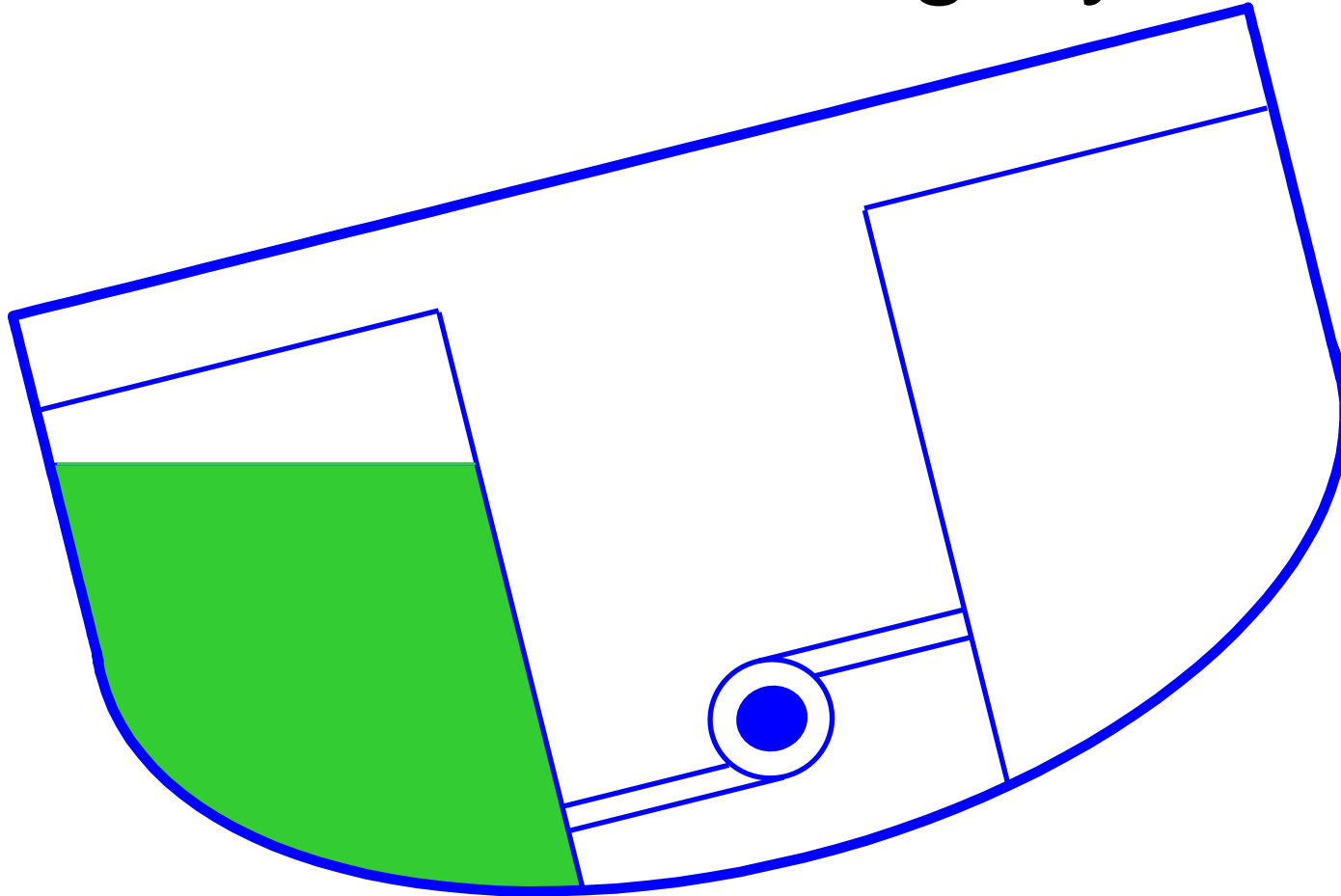


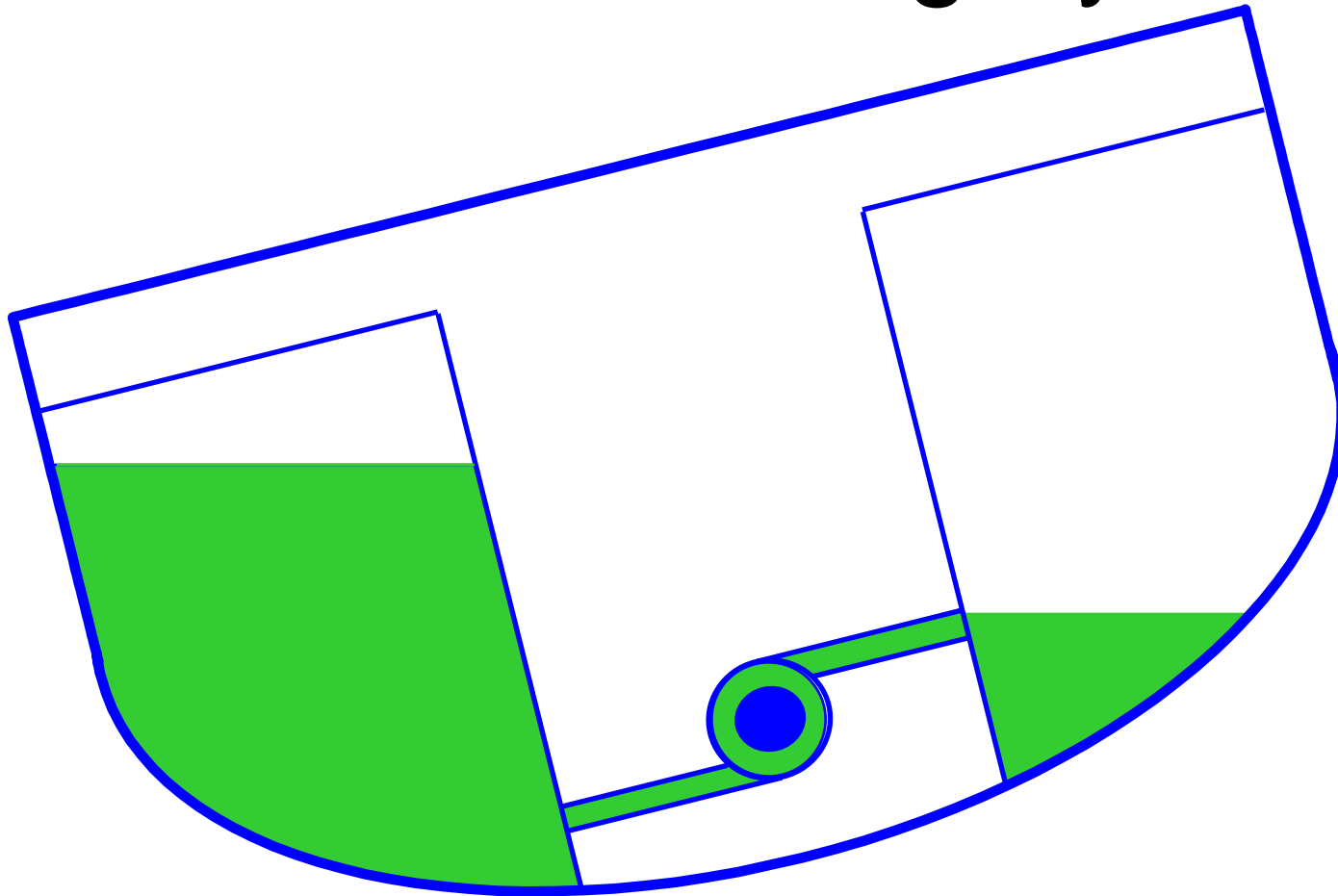
# Lesson 4.10

## Installed Ballasting Systems



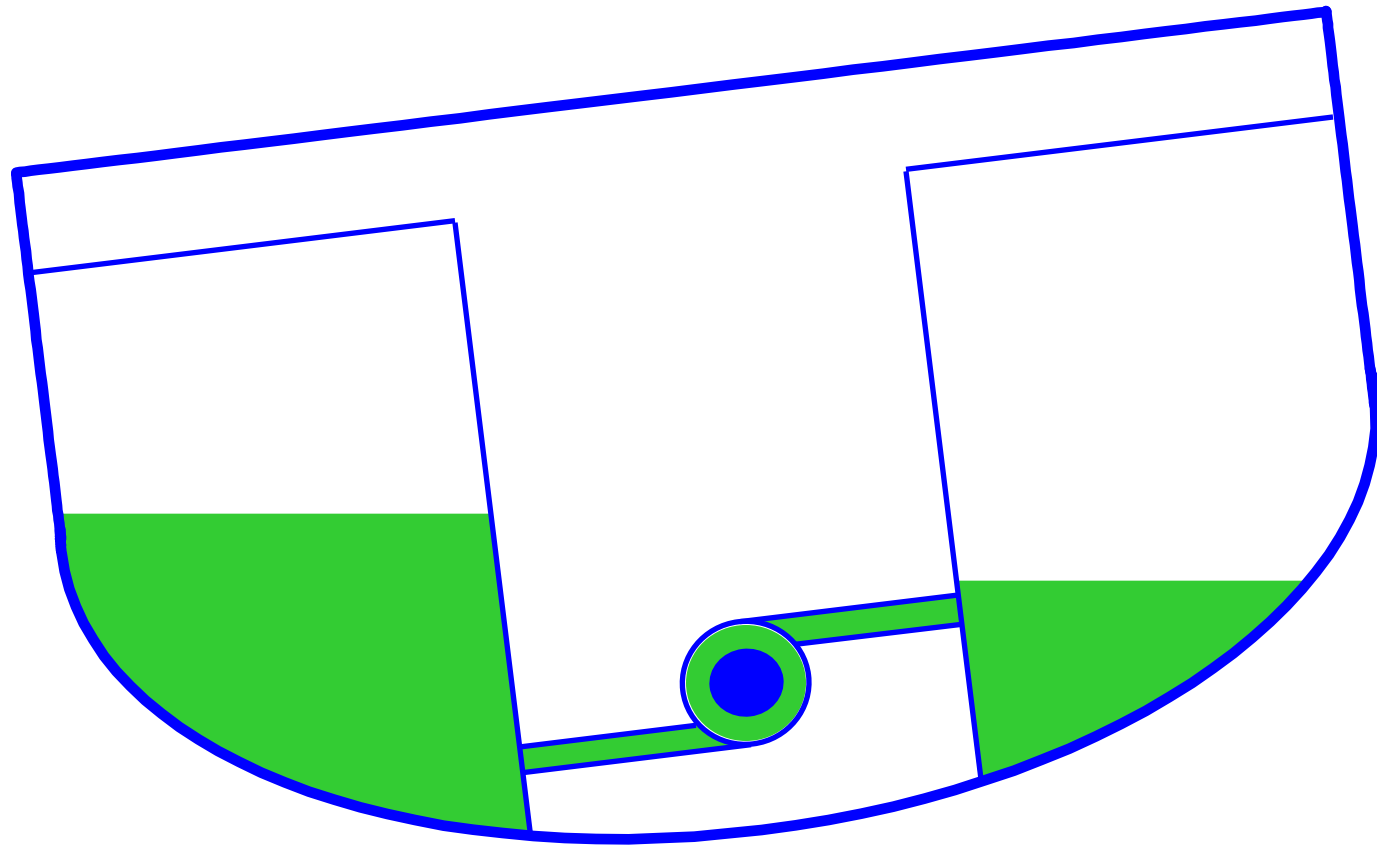
