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Army Aviation has a new technology that enhances battle command, improves over-the-horizon communications, and assists with airspace deconfliction. The Blue Force Tracking-Aviation, or "BFT", component of the Force XXI Battle Command Brigade and Below (FBCB2) system is a novel but efficient tool to assist the commander with his situational understanding and command and control and is proving itself over the extended distances in the vastness of Afghanistan.

2-10 Aviation Regiment, Tenth Mountain Division (Light Infantry) was first introduced to the BFT system late in its preparation for deployment to Operation Enduring Freedom-Afghanistan. All deploying aircraft were equipped with the mounting and wiring - or "A" kits - and operations personnel as well as UH-60 crew chiefs received initial training on the system. Other units attached to 2-10 AVN also received their A-kits and training, so that by the time Task Force Knighthawk assumed the Aviation Task Force mission in southern Afghanistan, all aircraft - AH-64, UH-60 and CH-47 - were outfitted.

In country, B-kits, consisting of the computer itself and antennas, were installed and task force personnel underwent further training provided by on-site DynCorp-Europe and ElmCo contractors. The task force also received a TOC ground station for mission planning and for monitoring mission execution. The skepticism of the previous task force was soon replaced with confidence as operators became familiar with the system and command emphasized its employment. Among its strengths, BFT enhances situational understanding, facilitates command and control, and assists with airspace deconfliction.

As an aid to situational understanding, BFT enables users to monitor the location of other BFT-equipped aircraft and vehicles. Assault, lift, and MEDEVAC aircraft are equipped with an 8" x 9" LCD screen while the TF Knighthawk TOC system is augmented with a 28" x 48" plasma screen prominently located so the entire battle crew can immediately track locations of BFT-equipped aircraft, other friendly unit vehicles, and other ground stations. This is as simple as looking at a unit (or vehicle) icon on a map, but instead of a map on a wall and some "sticky notes" being moved by a radio monitor, an electronic icon is displayed on a scalable Falconview map and positions are automatically updated by satellite at specific user-defined time intervals. The result is a near-real time picture of friendly BFT-equipped vehicle locations that helps with tracking mission progress and could provide a last known point, should the need arise, to assist with lost or downed aircraft.

Without AWACS, communications over the extended distances in Afghanistan has been a significant challenge. The size of the TF Knighthawk area of responsibility, roughly equal to half the size of Texas, easily negates traditional FM, UHF, and VHF communications. As a C2 tool, Blue Force Tracking-Aviation allows the commander to track the locations of his aircraft and provides an alternative means of over-the-horizon communications to meet this challenge. The best means of communications is the Tactical Satellite (TACSAT) net, but aside from the MEDEVAC and command console-equipped aircraft, TF Knighthawk aircraft are not equipped with this system. Too, TACSAT channel availability is constrained and High Frequency radio, while available, has proven less than reliable. Blue Force Tracking-Aviation fills the communications gap by providing the capability to pass text messages between stations. Code words and similar short text transmissions are easily passed to supplement, or even replace, radio calls. MEDEVAC aircraft often use the system to even send patient vital signs ahead to the awaiting care providing facility.

In planning, BFT enhances command and control by enabling the common operational picture (COP) to be readily shared between headquarters and between aircraft. Graphic control measures such as pickup zones, flight routes, restricted operating zones, landing zones and fire support control measures can be developed, plotted, and shared with other BFT-equipped units as a computer-graphics overlay file. These graphics can be downloaded to each BFT station, whether stationary or aircraft- or vehicle-mounted, to enable viewing by the crews. This is especially useful in the command console-equipped aircraft, where the scalable Falconview map displays aircraft positions in relation to battlefield control measures and replaces several hard-copy maps.

The display of aircraft locations while in flight is particularly helpful in deconflicting air traffic. More than a few times, TF Knighthawk aircraft have been alerted to oncoming traffic in the narrow passes and valleys throughout the region. BFT displaying positions and relaying location prowords provides a measure of positive airspace control to supplement procedural controls such as "rules of the road" flight and assists with aircraft avoidance.

A recent aerial extraction of US and coalition forces by TF Knighthawk illustrates the capabilities and utility BFT: As air routes and control measures were developed during mission planning, battle staff NCOs constructed an overlay using the TOC base station. During premission brief back, this overlay was sent as a computer file to the Aviation Brigade, located over 300 miles away in Bagram, via the BFT messaging function and was also shared with the Infantry Brigade TOC and all aircraft via the Mission Data Loader, a small, hand-held device used to transfer BFT data between systems. During aircraft run-up, BFTs were switched on and began transmitting location signals, monitored in the Knighthawk, Infantry Brigade, and Aviation

Brigade TOCs. Enroute, aircraft locations were automatically updated and displayed and, as serials passed predetermined checkpoints, code words were passed from the command and control aircraft to the TOCs via both TACSAT and BFT text messaging. At one point, a change in pickup zone was passed from the Infantry Brigade to TF Knighthawk, relayed via BFT text messaging to the C2 aircraft, which in turn relayed the new PZ location to the rest of the flight. Approach to and departure from the PZ was constrained through a single valley since it was located in a bowl surrounded by high peaks, but as the first serial departed the PZ for its egress back down the valley, the C2 aircraft easily monitored the location of the inbound second serial on BFT and advised the first serial of the oncoming traffic. Airspace deconfliction was simple, utilitarian, and effective.

