Soldiers assigned to A Battery, Field Artillery Squadron, 2nd Cavalry Regiment, conduct a continuous fire mission on an M777. (Staff Sgt. Ricardo HernandezArocho/U.S. Army)

Bringing digital capabilities back to the field artillery squadron

By Chief Warrant Officer 2 Ryan Groves and Chief Warrant Officer 2 David Zamora

The journey of regaining fire support proficiencies began in July 2014 with the arrival of our new squadron commander, Lt. Col. Deric Holbrook, whose focus was fire support. The fiscal year 14 Modified Table of Organization and Equipment (MTOE) changes brought fire support elements (FSE) back to the field artillery squadron and an energized staff in the 2nd Cavalry Regiment, Field Artillery Squadron. When combined, the conditions were set for success to regain digital capabilities and core competencies.

The establishment of digital fire support communications can be a simple process influenced by a number of complex factors. In August 2014, Field Artillery Squadron, 2nd Cavalry Regiment, set out to reestablish digital fire support communications, encountering a number of unforeseen

obstacles. This situation could be paralleled to what happened on April 11, 1970, when NASA launched its seventh manned mission to space and third planned mission to land on the moon. Apollo 13, however, had a different fate, encountering a number of obstacles that required engineering expertise and troubleshooting procedures to bring the crew home safely. Over the course of six months, as digital communications were being re-established, it felt as if the FA Squadron was trying to assist Apollo 13 on their mission home. While a number of the obstacles encountered were not directly related to digital communications, they influenced our unit's ability to effectively regain confidence and support along our digital quest. Some of the obstacles included MTOE changes, neglected equipment, untrained Soldiers, multiple contracts, lack of Stryker-specific work packages to support maintenance operations, and an overall lack of understanding as to how the mission equipment package (MEP) operates when paired with the M1131A1 Stryker.

After several months of focused training and maintenance, the FA Squadron, 2nd Cavalry Regiment established digital links among all 13 fire support vehicles (FSVs) but had a difficult time maintaining digital capabilities with all 13 FSVs in a single training exercise. As the weeks turned into months, all identified faults were job ordered for repair. At times, multiple hindrances and obstacles all pointed in the direction of failure; however, we achieved many successful milestones to include a better understanding of how even unpretentious goals can contain complex problem sets.

The FY14 MTOE changes brought the fire support elements back to the FA squadron. A number of manning, equipping, training and maintenance deficiencies across the FSE formations were identified. The greatest obstacles encountered equated to neglected fire support equipment and decayed knowledge of basic digital fire support tasks. Having the entire fire support system consolidated under the FA squadron allowed us to provide a focused energy to solve our manning, equipping, training and maintenance problems.

Phase 1: Training for digital fire missions

After reconsolidation of all the fire supporters and equipment from the infantry squadrons, the regiment's fire support (FS) combat power became more effective and our focus shifted towards individual observer skills and proper manning. To maximize the effectiveness of our fire support elements training objectives, the regimental fire support noncommissioned officer in charge developed a roster that tracked each individual by skill set: Joint Fires observer, target mensuration only; Joint Firepower Course, collateral damage estimation; Battle Staff Course, Electronic Warfare 1J, and a number of other courses. The individual skill sets were then paired with longevity and rotational needs. As the FSE's were manned by skill sets, a detailed training plan was developed to fill knowledge gaps.

With individual collective task being completed, the line of effort shifted towards team-focused training. We thought our FSVs were fully functional, but discovered the MEP that provides the digital capability had been neglected for the better part of a decade and required extensive maintenance. Several factors contributed to this neglect. The FA Squadron was activated after the modular re-alignments moved fire supporters to the infantry squadrons, and regiment continuously transitioned from Operation Iraqi Freedom to Operation Enduring Freedom deployments since its activation. Fire supporters had never been consolidated under the Field Artillery Squadron, 2nd Cavalry Regiment. In addition, the FSVs are among the oldest Stryker's in the Army and have not deployed or properly reset in seven years. The combination of these factors led to decayed technical knowledge on the operation and maintenance of the Stryker and MEP.

The first subcomponent of the MEP that we identified as a training deficiency was the stand alone computer unit (SCU) that runs the forward observers software (FOS). To correct this deficiency, we contacted the Fires Center of Excellence and coordinated a mobile training team from CGI Federal. The initial onset of requesting a MTT was identified during the Stryker War Fighting Forum and further developed through repetitive contact between FCoE and the leadership of Field Artillery Squadron, 2nd Cavalry Regiment.

