



DVR2-100, DVR2-200 & DVR2-400

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

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- Intelligent Tachometers
- Auxiliary Gauges
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- Display and Logging Systems
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- Display and Analysis Software
- Video Overlay Systems
- Solid-state Video Recorders
- Tyre Pressure Monitoring Systems

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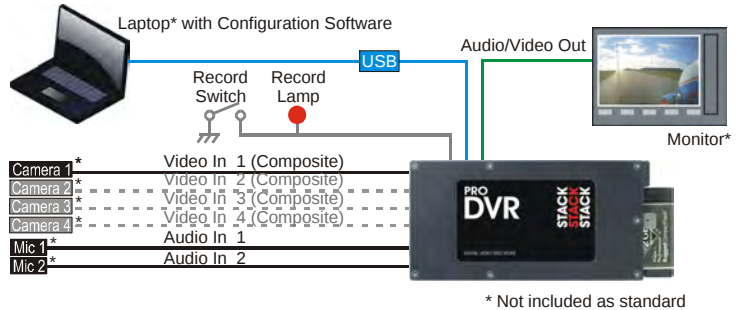
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Chapter 1. Introduction

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

All 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 archived direct to DVD for playback on either a PC or a DVD player. A data overlay feature is provided on the DVR2-400 so that date and time 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 15 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.

DVR2-100

The DVR2-100 is supplied with the following standard components:

Quantity	Description
1	ST9381 DVR2-100
1	DVR2-100 Harness (ST918104)
1	Switch and Lamp Harness (ST918105)
1	USB DVR2-100 to PC Lead (ST169049)
1	Monitor Lead (ST169021)
1	DVR2 Configuration Utility Software (ST920039)

DVR2-200

The DVR2-200 is supplied with the following standard components:

Quantity	Description
1	ST9382 DVR2-200
1	DVR2-200 System Harness (ST918101) (red)
1	DVR2-200 Monitor Harness (ST918103) (blue)
1	DVR2-200 Input Harness (ST918102) (yellow)
1	Switch and Lamp Harness (ST918105)
1	DVR2 Configuration Utility Software (ST920039)

DVR2-400

The DVR2-400 is supplied with the following standard components:

Quantity	Description
1	ST9386 DVR2-400
1	DVR2-400 System Harness (ST918101) (red)
1	DVR2-400 Monitor Harness (ST918103) (blue)
1	DVR2-400 Input Harness (ST918102) (yellow)
1	Switch and Lamp Harness (ST918105)
1	DVR2 Configuration Utility Software (ST920039)

Optional Components

DVR2s may be supplied with the following optional components:

Quantity	Description
1	DVR to VS Adapter Harness (ST900145)
1	Bullet Camera & Microphone Kit (ST8390 PAL or ST8391 NTSC)
1	CAM plug to BNC & Power lead (ST918106)
	Compact Flash (CF) Card

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 and only a reformat will restore its performance. A reformat can only 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).

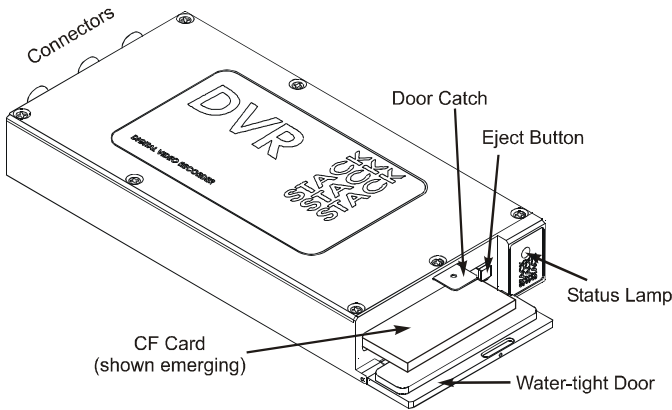
Deleting Files

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 reformat.