Still in its infancy, Blue Force Tracking-Aviation is not a panacea; it has its shortcomings, from poor ergonometry to the limitations of satellite systems to its limited fielding and distribution. These problems can be overcome, or at least tolerated, and the effort will yield significant results.

Perhaps the biggest drawback of the BFT is its aircraft mounting system. Hardwired and static mounted inside the AH-64 aft stowage compartment, BFT is totally inaccessible by the crew during flight. Thus configured, the AH-64 BFT is a location transmitter only. In the UH-60, the system faces aft between the two crew chief seats. This location also makes it inaccessible to the point where it too, is more often just a location transmitter unless a crew chief repositions himself to access the system or a fifth crewman is added to operate the system. Although the CH-47 mount allows easiest access, its use still requires another dedicated operator or a crewmember to leave his station. Task Force Knighthawk has enjoyed most of its success with BFT mounted in the command console-equipped UH-60. Mounted with a flexible cable mount, the BFT laptop can be passed from person to person or operated on the console itself, supplementing any mounted maps. A similar setup is what is needed in all aircraft – a flexible, airworthy mount that allows easy access for the flight crew from their current stations, whether left seat or right, front seat or back.

Blue Force Tracking-Aviation is a satellite-based system and as such, is subject to the limitations of a space-based communications system. Because the system is susceptible to deadspace, blackouts, and solar interference, current locations are not always updated and messaging functions are disrupted when BFT signals are blocked from satellite receivers by terrain, satellite position, or both. Lengthening the duration of the display and shortening the frequency of updates helps alleviate this drawback but then presents less timely information. Consequently, users must still have backup tracking systems, usually a map and graphics, in the TOC and in the aircraft.

Another drawback of the BFT is that it is only a NEAR-real time feed and not a 100% accurate picture of where units and aircraft are located. The lag between the time the signal was sent and the time the signal was received is negligible, however, the time lag between reception and display is user-adjustable and may be considerable, to the effect that when an icon location is updated and displayed, the aircraft may have already moved several kilometers.

The distribution and fielding of BFT is another drawback to the system. It is not distributed force-wide, nor is it a joint system. Not until it is improved and fielded throughout the Army and totally integrated throughout the joint force will it be a true COP-tool able to assist with fratricide prevention. Fiscal constraints, interservice rivalry, and parochialism will unfortunately take their toll on the system before it is widely fielded.

Despite its drawbacks, Task Force Knighthawk is employing BFT to great effect and is proving it to be a valuable tool to help provide clear situational understanding and assist with command and control. Keys to the successful employment of this system are contractor support, command emphasis, and a willingness and hunger to experiment.

Dyncorp-Europe and ElmCo's team of contractors located at Kandahar install the air Blue Force Tracking system and provide operator training. These contractors provide outstanding technical advice and assistance to our uniformed operators and maintainers. They do not operate the system for us, but advise our crew chiefs and flight operations personnel in the actual usage of the system. Too, our contractors have often gone the extra mile to troubleshoot, repair, replace and upgrade systems, sometimes only minutes before aircraft launch. Until the system is simplified and hardened to be "soldier proof", these civilians will continue to be key to the success of the system.

Well prior to deployment, the decision was made to employ BFT as a secondary means of communications and aircraft tracking. Upon arrival in theater, the Task Force Commander reemphasized and directed its use. Beginning with just being turned on for each and every flight, the use of the system grew to include premission planning, monitoring, and text messaging. As command emphasized its employment, both user proficiency and contractor support improved. While command direction was necessary to initiate its use, a supportive command climate that allowed for experimentation and temporary setbacks was just as important in the employment of the system. Command supported and encouraged its use and allowed it time to grow and mature. Currently, it is no longer a novelty, but a routine part of aircraft startup and a relied upon tracking tool in the TOC.

Another key to success is personnel, from the pilots and crew chiefs who startup the aircraft systems to the flight operations personnel who labor to perfect data loading. They have to be willing and technically able to experiment and work with the system to employ and perfect its use.

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Knighthawk was fortunate in having several soldiers who eagerly – and adeptly – waded into the mire of computer and satellite procedures and jargon to establish a user-friendly base of training and make the system reliable and fairly benign. Countless hours were spent developing shortcuts and TTPs to improve BFT usability and form a core of "BFT Pros" to man the TOC ground station and the airborne C2 system.

All told, Blue Force Tracking-Aviation is a command and control system and situational understanding tool still in its infancy but with great potential. Near-real time position reporting, two-way text messaging, air traffic avoidance, and friendly graphic sharing are all enhanced through the capabilities of BFT. Given the right emphasis, this system holds great promise, and today, here and now, it is an option that provides great capability over the extended mission distances encountered in Afghanistan. Given the right command climate and emphasis, and operated within its limitations, it is a system that adds immensely to Army Aviation operations.

NOTE From HQ Blue Force Tracking-Aviation: The system depicted in this article is an early generation BFT-A system. The latest design is considerably more advanced.