



ASSEMBLY  
20th session  
Agenda item 9

**RESOLUTION A.861(20)**  
**adopted on 27 November 1997**

**PERFORMANCE STANDARDS FOR SHIPBORNE  
VOYAGE DATA RECORDERS (VDRs)**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO that, by resolution 12, the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, being of the opinion that it would be desirable that ships, in particular passenger ships, be fitted with voyage data recorders (VDRs) to assist in investigations into casualties, requested the Maritime Safety Committee to develop, as a matter of urgency, operational requirements and performance standards for such recorders, taking into account any potential human element implications,

NOTING that consideration is being given to the development of carriage requirements for VDRs for inclusion in the SOLAS Convention at the earliest opportunity,

HAVING CONSIDERED the recommendations made by the Maritime Safety Committee at its sixty-eighth session and by the Sub-Committee on Safety of Navigation at its forty-third session,

1. ADOPTS the Recommendation on Performance Standards for Shipborne Voyage Data Recorders (VDRs), set out in the Annex to the present resolution;
2. INVITES Governments to encourage shipowners and operators of ships entitled to fly their flag to install VDRs on such ships, as soon as possible, especially considering that the carriage of VDRs may soon be made mandatory under the SOLAS Convention;
3. RECOMMENDS Governments to ensure that VDRs installed on board ships flying their flag conform to performance standards not inferior to those specified in the Annex to this resolution;
4. REQUESTS the Maritime Safety Committee to keep these Performance Standards under review and to adopt amendments thereto, as necessary.

## ANNEX

**RECOMMENDATION ON PERFORMANCE STANDARDS FOR SHIPBORNE  
VOYAGE DATA RECORDERS (VDRs)****1 PURPOSE**

The purpose of a voyage data recorder (VDR) is 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 the period leading up to and following an incident having an impact thereon. Information contained in a VDR should be made available to both the Administration and the shipowner. This information is for use during any subsequent investigation to identify the cause(s) of the incident.

**2 APPLICATION**

A VDR with capabilities not inferior to those defined in these performance standards is required to be fitted to ships of classes defined in SOLAS chapter V, as amended.

**3 REFERENCES****3.1 SOLAS:**

- 1995 SOLAS Conference, resolution 12.

**3.2 IMO resolutions:**

- A.662(16) Performance Standards for Float-free Release and Activation Arrangements for Emergency Radio Equipment
- A.694(17) General Requirements for Shipborne Radio Equipment Forming Part of the GMDSS and for Electronic Navigational Aids
- A.824(19) Performance Standards for Devices to Indicate Speed and Distance
- A.830(19) Code on Alarms and Indicators, 1995
- MSC.64(67), Performance Standard for Heading Control Systems  
annex 3
- MSC.64(67), Performance Standards for Navigational Radar Equipment, as amended.  
annex 4

**4 DEFINITIONS**

4.1 *Voyage data recorder (VDR)* means 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.

4.2 *Sensor* means any unit external to the VDR, to which the VDR is connected and from which it obtains data to be recorded.

4.3 *Final recording medium* means the item of hardware on which the data is recorded such that access to it would enable the data to be recovered and played back by use of suitable equipment.

4.4 *Playback equipment* means the equipment, compatible with the recording medium and the format used during recording, employed for recovering the data. It includes also the display or presentation hardware and software that is appropriate to the original data source equipment.<sup>1</sup>

4.5 *Dedicated reserve power source* means a secondary battery, with suitable automatic charging arrangements, dedicated solely to the VDR, of sufficient capacity to operate it as required by 5.3.2.

## **5 OPERATIONAL REQUIREMENTS**

### **5.1 General**

5.1.1 The VDR should continuously maintain sequential records of preselected data items relating to the status and output of the ship's equipment, and command and control of the ship, referred to in 5.4.

5.1.2 To permit subsequent analysis of factors surrounding an incident, the method of recording should ensure that the various data items can be co-related in date and time during playback on suitable equipment.

5.1.3 The final recording medium should be installed in a protective capsule which should meet all of the following requirements:

- .1 be capable of being accessed following an incident but secure against tampering;
- .2 maximize the probability of survival and recovery of the final recorded data after any incident;
- .3 be of a highly visible colour and marked with retro-reflective materials; and
- .4 be fitted with an appropriate device to aid location.

