

**CURTISS  
WRIGHT** Controls  
Embedded Computing



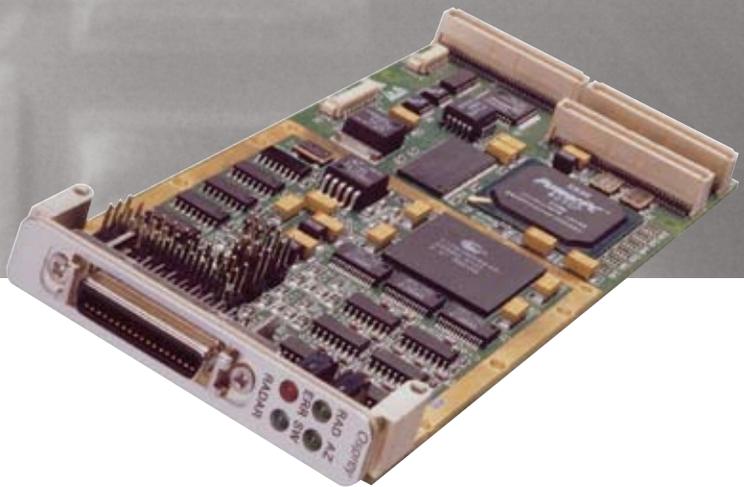
# RADAR Video Processing



**RADAR is the primary airspace sensor** for marine, ground-based and airborne surveillance and fire control applications with many thousands of installations in mobile, fixed and military platforms worldwide. The majority of these RADARs use rotating antennas with mixed analog and digital processing of the received signals to provide a PPI display followed by further processing depending on the end-use application of the RADAR. With so many of these RADARs using aging or obsolescent technology, Curtiss-Wright Controls Embedded Computing is ideally placed to offer solutions for technology revitalization based on our many years of experience coupled with the development of an extensive range of open-architecture COTS products designed for each stage of the RADAR processing and display chain.



**Incorporating new, open-architecture technology offers enhanced performance and lower maintenance costs.**



Developed in parallel with our graphics and display solutions, our RADAR products provide tight integration and assured compatibility. Open-architecture ensures that they are based on proven industry standards such as VMEbus or the PCI bus allowing them to be incorporated with Curtiss-Wright's extensive off-the-shelf range of embedded computing equipment with absolute confidence. Incorporating new, open-architecture technology into an existing installation offers enhanced performance and lower maintenance costs plus the opportunity in the future to make incremental improvements in performance and capability by the simple insertion of new, compatible COTS products as they become available.

## RADAR Video Processing

Curtiss-Wright is unique in its ability to tailor a COTS RADAR video processing subsystem to the varied needs of each individual RADAR installation, whether it is a single 2D or 3D surveillance RADAR or part of a much larger integrated sensor or weapons suite. We have developed innovative hardware and software capability that can be used to implement each element of RADAR video processing to achieve the optimum solution:

- ◆ RADAR interface products in PMC or PCI formats to digitize received analog signals over a broad range of PRFs and with a number of standard azimuth data formats, including synchro. Once digitized and assembled into range cells in range-azimuth polar form, further processing can be performed to develop clutter maps and averaging for CFAR settings.
- ◆ The digitized RADAR video may be compressed in standard format for distribution via a tactical network such as Ethernet or may be used for recording.
- ◆ Plot extraction to identify candidate targets from the RADAR returns when they exceed a certain threshold.
- ◆ Target tracking can be manually or automatically initiated creating tracks from a series of plots that meet recognizable characteristics over consecutive scans. Targets will usually be managed in a database and identified to an operator by appropriate labels and vectors on the RADAR display.

Each RADAR video processing element is designed to be modular and very flexible in its I/O formats and electrical interfaces to allow partial upgrades of existing RADAR installations. These could range from a hardware module, a software upgrade or complete chassis replacement.

## **Aegis CG-47 Cruiser, Mk 34 Gun Weapons System Consoles**

**The Mk 34 gun weapon system (GWS) is designed as a fully integrated subsystem of the AEGIS Combat System (ACS) to include the fire control computer, gun mount, and sight. The Mk 34 GWS receives target engagement orders from the AEGIS command and decision (C&D) system. It receives target data from shipboard sensors of a number of types, performs ballistic calculations, and generates gun control orders. The Mk 34 GWS will be installed on all new construction AEGIS ships beginning with the DDG-51 class destroyer. Several of the later Ticonderoga class cruisers will also be fitted with the Mk 34 GWS.**

**The Mk 34's computer display console serves as the operator interface by providing target/system status and data entry displays. It also permits manual selection of the engagement mode and type of ammunition, queuing and engaging targets, entering ballistic data, and adjusting fire. The console was designed as a commercial-off-the-shelf (COTS) subsystem accepting specialized RADAR video input formats, multiple camera video inputs, support for maps and numerous X-window graphics overlays - and providing real-time digital display recording.**

**Curtiss-Wright was selected for its ability to meet all the specifications and provide a technically superior, well integrated and highly cost-effective solution. The console subsystem utilizes a variety of cards from the company's extensive COTS range including a Hawkeye single-board RADAR scan-converter, a Cobra quad video windows card, a multi-layer display card and a record and replay system.**

With the introduction of platform-wide Ethernet networks compressed RADAR video can be packetised and passed through the network very efficiently as datagrams. Compressed RADAR video can be directed to one display console or to many using multicasting over existing network cables. In addition to the initial savings in cable cost and complexity, this also provides great flexibility in the future as reconfiguration can be accomplished quickly and easily by rerouting the network rather than adding or moving many video cables to meet the new configuration. Curtiss-Wright's solutions for RADAR video processing can be easily incorporated into new or existing systems providing end-to-end seamless integration from RADAR receiver to tactical display console.

**» Curtiss-Wright's scan converters use advanced algorithms to simulate the fading of a rotating display.**



# Scan Conversion

Scan conversion technology is at the core of Curtiss-Wright's RADAR processing and display capability, offering advanced display clarity and operator acceptance. Faithfully reproducing the characteristics of a PPI RADAR display, our range of solutions accept RADAR video in analog or digital format, converting from polar to raster for display on many different screen types with resolutions up to 2K x 2K. Implemented in a mix of hardware and software Curtiss-Wright's scan converters use advanced algorithms to simulate the fading of a rotating display while offering the flexibility of a number of selectable PPI views plus A-scan or B-scan for specialized applications such as fire control. They are designed for easy integration with graphics to provide a complete RADAR display subsystem, allowing overlay of symbols and vectors, representing plots and tracks, with underlay capability for maps and charts. When combined



with Curtiss-Wright's graphics and video products very complex RADAR processing and display subsystems can be implemented covering a broad range of RADAR applications providing extensive multi-sensor display command and control capabilities.

