MILITARY TRANSITION TO COMMERCIAL-OFF-THE-SHELF (COTS) ELECTRONICS

CECD
CENTER FOR ENERGETIC CONCEPTS DEVELOPMENT

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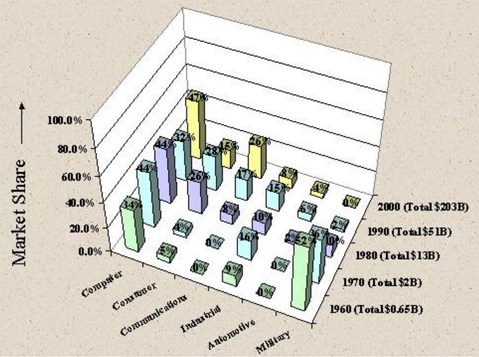
State-of-practice in U.S Military Electronics

- Commercial-off-the-shelf (COTS) electronics is being widely used.
- US military has minimal leverage over commercial suppliers in regard to technical specifications and availability of COTS components.
- Operational sustainment of US military electronics is presently "controlled" by the commercial electronics market.

Changing Semiconductor Marketplace



Demand from Military is a miniscule portion of the total semiconductor market

Need for Uprating of Electronic Parts

- Today's electronic parts are most often specified for use in the "commercial" 0 to 70°C, and to a lesser extent in the "industrial" –40°C to 85°C operating temperature ranges.
- Demand from the military is not always large enough to attract or retain part manufacturers to manufacture in that extended temperature range. There is need to assess "commercial" and "industrial" temperature range electronic parts for use beyond their rating.
- Uprating is the process of assessing the ability of a part to meet the functionality and performance requirements for the application in which the part is used outside the manufacturer-specified temperature range.

Counterfeit Electronics Parts Find Their Way in Military Applications

- On April 16, 2002, GIDEP (Government-Industry Data Exchange Program) issued an alert regarding IC-memory, SRAM/FIFO, part number CY7C199 of Cypress Semiconductor Corp.
- The U.S. Army's Brilliant Anti-Armor Submunition (BAT) program had experienced numerous failures of Cypress SRAM CY7C199-20VI.
- Failure analysis revealed a number of anomalies with memory, timing, and other electrical parameters.
- It was determined that unqualified products (screening failures and material rejects) being smuggled out of assembly facilities and sold to an unknown number of brokerage firms and parts dealers were being recirculated in the electronics supply chain.

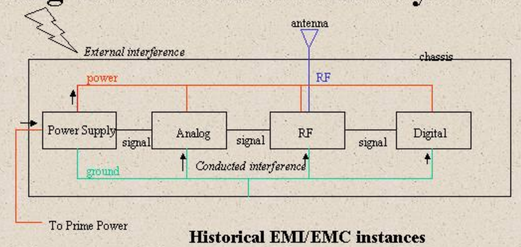
CECD and CALCE Collaboration in Military Electronics Transition

CECD
CENTER FOR ENERGETIC CONCEPTS DEVELOPMENT

calce
Electronic Products & Systems Center

The Computer Aided Life Cycle Engineering (CALCE) Electronic Products and Systems Center is dedicated to providing a knowledge and resource base to support the development of competitive electronic components, products and systems.

Fighting the Wars in the Airways: EMI/EMC



Historical EMI/EMC instances

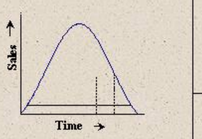
Military Equipment	Cause	Result
USS Forrestal	Search radar	Explosions and fire
HMS Sheffield	Operational constraints due to systems interference	Missile impact
UH-60 Black Hawk	Radio transmitter	Crash

Addressing DMSMS - Lifecycle Mismatch Assessment

The lifetime of military hardware spans many technology cycles of commercial parts

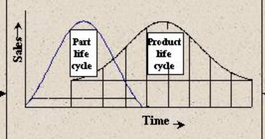
CALCE has developed practical algorithms to evaluate "year to obsolescence" for electronics parts

Part life cycle forecast



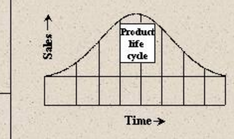
Determine part life cycle stage, and years to obsolescence

Life cycle mismatch assessment



Degree of mismatch = (product life – remaining part life)

Product life cycle forecast



Estimate service life of product

Lead-Free Electronics Risks For Military

- Reliability of lead-free electronics under harsh environmental conditions has not been fully understood.
- Long-term reliability data for lead-free COTS electronics is not available since commercial companies design their products for short life cycles.
- Compatibility of lead-free electronics with existing military hardware is unknown in relation to repair, replacements and partial upgrades.
- Test standards for lead-free electronics has not been fully established.
- Dual technology implies increased cost of rework and repair.

Assessments Required for Lead-Free Implementation in Military Programs

- Long-term reliability of lead-free electronics.
- Impact of long-term storage on lead-free electronics and its potential detrimental effects on mission readiness.
- Maintenance issues like repair, rework, and replacement arising out of mixing technologies.
- Need for unique test requirements.
- Tracking and identification methods of lead-free electronics.