

National Training Center Update

Maintaining at Pace

March 2020





30 March 2020

Fellow Leaders,

In February 2020, the NTC Operations Group published an article entitled "[Winning the Maintenance Fight At Pace](#)." The article highlighted some common shortcomings with regards to creating a culture of maintenance in our formations as well as tips for building a solid maintenance program capable of performing in any environment.

This month, the Officers and NCOs of Operations Group at the National Training Center builds upon that article in an effort to help us all understand specific tactics, techniques, and procedures (TTPs) that can allow the Army to maintain combat power while simultaneously conducting large scale combat operations against a near peer threat.

Our ability to maintain our equipment directly contributes to our ability to accomplish our wartime mission. Regardless of your branch or MOS, even our best Soldiers become nothing more than bystanders without properly maintained equipment. It doesn't matter if you are a Scout operating further forward on the battlefield than anyone else in the BCT or an infantryman in the back of a Bradley. If your equipment isn't operational, you can't do your job. At the National Training Center, we see these challenges every month.

Often, we spend inordinate amounts of time debating the best tactics, techniques, and procedures for every branch, MOS and warfighting function. We wrestle continuously with the best methods for combining arms to accomplish our missions. We work tirelessly to train our formations to combat our Nation's threats. However, as an Army, if we don't get maintaining our equipment in the operational environment envisioned against a near peer threat, none of that matters. We can't do our jobs without well trained Soldiers. Well trained Soldiers can't do their jobs without well maintained equipment.

From operator level mistakes to mechanics lacking proper diagnostic equipment to leaders failing to include maintenance within priorities of work, each small cut into our maintenance program, at echelon, results in a loss of combat power available for the fight. Moreover, each combat power loss places a heavier burden on those Soldiers moving forward into battle. What might have been a well-resourced plan can easily become a "mission impossible" task - all because of a unit's inability to execute a consistent, well thought out maintenance program that maintains combat power at the pace required in a decisive action training environment.

As always, we appreciate all that you do for our Army, and we stand ready to assist units in any way possible.

Sincerely,

Michael J. Simmering
Outlaw 01
Operations Group
The National Training Center & Fort Irwin
Phone (760) 380-4476



Table of Contents:

Section I: Cavalry Squadron Maintenance

Section II: Combined Arms Battalion Maintenance

Section III: Sustaining Army Aviation Combat Power

Section IV: Field Artillery Battalion and Below Maintenance

Section V: Maintenance in the Brigade Engineer Battalion

Section VI: Brigade Maintenance at Pace



Section I: Cavalry Squadron Maintenance

MAJ Jim Plutt, Cobra 03, Squadron S3 Trainer, at james.m.plutt2.mil@mail.mil.

Introduction: One of the biggest challenges facing a cavalry squadron at NTC is demand of maintaining their equipment in a tactical environment. Units often provide maintenance support from their motor pool while training at home-station, lending themselves to brick and mortar infrastructure and easy access to their brigade supply support activity (SSA) and other SSAs on the same installation. These unrealistic work conditions create complacency in our ability to conduct maintenance in a tactical environment. Under this construct, units do not stress their equipment, develop analog systems of record, test the strength of their shop stock listing (SSL), practice their 5988-E flow, or fine-tune hasty maintenance meetings at Logistical Release Points (LRPs).

Challenges with the System of Record at NTC

Observation: Soldiers lack expertise on the Very Small Aperture Terminal (VSAT). Clerks struggle setting-up and tearing-down the VSAT at NTC. When VSAT connectivity degrades at NTC, maintenance leaders are challenged to deadline equipment and requisition parts. Unit Standard Operating Procedures (SOPs) do not outline a PACE plan for executing maintenance when the VSAT is not setup.. Units are vulnerable to VSAT outages and slow to execute maintenance until a leader takes the initiative to solve the issue. The Global Command Support System-Army (GCSS-A) is the system of record for executing maintenance in the Army. Still, a redundant analog system is also required to capture maintenance operations using the analog system outlined in appendix A, section II of AR 750-1, Army Material Maintenance Policy (AMMP). Maintenance control sections rarely have efficient analog trackers updated within their shop, informing all leaders within the section and creating shared understanding of operations.

Best Practice: Automated logistics clerks need to understand the VSAT's capabilities and develop trouble-shooting skills to expedite VSAT connectivity when the shop office displaces or VSAT maintenance issues arise. An SOP that captures tactics, techniques, and procedures (TTPs) within maintenance control impacts success, and a TTP for ensuring VSAT connectivity is vital for maintenance control. Training clerks on the VSAT is as simple as tearing it down and setting it up semi-weekly at home station in the motor pool. Sections can also build on this by tearing down the VSAT and moving to a local training area and setting up the VSAT and shop office. Another TTP is networking with other maintenance control shops in the brigade. During VSAT outages, clerks can update the ESR at another GCSS-A work station within the brigade streamlining coordination with adjacent maintenance control sections in the event of a VSAT outage.

Building a good relationship with the Sustainment Automation Support Management Office (SASMO) is critical in developing contingencies for VSAT outages. A TTP that units can establish is coordinating with SASMO to tear down and set up their brigade substitute VSAT. This builds cohesion between the maintenance and SASMO clerks, and it gives the maintenance clerks hands-on training on the substitute VSAT in case theirs develops a dead-lining fault.

Maintenance control needs redundant analog maintenance trackers within their sections. They must update analog trackers as the equipment status report (ESR) changes, so there is a



Common Operating Picture (COP) within the shop. Additional trackers capturing on-hand packaged fuel (POL), recovery operations, high-demand parts out of Shop Stock Listing (SSL), and status of critical job-orders are essential for maximizing the shared understanding and efficiency amongst all leaders in the squadron and maintenance section.

Units must maintain analog redundancy using the DA Forms outlined in appendix A, section II of AMMP to ensure they can continue to execute maintenance in cases of extreme VSAT outages. DA Forms required to execute analog maintenance are: DA form 2407 for each work order, DA form 2405 as a registrar for all work-orders, DA form 5987 for dispatches, DA form 2404 for equipment inspections, DA form 2765 to walk-up parts at the SSA, DA form 2064 as a document registrar to track parts, and a DD form 314 to monitor non-mission capable (NMC time). These DA Forms allow the maintenance control section to continue executing maintenance in place of GCSS-A connectivity. It is imperative that the manual forms and processes are input into GCSS-A once it becomes accessible to ensure continuity and accuracy of data.

Shop Stock Listing (SSLs): Enabling Quick Forward Repair



Observation: GCSS-A automatically tracks the demand-history of parts issued against job-orders. Internal SSL reviews chaired by the maintenance control technician can capture unique needs that automatic demand-history audits will not achieve. For example, at the NTC, Stryker cavalry formations often have a high consumption of tires due to the harsh terrain they experience, but without an SSL review, Stryker units may not have increased their stockage levels for tires. Without appropriate SSL, maintenance control is forced to order the part, which requires GCSS-A inputs and picking up parts from the SSA, which in turn slows tempo and delays repair of combat power.

SSL is often maintained exclusively at the Maintenance Collection Point (MCP) rather than distributed across the maintenance footprint to include Field Maintenance Teams (FMTs) and contact teams. SSL that is out of reach of mechanics or does not meet the demands of unscheduled maintenance takes a toll on the operational readiness rate and puts a strain on pass-back maintenance process, limiting the ability to maintain at pace.

Best Practice: Maintenance control sections must conduct quarterly SSL inventories and internal SSL reviews where key maintenance leader personnel and senior mechanics review historical data on the ESR and identify routine faults. A good TTP for fleet management is reviewing the fleet by bumper number and fault, following field problems, and keeping a historical record over time. The historical ledger allows maintenance leaders to have data that they can review that gives them insight into their fleet. They also need to examine demands that an upcoming mission might have on their fleet so that they can forecast the potential parts their fleet might require based on the task and terrain. Once shop stock is vetted and filled, maintenance control must conduct a fleet analysis to identify the parts required by troops and provide the parts to them. This analysis allows field maintenance teams (FMTs) and contact

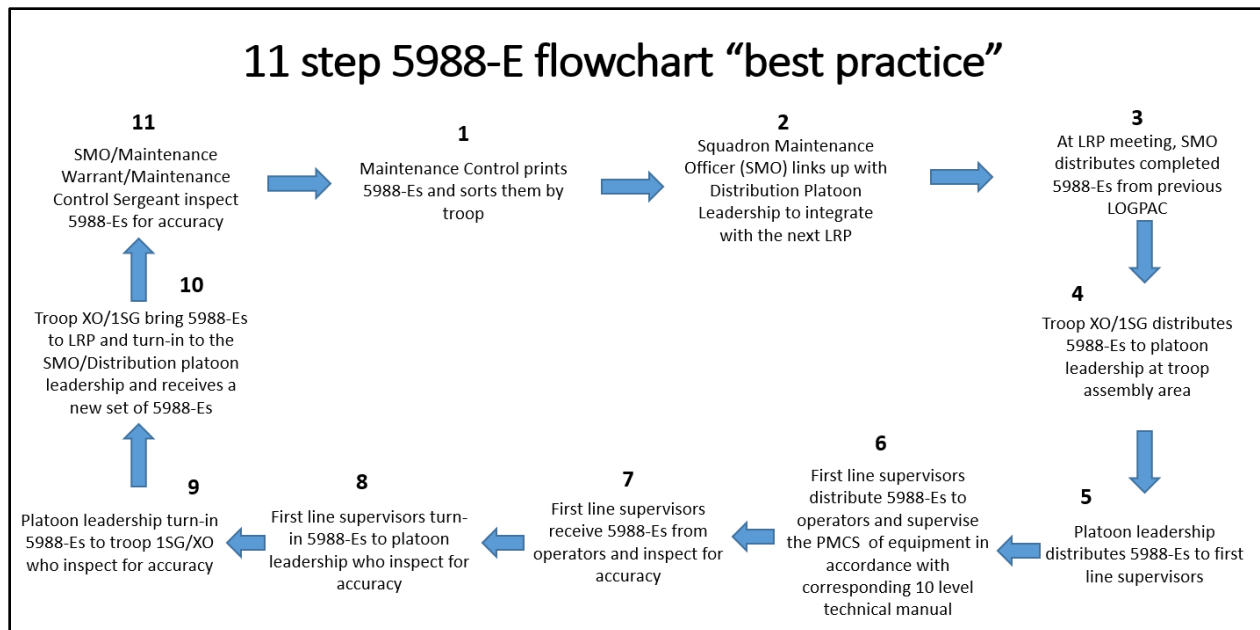


teams to push forward in a tactical environment with their supported troops and have parts on-hand that can rapidly fix equipment forward.

