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PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) DO WE CHECK TOO MUCH AND MAINTAIN TOO LITTLE?

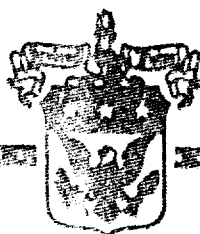
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Our current system of Preventive Maintenance Checks and Services (PMCS) has proven to be inefficient! Is this because the soldiers don't understand the requirement? The leaders don't enforce it? Or is the system itself to blame? The basic Army philosophy is that maintenance is a command responsibility, beginning at the unit level, and should be performed at the lowest level possible. This task was relatively easy when the Army traveled by horses and wagon. Broken wagons were relatively simple to repair and neglect of the animals was very easy to identify. The mechanization of (continued on back)		

the Army placed new demands on the soldiers to maintain sophisticated and diverse equipment. The most critical link in the organizational maintenance chain is the operator/crew performing mandatory checks (under the supervision of their first-line supervisor) according to the applicable TM. 10 and 20 series manuals. This also is probably the weakest link in the chain since they will have very little training on how to perform maintenance. In November 1943, Lt. Gen. McNair realized the importance of maintaining the new equipment being introduced into the Army. He was concerned about the requirement to maintain this equipment in a combat-ready condition at all times. There have been tremendous improvements in the equipment, technology, and organizational structure in the last 46 years. Yet we are still faced with the same problem. His suggestions made in 1943 are as valid today as they were then. We have based our entire readiness reporting on this weak link! This study concludes that the PMCS system has been an extremely ineffective system in the past. The system has tried to cover everything, but covered nothing very well. In fact, we have developed an excellent system to keep us busy checking, but a very inefficient system to manage our maintenance program.

USAWC MILITARY STUDIES PROGRAM PAPER

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
Do We Check Too Much and Maintain Too Little?

An Individual Study Project
Intended for Publication

by

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U.S. Army War College
Carlisle Barracks, Pennsylvania 17013
26 March 1990

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PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Do We Check Too Much and Maintain Too Little?

INTRODUCTION

The responsibility to maintain an Army in a condition of readiness has constantly been a challenge. Not only are its leaders challenged to man, equip, train, and discipline this force, but they also have the obligation to maintain it in a state of constant readiness.

Ever since man walked into battle, the importance of maintaining soldiers' mode of transportation has been critical to their survival. In former times the individual soldier either walked or rode a horse into battle. If he walked, he paid attention to his path and to the care of his feet. If on horseback, he knew that the proper care of his mount was essential if he wanted to continue to ride. Since the horse not only hauled the supplies but also carried the soldier into battle, the maintenance of this animal was of critical importance to the soldier. Daily care and feeding were critical to the health of the horse and to its ability to carry out its mission. A very special relationship developed between the soldier and his mount. If the soldier didn't take proper care of his animal, this neglect was very easy to detect.

The Industrial Revolution and the mechanization of the Army changed methods of transportation and altered the special relation between the soldier and his method of transportation. Distances that formerly took days could be covered in hours. No longer did armies have to be constantly on the move to find necessary fodder for their animals. Large armed forces were now being stationed in one location and supplies were brought to them. The influx of gasoline engines allowed jobs once delegated to many horses to be disposed of by a few trucks. Now soldiers rode mechanical horses that required a new type of fodder called gasoline. These mechanical horses also required someone to care for them and monitor their ability to carry out the next mission. Over time our organization has changed, and our methods of transportation now reflect the latest technology. However, it's still the individual soldier's responsibility to take care of his means of transportation.

The basic Army philosophy is that maintenance is a command responsibility, beginning at the unit level, and should be performed at the lowest level possible. This task was relative easy when the Army traveled by horse and wagon. Broken wagons were relatively simple to repair and neglect of the animals was very easy to identify. The mechanization of the Army placed new demands on the soldiers to maintain sophisticated and diverse equipment. When the army first received their motor vehicles, the officers and NCOs tended to assure the vehicles received as much

attention as the horses had previously received. This responsibility to care for the equipment is performed through a system known as Preventive Maintenance Checks and Services (PMCS). This system prescribes a method and routine an individual soldier uses to take care of his equipment and to assure that it is ready for the next mission. However, this system has proven to be ineffective. As our vehicles became more reliable and more complicated, we started to take them for granted. Is it because the soldiers don't understand the requirement, the leaders don't enforce the system, or is the system itself to blame? Traditionally we have paid lots of lip service to this idea. PMCS has generated mountains of publications and procedures for the soldiers to follow. But we have failed to take significant corrective actions to solve the overall problems of maintenance. For at least the past decade, the Army has been subject to many inspections that constantly highlight this fact.

Recent inspection results seem to paint the soldier as incapable of correctly performing PMCS checks required by our various systems. Why would this be the case when we have better educated soldiers in today's Army than ever before? Is it true that the soldiers in today's Army are incapable of performing these tests? Maybe there are better questions: Are we performing the right checks? Are we checking too much and maintaining too little? Is our program out of date?

This study will increase our awareness of this critical part of our maintenance structure and the system that has evolved over time. To fully comprehend the subject, we must first review how we got to where we are today. The path to our current location has been an extremely bumpy road, filled with detours and many potholes. What should be a very easy system to set up has obviously failed. Changed over time as we continue to modernize our Army, PMCS as a system has failed. Proposed force reductions and tighter budget limitations as we downsize our organizational structure will not allow us to continue with our inefficient system. We must insure that we train to maintain our equipment in a combat-ready condition--ready to deploy and perform its mission.

FIRST USE OF MOTORIZED VEHICLES BY THE ARMY.

The first use of vehicles by the Army was to support the Pershing expedition in the Mexican war of 1916. Pershing had a force of 4,800 personnel and 4,175 animals, and the promise they would be reinforced if needed.¹ The animals suffered due to the Mexican climate; this resulted in many deaths. Pershing thus depended on the railroad to bring his supplies and replacement personnel. He also moved troops by train.