5.1.4 The design and construction, which should be in accordance with the requirements of resolution A.694(17) and international standards acceptable to the Organization<sup>2</sup>, should take special account of the requirements for data security and continuity of operation as detailed in 5.2 and 5.3.

### **5.2 Data selection and security**

5.2.1 The minimum selections of data items to be recorded by the VDR are specified in 5.4. Optionally, additional items may be recorded provided that the requirements for the recording and storage of the specified selections are not compromised.

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<sup>1</sup>Playback equipment is not normally installed on a ship and is not regarded as part of a VDR for the purposes of these performance standards.

<sup>2</sup>Refer to publication IEC 945-Maritime navigation and radiocommunication equipment and systems - General requirements, methods of testing and required test results.

5.2.2 The equipment should be so designed that, as far as is practical, it is not possible to tamper with the selection of data being input to the equipment, the data itself nor that which has already been recorded. Any attempt to interfere with the integrity of the data or the recording should be recorded.

5.2.3 The recording method should be such that each item of the recorded data is checked for integrity and an alarm given if a non-correctable error is detected.

### **5.3 Continuity of operation**

5.3.1 To ensure that the VDR continues to record events during an incident, it should be capable of operating from the ship's emergency source of electrical power.

5.3.2 If the ship's emergency source of electrical power supply fails, the VDR should continue to record Bridge Audio (see 5.4.5) from a dedicated reserve source of power for a period of 2 h. At the end of this 2 h period all recording should cease automatically.

5.3.3 Recording should be continuous unless interrupted briefly in accordance with 6 or terminated in accordance with 5.3.2. The time for which all stored data items are retained should be at least 12 h. Data items which are older than this may be overwritten with new data.

### **5.4 Data items to be recorded**

#### **5.4.1 Date and time**

Date and time, referenced to UTC, should be obtained from a source external to the ship or from an internal clock. The recording should indicate which source is in use. The recording method should be such that the timing of all other recorded data items can be derived on playback with a resolution sufficient to reconstruct the history of the incident in detail.

#### **5.4.2 Ship's position**

Latitude and longitude, and the datum used, should be derived from an electronic position-fixing system (EPFS). The recording should ensure that the identity and status of the EPFS can always be determined on playback.

#### **5.4.3 Speed**

Speed through the water or speed over the ground, including an indication of which it is, derived from the ship's speed and distance measuring equipment.

#### **5.4.4 Heading**

As indicated by the ship's compass.

#### **5.4.5 Bridge Audio**

One or more microphones positioned on the bridge should be placed so that conversation at or near the conning stations, radar displays, chart tables, etc., are adequately recorded. As far as practicable, the positioning of microphones should also capture intercom, public address systems and audible alarms on the bridge.

#### **5.4.6 Communications Audio**

VHF communications relating to ship operations should be recorded.

#### **5.4.7 Radar data, post-display selection**

This should include electronic signal information from within one of the ship's radar installations which records all the information which was actually being presented on the master display of that radar at the time of recording. This should include any range rings or markers, bearing markers, electronic plotting symbols, radar maps, whatever parts of the SENC or other electronic chart or map that were selected, the voyage plan, navigational data, navigational alarms and the radar status data that were visible on the display. The recording method should be such that, on playback, it is possible to present a faithful replica of the entire radar display that was on view at the time of recording, albeit within the limitations of any bandwidth compression techniques that are essential to the working of the VDR.

#### **5.4.8 Echo sounder**

This should include depth under keel, the depth scale currently being displayed and other status information where available.

#### **5.4.9 Main alarms**

This should include the status of all mandatory alarms on the bridge.

#### **5.4.10 Rudder order and response**

This should include status and settings of auto-pilot if fitted.

#### **5.4.11 Engine order and response**

This should include the positions of any engine telegraphs or direct engine/propeller controls and feedback indications, if fitted, including ahead/astern indicators. This should also include status of bow thrusters if fitted.

#### **5.4.12 Hull openings status**

This should include all mandatory status information required to be displayed on the bridge.

#### **5.4.13 Watertight and fire door status**

This should include all mandatory status information required to be displayed on the bridge.

#### **5.4.14 Accelerations and hull stresses**

Where a ship is fitted with hull stress and response monitoring equipment, all the data items that have been pre-selected within that equipment should be recorded.

#### **5.4.15 Wind speed and direction**

This should be applicable where a ship is fitted with a suitable sensor. Either relative or true wind speed and direction may be recorded, but an indication of which it is should be recorded.

