

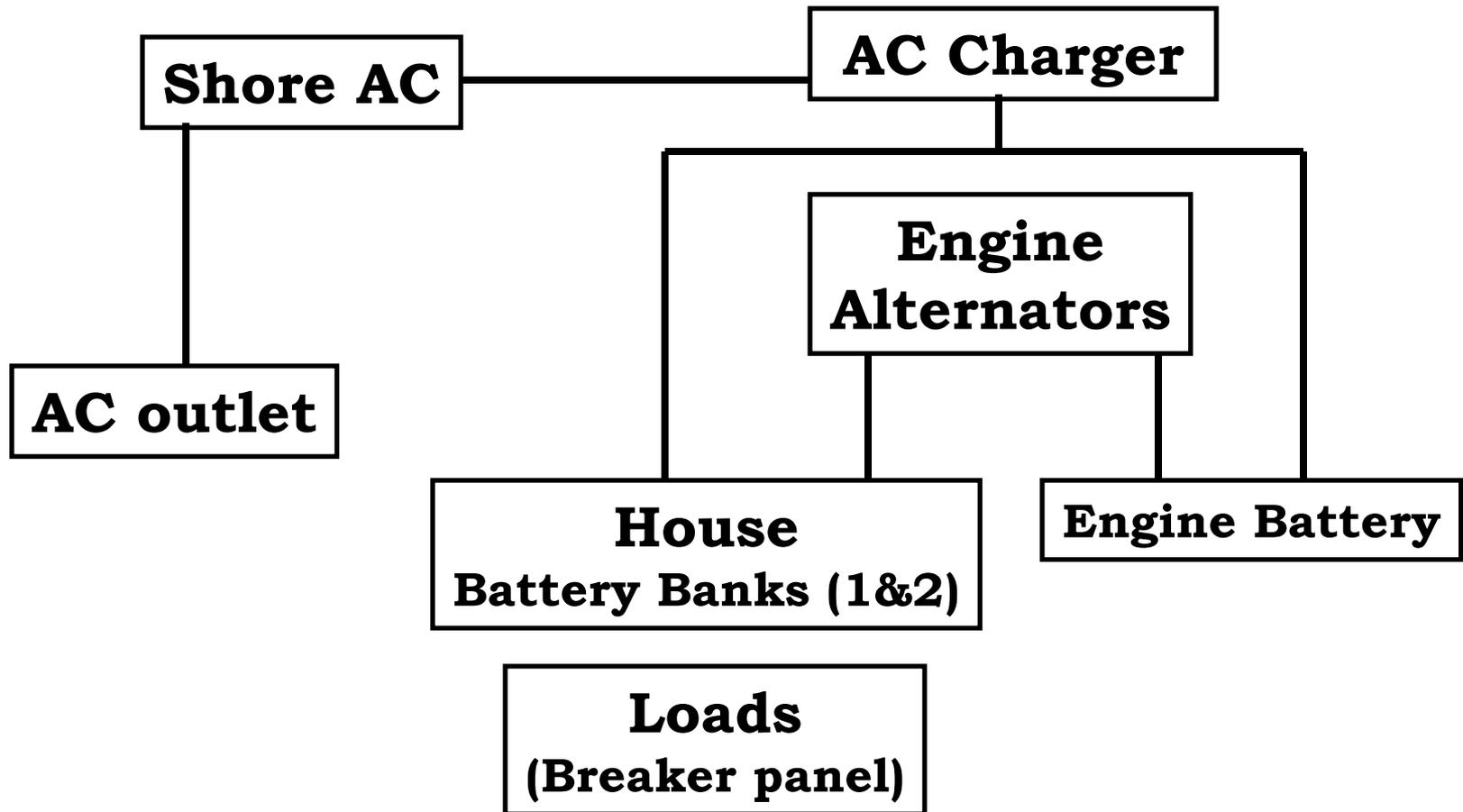


# **Electrical Systems**

**SCRF Winter Training**



# Navy 44 Electrical System





# SAFETY

- **The electrical system can kill you**
- The 120 VAC can electrocute you
- The 12 VDC can burn you
- The rotating engine components can sever your fingers or hands



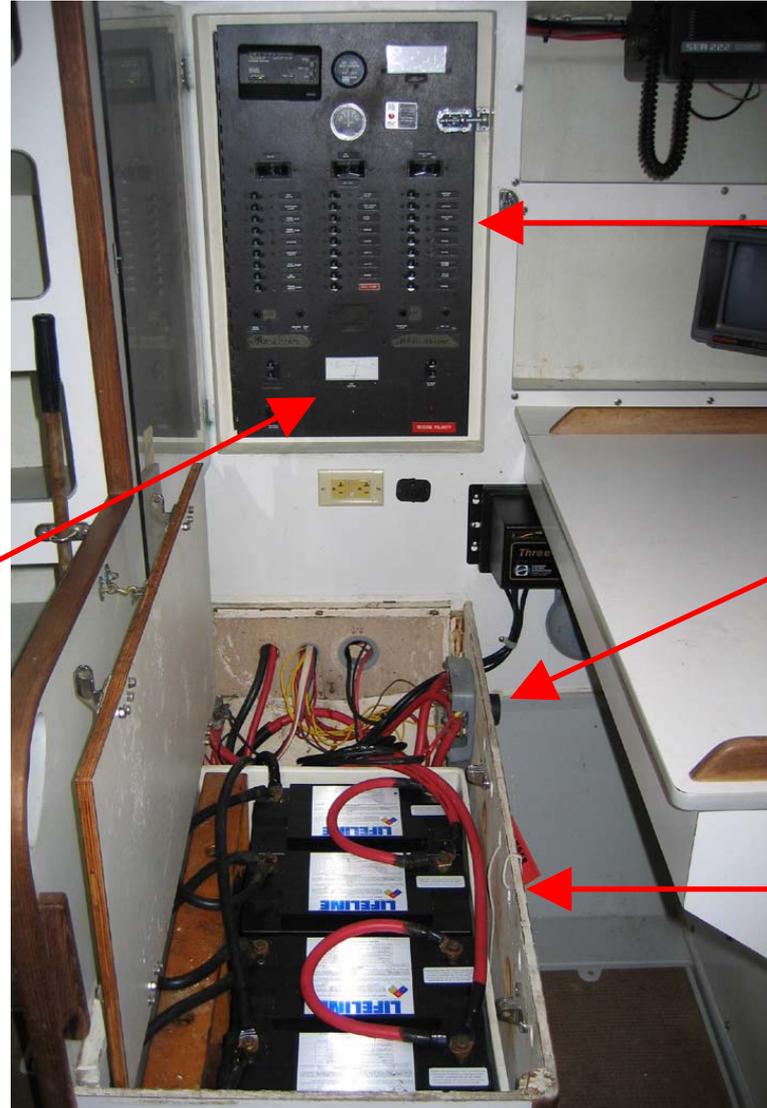
# Shore Power (110 VAC)



- When boarding the boat, the shore end of the power cord is disconnected first
- When securing the boat, the shore end is connected last



# Switch Board



**Switchboard**

**Battery switch**

**Battery box**

**110 VAC**



# Getting Underway

- Power up DC switchboard
  - Shore power circuit breakers **OFF**
  - **THEN DISCONNECT SHORE END OF 120 VAC POWER CABLE**
  - Ship Service (House) Battery Switch to **Both**
  - Main DC breaker **ON**
  - Alternator field breakers **ON**