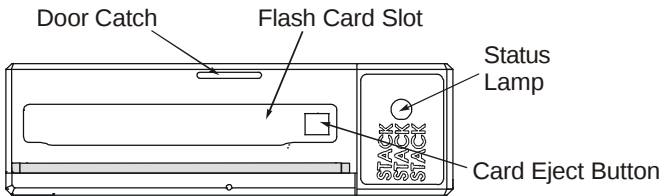
! *Ensure any useful recordings have been archived before performing a reformat.*

Chapter 3. Installation

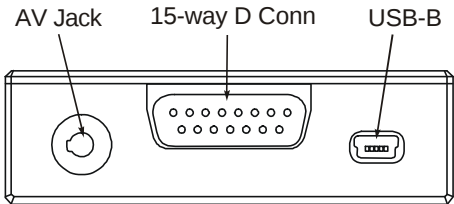
Before installing the DVR2, take a few moments to plan the installation. First identify all the components which came with your system. You may like to perform a *dry run* by connecting the components together to get a feel for how the final installation will be accomplished.



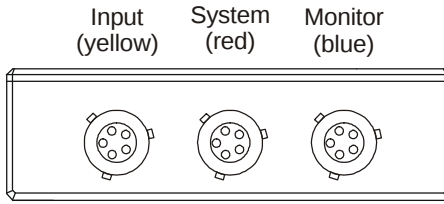
The DVR2 Module



The Front Panel showing the Card Slot



DVR2-100 Rear Panel showing the Connectors



DVR2-200 and DVR2-400 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.

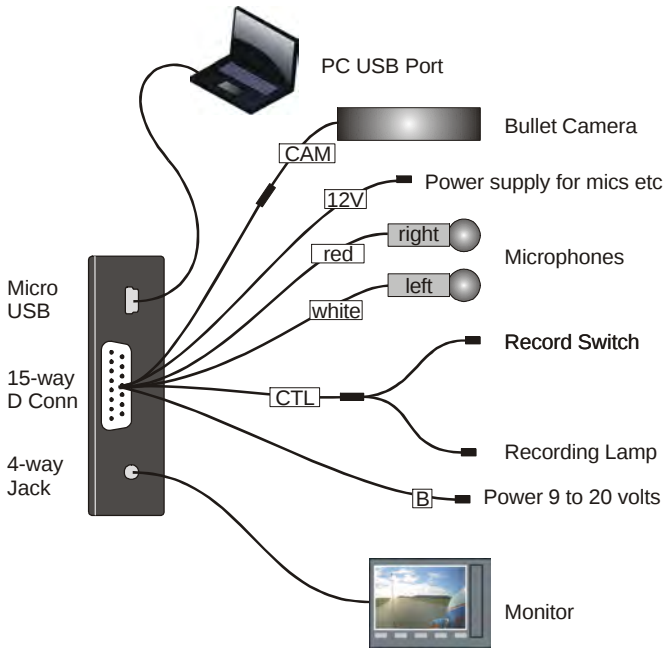
The module can be mounted by various means including using double-sided tape or Dual-Lock™. A rigid mounting can be made to a suitable bracket using the six M3 tapped holes in its underside (see Appendix A for dimensions).

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.*

DVR2-100 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 50mA max.

Connect a permanent DC supply of between 9 and 20 volts 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:

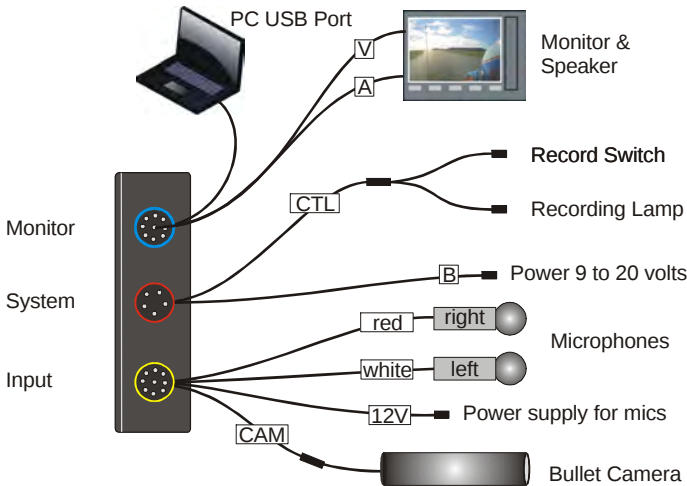
If audio recording is required, connect your microphones to the white (left) and red (right) microphone inputs. A 2.1 mm power connector has been provided if your microphones need to be powered. The power plug supplies a regulated 12 volts up to a maximum of 0.5 amps. If the current required is greater than 0.5A, you must provide a separate power supply. Microphone gain can be adjusted using the DVR Configuration Utility (see page 24).

