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1 INTRODUCTION

The technological requirements of sea-going vessels¹ are affected by the vagaries of maritime law together with the need to improve the standard of safety at sea and to reduce maritime pollution. The aim of this research paper is to identify any legal regulations which might influence the choice of ship science technologies, such as Voyage Data Recorders (VDRs). International maritime regulations are drawn up by the International Maritime Organisation (IMO) usually in the form of performance standards. These are developed into technical and test standards by the International Electro-technical Commission (IEC). Other organisations, such as The International Association for Marine Electronics Companies (CIRM), have played a role in VDRs and also have a consultative status at the IMO. The purpose of a VDR as stated by the IMO is to *“to maintain a store, in a secure and retrievable form, of information concerning the position, movement, physical status, command and control of a vessel over a period leading up to, and following an incident and having an impact thereon”*.² It is sometimes also referred to as a Marine Black Box.

This research paper will also discuss the current and pending status of legislation for VDRs. The current legislation concerning VDRs is embodied in SOLAS Chapter V under Regulations 18³, 20⁴ and Annex 10. In summary, the existing rules for the carriage of VDRs or SVDRs cover all new vessels (over 3000gt) engaged on international voyages with a phased retrofit on all existing vessels (over 3000gt) by 2010.

The final objective of this study was to recognise and identify the national routes available to gain access to the IMO and to enable the submission of papers. Presently, the UK's national route for submitting papers to the IMO is via the Maritime and Coastguard Agency (MCA).⁵ – Formerly the UK Department of Transport Marine Directorate. A detailed discussion of the topic is presented below.

This research will address many important issues associated with the implementation of VDRs across the majority of the shipping fleet. It will also highlight some background information leading to the introduction of VDRs and S-VDRs and the important role of VDRs in respect of legislation and to the maritime community at large.⁶

1 It would be a good idea to write an orderly account on the risks involved at sea and to analyse the various measures set in place to tackle the problem.

2 Paragraph 1, IMO Resolution A.861(20) Performance Standards for Shipborne Voyage data Recorders (VDRs), 27/11/1997

3 Regulation 18 includes Approval, Surveys and Performance Standards of Navigational Systems and Equipment and Voyage Data Recorder.

4 Regulation 20 includes Voyage Data Recorders.

5 www.mcga.gov.uk.

6 The maritime community also includes the Marine Accident Investigation Bureaus which claims that it is mainly for technical reasons that the VDR was introduced to improve safety at sea and not to apportion blame or liability.

2 BACKGROUND ON THE USE OF VDRS

Throughout the late 1980's and the 1990's the question of recording events on board all types of vessels, was debated by the International Maritime Organisation (IMO). There had been a number of significant maritime disasters - such as the loss of the bulk carrier m.v. Derbyshire and the ferry m.v. Herald of Free Enterprise - which had caused international concern, while new technology meant it really should be possible to record what happened on board ships, so that an end could be put to the unexplained marine incident.

During this period the IMO established that the key criteria for any Voyage Data Recorder (VDR) system should be the ability to:

- a) Analyse all types of incident
- b) Produce hard data
- c) Be user friendly
- d) Suitable for any type of vessel

This allowed the creation of an IMO Performance Standard for a VDR which was adopted on 27th November 1997 as Resolution A.861 (20). In the simplest of terms an IMO Performance Standard determines the Purpose and Operational Requirements of a system and marks the first milestone in the legislative process. This Standard (also described as listing what a system should do) is then developed by the International Electrotechnical Commission (IEC) into a Technical Standard which determines HOW a system should perform and HOW it should be tested.

As a result of this initiative to introduce VDRs, several other sessions, held by the maritime committee, emphasized the necessity of a VDR.⁷ A VDR is defined, in this prime Resolution⁸, as “*a complete system, including any items required to interface with the sources of input data, for processing and encoding the data, the final recording medium in its capsule, the power supply and dedicated reserve power source.*” Despite the apparent advantages there was some opposition to the introduction of VDRs from a portion of the maritime community. Opponents sighted arguments concerning whole system *pricing, simplicity and interfacing to existing equipments*. This reluctance and opposition -hindered the promulgation of VDR technology. As a result, at the IMO MSC 73rd Session, a resolution was adopted – MSC.109 (73) – which decided that a study should be carried out to assess the feasibility of installing VDRs on existing cargo ships. The period which followed saw the submission of a number of IMO input papers contributing to the feasibility study, which concluded that consideration should be given to the introduction of a Simplified Voyage Data Recorder (SVDR) as an interim measure to cover existing vessels. The SVDR was readily capable of being interfaced with existing equipments on board old vessels.

On the 17th of May 2004 Res. MSC. 163 (78) adopted performance standards for shipborne SVDRs⁹. Under this resolution, international governments were required to encourage ship owners to install

7 Some of these sessions include: MSC at its Sixty Eight Session; Sub Committee on safety of Navigation at its Forty-Third Session; 1995 SOLAS Conference, Res 12; Res MSC.109 (73) Amendments to CH V of SOLAS 1974; Forty-fourth Session of IMO sub Committee on safety of Navigation in July 1998 considered VDR carriage requirements; Res. MSC. 109 (73) 6th December 2000, Carriage of VDRs on Existing Cargo Ships.

8 Ibid 9 p 2.

9 EXTRACT MSC 78/26/Add.2 ANNEX 26.



SVDRs on their vessels as soon as possible.¹⁰ The Resolution defines the SVDR in exactly the same way as the VDR was defined in Res A.861 (20) Performance Standards for Shipborne VDRs.

In summary, this section of the report has explained how the S-VDR was introduced, as the result of a common initiative to promulgate VDRs. This initiative has become more widely respected and recognised by ship owners, as time passes and more vessels become equipped with the equipment identified by Regulation 18 and 20 of SOLAS CH V. The reasons why the maritime committee thought it wise to introduce VDRs on vessels are analysed below.

¹⁰ ANNEX 26 Res MSC. 163 (78) May 2004, Performance Standards for Ship borne S-VDRs.