Denied the use of the rail network in March 1916, the Army faced the decision to leave Mexico or arrange for means to supply the troops. Though the use of vehicles was still new to the Army, they lacked any option but to use vehicles to bring supplies. The

Army Chief of Staff, General Hugh Scott, ordered Brigadier General Henry G. Sharpe, Quartermaster General, to purchase trucks to supply Pershing. Acting without Congressional authority, Sharp purchased trucks, the necessary traveling garages and hired mechanics. A civilian driver accompanied every truck. The Army purchased a mixture of more than six hundred trucks in a single month: Whites, Jeffreys, Macks, Packards, Locomobiles, Peerless, Velies, a dozen tank trucks, six wreckers, and four machine-shop trucks.

By June most of the trucks were rolling in convoy toward Mexico. Conditions were so harsh that the engines would boil over by day and the cylinder heads crack at night. The drivers often had to use their ingenuity to keep them going. A mixture of gasoline, kerosene, and mule dung served as a sealant for leaking radiators. The quartermaster general also purchased seventy-three passenger cars, most of them Dodge touring limousines, to be used in Mexico. Dodge commercial vehicles took the generals off the horse and gave them increased mobility.² Sharp also ordered 298 cars from the Packard Motor Car Company. In less than 24 hours after Sharpe ordered the vehicles, 298 cars were on the way with drivers and mechanics for each car.³ It is interesting to note the Army procured vehicles along with drivers to maintain the vehicles. Our first experience with motorized transportation established the precedent of PMCS. Maintenance was the drivers' responsibility.

Before World War I all nations relied on a pool of horses as transportation for war. But the vast increase in the number of motor vehicles during the early 1900s would force the Army to change its mode of transportation. By 1917 there were thousands of civilian truck on the streets of America. Delivery trucks now replaced horse drawn wagons. The decrease in numbers of animals available to transport armies made the switch to vehicles a matter of necessity.

WORLD WAR ONE.

The first World War had a tremendous impact on the mobilization of the army. Trucks now moved personnel and supplies across the battlefield for the first time. The mechanization of the Army had started. By 1917 the requirement for increased vehicles and the lack of standardization led each service to purchase its own vehicles. In August 1918 the Quartermaster General adopted a standard "B" 3-ton truck to be built for the Army. He identified 20 truck companies that would build the truck, and they contracted with 150 different companies for parts. Forty-three thousand orders were placed for these trucks, but only 10,000 were produced before the Armistice. And only 8,000 of those were shipped overseas.⁴ Though the Army maintained several active cavalry divisions during World War I, the motor vehicle had proven itself by then to be the horse of the future. In the future, the smell of gas fumes would replace the smell of hay and horse manure!

Tanks were introduced by the British in 1916 to break the stalemate of trench warfare during World War I. This new invention would force changes in tactics and dictate the way the land wars of the future would be fought. The U.S. Army realized the value of this new technology and authorized a Tank Corps in 1918 to explore their value.

The large army quickly demobilized after the war. The War to End All Wars was over. Assured there would never be another war on so large a scale, the politicians were meeting to agree on limitations for military armament. No one was eager to spend money to equip an army with additional vehicles which surely would not be needed. Technology was growing so fast that each year brought better vehicles to the market. Politicians did not want to spend money to equip the Army with vehicles that would soon be rendered obsolete. Testing of the new tank was conducted on a limited scale during the early 20s, but the test results proved unfavorable due to a lack of adequate tactics and many mechanical breakdowns. This resulted in their lack of acceptance. Mechanization of the U.S. Army would have to wait. Horses would remain the primary method of transportation.

WORLD WAR II

In 1939 when Germany started their blitzkrieg campaign, the U.S. Army was a very small organization. This small force of approximately 200,000 soldiers was not trained or equipped to fight

another war on a distant continent. "In 1940 the U.S. Army had 464 tanks in all, armed mostly with machine guns. The Germans had over 5,000 tanks, armed mostly with 75-mm. cannon." ⁵

President Roosevelt realized that it was just a matter of time before the U.S. would be involved in a war in Europe. He convinced Congress of the need to mobilize the industrial base. The nation rapidly mobilized in the early 1940s. Factories were converted into the industrial machine necessary to fight a major world war. They were manufacturing war goods and providing a training base for civilians. The major manufacturers were preparing civilians to operate, maintain and fight equipment prepared for war. Dodge, Chevrolet, Ford and Reo commercial vehicles were slightly modified and sent off to Europe. Their efforts produced 950,000 trucks for the services in the first 19 months of our involvement in this war. This represented 19 times the number of vehicles obtained for the services during the same period in World War I. From Pearl Harbor to V.J. day, the industrial base would produce 84,000 tanks and 2.2 million trucks.⁶ Again we were entering a massive mobilization to fight on foreign soil, yet still we did not have a standard type vehicle. Neither were the soldiers adequately trained to maintain these new assets.

Maintenance has been a pervasive problem in the Army since the massive mechanization of the 1940s. In early 1943 Lt. Gen. Leslie McNair recognized that the new mechanical Army would require more

intensive management by the chain of command. In a letter to all Major commands, he identified the corrective measures that must be accomplished to insure that Preventive Maintenance of Equipment was carried out:

- A. More command and officer supervision.
- B. Thorough and constant first and second echelon maintenance.
- C. Drivers and equipment operators to be trained.
- D. Parts requisition followed up vigorously.
- E. Through inspection by technically qualified personnel.
- F. Field and technical manuals on hand and used.
- G. Supply personnel trained and supervised.⁷

The introduction of tremendous mechanical vehicles into the Armed Services during the early days of World War II greatly improved the mobility of the Army. It also contributed tremendously to the logistical burden. The challenges to maintain this force during World War II were formidable. The U.S. Armed Forces used over 330 different types of vehicles during World War II. 2 1/2 ton trucks and 1/4 ton jeeps constituted well over 1/2 of the nearly 2.4 million vehicles provided between 1940 and 1945.⁸

Manuals produced by the manufacturers were very simple and easy to read. There were sufficient parts to repair broken items in a timely manner. Soldiers were eager to work on these type vehicles. They were learning a trade they could market in civilian life.