# Lesson 4.10

## Installed Ballasting Systems



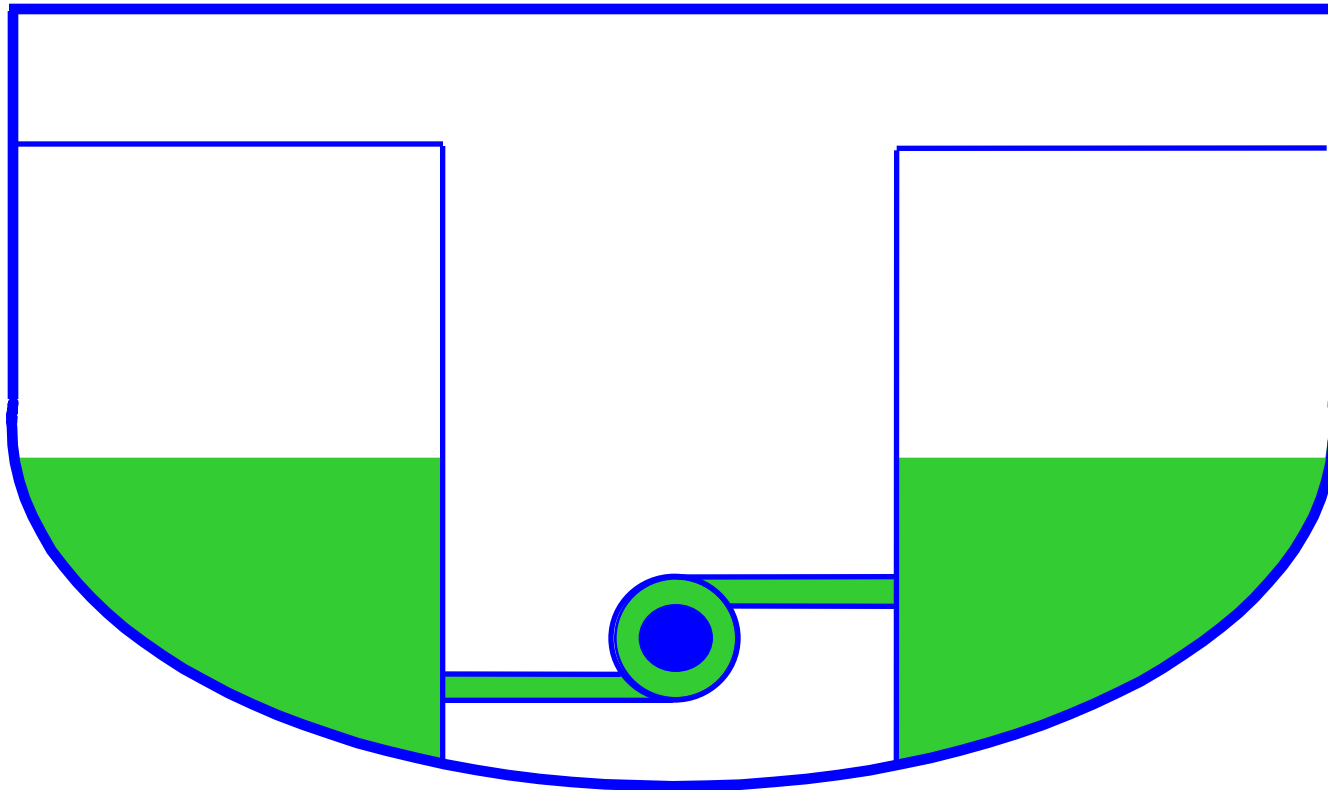
# Lesson 4.10

## Installed Ballasting Systems



# Lesson 4.10

## Installed Ballasting Systems



# SAILOR'S CREED

***“ I am a United States Sailor.***

***I will support and defend the Constitution of the United States of America and I will obey the orders of those appointed over me.***

