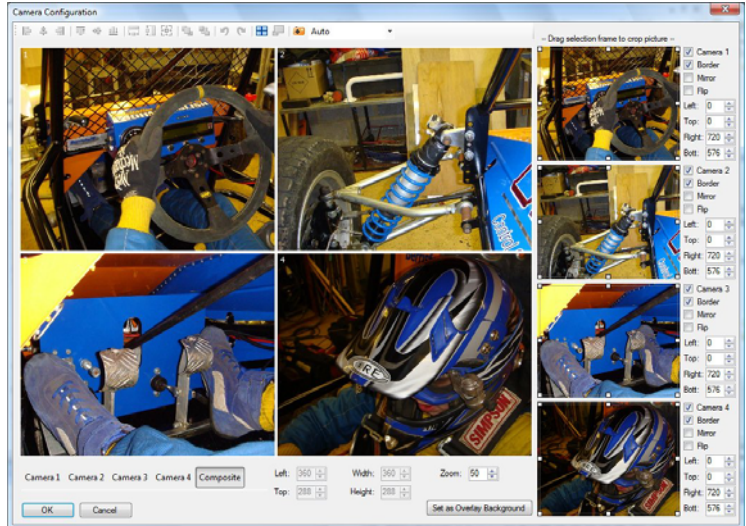
Quadrant Style Output

To maximise a window, first select the window by clicking it, then click the maximise button on the toolbar.

Selecting more than one window by holding down the Ctrl button while clicking the windows will enable the alignment buttons on the toolbar.

If you are using Text Overlay, you may click the **Set as Overlay Background** button to use the current composite image as a background for the Overlay configuration screen.

Click the **OK** button when configuration is complete. Then click **Write Config.** to save the changes to the DVR2.

Audio Setup

This screen allows you to configure the various aspects of the audio recorder.
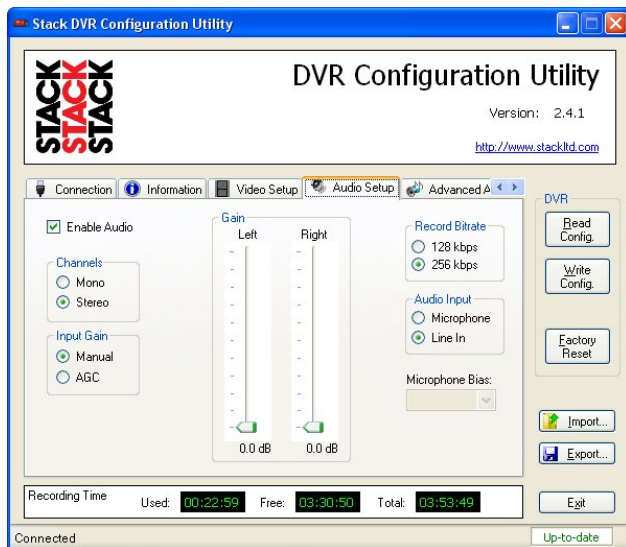
Audio Set-up Screen

Select AGC to use Automatic Gain Control for audio inputs. This will enable the Advanced AGC tab options.

Select AGC Disabled to configure the recording levels individually for each stereo channel.

You can use Record Bitrate to set the amount of compression applied to the audio signal.

Set the Audio Input level to match your microphones. Set the "Audio Input" to Microphone only if you need to turn on the microphone bias supply.

! *Uncheck Enable Audio if you do not want to record audio; that will free more space for video recording.*