The vehicles produced during this time were very basic and simple to repair. They were similar to the trucks and tractors that many soldiers had back home on the farms. Since the U.S. was predominantly a rural society then, the basics functions of the equipment were not new, just the shape. The system of preventive maintenance developed for the vehicles was very simple to follow. A review of TM. 10-1115 Operation and Maintenance Manual for 2 1/2 ton 4X2 truck International gave the soldier the following advice:

Daily Inspection.

Each day the driver should make the following inspections before starting his truck:

1. Check oil level with bayonet gauge. Add oil if necessary to bring the oil level up to the "Full" mark.
2. Make sure there is enough gasoline in the fuel tank.
3. Make sure the radiator is full of water. If weather is cold, make sure water has sufficient "anti-freeze" protection (see Radiator Section 13). Check fan belt for looseness and hose connections for leaks.
4. Check tires and make sure they are properly inflated to 60 pounds air pressure.
5. Make sure all lights and horn operate properly

By order of the Secretary of War

July 26, 1941

G.C. Marshall

Chief of Staff⁹

Such simple instructions set the parameters under which the soldiers were to operate. The vehicles were new and the soldiers still had a fascination with mechanical items. The soldiers in this war were older than they are in today's army and probably took better care of their vehicles than we do now. Their sense of responsibility for their actions was very deeply ingrained. They realized the importance of the vehicle in the quick-moving situation; they knew their lives might depend on its ability to move. James Huston states in The Sinews of War; Army Logistics 1775-1953 that "Undoubtedly the most revolutionary change in the American ground forces of World War II was their almost complete modernization."¹⁰ In a short period (less than a decade), we had gone from a predominantly horse-drawn Army to the most mechanized force in the world.

At the end of World War II General Marshall, as well as all senior leaders, was well aware of the changes in strategy and tactics resulting from increased mechanization and mobility. Never before had an Army been able to cover such vast distances in such a short time. Our leaders were also aware of the limiting factor this mechanized age placed on them. They were tied to long logistical support lines and to the new task of maintaining this mechanized Army. Maintaining these iron horses in a go-to-war condition was more involved than the good old days of caring for the horses. Soldiers could do more, go further faster; but all this depended on the mechanized force being ready at all times.

However, he was faced with a severe lack of qualified professional experts to maintain this force. Further, the study of this type problem was not as glamorous as tactics or theorization on how to fight the next battle.

THE ARMY SHRINKS.

The rapid demobilization after World War II may have been the start of our current maintenance problems. Between 30 June 1945 and 30 June 1946 the Army reduced from a strength of approximately 8 million down to less than 2 million. The new military was very small and still disorganized because of the massive demobilization after World War II. Our leaders were involved in nation-building, so maintenance was not a top priority. As a result of the war, we had excess equipment everywhere. Equipment was given away, left to rust in huge stockpiles, or shipped back to the United States where it was put in storage, sold as surplus, or cannibalized for parts.

The U.S. was now the most powerful nation on the earth. The Atomic Bomb was so powerful our Congress questioned why we even needed the Army. This general feeling of invincibility resulted in a poor state of readiness and training. The Army would not be prepared for the War in Korea that would occur less than five years after the end of World War II.

FIVE YEARS LATER

The problems of deploying the U.S. Army to Korea proved that we were not ready to go to war. During the early 50s there was no reporting system to inform higher headquarters of the actual standard the units were maintaining. There was a quick call-up of soldiers back to active duty; they were sent to war without adequate retraining. Equipment was not available for immediate use. Units in Japan started a rebuild program to provide necessary equipment for Korea. The limited number of assets available in Korea required that U.S. soldiers operate equipment almost constantly with no time for Preventive Maintenance. They operated the equipment until it failed, and then if possible repaired the asset and used it again.

New trucks were being produced and sent to Korea to replace the old World War II equipment. These new vehicles were larger, better built and much more sophisticated than the vehicles of WWII. The new 2 1/2 ton truck would now haul 5 tons over the road. The vehicles were more expensive -- costing \$7,000 each vs. \$2,500 during the war. The new Jeep cost more than twice the cost of the previous model.¹¹ Equipping the modern Army would not be cheap.

The truce ending hostilities in Korean again resulted in rapid demobilization. However, Army leadership recognized that the age of mechanization created additional challenges. They had to devise an integrated logistical system for the Army. In 1954 the Office

of the Deputy Chief of Staff for Logistics (ODCSLOG) was tasked to develop and oversee an integrated logistical system within the Army. Before this action, all the tech services managed "stove-pipe" systems for the systems procured. It was evident that the Army needed to improve its standardization and operational procedures. The Army realized that they would have to do a better job of maintaining a force in a constant state of readiness in the future.

Without a reporting system, our leadership did not know the real state of readiness. Only in 1957 was the Deputy Chief of Staff for Operations (DCSOPS) assigned to develop a uniform system of reporting standards for all units. In 1962 the Army underwent a major reorganization that abolished the technical services. As a result, the material, personnel management, and combat development functions were transferred to the newly formed Army Materiel Command (AMC) and the U.S. Army Combat Development Command (USACDC). In 1963 the Army published AR 220-1 the Army's Unit Readiness Reporting System (AURRS), the forerunner of our current Unit Status Reporting system. While all this change was occurring, the U.S. was slowly getting involved in a different type of war in Vietnam.