***I represent the fighting spirit of the Navy and those who have gone before me to defend freedom and democracy around the world.***

***I proudly serve my country's Navy combat team with Honor, Courage, and Commitment***

***I am committed to excellence and fair treatment of all. “***

# Enabling Objectives

- **DESCRIBE** types and components of Ballasting Systems.
- **LIST** reasons for ballasting.
- **DESCRIBE** common arguments against ballasting.
- **STATE** DCA's responsibilities with respect to ballasting.
- **LIST** common INSURV problems w/ ballasting systems

# References:

- EOSS / EOP
- Liquid Loading Instructions
- DC Book Section II(a)
- NSTM 079 Volume 1
- NTTP 3-20.31

# REASONS FOR BALLASTING

- INCREASE WEIGHT LOW TO IMPROVE STABILITY
- ELIMINATE EXCESSIVE LIST / TRIM
- COUNTERFLOOD FOLLOWING DAMAGE TO OFF CENTER COMPARTMENT
- EXPLOSION ABSORPTION (CV & CVN)
- WET WELL OPERATIONS (AMPHIBS)
- GROUNDING *“Weigh the ship down hard”*
- SUPPRESS FREE SURFACE EFFECT



# AMPHIB OPS



# DEFINITION

- **BALLASTING** is the process of filling low compartments from the sea to improve ship stability or control list / trim.
- **BALLASTING** systems may be independent (**clean ballast**) or they may incorporate sections of the fuel and drainage systems (**dirty ballast**).

# TYPES OF BALLAST

- SOLID
- LIQUID

# SOLID BALLAST

- PERMANENT
- NORMALLY USED TO ELIMINATE INHERENT LIST
- TYPICAL MATERIALS:
  - CEMENT (OR "SEEMENT")
  - IRON
  - LEAD
- LIST OF SOLID BALLAST WILL BE INCLUDED IN SUMMARY OF FULL LOAD CONDITION OF SHIP'S DAMAGE CONTROL BOOK (SECTION II A)

“Intentionally Left Blank”

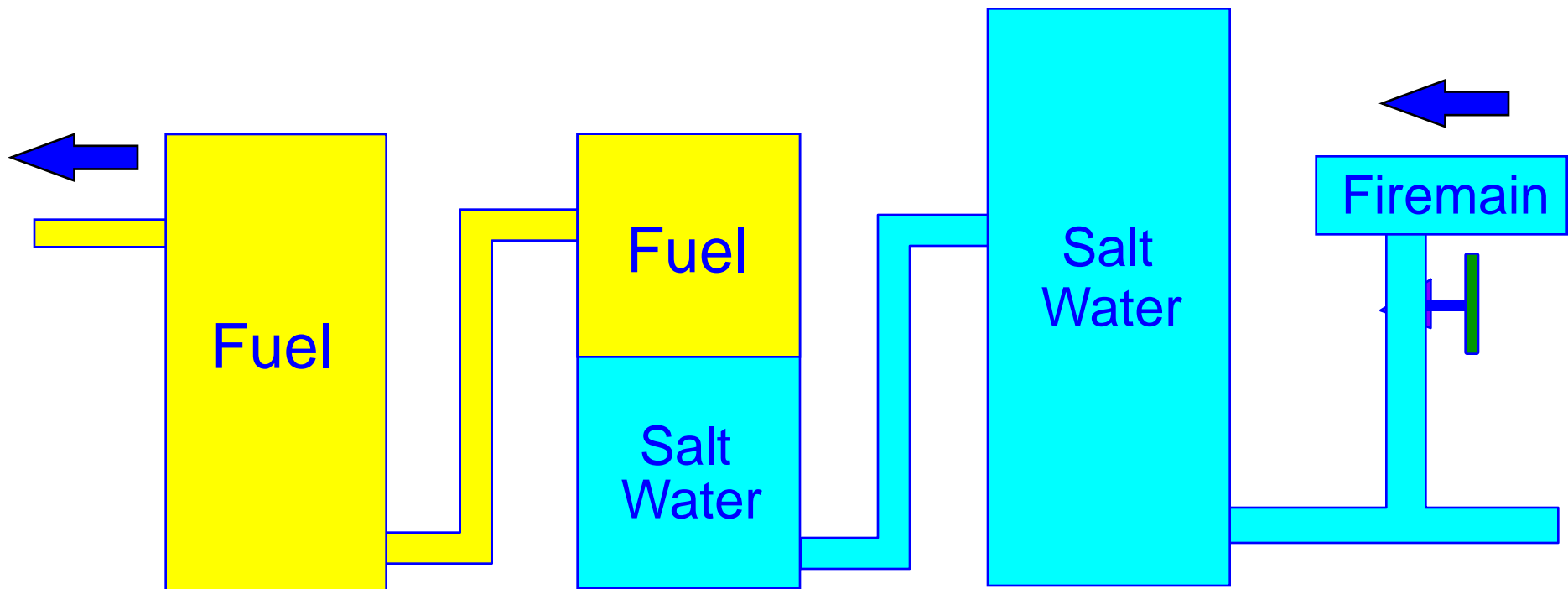
# LIQUID BALLAST SYSTEMS

- AUTOMATIC  
(FUEL OIL COMPENSATION)
- MANUAL SYSTEMS

Provides constant ballast for all liquid loading conditions.

