

Future Carrier Design Technology Concepts

By Bill Deaton

Technology Opportunities for CVN 77

Integrated Information System

Supports the transfer and integration of voice, video and data information between audio, video and computer systems. Key features will include common and standard operating systems, network functions, communication protocols, interfaces and message structure. The system will capitalize upon advances in commercial industry.

Fiber-Optic Backbone

Single, integrated, commercial and military standard compliant physical grid supporting communications between systems/equipment via fiber-optic cables and electric-to-optic conversion devices. Key feature is providing end-to-end connections using ruggedized commercial off-the-shelf components.

Zonal Electric Distribution System

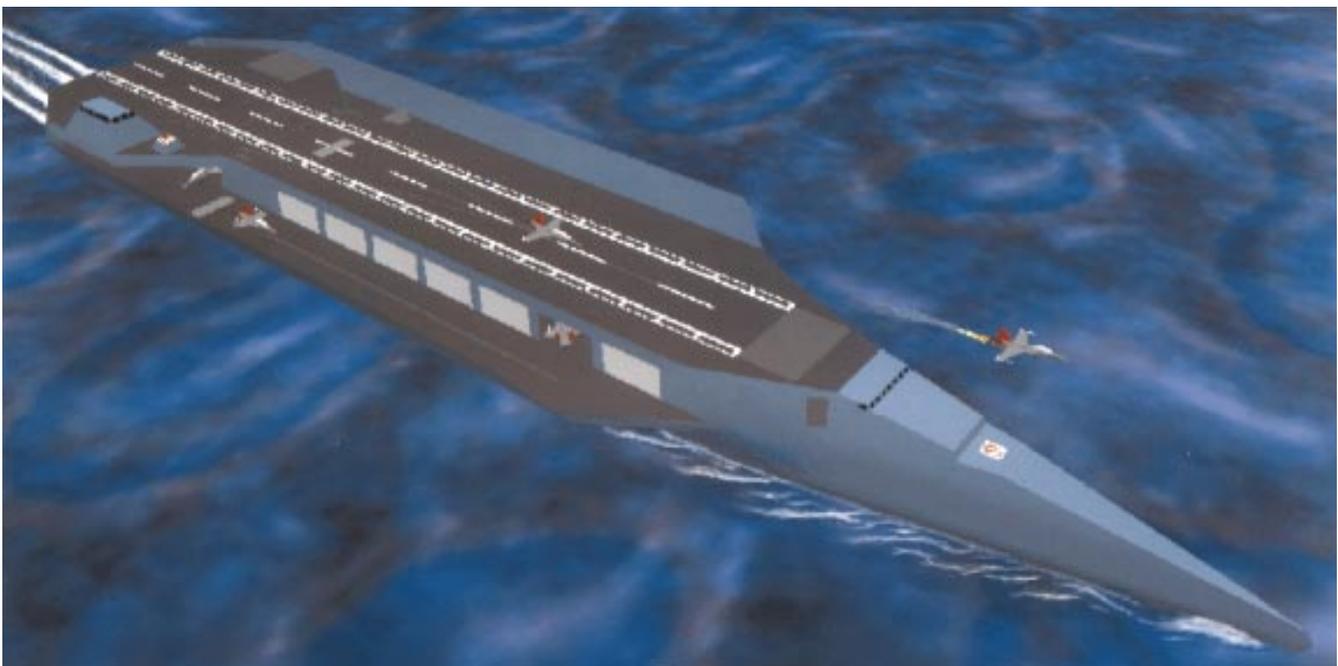
Open system architecture DC electrical distribution with standard interfaces between components. Power conversion and conditioning are performed locally from a single shipwide DC electrical power bus to provide each end user the type/quality of power required. DC power allows for solid state control, which achieves power continuity in case of a fault and provides for near-instantaneous recovery from power interruptions. In addition to the survivability benefits inherent in uninterrupted power, this system is anticipated to be easier to install, require less physical cabling and provide greater flexibility for ship upgrades than current electrical systems.