# Shore Power AC Breakers



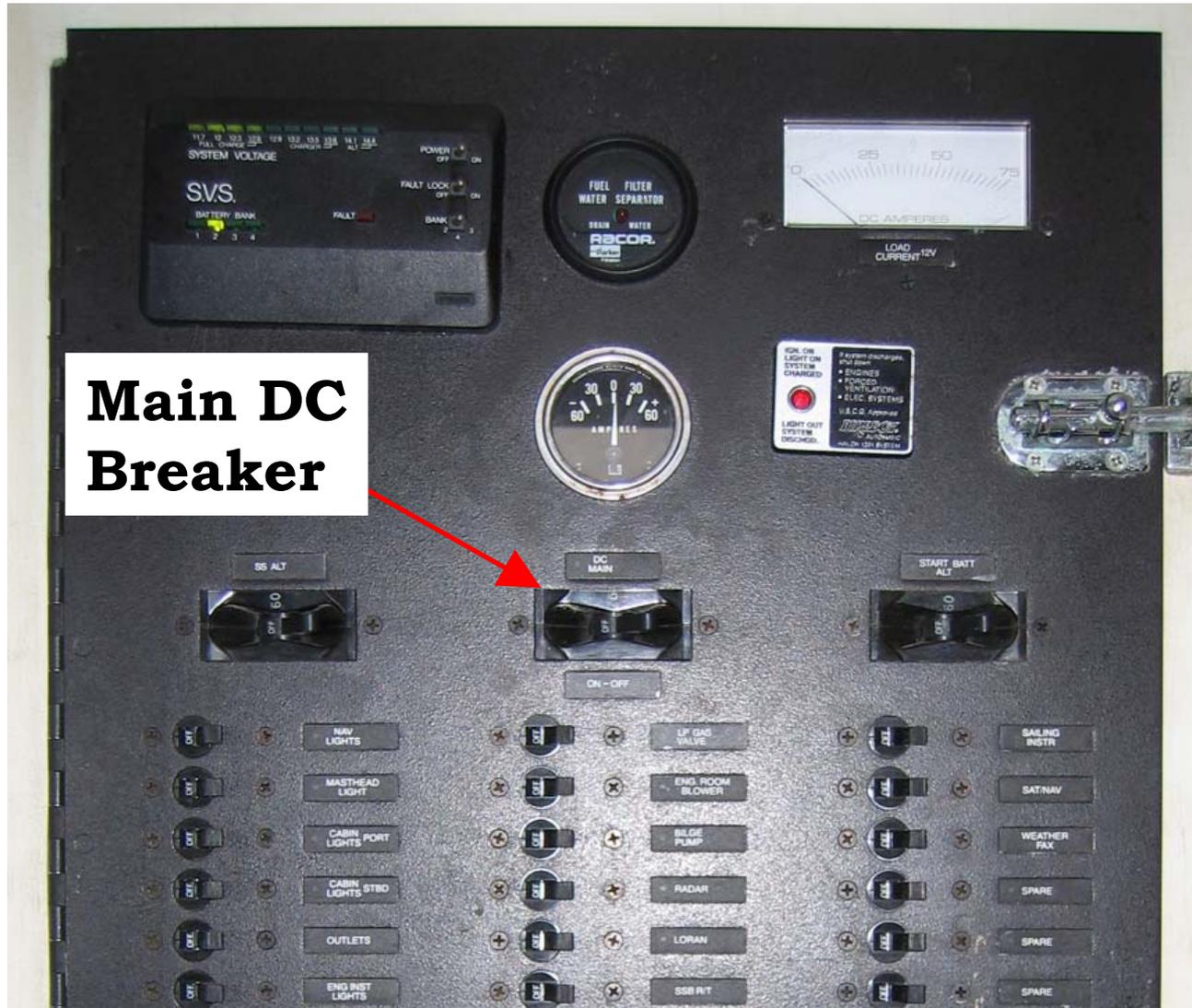


# House Battery Switch





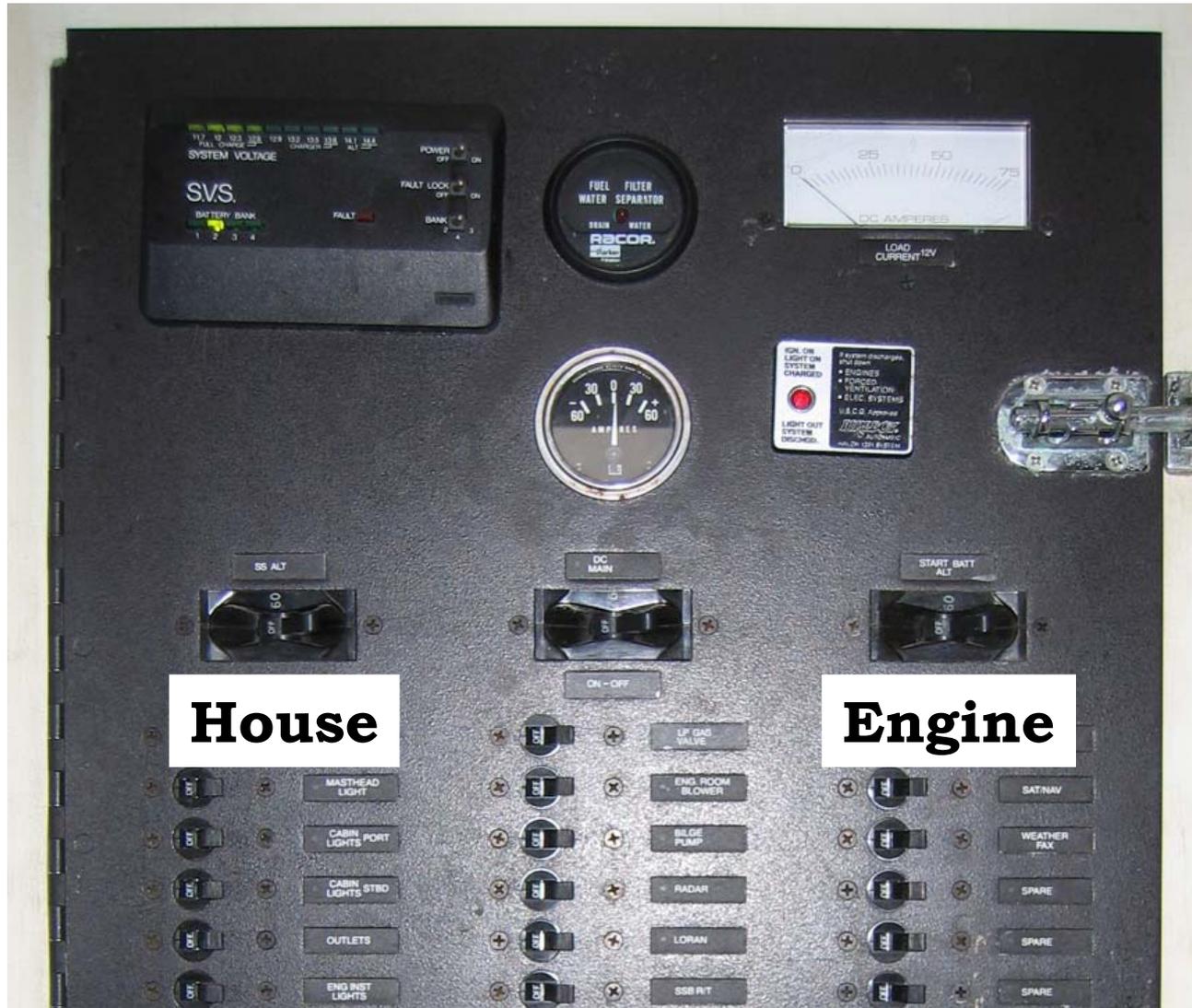
# Main Panel Breaker



**Main DC Breaker**



# Alternator Breakers



**House**

**Engine**



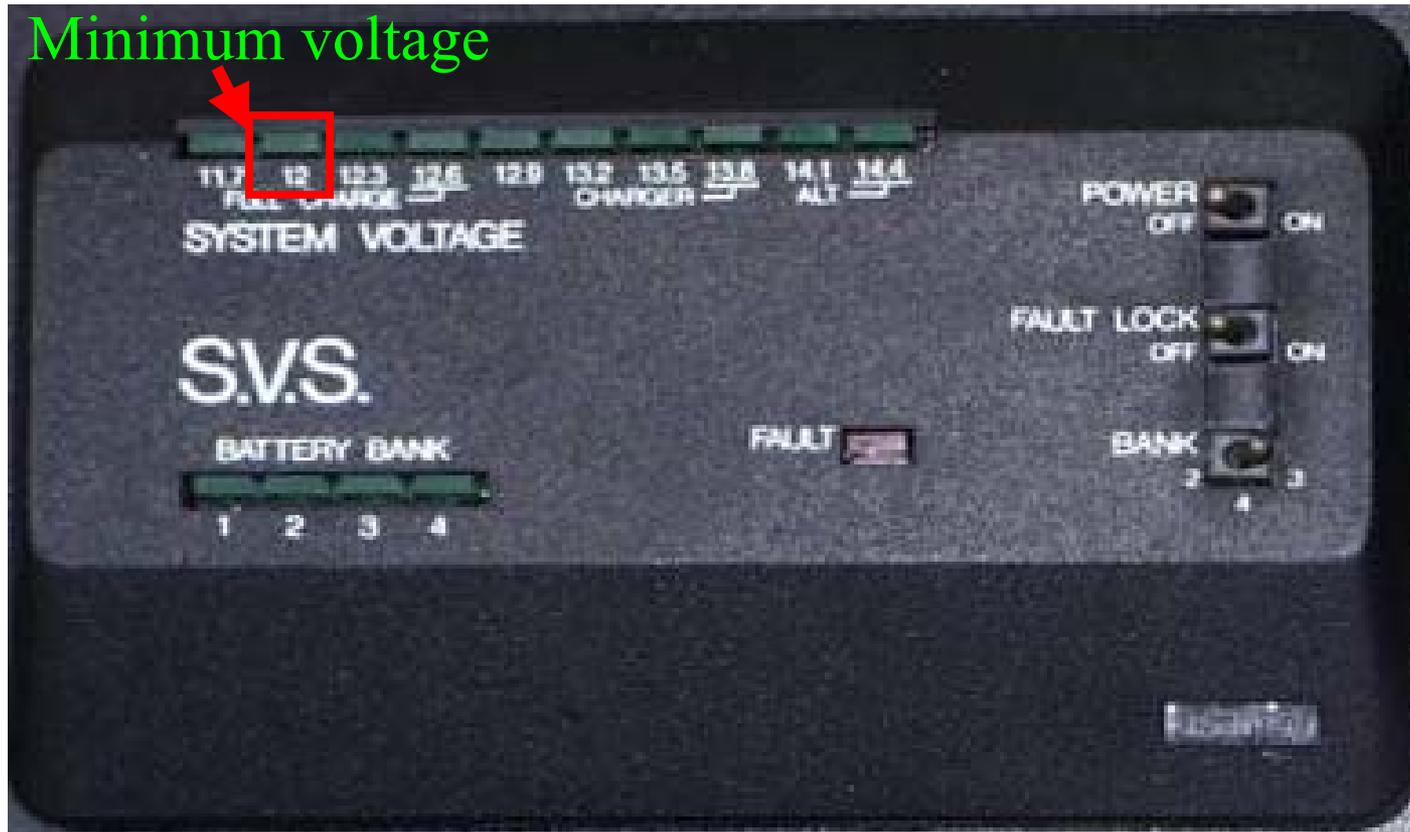
# Getting Underway II

- Verify battery bank 1&2 status with the SVS
- Log voltages
- Do not move engine battery switch from OFF until engine inspections are complete



# System Voltage Status

1 = House Bank 1      2 = House Bank 2      3 = Engine Start



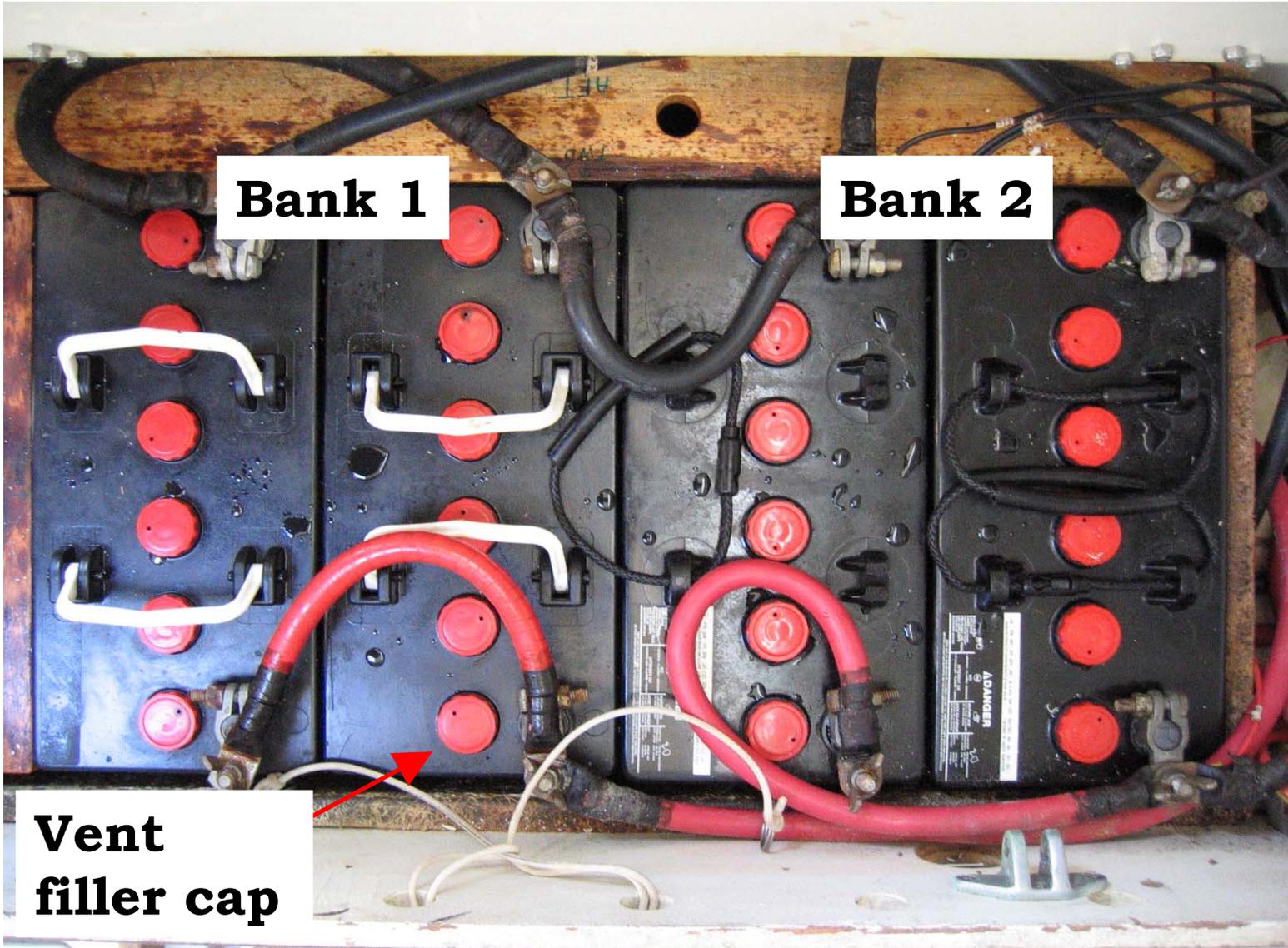


# Battery Box





# Battery Box



**Bank 1**

**Bank 2**

**Vent  
filler cap**



# Engine Battery





# Individual Electrical Systems

- Individual electrical systems are energized and secured by turning on or off **system breakers** at the **electrical panel**
- Always verify component power switch status



# System Circuit Breakers





# Battery Operation Underway

- When the engine is operating, the alternators must be on and connected to a battery
- If the alternators are not connected to a battery they may be burned out
- If a battery bank is not selected by the battery switch, it is NOT being charged



# How to Switch Batteries

- After the battery switch is turned on, battery banks are selected by always going through BOTH