### **6 OPERATION**

The unit should be entirely automatic in normal operation. Means should be provided whereby recorded data may be saved by an appropriate method following an incident, with minimal interruption to the recording process.

### **7 INTERFACING**

Interfacing to the various sensors required should be in accordance with the relevant international interface standard, where possible. Any connection to any item of the ship's equipment should be such that the operation of that equipment suffers no deterioration, even if the VDR system develops faults.

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**ANNEX 26**

**RESOLUTION MSC.163(78)**  
**(adopted on 17 May 2004)**

**PERFORMANCE STANDARDS FOR SHIPBORNE SIMPLIFIED  
VOYAGE DATA RECORDERS (S-VDRs)**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the functions of adopting performance standards for radio and navigational equipment, as well as amendments thereto, shall be performed by the Maritime Safety Committee on behalf of the Organization,

NOTING that the provisions of regulation V/20 of the International Convention for the Safety of Life at Sea, 1974, as amended, do not apply to the existing cargo ships with respect to the carriage requirements of voyage data recorders (VDRs),

RECALLING FURTHER resolution MSC.109(73), by which the Committee decided that a study should be carried out, as a matter of urgency, to assess the feasibility for existing cargo ships to carry VDRs and instructed the Sub-Committee on Safety of Navigation accordingly,

NOTING ALSO that the report on the feasibility study clearly demonstrates the compelling need for mandatory carriage of a simplified version of VDRs on existing cargo ships,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Safety of Navigation at its forty-ninth session,

1. ADOPTS the Recommendation on Performance Standards for Shipborne Simplified Voyage Data Recorders (S-VDRs);
2. INVITES Governments to encourage shipowners and operators of the existing cargo ships entitled to fly their flag to install S-VDRs on such ships, as soon as possible, especially considering that the carriage of S-VDRs may soon be mandatory under the SOLAS Convention;
3. RECOMMENDS Governments to ensure that S-VDRs installed on board the existing cargo ships flying their flag conform to performance standards not inferior to those specified in the Annex to this resolution.

ANNEX

**RECOMMENDATION ON PERFORMANCE STANDARDS FOR  
SHIPBORNE SIMPLIFIED VOYAGE DATA RECORDERS (S-VDRs)**

**1 PURPOSE**

1.1 The purpose of a simplified voyage data recorder (S-VDR) is 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 the period leading up to and following an incident having an impact thereon. Information contained in a S-VDR should be made available to both the Administration and the shipowner. This information is for use during any subsequent investigation to identify the cause(s) of the incident.

**2 APPLICATION**

2.1 A S-VDR with capabilities not inferior to those defined in these performance standards is required to be fitted to ships of classes defined in SOLAS chapter V, as amended.

**3 REFERENCES**

3.1 SOLAS:

- 1995 SOLAS Conference, resolution 12.

3.2 IMO resolutions:

- A.662(16) Performance Standards for Float-free Release and Activation Arrangements for Emergency Radio Equipment
- A.694(17) General Requirements for Shipborne Radio Equipment Forming Part of the GMDSS and for Electronic Navigational Aids
- A.802(19) Performance Standards for Survival Craft Radar Transponders for use in Search and Rescue Operations
- A.810(19) Performance Standards for Float-free Satellite Emergency Position-Indicating Radio Beacons Operating on 406 MHz
- A.812(19) Performance standards for float-free satellite emergency position indicating radio beacons operating through the geostationary Inmarsat satellite system on 1.6 GHz
- A.824(19) Performance Standards for Devices to Indicate Speed and Distance
- A.830(19) Code on Alarms and Indicators, 1995
- A.861(20) Performance Standards for Shipborne Voyage Data Recorders (VDRs)



- MSC.64(67), Performance Standard for Heading Control Systems annex 3
- MSC.64(67), Performance Standards for Navigational Radar Equipment, annex 4 as amended.

## 4 DEFINITIONS

4.1 *Simplified Voyage data recorder (S-VDR)* means 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, the power supply and dedicated reserve power source.

4.2 *Sensor* means any unit external to the S-VDR, to which the S-VDR is connected and from which it obtains data to be recorded.

4.3 *Final recording medium* means the item of hardware on which the data is recorded such that access to it would enable the data to be recovered and played back by use of suitable equipment.