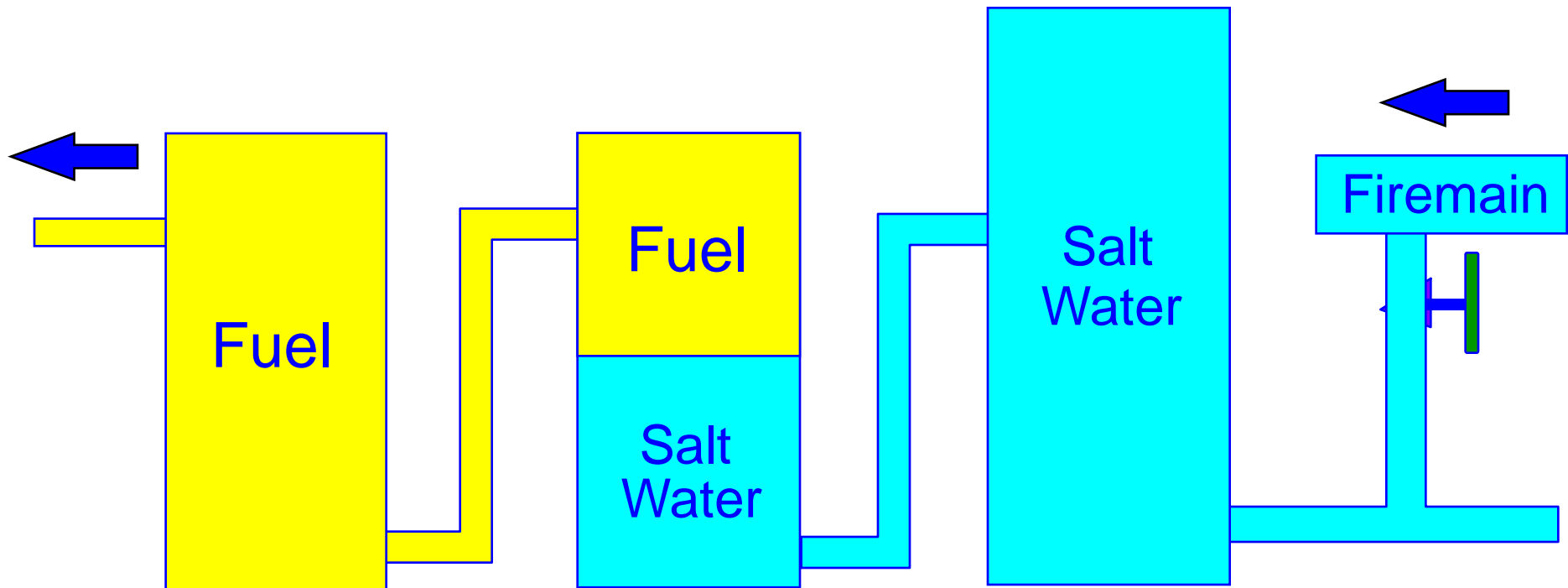
Supplied by the firemain. Pressure is reduced so as not to over pressurize the tanks.

Regulated by static head on salt water peak tank.



Fuel is replaced by salt water. Once drawn from storage tanks, the fuel is purified twice, first by a centrifugal purifier, then by a coalescer.