Challenges with 5988-E flow, maintenance at LRPs, and tactical maintenance at NTC

Observation: Cavalry squadron SOPs generally articulate a 5988-E flow interval, which is neither mutually understood nor practiced. Many units ambitiously have a 24-48 hour flow requirement, but have inadequate systems in place to ensure they are receiving the 5988-Es back and that they are properly filled out. Key maintenance managers rarely attend LRPs. Thus, maintenance leaders miss an opportunity to discuss and resolve maintenance issues at an LRP meeting. At the Forward Line of Troops (FLOT), troops often fail to conduct maintenance efficiently. Units fail to have an SOP that explains a standardized way of "when" and "how" to perform field maintenance. Units commonly fail to understand where field maintenance falls on the priorities of work, rehearse how to maintain security posture during maintenance activities, and have internal tracking mechanisms in place that utilize vital leaders of the troop and the FMT or contact team that is attached to the troop.

Best Practice: The SOP should express how to conduct field maintenance while maintaining security, refine where maintenance sits in the troop priorities of work, and list roles and responsibilities of FMT and contact team personnel as well as key leaders of the troop in how to manage maintenance. A good TTP is establishing a 5988-E flow that directly involves essential leaders. Normally, the key leaders who need to play an active role in the 5988-E flow are first line supervisors, platoon leadership, troop executive officers (XOs), troop first sergeants (1SGs), distribution platoon leadership, and the squadron maintenance officer (SMO). Once the 5988-E flow is published in the squadron SOP, units need to practice that system routinely at home station to build continuity within the flow structure. Another TTP to ensure 5988-Es are protected and sorted by unit is producing two polyvinyl (PVC) pipes per troop. A new set of 5988-Es goes in one PVC pipe, and the completed set in another, and key POCs exchange the PVC pipes at the LRP. This TTP speeds up the LRP and protects the 5988-Es in the process.





Section II: Combined Arms Battalion Maintenance: Observations at Echelon

MAJ Woo Shin, Tarantula 02, XO Trainer, at woo.c.shin.mil@mail.mil

Operations in a Decisive Action environment against a near-peer threat stress maintenance systems at all levels. The following discussion is based on observations over the last eight rotations, acknowledging variation between units in training level and competency.



At the platoon level, operator-level Preventative Maintenance Checks and Services (PMCS) are poorly conducted or not conducted at all due to the pace of operations, Soldier fatigue, or a lack of enforcement. Operators and their small-unit leaders generally do not understand how PMCS provides the parts they need, and are generally not equipped or trained to conduct basic recovery, troubleshooting, and repair operations.

At the company level, challenges are multi-faceted. Compiling data and PMCS information are challenging if the chain of command does not emphasize and enforce requirements to conduct PMCS. A lack of

maintainers attached to the company results in inaccurate reporting or ineffective quality control when reporting equipment faults. These problems are exacerbated in offensive operations or when the companies/troops get extended geographically. Without a clear plan for Primary, Alternate, Contingency, and Emergency (PACE) communication, the transfer of maintenance requirements from the companies to the Maintenance Platoon and Battalion Command Posts (CPs) is difficult.

At the battalion level, management of the flow of information and the flow of equipment is often not prioritized or is not incorporated into the Common Operating Picture, or is lost when a large amount of other information (intelligence, operations, plans, sustainment reports) are overlaid on top. Additionally, if key players (most significantly, battalion executive officers) are directed away from command and control nodes, the overall system is rudderless and fails to deliver results.

Discussion

In order to maintain at the higher pace of operations demanded by Decisive Action, a clear, disciplined, realistic, well-understood, and well-practiced maintenance plan must be designed and executed at all levels. This discussion flows from battalion down to platoon-level, since the system needs to be defined by higher, with buy-in and execution conducted by subordinate elements.

Battalion Level Observations: Units often plan to conduct maintenance at the NTC along the following lines. Crews conduct PMCS at least once daily and record faults on a daily



5988-E. 5988-Es are turned in daily during logistics package (LOGPAC) operations and are hand-carried back to the Unit Maintenance Collection Point (UMCP) for processing and input into the Global Combat Support System-Army (GCSS-Army). Parts are ordered through GCSS-Army, and are picked up by the Forward Support Company (FSC) or Field Trains Command Post (FTCP) personnel at the Supply Support Activity (SSA) in the Brigade Support Area (BSA). Battalion Executive Officers (BN XOs) and Battalion Maintenance Technicians (BMTs) report daily to the BSA or Brigade Main Command Post (MCP) for a daily, in-person Brigade Maintenance Meeting. This system is fully compliant with ATP 4-33 *Maintenance Operations w/ Change 1*, 19 November 2019.

However, observations over the past eight rotations indicate this system commonly fails along three lines.

First, the printing, distribution, and collection of paper 5988-Es is too slow to keep pace with the operation. Print capability generally is limited to the UMCP and the Battalion MCP, and the quantity of paper flowing back and forth is difficult for company leaders to effectively manage. Additionally, the request for critical parts becomes delayed because it is dependent on 5988-Es returning to the UMCP before being ordered. (Compounding the problem, the 5988-Es are often poor quality, discussed below in the following sections on the company and small-unit levels.)

Second, the requirement almost standard unit requirement for battalion XOs to attend an in-person Brigade maintenance meeting commonly removes a critical leader from the command post and operations process for four to eight hours per day (1-2 hours for travel to the BSA or BCT MCP, 1-2 hours for the meeting, 1-2 hours of follow-on face-to-face meetings/discussions, 1-2 hours for travel back to the BN MCP). Battalions sometimes choose not to send the battalion XO, improving battalion performance but potentially disrupting the brigade's ability to support the battalion's maintenance.

Lastly, battalion maintenance communications PACE plan is generally insufficient for maintenance operations to keep up with the pace of Decisive Action. With the exception of 5988-Es (which flow by hand through LOGPAC), maintenance PACE is usually subsumed under the operational PACE, and utilizes some form of Frequency Modulation Radio (FM Radio), Joint Capabilities Release (JCR)/Joint Battle Command-Platform (JBC-P) message traffic, tactical satellite (TACSAT), High Frequency Radio (HF Radio), or some combination thereof. Without specific frequencies, chats, or role names, maintenance information is deprioritized or lost amid the din of intelligence and operational information.

Company Level Observations: At the company level, the maintenance system commonly involves the XO as he "plans and supervises the company's maintenance effort before battle with the first sergeant and works with the first sergeant, platoon leaders, platoon sergeants and maintenance team chief to maintain a current operating picture on maintenance." (ATP 4-33, C1, 19 November 2019). In the prevailing TTP seen utilized at the NTC, the company XO receives a ream of 5988-Es from the LOGPAC (if the distribution element remembers to bring and distribute them) and then needs to distribute them to platoons. He then gives the completed 5988-Es back to the distribution element, hoping that his company's 5988-Es don't get lost or forgotten about during transit.

A critical company 5988-E chokepoint is a quality check. Company XOs can supervise 5988-E flow, but they often lack the necessary subject matter expertise without a forward mechanic to advise them. We observe that units rotating through the NTC which do not detach Field Maintenance Teams (FMTs) to their companies have drastically degraded maintenance



outcomes. This is less common in Armored Brigade Combat Teams (ABCTs), which are resourced by their Modified Tables of Organization and Equipment (MTOEs) to include FMTs for each company, but very common amongst Infantry Brigade Combat Teams (IBCTs) and Stryker Brigade Combat Teams (SBCTs), which do not have MTOE FMTs and doctrinally rely on smaller contact teams. The decision not to have an FMT/maintainers forward can be due to a lack of manning in the Forward Support Company's (FSC's) Maintenance Platoon, because of an equipment shortage, or because the battalion wants to maximize maintenance capabilities and throughput at the UMCP. However, without even just one motivated maintainer to assist the PMCS process, assist in basic diagnosis and repair, conduct troubleshooting, and conduct quality control of maintenance needs, company XOs often provide incomplete and/or inaccurate data to the battalion and unit maintenance personnel. Bad information begets incorrect parts, which causes inefficiency and unnecessary delays in fixing equipment.