3 DEFINITION AND IMPACT OF VDR TECHNOLOGY

To recapitulate the introduction explained that the purpose of a VDR as stated by the IMO is to “*to maintain a store, in a secure and retrievable form, of information concerning the position, movement, physical status, command and control of a vessel over a period leading up to, and following an incident and having an impact thereon*”¹¹. The impact of VDR technology will be considered from the two separate perspectives: 1) Engineers and Investigators who seek to make technical improvements to develop safety standards and 2) the Legal sector, who aim to arbitrate with cogent facts.

¹¹ Ibid 2.

4 THE IMPORTANCE OF VDRS WITH RESPECT TO TECHNICAL IMPROVEMENTS.

A VDR can be used to assess the efficiency of a vessels crew, whilst at sea. This would ensure the vessel and its gear¹² to be operated properly and that the general rules of good seamanship are maintained. This device would also ensure seaworthiness of a vessel and reduce claims of unseaworthiness. The VDR would also improve safety at sea because the data it provides might uncover high risk operations such as those associated with navigation. In the long term the VDR might be used to train staff.¹³

The National Transport Safety Board (NTSB) numbers among the other companies and organisations which have encouraged installation of the VDR.¹⁴ Michael T. Brown of NTSB has encouraged and propagated the introduction of VDRs through his paper, and commented thus “*it may not be a first line safety tool, such as life jackets...it certainly has great value in ensuring that a vessel is operated safely*”. The rate at which the VDR is said to encourage safety at sea explains the cost of the device and Michael T. Brown continued thus, “*the management benefits derived from installing a VDR system would quickly offset the cost of its installation*”.

4.1 The importance of VDRs in the legal sector

A VDR stores data which might provide evidence in court or help to uncover the key events/facts relating to a court case. The human memory is known to be both frail and fallible, and even the most honest witnesses or survivors describe a version of the incident which may contradict whatever firm evidence is available. In summary, therefore the VDR will help to record and prove facts the human accounts often failed to.

The VDR will also reduce the cost of investigating casualties at sea and time wasted on board a ship trying to trap evidence from the vessel or crew.¹⁵ Lord Carver and Lord Donaldson have both encouraged the introduction of the VDR and even compared it with the Black Box Flight Recorder installed on all aircrafts. They remind us that the Black Box Flight Recorder has improved safety standards associated with air travel and has also reduced the rate of human deaths immensely. The introduction of the VDR on board shipping vessels brings the same advantages to the maritime community. In particular the VDR plays an important role in the proposed EU Directive¹⁶ to establish the fundamental principles governing the investigation of maritime accidents. It may address the many

12 *The Derbyshire* sank on 10th September 1980 off the coast of Okinawa without any distress signal and all her 17 member crew died. Two vessels of the same manufacturers *Casi Kittiwake* and *Sir Alexander Glen* were inspected by Lloyds Register and discovered to have had the same defect as *The Derbyshire*. Had there been a VDR on the *Derbyshire*, perhaps it was a fault which could have been prevented by technical experts.

13 “*The data is also used to feed into ship training simulators, making sure that their realism is maximized. Star Cruises of Malaysia has been using its VDR data as fodder for simulators for a number of years.*” The “MAIN HEAD, VOYAGE DATA RECODERS”, p 2.

14 Hereinafter NTSB.

15 “*Fast access to the VDR data is important to enable the investigation to be focused on the most valuable issues*”, said Captain Nick Beer, Principal Inspector of Marine Accidents.

16 Para 13 and Article 13, Proposal for a Directive of the European Parliament and of the Council establishing the fundamental principles governing the investigation of accidents in the maritime transport sector and amending Directives 1999/35/EC and 2002/59/EC, COM(2005), 2005/0240 (COD)

incidents, highlighted by accident investigators, which occur between fisheries vessels and commercial vessels

In most cases the installation of a VDR on board a vessel should allow incidents to be investigated hence insurers may also reduce their insurance rate and possibly the premiums to be paid. This is very beneficial for the ship-owner as insurance premium rates depend on the risk of any casualties and the nature/number of past insurance claims.¹⁷

Above all, VDRs should ensure that there is justice and fairness after a maritime catastrophe. This is because the aim of arbitration is to determine which party is responsible and to make that party bear the associated cost together with any legal penalties. In cases where it is unclear who was to blame both parties are normally charged in accordance with the size of their individual responsibilities. This system has not always been fair as lawyers or judges may come to conclusions which those on board the vessel may find unreasonable. From a lawyer's point of view, the use of information collected by a VDR might reduce the need for witnesses. This would, in turn, lead to a considerable saving of time and cost by reducing the need for witness examination, by counsel, and for cross examination of the witnesses. The question of who is to blame would be answered without uncertainty and the injustices sometimes caused by the use of unscrupulous witnesses will be avoided.¹⁸

The EU is considering proposals that will enable identification of vessels¹⁹ that infringe Directive 2005/35²⁰ rules on ship-source pollution. Under Article 10²¹, Accompanying Measures, the member states are required to establish reliable methods of tracing to a particular ship and this may include on-board monitoring equipment. The VDR record already supports part of this requirement.

4.2 Detailed description of the working of the IMO with the respect to legislative matters for VDRs

One of the main arguments supporting the introduction of the VDR is that it will enable investigators to analyse the cause of an accident and to improve the standards of safety at sea both in terms of the preservation of human life and for the safe carriage of goods by sea. The introduction of VDRs has been strongly spearheaded by the IMO. The IMO has passed legislation describing the performance standard that the VDR must satisfy.²² The IMO has also passed legislation concerning VDRs and the functions of an investigator working to recover a VDR from a stricken vessel. A new

¹⁷ Simplified Voyage Data Recorder S-VDR, "A Marine Underwriter's Perspective".

¹⁸ Simplified Voyage Data Recorder, S-VDR: "A Need to Know"- Lloyd's List. A powerful tool to ensure fairness in the event of an accident.

¹⁹ Annex 4b, Towards a future Maritime policy for the Union: A European vision for the oceans and seas. Commission of the European Communities, Green Paper, COM(2006)275 final

²⁰ Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements, Official Journal L 255, 20/09/2005 P.11-21

²¹ Ibid

²² This part of the paper shall not cover IMO's specific performance standards for VDRs since it is beyond the scope of our limit. The IMO has implemented specific performance standards for VDRs and has presented "views on the downloading and playback of the data from VDRs and S-VDRs". The report from the UK and Danish papers led to the production of a draft called "safety of navigation circular which promotes a practical and low cost solution".



