

# Medium Voltage Direct Current (MVDC) for Shipboard Application

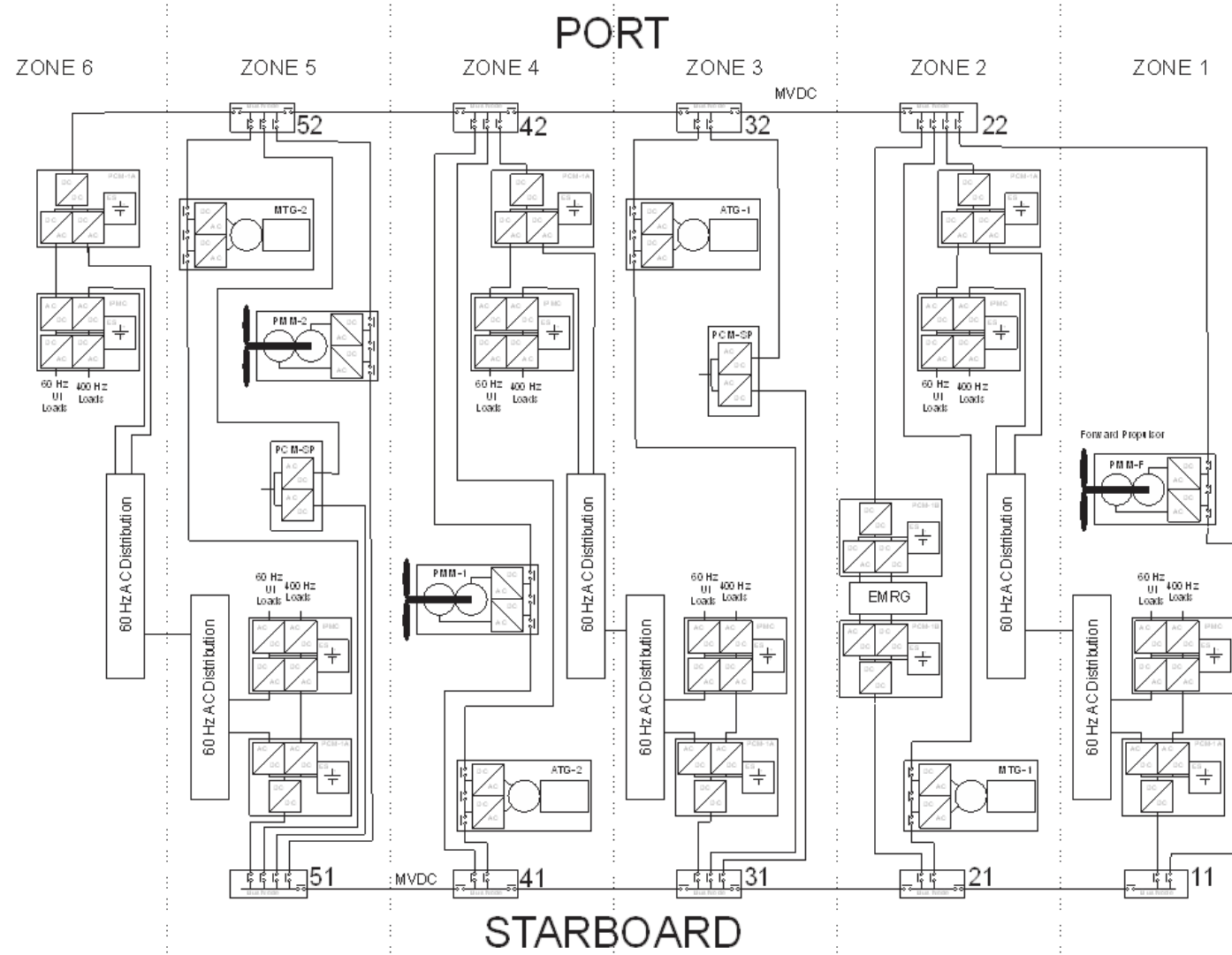
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NSWCPD and NSWCCD

ONR MVDC Risk Reduction Program Review

21 – 22 September 2023

# MVDC Reference Architecture



Approved for Public Release

# SBIR/STTR MVDC TOPICS

- N16A T012 MVDC Grounding
  - N21A T005 LVAC Grounding
- N221 T064 MVDC Disconnect Switch
- N211 069 MVDC Partial Discharge and Space Charge
- N162 T109 MVDC Casualty Power System
- N16A T009 MVDC Fault Isolation
- RIF-19-0005808 MVDC SSCB
- N22A T011 Shipboard Creepage and Clearance
- (FY25 submitted) MVDC Protective Relay

# N16A T012 MVDC Grounding

- Two Phase II Contracts – Develop an MVDC grounding system
  - N6833518C0108 Continuous Solutions with Purdue University
    - Focus on common mode equivalent circuit models and common mode mitigation
  - N6833518C0070 Hepburn & Sons with Florida State CAPS
    - Focus on ground fault localization
- Phase II.5 Contract
  - N6833521C0174 Continuous Solutions with Purdue University
    - Adapt MVDC CMEC and mitigation approach to MVAC, target transition DDG(X)
    - PLISN and ALISN test equipment and common mode mitigation designs being developed
- Phase II Contract
  - N6833523C0217 Hepburn & Sons with Florida State CAPS
    - Adapt MVDC localization to LVAC and demonstrate on RV Sally Ride
    - System modeling underway

# N221 T064 MVDC Disconnect Switch

- Currently Two Phase II Contracts – Develop a family of MVDC disconnect switches
  - N6833522C0607 Diversified Technologies
    - Demonstrated a disconnect switch in Phase I effort
  - N6833522C0608 Hepburn & Sons
    - Use of virtual prototyping

# N211 069 MVDC Partial Discharge and Space Charge

- Phase II Contract – Develop a means to monitor insulation health
  - N6833523C0284 Hepburn & Sons with Florida State University CAPS
    - Focus on online, automated monitoring of partial discharge
    - Demonstrate measuring space charge condition of cable

# N162 T109 MVDC Casualty Power System

- Phase II Contract – Develop, design and test, an MVDC casualty power system
  - N6833518C0207 The Columbia Group
    - Contract completed
    - Scope expanded to include design of MVAC casualty power system with DDG(X) transition target
    - Design, equipment and test reports delivered to NSWCPD.
    - Phase III contract remains possible.

# N16A T009 MVDC Fault Isolation

- Phase II Contract – Develop an MVDC fault detection, localization and isolation system
  - N6833518C0149 ISSAC Corp with UT Austin, CEM
    - Contract completed
    - Phase III contract remains possible.



# N22A T011 Shipboard Creepage and Clearance

- Presently two Phase I Option contracts – Develop test equipment to characterize shipboard machinery environment to provide OQE for updates to standards and specifications
- N6833522C0497 Electromagnetic Applications, Inc.
- N6833522C0498 Texas Research Institute with University of Texas at Arlington

# Questions

- Preparation of this presentation must avoid Distribution Statement B material. Small Business Data Rights are involved in these efforts.
- Please address questions to me, [john.v.amy.civ@us.navy.mil](mailto:john.v.amy.civ@us.navy.mil).
- Alternatively, you may contact the companies involved and commence discussion with them.