Tools: PINCODE Authorisation

The Tools tab allows you to authorise a PINCODE.
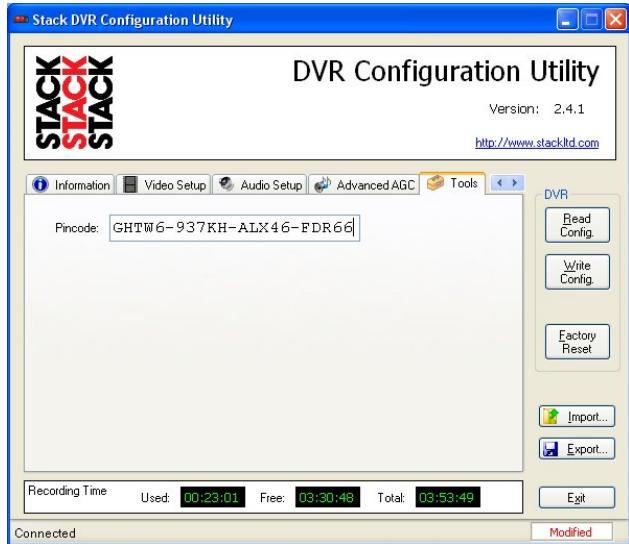
PINCODE Authorisation Screen

Enter your supplied PINCODE exactly as it appears on your packing list, then write the configuration to the DVR.

Chapter 7. Video and Data Systems

The DVR2 may be supplied as part of a Stack Video Logger System:

Synchronised Video Logger Systems

When using these systems, the control of the DVR2 recording mode is automatic. The DVR2 will start recording when the Data Logging system starts recording.

! *Ensure the configuration includes a 'Stop Log' command which will also stop the DVR2 recording.*

Video Overlay Systems

If the DVR2 is part of a data overlay system that does NOT include a recorder then the VS/VSR will need to be configured with an action to start the DVR2 recording.

Automatic recording start control

The recording status of the DVR2 is automatically controlled by the VS/VSR module. Shown is a test based on ESPD (Engine RPM) which causes a 'Start log' command when the Engine speed is greater than the specified RPM.

! *The 'Start Log' command will cause the DVR2 to start recording.*

Automatic recording stop control

The system must also include a 'Stop Log' command. This is because recording MUST be stopped before power is removed.
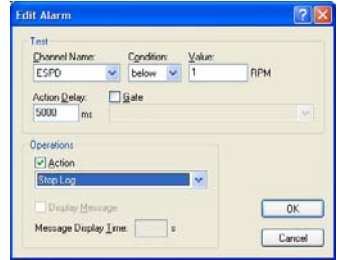
! *Without this, the last part of the video that was recording may be lost when the power is removed.*

Manual recording control

Additionally, recording can be initiated using the DVR2 Record Switch.

The VS/VSR module's recorder control output is wired in parallel with the DVR2 Record Switch such that either the VS/VSR output or the DVR2 Record Switch can cause the DVR2 to start recording.

To stop the DVR2 recording both the VS/VSR output and the DVR2 Record Switch must be off to stop recording.

Recording Lamp

The DVR2 Recording Lamp output is directly connected to both the DVR2 Recording Lamp and the VS/VSR Video Status Lamp. When the DVR2 is recording, both lamps will be illuminated.

! *It is not necessary to connect the Recording Lamp when using the Video Controller.*

Recommended Vehicle System Power connections

Power for the Stack Video/Data System and DVR2 must be connected to the Master switch supply and not to the switched Ignition supply. This arrangement allows the

engine to be switched off before the power to the Stack system.

!   *This is necessary so that the system can detect that, for instance, the Engine Speed (RPM) has fallen to zero and will have sufficient time to stop the DVR2 from recording before power is removed from the Stack system.*

!   *Failure to stop the DVR2 from recording before the power is removed will cause up to the last 20 seconds of the video recording in progress to be lost!*