This training focused solely on the SCU operations. To facilitate training a large group of fire supporters, the CGI instructor dismounted the SCUs and conducted the training in a classroom environment. This environment allowed fire supporters to gain confidence in the SCU. In hindsight, we practiced poor habits by failing to integrate the SCU into the MEP, not exercising the tactical network and instead relying on single channel/plain text frequencies and external power supplies.

Given that the SCU is an interface that allows communication between MEP components we should have placed more focus towards how the MEP components interact. While this is not part of the outlined training for the SCU and FOS, this is one of the moments when we felt as if we were trying to land Apollo 13 on the moon, rather than accomplish a basic digital call for fire.

Our complex problems began shortly after the FOS trainer departed in late September 2014. The new FOS software was not compatible with the outdated Fire Support Sensor System (FS3) software. This limited us to manually generating targets on the SCU to send them to the AFATDS. Further research into the problem determined that our software issues spanned several components of the MEP. We identified dated software on the Target Station Control Panel (TSCP), and the Mission Processing Unit (MPU). In addition to the software issues, a number of hardware issues were identified that included not mission capable wiring harnesses, improperly installed cables and missing cables.

Phase 2: Deadlining the regiments' fire support system

Our noncommissioned officers' and Soldiers' training on the M1131A1 Stryker and its capabilities to this point had been limited to automotive training. The fire supporters' lack of knowledge on the M1131A1 stems from years of constant deployments, that exclusively focused on the use of theater provided equipment (TPE) as it pertained to the non-standard missions that required limited FS knowledge. As we visualized the magnitude of the problem, the squadron commander decided to deadline all 13 FSVs; the MEPs' state of disrepair was too much to consider them fully mission capable (FMC).

To establish a baseline to begin repairing the FSVs, we reached out to field service reps from Communications Electronics Command and Tank Automotive and Armament Command in hopes of obtaining Stryker specific schematics of the wiring diagram, which would allow us to initiate troubleshooting procedures. Up until this point we had been using

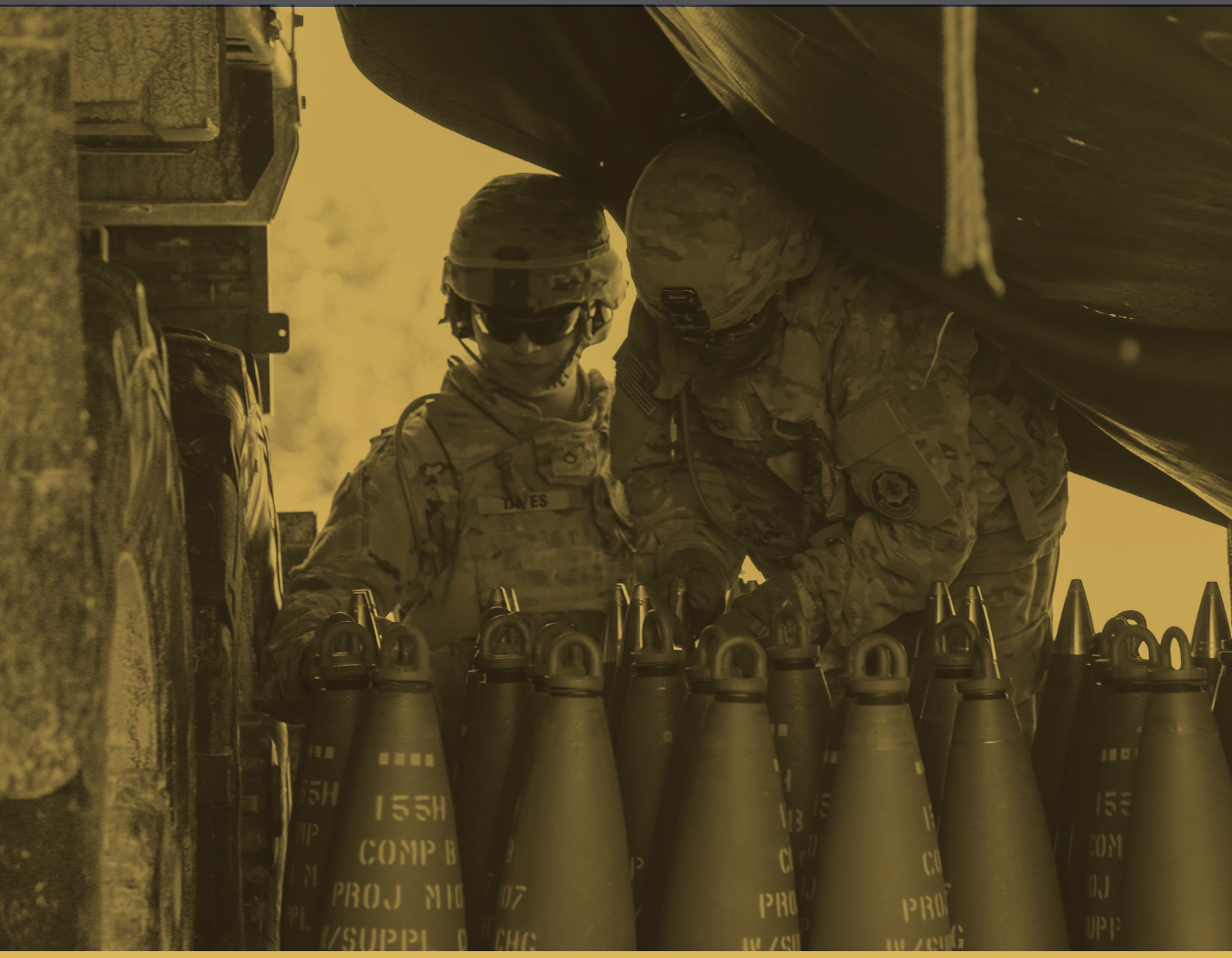
schematics that were developed for the M117 and M1200 Armored Knight platform.