Platoon and below Observations: Platoons and subordinate crews generally lack the experience or desire to conduct basic operator-level maintenance, placing undue burdens on the FSC's maintenance platoon. Crews and operators fail to conduct basic-level troubleshooting and diagnosis of faults or operator-level repairs. OC/T observations indicate that platoon leadership and crews see daily 5988-E processing as an onerous administrative requirement and fail to prioritize it. The requirement for a crew to fill out daily 5988-Es while conducting operations becomes a cursory paper drill as competing requirements take precedence. Delay or friction in receiving parts reinforces junior leader and operator perceptions that 5988-Es are a waste of time. In this environment, leaders who attempt to enforce daily 5988-E execution often gain higher frequency at the cost of reduced actual quality.

Additionally, platoons and subordinate crews often come to the NTC without the equipment or training they need to conduct recovery. Not every recovery requires a wrecker or purpose-built recovery vehicle; defaulting to these critical assets increases the load on maintainers and reduces their availability where they are truly needed.

Best Practices

Effective battalions which keep operational readiness (OR) rates up throughout high-tempo Decisive Action operations address the issues stated above at all levels. They establish a maintenance system that makes sense and reduces the burden at every level, while ensuring the quick, effective distribution of information, parts, and capabilities. Most importantly, the units establish this system early and *train to maintain* at all levels.

Platoon Best Practices: Platoon leadership, crews, and operators must be educated on the maintenance system, trained and practiced in diagnostics and operator-level repair, and understand the importance of conducting PMCS to quickly identify deadlining faults and issues. Soldiers must see their work produces parts, and understand the delay when it does not. When combined with a less-frequent 5988-E cycle (described below, in the battalion-level recommendations), junior leaders can successfully re-frame the PMCS process from "fill out the form so that we can get battalion off our back" and more about "let's do the PMCS we need to so we can keep this equipment running to stay in the fight."

Minimum essential recovery and repair equipment and high-failure rate parts must be kept on hand and established in load plan SOPs. A best practice is to have two appropriate tow bars (and associated other equipment) per platoon, with the other vehicles in the platoon carrying



chains or tow straps. Stryker platoons may load a spare tire per vehicle with the other equipment associated with changing tires, as load plans and SOPs allow. Platoons should also carry commonly-used Class III(P) like oil, coolant, and transmission fluid so operators can conduct quick fixes that keep vehicles running until a lull in the operation presents itself.

Company Best Practices: A best practice is to have a habitually-attached maintainers with the company trains. OC/T observations of a Stryker Infantry Battalion that chose to push maintainers forward indicate a significantly higher OR rate across the force than those that did not (~60-70% OR rate vs. 90-95% OR rate averages). Maintainers can be leveraged in training to train operators to conduct basic recovery and repair operations, as noted above. Additionally, when operators conduct PMCS and identify faults, forward maintainers can assist in diagnostics and troubleshooting, and then translate that knowledge into actionable information that needs to be passed to the UMCP and battalion. Maintainers can conduct quality control of 5988-Es as they get turned into the company and assist the company XO in ensuring that the most accurate information gets transmitted. Finally, a properly-equipped FMT will be able to conduct most repairs required if they get the required parts, increasing efficiency and reducing the time that might be required to evacuate a vehicle to the UMCP, repair, and return.

Another best practice is for companies to send reports directly to the BN MCP, CTCP, FTCP, and UMCP via JCR/JBC-P with the minimum required information to order parts on GCSS-Army as soon as the faults and parts required are identified and verified by the FMTs. This TTP ensures that multiple command and control (C2) nodes are receiving the information at the same time. This also helps to expedite the process of ordering parts in GCSS-Army without having shop office clerks work through a ream of paper. The amount of time that can be saved by distributing this information widely cannot be overstated; the BN MCP and CTCP gets near-real time data on maintenance faults and needs, ensuring the maintenance COP and combat power data is compiled quickly for the commander. Likewise, the UMCP can lean forward and prepare parts for movement if they are available in the bench or shop stock SSL/ASL. The FTCP can keep track of parts needed and coordinate with the Brigade Support Battalion to try to acquire the parts as quickly as possible, or at the very least be ready to pick those parts up from the SSA when they become available. (The requirement to do 5988-Es to officially account for the parts still exists. Per ATP 4-33, para. 3-18, "units may utilize communications to rapidly pass information up the chain of command but must utilize a DA Form 5988-E to maintain a permanent record.")

Battalion Best Practices: A best practice is simply to reduce the requirement for hard-copy 5988-Es to a manageable frequency. Submitting 5988-Es less often can prevent overloading maintenance clerks, hitting printing constraints, or requiring Soldiers to fill out paperwork more often than is required to produce parts. At the NTC, a period of 48 to 72-hours between 5988-E turn-ins required seems to strike the right balance, more effectively utilizing the limited time available and balancing competing requirements. OC/T observations indicate that turn-in rates for 5988-Es on a 48 to 72-hour cycle approach 100% compliance, whereas turn-in rates for 5988-Es on a daily schedule often are as low as 25-50%. (Even when turn-in rates are higher, OC/T observations indicate that the vast majority of daily 5988-Es get turned in with incorrect or incomplete information.) A 5988-E turn-in cycle of 48 to 72-hours may seem like a decline in standards and a way to excuse operators from conducting PMCS. However, no regulatory or policy guidance exists that require 24-hour 5988-E cycles; in practice, OC/Ts see an increase in actual PMCS, even without a fresh 5988-E to log it on. (Best practices for daily PMCS with semi-daily 5988-E cycle includes maintaining maintenance notes on a running, laminated 5988-



E or 2404.) When less frequent but more accurate 5988-Es are combined with the best practice of having the FMT/maintainers at the company level to help quality control and a solid communications plan, OC/Ts observe battalion maintenance speeds up to keep pace with Decisive Action operations.

None of this precludes the ability of any subordinate to immediately report a deadline fault to their higher in order to expedite the troubleshooting and parts ordering process. One TTP practiced often by successful units is to reduce the frequency of 5988-E while maintaining a method for immediately reporting deadlines via JBC-P to expedite deadline maintenance. This TTP does reduce the daily burden on operators and clerks by placing an emphasis on quality over quantity.

The battalion XO's input to the Brigade maintenance meeting is vital to keep the brigade's sustainers informed on battalion operations, intent, and friction. When the brigade requires the battalion XO's physical presence, battalions can sometimes mitigate the friction of removing the battalion XO's absence by deliberately planning for the battalion XO's absence (synchronizing battalion planning around the brigade battle rhythm, coordinating for the S3 to stand in for the XO, etc.) When the brigade can accept the risk of not having the battalion XO present or the battalion needs to have its XO on hand, the battalion XO should participate via Ventrillo, SVOIP, or another distributed command and control system. This coordination must be established prior to starting operations, as it is much more difficult to establish on-the-fly.

The overall message of these best practices is that the maintenance system must be clear, disciplined, realistic, well-understood, and well-practiced. It is too late to implement a system when a unit arrives to the NTC or in combat. The prevailing maintenance system executed by BCTs at the NTC is often a departure from home-station training exercises and normal training/garrison operations, and OC/Ts see units struggling to execute a system with which they are not familiar. Whatever system the BCT decides to implement at NTC or combat must be trained while at home station, with clear expectations, roles, and training provided at all levels. It must be practiced at every opportunity, whether it is in the motor pool, during steady-state training, or in major training events like collective Field Training Exercises or Live Fire Exercises.

Maintaining at Night

CPT Martin A. Johnson, Scorpion 17, FSC Trainer, at martin.a.johnson37.mil@mail.mil

One of the key strengths of our Army is our ability to operate at night. Just as we can maneuver and engage the enemy at night, we must be able to maintain at night. More often than not, maintenance at the Unit Maintenance Collection Point stops shortly after the sun goes down. This is often due to a lack of comfort to repair in limited visibility, or more commonly having no experience doing so. If major maintenance operations are only conducted during daylight hours, this drastically reduces the pace of regenerating combat power.

Often during AARs, topics of a units SSL, parts received but not installed, and even the number of toolboxes available will come up. However, hours of operation for a UMCP is rarely discussed. It should be a 24-hour operation and often is not. Everything can align perfectly. However if there are limited maintainers or wrench turning, even a flawless supply system will yield less than desired results.



Combined Arms Battalion Maintenance: The Role of the Forward Support Company

CPT Amanda L. Walton, Panther 17, CSS Trainer, at amanda.l.walton4.mil@mail.mil

The year is 2032, you are deployed as a Forward Support Company (FSC) Commander in support of a Combined Arms Battalion (CAB) in an Armored Brigade. You receive an urgent message from the Battalion S4 over your Joint Battle Command–Platform (JBC-P), “Need you at the CTCP. We need to talk combat power for the attack. Bring a copy of the Equipment Status Report (ESR) with CL IX parts statuses you’re tracking at the BSA and any parts on hand there.”

You think to yourself, “We already rehearsed and discussed the plan at length at the battalion combined arms rehearsal. Why do they need CL IX earlier than our scheduled logistics package (LOGPAC)?” You reply back to the Battalion S4, “I’ll be there in two hours.”

On the way to the Combat Trains Command Post (CTCP) you finally get to catch up on messages from the battalion administration/logistics chatroom. Then you realize why the Battalion S4 wants to talk. Scrolling up you read:

- A/XO: 1x M1 no mobility, 1x M1 turret destroyed, 1x M1 no power
- B/XO: 1x M1 no brakes, 1x M1 trans inop.

You arrive at the CTCP. The distribution platoon Soldiers immediately begin downloading the CL IX repair parts. The BN S4 and the BN maintenance warrant greet you at your JLTV door, “Did you see the messages from the company XO’s?” The maintenance warrant adds, “We have 18-24 hours to get three more M1s back in the fight for the commander. Let’s go talk.”