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

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

DVR2-200 and DVR2-400 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 CAM1, 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 left (white) and right (red) microphone inputs. A 2.1 mm power connector has been provided if your microphones need to be powered. The power plug supplies a regulated 12 volts up to a maximum of 0.5 amps (DVR2-M 1.0 amps). If the current required is greater than that, you must provide a separate power supply. Microphone gain can be adjusted using the DVR Configuration Utility (see page 24).

- ! *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 50mA max.

Connect a permanent DC supply of between 9 and 20 volts 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).*

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 38).

- ! *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 20 seconds 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.

The Compact Flash card may now be removed and placed into a PC with a suitable Compact Flash 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%		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.
Memory 50%			
Remaining 10%			
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:

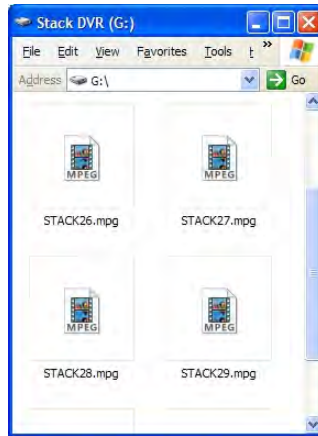
DVR2 files can be played on a PC using an MPEG-2 media player.

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.

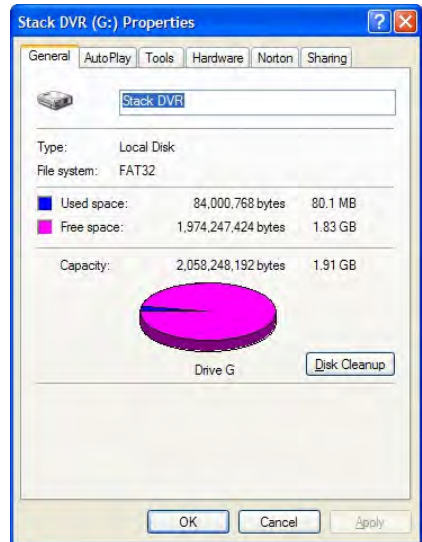
Due to the relatively slow read speed of Compact Flash cards, better results are usually obtained by transferring the required files to the PC’s hard disk before playing.

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”.

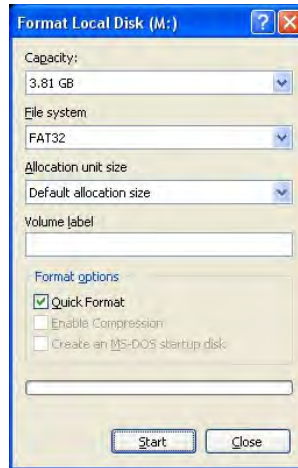
If the Compact Flash card was supplied as FAT16, reformat to FAT32 using Windows XP or Vista’s format utility to select the File System (see Formatting a Compact Flash card below).



