



Micro Systems, Inc. Develops the Next Generation Unmanned Aerial Target Vehicle Control System

NKK Switches provides quality toggle switches, supporting a short lead time for the new portable aerial target command and control system

Micro Systems, Inc. is engaged in the design, development and manufacture of sophisticated electronic components, subsystems and systems used in a broad range of advanced military and defense applications. The company is the leading supplier of unmanned aerial target command and control systems used by the US Department of Defense and friendly foreign military for advanced aerial target drone operations. Micro Systems' customers include all three branches of the US armed services, friendly foreign military organizations, and major aerospace and defense companies.

Micro Systems, a wholly owned subsidiary of Herley Industries, Inc. is headquartered in Fort Walton Beach, Florida and has been in operation since 1976.

Challenges

Micro Systems' command and control systems have been used with virtually every U.S. aerial target drone for the past decade. These systems control unmanned aerial vehicles that use both weapon test and evaluation for the training of military personnel. They simulate threats ranging from cruise missiles to supersonic aircraft flying at altitudes ranging from 7 feet to 40,000 feet. Equipment designed to meet such high performance requirements must meet stringent safety and reliability requirements. As a result, Micro Systems is extremely selective when choosing component vendors to support their system development efforts. Potential vendors are critically rated on quality of material, contract compliance, and on-time delivery.

"There is a significant effort required for target drone operations and our customers demand high quality, reliable systems to support their missions" said Maynard Factor, Micro Systems' business development engineer. "Target drone missions are very expensive and there is no tolerance for equipment malfunction."

"Micro Systems recently recognized a need in the industry for a new, portable, low cost system that would be easy to use and maintain," Factor said. "As a portable command and control system, we knew



Control panel with NKK's high quality toggle switches.

this system would also have to be extremely durable if it was to live up to our standards as well as the standards of our customers."

Micro Systems leveraged the design of the new portable command and control system from its existing MOodular Networked TArget control Equipment (MONTAGE). MONTAGE is a field proven and successful design that has supported over 1,000 high reliability missions worldwide. Micro Systems engineers envisioned a new hardware command and control system configuration that was easily portable, durable and cost effective. The solution was the Portable Aerial Target System (PATS) and the challenge was to develop the new system in less than 6 months. Among the key challenges faced by engineers on this new design was the quality and durability of the individual switching components PATS would require.



Factor commented "For the command panel design we looked at many different vendors of pushbutton and toggle switches but it always came back to quality and lead time. We needed a supplier that could provide switches that could function reliably and safely in adverse environmental conditions and also support an accelerated delivery schedule of only 6 months; a schedule that is almost unheard of in the industry."

In addition, Micro Systems needed the solution to have gold contacts and feature a solder lug connection option. "Gold contacts were a requirement due to the low electrical current that was available in various measurement circuits used in the system," said David Ault, lead engineer on the PATS project. "The solder lug requirement was driven by cost and manufacturability considerations."

Solution

After weighing options from several vendors, Micro Systems selected NKK's bushing mount toggle switches to populate the primary switch array of the PATS Command Panel. Specifically, Micro Systems incorporated 31 NKK toggles with black bat lever caps.

"We looked at a number of top vendors," Ault said. "In the end, competitive solutions weren't a good fit as we felt the quality was not suited for our applications or had extremely long delivery times that simply would not meet our schedule. NKK had the best quality solution and offered a satisfactory lead time."

NKK's miniature toggle switches feature several distinguishing characteristics such as a high torque bushing construction to prevent rotation or separation from the frame during installation; an anti-rotation design on all non-cylindrical levers; an interlocked actuator block to prevent switch failure due to biased lever movement; and stainless steel construction to resist corrosion.

An anti-jamming actuator design protects the switch against mechanism damage from downward force on the toggle and the terminals are epoxy sealed to prevent the entry of flux, solvents, and other contaminants. The toggles are also UL Recognized, C-UL Recognized, and CSA Certified. All models feature UL 94V-0 flammability ratings. Water tight and dust tight versions are available and qualify to IP 67 of IEC60529 Standards. The series meets RoHS directives for environmental safety.

NKK was also able to quickly provide Micro Systems' engineers with sample switches to aid them in their design and prototyping efforts. This allowed Micro Systems to ensure that they had the right solution before fully committing to a purchase.

"When developing a new command panel, it's always nice to be

able to fabricate a functional prototype with the potential system components before fully committing to one solution," Factor said. "It's one thing to see specifications on a datasheet, but when it comes to cutting holes in metal as part of the manufacturing process, you want to make sure that you've got all your ducks in a row. We really appreciated the fact that NKK was so good about getting us samples to use in our prototypes."

Having been on the market now for nearly six months, PATS is quickly emerging as the gold standard for many aerial target applications. The new command panel is a sleek, ergonomic design using a light weight molded plastic enclosure and precision joystick. The entire system can be broken down and stowed in convenient ruggedized transit cases for high mobility. The design concept allows for PATS to be easily transported to any flight test range and become fully functional in minutes.

The innovative design was well received in the target industry where it was debuted at the National Defense Industry Association (NDIA) annual symposium in Savannah, Ga. in late October 2009.

About Micro Systems

Micro Systems, Inc. designs and manufactures airborne transponders, GPS-tracking pods, real-time micro processor-based control systems, unmanned vehicle control stations, Flight Termination Systems (FTS), Electronic Warfare (EW) threat simulators, radar environment simulators, Electronic Counter Measure (ECM) target generators, digital RF memories, and associated test equipment.

Since 1976, Micro Systems has been continuously exceeding its customers' expectations in engineering, production, and services. For more information, contact Micro Systems, Inc., 35 Hill Avenue, Fort Walton Beach, FL 32548-3858. Phone: (850) 244-2332. Fax: (850) 243-1378. Visit Micro Systems' Web site at www.gomicrosystems.com.

About NKK Switches

A leading designer and producer of electromechanical switches, NKK Switches offers one of the industry's most extensive selections of illuminated, process sealed, miniature, specialty, surface mount and programmable switches. NKK has produced more than 3.5 million toggle, rocker, pushbutton, slide, rotary, DIP rotary, keypad, and keylock switches, each of which can be used as the foundation of a customized design. All switches are designed and manufactured to provide the quality and dependability that has made NKK the benchmark for reliability for over half a century.

NKK continues to lead the industry in responding to the needs of the marketplace with innovation, high reliability, customization, and a commitment to excellence. The company provides a full suite of customization solutions that include: design, programming, printing, and support. Downloadable 3D CAD models of the company's switches are available, allowing design engineers to quickly integrate complex models into their designs at no charge. NKK maintains a complete network of qualified representatives and distributors through the United States, Canada, Central and South America, Europe and Asia.

Engineers who design the human-machine interface for their products rely on the broad product line, specialized design expertise, and customer support of NKK Switches. For more information, contact NKK Switches, 7850 E. Gelding Dr., Scottsdale, AZ 85260. Phone: (480) 991-0942. Fax: (480) 998-1435. Visit the NKK Web site at www.nkkswitches.com.