Long Island's Electronic History
by Jesse Taub, IEEE LI Section Historian

This month Data Device Corporation is featured. A summary of their many contributions to military electronics since its founding 45 years ago is described by Mike Glass.

Data Device Corporation (DDC)

Since its inception in 1964, Data Device Corporation (DDC) has evolved to its position of worldwide leadership in the areas of high reliability data networking, data conversion, and power distribution for military/aerospace applications. After operating in two different locations in Hicksville, DDC moved to its current facilities in Bohemia in 1974.

In its early years, DDC's initial products were discrete packaged operational amplifiers, prior to the wide availability of monolithic op-amps. These were internally compensated, with gain-bandwidth products of up to 100 MHz. Later in the 1960s, DDC developed data conversion products, including both linear analog-to-digital and digital-to-analog, along with synchro/resolver converters. Originally introduced as discrete modules, these products were later implemented as hybrid microcircuits.

DDC's oldest product area is synchro/resolver conversion. Synchros and resolvers, used originally during World War II, are rotating transformers used for position sensing. Synchros and resolvers are used in the rugged environments of fighter aircraft, ships, and military ground vehicles. Over the years, DDC's synchro-to-digital converters evolved from multi-chip discrete modules, to a 6-hybrid set, to a 2-hybrid set, to monolithic-based thick film hybrids, and eventually to fully monolithic mixed signal ASICs. These converters digitize the transducers' AC analog outputs to provide a high degree of both static and dynamic accuracy for use in modern digital position and velocity control loops, providing accuracy of ±1.3 arc minutes at 16-bit resolution.

Introduced in the early 1980s, DDC's largest product area is MIL-STD-1553 data bus. During this time, MIL-STD-1553 has been the workhorse for system integration of military aircraft, ground, and space vehicles. Over the years, DDC's 1553 products have evolved from full boards, to sets of metal hybrids, single metal hybrids, ceramic hybrids, and most recently to its Total-ACE. As the world's first fully integrated 1553 component, Total-ACE is based on the confluence of analog, digital, and memory ASICs, transformers, and plastic packaging. In addition to miniaturization, each succeeding generation of DDC's 1553 products provided increased capabilities, with the major objectives of improved host interfaces and increased offloading.

In addition to components, DDC supplies 1553 cards. These include supporting software, including drivers for several real time operating systems; along with Windows menus and tools for system developers, system integrators and 1553 test applications.

DDC's other major product area is Solid State Power Controllers, or SSPCs. Since 1988, more than 500,000 DDC SSPCs have been installed on the Bradley fighting vehicle, the M1A2 Abrams tank, and other vehicles. For military power distribution, there's been an ongoing migration from electromechanical to solid state switching. In part, this is to improve distribution for power-hungry applications, such as computers, networks, sensors, and weapons. Critical design aspects for SSPCs include intelligent control, power switching and sensing, and thermal design. SSPCs' "I2T" protection, a method for emulating the behavior of thermal circuit breakers, allows short duration overloads at power-up, while protecting vehicle wiring against longer-term over-current conditions. Solid state switching provides high reliability, reduced EMI, and faster "reaction" time for clearing short circuit faults. In addition, SSPCs enable advanced energy conservation and management schemes, along with monitoring for preventive maintenance.

Two looming technologies for DDC's data networking business are HyPer 1553 and High-Speed 1760. HyPer 1553 leverages modern modulation techniques to communicate at tens and hundreds of MHz over a multi-drop 1553 bus designed for 1 MHz. High-Speed 1760 provides a 1553-like protocol over a 1 Gb/s Fibre Channel network, for interfacing between launchers and weapons. In both cases, the new technologies support 1553's traditional command and control messaging, along with larger transfers such as sensor data, images, files, maps, and target information.

An emerging future trend for military power distribution involves the use of higher voltages such as 270 and 600 VDC. This entails additional challenges in the areas of thermal design and safety, areas of ongoing development for DDC.

February

IEEE Calendar and Historical Events

1: 1972: Hewlett-Packard introduces the **HP-35 pocket calculator**, the first to compute trigonometric functions and logarithms.

5: 1952: New York City installs the first electric **Walk/Don't Walk** sign in Manhattan.

7: 2003: IBM's chess computer **Deep Junior and grandmaster Garry Kasparov** end their two-week match in a draw.

9–14: IEEE Meeting Series in Atlanta

11: 1847: Birth date of **Thomas A. Edison**.

19: 1878: Thomas Edison's patent for a phonograph is granted.

20: 1962: **John Glenn** becomes the first American to orbit Earth, aboard the Friendship 7 spaceship on the Mercury-Atlas 6 mission

23: 1927: U.S. President Calvin Coolidge signs into law the **Radio Act of 1927**, which creates the Federal Radio Commission.

27: 1891: Birth date of **David Sarnoff**, radio and television pioneer.

27-28: Region 10 meeting in Lapu-Lapu City, Philippines