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

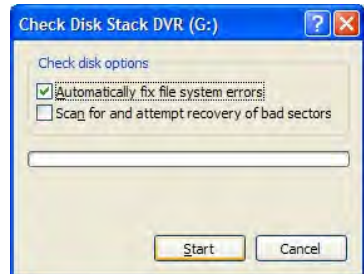
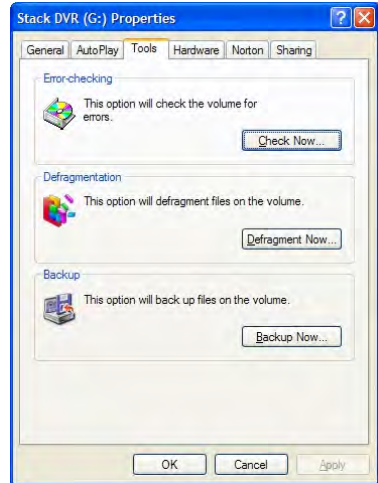
If the Compact Flash card is removed, or if power is disconnected from the DVR2 during a recording, it is possible the card may become corrupted or the files could be incomplete. In this case run Windows' Scan Disk routine which will help recover any missing data.

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 (DVR2-100 & DVR2-200) and 32 Gbytes (DVR2-400). 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 $\times 16$ 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 24).

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. Once the transfer is complete, the following dialog box will be displayed.



The USB cable **MUST** be disconnected from your PC for the new configuration to be accepted by the DVR2. After a few seconds you may reinsert the USB plug.

! *The time and date are updated when the USB cable is disconnected. For this purpose the utility assumes a one second delay between pressing the “Write Config” button and the USB being disconnected.*

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.

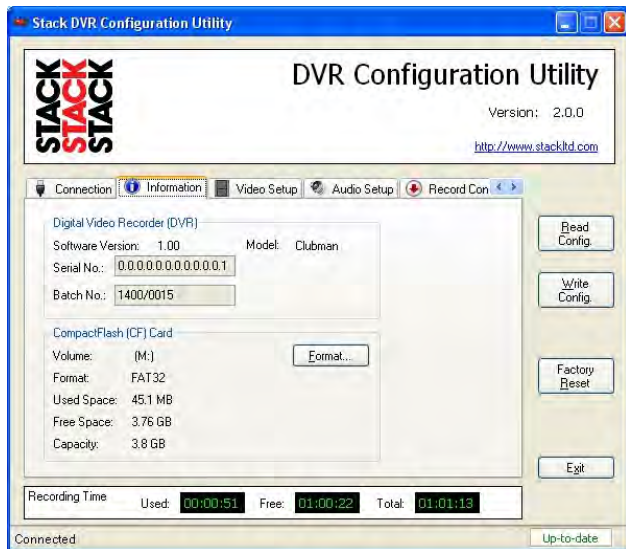
Finally write this default configuration to the DVR2 using the method outlined above (see page 22).

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 “Format” button to display the Windows Format dialog box which can be used to format the Compact Flash card (see page 18).

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

- ! *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 highest 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.*

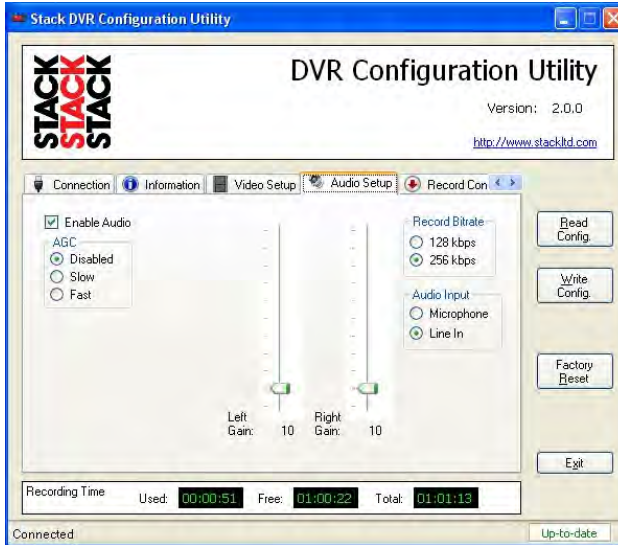
High Quality VBR

This option is used to enable Variable Bit Rate support.