VIETNAM WAR.

Then things started to change rapidly in the Sixties. The "old" soldier from Korea was no longer around to guide the new

soldiers. The U.S. Army found itself involved in a different kind of war in Vietnam. Policies, procedures, doctrine, and standards maintained by the Army for years were all now subject to change. Our doctrine did not fit this new type of war. Tactics and strategies practiced in previous wars now were obsolete. Standard Operating Procedures all had to change. The Army was in a state of turmoil.

During the Vietnam War, maintenance was accomplished as required rather than through a program of Preventive maintenance or scheduled services. Repair part "scroungers" roamed the area bartering for required parts. The logistical system was overloaded through the practice of pushing supplies forward and the lack of adequate controls. The inability to get the right part to the right place at the right time resulted in extreme shortages at one location and excesses at the next. This system also resulted in excessive quantities of repair parts being procured and shipped to Vietnam. We were purchasing more parts than we needed, overloading the logistical support structure, spending more dollars than required to maintain our equipment and building tremendous Depot stocks that were not required.

Unique logistical systems were developed to support U.S. forces in Vietnam. These systems solved many problems, but also created many problems. No longer were soldiers assigned to a unit for the duration; rather a system of one-year tours emerged. Some

units experienced more than 100 percent turnover in a year. Leadership was constantly in a turmoil. There was very little loyalty to the unit; soldiers simply marked off days on a calendar and waited for their turn to return to the states. The lack of cohesion in the unit as a result of the constant turn-over of personnel in a unit destroys a unit. The common practice of changing commanders every few months resulted in a complete breakdown of our traditional system of Army standards, including Preventive Maintenance on the equipment.

The age of the equipment in Vietnam also contributed to the maintenance challenge. In the late 60s the majority of the equipment being used in Vietnam was 10 to 15 years old. To add to this confusion, many major weapon systems sent to Vietnam were expedited through the procurement cycle and delivered with design shortcomings. New vehicles frequently had to be modified after they arrived in Vietnam. The soldiers started to lose confidence in the ability of such equipment to perform up to its full potential. An obvious example was the lack of trust in the M113 Armored Personnel Carrier to protect the crew. Other vehicles were modified locally for a special missions. It seemed as if all the rules and regulations we had tried to instill in our soldiers no longer applied. The soldiers took any measure they could to complete the task, regulations be damned. So equipment in Vietnam was either old and unreliable or new and untried or inadequate to the situation.

The tremendous influx of new equipment and lack of standardization provided a constant frustration. The procedures and policies practiced in Vietnam from the early 1960s through the early 1970s had a significant impact on the Army for the next ten years. Many soldiers had learned to do things their way in Vietnam. To further degrade the importance of performing Preventative Maintenance, the Army in Vietnam was excused from reporting their status according to AR 220-1. Traditional standards were not enforced. Soldiers serving one-year tours learned a different set of standards. They invented various methods of circumventing the system to get required items. Commanders were too busy with the tactical solution, morale problems, drugs, and their six-month command tour to influence the deteriorating maintenance situation. They were not judged or evaluated on their performance in maintenance. Other statistical indicators were applied to measure their performance.

The GAO survey twenty years later would confirm the lack of standards developed during the Vietnam War would haunt the entire organization for a number of years. "Through analysis of inspection reports and discussions with maintenance and management officials, we concluded that first-line supervision, training, and resources (for example, parts and maintenance publications) were major factors in determining how well a unit performed organizational maintenance."¹² Old habits are hard to kill.

Not only were things different in Vietnam, but practices there also had a tremendous impact on the rest of the Army. Tremendous shortages existed in the rest of the Army because of equipment diverted or withdrawn from the major Army commands' support of Vietnam. LT.Gen. (Retired) Joseph M. Heiser, Jr. summarized the impact as follows:

. . .by June 1966 only 35 percent of Continental Army Command's active Army units were meeting logistics goals in equipment on hand and 25 percent were meeting equipment status goals. A similar posture existed in other commands. U.S. Army Pacific (less U.S. Army Vietnam) had only 40 percent of the Active Army units meeting equipment on hand goals and 18 percent meeting equipment status goals. At the same time, U.S. Army South reported only 46 percent equipment on hand and 50 percent equipment status; and U.S. Army Europe reported 66 percent equipment on hand and 50 percent equipment status. Similarly most our major combat units outside Vietnam were C-3, marginally ready; or C-4, not ready. For example, both the 2d and 7th Infantry Divisions in Korea were C-4.¹³

Units were manned at cadre strength; they were used as holding stations between short tours of combat in Vietnam. Training was not important, and the attitude of the mid-level and some senior leaders was that there was only one war going on, so the rest of the Army was only there to support this war. "Don't worry about it because it isn't important."

Toward the end of the Vietnam War, the Army was whip-lashed from the lack of public trust and many social ills. The unpopularity of the war had resulted in numerous programs being developed to man the Army. Secretary of Defense McNamara's famous "project 100,000" resulted the Army enlisting soldiers without the basic skills necessary to be an effective soldier. Studies conducted during World War I had shown that only 16 percent of the soldiers with eight-grade education or less were able to be outstanding soldiers, while 64 percent of those with a high school degree or better exceeded the standards. Until the rising civilian unemployment during the 1978 recession, roughly 40 percent of the Army's yearly intake read at only the fifth-grade level. These soldiers were overwhelmed by the complexity of the equipment, numb to discipline, alien to responsibility and incapable of maintaining our equipment in accordance with the Army standards.¹⁴ Technical Manuals had to be written in "comic-book" format with lots of illustrations so the soldiers could use them. Morale in the Army was at an all-time low, drug use was a major problem. The quality of personnel staying in the Army often was very poor.