IMO code is currently at the draft preparation stage relating to procedures to be adopted by principals involved in investigations. It should be noted that the VDR shall remain property of the ship-owner except when a disaster occurs in which event the investigator shall have custody of the VDR and the ship-owner a copy of all stored data. The present legislation on VDRs will be examined in the light of the workings of the IMO.

5 IMO'S LEGISLATION ON RECOVERY OF THE VDR AFTER AN INCIDENT²³

One of the most important pieces of legislation passed by the IMO concerns the recovery of data from the VDR. The F.S.I.²⁴ Sub – Committee of the IMO have ruled that in the aftermath of an incident the VDR should be retrieved as soon as possible in order to preserve the important information which it stores.²⁵ This should be the procedure in any scenario where the accident is 'non catastrophic'. In the event of an incident it is the owner's duty to remove and preserve the VDR for investigation purposes at the earliest possible opportunity. In the event that the crew is about to abandon the vessel, the master must follow previously laid down instructions regarding the best method to preserve the VDR. The VDR would then be handed on to the Marine Accident Investigation Branch²⁶ and the owner of the vessel, for further inquiries. When a catastrophic accident occurs the crew might be unable to retrieve the data. In such instances the flag state and any other states that might have an interest in the sunken vessel would decide whether or not to instigate an expedition to retrieve the VDR. This expedition would be led by the investigator. The investigator and other technical specialist would keep an open mind on the condition of the 'capsule'. If the VDR is undamaged the team would carefully retrieve the 'capsule' in order to avoid damaging it and to safeguard the precious information which it holds.

5.1 Custody of the VDR/data

The ship owner and investigator have the duty of custody over the VDR, at all times.

5.2 Read out of the VDR/data

It is the responsibility of the investigator to download and read-out the information stored by the VDR. The investigator shall inform the owner of the investigations progress and provide him with a copy of the data retrieved from the VDR. The investigator may be assisted by other experts of other disciplines, if required.²⁷

23 These decisions were reached by IMO and F.S.I sub committee.

24 IMO Sub-Committee on Flag State Implementation.

25 If the VDR is not retrieved quickly would the information stored on it be wiped off?

26 This is the investigation branch for the UK; other branches exist for other countries.

27 Simplified Voyage Data Recorder "S-VDR: Data Ownership and Recovery"

6 THE WORKINGS AND ACTIVITIES OF THE IEC WITH RESPECT TO LEGISLATIVE MATTERS FOR VDRS

6.1 IEC

The abbreviation IEC stands for International Electro-technical Commission. The IEC is a technical committee of engineering experts which has observer status at the IMO, and devises technical specifications, that ensure marine equipment is fit for purpose. These specifications are typically in forced through legislation. In 1996 following suggestions from the UK and USA maritime committees, the forty-third session of the IMO's Navigation Sub-Committee (NAV), asked IEC "to develop international technical testing standards for VDRs based on IMO recommendations".²⁸ The IEC responded l, and its working group (TC-80wg-11) began to draft the technical and test standards based on the VDR performance standards drawn up by the IMO.

Various committees of the IEC are working concurrently on matters relating to the VDR. The IEC61162 standard aims to reduce the technical problems experienced when interfacing the VDR with other items of shipboard equipment. This will be achieved in part by world-wide standardization of electronic communication protocols for interfacing data between items of ship board equipment. Experiences in using the data retrieved from VDRs have proved highly successful, and evidence from the data collected has been useful as a means of confirming the activities and actions surrounding many incidents during voyages. The ability of a VDR to record audio, radar, navigational and other data represents a great achievement for the maritime community, because this has improved safety standards on sea going vessels and also reduces levels of marine pollution.

The IEC comprises of technical experts and other accident investigators from around the world including NTSB representatives. On this occasion the IEC convened at the British Standard Institute in London "to develop VDR functional performance requirements based on the generic performance standards approved by the IMO in November 1997 (IMO Res A.861)."²⁹ In one of his recent papers Michael T. Brown outlined the official workings of the IEC thus, "the IEC TC-80, WG-11 is tasked with developing these functional performance requirements, which, when published, will be known as IEC 61996 shipborne VDR, Performance Requirements, Methods of Test and Required Test Results".

The workings and activities of the IEC are varied but with regards to VDRs they are indispensable and specific as they provide good technical clarification to the IMO on the VDR, considering the fact that the IMO is an administrative body which requires technical experts in such an industrial innovation. Nevertheless, there are other organisations and specialists (whose functions will be analysed below) who also assist the IEC during the preparation of specifications.

28 Marine VDR, International Symposium on Transportation Recorders, May 3-5, 1999. Michael T. Brown, Marine Transportation Safety Specialist NTSB P.4.

29 Ibid 37 P.5.

6.2 Detailed description of the workings of the CIRM³⁰ with respect to legislative matters for VDRs

The CIRM also known as the International Association for Marine Electronics Companies has observer status at the IMO and is encouraged to provide technical as well as industrial advice during the improvement of international regulations pertaining to their specialty and standards. CIRM members range from manufacturers and producers of electronic and navigation equipment, to service providers and suppliers of these products.

The main function of the CIRM is to endorse the safe use of marine electronics and to encourage the development of good safety measures on a worldwide basis. For over 79 years, the CIRM has *influenced major international maritime legislation*. The most recent major example is probably that concerning the VDR. The CIRM also has representatives at the IEC, which is another important organisation as far as legislative matters for VDRs are concerned. Other shipping branches where the CIRM has observer status include: the International Chamber of Shipping (ICS)/ Institute of Chartered Shipbrokers, the International Hydrographic Organisations (IHO), and the Radio Technical Commission for Maritime Services (RTCM).³¹ The CIRM is one of the pioneering organisations which assisted in the drafting of regulatory standards and guidelines on the safe use of VDRs.

An amendment to the IMO's performance standards for VDRs and SVDRs was recently sketched out, alongside a *safety of Navigation Circular (SN/Circ/246)*. The circular encouraged manufacturers to ensure that after 1st July 2006 software and any necessary parts were available inside the VDR/S-VDR hardware so investigators can analyse data without delay. The functions of CIRM are technical; it also provides other vital expertise in this field to the IMO. There are also other organisations which have assisted in the development of legislation for VDRs.