- ! *Variable Bit Rate is only available on the DVR2-400.*

Audio Setup

This screen allows you to configure the various aspects of the audio recorder.



Audio Set-up Screen

Select AGC Slow or Fast to use Automatic Gain Control for audio inputs.

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

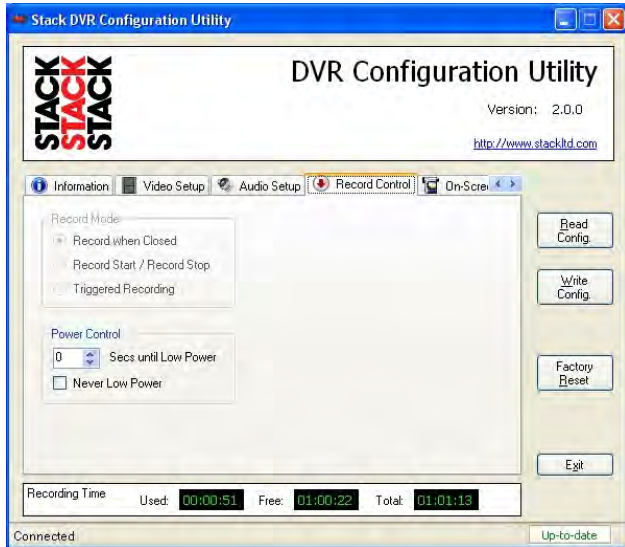
You can use Record Bitrate to set the amount of compression applied to the audio signal.

Set the Audio Input level to match your microphones. In most cases Line In is used for powered microphones and Mic level for un-powered microphones.

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

Record Control

This screen allows you to configure how the recordings will be controlled, ie, how the DVR2 will respond to the Record Switch.



Record Control Screen

Record When Closed

When this mode is selected, the DVR2 will record only when the Record Switch is switched on, ie, when the contacts on the external switch are closed. As soon as the Record Switch is switched off, (contacts opened) the DVR2 stops recording.

Record Start / Record Stop

! *Record Start / Record Stop is not currently available in the DVR2.*

Triggered Recording

! *Triggered Recording is not currently available in the DVR2.*

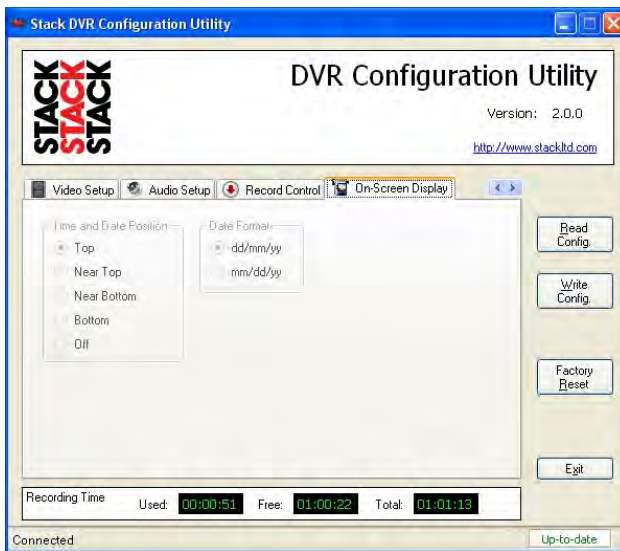
Power Control

! *Power Control is not currently available in the DVR2.*

On-Screen Display

This screen allows you to configure how the date and time will be displayed.

! *On-Screen Display is only available in the DVR2-400.*



On-Screen Display Screen

Select the position at which you want the Date and Time to be overlaid on the video frames. Select Off if you don't want to display the Date and Time.