During this same period American society was also going through a turbulent time with traditional values being questioned. Every one in the US wanted to do things their way. Anti-war groups in the U.S were very popular with the youth. Soldiers returned home from the war only to be called derogatory names. They were not well accepted by the folks back home. The American public had

tired of the war and wanted the U.S. to withdraw. Retired Lt.Gen. Arthur S. Collins, Jr. in Common Sense Training explained that the Army leadership in the early 1970s was leading through a program of "crisis management." He believed commanders were under tremendous pressure to meet all the demands placed on them by higher headquarters. He described the situation as follows:

A host of programs reflecting a Madison Avenue approach to a volunteer army, some poorly conceived, and others too hastily imposed, eroded the confidence of the noncommissioned officers. A commander's lot is never an easy one, but in this period the pressures and problems were greater than any I had encountered in my years of service.¹⁵

Throughout the 1970s, the Army was still recovering from Vietnam. The Army was going through a process of reducing its strength. We had too many officers on active duty, and the "fat" was being reduced through a reduction-in-force. Morale of the Officer Corps started to deteriorate. Junior Officers started to be more concerned about getting the right ticket punched in order to avoid the reduction than in doing the job at hand well. The old NCOs from Korea were now retiring. Their replacement were the new breed of NCOs from Vietnam. Approximately 57% of the young soldiers in the Army were Category IVs and basically not trainable. The budget was tremendously reduced, equipment deteriorated, military professionalism and morale were at a new low. Social unrest in America and the Army caused many problems. Morale and

Discipline were extremely low. Soldiers in the U.S. were subject to verbal abuse. Soldiers serving overseas were living and operating in facilities that had been neglected for a decade. In Europe the Army was almost out of control. Soldiers were refusing to obey the orders of the officers or accept responsibility for their actions. Drug use had reached epidemic proportions. Field units were trying to maintain a myriad of statistical information on various social programs implemented by higher headquarters. Commanders spent more of their time determining that their statistics were correct than they spent training the soldiers. Preventive maintenance was not being performed. Arthur Hadley aptly describes this period:

From the end of the Vietnam War until 1978, soldiers were murdering their officers and destroying their equipment, drugs were rampant, weapons and facilities were neglected and poorly maintained.¹⁶

VECTOR CHANGE

During the 50s, the chain of command was very involved in the maintenance of their equipment. The "old" NCO from World War II was still serving; he still remembered those early days when he personally cared for his horse. To him, these new motor vehicles were just a different type of horse: you still had to care for them. Motor stables were a part of the soldier's life. They were conducted by the book, with NCOs and officers performing spot checks to ensure the soldiers knew how to check their vehicles.

Inspection teams were formed to validate how well the soldiers were taking care of their equipment. The most dreaded was the old Command Maintenance Management Inspection (CMMI). This was the first attempt to correct the problem by putting more emphasis on inspections and forcing the commanders to pay more attention to maintenance. But this system did not work. Commanders would try to "peak" out their maintenance for this inspection and thus tended to neglect it the rest of the year. The system of unannounced inspections also didn't have the desired effect. The inspection concept lasted until the early 1970s, when the Army abolished this program and went to an assistance type evaluation. But the new idea of Maintenance Assistance and Inspections Teams (MAIT) also failed to accomplish the goal of improving maintenance procedures at the organizational level.

During the late 1970s, the Army Audit Agency and General Accounting Office (GAO) confirmed that Army maintenance was still not being performed according to the standard. This should not have been a surprise to anyone in the Army. Soldiers were continuing to practice the traits they had learned during the late 60s in Vietnam. Rather than attacking the problem, numerous programs were instituted and special teams were established by all levels of command to evaluate maintenance. Still, no one was taking the time to see why the inspection results were so bad. Was it the fault of the individual soldier? Was it his lack of ability to comprehend the instructions? Was it the lack of

experience on the part of his supervisor on how to check? Was it a lack of training at the service schools? What was the root cause of so many units failing to maintain their vehicles according to the standards published in the technical manuals?

As we have seen, from the early 50s to the late 80s the Army has undergone tremendous reorganizational efforts, all having a significant effect on the way we operate, train and maintain. From the pentomic division structure, through the Reorganization Objective Army Division (ROAD) structure to the current Army of Excellence concept, we have been in a state of constant change. Each reorganization has resulted in significant changes in our force structure and our training base. We hardly had time to complete the implementation of one changed before a different concept was developed.

Recent studies by the United States General Accounting Office of five of the Army's 16 active duty divisions paints a very bleak picture of our ability to adequately maintain our equipment. The units reported from 82 to 93 percent of all vehicles combat-ready. Yet when the Inspector General and the Maintenance Evaluation Team inspected these same vehicles, their inspection revealed that 50% of all the vehicles reported as combat-ready didn't pass. At two installations, the GAO found the operators were not performing proper PMCS, as was evident because operators were unable to identify (81 and 93 percent, respectively) all the deficiencies in

their vehicles.¹⁷ Whatever the numbers, the point is that our operators are not trained to perform PMCS: the system is broken. The chart below reflects the condition that the General Accounting Office presented to the Department of Defense:

Inspection Site	Total	made inoperable		
	vehicles	upon inspection		inoperable
	inspected	Number	Percent	defects
A	1,105	617	56	1,040
B	1,320	508	39	734
C	449	330	73	716
D	*	*	*	*
E	446	248	53	483
F	2,199	1,067	49	1,636
TOTAL	5,539	2,770	50	4,609

- a. Site A: a division and a brigade
- b. Site B: two divisions
- c. Site C: a division
- d. No detailed vehicle inspections
- e. Site D: nondivisional units
- f. Site E: a division

With the exception of those at Site b, all vehicles had been reported as fully mission-capable.¹⁸

This evidence should cause our senior leaders to question either the readiness rates or the system itself. How could we report our units as combat-ready if in fact they were not maintaining their equipment?

