

Via Satellite's

# Tech Focus REPORT



## Antenna Solutions

The satellite industry is unrelenting in its demand for products that offer higher performance at reduced cost.

This puts considerable pressure on antenna manufacturers in particular who must keep an eye on the fact that their products must perform in the field, year after year, with absolute accuracy and structural soundness.



**Patriot's 12-meter Ka Rx-Only Antenna  
For NASA's Jet Propulsion Laboratory**

**A**t Patriot Antenna Systems, attracting the right team of top antenna designers and engineers was seen early on as an important first step to developing a successful line of antenna products. Since its founding in 1992, Patriot has assembled a talented team consisting of the best and brightest people in this sector. With annual sales now exceeding \$20 million and with 115 employees, Patriot can take pride in the fact that its product development resources are second to none.

Senior antenna engineer John Vezmar, for example, recently was granted his sixth U.S. patent. Vezmar joined Patriot in 2001 after 6 years at Channel Master and another 6 years at Westinghouse Electronics Systems Division (now part of Northrop Grumman). He holds a Master of Science degree in electrical engineering from The Johns Hopkins University and he did his undergraduate work at Michigan State University.

"What I bring to the table is a strong antenna engineering background with an emphasis on low-cost manufacturing. I designed the majority of Channel Master's transmit-and-receive feed systems and all of Patriot's transmit-and-receive, and receive-only feed systems," says Vezmar.

Dr. Mark P Godwin, Senior Systems Engineer at Patriot Antenna, started in the antenna industry in the late 1970s. After completing his Ph.D in microwave antenna testing at the University of Sheffield, United Kingdom, he ran his own consulting company for almost ten years, during which time his company achieved some notable engineering successes, including a significant role in the upgrade of the JPL/NASA 70-meter antenna reflectors in preparation for Voyager II's encounter with the planet Neptune. As the technical director at a U.K. antenna

company, he broadened his technical skills considerably to encompass mechanical, structural, power and control systems. In terms of the management of high-technology development projects, Godwin is adept at transforming novel concepts into proven products.

"Being dominated by a small number of large companies, there is a natural reluctance in the satellite antenna industry to adopt new technology," says Godwin. "Novel engineering solutions are the hallmark of the Patriot Antenna System success story. We excel at identifying market-driven opportunities and strive to increase our market share through technical innovation."

## Not Just A Warehouse

In its Albion, Michigan facility — 300,000 square feet spread over 27 acres — Patriot produces and ships its systems to a long list of customers around the globe. Manufacturing machinery includes two powder coat paint lines, 18 presses and a 6 station welding bay where a Mitsubishi VZ2 5-axis laser cutter resides, a machine that can cut anything from plastic to stainless steel an inch thick.

Patriot Antenna Systems has achieved 26 type approvals and certifications from various satellite operators as well as an ISO 9001 manufacturer rating. The introduction of low-cost, die cast feed components to Patriot's strong antenna line four years ago has opened up the Very Small Aperture Terminal (VSAT) market for Patriot, making it the company's primary revenue generator. This has made the transition to large aperture earth stations, mobile VSATs, and flyaway markets possible.

Patriot's engineering prowess is easily observed in its lineup of top notch flyaway systems, mobile VSATs and large aperture earth stations.

Its 3.8-meter High Wind (HW) VSAT antenna system, which is quad band capable — C-, Ku-, Ka- and X-Band — features

close-out panels that make the antenna more rigid and wind resistant especially with the added stability of dual axis lock down.

The 3.8-meter HW is easily adjusted manually, but it also has the option of a motorized drive. The design not only sits lower to the ground, making installation easier, but all in all, it is less expensive to produce, package and ship than its counterparts.

Patriot's patented dual skin technology enhances portability and makes possible a full line of rugged



**Patriot 1.8-meter Flyaway Antenna can be set up in minutes by as few as one person.**

and lightweight flyaway antennas ranging from a basic unit with manual adjustment to a dual-axis motorized unit that offers one-touch auto acquisition jog control. The auto-locate flyaway automatically locates a satellite without any manual adjustment. Set up for all three of these antennas takes only minutes and can be done by one or two people depending on the size of the reflector.

When it comes to large aperture earth stations, high RMS accuracy is critical. Patriot's solution is capable of Ka-Band quality transmit and receive with full motion or a limited motion-tracking system.

Patriot offers a lineup of mobile VSAT antennas starting with a cost effective jog control solution with motorized feed for polarization adjustments and a dual rotolock mount. Simple one touch transmit and receive capabilities are what make the auto locate unit attractive, via its manual peaking and automatic satellite locating capability. Patriot's top-of-the-line auto commissioning mobile VSAT system automatically locates and peaks the signal without any manual adjustment.

