Upgrade of the Power Management and Propulsion Control Systems of the RRS James Clark Ross

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The RRS James Clark Ross

- Dual purpose:
  - Oceanographic research ship
  - logistics supply ship
- Ice strengthened “special purpose”
- Built by Swan Hunters & launched in December 1990
- Designed to be acoustically quiet for optimal operation of acoustic systems
- Lloyds classification +100A1 ice class IAS +LMS UMS

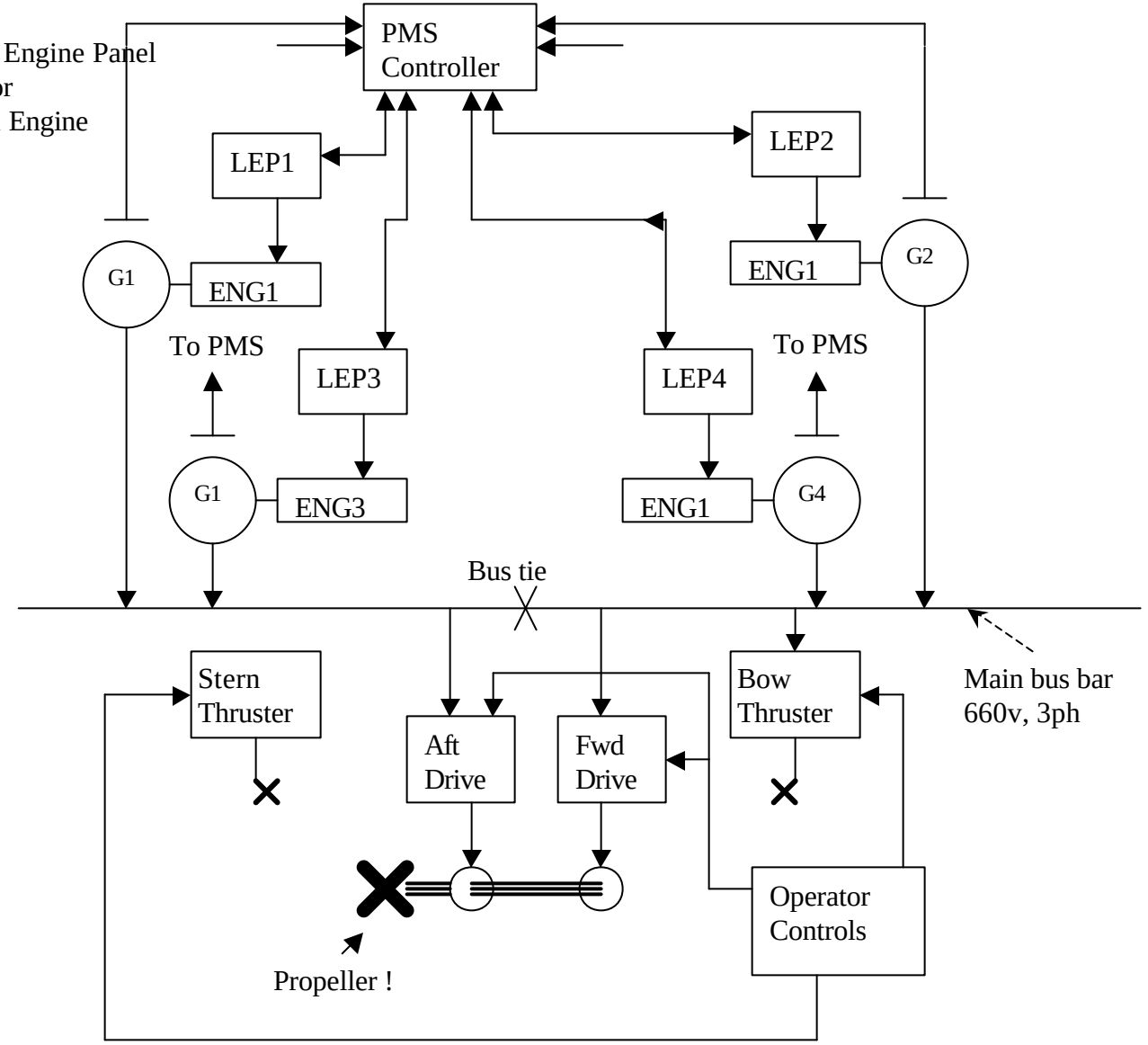
What Does a Ship's Power Management & Propulsion Control System Do?