The early 80s could be characterized as a time of rebuilding, modernizing and restructuring the Army. The quality of soldiers enlisting reached an all time high. Where as 40 percent of our soldiers were high school graduates in the late 60s and 68 percent were high school graduates in the late 70s, by 1984, 93 percent of all the soldiers in the Army had high school diplomas. Many of these had some college also. The quality of personnel entering the Army were the best our country had to offer. Doctrine has been rewritten; our leadership has started to place more emphasis on standards. Increased emphasis has been placed on training. We looked good on paper.

The Army now had a new problem. Soldiers entering service were much smarter than many noncommissioned officers who had stayed in after the end of the war. We started an intensive program to enroll these NCO's in high school or GED classes to get them at least a high school education. Qualitative management standards were starting to be enforced. Procedures were implemented to eliminate the drug users. We were now in a position to select reenlistees. Readiness rates started to improve. The Reagan administration started a massive modernization program to improve

the readiness of the services. The defense budget started to improve, facilities were being improved, the All-Volunteer Army system was starting to work. The Army was on the way back.

In the late 80s, our leadership started to realize that the Army could not continue to operate as we had in the past. Funds were starting to be reduced and we would have to improve our internal management of assets. We began to stress the importance of maintaining our equipment and performing correct PMCS. The reorganization of the Army had eliminated the cushion of support troops. No longer were there adequate support units in the force structure to do massive backup repair. Repairs now were taking longer to accomplish, and studies were showing that support units were performing too much work that should have been performed at a lower level. As a result of this reorganization, approximately 70 percent of the logistical support units are located in the DoD's Reserve Components. "Currently, we have 367 maneuver battalions in the active Army, as many as in 1968 at the peak of the Vietnam conflict -- 142 more maneuver battalions than in 1962 --but we have nearly a quarter of a million fewer soldiers on active duty."³ These reorganizational efforts resulted in more combat power being available in the force and also in an increase in the number of items that must be maintained. We now have a shortage of personnel to repair the items if they have to go to support. In CONUS this problem is solved by sending the vehicles to the Directorate of Logistics where civilian technicians perform the

repair. This creates an additional problem since the same repairs will have to be performed by General Support Units in time of war and our soldiers are not being trained to perform this type repair. The criticality of maintaining our equipment and proper PMCS is now very evident.

Senior leaders who had lived through the numerous reorganizations of the Army and survived the "crisis management" era started to evaluate the status of the Army. I believe that they realized it was time to go back to basics and correct many things that had deteriorated over time.

INSPECTIONS DON'T FIX.

The failure of the CMMI inspection team to solve the organizational level maintenance problem should have sent a very strong signal that something was wrong with our system. The Logistics System Program Review panel appointed by the DCSLOG in 1983 stated that inadequate operator level maintenance was the most serious maintenance problem in the Army.²⁰ Thus the GAO studies conducted during the 80s only confirmed a known fact. The soldiers in the Army were not performing maintenance according to the manuals. This was not a new revelation.

The obvious question must be if we have known about this problem for so long, why haven't actions been taken to solve the problem? For the last few years we have tried to solve problems

by establishing new boards or agencies to study them. However, the establishment of boards, or even of new programs like the Maintenance Management Improvement Program (MMIP), did not solve the maintenance problem. The problem cannot be solved by publishing new pamphlets in comic book format or opening new offices in various parts of the world where customers can come in and tell you their problems. We have been treating the symptoms for many years, but we have never tried the hard cure. To solve the problem, we must take action.

The problem of inadequate and non-performance of PMCS checks is not a new problem, something that has just developed in the last few years. It also should not come as a surprise to any of our senior leaders. It was a major finding in a survey conducted by the GAO in 1978, 1982, 1983 and again in 1987. Maybe we need to look at the problem as addressed by the latest survey to evaluate the challenges as outlined by the GAO report.

The survey team believed that the Army has failed to provide adequate training for the personnel assigned to operate the equipment. Traditionally this has been a problem with the wheel vehicles. We have over 330,000 wheel vehicles in the Army and over 500,000 personnel licensed to operate these vehicles. However, only 10 percent of these personnel were trained by TRADOC to operate the vehicle. The Army has 19 different publications concerning correct operating procedures. The Army Regulation for

Motor Vehicle Driver and Equipment Operator Selection, Training and Licensing (AR 600-55) has only been revised once since it was published." We tend to think that if a person can drive a civilian car, he should be able to drive an Army vehicle without any special training. At some locations, a soldier needs only to pass a written test and demonstrate the basic skills necessary to operate the vehicle. The GAO survey identified the fact that most wheel vehicle operators receive no formal training (including PMCS). To further justify this statement, 57% of the inspectors in Europe stated that insufficient training was the major problem with maintenance; 59% of the inspectors in the U.S. stated the same reason." Not one inspector stated that the major problem was a lack of supervision by the chain of command. Were they passing the buck back to the school house?

Current procedures call for the operator to perform a before-operations check, a during-operations check, an after-operations check, a weekly check and a monthly check. It also requires a quarterly service, a semi-annual service and annual service on most of the equipment, to be conducted by the unit organizational mechanic. The modernization of our fleet has placed some very sophisticated equipment in our inventory. Could we possibly be servicing our equipment into a worse condition than it would be if we eliminated some services?