30 Comite International Radio-Maritime

31 CIRM journal paper.



7 EU AND LEGISLATIVE MATTERS FOR VDRs.

After the Erika disaster in 1999, the European Commission issued its second set of proposals called “Erika 2 Package”. These were issued on the 6th of December 2002 under the Oil Companies International Marine Forum (also known as OCIMF). The European Commission is keen to control and monitor information systems on board ships and to ensure that vessels are fitted with compliant equipments which will enhance safety standards in EU waters. The VDR is one such item of equipment. EU Council Directive 1999/35/EC requires that VDRs be fitted on all ships that undertake international and domestic voyages from EU ports. The EU requirements for VDRs on passenger ships on domestic voyages are detailed in Annex 10 of SOLAS CH V.

Although the EU is devoted to encouraging safety at sea through the use of VDRs, the provision for VDRs under EU law is not enacted as a Regulation.

The IMO is an administrative body which determines the Purpose and Operational Requirements of a system and marks the first milestone in the legislative process. Technical clarifications of these requirements are provided by the International Electrotechnical Commission (IEC) with input from many experts. There are many other Agencies (whose functions will be analysed below) which also assist the IEC and CIRM to provide mechanical and industrial intelligence with regards to technology.

8 MCA AND LEGISLATIVE MATTERS FOR VDRS.

This agency is a representative only at the IMO and does not have full voting rights. The functions of three marine agencies will be examined in the light of their contributions towards legislative matters for VDRs. These three agencies are:- 1) the Marine and Coastguard Agency of the UK, 2) The US Coast Guard, 3) the Standard Council of Canada.

The MCA provides guidance to masters and operators of ships on how to comply with Regulation 18. The MCA offers an information service directing ship owners towards the information and measures that are available to help ensure the purchase of the type approved marine equipment such as VDRs. For the UK this information is contained in *MSN 1734 Type Approval of Marine Equipment (EC Notified Bodies)*. This information is abstracted from the EU Document entitled Marine Equipment Directive which lists all Type Approved marine equipments.

The MCA also warns and provides guidance information to cover those cases where internationally agreed testing standards currently do not exist (see *MSN 1735. Type Approval of Marine Equipment*).³²

8.1 USA Coastguard

The functions of the US Coast guard with regards to legislative matters for VDRs will also cover some activities of NTSB as these two groups work together. The concept of VDRs in the marine industry originated from aviation industry and evolved as a direct result of a number of high profile incidents³³ which have been encountered at sea.³⁴ The USCG has worked with NTSB towards legislative matters for VDRs.³⁵ The USCG and Maritime Transportation Act of 2006, Section 420, Congress directed the USCG to carry out feasibility studies on the carriage of VDRs on passenger vessels described in Section 2101 (220 (D) of title 46, US Code carrying more than 399 passengers. The studies on VDRs include performance standards, techniques for type approval VDRs and the formula for compulsory annual testing.³⁶

The feasibility studies include ferries of at least 100 gross tons in accordance with title 46 of the US Code, Section 14502 and also under title 46 of the US Code of Section 14302 tonnage, travelling at a distance of not more than 300 miles with not more than 399 passengers. The coastguard would also review the origins of VDRs, cost of the equipment and the benefits which would be derived from this device and also examine current regulations including carriage requirements. The coastguard requested comments from other parties concerned with VDRs especially on matters dealing with *installation; equipment cost; operational requirements; VDR equipment standards and approval*

32 UK nominated bodies MSN 1735. MCA emphasizes that Regulation 18 and the MCA guidance notes supersede all especially MNS 1688 which had been previously decided.

33 *The Torrey Canyon [1967], The Amoco Cadiz [1978] The Sea Empress [1996], The Erika [1999] The Prestige spill [2002]*.

34 Although an aircraft incidence happens swiftly, not allowing the crew time to make important decisions, the situation at sea could be different as a ship may take time to sink. Recently, this has not been the case as a number of deaths have been recorded at sea and sometimes there have been no crew left to tell the story and with the absence of a VDR questions may remain unanswered.

35 These two groups carry out investigation when there is an incident at sea.

36 National and International Standards, USCG. FR Doc. E6-20801, P. 2.



*methods; and training requirements.*³⁷ The USCG³⁸ also opened a forum for proposals to be submitted about VDRs and asked a number of questions to assist the feasibility study and possible proposals for amendments under SOLAS CH V.

8.2 Standard council of Canada

The Standard Council of Canada also derived the initiative for a VDR technology from the airline industry. The Estonia Ferry which capsized into the Baltic and sank off the coast of Finland on the 28th of September 1994 killing more than 850 people contributed to the debate for the introduction of VDRs. This disaster led to negotiations for a VDR to be installed on all passenger vessels across the world and Canada was not an exception. *Standard council of Canada is a federal crown corporation with a mandate to promote efficient and effective standardization.*³⁹

³⁷ Ibid 54,p 3.

³⁸ The USCG has certified Sperry Marine as an authorized annual service provider Shipborne VDR and Sperry Marine is allowed to conduct performance test on Voyage Master VDR.

³⁹ The aim of SCC is to lead and facilitate the recognition and *development of the use of national and international standards and accreditation services in order to enhance Canada's competitiveness and well being*. Available at Features-Standards Council of Canada. 'The Modern Mariners' Log - Canadian Technology Onboard'. http://www.scc.ca/en/news_events/features/featuresindex_40.shtml

9 COMMENTS ON ANNEX 10 OF SOLAS CHAPTER V

Rules 1.2 noted that there is no recommendation for ships under 3000 gross tonnage to be fitted with a VDR. This is also true of existing non passenger carrying ships. In the UK, ship owners and ship operators are encouraged to install VDRs on their vessels as soon as possible as this will ease accident investigation and improve the standards of safety at sea. It is hoped that significant progress will be made in this area as a result of the work being undertaken within this Project.

9.1 Other matters regarding pending legislation

A summary of the amendments of SOLAS CH V Safety of Navigation was prepared and published by Lloyd’s Register Marine Business Stream.