Chapter 8. Troubleshooting

Symptom	Possible Cause	Remedy	Notes
The DVR2 will not operate with a new Compact Flash card.	The new Compact Flash card has an incorrect file system.	Set the Compact Flash card to the FAT32 file system.	To check the CF card's file system, insert the card into a PC and display its properties (see page 17)
Video files are corrupted or missing.	The DVR2 was switched off before recording finished.	Ensure recording has finished before switching off the DVR2.	Use Windows Check Disk utility to recover damaged recording files (see page 18)
My media player will not play DVR2 files.	DVR2 files have a MPEG-2 format and some media players can only play MPEG-1 by default.	Install an MPEG-2 decoder on your PC or use another MPEG-2 player.	If the PC does not have a DVD drive / player installed, you may need to obtain a plug-in for your media player. This can often be obtained via the Microsoft Update website.
Video will not play back correctly on a DVD player.	Record Resolution is too low.	Increase Record Resolution to its highest setting.	Many DVD players will not work with low resolution video files.
Video Playback is "jerky" or "hesitates".	The transfer rate from the Compact Flash card to the PC is not fast enough.	Copy the video file to the computer's hard drive and play the copied file from that location.	Where the transfer rate is nearly high enough, it is sufficient to pause playback for a few seconds to fill your media player's buffer. Often the file will play correctly from then on saving the time-consuming transfer to the PC's hard drive.
Video Playback is "jerky" and the picture is incomplete or has extra lines.	Incorrect video standard selected.	Check that the DVR2 is configured for video of the same standard as the video source (NTSC or PAL).	Check this using the DVR Configuration Utility which shows how the DVR2 is configured and the standard of the video source.

Chapter 9. Specifications

General
Video Standard	PAL / NTSC
Power Input	9 V to 20 V DC
	20-50V Option (ST9399)
Power Over-voltage	-60 V to +60 V (DVR2-400/500)
Power Consumption	~6 W (~10 W DVR2-M)
Maximum load	3.5A for 10 mS
	(in-rush current at power on)
Standby battery life	> 5 years
Case Dimensions	151 x 76 x 21 mm
Case Material	Hard anodised aluminium.
Weight	300g (without CF card)
Electrical Connectors :-	
DVR2-130	15w D, 4w jack, Micro USB
DVR2-240, 440 & 540	1 x 5w AS, 2 x 9w AS

Configuration
Operating System	Windows XP or Vista
Connection	Configuration uploaded from PC via USB cable

Recording Media
Recording Media	Compact Flash
Maximum Media size	16 Gbyte
	32 Gbyte (DVR2-440 & 540)
Maximum File size	2 Gbyte
	Larger recordings are automatically fragmented into 2 Gbyte files with < 0.5 second gaps
File Format	MPEG-2 DVD compatible
Media supply voltage	3.3v DC
Media format	PC FAT32

Recording Control
Record switch	TTL Compatible with 22K pull up to 5.0 volts.
Status Lamp (internal)	Bi-colour green/red

Recording Lamp output   Open collector (50 volt max)
Power on to recording delay   < 20 seconds
Switch to recording delay   < 0.5 seconds
Video lost between files   < 0.5 seconds
Video lost at power failure   < 1 second
No Loss Option (ST9397)   (DVR2-440 & 540 only)

Video
Number video channels   DVR2-130 = 3
All other models   4
Video standards   PAL, NTSC (RS170,RS170A)
Frame Rate   25 fps (PAL), 30 fps (NTSC)
Composite Video Input   1.0 V pk-pk
Composite Video Output   1.0 V pk-pk
Compression format   MPEG-2 (MP@ML PS)
Resolutions supported   See Table 1
CF Recording time
   (at D1 resolution)   9 to 136 minutes per Gbyte
Quality bit-rates:-
   DVR2-130   6 Fixed   (1, 2, 4, 5, 6 & 8 Mbps)
   DVR2-240   7 Fixed   (1, 2, 4, 5, 6, 8 & 10 Mbps)
   DVR2-440   9 Fixed   (1, 2, 4, 5, 6, 8, 10, 12 & 15 Mbps)
                        also Variable Bit Rate
   DVR2-540   10 Fixed (1, 2, 4, 5, 6, 8, 10, 12, 15 & 20
                        Mbps) also Variable Bit Rate

Audio
Channels   2 In, 2 Out   0 to -40dB
Analogue Input   Line level

Automatic gain control (AGC)   Yes
Microphone bias   2.5v 10k Option
Compression format   MPEG-1 (Layer 2)

Real Time Clock
Picture overlay   DVR2-440 & 540

Environmental
Operating temperature range* :-
   DVR2-130   0 to 50ºC   (32 to 122ºF)
   DVR2-240   0 to 70ºC   (32 to 160ºF)
   DVR2-440 & 540   -20 to 80ºC   (-4 to 176ºF)

Sealing :-
   DVR2-130   IP54
   DVR2-240   IP65
   DVR2-440 & 540   IP67
Humidity (not DVR2-130)   0-100% RH Condensing
DVR2-440 & 540 :-
Vibration*   20g 50-2000 Hz swept
                            sinusoidal 12 hour x 3 axes
Shock*   50 G, 15 ms
Radiated emissions*   EN55024B CiSPR25
Radiated immunity*   50 V/m
Conducted immunity*   DIN40839 Cat IV

∗ Specification is for the DVR2 only. When combined with a CF
   card, the specifications will be reduced to the lesser of the two.

