

# The Quiet Innovator

## Lightspeed Aviation has become a major player in wearable communications technology in a relatively short time

By Robert W. Moorman

The pilot headset market has come a long way in the last 15 years thanks to inventive companies like Lightspeed Aviation. Over the years, Lightspeed has become a market force by offering an incrementally priced line of Active Noise Reduction (ANR) equipped pilot headsets.

"Lightspeed deserves a lot of credit for advancing the state of the headset market," John Zimmerman, vice president of the catalogue division for Sporty's Pilot Shop said. "They were aggressive proponents of ANR when it was relatively new, as well as Bluetooth wireless connections and wireless headsets."

Like all start-ups, there were lean years for Lightspeed and its founder and President Allan Schrader.

Schrader began his career in the late 1980s with Tektronics. His early experience included the development of "Clark Clones" modeled after the green-colored David Clark passive headsets, the industry standard at the time. Clark's headset was utilitarian, consisting of a metal frame, ear cups and some form of air-seal. The headset reduced cockpit noise, but they were far from quiet.

The first ANR headsets were unveiled in 1989 by Telex and Bose at EAA AirVenture Oshkosh. While expensive (between \$800 and \$1,000 per pair) and bulky, these early model ANR headsets were a game changer in the headset market that would spawn additional competitors for Dave Clark.

In 1994, Ed Lee, an aviation products supplier, with intercom making experience, approached Schrader about developing a marketable ANR headset that could compete with a host of competitors.

In 1996, Lightspeed unveiled its first K Series ANR headset at EAA AirVenture. At less than \$400 per pair, the K became popular with those pilots searching for an affordable ANR headset.

In 1999, Lightspeed Aviation was spun out of Lightspeed Technologies and became a separate company.



*The Tango wireless headset is the first that allows "crew members to stay connected as they work within and around aircraft." (All photos courtesy of Lightspeed)*

"Those were the 'Lightspeed Who?' years," Schrader recalled. "We had ten-foot booths at tradeshow. It was a challenging time for our startup."

The Lightspeed 20K demonstrated what was possible in ANR wearable technology — quiet, yet robust. After the K series, the XL series introduced the Auto Shutoff; followed by the 3G series, which brought wired music and cell phone capability, along with intercom priority muting and EQ setting. After the 3G, the company launched the Zulu series in 2007. The Zulu PFX has all the bells and whistles a pilot could want in an ANR headset, including enhanced durability, acoustic response mapping, Bluetooth and cellphone interface, as well as upgradeable firmwear.

Lightspeed unveiled its first wireless ANR headset, Tango, at Heli-Expo in March 2016. With the untethered Tango, Lightspeed reduced headset noise by 30 dBA, Schrader said. This latest ANR headset comes with Lightspeed Link, a patent-pending blending of analogue and digital signals to enhance clarity. The Tango sells for around \$800, according to Sporty's Pilot Shop, and is

comparable to the \$1,095 Bose A20 with Bluetooth.

The top-of-the-line wired Zulu PFX sells for around \$1,100. The mid-range Zulu 2 and Sierra sell for around \$800 and \$650, respectively.

Lightspeed also offers FlightLink, a free, proprietary app for the iPhone and iPad that adds enhanced functionality to Lightspeed headsets. FlightLink retrieves incoming and outgoing communications.

### Challenges and Opportunities

One major challenge for any manufacturer of ANR wireless headsets is the issue of "latency," which is a delay of transmission of an audio signal. If not managed carefully, the delay rapidly degrades the audio experience and leads to poor communications. It is a noticeable problem in aircraft particularly because the sidetone the pilot hears is actually generated by the radio or intercom.

When a pilot speaks through a microphone of a wired headset, copper

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delivers the audio instantaneously to the radio and sidetone sends it back just as fast. In a wireless system, communication is packed, sent wirelessly, received, unpacked and sent to the radio. When that process is replayed back to the headset, it creates a delay in communications called latency. When it is longer than, say, 10-12 ms, an echo is introduced. Latency is noticeable over 20 ms and communications between the pilot and air traffic control becomes unusable beyond a 50 ms delay. The problem has raised concerns among pilots.

The innovations around the Lightspeed Link System, a proprietary hybrid analog and digital system, virtually eliminate the latency problem. "The delay is almost inaudible today," Schrader said. "We've licked the problem." The wireless link is neither Bluetooth

nor WiFi but a hybrid, two way, high fidelity audio system.

Crews tethered to their stations by headsets have long been an issue that interferes with optimal mission needs. Wireless headsets open the possibilities for greater efficiencies in the function of helicopter crew — particularly for EMS and some military operations, allowing

crew members full mobility within the cabin and to move externally in ground operations would allow for safer and easier workflow with far greater mission effectiveness. The wireless headset technology will likely usher in a new class of headsets and helmets for crew usage.