4.4 *Playback equipment* means the equipment, compatible with the recording medium and the format used during recording, employed for recovering the data. It includes also the display or presentation hardware and software that is appropriate to the original data source equipment.<sup>1</sup>

4.5 *Dedicated reserve power source* means a secondary battery, with suitable automatic charging arrangements, dedicated solely to the S-VDR, of sufficient capacity to operate it as required by 5.3.2.

## 5 OPERATIONAL REQUIREMENTS

### 5.1 General

5.1.1 The S-VDR should continuously maintain sequential records of preselected data items relating to the status and output of the ship's equipment, and command and control of the ship, referred to in 5.4.

5.1.2 To permit subsequent analysis of factors surrounding an incident, the method of recording should ensure that the various data items can be co-related in date and time during playback on suitable equipment.

#### 5.1.3 Final recording medium

5.1.3.1 The final recording medium should be installed in a protective capsule of either a fixed or float-free type, which should meet all of the following requirements:

- .1 be capable of being accessed following an incident but secure against tampering;

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<sup>1</sup> Playback equipment is not normally installed on a ship and is not regarded as part of a S-VDR for the purposes of these performance standards.

- .2 maintain the recorded data for a period of at least 2 years following termination of recording;
- .3 be of a highly visible colour and marked with retro-reflective materials; and
- .4 be fitted with an appropriate device to aid location.

5.1.3.2 The fixed type protective capsule should comply with the requirements set out in resolution A.861(20) with the exception of the resulting requirements for withstanding penetration.

5.1.3.3 The float-free type protective capsule should:

- .1 be fitted with means to facilitate grappling and recovery;
- .2 be so constructed as to comply with the requirements specified in resolutions A.810(19) or A.812(19) and to minimize risk of damage during recovery operations; and
- .3 the device should be capable of transmitting an initial locating signal and further locating homing signal for at least 48 hours over a period of not less than 7 days/168 hours.

5.1.4 The design and construction, which should be in accordance with the requirements of resolution A.694(17) and international standards acceptable to the Organization<sup>2</sup>, should take special account of the requirements for data security and continuity of operation as detailed in 5.2 and 5.3.

## **5.2 Data selection and security**

5.2.1 The minimum selections of data items to be recorded by the S-VDR are specified in 5.4. Optionally, additional items may be recorded provided that the requirements for the recording and storage of the specified selections are not compromised.

5.2.2 The equipment should be so designed that, as far as is practical, it is not possible to tamper with the selection of data being input to the equipment, the data itself nor that which has already been recorded. Any attempt to interfere with the integrity of the data or the recording should be recorded.

5.2.3 The recording method should be such that each item of the recorded data is checked for integrity and an alarm given if a non-correctable error is detected.

## **5.3 Continuity of operation**

5.3.1 To ensure that the S-VDR continues to record events during an incident, it should be capable of operating from the ship's emergency source of electrical power.

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<sup>2</sup> Refer to publication IEC 60945 - Maritime navigation and radiocommunication equipment and systems - General requirements, methods of testing and required test results.

5.3.2 If the ship's emergency source of electrical power supply fails, the S-VDR should continue to record Bridge Audio (see 5.4.5) from a dedicated reserve source of power for a period of 2 h. At the end of this 2 h period all recording should cease automatically.

5.3.3 Recording should be continuous unless interrupted briefly in accordance with 6 or terminated in accordance with 5.3.2. The time for which all stored data items are retained should be at least 12 h. Data items which are older than this may be overwritten with new data.

## **5.4 Data items to be recorded**

### **Date and time**

5.4.1 Date and time, referenced to UTC, should be obtained from a source external to the ship or from an internal clock. The recording should indicate which source is in use. The recording method should be such that the timing of all other recorded data items can be derived on playback with a resolution sufficient to reconstruct the history of the incident in detail.

### **Ship's position**

5.4.2 Latitude and longitude, and the datum used, should be derived from an electronic position-fixing system (EPFS). The recording should ensure that the identity and status of the EPFS can always be determined on playback.

### **Speed**

5.4.3 Speed through the water or speed over the ground, including an indication of which it is, derived from the ship's speed and distance measuring equipment.

### **Heading**

5.4.4 As indicated by the ship's compass.

### **Bridge Audio**

5.4.5 One or more microphones positioned on the bridge should be placed so that conversation at or near the conning stations, radar displays, chart tables, etc., are adequately recorded. As far as practicable, the positioning of microphones should also capture intercom, public address systems and audible alarms on the bridge.