There are three major keys to success that the fictional organization described above can do to regenerate combat power for future operations:

1. Task organization of field maintenance teams (FMTs).
2. Specified Maintenance Control roles and responsibilities.
3. Shared understanding of the battalion’s maintenance picture.

Mobile but well-equipped FMTs are critical to fixing forward. The FMT looks different than garrison operations because they have to keep up with the fight forward. The most successful method is to attach each company’s assigned M88 recovery vehicle, a contact truck, and an LMTV to haul a small section of the unit’s shop stock listing (SSL). This will enable field maintenance teams to fix as far forward as possible. The Forward Repair Systems (FRSs), each FMT chief, and the bulk of each SSL should be located inside the Unit Maintenance Collection Point (UMCP). An unequivocally crucial component to maintenance operations inside the UMCP is lift assets. Each FRS and the M88s organic to the FSC give that capability.

Another key to success is operations inside of the expando van. Each member of shop office has specific roles and responsibilities, and the ability to successfully synchronize these efforts can effectively drive maintenance for the battalion. There are three key leaders inside the maintenance control section: the maintenance warrant, the maintenance control officer, and the maintenance control sergeant.



The maintenance warrant is the primary driver of maintenance for the battalion. The maintenance warrant should be the most technically proficient member of the UMCP in regards to maintenance and supply/GCSSA operations. They focus on parts flow from the SSA, work order statuses, and attend the daily maintenance meeting at the BSA. Additionally, the maintenance warrant keeps the Battalion Executive Officer informed of available and projected combat power.

The maintenance control officer (MCO) battle tracks what is happening forward with the companies through JBCP and FM communication with the company executive officers. The MCO synchronizes daily operations between the shop office and FMTs, especially when the maintenance warrant has to be away at the BSA. Lastly, the maintenance control sergeant (MCS) directly manages operations and work orders on the ground inside the UMCP. The MCS receives priorities of maintenance from the maintenance warrant and assigns work orders to each FMT. The MCS should be interfacing multiple times a day with FMT chiefs to inspect progress of work orders and ensuring safe operating procedures.

The last thing for successful maintenance operations is a maintenance common operating picture (COP) inside of the shop office. GCSSA is the system of record for maintenance in the Army. However, analog tracking inside of shop office creates redundancy for when the Very Small Aperture Terminal (VSAT) becomes non-mission capable (NMC). Analog tracking synchronizes efforts and gives leadership a complete picture of the battalion's maintenance posture. A maintenance COP inside the shop office should include:

1. Overall slant for combat power in the battalion
2. Status of work orders for combat power inside the UMCP
2. Parts statuses
3. Estimated time of completion for repairs
4. Ongoing recovery missions

This vignette began with a situation from the perspective of the FSC commander. They are in command of all maintenance assets for their supported battalion, and they are also the senior logistician for their supported battalion. In that role, the FSC commander must be involved in maintenance management. Too often their response to this is, "I have too many other things to worry about. That's why there is a maintenance warrant." The FSC commander should be using their command authority to employ the processes outlined above to enable successful maintenance operations for their supported battalion.

Doctrinal References: ATP 4-90, ATP 3-90.5



Section III: Sustaining Army Aviation Combat Power

CPT Michael Cavalier, Eagle 13. CAV/ATK Trainer, and CW3 Ariel Rodriguez-Alvarez, Eagle 26, Aviation Maintenance Trainer at michael.p.cavalier.mil@mail.mil and ariel.rodriguezalvarez.mil@mail.mil.

The Aviation Task Force (AVTF) provides a lethal mixture of firepower and maneuverability. Depending on task force configuration, the AVTF consists of a varying quantity of AH-64, CH-47, UH-60, RQ-7B's and MQ-1C that all enable the ground force commander to find, fix, and destroy the enemy through fires and maneuver. However, this also presents the AVTF Commander with many unique maintenance challenges not typically found in any other unit. Over the years of Counter Insurgency (COIN) and in preparation for Decisive Action (DA) against near peer threats, Army Aviation has developed some maintenance techniques and lessons learned that can help alleviate these complex and unique maintenance problem sets and help maintain combat power for the Ground Force Commander (GFC). This paper will focus primarily on successful maintenance operations that are observed at the National Training Center (NTC) in a Decisive Action Training Environment (DATE).

The AVTF has become even more critical to the success experienced in today's highly dynamic and unforgiving operational environment, where aviation assets are always in high demand. The ability of an AVTF to continuously perform its mission set as ordered is directly related to its ability to maintain the operational readiness status of its aircraft and support equipment. Aviation Units with exceptional operational readiness rates deliberately plan and execute their maintenance training program and consistently integrate aviation maintenance throughout the Military Decision Making Process (MDMP).

The concept of modularity in Army Aviation is crucial in order for the AVTF to successfully meet the complex requirements of being able to deploy and provide aviation assets anywhere in the world at a moment's notice. This modularity also puts a strain on aviation maintenance; however, a unit's maintenance training program and their ability to conduct expeditionary maintenance is critical. Aviation maintenance is the foundation for any AVTF providing continuous mission support to the GFC. It is important that key leaders within the formation continuously evaluate the ability of the unit to perform the required level of maintenance necessary in order to meet the GFC's intent.¹ It is the commander's responsibility to plan, prepare, execute, and assess unit training plans which not only result in a unit proficiency in executing mission essential tasks, but also incorporate low-density or small section training opportunities to ensure and improve individual task proficiencies and contribute to overall unit readiness.² Each NCO and officer must be capable of performing every task required of their immediate subordinates and understand the relationship between individual job requirements, soldier's manuals, and collective tasks.³

As OC/T's (Observer, Controller, Trainer), we often find commanders constantly adjusting and eliminating courses of action late in the planning process due to insufficient facts and poor assumptions regarding aviation maintenance and aircraft availability. The majority of units fail to integrate their key maintenance leaders into the planning cycle, preventing the identification of

¹ TC 3-04.71 Introduction

² TC 3-04.71. Chapter 1, para. 1-6 "Responsibilities"

³ TC 3-04.71. Chapter 1, para. 1-7 "Responsibilities"



key friction points throughout the execution timeline. Inserting key leaders such as the Aviation Materiel Officer (AMO) into the Military Decision Making Process (MDMP) can help in the prioritization and integration of maintenance actions and requirements across the Task Force. The AMO will have the most up to date maintenance information and understanding of how operational requirements will impact aviation maintenance. The AMO is able to analyze the mission requirements against the available resources, thus having the ability to directly resource projected shortfalls. The AMO is able to conduct a detailed analysis of maintenance facts and assumptions and provide the commander and staff with a realistic expectation of combat power available. The technical expertise provided by the AMO greatly assists in the prioritization efforts between the Aviation Maintenance Company and Aviation Support Company to maximize the use of finite resources in order to maximize combat power at decisive points in the battle. The synchronization of these maintenance actions and identification of friction points can greatly reduce mission delays and/or failures.



The identification of maintenance requirements is a critical step in the mission analysis phase that is often overlooked by most units. At the National Training Center we continually observe that key maintenance leaders (AMO, PC OIC, Aviation Maintenance Company Commander) are not included into the MDMP, nor contributing members at key AVTF meetings and rehearsals. These missed opportunities and touch points could otherwise help assist in identifying operational and maintenance requirements,

thus synchronizing maintenance requirements in the most efficient manner possible. By integrating key maintenance leaders, the Executive Officer (XO) can drive maintenance decisions and prioritize actions early in the planning process, thus maximizing the generation and sustainment of combat power in order to support the operation. With the addition of these running estimates as part of the planning process, the AVTF XO will be able to identify limitations of the available combat power and develop appropriate and realistic courses of action prior to execution. When running estimates concerning aircraft maintenance become afterthoughts rather than continuous planning factors, delays in mission execution are unavoidable, or the commander must execute outside of his pre-approved course of action.

Rotational Unit (RTU) Commanders often express concern at the difficulty in planning and performing aviation maintenance in expeditionary environments, under mixed Mission Design Series (MDS), and with inexperienced maintainers. This is reflected through multiple observations at the National Training Center. Units continuously struggle with returning aircraft back to an operational status in a timely manner, especially after following an unscheduled maintenance event.

The most important and simple maintenance approach to combat this problem set is to implement the "P4T3" method. It consists of seven elements: problem, plan, people, parts, time, tools and training. P4T3 provides a methodology and framework for any aviation maintainer and



manager to coordinate complex aviation maintenance requirements without fail. This method helps anticipate maintenance requirements at the individual soldier level for any maintenance task and help identify shortcomings early. Units who begin MDMP early and adapt the P4T3 methodology at home station to the challenges typically perform better than those who treat the P4T3 process as a “just another process”. The P4T3 methodology outlined in ATP 3-04.7 is widely understood as a common-sense platform for an effective maintenance and logistics program. The P4T3 method should include a standardized document with multiple checks and balances from Production Control, Quality Control, and Technical Supply supervisors.

An Aviation Maintenance Company (AMC) must have the capability to conduct split-based operations within and across an entire theater in order to help maintain and generate combat power for the AVTF. AMC is responsible for conducting field level maintenance in accordance with the maintenance allocation chart (MAC). AMC's consistently arrive at NTC unequipped and untrained in their two most critical mission essential tasks, Downed Aircraft Recovery Team (DART) and Battle Damage Assessment and Repair (BDAR).