! *Do not select the Top or Near Top positions if you are using a Stack Synchronised Video system.*

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 DVR2-100 and DVR2-200 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 web-site.
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 (16 V to 48 V DC optional)
Power Over-voltage	-60 V to +60 V (DVR2-400)
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 :-	
DVR2-100	15w D, 4w jack, Micro USB
DVR2-200 & DVR2-400	2 x 5w AS, 1 x 9w AS
DVR2-200M & DVR2-400M	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 (DVR2-400 only)
Maximum File size	2 Gbyte Larger recordings are automatically fragmented into 2 Gbyte files with < 2 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 100K pull up to 3.3 volts.
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Status Lamp (internal)	Bi-colour green/red
Recording Lamp output	Open collector (12 volt max)
Power on to recording delay	< 20 seconds
Switch to recording delay	< 0.1 seconds
Video lost between files	< 2 seconds
Video lost at power failure	< 20 seconds
	No loss (DVR2-400 only)

Video

Number video channels	1
Video standards	PAL, NTSC
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:-	
DVR2-100 6 Fixed	(1, 2, 4, 5, 6 & 8 Mbps)
DVR2-200 7 Fixed	(1, 2, 4, 5, 6, 8 & 10 Mbps)
DVR2-400 9 Fixed	(1, 2, 4, 5, 6, 8, 10, 12 & 15 Mbps)
	also Variable Bit Rate

Audio

Channels	2 In, 2 Out
Analogue Input	Line level +3 to -30dB
	Mic. level -27 to -60dB
Automatic gain control (AGC)	Yes
Microphone bias	None
Compression format	MPEG-1 (Layer 2)

Real Time Clock

Picture overlay	DVR2-400 only
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Environmental

Operating temperature range* :-	
DVR2-100	0 to 50°C (32 to 122°F)
DVR2-200	0 to 70°C (32 to 160°F)
DVR2-400	-20 to 80°C (-4 to 176°F)

Sealing :-

DVR2-100 IP54

DVR2-200 IP65

DVR2-400 IP67

Humidity (not DVR2-100) 0-100% RH Condensing

DVR2-400 only :-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

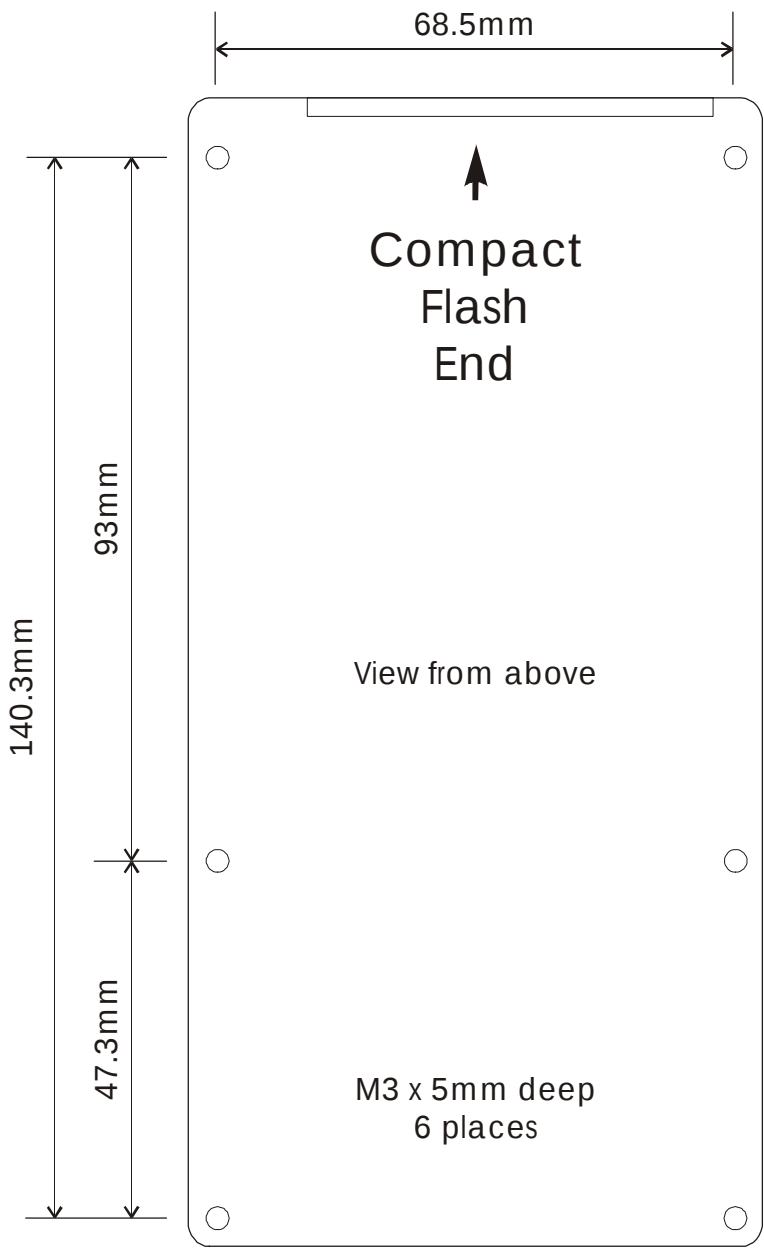
* Specification is for the DVR2 only. When combined with a CF card, the specifications will be reduced to the lesser of the two.

