VDR & SVDR

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What is VDR?

The primary purpose of a voyage data recorder (VDR) or a simplified voyage data recorder (S-VDR) is to maintain a store of information, in a secure and retrievable form, concerning the position, movement, physical status, command and control of a vessel over the period leading up to and following an incident. This information is for use during any subsequent investigation to identify the cause(s) of the incident.

IMO Requirements

All cargo ships over 3000 GRT constructed after 2002 and all passenger ships are required to be fitted with a Voyage Data Recorder (VDR). Additionally, all cargo ships over 3000 GRT built before 2002 must be fitted with a VDR or a Simplified VDR (S-VDR). All VDRs and S-VDRs are subject to an annual performance test, conducted by an approved servicing facility, to verify the accuracy, duration and recoverability of the recorded data.

Disclaimer

The purpose of this publication is to provide information which is additional to that available to the maritime industry from regulatory, advisory, and consultative organisations.

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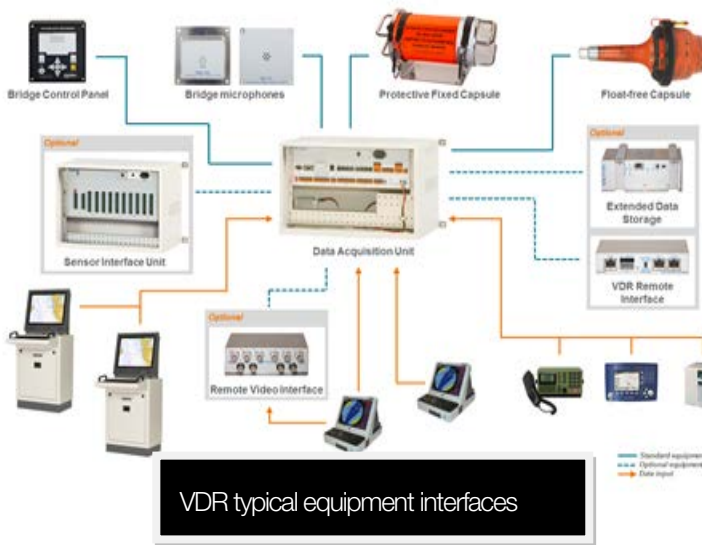
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VDR & S-VDR Inputs

The data inputs required for VDR and S-VDR are illustrated in the following table:

Input	VDR	S-VDR
Date and Time	X	X
Ship's Position	X	X
Speed	X	X
Heading	X	X
Bridge Audio	X	X
Communications Audio	X	X
Radar Data	X	X
AIS – (Radar alternative)		When no radar signal is available
Acceleration & Hull Stresses (if fitted)	X	Only when they are available on the bridge via an IEC 61162 interface
Echo Sounder	X	
Engine Order and Response	X	
Hull Openings (Doors) Status	X	
Main Alarms (IMO Mandatory Bridge Alarms)	X	
Rudder Order and Response	X	
Watertight and Fire Doors Status	X	
Wind Speed and Direction	X	

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VDR & S-VDR Equipment Interfaces

Typical equipment interfaces with VDR and S-VDR are shown below.

VDR typical equipment interfaces

S-VDR typical equipment interfaces

Download & Playback Problems

As stated earlier, the primary function of the VDR / S-VDR is, like the black boxes carried on aircraft, to enable accident investigators to review procedures and instructions in the moments before an incident and help to identify the cause of any accident.

VDR downloads of incidents that are reviewed ashore by ship operators, incident investigators, P&I Clubs etc. are often damaged or incomplete, to the extent that they sometimes contain very little data of value. Sometimes, even if data can be replayed, the period of time that the download covers is completely different to that in which the relevant incident occurred. Failure to be able to produce VDR information can lead to claims made against the Club and its Members that are more difficult and costly to defend than would otherwise be the case.

VDR hardware malfunctions may not always trigger the in-built alarm that is supposed to alert the operator in the event of any problem. Mandatory annual performance checks of VDRs and S-VDRs may also fail to identify some issues that can compromise effective data recording.

In many cases, VDR data is only downloaded and reviewed after a significant incident; and it's only then that it's discovered that the download is missing significant relevant information.

Missing audio data, because of mal-functioning, poorly situated or non-existent VDR microphones is a cause of particular frustration for those tasked with reviewing VDR downloads. (See following section 'Consider up-grading' for more advice on the subject of microphones).

There is also evidence to suggest that ships' officers may sometimes have an incomplete understanding of the operation of the VDR/S-VDRs fitted on their ships, particularly when it comes to saving data in the event of an accident or incident. The IMO performance standard requires data to be retained for a minimum of 12 hours before it is overwritten; although many VDRs offer an option to retain data for longer periods. Therefore, if a vessel is unfortunate enough to suffer an accident or incident and the VDR/SVDR data is not promptly saved, it may well be overwritten and lost.