DART and BDAR are critical to any unit trying to maintain combat power after receiving battle damage and unforeseen unscheduled maintenance issues. Commanders have to incorporate DART battle drills into their quarterly training plan and ensure aircraft recovery is briefed at every rehearsal. AMC SOPs have to include at a minimum a downed aircraft recovery section that outlines basic recovery procedures for damaged or disabled aircraft. DART battle drills and training should aim to improve proficiency in ground convoy operations, aerial recovery kit installation, battle damage/repair, and security team emplacement.

Commanders are also provided new and innovative tools in order to help track aircraft and help develop situational awareness when aircraft are executing their mission. The System-Level Embedded Diagnostic (SLED) and Smart Tool Aviation Maintenance Picture (STAMP) program is a relatively new system that should be incorporated into an AVTF Main Command Post if available. The SLED and STAMP identifies maintenance faults and/or issues experienced by aircraft and automatically sends digital traffic to the STAMP with aircraft status and fault experienced. Maintenance can utilize the data to initiate P4T3 prior to the aircraft arriving back at the AVTF. The data is sent automatically by the aircraft through the air fault reports provided by STAMP. The system can also improve accuracy and consistency in fault reporting and provides maintenance production control with useful data which will reduce troubleshooting time and ultimately reducing the down time of aircraft.

Each unit must identify and establish its own approach to maintaining its equipment in order to generate combat power and meet the GFC's intent. The Aviation Task Force will continue to be one of the most maneuverable and powerful units on the battlefield, but only if its equipment is fully mission capable and operational readiness can be sustained throughout operations.



Section IV: Field Artillery Battalion and Below Maintenance

LTC Robin W. VanDeusen, CPT Joshua T. Kline, CPT Christopher Mauldin, CPT Daniel Lao-Talens, CPT Valerie Blanding, MSG Jean M. Marthone, SFC Rolando Flores, SFC Matthew S. Konopatski, SFC Gregory E. Wilson, SFC Tommy W. Ferrell, and SFC David A. Quintanilla

Introduction

The purpose of this section is to provide context for Field Artillery (FA) units executing maintenance operations during a high operational tempo (OPTEMPO) fight in a Decisive Action Training Environment (DATE). In this environment, units must conduct maintenance at a pace that enables the maneuver commander to have readily available combat power despite conducting operations during prolonged periods in harsh environmental conditions. Moreover, units must conduct maintenance actions themselves in these demanding conditions, and do not have the luxury of utilizing hardened bays or paved motor pools. Leaders must operationalize all maintenance actions to ensure proper utilization of manpower and resources to consistently provide maximum available indirect firepower to the maneuver commander.

Field Artillery units are arriving at the National Training Center (NTC) with a 90% operational readiness (OR) rate but cannot maintain that level of readiness throughout the rotation. Historically, the OR rate declines on training day four (4) and this paper will detail the various contributing factors. Maintenance is not only an operator issue, as difficulties are observed at all echelons. Leaders at all levels understand that operator or crew maintenance is the most critical operation of the Army Maintenance System and requires continuous emphasis (AR 750-1); however, at NTC we observe either a tactical decision by Battery Commanders to not conduct maintenance due concerns about operational tempo or misunderstanding its of importance. This paper will discuss the observations of rotational units ability to maintain at pace and the doctrinal references to apply in order to provide fires in a continuous fight.

Battalion Communications Maintenance Focused Reviews

Field Artillery Battalions habitually focus on the readiness of their pacing items, but observations from NTC suggest that they struggle with maintaining their communications equipment at both the battery and battalion level regardless of the operating environment. These struggles include not having a good tracking system for FM equipment not listed as reportable by default within Global Combat Support System – Army (GCSS-Army) and a lack of S6/Signal Soldier involvement in maintenance meetings. Ultimately, the inability to perform effective signal maintenance at home station degrades unit readiness and further hinders the mission in a high-OPTEMPO environment.

Greater involvement from the Battalion S6 sections and battery communications specialists in sustainment and maintenance functions is critical to properly identifying faults at both the battery and battalion levels. 25Us at the battery level must be involved in training end users on proper PMCS as well as conducting their own troubleshooting and inspections of both equipment and service records. They must also be able to advise the Battery Executive Officer, First Sergeant, and Battery Commander on Signal maintenance issues to ensure the accuracy of any status reports and maintenance work orders. Battalion S6 sections must have representation at battalion and brigade level maintenance meetings to provide their expertise and recommendations to the battalion executive officer and ensure that their unit's reports and



requests are accurate. They must also understand the status of non-mission capable (NMC) equipment on the ESR. Battalion S6 OICs and NCOICs must also collaborate with the S4 section and Forward Support Company to ensure follow up on parts ordered and coordination of services per Appendix D (Signal Systems Maintenance) of FM 6-02 (Signal Support to Operations) and Section IX (Maintenance) of ATP 3-09.23 (Field Artillery Cannon Battalion).

Counter Battery Radar (CBR) Maintenance

When preparing for deployment, developing a CBR maintenance schedule is critical to the successful employment of this platform. This section's ability to be self-sustaining due to the separation in space from its parent organization on the battlefield is essential to the survival of the radar section and its successful employment in accordance with the brigade fires plan. Very similar to the battery maintenance teams, the radar section is assigned radar mechanics and a parts container called an essential repair parts stockage list (ERPSL). While the radar system is a pacing item, the maintaining of critical equipment is not viewed with the same reverence as the delivery systems. Radar sections frequently do not maintain 100% of their ERPSL, or do not bring all parts forward when they deploy. These identified parts in the ERPSL will provide the radar section with the ability to repair forward and stay in the fight.

A strategy when developing a radar maintenance schedule is to synchronize radar coverage with Division assets throughout the operation. Our radar systems are an enemy's High Payoff Target, and as such, require the radar to continuously conduct survivability moves or to reposition for the next phase. Synchronizing with Division will allow blocks of time where other radar assets can be employed and provide the necessary coverage in order to facilitate planned maintenance and priorities of work. This requires detailed planning at the battalion, brigade, and division levels and will allow critical PMCS during and after operations when conducted correctly. Concurrently, the radar section can execute maintenance during non-cueing timelines. The brigade can publish a cueing schedule that will provide the radar section the shared understanding of when and where the radar is required to radiate. During periods of non-cueing, the radar section leaders have opportunity to conduct levels of priority of work, to include during and after PMCS operations.

Battery Maintenance Focus Overview

Maintenance at the section and company level is a battle rhythm event at home station. Every Monday, units across the Army conduct -10 level maintenance on their vehicles and equipment to maintain a "Fight Tonight" posture. To ensure mission capability in a continuous operational environment, units must conduct field maintenance but struggle to maintain at pace. Soldiers conduct field maintenance in accordance with the respective technical manual, but do not possess the ability to troubleshoot issues. Leadership often does not have the required material available at the section level. Often the section chief or squad leader maintains the preventive maintenance checks and services (PMCS) excerpt of the technical manual (TM) to conduct the required PMCS checks, but does not have the entire TM to enable troubleshooting. This in turn requires maintenance support to intervene during a 10-level maintenance task. This effect can increase issues systemically throughout the battery and battalion by not addressing faults head on at the operator level. Faults that require a relatively simple action when left unattended increase in severity to a dead-lining fault. Conducting PMCS and operator level troubleshooting may be time consuming during field operations and offers challenges to the commanding officer



on how to employ the mission capable guns to support the maneuver commander's intent. It is essential that battery level leaders incorporate the necessary time to execute maintenance into their troop leading procedures (TLP). Ineffective time management will cause delays in the unit identifying faults early and receiving repair parts in a timely manner. Commanders at all levels need to operationalize maintenance into their battle rhythm and timeline. Successful commanders and leaders create deliberate maintenance plans that facilitate planned maintenance during operations while maintaining firing capability and achieving the commander's desired effects.

During reception, staging, onward movement and integration (RSOI) maintenance plans are briefed to the lowest level leader. Leaders across the brigade understand the importance of maintenance, and the recovery plan for their equipment and personnel during the training exercise as briefed by higher commands. While Soldiers may be performing maintenance before, during, and after operations, we often observe a lack of commanders providing adequate supervised time during operations for elements to perform effective PMCS. Soldiers conduct maintenance while first line leaders conduct other priorities of work in preparation for follow on operations. Simply put, leaders must plan and supervise maintenance operations. Much like units at home station place services on their training calendars, batteries should include the planned maintenance periods on their operational timeline during operations. Successful units enforce the correct PMCS before, during and after an operation with leadership supervision.

In Field Artillery units, platoons are designated hot and cold during execution of field artillery tasks or during specified blocks of time to provide constant firing capability within the battery and facilitate the execution of cold platoon's priorities of work. Critical to pulling sections or



platoons out of the fight to conduct maintenance is understanding the larger fight at Battalion and Brigade, so units can plan optimal times to conduct maintenance with the lowest risk to mission. Often observed, as howitzers become non-mission capable, the platoon hot-cold concept collapses and becomes a firing battery. If this occurs during a time of scheduled fires, commanders are understandably reluctant to take howitzers out of the fight to conduct maintenance. Decision makers identify the required need of mission capable guns to provide the required volume of fire to meet the commander's desired effects, but do not weigh the consequence of continuous operation without conducting field maintenance. This concept is described in AR 750-1 (Commanders' Maintenance Handbook) as the purpose of army maintenance operations, "Preventive maintenance operations performed by Soldiers in field organizations that preserve the operational condition and inherent reliability of equipment, comprise the most critical of all of the building blocks in the Army maintenance system (AR 750-1, pg. 1)."