The soldiers in today's Army are much brighter than in the past. They are capable of understanding what we leaders think is important, and they will work hard to accomplish the task. They also observe what we as leaders fail to emphasize by our actions. They perceive what we consider to be unimportant. Is the proper performance of PMCS one such area of neglect? The GAO report stated that when soldiers at one location were given the time to correct the vehicles' operational status, the operational readiness of the unit improved. As stated in their report:

When inspectors gave the unit time to correct defects, the vehicles' operational status noticeably improved. For example, when the Inspector General at one location gave units 2 hours to correct defects, the number of operational vehicles increased from 51 to 83 percent. However, because most inspections cover only from 10 to 50 percent of a unit's vehicles, any defects on the remaining uninspected vehicles would remain undetected and uncorrected.²³

This report supports my claim that if the soldiers are told what they must do and checked, then they will meet the standard. The study did not say so, but I have to assume that the entire chain of command was in the motor pool monitoring this two-hour period. Soldiers saw the command involvement, realized the importance of the mission and performed up to the standards expected of them. Soldiers today can accomplish the task. However, somewhere along the way the Army leaders forgot that maintenance

is still a command responsibility. General Bruce C. Clarke is often quoted as saying " an organizations does well only those things the boss checks." The boss needs to start checking our maintenance program.

IS IT THE SYSTEMS FAULT?

One of the major reason our soldiers today do not adequately perform Preventive Maintenance Checks and Services resides in the system under which they must operate. We have allowed our technical manuals to expand to the point that they are overwhelming to the young soldier. Our manuals try to cover every conceivable detail a bureaucrat sitting in a comfortable office could ever think of. Since the developer gets paid by the page, our system has encouraged him to make the book as large as possible. These manual writers know they will not have to follow these instructions out in the cold, muddy terrain of a field problem. Without doubt, manual directives are too complicated and hard to comprehend. Also, they have filled the manual with too many illustrations and have tried to lower the reading level to such an extent that the manual no longer makes sense. The military specification that the developers now follow must be changed. Our current Technical Manual system is out of control.

We have a tremendous quantity of manuals to carry with us, but the cogent information is buried so deep sometimes that the soldiers just try to repair the problem without spending all day

looking for the information. The proliferation of technical manuals for Army equipment has reached the point that the sheer bulk causes numerous problems. Manuals occupy a tremendous amount of space in garrison. They require constant updating, the soldiers can not find the information they need in an expedient manner, and we do not have sufficient equipment to carry all MTOE equipment and the publications. One of the units largest challenges is the receipt, storage, updating, transporting and use of the Army's technical publications system as it currently exists.

A great example of this overkill can be found in the original manuals for the M1 tank. This system is much more advanced than the M60 series it replaced, and the technical manuals for this new tank almost double what we had for the old version. There were over 40,000 pages for the tank when first introduced. The new Bradley Fighting Vehicle manual has over 20,000 pages, and the Patriot Missile System manual has more than 80,000 pages. Our technical manuals need to be revised. They are very bulky. Extensive cross-referencing between manuals for major systems often slows the work. Or the soldier tries to perform the work without them, which may result in increased failure rates. This also has an adverse effect on our budget, since we may be replacing parts that are still serviceable.

We have to advance out of the stone age with our maintenance programs. Soldiers are better educated than their predecessors,

have higher aspirations, and are more easily bored by the redundant routines required by our present FMCS system. Most of our soldiers have automobiles they depend on every day, and these vehicles do not require constant checking. Major automobile manufactures in the U.S. now guarantee their vehicle seven years or 70,000 miles. These commercial products that our soldiers drive every day do not require as many checks as does a truck in the motor pool. If we applied FMCS standards for the vehicles we all drive every day, most of us would walk to work.

While I realize that our equipment is more complicated than the equipment of the early 40s, we can still learn from the past. A review of TM 10-460, Drivers Manual, published in 1942, reveals they had five different preventive maintenance schedules. The items are listed logically and arranged in sequential order to speed the checks. This is a good lesson for our manual writers to learn, since today's manuals do not list required maintenance checks in sequence. Also, the emphasis in 1942 was on after-operations checks, which they considered to be the most important. Today we place more emphasis on before-operation checks. The logic in 1942 was that the vehicles should be ready to roll on a moment's notice. Their schedule of before-operation maintenance was only a quick check to see if the condition of the vehicles had changed. This manual fit in their fatigue pockets, and soldiers were instructed to take the manual with them when operating the vehicle.

I find it interesting that we could depend on the drivers to check and operate their vehicles in a safe manner during a World War with far fewer instructions than we believe the soldier of today requires. Could it be that our system of bureaucratic paperwork has finally caught up with us?

PMCS should not be this large of a problem in today's Army. However, we still find ourselves attacking the same problem in 1990 as we were in 1943, when the Army started to mechanize. It has been almost 50 years, and the problem remains the same. Is it the failure of the operators to take care of their equipment? Or of the leaders to check and make sure we are maintaining to a realistic standard?

WHERE ARE WE NOW

Within the last few years, Army leadership has taken significant steps in the right direction to provide a plan of action. The formation of a general officer steering committee by the DCSLOG in 1989 to direct the efforts of AMC and TRADOC in solving the PMCS problem is working. A significant corrective action was the chartering of the Unit Maintenance Office (UMO) at the U.S. Army Ordnance Center and School (USAOC&S) as the TRADOC Executive Agent for the management of unit maintenance on selected equipment. This started the ball rolling. The charter (signed on 31 August 1988 by the TRADOC Commander) provides a major step in a progressive action plan to solve the PMCS problem in the Army.

This office has accepted the challenge and is demonstrating a determined attitude in their attack on the problem. During a visit to the UMO on 9 and 10 January 1990, I was very impressed with the enthusiasm and dedication displayed by the entire team. Their revision of DA Pam 750-1 Leaders Unit Level Maintenance Handbook is an excellent example of quality workmanship. It is no longer written in the "comic" book format so popular in the 1970s. Its volume has been reduced by 2/3 (57 pages vs. 159), yet it contains more usable data in a quick, easy-to-read form. The old version states that it was the responsibility of the unit mechanic to spot check PMCS. The newer version reinforces the chain of command by specifying the soldier's supervisor as the person responsible for spot checking PMCS. This is a gigantic step in the right direction. Now we must enforce the regulation and assure our supervisors know how to supervise the performance of PMCS.