# House Battery Switch





# Battery Operation Underway

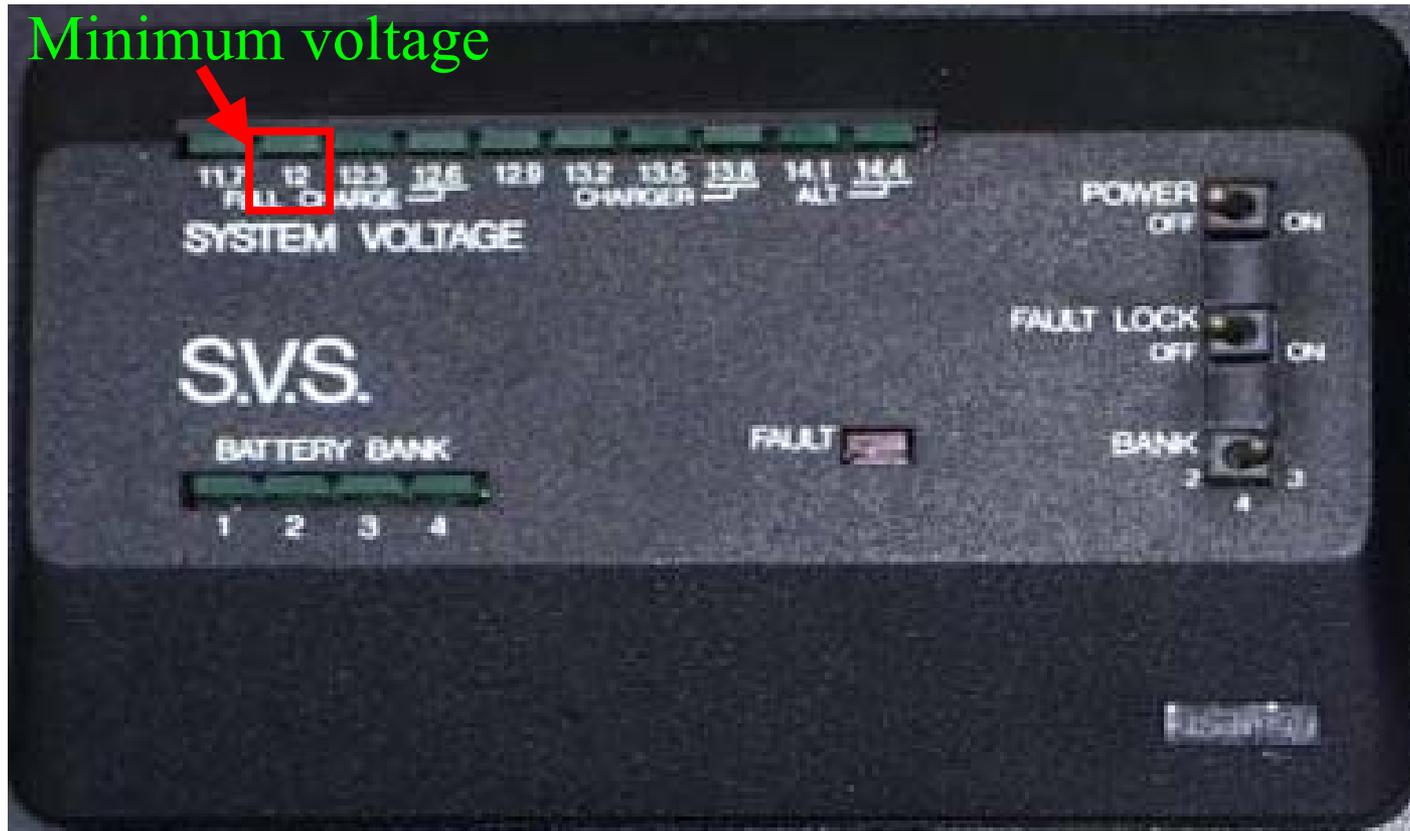


- Batteries should never be operated under 12 volts as indicated by the SVS
- When 12 VDC is reached, the engine should be started and charging begun



# System Voltage Status

1 = House Bank 1      2 = House Bank 2      3 = Engine Start





# Battery Operation Underway



- Battery voltage should be logged hourly
  - Time, battery banks, voltage
- Length of service from a battery bank is dependant on the load being drawn
- Failure of a battery bank is indicated by a short length of service



# System Loads

- |                |         |               |        |
|----------------|---------|---------------|--------|
| • Nav (10)     | 6       | • Tricolor    | 3      |
| • Cabin lights | 6       | • Fans        | 6      |
| • Bilge pump   | 15      | • MSD pump    | 20     |
| • VHF          | 1.2/6.3 | • SSB         | 2.5/17 |
| • WEFAX        | 1.2/2.2 | • Radar       | 4.2    |
| • Loran        | 0.8     | • B&G         | 0.66   |
| • Reefer       | 6.8     | • Water pumps | 6      |



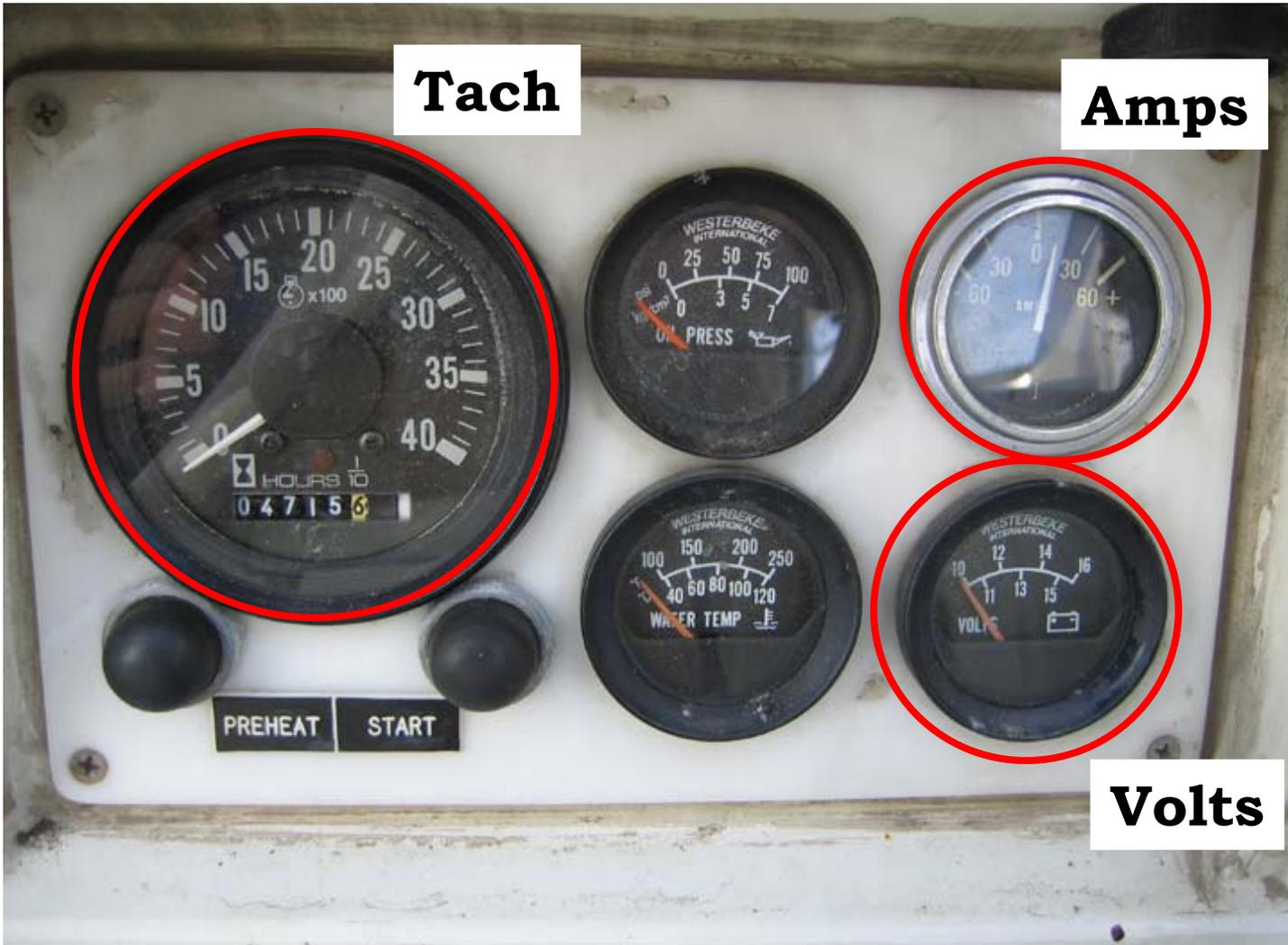
# Engine Starting Battery



- Verify starting alternator field breakers on
- Charging current and voltage is indicated on the engine instruments located on the stbd side of the helm
- The engine tach is derived from the engine alternator field circuit



# Verification of Alternator Function



**Tach**

**Amps**

**Volts**

PREHEAT    START



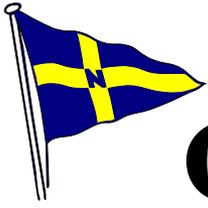
# Alternator Circuit

- The alternators will operate only if oil pressure exceeds the pressure required to deactivate the alarm switch
- Should the oil pressure switch fail, and the engine oil is functioning, the switch will have to be bypassed or replaced for the associated alternator to function

