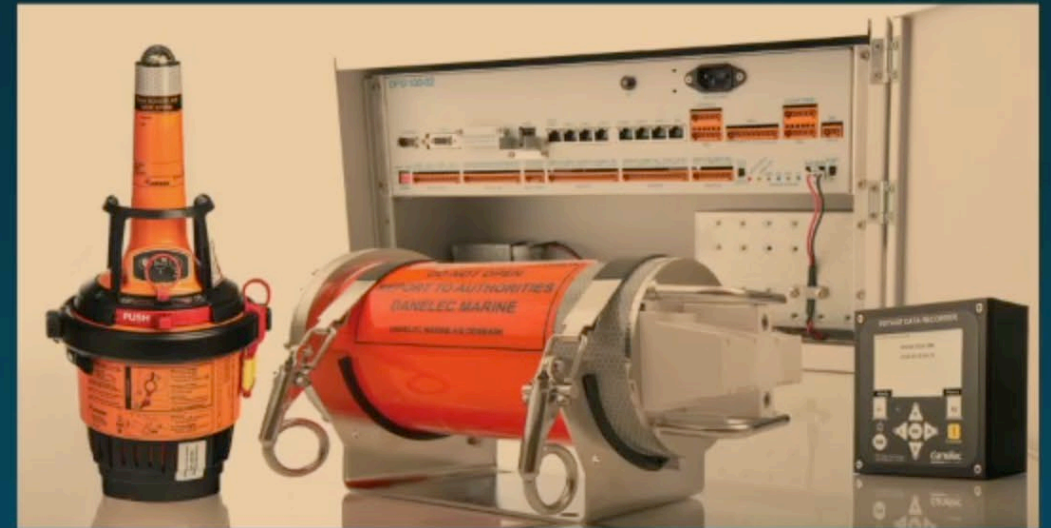


# NTSB finding regarding VDRs

# Voyage Data Recorder (VDR) Overview

VDRs record:

- Navigational data
- Radar images
- Chart plotter information
- Basic engine operation
- Alarm statuses
- Bridge audio recordings
- VHF radio communications



(Source: Danelec)

# VDR Issues Encountered in *Dali* Investigation

- Unrecorded data during vessel blackout
- Lack of recorded communications between ship's bridge and engine room
- Destructive mixing of recorded bridge audio channels
- Inadequate VDR playback software
- Inability to download full VDR dataset on scene
- Complex workflow for processing proprietary data into common formats
- Inadequacy of VDR performance standards to address functionality and usability standards for VDR software

# Lack of Recording during Blackout

VDR under normal power

- Bridge audio
- Engine and rudder operation
- GPS position
- Automatic Identification System (AIS)
- Chart plotter

VDR standards do not explicitly state other powered data needs to be recorded

# Lack of Recording during Blackout

## VDR during blackout

- Bridge Audio – Sending Data, Recorded
- ~~Engine Operation and Rudder - Disabled~~
- GPS position – Sending Data
- Automatic Identification System (AIS) – Sending Data
- Chart plotter – Sending Data

VDR standards do not explicitly state other powered data needs to be recorded

# Bridge/Engine Room Communications

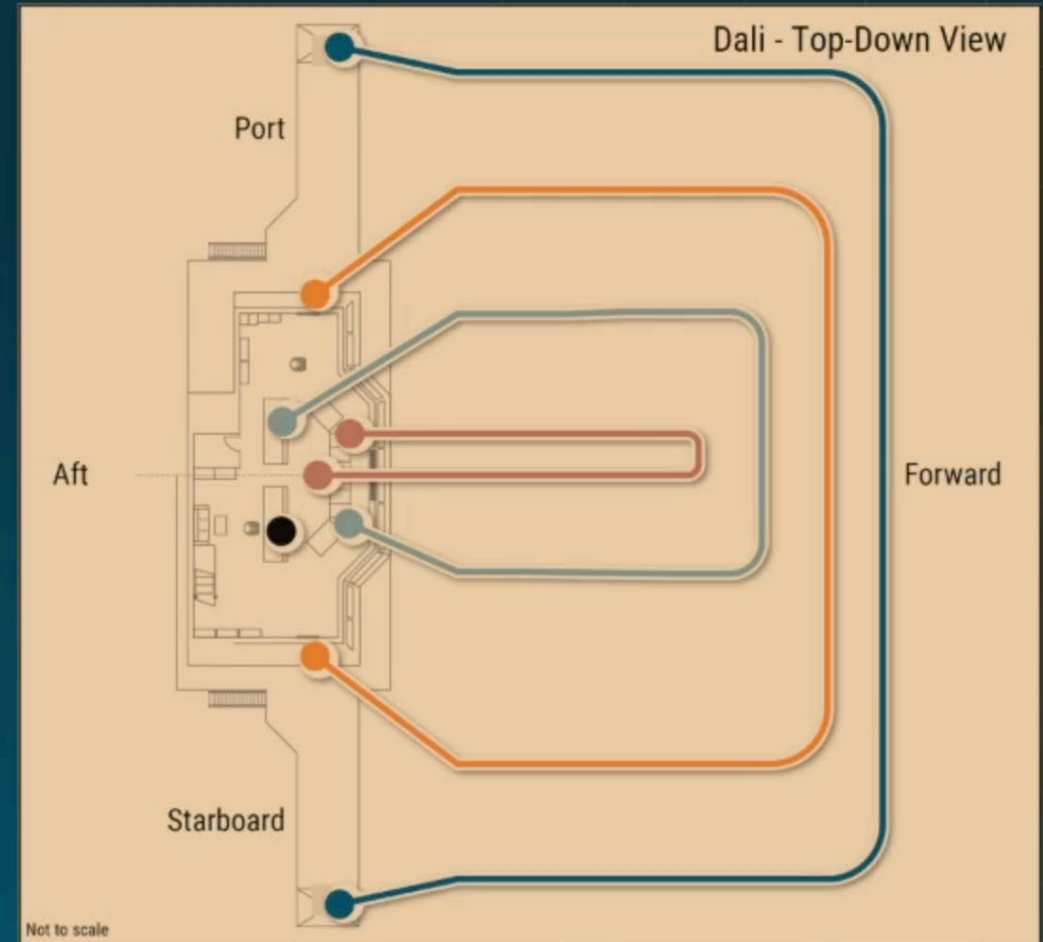
- Bridge/engine control room communications over wired telephone increased during emergency
- No requirement to record line; only bridge side of conversation recorded