There are a multitude of reasons why a howitzer could become non-mission capable, but a loss due to negligent maintenance or lack thereof is an unacceptable loss. Maintenance operations are briefed to be a critical priority of work, therefore commanders and leaders at all levels need to provide the necessary time to conduct maintenance operations. If that means pulling a howitzer out of the fight to conduct maintenance, in efforts to continue the operational use of that equipment longer, then that requires a decision point understood throughout the formation. This decision should be operationalized, and planned throughout the fight during periods of reduced tempo. Shared understanding of the equipment's capabilities and limitations will provide the necessary analysis of the duration of use and the frequency during that duration. There are several ways to conduct this concept, but the absolute necessity is commanders must make the deliberate decision to take an echelon out of the fight to conduct maintenance to ensure the future operational use.

Successful units operationalize their maintenance schedule throughout the deployment. Planners are able to forecast periods of high OPTEMPO that require the entire battalion, and other periods of time that will enable sections or platoons to conduct priorities of work. Understanding the larger fight at the Battalion and Brigade level will allow shared understanding of the times throughout the fight to conduct maintenance. Commanders need to synchronize with the battalion's operational plan to identify periods of time where maintenance can be conducted and report that to their higher command. This will drive the operations process to ensure the required amount of firepower is in position ready to fire at all times, and when warranted, maintenance will be executed as a specified task.

Field Artillery Forward Support Company Maintenance

SSL Management: To compound issues of poor maintenance at the section level and coupled with ineffective priority of work and battle rhythm execution is the forward support company's ability to maintain the correct shop stock to fix problems as they occur. At home station and deployed, the supply support activity (SSA) supports the unit with critical supplies. In general terms, the SSA acts as a warehouse of Class IX (repair parts) at the BCT level. Subsequently, each Battalion is authorized by FORSCOM to carry Shop Stock Listings of additional parts that allow for the quick forward repair of equipment. FA Battalions should routinely inventory and analyze their SSLs to alter the stocked quantity based upon valid demands or known upcoming mission requirements. If short, the unit should order to maintain at 100% levels at all times. However, too many units fail to auto-replenish their SSLs on a routine basis as a method for saving OPTEMPO dollars.



Successful units routinely nominate through their leadership an automatic resupply trigger when class IX parts get consumed. This creates a system of efficiency if executed correctly. However, this efficient automation can only be useful if the end maintenance professional accounts for the consumed class IX part and updates the inventory levels in their systems. Maintenance technicians often do not conduct an accurate inventory of all class IX parts on hand.

Take All Of Your Parts With You: Additionally, many deploying units do not take all class IX parts forward with the unit. When ordering parts, the Department of the Army determines if the unit requesting parts has any on hand. If an inventory is not conducted correctly prior to leaving home station, it can result in the unit not having a critical part on hand. Also, in the event of a human error in accounting or simply not bringing the actual part forward, the system will account that the unit has that part on hand; resulting in the unit not receiving that part from the Army system.

Resource Your FMTs: Each battery's MTOE contains a field maintenance team (FMT) that typically contains a fueler, contact truck, and a parts container. Critical to maintaining at pace is the inventory and standard operating procedures (SOPs) of operating each battery's parts container. The FMT's ability to maintain communication with the maintenance control section on stock line quantities, and the status of incoming parts is critical to the success of maintaining all equipment in the fight. Being separate from the forward support company adds a level of decentralization for accountability of all class IX parts. All repair parts throughout the entire battalion are identified at their end location in global combat support system army (GCSS-Army).

Reports: Another critical aspect to maintaining the fleet is establishing shared understanding of reporting requirements. Units experience difficulties establishing troubleshooting parameters in reporting faults to higher echelons. The equipment status report (ESR) provides situational awareness in real time to decision makers on the ground in order to understand combat power when planning and synchronizing desired effects. Successful units immediately report faults as they occur, and update the ESR to reflect equipment in the troubleshooting phase by placing a condition code "A" – awaiting initial inspection. This code will show a piece of equipment being NMC on the ESR without an identifying fault or part; however, it will provide the situational awareness to higher echelons on the equipment's mission capable status. This enables comprehensive troubleshooting that ensures that the unit places all necessary parts on order or conduct controlled substitutions as necessary to repair the equipment. If conducting controlled substitutions, units must also establish shared understanding of who may authorize them, reporting requirements, and how many they may authorize in a given time period. This enables proper tracking of incoming repair parts and ensures that commanders maintain visibility on the amount of controlled substitutions occurring in their fleet.

Command and Control: Units assess mission variables to determine the location of the Combat Trains Command Post (CTCP). According to ATP 4-90, the Forward Support Company (FSC) should position its Unit Maintenance Collection Point (UMCP) within the CTCP. During offensive operations, the UMCP should be located as close to the firing batteries as possible or approximately within 1km. Doctrinally, the CTCP should maintain a 1-4km distance from the firing batteries to enable freedom of action, prolonged endurance, and operational reach for the supported battalion. The FSC and maintenance personnel should understand the battalion's current operations so they can efficiently manage time in conjunction with workflow when determining maintenance jobs at the CTCP. This understanding of the supported battalion's Operational Tempo (OPTEMPO) will determine if the unit initiates repairs on a piece of



equipment or postpones them until after conducting a required move. FSCs must be able to keep pace with the supported battalion and cease operations at the UMCP if necessary. A few situations in which the UMCP would terminate operations and move include: the supported battalion can recover equipment forward, the FSC can recover the equipment forward, or the firing battery can conduct battle damage assessment and repair to enable the equipment to move forward. An example for the UMCP delaying movement would be the converse to the previous situations or if a pacing item at the UMCP has all NMC parts on hand and the job is anticipated to take less than 24 hours.

Increased Technology Challenges & Maintenance

As Army technology increases, so does that of our equipment. However, when units are fielded new equipment, they are also accompanied by defense contracts that prevent end users from performing operator and higher-level maintenance. These contracts or agreements prevent operators from fixing -10 level issues, and more importantly, gaining confidence on the equipment. Mission accomplishment requires Soldiers to be subject matter experts on their equipment. This includes understanding and implementing maintenance operations.

These contracts prevent Soldiers from truly understanding the limitations of their equipment. As technology increases, our understanding of equipment decreases, and increases the associated degraded operations of that equipment. Maintainers are critical in this aspect; they must develop a maintenance schedule with contracted mechanics or field service representatives (FSRs) and ensure that support is available during all operations. Units must operationalize this on unit training calendars and operationalize planning timelines in the field. Waiting until a problem presents itself is a reactive choice in a complex environment that requires proactive thinking. Many argue that this is an unnecessary risk and only produces additional threats to the unit. This equipment does not receive the proper before, during, and after PMCS due to contracted mechanics not being available to work on the equipment. The right to repair will continue to be a highly debated concept, but in the meantime, will challenge the unit's ability to maintain at pace.

Conclusion

There are a multitude of reasons why units experience maintenance issues and struggles throughout their rotation. These reasons vary from a shortage of qualified personnel, poor training plans leading up to this collective training event, reduction in the PMCS of equipment on a daily basis, misuse of equipment through lack of leadership supervision, and inaccurate or unreliable reporting of equipment status.

However, what is unique about the United States military force is our Non-Commissioned Officer corps' ability to apply disciplined initiative to accomplish the commander's intent. It is impossible to train on all aspects of a unit's mission essential task list (METL), but by becoming trained on critical tasks and allowing leaders at all levels to execute within the parameters of commanders intent, leaders can supervise and execute any mission within their mission set. The most efficient units make maintenance a priority. The leaders of these units collectively have the shared understanding of the importance of conducting regularly scheduled maintenance and the importance of accurate reporting.

Commanders at all levels must establish ownership of their maintenance plans. As we enforce operator to ownership and maintenance of their equipment, commanders and leaders must provide the deliberate action for prioritizing this maintenance. This action can be started by



operationalizing maintenance plans on training calendars, deployment readiness gates, and battle rhythm or priorities of work during operations. The Army dictates the importance of maintenance by teaching units to conduct weekly maintenance at the start of every week. Successful units incorporate maintenance cycles that apply to their entire equipment fleet to guarantee operational use in the field. These cycles include CBRN, communications, and individual and crew served weapons. As operators take ownership of their equipment, leaders must provide the time through dedicated supervision for PMCS and application of equipment in efforts to allow the Soldier to gain confidence in its use.

References:

- *ATP 4-33 (Maintenance Operations)*
- *ATP 3-09.23 (Field Artillery Cannon Battalion)*
- *FM 6-02 (Signal Support to Operations)*
- *AR 750-1 (Army Material Maintenance Policy)*
- *DA PAM 750-1 (Commanders' Maintenance Handbook)*
- *DA PAM 750-3 (Soldiers' Guide for Field Maintenance Operations)*
- *AR 700-138 (Army Logistics Readiness and Sustainability)*
- *FM 4-95 (Logistics Operations)*
- *ATP 4-0.6 (Techniques for Sustainment Information Systems Support)*



Section V: Maintenance in the Brigade Engineer Battalion

Success throughout any National Training Center (NTC) rotation often directly reflects the rotational units' emphasis placed on maintenance operations prior to and during the training event. Maintenance operations are often the primary shortcoming of Armored Brigade Combat Teams (ABCTs) at Fort Irwin. The following article provides observations, best practices, and potential solutions for Echo Forward Support Company (FSC) maintenance operations, Engineer specific problem sets, and Chemical Biological Radiological Nuclear (CBRN) Reconnaissance Platoons' challenges within the Brigade Engineer Battalions (BEB) of ABCTs during Force on Force operations in a Decisive Action Training Environment against a near-peer threat.