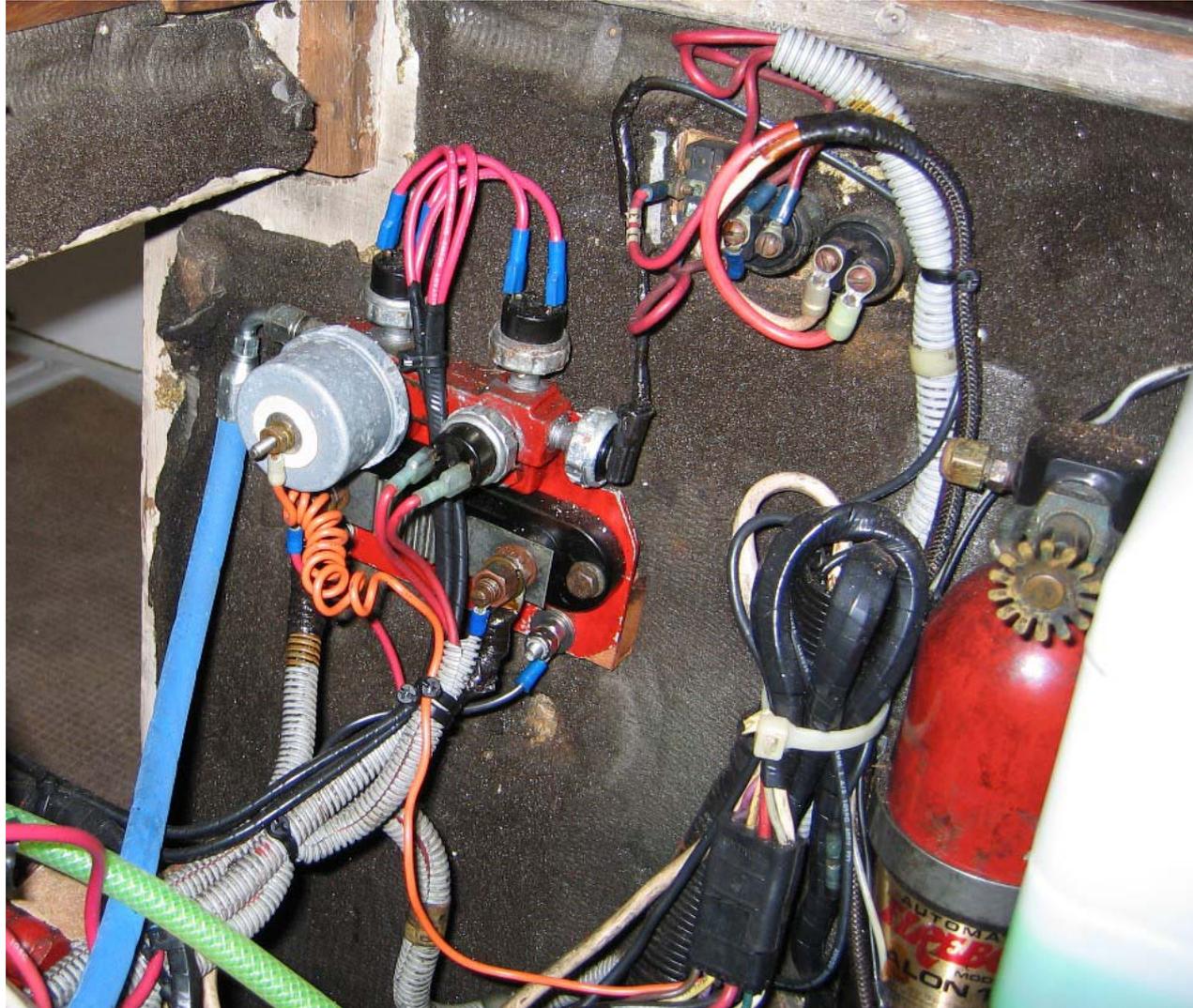


# Oil Pressure Switch Failure

- Oil pressure switch failure is indicated by a proper oil pressure gauge reading
- An alternator is not operating
  - Low SVS voltage readings for associated banks
  - Amp meter is not indicating a charge
    - Breaker panel for House alternator
    - Eng inst panel for Eng start alternator
  - Tachometer not functioning (Eng start alt)



# Oil Pressure Switch Location





# Securing the Electrical System

- Secure individual system breakers
- Secure the panel
- Turn off the alternator field breakers
- Turn off the battery switches
- Properly rig the shore power cable
- Verify polarity
- Turn on the 120 VAC panel breakers