Although our CECOM and TACOM representatives worked well together, isolating the faults in each Stryker was challenging because each fault repaired during a CECOM technical inspection uncovered another fault, drawing TACOM back in for troubleshooting. In addition, no single source of documentation exists for troubleshooting the M1131A1 Stryker FSV MEP. All work packages that had been provided by CECOM and TACOM were generally reference material developed for the M117 and M1200 Knight platform. While the provided material did reference Stryker specific issues, it failed to identify corrective actions, part numbers and detailed schematics to begin proper trouble-shooting procedures. To further complicate the process, fire support teams continued to identify new problems during weekly digital sustainment training (DST). We turned in every FS3 for software updates and learned that annual services and software updates had been overlooked for at least five years.

Phase 3: Fixing the problems and regaining expertise

Once we had finally fixed the majority of the cables, every FSV in our formation had the same fault. With CECOM and TACOM assistance, we identified that TSCPs and MPUs were running outdated software. We found the problem! Our concern quickly returned; we learned the MEP components are managed by several different contracts. Disappointment set in when we learned that the FSV Technical Manual did not contain instructions to re-load the new software. By this time we had estab-

Soldiers assigned to A Battery, Field Artillery Squadron, 2nd Cavalry Regiment, conduct a continuous fire mission with their M777 during the Saber Strike 16 Combined Live Fire Exercise at a training site near Tapa, Estonia, June 20, 2016. Exercise Saber Strike 2016, is a U.S. Army Europe-led cooperative training exercise designed to improve joint interoperability to support multinational contingency operations. (Staff Sgt. Ricardo HernandezArocho/U.S. Army)



Soldiers from Archer Battery, Field Artillery Squadron, 2nd Calvary Regiment, conduct a combined forces live-fire exercise along with other multinational participants in the Saber Strike 16 at Tapa, Estonia, June 20, 2016. (Spc. Sandy Barrientos/U.S. Army)

lished weekly teleconferences with PM Stryker, TCM Fires and DRS Technologies, who designed and engineered several of the MEP components. The weekly teleconferences with all enablers allowed us to isolate the new fault identifying outdated software on our TSCPs and MPUs, which caused compatibility issues among all MEP components. TCM Fires and PM Stryker provided a link to download the software and the procedures to update the TSCPs and MPUs.

We immediately hit roadblocks installing the software. After a week of trial and error, we finally had one vehicle take the software update for the TSCP but could not replicate this process across our formation. Our FSV repair team spent two more weeks in the hull of the Stryker attempting to load the MPU and TSCP Software. PM Stryker and DRS Sustainment Systems asked us to send one MPU and TSCP to the DRS lab in St. Louis for testing to identify the procedural issues we were experiencing.