Table 1

Resolution	PAL	NTSC
Full (D1)	720 x 576	720 x 480
Medium (2/3 D1)	480 x 576	480 x 480
Small (1/2 D1)	352 x 576	352 x 480
Smallest (SIF)	352 x 288	352 x 240
Widescreen 16:9	720 x 400	720 x 400

Appendix A. Mounting Template

Use the template on the next page for mounting the DVR2. Remember to leave room for card insertion and removal.

68.5mm

Compact
Flash
End

93mm

140.3mm

View from above

47.3mm

M3 x 5mm deep
6 places
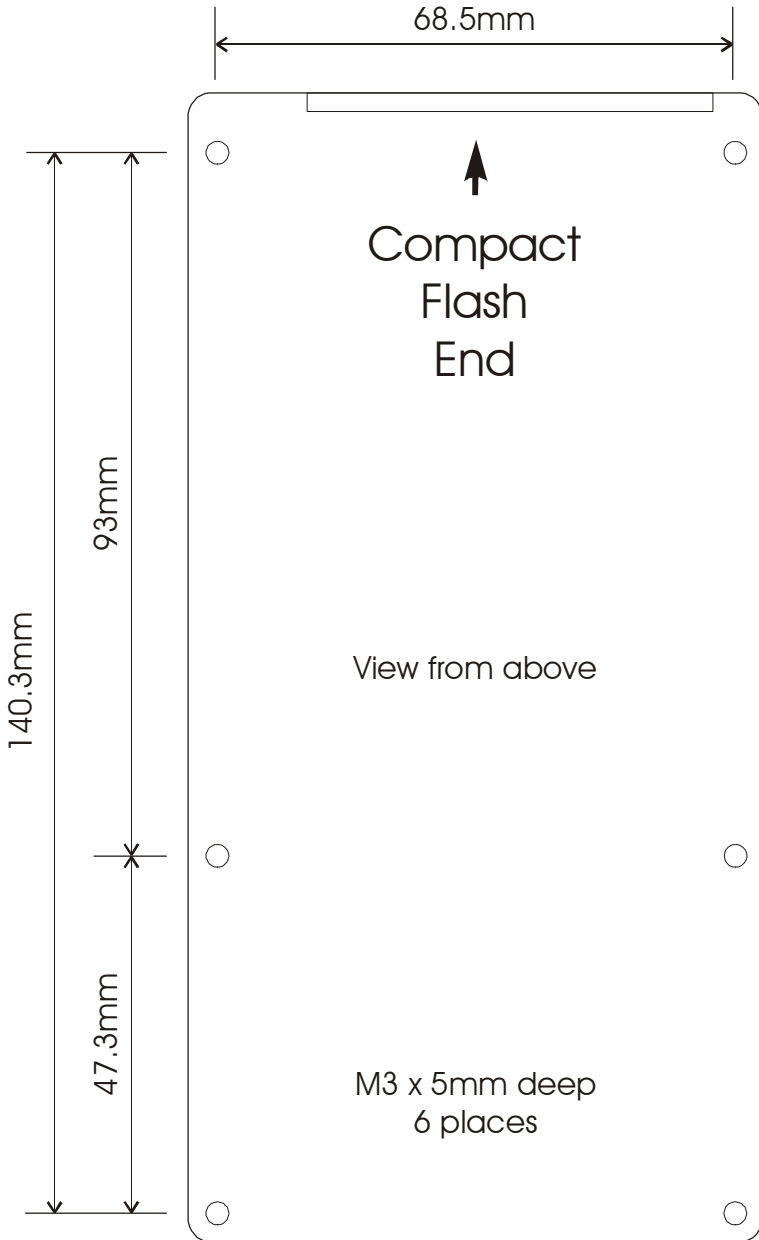
Appendix B. Wiring Harness Diagrams