Echo Forward Support Company

The goal of any FSC at the NTC is to prolong operational endurance for the BCT through the use of their organic maintenance assets. The most common inefficiency observed by NTC Observer-Coach-Trainers (OC/Ts) in Echo FSCs maintenance processes is the DA Form 5988-E (Equipment Maintenance and Inspection Worksheet) flow. Efforts to maintain 100% situational awareness of Operational Readiness Rate (ORR) results in the 5988-E flow following a 24 hour issue/submission cycle. The area of operations a BEB encompasses, along with widely dispersed company and smaller elements, frequently results in an inefficient and ineffective 5988-E flow. Best practice to mitigate a poor 5988-E flow is to follow a 72 hour staggered issue/submission process for 05/12 priority issues, with 02 priority issues requiring immediate notification via VOIP Phone/JCR/JBC-P directly to the supporting maintenance echelon and the BEB Maintenance Chief. Staggering of the 5988-E's prevents the maintenance echelons from being overwhelmed and typically result in a healthier ORR.

Mission Essential Tasks Lists (METLs) describe the specific tasks necessary to ensure mission accomplishment down to the platoon level. Maintenance sections across all E FSCs share similar shortfalls, such as the inability to effectively Conduct Unit Defense (MET 63-CO-4546) while simultaneously conducting support maintenance operations. This gap primarily results from a poor Tactical Assembly Area (TAA) development plan, a lack of junior NCO knowledge base on defensive operations, and FSCs conducting their rotation without their full Modified Table of Equipment (MTOE) of personnel and equipment, leaving the unit under-resourced. The Tactical Assembly Area (TAA) development plan determines whether an FSC's Unit Maintenance Collection Point (UMCP) and Combat Trains Command Post (CTCP) are co-located or dis-located from the TAA, which results in vastly different manpower requirements for the unit. Best practices observed are to co-locate the UMCP and CTCP within the BEB TAA, which minimizes the number of Soldiers drawn from the maintenance platoon for defense of the TAA.

Lack of junior NCO knowledge on defensive operations can be improved through tough, realistic training at home station that focuses on fighting position establishment, sector sketches, crew served weapons drills, and employment of communication systems; all of which are the notable failures during FSC defenses at NTC. Constraints against FSCs bringing their full MTOE equipment set for a rotation are varied and can usually be mitigated via the draw grid at the NTC, but FSCs should also bring their full MTOE of crew served weapons to improve the TAA's defenses. FSC maintenance sections are most effective and can accomplish both their maintenance and defensive missions when they are properly trained and resourced.



The final observed limitation to effective maintenance operations within the E FSC is inadequate crewing of the Distribution Platoon. This shortfall is usually remedied by resourcing additional Soldiers from the maintenance and/or field feeding sections. If FSCs resource those additional personnel from the maintenance section, a noticeable reduction in throughput of maintenance operations occurs. Without changes to the FSC MTOE for personnel, the best practice observed is to cross-train both the field feeding teams and headquarters platoon Soldiers to accomplish the distribution platoon's mission.

Enabler Units

Maintenance and sustainment problems are typically exacerbated when incorporating Echelons Above Brigade (EAB) enablers to the BEB. Any non-organic unit like the Mobility Augmentation Company (MAC), Sapper Company, and Engineer Construction Company (ECC) historically experiences issues with maintenance and sustainment operations during their rotation at the NTC. Issues include Department of Defense Activity Address Code (DoDAACs) not being pulled under the BEB properly in the Global Combat Support System – Army (GSCC-A), CLIX parts denied by brigade when the MAC or Sapper Company requests parts, and the company failing to submit 5988-Es correctly or in a timely manner. Nearly every enabler unit that supports the BEB deals with one of these issues, severely restricting their ability to be a combat multiplier. Fortunately, there are solutions for each identified issue that will successfully integrate enablers into maintenance operations.

One of the most frustrating issues with ordering CLIX is ensuring that the enabler has their DoDAACs aligned under the BEB in GCSS-A. From the OC/T side, we focus on making sure the unit coordinates DoDAAC relocation with the BEB prior to arrival at NTC. Upon arrival at the LSA, OC/Ts advise enablers to order a washer in GCSS-A, commonly referred to as the “washer test”. This allows the unit to confirm their DoDAAC is placed under the correct supported higher unit, that the part arrives at the correct SSA, and that the enabler unit can physically receive the part ordered. While uncommon, the enabler's DoDAACs can get pulled back to their organic higher unit which prevents them from receiving parts during the rotation. If this occurs, the unit must contact with their organic Property Book Officer (PBO) and request the release of their DoDAAC for realignment under the supported rotational BEB. However, if this occurs during the unit's 14 training days, it becomes extremely difficult to reach the PBO and may result in the unit not receiving any additional parts until the rotation's end.

Over the last 12 rotations, OC/Ts have seen nearly half of the enablers fail to receive any parts due to ordering parts improperly. One of the most common errors we see in GCSS-A is ordering parts and sending them to the wrong storage location (SLOC), usually their home station SLOC. There are a few ways to prevent this, such as ensuring the Prescribed Load List (PLL) clerk is trained on GCSS-A and is coordinating well with the BEB's Battalion Maintenance Officer (BMO). The BMO is the unit's subject matter expert and can catch SLOC errors when parts are ordered.

Finally, some enablers simply do not have a solid maintenance program in place. This is a problem that must be solved at the company and battalion level. During the rotation, OC/Ts have noticed that units fail to conduct PMCS before, during, and after missions effectively. This becomes apparent when the enabler has a drastic drop in their combat power mid-rotation. The simplest fix to this is the company creating and enforcing a maintenance Standard Operating Procedure (SOP) for the field. Many units seem to get stuck in the “motor pool Monday” mentality and fail to understand the importance of getting 5988-Es submitted more than once a



week while at NTC. When enablers come to the NTC they have their own SOPs for conducting maintenance, which presents problems when attached to new units and requires an adjustment to their SOPs prior to arriving for their rotation. Enablers that coordinate and integrate with rotational unit SOPs prior to arrival at NTC tend to have a more effective maintenance program.

In conclusion, EAB enabler maintenance presents a real challenge to BCTs. However, there are solutions that will make enabler maintenance successful. It is vital that companies work with both organic and supported PBOs to ensure their DoDAAC is moved to the correct parent unit. It is also important that companies have certified and trained PLL clerks, and if possible, a Chief who can supervise the ordering of their specific parts. Finally, the enabler leaders must take ownership of their maintenance program and work with the unit they will be supporting months in advance of the rotation to identify what changes they will make to match the supported unit's maintenance standards and requirements. These changes and TTPs will have a significant positive impact on the unit's performance during their rotation at the NTC.

CBRN Platoons

The Army maintains two variants of the CBRN Reconnaissance and Surveillance Platoons (R&S) light and heavy, in the modular force design. The primary differences between the platoons are the way in which they conduct missions and the vehicles they use to conduct those missions. The CBRN R&S platoon (light) primarily conducts R&S by using the dismounted reconnaissance sets, kits, and outfits (SKOs) and are capable of conducting missions in urban environments where maneuvering is confined. The CBRN R&S platoon (heavy) conducts mounted reconnaissance using three CBRN reconnaissance vehicles with a variety of detection equipment; affording increased terrain coverage in support of route and area reconnaissance. Both Stryker BCTs (SBCTs) and ABCTs are allocated one CBRN R&S heavy platoon. While duties of unit CBRN teams are not necessarily performed by Soldiers with military occupational specialty 74D, the R&S platoons are 74D specific with special skill identifiers; allowing the highly specialized R&S platoon to more effectively support the BCT.

Almost without exception, every R&S platoon over the last year has arrived at NTC with NMC NBCRVs. Many NBCRV maintenance issues require FSR support to diagnose and repair. The platoon often struggles to turn in 5988-Es and struggles to maintain an accurate status of ordered parts. A key to success is following through with the FSC maintenance section to ensure parts are in fact on order. Success at NTC has a direct correlation to units that conduct maintenance to standard at home station and have systems and processes in place to mitigate aforementioned maintenance problem sets.

Additional issues that plague BCT rotations at NTC are that R&S platoons are consistently underutilized, there is no maintenance plan (nor are personnel capable of supporting the specialized equipment within the NBCRV), and BCTs do not utilize their R&S platoons with any regularity or consistency. Some BCTs will place them forward with the cavalry squadron while others keep them in reserve. In order to incorporate the R&S platoon, staff considerations must include: Focus on CBRN defense to provide the commander versatility and synchronization; focus on CBRN reconnaissance assets on repositioning and withdrawal routes, passage points, and passage lanes; identifying alternate routes if passage routes become contaminated; balancing vulnerability of the force against the need for mass, agility, and depth; understanding the enemy order of battle and doctrinal templates as they relate to CBRN use. Utilizing these considerations will allow the R&S platoon to shape the battlefield while providing valuable insight to the BCT.