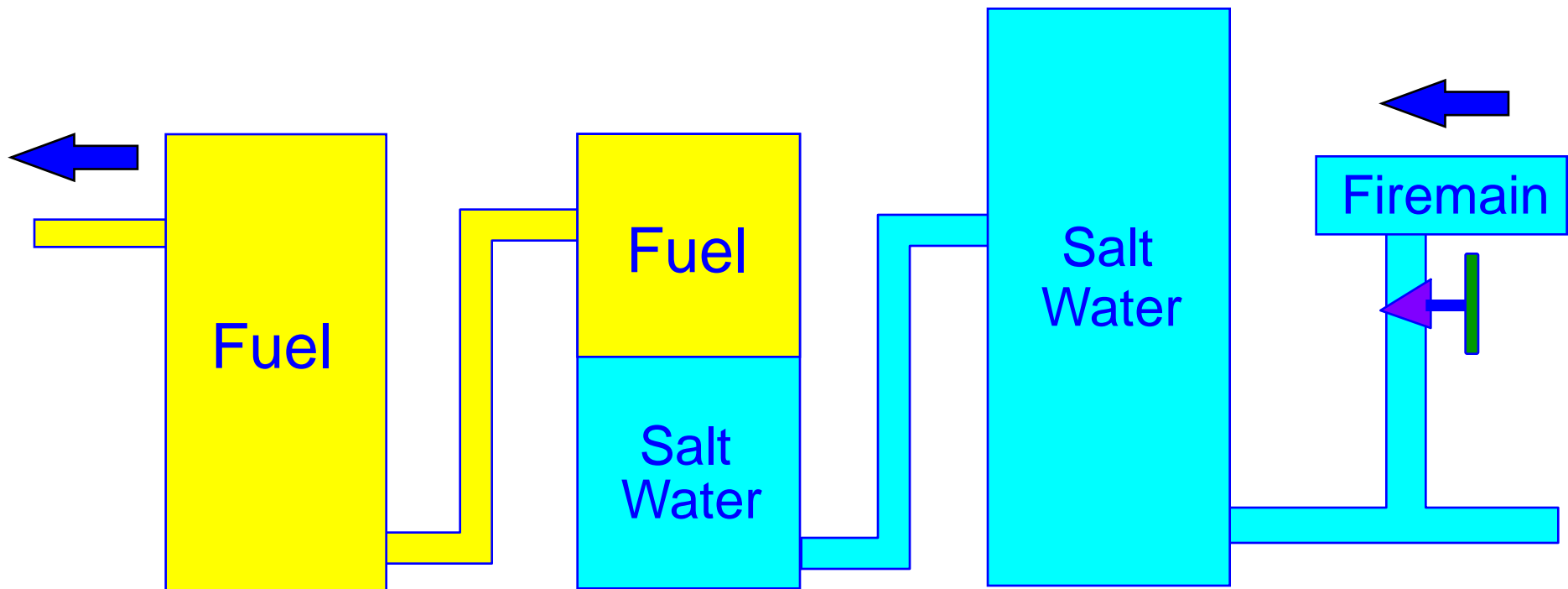
Systems use fuel purifiers and coalescers to maintain fuel quality, however, salt water will cause tanks to corrode faster.





Tanks are refilled by isolating the firemain, then pushing the salt water overboard with the fuel. Often, some fuel will discharge overboard with the ballast.

The ship will be **more stable** at lower fuel states.



# MANUAL BALLAST SYSTEMS

- INDEPENDENT
- FUEL TANK SYSTEMS

# INDEPENDENT SYSTEMS

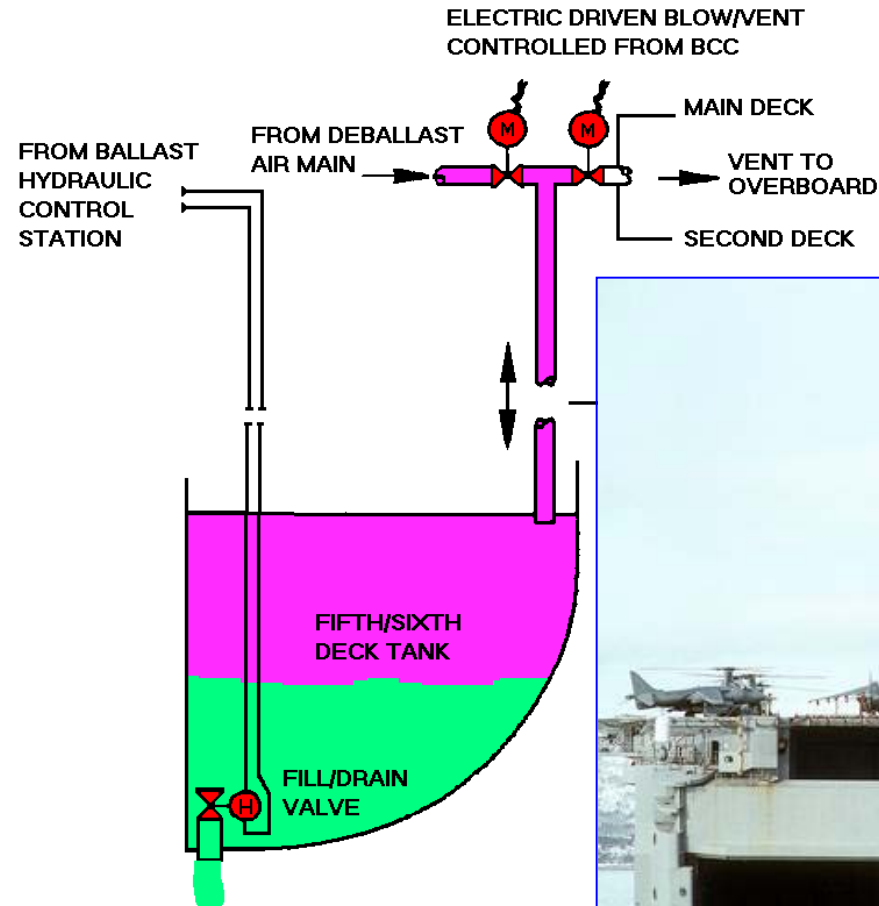
- Found on AO, CVN, LHA, LHD, LPD, WAGB, WMEC 270'
- Systems have their own tanks, piping, and pumps.
- Simple to operate.

# FUEL TANK SYSTEMS

- Found on AD, AS, FFG, LHA, LHD, LPD, WHEC, WMEC 210'
- Use firemain or auxiliary salt water systems to replace fuel.
- Tanks filled with ballast are logged 100% on the daily fuel and water report.
- CHENGs often discourage this practice because of fuel contamination.