DVR2-130 Harness (ST918109)
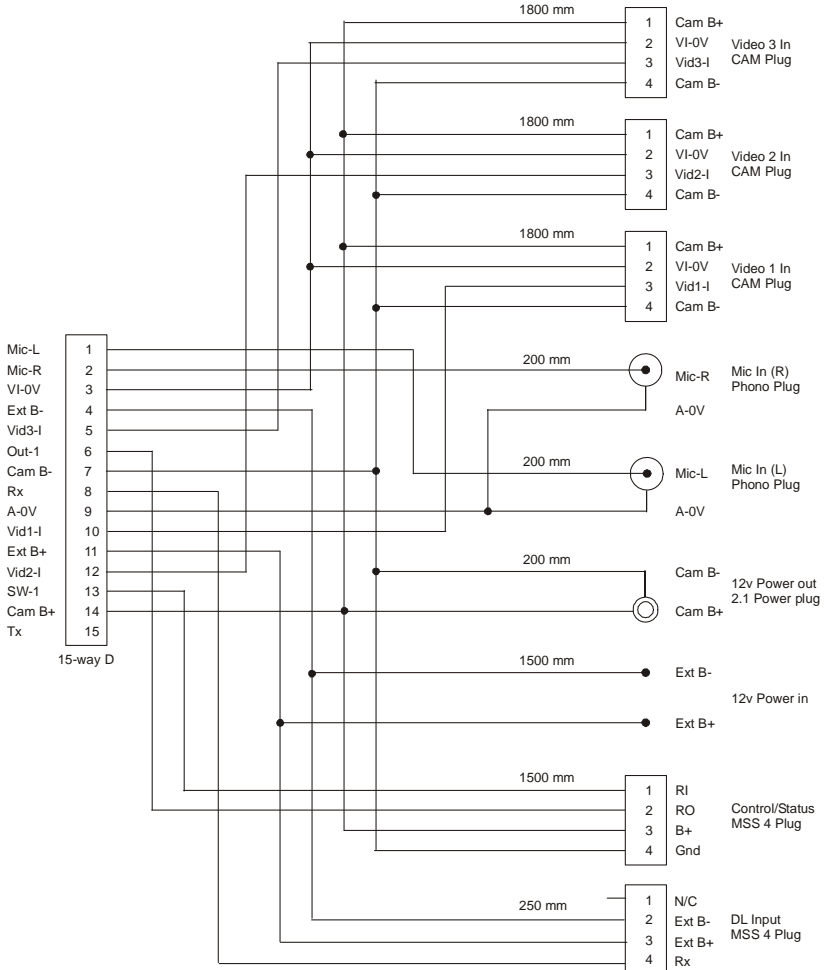
DVR2-240 / 440 & 540 System Harness (ST918101)

```
                                          1500 mm
                                                            Ext B+
     SYSTEM
                                                            12v Power in
SW-1       1
Out-1      2                                                Ext B-
Ext B+     3
Ext B-     4                              1300 mm
RX         5                                          1    SW-1
                                                      2    Out-1     Control/Status
   AS 5-way                                           3    Ext B+    MSS 4 Plug
    (red)                                             4    Ext B-

                                                      1    N/C
                                                      2    Ext B-    DL Input
                                                      3    Ext B+    MSS 4 Plug
                                                      4    Rx
```
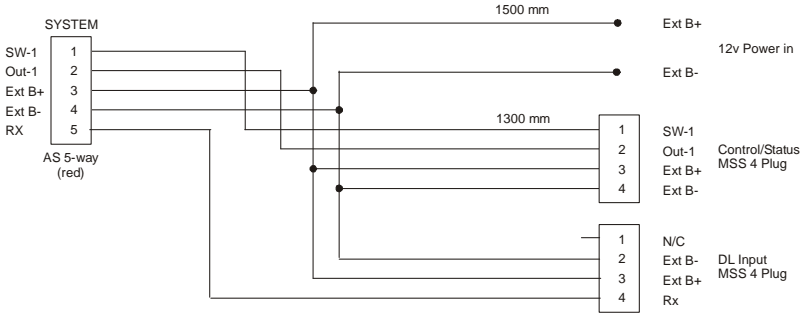
Control / Status Harness (ST918105)

```
                                    200 mm
RI      1                                               Record Switch
RO      2
B+      3                                               Record Lamp
GND     4                    1 KOhm Resistor
   Control
   MSS 4 Receptacle
```
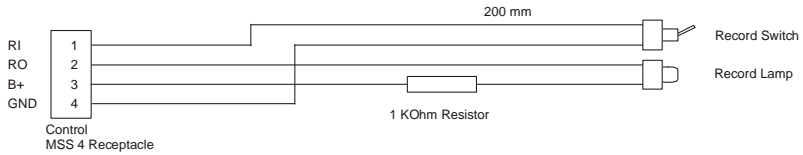
DVR2-240 / 440 & 540 Monitor Harness (ST918114)

```
                                          1000 mm
                                                        Video Out
                                                        Phono Plug