### **Communications Audio**

5.4.6 VHF communications relating to ship operations should be recorded.

### **Radar data, post-display selection**

5.4.7 This should include electronic signal information from within one of the ship's radar installations which records all the information which was actually being presented on the master display of that radar at the time of recording. This should include any range rings or markers, bearing markers, electronic plotting symbols, radar maps, whatever parts of the SENC or other electronic chart or map that were selected, the voyage plan, navigational data, navigational

alarms and the radar status data that were visible on the display. The recording method should be such that, on playback, it is possible to present a faithful replica of the entire radar display that was on view at the time of recording, albeit within the limitations of any bandwidth compression techniques that are essential to the working of the S-VDR.

#### **AIS Data**

5.4.8 If it is impossible to obtain radar data<sup>3</sup> then AIS target data should be recorded as a source of information regarding other ships. If radar data is recorded, AIS information may be recorded additionally as a beneficial secondary source of information on both other and own ship.

#### **Other items**

5.4.9 Any additional data items listed by IMO with the requirements set out in resolution A.861(20) should be recorded when the data is available in accordance with the international digital interface standards<sup>4</sup> using approved sentence formatters.

### **6 OPERATION**

6.1 The unit should be entirely automatic in normal operation. Means should be provided whereby recorded data may be saved by an appropriate method following an incident, with minimal interruption to the recording process.

### **7 INTERFACING**

7.1 Interfacing to the various sensors required should be in accordance with the relevant international interface standards, where possible. Any connection to any item of the ship's equipment should be such that the operation of that equipment suffers no deterioration, even if the S-VDR system develops faults.

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<sup>3</sup> Where commercial off the shelf (COTS) interfaces are not available.

<sup>4</sup> Refer to publication IEC 61162

## ANNEX 27

**DRAFT AMENDMENTS TO THE RECORD OF EQUIPMENT FOR THE CARGO  
SHIP SAFETY EQUIPMENT CERTIFICATE OF THE 1988 SOLAS PROTOCOL**

**APPENDIX**

**MODIFICATIONS AND ADDITIONS TO THE APPENDIX TO THE ANNEX TO  
THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974**

**Record of Equipment for the Cargo Ship Safety Equipment Certificate (Form E)**

1 Existing section 3 is replaced by the following:

**“3 Details of navigational systems and equipment**

Item	Actual provision
1.1 Standard magnetic compass*	.....
1.2 Spare magnetic compass*	.....
1.3 Gyro compass*	.....
1.4 Gyro compass heading repeater*	.....
1.5 Gyro compass bearing repeater*	.....
1.6 Heading or track control system*	.....
1.7 Pelorus or compass bearing device*	.....
1.8 Means of correcting heading and bearings	.....
1.9 Transmitting heading device (THD)*	.....
2.1 Nautical charts/Electronic chart display and information system (ECDIS)**	.....
2.2 Back up arrangements for ECDIS	.....
2.3 Nautical publications	.....
2.4 Back up arrangements for electronic nautical publications	.....
3.1 Receiver for a global navigation satellite system/ terrestrial radionavigation system* **	.....
3.2 9 GHz radar*	.....
3.3 Second radar (3 GHz/ 9 GHz**)*	.....
3.4 Automatic radar plotting aid (ARPA)*	.....
3.5 Automatic tracking aid*	.....
3.6 Second automatic tracking aid*	.....
3.7 Electronic plotting aid*	.....

	Item	Actual provision
4	Automatic identification system (AIS)	.....
5.1	Voyage data recorder (VDR)**	.....
5.2	Simplified voyage data recorder (S-VDR)**	.....
6.1	Speed and distance measuring device (through the water)*	.....
6.2	Speed and distance measuring device (over the ground in the forward and athwartship direction)*	.....
6.3	Echo sounding device*	.....
7.1	Rudder, propeller, thrust, pitch and operational mode indicator*	.....
7.2	Rate of turn indicator*	.....
8	Sound reception system*	.....
9	Telephone to emergency steering position*	.....
10	Daylight signalling lamp*	.....
11	Radar reflector*	.....
12	International Code of Signals	.....

\* Alternative means of meeting this requirement are permitted under regulation V/19. In case of other means they shall be specified.

\*\* Delete as appropriate.”

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