- Controls power generation: mechanical to electrical energy
  - Diesel generator control
  - Load sharing & synchronisation
  - Controls the AC to DC power conversion
  - Monitors & raises alarms

- Responds to operator or Dynamic Positioning System commands:
  - Controls the electrical drive of the propeller
  - Controls the electrical drive for the bow thruster

Block Diagram

LEP :Local Engine Panel
G :Generator
ENG Diesel Engine



Why Upgrade ?

- Programmable logic controllers (PLC) 15years old & are obsolete
- Turn round time for repairs is extending & not guaranteed
- The manual adjustments are labour intensive
- System failure starting to become a risk to research and logistics' operations
- Get the benefit for the remainder of the ships life
- Cheaper than total replacement

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Key Requirements

- Increased reliability
- Reduced maintenance
  - Better Diagnostics
  - Remote access, world wide
- Improved power management
- Retain ships performance:
  - Operational
  - Acoustic
- Ships Lloyds Classification retained

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Power Management System Upgrade

- Reuse existing Engine Governors and existing Automatic Voltage Regulators,

BUT:

- Replace PLCs with a bus based Generator Protection & Control System
  - Remove existing problems of manual adjustment
  - Reduce maintenance requirements

Propulsion Control System Upgrade

Core control model to be retained: low speed, power control; Medium speed +, speed control

BUT:

- Replace PLC with “top hat” din rail mounted PCs & I/O – COTS
- Replace Thyristor Gate firing circuitry
- Refurbish Thyristor blocks:
  - Test Thyristors, Clean & Re-plate Electrical Connections
- Modify Software

Where From Here ?

- Contract awarded to Converteam (formerly Alstom/ Cegelec/ GEC) following competitive tender
- Detail design Stage Starting
- Installation Summer 2007

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Any Questions?

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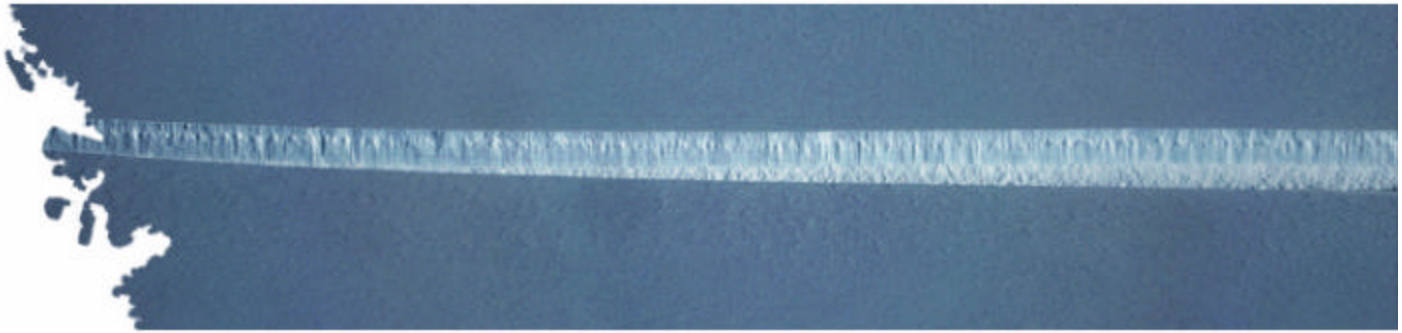

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Our Other Ship

- RRS Ernest Shackleton

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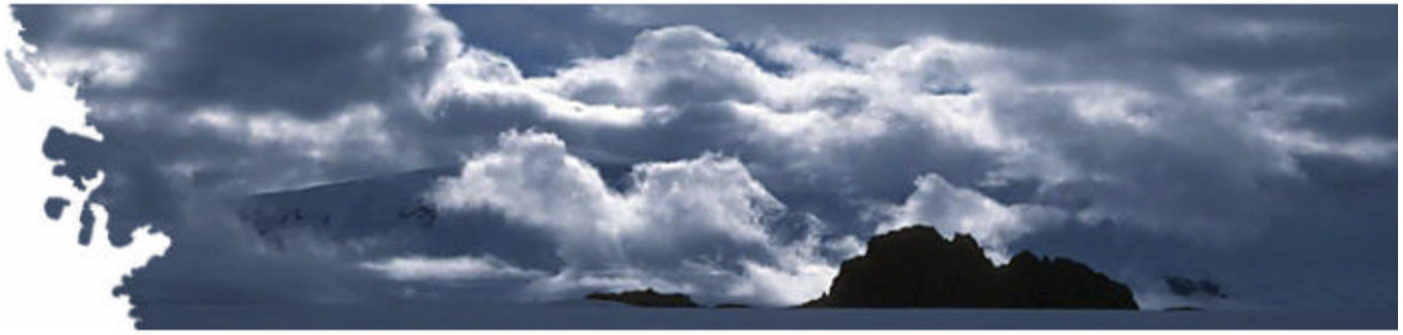