                                                        (yellow)
     MONITOR
                                                        Left Audio Out
VID-Out      1                                          Phono Plug
Audio-Left   2                            1000 mm       (white)
USB Data -   3
USB Data +   4                                          Right Audio Out
USB 0V       5                                          Phono Plug
USB +V       6                            1000 mm       (red)
Audio-Right  7
Vid-0v       8                            1000 mm
Audio-0v     9                                       1    USB +V
                                                     2    USB Data -
   AS 9-way                                          3    USB Data +
    (blue)                                           4    USB 0V

                                                       USB "A"
                                                       Plug
```
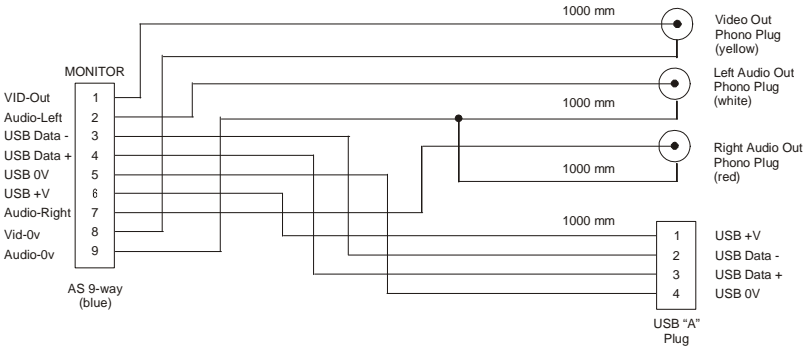
DVR2-240 / 440 & 540 Input Harness (ST918107)

```
                                           1800 mm
                                                        1   Cam B+
                                                        2   VI-0V      Camera 1
                                                        3   Vid-I      CAM Plug
              INPUT                                     4   VI-0V
Vid1-I    1
Cam B+    2                                 200 mm          Mic-R
VI-0V     3                                                Phono plug
Mic-R     4
Mic-L     5                                               Audio-0V
A-0v      6
