



– INTRODUCTION TO MARINE BATTERIES –

Modern ocean trawlers and passage makers have large and complex electrical systems, with large battery banks as the foundation for the system. The batteries generally supply two types of loads: high burst loads, which are characterised by short-duration and very high current, typically hundreds of amps for a few seconds to a few minutes. Engine starting is the most common such load. And house loads, which are generally much smaller but longer-term loads. These include lighting, electronics, and small appliances.

◇DIFFERENT TYPES OF BATTERIES

Virtually all marine electrical systems are based on lead-acid batteries. This is because lead-acid batteries can store very large amounts of power in relatively small space. While there are a variety of technologies used to construct lead-acid batteries, they all share the same basic components. Lead plates or grids are immersed or sandwiched in an acid electrolyte. A reversible chemical reaction between the electrolyte and plates generates electrical energy. Charging the battery reverses this reaction. There are three primary battery technologies in common use today, and any of these technologies can be used to build either starting or house batteries. The three primary technologies are:

- flooded-cell batteries
- gelled electrolyte (referred to as gel cells)
- absorbed glass mat (AGM)

Jet Tern Marine has chosen to equip all its Selene Trawlers and Explorers with AGM batteries for both starting and house applications.

◇WHAT IS AN AGM BATTERY?

An AGM battery is built by packing a glass mat, similar to fibreglass, between the battery's positive and negative plates. The mat is saturated with acid electrolyte. This packed structure gives the AGM battery one of its greatest strengths: vibration and shock resistance. Flooded cell batteries, and to a lesser extent, gel batteries are subject to damage when their relatively fragile plates are subjected to vibration and shock, which are quite common on an ocean-going trawler. Sealed, positive pressure relief valves within the battery re-direct excess hydrogen and oxygen vapours back into the glass mat, where the vapour returns to liquid. Thus, the AGM

battery also requires no regular maintenance to maintain electrolyte levels. In addition, because there are no vents or fill holes, the batteries will not leak dangerous acid, even if they are inverted. The dense packing of plates with the glass matt also lowers the internal resistance of the battery, which allows AGM batteries to recharge faster, discharge longer and deeper, and generate larger bursts of current for engine starting and other high-current applications, such as electric windlasses or bow thrusters. Of course, there are always tradeoffs. The primary one is cost. AGM batteries are more expensive than similarly rated flooded or gel-cell batteries. In addition, if AGM batteries are severely overcharged over long periods, they can be damaged and the electrolyte cannot be replaced as it can in a flooded cell battery. AGM batteries are also somewhat heavier than similarly rated flooded or gel batteries.

◇ADVANTAGES OF AGM BATTERIES

No maintenance (except periodic external cleaning), batteries will not spill or leak, even if cracked or inverted. Dual purpose; can be used for starting or deep-cycle applications. Can be installed at any angle (except upside-down, which could restrict valve operation). Shock and vibration resistant. Minimal gas release when properly charged. Low self-discharge (3% per month at 77°F). Submersible without damage. Long cycle-life when properly charged. Can be shipped via UPS. More efficient charging, less heat generated during charging.

◇DISADVANTAGES OF AGM BATTERIES

High initial cost. More weight per AH than flooded. Electrolyte cannot be replaced if severely and continuously overcharged