USMC Family of Environmental Control Equipment

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AGENDA

• USMC Family of Environmental Control Units (ECUs)
• Issues with current ECU Family
• Future Family of ECUs
• Desired Improvements
• Technologies of Interest
• Field Refrigeration System/Refrigerated Boxes
• HVAC Tool Kit
FAMILY OF ECUbs

- ¾ Ton (9,000 BTU/hr)
  - In production verification testing
- 1.5 Ton (18,000 BTU/hr) ECU
  - Fielding
- 3 Ton (36,000 BTU/hr) ECU
  - Fielding
- 5 Ton (60,000 BTU/hr) ECU
  - Fielding
- 8 Ton (96,000 BTU/hr)
  - Developed and tested, but not fielded
FAMILY OF ECUs

- USMC unique items
- 50/60 Hz
- R-22 Refrigerant
- Replaces multiple types of (vertical and horizontal) military standard units
- 3/4 Ton unit is single phase 120 VAC
- Larger units are three phase 208 VAC
ECU ISSUES

• **400 Hz ECUs**
  - The family of ECUs does not replace any 400 Hz ECUs.
  - The problem of supporting 400 Hz systems is a known issue.
  - We are developing an interim solution of refurbishing the fleet of 400 Hz ECUs to extend service life until the requirement disappears.

• **Family of ECUs interface issues**
  - The family of ECUs does not interface with some specific systems in the same way as the older ECUs.
  - The interfaces are being redesigned for replacement systems.
  - Interim solution is to retain existing ECUs for those limited applications.
FUTURE ECU FAMILY

• A new family of ECUs will be developed to replace the current “family of” ECUs in the 2010-2012 time frame.

• New refrigerant
  – Will need to use a more environmentally friendly (and less regulated) refrigerant.
  – Next refrigerant is yet to be determined, but industry and the US Army seem to like R-410A.
  – For economy, we will follow industry as much as possible.
  – R-134A will see continued use in automotive systems and refrigeration systems.

• New family will probably have same ECU sizes, but largest unit may be 10 tons rather than 8 tons.
DESIRED IMPROVEMENTS

1. Reduced power requirements
2. More ruggedization (for transport)
3. “Soft Start” to reduce startup power
4. Better energy efficiency
5. Reduced noise
6. Better heating capability
7. Multi-frequency and multi-voltage capability
TECHNOLOGIES OF INTEREST

• Variable speed drive for compressors
• Variable displacement compressors
• Multi-compressor systems
• Environmentally acceptable refrigerants
• Heat pumps
• Thermo-electric systems
• Fabric ducts
• Radiant spot heating
FIELD REFRIGERATION SYSTEMS

• Large Field Refrigeration System (LFRS)
  – Based on standard 20-foot insulated ISO container

• Mortuary Affairs Refrigeration System (MARS)
  – Similar to LFRS, but with unique internal features

• Small Field Refrigeration System (SFRS)
  – Developed by Food Services
  – Based on Quadcon (quarter ISO) container

• “Legacy” 10-foot Refrigerated Boxes
**LARGE FIELD REFRIGERATION SYSTEM**

- Large Field refrigeration System (LFRS)
  - Based on standard 20-foot ISO container
  - Based on commercial equipment modified to meet military requirements
  - Single item for refrigeration unit and insulated box (no longer two separate items)
  - Currently awaiting responses from vendors
Food Services and Utilities support have landed!
FUTURE RECOVERY SYSTEM

• Will be included in new version of HVAC tool kit
• Replaces functionality of existing recovery machine in a more portable kit
• Advantages:
  – Portable
  – Light
  – No digital screen
  – Faster recovery
  – Oil-less compressor
  – Can be used with more refrigerant types
  – No filters to replace

Notional Solution Only
NEW HVAC TOOL KIT

Replacement for Refrigeration Tool Kit

• Replaces 2 existing items with one
• Modern refrigeration tools
• Updated hand tools
• Also replaces consumables kit that is currently a separate item
• Currently awaiting responses from vendors
Questions?

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