(Source: NTSB)

# Recorded Bridge Audio is Destructively Mixed

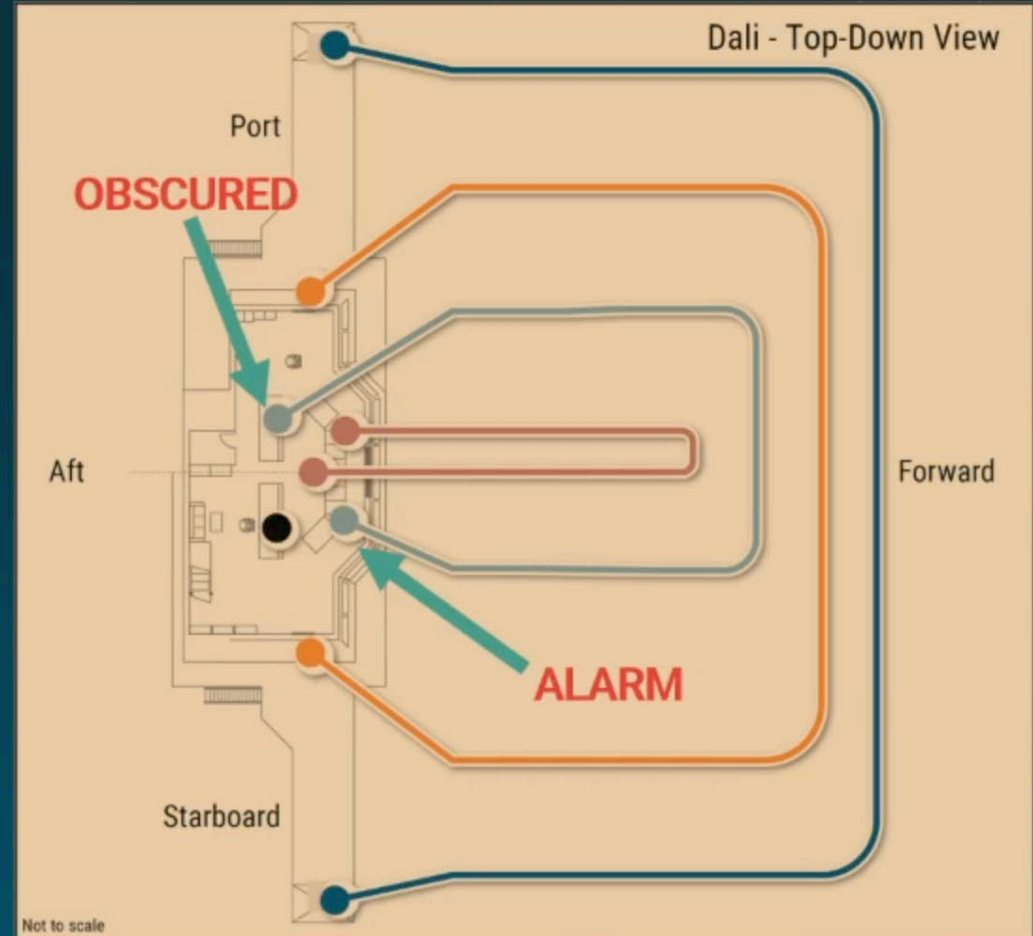
- Bridge audio recorded from numerous microphones
- Two audio types:
- Mono audio—mixes inputs as one channel, destructive
- Stereo audio—mixes inputs separately, non-destructive
- VDR standards allow destructive mixing
- 1990s technology limits still present in current VDR standards



(Source: NTSB)

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(Source: NTSB)

# VDR Software Deficiencies

- Standards for VDR software minimally defined
- NTSB could not download entire VDR data set on board the ship
- Software could not:
  - Playback audio efficiently
  - Enhance audio recordings
  - Create data graphs
- Users must export data, which results in thousands of files
- VDR users employ alternate software for playback

# What We Found: Voyage Data Recorder

- VDR was designed to shutoff data collection during the blackout
- Bridge/engine room communications were not required to be recorded
- VDR standards allow destructive audio mixing
- VDR standards do not define any functionality requirements for software
- What we propose:
  - One recommendation to the American National Standards Institute (ANSI)
  - One recommendation to the US Coast Guard