Part of the Table is reproduced below which presents a good indication of the current situation as well as providing an indication of the potential effect of the introduction of such legislation.

<p>Entry into force date</p> <p>1st July 2006</p>	<p>1 1</p>	<p>Chapter V Safety of Navigation</p> <p>Regulation 20 Voyage Data Recorders</p> <p>A new paragraph 2 is added after existing paragraph 1: Existing paragraph 2 is renumbered as paragraph 3.</p>	<p>Amended by Res. MSC.170(79)</p> <p>Applicable to: all existing Cargo ships, built before 1st July, 2002, engaged on international voyages, of 20.000 gross tonnage and upwards, at the first scheduled dry-docking after 1st July,2006 but not later than 1st July, 2009.</p> <p>Background and implications: This amendment requires existing ships to be fitted with a voyage data recorder (VDR), generally in the same way that all new ships are required to VDR fitted.</p> <ul style="list-style-type: none"> . Owner: significant impact, mainly concerning with the cost of purchasing and fitting a VDR. . Shipbuilder / Equipment manufacturer: noticeable impact mostly concerned with the design, approval and sale of VDRs and SVDRs, the cost of which would have to be passed on to the owner. . National Administration / Recognised Organisation: minimal impact, mainly concerning surveyable items and documentation.
<p>1st July, 2007, SOLAS 1974 as amended</p>	<p>5 2</p>	<p>Chapter V Safety of Navigation</p> <p>Regulation 20 Voyage Data Recorders</p> <p>A new paragraph 2 is added after existing paragraph 1. Existing paragraph 2 is renumbered as</p>	<p>Amended by Res. MSC.170(79)</p> <p>Applicable to: all existing Cargo ships, built before 1st July, 2002, engaged on international voyages, of 3.000 gross tonnage and upwards, at the first scheduled dry-docking after 1st July,2007 but not later than 1st July, 2010.</p> <p>Background and implications: This amendment requires existing ships to be fitted with a voyage data recorder (VDR), generally in the same way that all new ships are required to fit</p>

	<p>paragraph 3.</p>	<p>this type of equipment.</p> <ul style="list-style-type: none"> . Owner: significant impact, mainly concerning with the cost of purchasing and fitting a VDR or SVDR. . Shipbuilder / Equipment manufacturer: noticeable impact mostly concerned with the design, approval and sale of SVDRs, the cost of which would have to be passed on to the owner. . National Administration / Recognised Organisation: minimal impact, mainly concerning surveyable items and documentation.
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The table above produces a clear picture of the pending legislation. It states that all existing cargo ships built before 1st July 2002⁴⁰ and engaged on international voyages⁴¹ of 3.000 gross tons and upwards, at the 1st scheduled dry-docking after 1st July, 2007 but not later than 1st July 2010⁴² should be installed with a VDR.

Consequently, the maritime community has a few years before it will experience the VDR being compulsory on all vessels irrespective of its tonnage limit or whether the vessel is involved in an international or national voyage.

40 What about ships that were built before 2002?

41 What about the vessels which only engage in national voyages?

42 Why are there many years in between 2007 and 2010? Is it a way to give time to ship owners to install the VDR? These comments also apply to the rule implemented on “*cargo ships of 20.000 gross tonnage and upwards, at the first... but not later than 1st July 2009*”.

10 BACKGROUND TO IEC TECHNICAL AND TEST STANDARDS FOR VDR.

The IEC is an international standards organisation dealing with electrical, electronic and related technologies. Its work is done by some 10,000 electrical and electronics experts from industry, government, academia, test labs and others with a specialised knowledge in the subject. The Commission is made up of members, called national committees (NC), and each NC represents its nation's electrotechnical interests in the IEC. This includes manufacturers, providers, distributors, vendors, consumers and users, all levels of governmental agencies, professional societies and trade associations as well as standards developers from national standards bodies. About 90% of those who prepare IEC standards work in industry. In order to serve the diverse technical subjects the IEC is organised into a number of technical committees and sub-committees. In the case of VDRs, matters are referred by the IMO to IEC Technical Committee 80 (TC80) which covers Marine navigation and radio communications equipment and systems and in particular Working Group 11 (WG11) which is dedicated to the subject of Shipborne Voyage Data Recorders.

WG11 was formed during 1997 and held preparatory meetings prior to the issue of VDR IMO Performance A.861(20). As this was a new piece of equipment there was no previous IEC standard in place, although many other standards relating to associated equipments were in place which required to be identified in readiness. The early meetings were attended by an average of some 40 delegates representing a balanced cross section of members with an emphasis on manufacturers. It soon became clear that the task was very large and the IMO and others were pressing for the work to be completed in short order.

The reason being that without an IEC standard,

- a) IMO were unable to proceed to the next stage of legislation, that of Carriage Requirements.
- b) Manufacturers were unable to produce equipment
- c) National Test Houses were unable to conduct Type Approval certification.

In an effort to accelerate drafting of the IEC Standard, WG11 was split into three sections, each working on a particular section. Assistance and input was also received from technical representatives of the aircraft industry. This Industry had some 25 years experience in the field of Black Box technology and although there are major differences between Marine and Air operations, the input provided (particular in the ghosting of parts of their own technical specifications) proved to be both useful and timely.

Each line of the IMO Performance Standard was written into the IEC Standard and clarified as required. Technical parameters were set and from this, two further sections were added to cover the method of testing required and the required test results.

Work on the draft was completed during 1999 and the document circulated internationally through the IEC members and via their NCS for comment. This Standard, prefixed with the project number of IEC 61996, was finally agreed and published in July 2000.

The IMO, manufacturers and Test Houses were now able to progress towards their individual goals. At the December 2000 meeting of the IMO Marine Safety Committee (MSC73).



The phased implementation of the carriage of voyage data recorders was debated and a proposal put forward to the Plenary session which recommended the fitting of VDRs to the majority of vessels engaged on international voyages. However this proposal was met with opposition from some countries who expressed concern on a number of counts including.

- a) The practicability and perceived technical problems relating to the retrofitting of VDRs
- b) The adequacy of existing performance standards, including the possible development of simplified standards
- c) The need to gain experience in the use of VDRs on ships already fitted
- d) The relevant financial implications which required examination through a cost benefit analysis

In view of these concerns it was decided to limit the Carriage Requirements, resulting in IMO Resolution MSC.99(73) being adopted which excluded the fitting of VDR in existing cargo ships. – (This regulation was one of a raft of amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS) agreed during the MSC73 session).