In the following sections, we will review some of the changes and upgrades that Members might consider making to their VDR procedures and equipment and the benefits that can be derived from those changes and upgrades.

Monitoring & Training

Although the primary purpose of VDR is to be used in the event of an incident it can be an invaluable tool in assisting Members in the training and monitoring of their bridge teams.

VDR & SVDR

Airlines have been analysing data downloaded from Flight Data Recorders (FDR – the aviation equivalent of VDR) for many years. The analysis of FDR data has led to a significant reduction in the number of accidents suffered by the airline industry. Similar initiatives by the vessel operators can therefore be expected to have similar beneficial results.

Increase Playback Time

Packages are available in the market that can significantly increase the duration for which VDR information is available from the current 12 hour minimum up to 90 days or more. Members are encouraged to consider upgrading their own shipboard equipment, if it does not already have the facility to preserve data for a prolonged period.

Remote Playback Facilities

Members are encouraged to have suitable software installed in their technical management offices, so that VDR / S-VDR downloads can be played back easily. Software compatible with all of the VDRs / S-VDRs fitted across Members' fleets should be purchased.

Members arrange to have downloaded data regularly transferred to and replayed in the managing office, so that routine events can be reviewed, analysed and used as a training tool.

One approach Members may consider adopting is to undertake a central assessment of VDR data obtained across their entire fleet. This could lead to being able to correlate trends which may be identified as being common to particular ports, or to particular bridge teams or individual bridge team members. Some shipping companies have already initiated the practice of analysing VDR downloads. Examples of issues identified from these analyses, and improvement measures implemented, are included in the below table.

Under Keel Clearance (UKC)	• Company UKC policy below routinely ignored in one port • Discussions with masters, pilots and port authority led to improvements
Manoeuvering	• Analysis revealed some Masters not using propeller pitch controls effectively • Masters given additional training
New Ports	• Initial entry to new port recorded on VDR • Passed to other ships to assist with their passage planning

Regular shore-side play-backs will have the added benefit of being able to ensure that the complete set of data is being correctly recorded by the VDR/S-VDR on board.

Drills and Exercises

Saving of VDR/SVDR data should form part of each ship's emergency response procedures and be included in the emergency response section of the vessel's Safety Management System (SMS). The procedures should list the type of incidents that should be saved on the VDR/S-VDR for securing of evidence. Saving of data should be practised during emergency drills, so that bridge teams become familiar with the operation of the equipment. It is also recommended that procedures should include the recording of 'near misses', so that saved data may be used for 'lessons learnt' exercises and briefings.

Consider Up-grading

Many ship operators have fitted VDRs and S-VDRs to their ships which comply with the bare minimum regulatory requirements. Members are encouraged to view the VDR as an instrument which can enhance their operational safety performance. Some VDRs only receive data from a single piece of each type of equipment – such as one radar, when two or more are fitted. Members may wish to consider providing separate feeds from each item of equipment, and upgrading the VDR if the current version does not allow for additional inputs because of restricted data storage.

Many basic VDRs have microphones installed only in the wheelhouse. In some incidents that occur, during berthing

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for instance, important conversations take place outside the wheelhouse, on the bridge wings. Members are encouraged to consider fitting additional microphones on bridge wings if they are not already installed there. Members may also wish to consider installing microphones near the GMDSS station. It is also important to ensure that conversations held on hand-held radios are recorded and Members may want to consider having a spare hand-held radio placed near to a VDR microphone, to ensure that all hand-held radio conversations are recorded.

Another upgrade that Members may wish to explore is to install remote playback, a capability of some VDRs, so that data can be downloaded directly from the VDR and viewed in Member's office via a normal Internet connection. It is also possible to have an on-board wireless live connection so that the crew can access the VDR data and use it as an on-board training tool.

Summary

VDRs provide a means for Members to not only enhance operational safety by analysing data and noting trends which, if left unchecked, may lead to incidents but also allow them to introduce corrective and preventative actions before real incidents occur.

Similarly, Members can use VDR data to identify best practices employed on board that are worthy of replication.

When reviewing their VDR policy Members should consider the points listed below.

Record
- Extend recording time beyond minimum 12 hours
- Up to 90 days or full voyage

Check
- Initiate regular checks on VDR operation to see that:
- Complete dataset being recorded

Ensure
- Ships' officers conversant with VDR operation
- Data recorded during an incident is correctly preserved.

Upgrade
- Additional ports/sensors
- All electronic & aural data recorded, not just regulatory minimum.

Transfer
- Data to central, remote, location so:
- Further analysis can be undertaken

Assess
- Downloaded information routinely analysed and assessed
- Issues & best practice identified

Train
- Best practice promulgated
- Corrective measures applied where necessary

The Oil Companies International Marine Forum (OCIMF) has produced a paper entitled 'Recommendations on the Proactive use of Voyage Data Recorder Information'. This and other useful information papers covering many subjects can be accessed at the following link:

http://www.ocimf.org/library/information-papers/

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