Simultaneously, our weekly teleconferences prompted PM Stryker to send a technical inspector from DRS Technologies to evaluate the problem set firsthand. While he completed technical inspection of the FSVs, DRS in St. Louis found a hardware fault linked to all MPUs and TSCPs. The upgraded software package they had published required higher data storage rates than our outdated MPU and TSCPs supported. DRS quickly loaded the new flash drives at their lab and shipped them to the technical inspector to install before he departed.

To complement the technical inspections, PM Stryker sent a training team that arrived one week after the DRS inspector. Initially, we thought the week-long delay between inspections and training would be sufficient. The technical inspections produced more faults, requiring parts that could not arrive in time to repair vehicles for training. To overcome this challenge, we designed a training program that rotated two to three crews through a condensed version of training on our best Strykers over a two-week period.

Lessons learned

We had five of 13 FSVs fully digitally capable and 13 of 13 trained crews after three weeks of intensive training and maintenance. Weekly digital sustainment training (DST) over the next four weeks, focused on operator-level training, commu-

nication parameters and tactical network establishment.

The aforementioned poor habits from the SCU training plagued DST. We thought that putting everyone on the same single channel/plain text net would make crawling through digital training easier. In fact, our efforts to simplify the training with TTPs from classroom SCU training over-burdened the net and prevented us from seeing our success. Once we established and transitioned to the regiment's digital architecture, we had 10 Stryker's sending digital calls for fire from the FS3, through the MEP and SCU, to the AFATDS.

In hindsight, we did not allow enough time between the technical inspections and training. Had we waited two to three weeks between the inspection and training, we could have had 13 of 13 vehicles FMC and allowed the crews to train on their own vehicle as a team. One month after the trainers and technical inspector departed, our fleet of FSVs has established digital connectivity from sensor to shooter with all 13 FSVs. We currently sit at 13 of 13 FMC FSVs.

To ensure our crews remain trained and have confidence in the equipment, we have developed several short training videos, created a FSV MEP smart book, and are in process of developing two ranges in the United States Army, Europe training areas to determine our average grid error through long-range confidence checks.

Assisting the FA community

Units looking to replicate our success must begin by assessing the mechanical maintenance status of their fleet. Once all mechanical maintenance issues have been addressed units should verify that all versions of software that pertain to the MEP are current. From this point, a solid baseline can be established that allows technical inspections to properly direct towards the MEP. Using TACOM, CECOM, PM Stryker and the other enablers is critical to this step. It is difficult to isolate faults and repair the Stryker MEP when Soldiers and NCOs do not have the expertise or documentation to guide them along the process.

As the technical inspections near completion units will have a solid foundation to develop training and repair plans that foster team development, working on the actual equipment they will deploy with. This is important as every individual Stryker will present its own unique maintenance quirks. As the crews train on their own equipment, those quirks can be addressed and handled in a proper manner. This not only decreases the maintenance status, but crew members learn troubleshooting procedures first hand.

As technical inspections near completion, the FSE's focus should shift towards training. This process should not be rushed and is based on identified faults and repair timelines. Training for each Stryker crew should last at least five days. Day 1 should focus on how the MEP is properly started, how to identify and correct known faults, and proper shut down procedures. Day 2 should incorporate the actions learned during Day 1 and provide a solid introduction into bore sighting and FS3 operations. Day 3 should recap all training provided up to this point and incorporate the units' digital architecture; establishing communications between troop level SCUs and AFATDS. Day 4 should be used to identify any training shortfalls and cross-section training goals and preparation for a digital communications exercise (COMEX) should be completed. Day 5 should focus on crew-level operations that support an instructor-led digital COMEX. While the COMEX is facilitated by the instructor, crews should have the baseline knowledge to operate independently.

In summary, I decisively believe involvement from all levels of leadership, our civilian counterparts and all fire support related MOS's must take ownership and share collective wisdom in order to evolve and adapt the Fires war-fighting function. Positive attitude is a must throughout the ranks; every member of the FA team is important to mission success, and must understand their role which is essential to overall mission accomplishment.

Additional information

FIST OP provides information software, sensors and mounted platforms. Additional information can be viewed at https://www.us.army.mil/suite/page/111551. Common Access Card (CAC) required.

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