11 BACKGROUND TO IEC TECHNICAL AND TEST STANDARDS FOR S-VDR.

At the same December 2000 IMO MSC 73rd Session, a further resolution was adopted - MSC.109(73) – which decided that a study should be carried out, as a matter of urgency, to assess the feasibility of installing VDRs on existing cargo ships. The principal concerns raised during the meeting (as recorded above) formed the basis of the study with the resolution calling for the study to be completed not later than 1st January 2004. The resolution further recommended that if the study clearly demonstrated the compelling need for mandatory carriage of VDRs on existing cargo ships, then appropriate draft amendments to SOLAS Ch V and the associated Performance Standards should be prepared.

The period which followed saw the submission of a number of IMO input papers contributing to the feasibility study, which, through various sub-committee sessions concluded that consideration should be given to the introduction of a Simplified Voyage Data Recorder (SVDR) as an interim measure to cover existing vessels.

As the study continued, it became clear that great care would be required in the modification of the IMO Performance Standard to avoid a complete re-write of the IEC Technical Standard. The consequence of such a major rewrite would be to incur a possible two to three year delay and the need for manufacturers to create a different VDR. This, in turn, would involve equipments being submitted for Type Approval with ensuing time delays and additional costs.

The feasibility study was completed towards the end of 2003 and a draft performance standard produced at a sub-committee meeting of the IMO Marine Safety Committee 78th Session (MSC78) in May 2004. After discussions and minor amendments at the Plenary session, Resolution MSC.163(78) was adopted which laid down Performance Standards for Shipborne Simplified Voyage Data Recorders (SVDRs). In general this new Standard followed that of the original A186(20) for VDR with a number of exceptions and exclusions. These included a relaxation in the recording of radar where a commercial off the shelf interface was not available. In these cases AIS target data should be recorded. Also the requirement for a SVDR to interface with other equipments as laid down in the original A861(20) standard was limited to those instances where data was available in accordance with the international digital interface standards using approved sentence formats. Both of these changes significantly simplified the retrofitting of voyage data recording equipment on existing vessels and the feasibility study deemed a success.

With a new IMO Performance Standard MSC.163(78) adopted for SVDR, the IEC WG11 was re-convened to modify the existing VDR Technical Standard 61996.at all speed. This was completed during late 2004 / 2005 and a SVDR draft Technical Standard circulated through the IEC members and ncs for comment using the same procedure as for VDR. However the work was at such an advanced stage by December 2004 that it was possible to issue the Standard as an IEC Publicly Available Specification (PAS). This document, in advance of the final published Standard enabled IMO to adopt Carriage Requirements at its Marine Safety Committee 79th Session held in December 2004. These Carriage Requirements recommended the phased introduction of SVDRs into existing cargo ships commencing July 2006 through 2010 and were detailed within Resolution MSC.170(79) Annex 3. This annex listed a number a number of adopted amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS 74). The new SVDR added as an additional paragraph to SOLAS Chapter V Regulation 20.



Publication of the IEC 61996-2 simplified voyage data recorder (S-VDR) – Performance requirements, methods of testing and required test results, was finally achieved in March 2006. Thus, in less than six years two new equipments had been specified, legislated, manufactured, tested and at an advanced stage of installation on the majority of high seas vessels.



12 DETERMINE CURRENT STATUS OF PENDING LEGISLATION.

12.1 Voyage Data Recorder (VDR), in force as of April 2007

IMO Performance Standard A.861(20) Nov 1999
IEC Technical & Test Standard IEC 61996 July 2000
IMO Carriage Requirements MSC.99(73) Dec 2000

12.2 Simplified Voyage Data Recorder (SVDR), in force as of April 2007

IMO Performance Standard MSC.163(78) May 2004
IEC Technical & Test Standard IEC 61996-2 March 2006
IMO Carriage Requirements MSC.170(79) Dec 2004

12.3 Pending Legislation as of April 2007

All IEC Standards are subject to regular Maintenance Cycle Reports. The purpose of these routines is to enable individual standards to be reviewed and updated as required, based on experiences gained, ambiguities identified, and advances in technology and changes to Performance Standards.

In the specific instances of Voyage Data Recorders and Simplified Voyage Data Recorders, both IEC Standards underwent Maintenance Cycles during the latter part of 2006 resulting in circulation of the respective Committee Draft with (CDV) in February 2007.

The current situation, as of April 2007, is therefore summarised as follows:

Document Ref:	Circ: Date	Closing Date
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80/470/CDV – IEC 61996-1 Ed 1.0 Maritime navigation and Radio communication equipment and systems Shipborne voyage data recorder (VDR) Part 1: Performance requirements Methods of testing and required test results	9-02-2007	13-07-2007
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80/471/CDV – IEC 61996-2 Ed. 2.0 Maritime navigation and Radio communication equipment and systems Shipborne voyage data recorder (VDR) Part 2: Simplified voyage data recorder (S-VDR) Performance requirements Methods of testing and required test results		
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12.4 IEC Technical & Test Standards changes since April 2007

This document was originally written in April 2007, since then the IEC has completed the maintenance cycle on Technical & Test Standards for the VDR and S-VDR and new standards have been issued.

IEC61996-1:2007 (VDR) supersedes IEC 61996 July 2000

IEC61996-2:2007 (S-VDR) supersedes IEC 61996-2 March 2006

12.5 EU Directive proposals

Directive proposal 2005/0240(COD)⁴³ seeks to improve maritime safety through amendments to Directives 1999/35/EC and 2002/59/EC. Paragraph 13 proposes that VDRs *should be systematically required on board ships making national or international voyages which call at Community ports.*

⁴³ Proposal for a Directive of the European Parliament and of the Council establishing the fundamental principles governing the investigation of accidents in the maritime transport sector and amending Directives 1999/35/EC and 2002/59/EC, COM(2005), 2005/0240 (COD)

13 PLAYBACK HARMONISATION AND ASSOCIATED MATTERS.

13.1 Background

The original IMO Voyage Data Recorder (VDR) Performance Standard – A.861(20) did not specify standards for the downloading and playback of data. As a result, the various manufacturers involved in the development of VDR models adopted different approaches to achieving these essential functions.