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

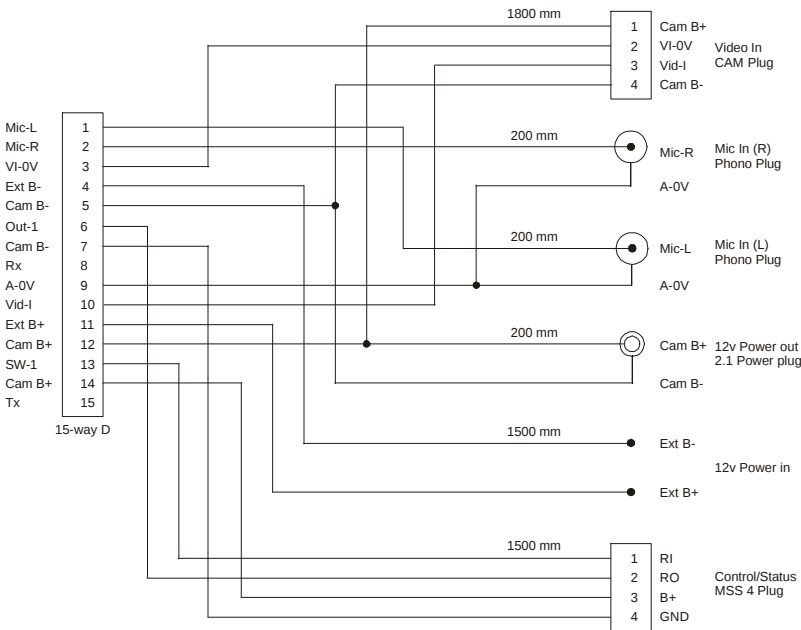
Appendix A. Mounting Template

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

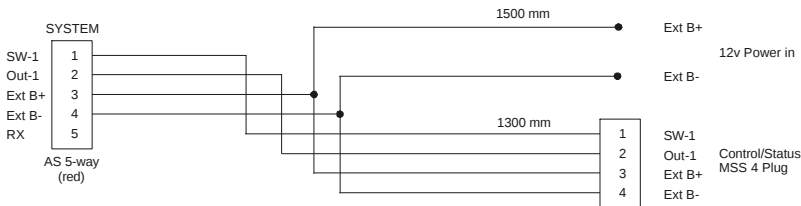


Appendix B. Wiring Harness Diagrams

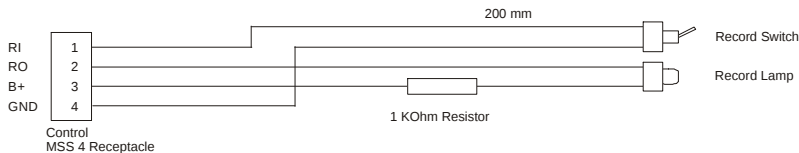
DVR2-100 Harness (ST918104)