# Shore Power AC Breakers





# Marine 12 VDC Battery



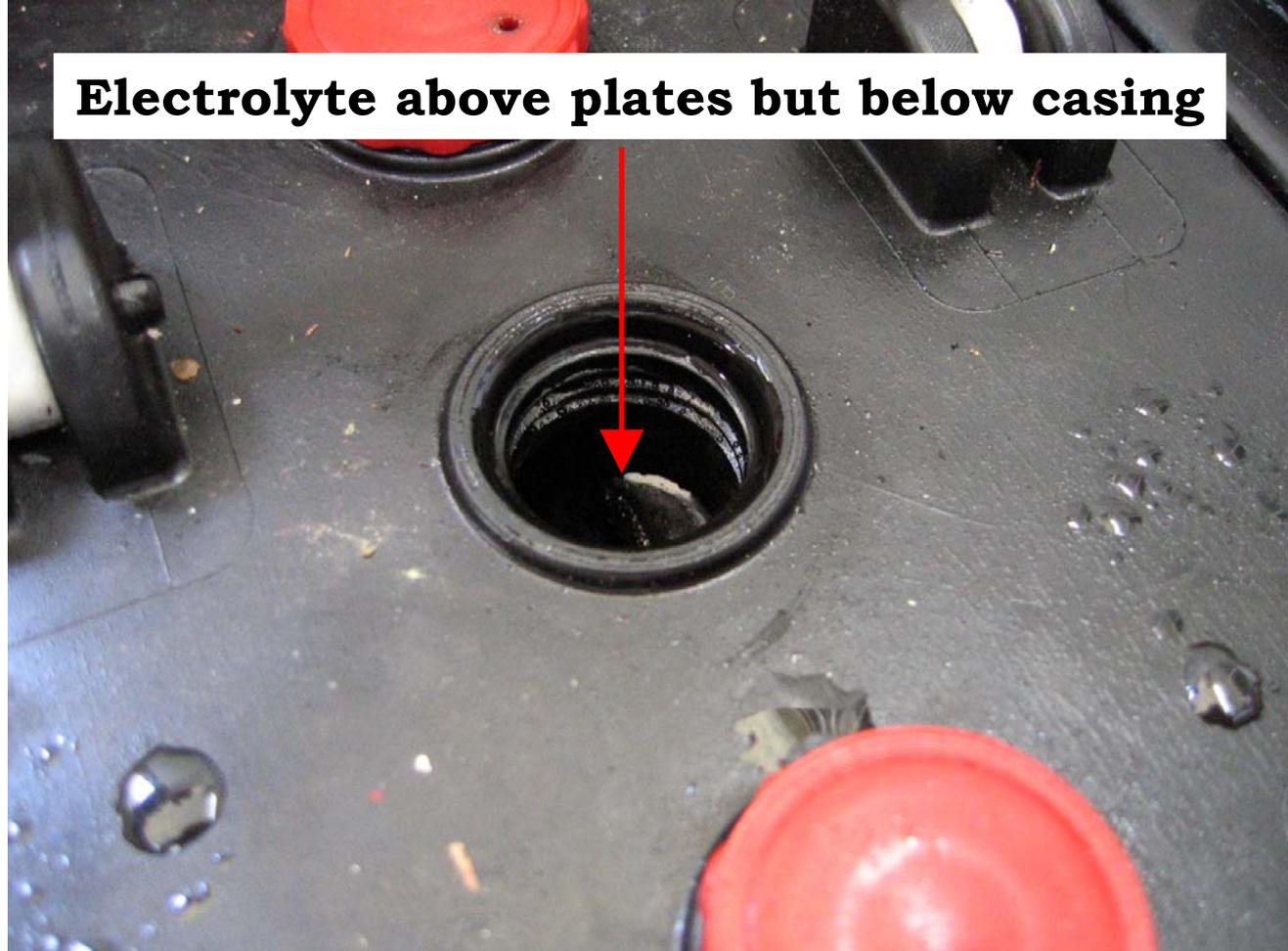


# Marine 12 VDC Battery





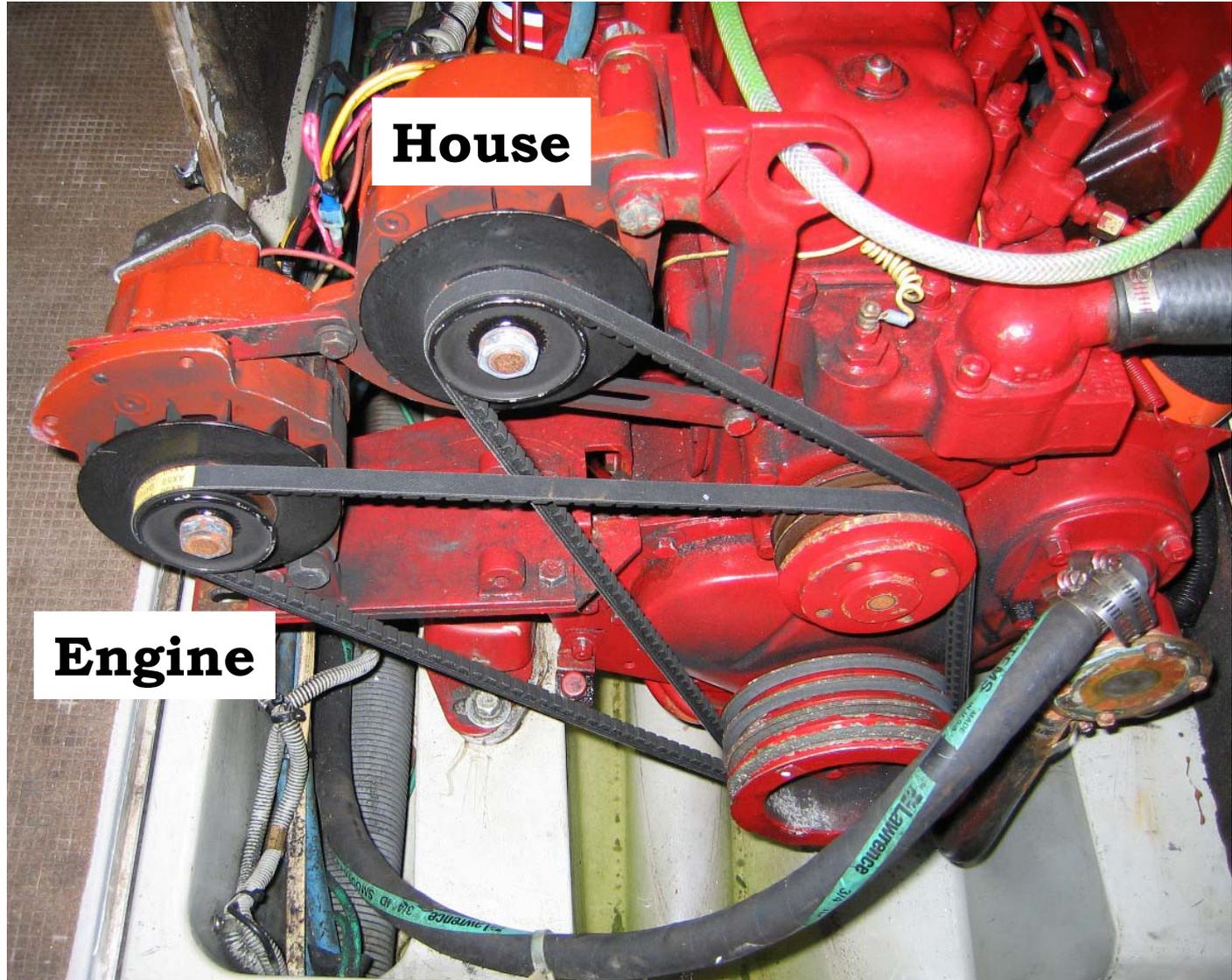
# Correct Electrolyte Level



**Electrolyte above plates but below casing**



# Alternator

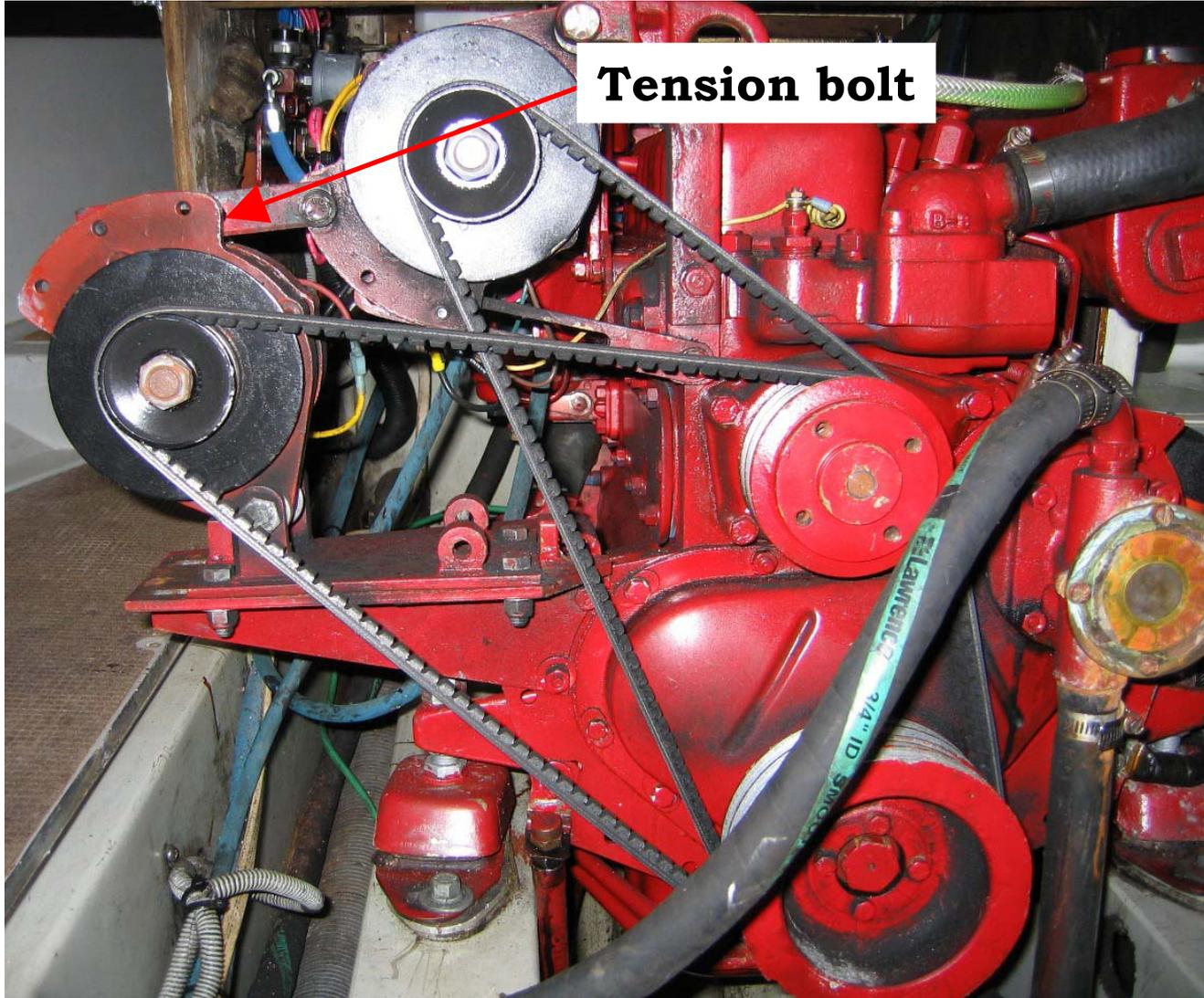


**House**

**Engine**



# Alternator



**Tension bolt**



# Verification of Alternator Function



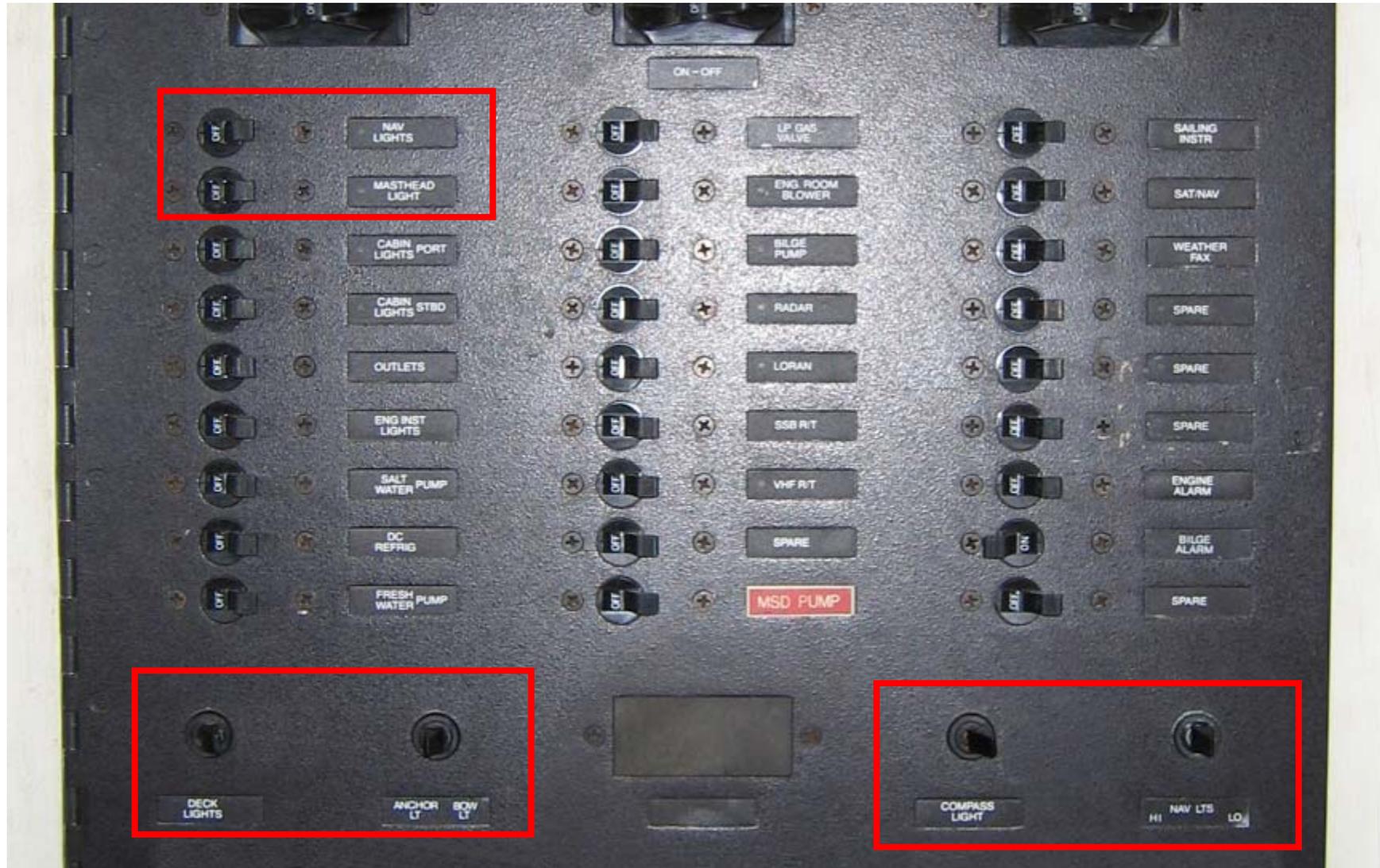


# Navigation Lights

- Nav lights are turned on from sunset to sunrise, and in restricted visibility
- Anchor, steaming and deck lights are also considered nav lights on the panel