Vid2-I    7                                 200 mm          Mic-L
Vid3-I    8                                               Phono plug
Vid4-I    9
                                                          Audio-0V
        AS 9-way
        (yellow)                            500 mm         Cam B+
                                                                12v Power out
                                                                2.1 Power plug
                                                          VI-0V

                                           1800 mm
                                                        1   Cam B+
                                                        2   VI-0V      Camera 2
                                                        3   Vid-I      CAM Plug
                                                        4   VI-0V

                                           1800 mm
                                                        1   Cam B+
                                                        2   VI-0V      Camera 3
                                                        3   Vid-I      CAM Plug
                                                        4   VI-0V

                                           1800 mm
                                                        1   Cam B+
                                                        2   VI-0V      Camera 4
                                                        3   Vid-I      CAM Plug
                                                        4   VI-0V
```
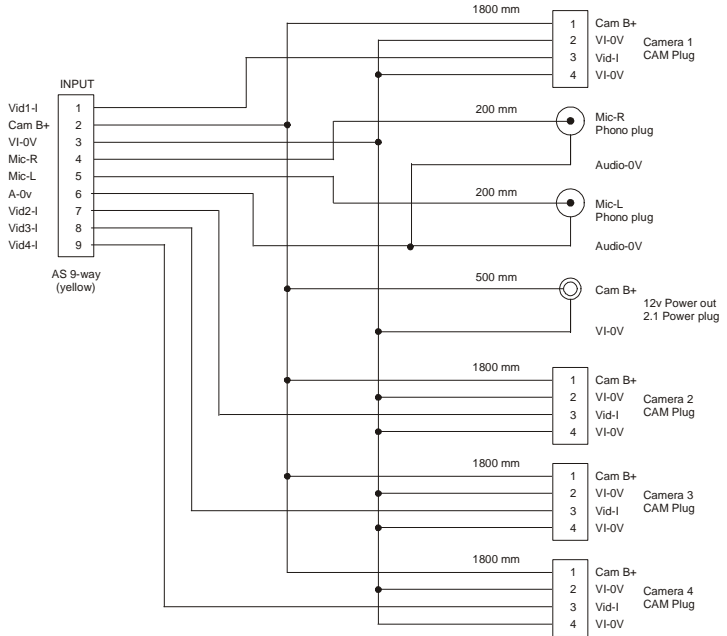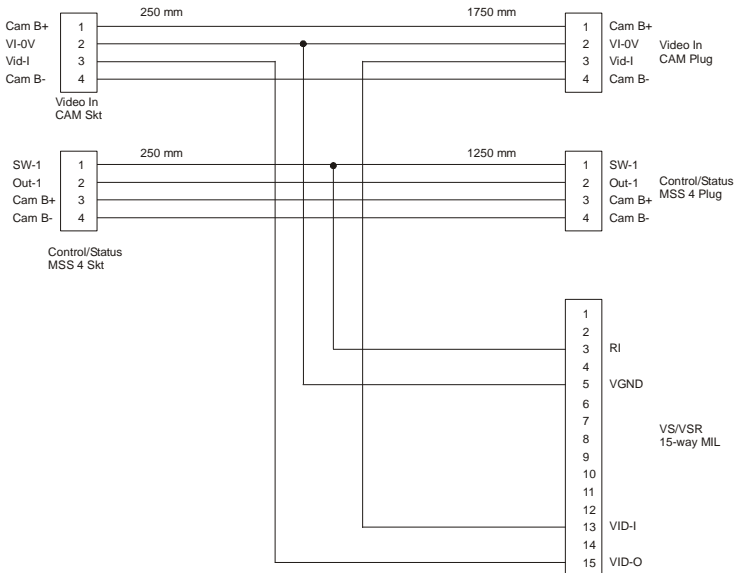
DVR to VS Adapter Harness (ST900144)