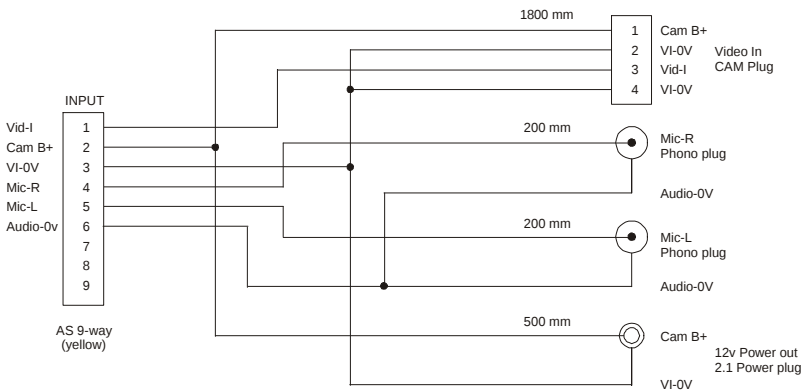
DVR2-200 and DVR2-400 System Harness (ST918101)



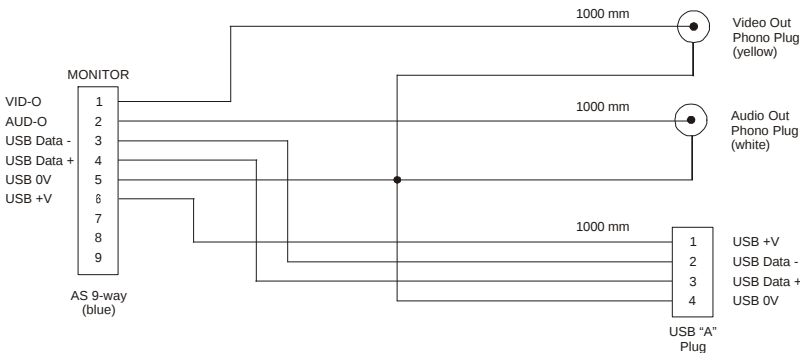
Control / Status Harness (ST918105)



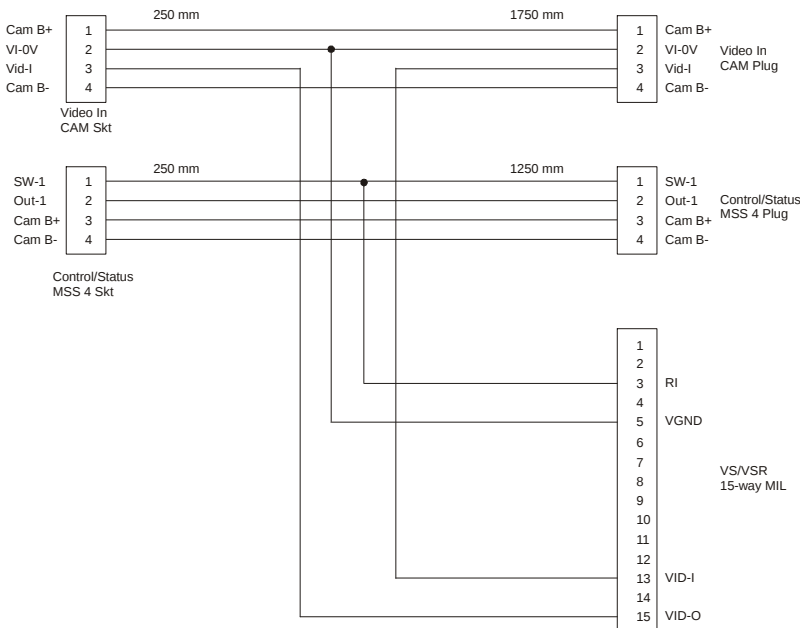
DVR2-200 and DVR2-400 Input Harness (ST918102)



DVR2-200 and DVR2-400 Monitor Harness (ST918103)



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

www.stackltd.com

United States

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

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Web:

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United States

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www.stackinc.com

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