# Nav Light Breakers



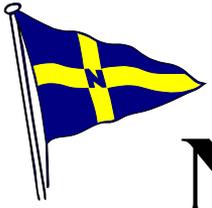


# Nav Light Breaker Configuration

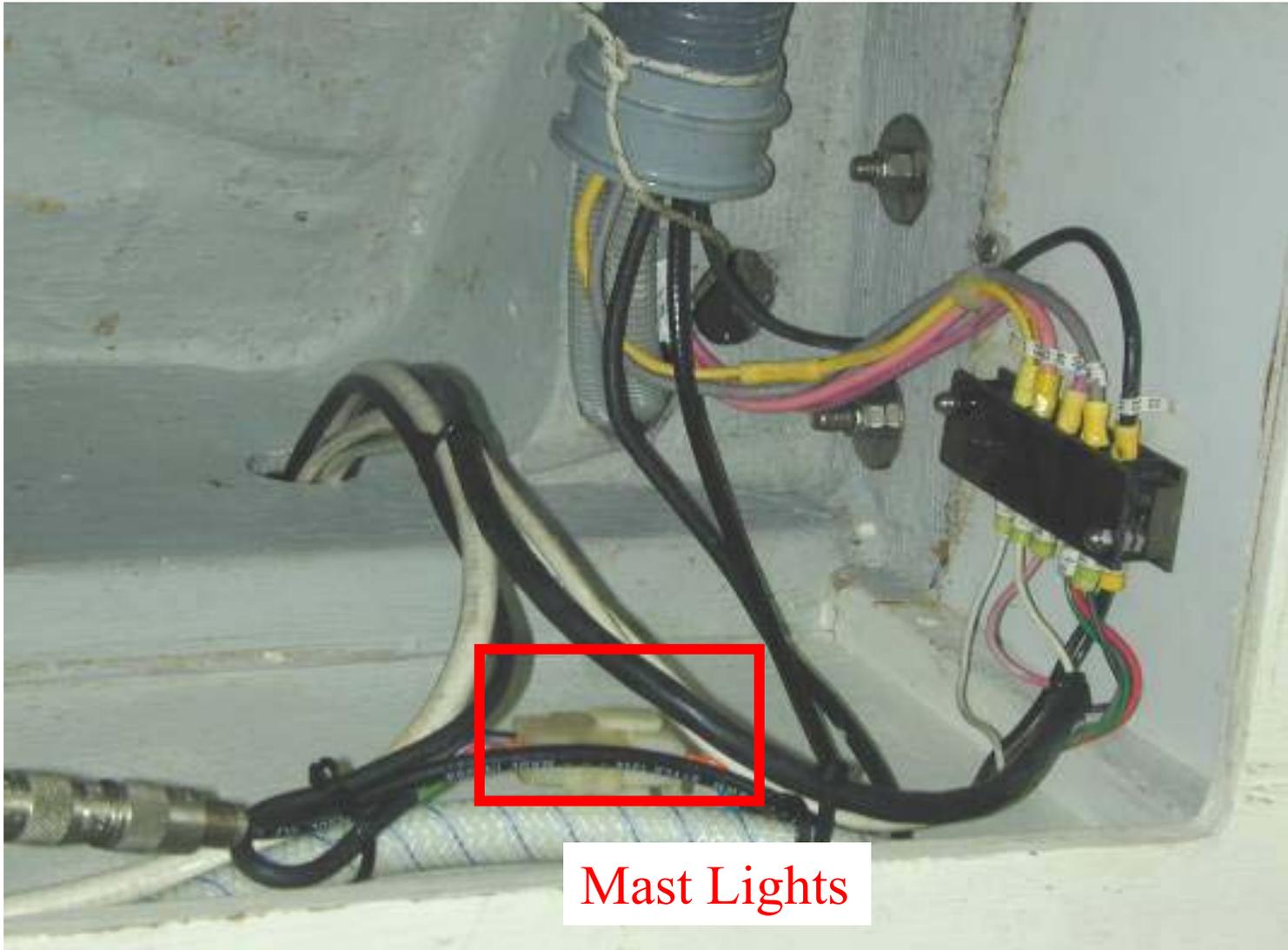


- The MASTHEAD LIGHT bkr provides power to the DECK LIGHTS and ANCHOR/BOW LTS
- The NAV LIGHTS bkr provides power to the COMPASS LIGHT and NAV LTS switches





# Navigation Lights connectors



Mast Lights



# Deck Light Switch

- Right OFF
- Left ON





# Anchor-Bow Light Switch

- Selects between Anchor light (colocated with the Tricolor at the top of the mast) and the Deck light (lights up the foredeck)
- Mid position is OFF





# Nav Light Switch

- HI selects Tricolor
- LO selects bow and stern lights



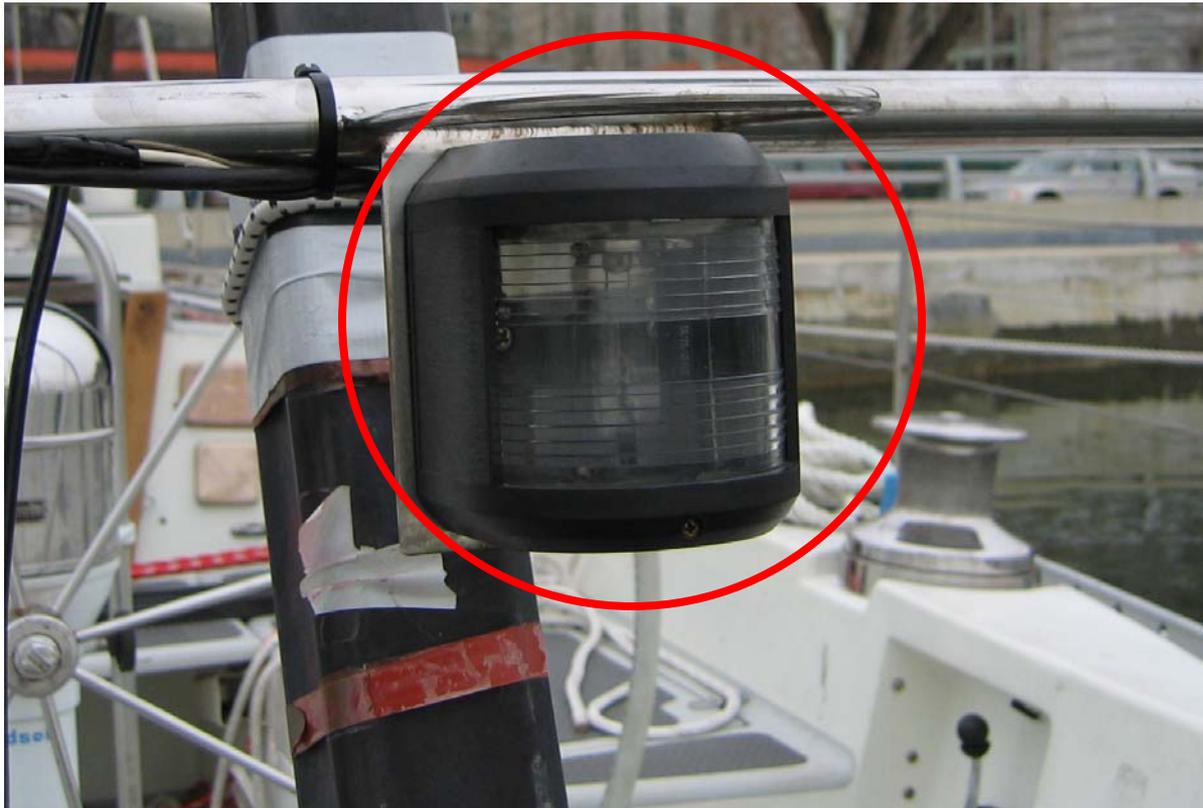


# Tricolor





# Stern Light





# Bow Light





# Steaming/Deck Light



**Steaming  
light**

**Deck light**



# Stove LPG Solenoid





# General Electrical Systems



- No power to multiple systems
  - Verify DC breakers are ON
  - Verify battery switches are properly set
  - Verify status of Batter Bank (SVS)