The subsequent IMO Simplified Voyage data Recorder (SVDR) Performance Standard MSC.163(78)SVDR)was mirrored on that of the VDR and therefore again remained silent on the harmonization of playback data standards.

Through the experiences gained in incident analysis it became clear that fast access to VDR data was important. Much time was being lost when first arriving on board a vessel which had suffered an incident in configuring equipment to suit the particular model of VDR fitted.

These and other concerns were eventually expressed in the submission of a paper MSC79/20/7 by the United Kingdom to IMO Marine Safety Committee's 79th Session held in London 1st –10th December 2004. In summary, the paper proposed that the IMO Sub-Committee on Safety of Navigation (NAV) should undertake a revision of the performance standards for VDRs and SVDRs to take account of both downloading and playback of the data. This was subsequently agreed and at the next meeting of the IMO Sub-Committee (NAV 51) held 6th to 10th June 2005 the subject was discussed at length. Draft revisions to both VDR and SVDR Standards were prepared and set out in Annex 15 of the Sub-Committee's Final Report NAV51/19. The Sub-Committee also approved Safety of Navigation Circular (SN/Circ/246) which recommended that all VDR and S-VDR systems be supplied with an accessible means for extracting the stored data from the VDR or S-VDR to a laptop computer. These recommendations were developed into IMO Performance Standard Annexes for the existing A.861(20) for VDR and MSC.163(78) for S-VDR and adopted at IMO's Marine Safety Committee 81st Session - May 2006.

The whole process had been completed in approximately eighteen months in order to allow inclusion in the IEC Technical Standards which were at an advanced stage of preparation in the case of SVDR and were undergoing a Maintenance Cycle in the case of VDR. This was successfully achieved and both cdvs circulated in February 2007 included the new sections to cover download.

14 NATIONAL ROUTES FOR THE SUBMISSION OF PAPERS TO THE IMO

There are a number of procedures which must be fulfilled before a paper can be submitted to the IMO. The contents of the paper is determined by the national organization that are qualified to examine the paper and decide if the document is fit for submission to the IMO. MSC-MEPC.1/Circ.1/ text details the requirement for the submission of papers of papers to the IMO. In the UK the BSI and MCA are the national body responsible for submitting papers to the IMO. For the purpose of VDRs the MCA would be appropriate as it covers departments which closely deal with matters on safety of Navigation.

The EU Presidency may submit papers on behalf of the European Commission and the Member States.

MSC-MEPC.1/Circ.1/ documents a number of questions that must be posed to determine whether the proposed paper meets those demands. These questions are summarized below and possible answers will be analysed to determine how far proposals on the VDR document qualify for submission.

14.1 Submitting papers to the IMO

The numbering of the following paragraphs follows that of the IMO documentation.

2.10 Conditions Required to Ensure General Acceptance

The IMO will examine each of the following points when deciding whether to accept a new item into the work programme:

- 1 A proposal for a new measure should explain why it is required. When proposing a new or amended convention, on the other hand, the document should convince the reader of the compelling need for it. This need should be set in context of the IMO's objectives.
- 2 Is the subject within the scope of the IMO's objectives and strategic plan?
Installing VDRs on vessels has been an objective for the IMO but a strategic plan is needed to make the carriage of VDRs compulsory on all vessels especially cargo vessels. The current situation is that there is a phased implementation programme in place which will see all vessels over 3000 gt installed with a VDR/ SVDR by July 2010.
- 3 Do adequate industry standards already exist, or are they under development. If so this will reduce the need for action by the IMO.
Companies and organisations like the IEC have assisted immensely with providing performance standards for VDRs to correspond with the requirements of the IMO.
- 4 Do the benefits justify such action?
Emphasis cannot be made on the importance of VDRs as it has been made above.⁴⁴ The VDR will ensure safety at sea and reduce maritime pollution.
- 5 Has the analysis addressed the; a) cost, b) far-reaching implications, and c) legislative and administrative burdens?

⁴⁴ See page 5-8 of this paper.

As mentioned earlier by Michael T. Brown, the advantages of installing a VDR will quickly offset the cost of the equipment

- 6 The proposal should detail the specific action required, the appropriate level of priority, the target completion date or the number of sessions required to complete the work. The VDR has been installed according to the dates on SOLAS CH V as SOLAS Convention is regularly amended if deemed necessary by majority of the Committee. Moreover, the suggestions carried out on this research paper hope to assist regulatory provisions for VDRs particularly for smaller vessels and to take advantage in the advancement of technology. A number of deadlines have been fixed for VDRs to be installed on vessels depending on whether they are ro-ro, passenger or cargo vessels.⁴⁵

The priority assigned to an item will depend on many factors including: a) the effect on safety and protection of the marine environment, as well as b) the ratio of benefit to implementation cost.

Two of the main reasons for regulatory technological improvements are to improve safety at sea and to reduce marine pollution. This can also be achieved when the VDR is used to detect the cause of accidents and the various committees would try to prevent them by using available measures.⁴⁶

14.2 Other considerations for submission of proposals

2.25 Emphasis is made for new constructional requirements recently recommended for new ships to also take into account provisions to include existing ships so as to maintain consistency of safety standards between new and old ships.

The rule of law on VDRs has fulfilled the new constructional requirements detailed in SOLAS CH V, under Regulation 18, 20. ANNEX 10 contains guidelines which help explain the procedure for fitting VDRs to new and old ships.

2.26 Enables the committee to recognize human actions as a fundamental component of maritime safety and the protection of the environment.

The VDR is installed on the ship for the purpose of providing information recorded leading up to and following an incident but can also provide valuable information for training and promoting best practice at no additional expense. Human error may however occur during installation of the VDR and compromise its performance. This possibility is minimised through the publication of IMO – VDR Installation Guidelines which will assist with installation of VDRs on ships.⁴⁷

45 See page 9 and 20 above.

46 Also see point 5 for implementation cost.

47 Human element principles are also addressed in MSC/Circ.763-MEPC/Circ.313.

14.3 Preparation and submission of documents

4.1 Documents submitted to the IMO should have single spaced paragraphs and meet the following formatting/ submission guidelines:

1 To enhance the clarity and help to ensure timely processing and all documents should be written in the most concise language possible and be preceded by a brief summary covering the following points a) executive summary, b) action to be taken, c) related documents.