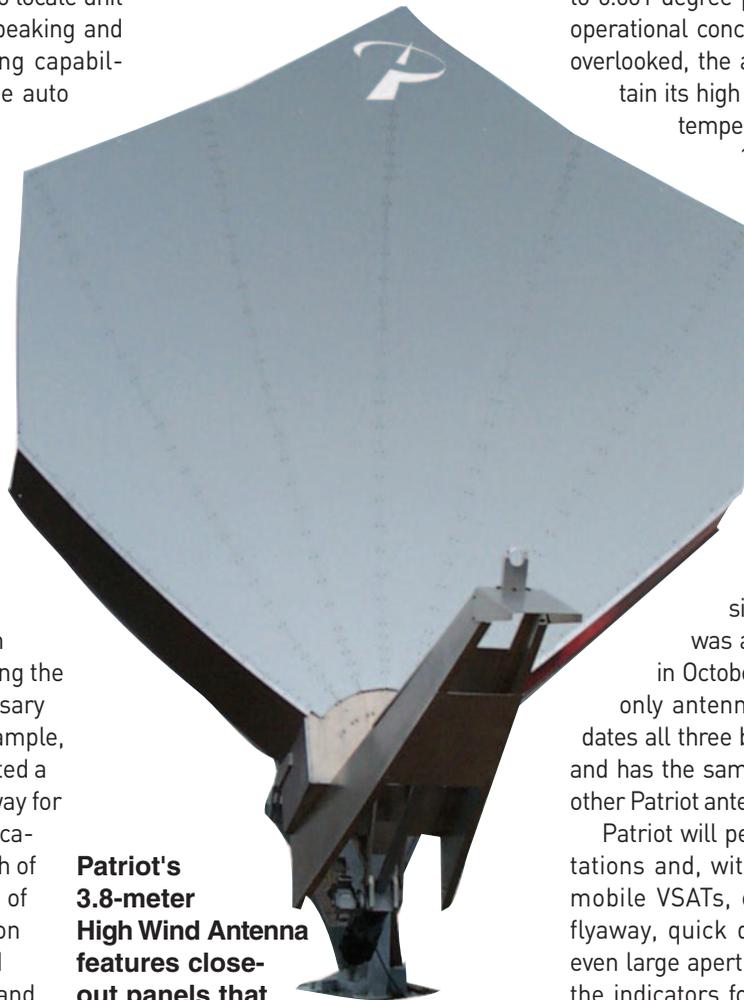
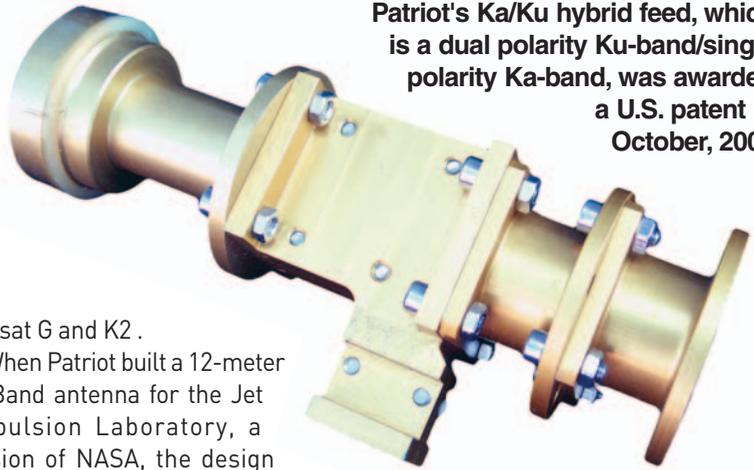
### Unique Challenges Require Unique Solutions

Developing a specialty product means knowing the customer and exactly what the customer requires of the antenna solution. Patriot stays ahead of the pack by maintaining a high level of quality while offering the capabilities that are necessary for the application. For example, Patriot's design team crafted a 1.8-meter motorized flyaway for government/military applications, applying the strength of carbon fiber with one third of the cost. A versatile solution featuring a multiband feed system — C-, Ku- and X-band — this unit had to meet Mil standard 188-164 as well as

Intelsat G and K2.

When Patriot built a 12-meter Ka-Band antenna for the Jet Propulsion Laboratory, a division of NASA, the design parameters were stringent indeed. The very narrow beam antenna that emerged has a pointing accuracy of better than one inch in a mile, meaning this particular antenna can find a target the size of a quarter from a mile away. The great pointing accuracy is trumped only by its 0.03 cm surface accuracy; a

**Patriot's Ka/Ku hybrid feed, which is a dual polarity Ku-band/single polarity Ka-band, was awarded a U.S. patent in October, 2005**



**Patriot's 3.8-meter High Wind Antenna features close-out panels that make the antenna more rigid and wind resistant.**

measurement that is tough to find in antennas at 1 meter, let alone 12 meters!. Additional design challenges included the ability to move each axis simultaneously at a rate of 3 degrees per second with the added capability of very smooth slow rate tracking down to 0.001 degree per second. An added operational concern that could not be overlooked, the antenna had to maintain its high degree of accuracy at

temperatures ranging from -15 to 50° C, and at wind speeds of up to 56 kph.

Patriot also developed and delivered, in just 6 weeks, the Ka-/Ku-band hybrid feed for Eutelsat, another important customer. This hybrid feed, which is a dual polarity Ku-band/single polarity Ka-band, was awarded a U.S. patent in October, 2005. This receive-only antenna system accommodates all three bands simultaneously, and has the same phase center as all other Patriot antenna systems.

Patriot will perform beyond expectations and, with its growing line of mobile VSATs, easily transportable flyaway, quick deploy antennas and even large aperture earth stations, all the indicators for future success are pointing in the right direction.

— By Peter Brown



PATRIOT 1.2M FLYAWAY



PATRIOT 1.8M MOTORIZED FLYAWAY



PATRIOT 1.2M MOBILE VSAT

## MOBILE ON THE MOVE

PATRIOT OFFERS MOBILE SOLUTIONS IN THE FORM OF FIXED AND MOBILE FLYAWAY ANTENNAS AS WELL AS FULLY AUTO COMMISSION MOBILE VSATS. ALL SYSTEMS ARE DESIGNED WITH PATRIOT'S HOT SWAP TECHNOLOGY, WHICH ALLOWS EACH ANTENNA TO CHANGE BETWEEN C, KU, KA, OR X BAND IN A MATTER OF SECONDS.



[WWW.SEPATRIOT.COM](http://WWW.SEPATRIOT.COM)  
1.517.629.5990 [INFO@SEPATRIOT.COM](mailto:INFO@SEPATRIOT.COM)