# Typical 5<sup>th</sup> or 6<sup>th</sup> Deck Ballast Tank

- HPU:  
Hydraulic  
Power Unit
- Vent/blow  
valves operate  
in conjunction  
with sea valves  
to control  
filling and  
emptying of  
ballast tanks



# GUIDANCE FOR BALLASTING

- SECTION II(a) OF DC BOOK GIVES SPECIFIC BALLASTING INSTRUCTIONS.
- USCG DC BOOKS HAVE ACTUAL BALLASTING INSTRUCTION SECTION.
- USUALLY DESCRIPTION PAGE FOR LOADING CONDITIONS DISCUSSES STATUS OF BALLAST TANKS.
- EOSS USED TO VERIFY VALVE ALIGNMENT FOR BALLASTING.

# LIQUID LOADING INSTRUCTION

- INCLUDED IN DC BOOK. USUALLY ALSO FOUND ON DC DIAGRAM #1.
- CLEAN BALLAST TANKS WILL BE SOLID COLORS (LIGHT GREEN).
- DIRTY BALLAST TANKS WILL BE SPLIT (HALF YELLOW / HALF GREEN).

# ARGUMENTS AGAINST BALLASTING

- "It Will Destroy My Tanks"- MPA
- "I've Never Seen It Done Before. It Must Not Be Necessary." - CHENG
- "When We Pump Out The Ballast Tanks, It Will Pollute The Water." - CO



# BALLASTING RESPONSIBILITIES OF DCA

- Maintain Awareness Of Ship's Liquid Loading Condition. (Full Load - Min Ops)
- Determine The Risks Associated With Violating LLI And Report To CHENG If Necessary.
  - HOGGING AND SAGGING STRESSES.
  - SUBMERGING LIMITING DRAFT MARKS.
  - SURVIVABILITY OF BEAM WINDS AND SEAS.
  - MAINTAIN ADEQUATE METACENTRIC HEIGHT.
- Ensure Most Current Fuel And Water Report Is Posted Daily At Each Repair Locker and DC Central.



# DC Systems Inspected

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- **Main & Secondary Drainage**
- **Fixed firefighting (AFFF, Halon, CO2)**
- **CBR (detection, clothing, CMWD)**
- **Portable firefighting (OBA/SCBA, extinguishers, fire stations, locker inventories)**
- **Watertight closures (doors, hatches, scuttles)**
- **Portable DC equipment (P-100, ESP, etc)**
- **Ballast / De-ballast**



# Monday of INSURV

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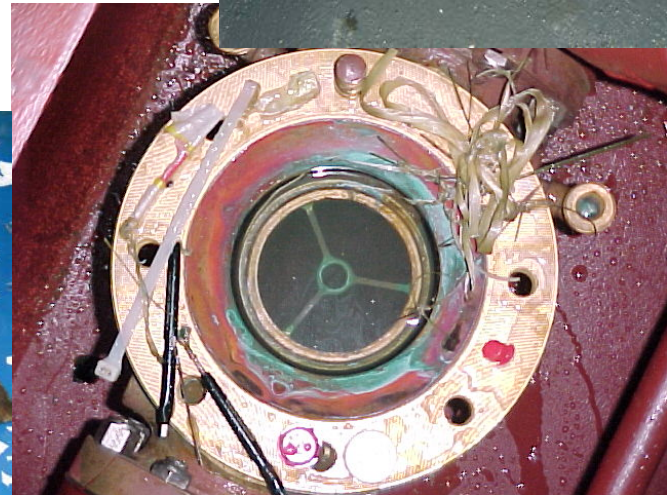
- Documentation ready & available
- Mainspace Walkthrough (DC, escape trunks)
- Halon (Time delay check)
- AFFF (Hose reels, station checks)
- Main Drainage (Using remote valves, verify suction)
- CO2 Flooding in Main Spaces
- P-100's/Sub pumps
- Repair 5 Inventory and Repair 5 SCBAs (100%)
- SCBA Charging Stations (50% must pass air quality)
- Ballast pre-checks
- CPS (~ 1630)