Multifunctional Embedded Antennas

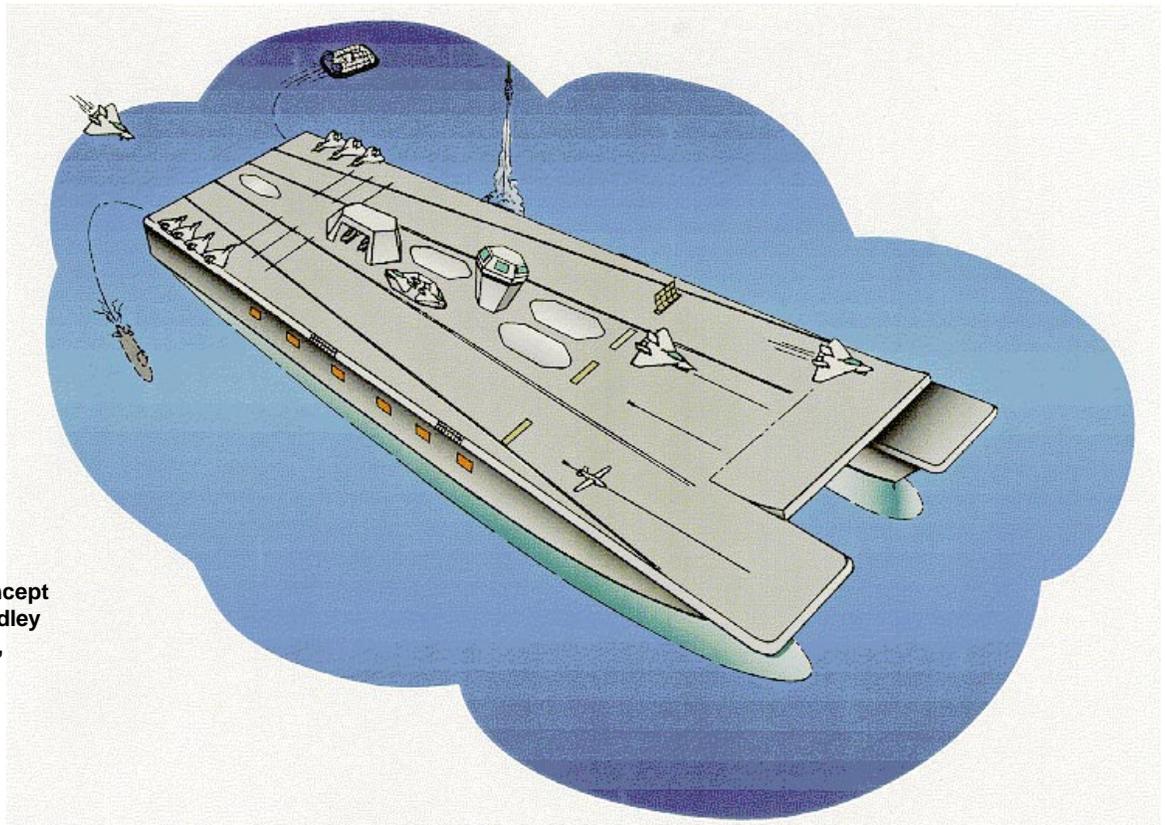
Reconfigurable, multiple apertures electronically combined to provide an antenna tunable across wide frequency bandwidth and sensitivity parameters. The apertures may be embedded in composite materials integral to the ship structure and may include combined or separate transmit and receive modules. Reduction of the number of antenna systems for communications and radars provides potential to improve performance by avoiding antenna blockages, reducing the structure required to support antenna placement, life-cycle costs and maintenance manpower requirements.

Modified Island Structure

The island's configuration, function and materials will be designed to satisfy aircraft support functions while minimizing its impact on ship control and flight deck operations. Potential benefits are reduced air disturbances caused on the flight deck by the island, more efficient flight deck arrangements and reduced radar and infrared signature characteristics.



Artist's conception of CVX by J. David McWhite, Naval Surface Warfare Center, Carderock, Bethesda, Md.



**CVX design concept
by Whitney, Bradley
and Brown, Inc.,
Vienna, Va.**

Concepts Being Considered for CVX

Alternative Energy Catapults

Electromagnetic Catapults: A launch-assist mechanism which will propel the aircraft to takeoff velocity using a traveling electromagnetic wave produced by a linear motor. When compared to current steam driven catapults, the electromagnetic launcher will provide the following benefits: independence from the ship's propulsion plant, a 50-percent reduction in weight and 65-percent reduction in volume, an increase in energy capacity with a highly controllable acceleration and deceleration profile, an increase in reliability and availability, and a 30-percent decrease in manpower required. This technology is similar to that used to propel high-speed "bullet" trains in other countries and may be used on the next generation of roller coasters.

Internal Combustion Catapults: A launch-assist mechanism utilizing liquid propellant as the energy source instead of steam. Benefits include elimination of steam system components; and reduced weight, airframe stresses and maintenance. This technology is similar to that used in automotive air bags.

Ski Jumps

An upward-sloped ramp at the forward end of the flight deck which will provide aircraft with a more optimum fly-away angle. This translates into benefits such as reduced takeoff velocity, increased payload capacity and reduced wind-over-deck requirements.

Automated Weapon Selection and Movement

Integrated family of procedures, magazine design, weapons elevators, passageway layout, information management systems, decision aids and reduced manpower ordnance-handling equipment to increase weapons' throughput, increase sortie generation rates and minimize risks associated with ordnance handling and stowage.

Advanced Systems for Flight Operations Management

Family of information management and decision aids to facilitate mission planning, aircraft control, aircraft/pilot information upload and download, aircraft turnaround and aircraft launch and recovery. May include a family of high-performance, integrated aviation work centers along with several pit stop-type aircraft servicing stations strategically positioned about the ship. Benefits include: improved aviation safety, significant manning reduction, increased sortie generation rate, flight deck optimization, reduced aircraft support equipment, more efficient maintenance and built-in servicing and support flexibility for follow-on generations of aircraft.

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