.2 & .3 Substantive documents should end with a summary of the required action(s), by contract information documents should conclude with a summary of this information.

When using the postal service to submit, the printed document should be accompanied by an identical electronic copy stored on computer diskette. Documents may also be submitted via email, in which case they should be confirmed by a hard copy. The requirements set out in paragraph 4.10 are also applicable to documents that are submitted electronically. In both cases Microsoft Word is preferred word processing software.

Documents should arrive at the IMO at least 13 weeks before a session. They should not be included in the plenary session unless the Chairman decides that it is essential.

Certain documents should be printed on pink paper in order to indicate their importance and make them distinctive. Such documents include proposed amendments to maritime safety instruments, or those concerning the protection of marine environments that have been approved for adoption by the MSC or MEPC.

The reports of Committees/subsidiary bodies should contain:

.1 A summary of key documents and a list of those submitted by Governments, international organizations and the Secretariat;

.2 A summary of views expressed during consideration of an item;

3 A record of the decisions taken

In drafting recommendations, codes or guidelines, one should cross reference text and terminology developed by the IMO (or other organizations) whenever possible.

Subsidiary bodies should indicate the progress made towards the target completion date.

The Chairman's reports do not require review.

Less than 13 weeks before a session of the Committee they will only consider those urgent matters specified at a prior session. As a general rule, the Committee will not consider matters arising less than 9 weeks prior to the Committee's session.



14.4 Submission of documents

One should ensure that all documents reach the IMO's Headquarters in all three working languages well before a session of the Committee or subsidiary body.

1 Most documents should not exceed 50 pages except for reports from working, drafting or correspondence groups and in exceptional circumstances. Where the exception applies the deadline for receipt is postponed by one week for every 20 pages exceeding 50.

.2 Proposals for new work programmes should be received by the Secretariat not later than 13 weeks before the opening session of the Committee(s). They should reach the IMO's Headquarters and be placed on their website (in three languages) not later than 5 weeks before the opening of the session.

.3 to .6 Different rules apply for other types of document, as well as those different sizes and those received from certain bodies

Member Governments and international organizations should endeavour to submit as early as possible.

To be exempted from these requirements one requires the Chairman's prior authorization. This can only be obtained after he has consulted with the Secretariat. Specific rules exist in the event of an emergency requiring immediate action by the Committee.



15 REFERENCES

15.1 Journals

Features- Standards Council of Canada. "The Modern Mariners' Log - Canadian Technology onboard".

Forty-fourth Session of IMO sub Committee on safety of Navigation, July 1998, VDR carriage requirements.

Guidelines on Voyage Data Recorder (VDR) Ownership and Recovery I:/CIRC/MSC/1024.doc.

IMO Assembly, 20th Session Agenda Item 9.

International Symposium on Transportation Recorders "Future Recorder Requirements for the Maritime Industry", presented by Chris Winkley, Broadgate.

Marine Accident Investigators International published at <http://www.maiif.net/newsletters/news27.htm> (this is only accessible to MAIIF members)

Marine VDR, International Symposium on Transportation Recorders, May 3-5, 1999. Micheal T. Brown, Marine Transportation Safety Specialist NTSB

MSC at its Sixty Eight Session

New IMO proposals for VDRs and S-VDRs data download and playback", available at http://www.svdr.com/index.php?Option=com_content&task=view&id=64&Itemid=41

Simplified Voyage Data Recorder "S-VDR: Data Ownership and Recovery".

Simplified Voyage Data Recorder S-VDR, "A Marine Underwriter's Perspective".

Simplified Voyage Data Recorder, S-VDR: "A Need to Know"- Lloyd's List. A powerful tool to ensure fairness in the event of an accident.

Sub Committee on safety of Navigation at its Forty-Third Session

Sub-Commission on Safety of Navigation (NAV), 51st Session: 6-10 June 2005.

The "MAIN HEAD, VOYAGE DATA RECODERS"

15.2 Resolutions

ANNEX 26 Res MSC. 163 (78) May 2004, Performance Standards for Ship borne S-VDRs
EXTRACT MSC 78/26/Add.2 ANNEX 26.



MSC-MEPC.1/Circ.1/ 15 December 2006, Guidelines on the organisation and method of work of the maritime safety committee and the Marine Environment Protection Committee and the Subsidiary Bodies.

Resolution A.861 (20) adopted on the 27th of November 1997, “Performance Standards for Ship borne Voyage Data Recorders (VDRs)”.

IMO Assembly, 20th Session Agenda Item 9.

Res. MSC. 109 (73) 6th December 2000, Carriage of VDRs on Existing Cargo Ships.

SOLAS Conference 1995, Res 12; Res MSC.109 (73) Amendments to CH V of SOLAS 1974.

15.3 Websites

www.bsi-global.com.

www.mcga.gov.uk.

www.imo.org.

www.scc.ca/en/news_events/features/featuresindex_40.shtml

16 EXCERPTS FROM PROPOSAL FOR A DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, 2005/240 (COD)

(13) Under SOLAS regulation V/20, passenger ships and ships other than passenger ships of 3 000 gross tonnage and upwards constructed on or after 1 July 2002 must carry voyage data recorders (VDRs) to assist in accident investigations. Given its importance in the formulation of a policy to prevent shipping accidents, such equipment should be systematically required on board ships making national or international voyages which call at Community ports.

Article 13

Preservation of evidence

Member States shall adopt measures to ensure that the parties involved in casualties, incidents and distress alerts under the scope of this Directive make every effort to achieve the following:

- (a) to save all information from charts, log books, electronic and magnetic recording and video tapes, including information from voyage data recorders and other electronic devices relating to the period preceding, during and after an accident;
- (b) to prevent the overwriting or other alteration of such information;
- (c) to prevent interference with any other equipment which might reasonably be considered pertinent to the investigation of the accident;
- (d) to collect and preserve all evidence expeditiously for the purposes of the marine casualty or incident safety investigations.