Appendix C. Upgrading the Firmware

From time to time Stack may release upgrades to the firmware within your DVR2. These upgrades can be found on the Stack web-site together with instructions detailing how to perform the upgrade.

We suggest that you visit the web-site occasionally to find out if an upgrade is available.

Appendix D. Service and Support

At Stack we take pride in having a very high-quality engineered product range and strive to offer first class service when supporting our customers.

Stack Web-site

If you have questions about Stack products or are experiencing a problem, a wealth of information is available on our web-sites to find the answers you need.

International   **United States**
www.stackltd.com   www.stackinc.com

Frequently Asked Questions

Log-on to the Stack web-site, click on **Motorsport Division** and then the **Support** tab and finally the **FAQ Page**.

If you need a User Guide, click on **Manuals and Download Support Area**. You must enter some basic information for Stack's internal use to gain access to downloadable versions of our product manuals. These give clear instructions on installation and correct operation of your Stack product as well as Troubleshooting sections.

! *If you still have questions, please contact your Dealer.*

Contacting your Dealer

For a current list of dealers, log-on to the Stack web-site, click on **Motorsport Division** and then the **Where to buy** tab and select the **Distributors** menu.

When contacting your Dealer it is important you have the following information to hand:

- Serial Number (found on the rear of the product).
- The Model Number.
- The date of purchase.
- A copy of the packing list supplied with the product.

- If it is a Data Logging product, please provide the TAG number, software licence number and DataPro version. Your Dealer will be able to help locating those numbers.

This information will help your Dealer ensure your enquiry is handled in an efficient manner.

Service Enquiries

If you or the Dealer have identified a fault with your Stack equipment, it is possible to return the goods for inspection. Your dealer will help you with this. Before returning your equipment, please be aware that:

- All services and repairs are subject to an initial inspection. No commitment can be made to repair the goods in full or within a specified budget or timescale until this inspection is complete.

- An initial inspection fee will be charged for all services and payment is required before we conduct the inspection. On completion of the inspection you will be advised of any work and the costs involved in repairing the goods. At this point you have the choice to proceed or terminate this service.

- It is your responsibility to safely ship (at your expense) the goods to Stack. It is also your responsibility to arrange for the safe return of the goods unless they are repaired under warranty, in which case Stack will organise their return. Please ensure that goods are adequately packaged and insured for the journey.

To arrange for your equipment to be returned for inspection, please contact your dealer. The process for returning goods is as follows:

1. Your dealer will complete and send you a Returns Authorisation form by fax or mail. This form includes a unique Returns Authorisation Number (RAN).
2. You must include that form with the goods when shipped. Your dealer will advise you about shipping.

3. At the time of shipping you should arrange to make payment via your dealer for the initial inspection who will advise you of this fee.

Your goods must be returned to Stack's factory in the UK. The inspection and service process is explained below:

1. On receipt your goods will undergo an initial inspection by one of our engineers.

2. The engineer will attempt to reproduce the fault as reported and make an assessment of the complexity of the corrective action:
    i) If the corrective action can be identified, we will contact you with details of the repair required and a quotation for that work.
    ii) If corrective action cannot be easily identified, a full diagnosis and a "Corrective Action Assessment" will be conducted. We will then contact you to advise the next course of action and will quote on expected duration and cost of repairs where applicable.

3. Once we have received your authorisation to proceed with the repair, we will complete the work and request payment. A full final test will be conducted before the goods are packed ready for shipping.

4. Once we have confirmation that payment has been received, the goods will be returned to you.

Cost and Duration of Service

Service and repair work is conducted at Stack's factory in the UK. The cost and the duration of the service will depend on:

*   Your Geographical location.

*   Whether the goods are covered by a warranty.

*   The complexity of the repair work required once the initial inspection has been completed.

Cost and Duration of Inspection – Your dealer will advise on the cost of the initial inspection. It is your responsibility to arrange for the safe shipment of the goods.

The time required to complete any service or repair work depends on the initial inspection. Upon receiving your RAN form, we will provide an estimated delivery time, which is subject to the outcome of the initial inspection.

Priority Service – If you require your goods to be returned faster than the estimated delivery time, we offer a priority service for which there is an extra charge. Again, the time required to complete any service or repair depends on the initial inspection. Wherever possible your goods will be returned within our priority delivery times:

- **UK** - 2-3 working days
- **USA & Rest of World** - 7 working days

Cost and Duration of Service and Repair – On completion of the initial inspection, we will quote for the final cost and expected duration of the service and any repair work. We will ask you for authorisation to complete the work and request payment. If you choose not to proceed, we will return the goods to you as we received them and you will only be charged for the initial inspection and return freight.

Harnesses and Sensors – Where goods include harnesses and sensors, those will be inspected to assess functionality. We are unable to repair harnesses or sensors that have been cut or become damaged due to use.
Note: A small number of sensors can be serviced or repaired. Your dealer can advise which sensors are serviceable.

Loan/Replacement equipment – Stack operate a return to base service and repair policy. We do not offer an advance exchange or loan scheme.

Stack Contact Details

Contact	International	United States
Email:	sales@stackltd.com	sales@stackinc.com
Web:	www.stackltd.com	www.stackinc.com

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