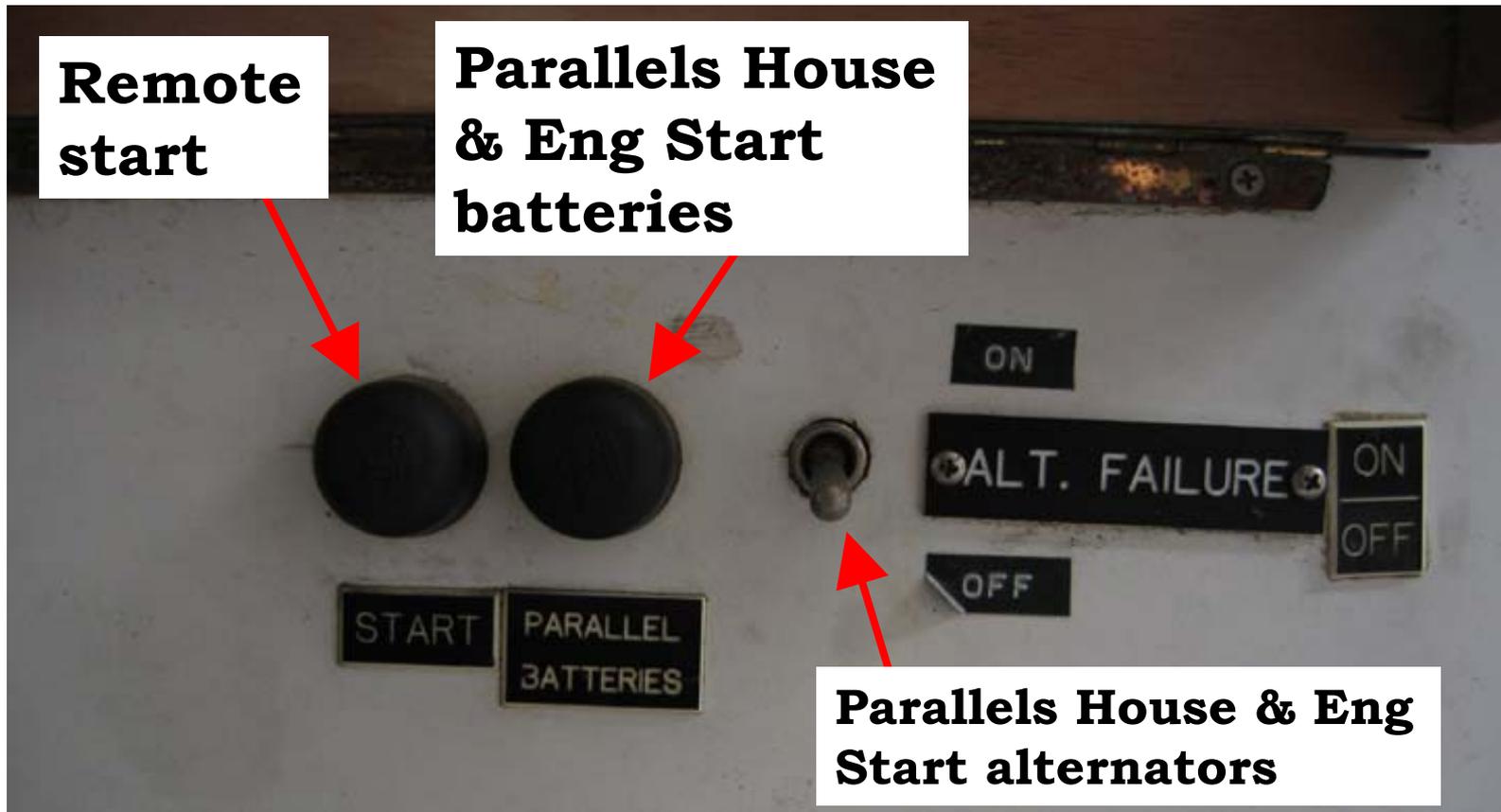


# Emergency Engine Start





# Emergency Engine Start





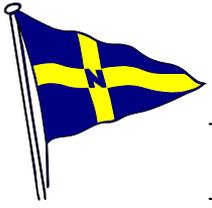
# Racor Fuel Filter



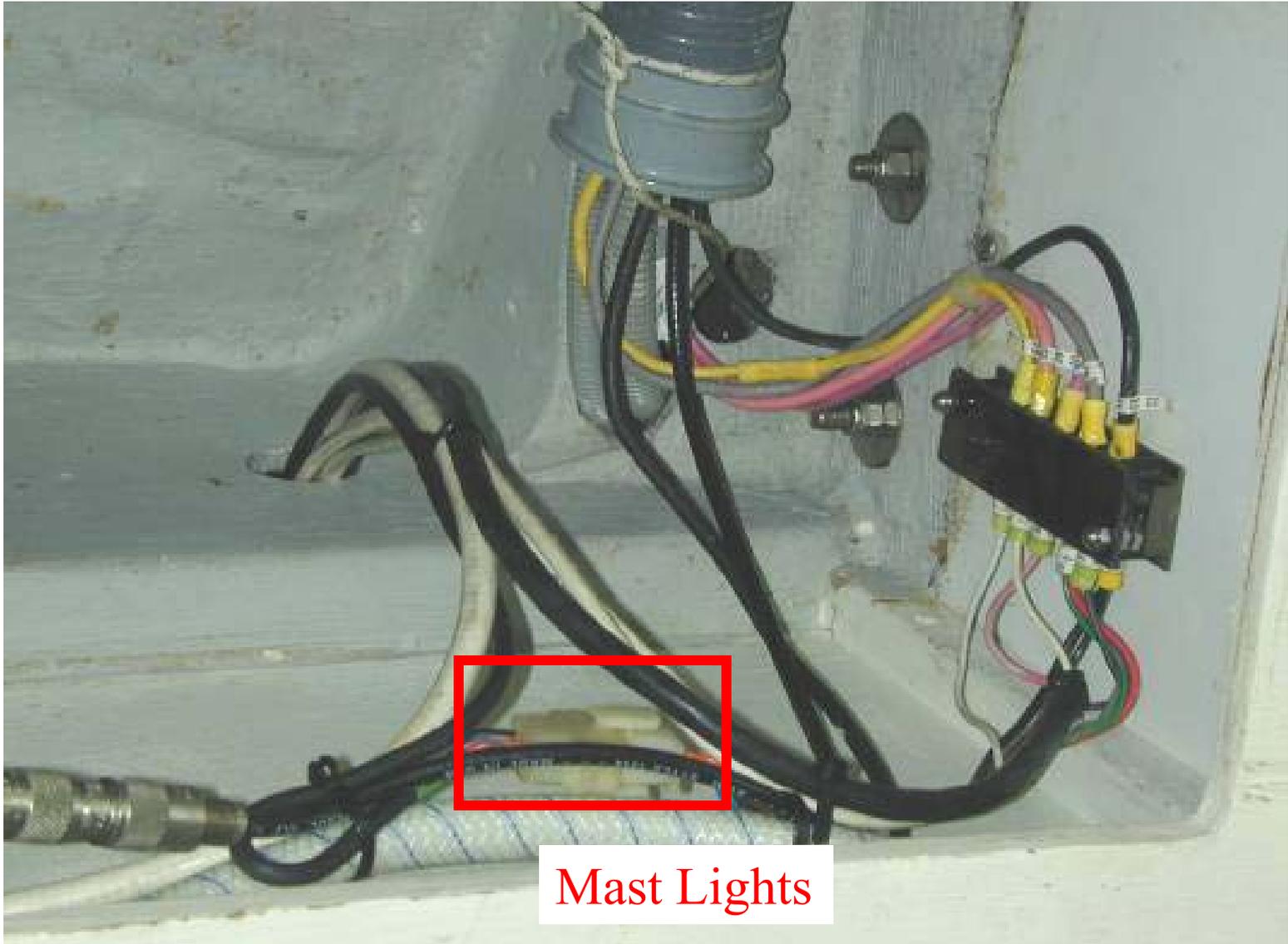


# Racor Fuel Filter





# Mast Electrical Connections



Mast Lights



Questions?