# Main Drainage

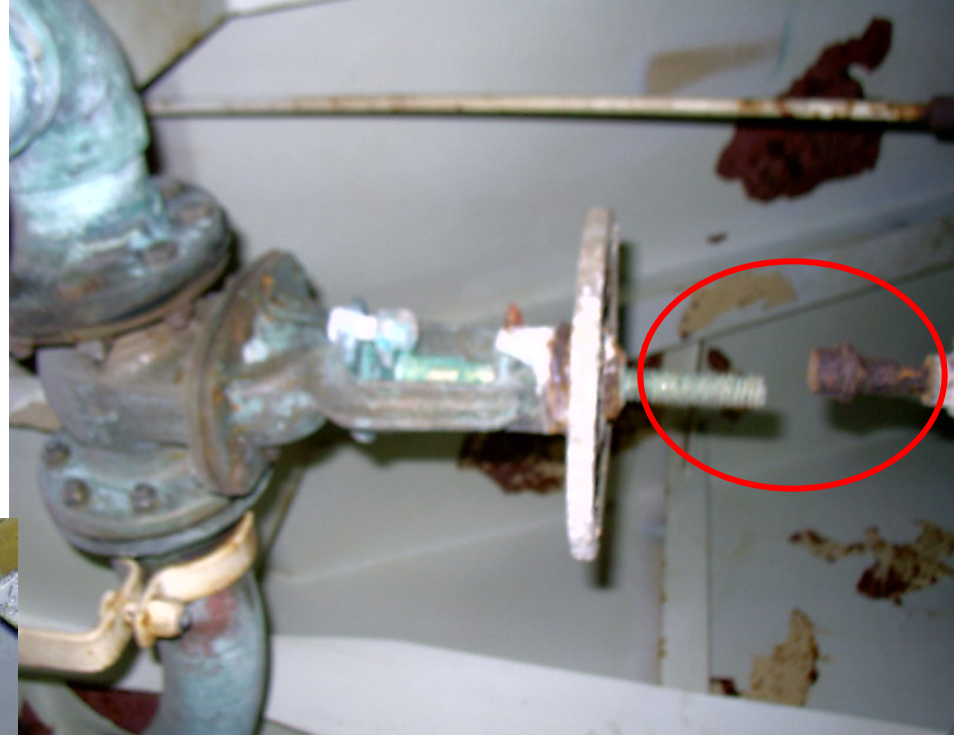
- **Issues**

- Inability to remotely dewater.
- Valve leak by, flooding hazards.
- Inoperative motor/hydraulic operators.
- Alignment issues.





# Valve Corrosion





# MAIN DRAINAGE DATA

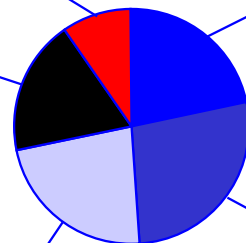
(frequency of discrepancies)

**F/M ACTUATING  
& OVERBOARD  
DISCHARGE  
FLOODING  
HAZARD DUE  
TO VLV LEAK-  
BY  
19%**

**EDUCTOR  
CHECK VALVE  
LEAKED BY  
10%**

**VALVE  
INOP/SEIZED  
22%**

**VLVS COULD  
NOT BE  
OPERATED  
REMOTELY  
23%**



**VLV POSITION  
INDICATORS  
WERE INOP  
26%**



# MAIN DRAINAGE DATA

## (Types of discrepancies)

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### 230104Z JAN 06 DCRA 2006-02 MAIN AND SECONDARY DRAINAGE SYSTEMS

“5. COMMONLY OBSERVED DISCREPANCIES ARE:

- VALVES TIGHTENED TO COMPENSATE FOR LEAK BY TO THE POINT THAT REMOTES CANNOT BE OPERATED.
- VALVE LEAK-BY.
- VACUUM GAUGES INOPERATIVE.
- INCORRECT RANGE GAGES INSTALLED.
- MISSING BILGE POCKET GRATES & SCREENS.
- CHECK VALVES FOULED BY DEBRIS.
- REMOTE OPERATORS INOPERATIVE OR NOT CONNECTED.
- MVHC STATIONS NOT MAINTAINED.
- NOT FOLLOWING EOSS.
- WEAK LEVEL OF KNOWLEDGE DURING DEMONSTRATIONS.
- LACK OF OWNERSHIP.”



# BALLASTING SYSTEMS

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## ISSUES

- Ballasting system performance was below the standard as defined by the original system design specifications (EOC- .58).

## CAUSES

- Ballasting support equipment in poor material condition (DBACs, Ballast HPUs, stern gates, air main unloaders, tank relief valves, sea valves).
- Ballast control system faults either in the Control Console or signal path to the remote operating mechanism.
- Incomplete coverage of valve maintenance PMS (tank relief valves and air main unloaders).

## RECOMMENDATIONS

Establish new ICMP class specific assessment procedure to fully test ballasting system and maintain a comprehensive list of system maintenance requirements.

- TYCOM continue to observe Ballasting/Deballasting operations as part of the IDTC.
- **Ensure all ballast related system equipment is covered by PMS** (e.g. Air Main Unloader valves).
- Ensure DCAs in the pipeline for amphib ships are aware of the responsibilities of the Ballasting Officer as defined in CNSL/CNSPINST 3340.3C, Wet Well Operations Manual.



# Review & Take Away Points

- R div and E div and A div....*Who owns DBACs/tanks/TLIs/console/valves?*
- **Don't** let ballast system operating and mechanical expertise reside in one person!
- **Exercise** the system so you know what to expect!



# Quiz...

**What are the types of LIQUID Ballasting systems?**

- *Dirty* (Fuel + Saltwater)
- *Clean* (Saltwater only / Separate tanks)
- *Automatic* (Fuel Compensating)
- *Manual* (Must turn valves energize pumps)

# Quiz...

- In an AUTOMATIC liquid Ballasting System... As we consume fuel will we get more stable?
  - **YES.** Since Saltwater weights more than Fuel – **G will move down** due to added weight low!!