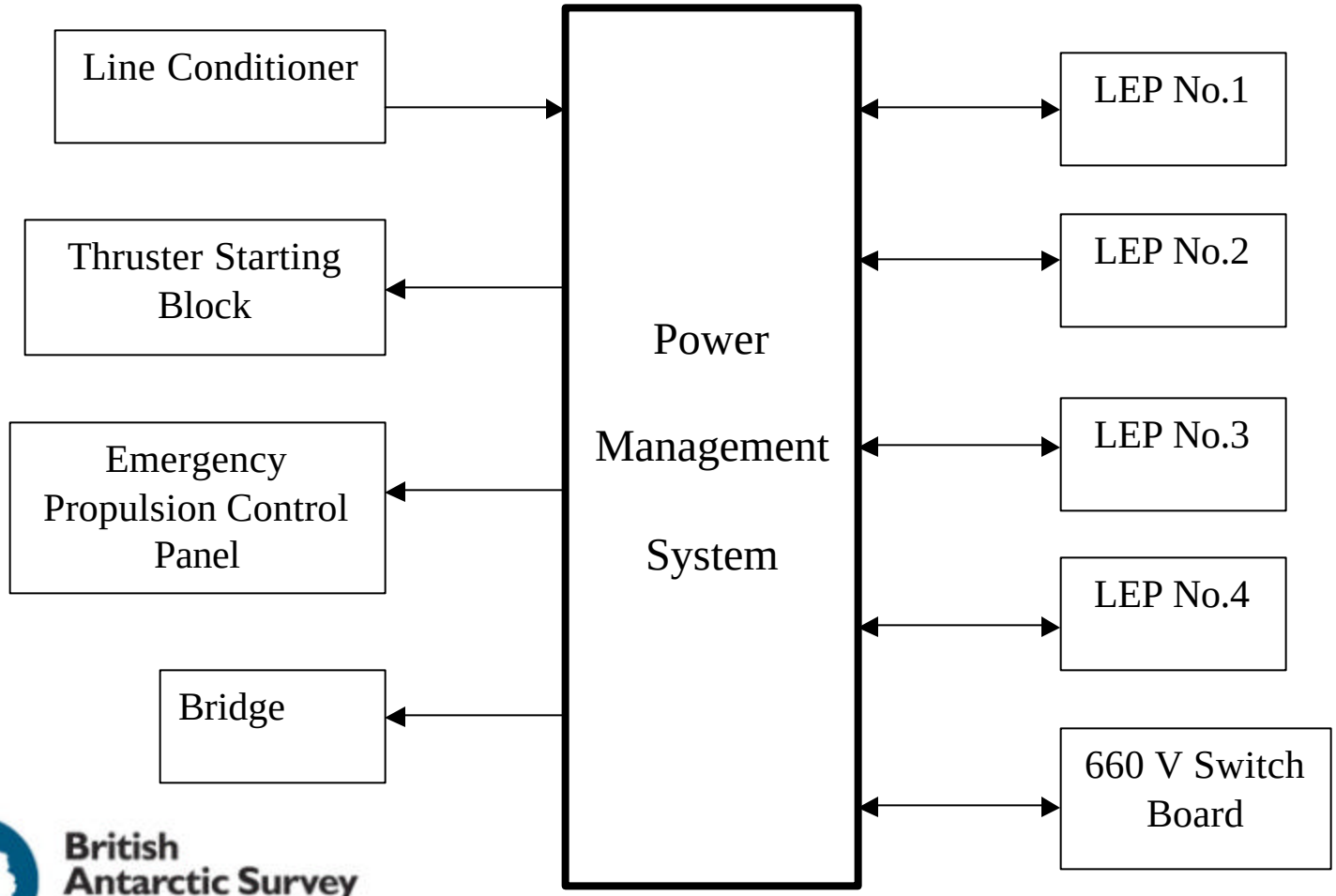

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