References:

- *FM 3-11: Multi-Service Doctrine for Chemical, Biological, Radiological, and Nuclear Operations*
- *Combined Arms Training Strategy (CATs)*
- *FM 4-95: Logistics Operations*

FM 4-0: Sustainment Operations



Section VI: Brigade Maintenance at Pace

Goldminer 02: MAJ Dan Cole, daniel.w.cole1.mil@mail.mil; Goldminer 26: CPT Tuan Dang, tuan.m.dang4.mil@mail.mil; Goldminer 26A: MSG Charles Taylor, charles.p.taylor.mil@mail.mil

The purpose of this paper is to inform Brigade Combat Teams of the challenges and best maintenance practices observed at the National Training Center. The brigade maintenance program at home station sets the climate for maintenance management during the fast-paced decisive action fight. The maintenance system will never be effective or efficient in a tactical scenario if it is not practiced at home station.



The brigade maintenance system is critical to the accomplishment of every brigade combat team's and battalion/squadron's mission. The system must operate every day, year round to support unit training and contingency operations. Leaders must be intimately familiar with their equipment, the equipment faults, the process to get the equipment repaired, and the supply chain containing the repair parts. Commanders at every echelon must set the tone necessary to achieve the 10/20 standard. Subordinate leaders must take ownership of their equipment and hold their team to the standard if they are going to have a positive maintenance culture in their unit. At the National Training Center, the Goldminers have three specific best practices to produce positive maintenance results: how the maintenance meeting is run to include Equipment Status Report (ESR) management, considering the option to operate a consolidated maintenance collection point, and maintenance talent management and training.



An effective brigade maintenance meeting is a combat multiplier, however, many units experience difficulty when they attempt to apply their garrison focused maintenance meeting agenda to the severely time-constrained environment at the National Training Center. The enemies to an effective maintenance meeting are an unclear agenda, leaders that are not prepared or not familiar with their equipment and its faults, and an untested PACE plan. The agenda drives situational understanding and helps focus subordinate leaders on the commander's priorities. Many units will default to simply reviewing the ESR by unit, but this is a highly inefficient practice if any commander is involved in the meeting, despite what the maintenance Warrant Officers may argue. A detailed scrub of the ESR can easily take two hours and will still not provide any projections of what combat power will be available in the next 12-72 hours. When battalion Executive Officers and maintenance Warrant Officers arrive at the meeting with their updated analysis of their ESR, proper identification of parts requirements, diagnosis of faults, and their class IX repair part requirements, then the maintenance meeting will produce positive results. In-person maintenance meetings encourage cross-unit coordination, cross-leveling of resources, and are simply more productive than distributed maintenance meetings. Unfortunately, conducting meetings in person is not always feasible. A maintenance meeting PACE plan is necessary or it will be overcome by events and the Operational Readiness Rate (ORR) will rapidly fall as units attempt to solve their equipment challenges without prioritization or access to necessary resources.

ATP 4-33 Recommended Brigade Maintenance Meeting Attendees

- BCT Executive Officer
- Support Operations Officer
- Brigade SPO Maintenance Officer
- BCT S4
- Battalion XOs or Maintenance Control Officers or Motor Sergeants
- SSA Accountable Officer

Additional Recommended Brigade Maintenance Meeting Attendees

- BSB Commander
- Battalion Maintenance Techs
- Brigade Support Maintenance Company Commodity Shop Representatives (as applicable)
- SASMO Representative

The best brigade Executive Officers set the priorities for maintenance by unit and by equipment type based on their understanding of the scheme of maneuver and the requirements of the commander. Once the priorities are set, each battalion or task force should provide their SITREP before going in to a deep dive on the ESR. ATP 4-33 recommends the following maintenance meeting agenda:

1. BDE Mission next 24/48/72 hrs.
2. BDE Priority of maintenance
3. XO issues
4. SPO issues
5. Review of issues from previous meeting
 - a. Current combat power
 - b. Status of CL IX parts
 - c. Cross-level options
 - d. Projected combat power based on maintenance management



6. Miscellaneous
7. Review of issue assignment
8. Closing comments

Briefing the battalion SITREP early in the meeting will provide a snapshot for the overall status of combat power so that the BCT commander can sit in to a small portion of the maintenance meeting and leave with a good understanding of the combat power that he will have available for the next phase.

The frequent movement of Maintenance Collection Points (MCPs) causes instability and less time to accomplish diagnostics and repairs leading to a decrease in combat power. If the commander sees that his combat power is falling below an acceptable level, he may decide to consolidate MCPs at the Brigade Support Area (BSA). Consolidating maintenance activities at the BSA provides a number of benefits that speed up the generation of combat power, but this comes at a cost. A commander may make the decision to move their MCP to the BSA if their ORR falls below an acceptable level. Moving maintenance activities to the BSA drastically shortens the supply chain, thus improving access to repair parts. Many units live on their Shop Stock Listing (SSL), but the SSL can only hold a fraction of the parts depth found in the Common Authorized Stockage List (CASL) located at the BSA. The shortened supply chain eliminates the double handling of parts and increases the velocity of repair parts to maintainers. The consolidated MCP also provides the stability for the mechanics to make the repairs that may require additional time. Battalion MCPs will often move frequently to maintain close proximity to the Combat Trains Command Post (CTCP), but this challenges a mechanic's ability to properly diagnose and repair the faults. The Brigade Field Maintenance Company in the BSB also contains all the commodity shops and the expertise necessary to make on-system repairs instead of removing components that will lengthen overall repair times.

Consolidating maintenance at the BSA does have some drawbacks, however. Consolidating MCPs at the BSA can drastically increase the physical size of the BSA and its life support requirements. The BSA is typically a large area already, and the inclusion of additional non-organic elements can increase the size to unmanageable proportions. The protection of a support area that is roughly the size of a grid square with a dozen BSB organic crew served weapons is difficult, and that difficulty compounds when the perimeter becomes larger. The most successful units welcome the consolidated MCP into the perimeter with a copy of the BSB TACSOP and their specific task and purpose while on the BSA. The crews for the damaged systems can provide a significant aid to BSA protection. Their weapon systems, when integrated into the BSA defense plan, dramatically increase the lethality of the BSA.

The culture of maintenance in the BCT and each leader's authorities can set the stage to avoid having to consider the consolidation of MCPs. The Field Maintenance Companies contain some of the most overworked and underappreciated Soldiers in the BCT, but they are not the only solution to the maintenance challenge. Operator level maintenance is absolutely critical to ensuring a maintenance program is producing a fleet ready to conduct its wartime mission. Each Soldier must have a technical manual available so that a correct and thorough Preventive Maintenance Checks and Service (PMCS) can be conducted and annotated on the 5988-E. A PMCS with the technical manual in hand and not from memory will catch minor faults before they become large deadlining faults. Operator ownership and pride leads to more involvement in repairs and a greater respect for the amount of work involved in repairs. Understanding of the repair work causes operators to pay more attention to their equipment's indicators, further reducing the requirement for unscheduled maintenance. Some units have gone so far as to



assess financial liability to individuals when equipment fails due to negligent operations or from operating equipment beyond its capabilities. Training operators to know the limits of their equipment, how to conduct a proper PMCS, and encouraging pride and ownership in their equipment will reduce the work load on the Field Maintenance Company dramatically, but it will not eliminate it.

Maintenance talent is managed primarily by the leaders in the BSB. The BSB commander serves as the proponent for placing Logistics Officers in the FSCs and BSB base companies, but the assignment of Logistics Captains should be approved by the BCT commander. Enlisted maintainer talent is managed by the BSB CSM with input from the maintenance technicians across the BDE as they often have the most contact with the younger Soldiers and will know how to best develop their talent. Ensuring the right maintainers are allocated requires a great deal of attention and care to ensure that the FSCs are all manned so that they can best support their assigned battalion. Ensuring that this management lies within the BSB allows the BSB commander to exercise their authority to surge and weight the main effort, in accordance with ATP 4-33. The maintainers in our formations will not receive all the necessary training during their AIT to be truly effective. An untrained maintainer will likely damage additional components while attempting to make a repair, thus extending the time equipment is Non Mission Capable (NMC). Individual training recommendations can all be found in DA Pam 600-25. Additionally, the Army Credentialing Opportunities On-Line (COOL) (www.cool.army.mil) provides information about civilian certifications and licenses related to MOS and ASIs, eligibility and exam requirements, and preparation resources. The Global Combat Support System – Army (GCSS-A) is the tool used to manage a wide range of functions including materiel management and maintenance. All maintenance managers will benefit from completing the following courses in the GCSS-A Training and Certification (GTRAC) on-line training: GCSS-A Overview, Basic Navigation, Intermediate Navigation, Data Mining, Process Flow, Using the EUM+, Maintenance Supervisor, and Store and Forward Maintenance. While the Automotive Service Excellence professional certification is not an Army course, the experience and general knowledge acquired through the certification process will dramatically increase mechanic proficiency. Lastly, take advantage of the COMET teams and TACOM representatives at home station as training facilitators to avoid needing them to correct larger issues.

Training to maintain equipment is a task that enables the BCT to accomplish its wartime mission. A ruthless inspection of equipment and processes in the motorpool will feel painful and unnecessary to the Soldiers that are on the receiving end of the inspection at the time, but it can also foster individuals' pride in their equipment. Soldiers will have more confidence that their equipment will help them close the distance with and destroy the enemy. The BCT maintenance meeting builds situational awareness of the fleet and resources parts to increase readiness. Consider the triggers to consolidate MCPs at the BSA to shorten the supply chain, but do not ignore the impacts of burdening the BSB commander with additional unit tenants. Develop the maintenance talent in the equipment operators and the mechanics. Treat maintenance as a system that runs 24 hours a day and commanders will be able to validate their readiness rates during routine training and combat operations.