Crews can use multiple Tango headsets in the helicopter with each delivering communications clarity in mobile systems with a range of 15-25 ft (4.5-6 m). This allows for freedom of operator movement within the cabin and even externally while still being connected to any aircraft internal communications system. Safety and effectiveness should be increased in many aspects of workflow. Lightspeed notes that "for the first time ever, wireless headsets allow crew members to stay



*The Tango wireless link is a hybrid Bluetooth-WiFi two way, high fidelity audio system that virtually eliminates latency.*

connected as they work within and around aircraft."

Managing the vagaries of the market is another challenge for makers of wearable technology. While Lightspeed's future is assured, the headset market is saturated. Industry experts expect some competitors will drop out or consolidate with bigger players. Discounts will become the norm. The exit of German headset maker Sennheiser in late 2015 seems to drive home the point.

"With active airmen counts and new business aircraft sales flat to down, it's clear that the market hasn't been big enough to support all of the manufacturers as evidenced by the exit of Sennheiser," said Brian Foley, Brian Foley Associates, an aviation consultancy.

Foley said the headset market has "become commoditized" with each company offering similar products.

"As such, the buyer's selection of a particular headset will be a combination of brand preference coupled with previous experience and recommendations from other pilots," Foley added.

In addition to ongoing product innovation, Schrader is a firm believer in exploring new markets. Lightspeed is making moves to further penetrate the helicopter and paramilitary sector. Marketing a next generation ANR headset to helicopter pilots, who operate in one of the noisiest environments imaginable, might be exactly what the doctor prescribed. Reducing noise and achieving relative mobility are two features helicopter pilots would like to see in an ANR headset.

"The best markets for us to go into are adjacent markets, which could leverage our brand," Schrader said. "I hope we can be a leading supplier to the helicopter market."

The helicopter helmet market is part of the Lightspeed's strategic growth plan. The Lake Oswego, Oregon-based company doesn't make pilot helmets, but Lightspeed may be announcing partnerships with those that do "in the next several months," Schrader said. Lightspeed is talking with two helmet manufacturers about developing helmets with embedded with Lightspeed's ANR headsets.

Tapping the military market is another goal. Bose has developed ANR

headsets for military pilots and ground personnel. The Bose Combat Vehicle Crewman headset, T5 Tactical Headset and the TriPort Tactical Headset Series 2 are popular with the military. Lightspeed wants to sell its products to the aviation units of the military and paramilitary, fixed- and rotary-wing.

One challenge to maintaining or expanding marketshare is to do it with current technology.

Advances in quiet technology "don't move the dial the way they did 10 years ago," Schrader said. As such, companies like Lightspeed will have to find other ways to enhance the marketability of its wearable technology.

Lightspeed is the first (and only) company to have their headset connected via an app called "FlightLink." With that platform to work from, Lightspeed could easily expand a communications device to monitor things like biometrics. FlightLink can track, manage and report vitals around pilot's respiration, aspiration, heart rate, and even blood oxygen saturation level. Aircraft efficiency and mission effectiveness rely on capable pilots and crew.

Another application under

consideration is in the areas of control and information integration. "I think connectivity to flight data and information is another important part of the wearable communications technologies of the future," Schrader added. "You are starting to see it in general aviation. This is another area we are exploring."

Using Flightlink as a gateway, pilots can command changes to all sorts of instrument settings and "text-from-voice" can be utilized for visual confirmation of audible responses.

"This new functionality in wearables will be central to safer, better, more efficient piloting in the years to come," Schrader added.

Lightspeed has "carved out a niche" in the top end of a limited market by positioning itself between the pricey Bose and utilitarian Dave Clark products, observed Foley. The company's good-better-best offering of ANR headset will insulate it from the headwinds of market forces and allow it to expand market share by looking to adjacent markets. Not a bad plan for company once known as Lightspeed Who.



## Giving Back

The Lightspeed Aviation Foundation is a good example of the "Pay it Forward" philosophy of giving back to the people or community that helped you when you needed it the most.

The Foundation, the creation and passion of Lightspeed Aviation Founder and President Allan Schrader recognizes through its Pilot's Choice Awards, a select group of aviation nonprofit organizations that promote growth in aviation or are using aviation to aid in humanitarian efforts.

"These organizations are passionate about their work. We help them better tell their story and be more effective," Schrader said.

The Foundation has invested significant sums in helping well over 50 nonprofits in the past six years. Recipients include: the Recreational Aviation Foundation (RAF), The Ninety-Nines, Think Global Flight, Mission Aviation Fellowship, and Pilots and Paws. In addition to cash contributions, well over 1,000 ANR headsets have been donated to missionary pilots worldwide.

Lightspeed also helps fund numerous non-profit organizations through membership and corporate service involvement.