Another significant problem area was improved with the publication of Maintenance Management Update 12 on 31 October 1989. Paragraph 3-1(a) defines TM 10-20 standards. This has been a problem as long as I can remember. We have required operators and unit maintenance personnel to maintain equipment to TM 10-20 standards, but prior to the publication of AR 750-1, Army Materiel Maintenance Policies, on 31 October 1989, that standard was not defined in any Army publication. This established standard is also published on the first and last pages of DA PAM 750-1. The vehicle is fully mission capable when it meets the following standards:

The Army has one maintenance standard. The maintenance standard is based on TM 10 and 20-series, preventive maintenance checks and services (PMCS). The maintenance standard (minimum) is the condition of equipment when: --

- (1) The equipment is fully mission capable.
- (2) All faults are identified following prescribed intervals using the "items to be checked" column of the applicable TM 10 and 20-series PMCS tables and --

- (a) Corrective actions which are authorized to be accomplished at unit level and have the required parts available are completed.

- (b) Faults requiring parts to complete the corrective actions have the required parts on valid funded request.

- (c) Corrective actions which are authorized to be accomplished at a maintenance level above the unit are on a valid DS maintenance request.

- (3) Equipment services are performed within the scheduled service interval.

- (4) All urgent and limited urgent MWOs are applied.

- (5) All authorized BII and COEI are present and serviceable or on valid funded request.²⁴,

ON THE RIGHT TRACK.

We are on finally on the right track! The project is getting the visibility that it needs to make it work. Realistic standards are currently being developed for our combat vehicles. Our current

system of preventive maintenance was not designed by a soldier who had to operate and maintain the system. It was developed by a technician to cover every conceivable condition. Many PMCS checks now required are not directly related to the ability of the equipment to perform its combat role. We must insure that the new standards correct this problem and be certain that the failure of an item requiring before-operation checks would render the item not mission-capable. Currently there are over 200 PMCS checks on the new Abrams tank -- checks that may take from 1.5 to 2 hours. This is completely unacceptable. We have to provide the soldier with equipment that can get out of the motor pool in a very limited amount of time. We must reduce the amount of time it takes for soldiers to execute maintenance checks. This problem is currently under scrutiny by the Unit Maintenance Office, which has set a goal of no more than 20 minutes time required to check before-operational PMCS on combat vehicles.

Every major change in equipment because of force modernization has a tremendous impact on the individual soldier. Soldiers are required to maintain one system according to one set of technical manuals and learn a different system for the new equipment. Shortages of training dollars often result in inadequate training accomplished at an incorrect level. The forecast reduction in our budget will only exacerbate our current training problems. We will have to depend more on the On The Job Training program (OJT) to train our personnel to operate and maintain new equipment. There

are some inherent problems with this system, since often soldiers' supervisors are not adequately trained, so they are unqualified to teach or supervise the young soldiers performance.

PMCS requirements need to be simplified. I believe we need a very short before-operation check. This should not be much more than a walk around the vehicle, a visual evaluation and a check of the instrumentation. Our emphasis should be on after-operations checks. We should have a system that allows us to practice rolling our combat vehicles as quickly as we possible. We should train as we plan to fight.

HOW DO WE CORRECT THE PROBLEM?

The new standards are only half the problem. The most critical step is an increased training effort for PMCS. I believe our first priority should be to ensure that officers know how to check PMCS on all the equipment they have under their control. The second step would be to ensure the NCOs have the capability to perform PMCS on all equipment under their control. Their evaluation report should reflect their ability to perform this task. The next step would be to hold the supervisors directly responsible for ensuring that proper PMCS is performed. Somehow we have forgotten this last step over the past few years. If the soldiers observe that their first-line supervisors cannot do these checks or that he doesn't consider them important, then they will not be important to the soldier. We must lead by example. We must

continue to streamline our PMCS system and identify only those mission critical tasks as the operator's responsibility. We must constantly ask if our vehicles really need these mandatory checks.

As we start to replace our fleet of over-age equipment, we should make maximum use of currently available technology. Downsizing the force structure should allow us to concentrate on a few excellent new systems. We must change our methods and get the best money can buy, not the cheapest they can procure. "In the past, planes, tanks and guns were the key to defense. In the new era, it is the computers, the radars, and the gyroscope that are the critical components of our defense and weapon system."²⁵ If we are to maintain a capable force, we must continue to modernize.

In 1970 Lt.Gen. (Ret.) Heiser stated a goal that would still serve us well today: "we are trying to get the guy in logistics to support the user and put less of a burden on the user . . . take the maintenance burden off the individual soldier in the using unit."²⁶ We have this capability today, if we are willing to take advantage of the technology currently available. "New technology will permit almost unlimited development of applications in logistics and control. Such advances permit even higher goals of system reliability to be set, perhaps to the point where systems are almost failure proof. Elimination of most operational logistics and the aggregation of items at retail level would result from such development and, ideally, weapon system logistics would

stop when the system was delivered to the user."¹⁷ The first step may be to demand systems with less emphasis on hydraulics and mechanical components that can fail.

The smaller our force structure becomes, the more critical it is for us to have vehicles designed with self-testing features to do those tests we once assigned to soldiers. Our system must allow for more flexibility, while quickly and easily alerting us to a major maintenance malfunction. The current system depends on the lowest level, the operator, to report the status of our equipment.

The operator is the key person in deciding if the items is mission capable or not. If the operator has decided there is no problem, then that is as far as it goes. He states no problem on the form and turns it in or gets the vehicle dispatched. If there is a problem and he can repair it, he does not have to annotate it. Only if the parts to repair the deficiency are not on hand or if the problem is above his level of maintenance according to the MAC chart should he annotate anything on this form. If the leaders of this unit are not checking, then our entire readiness system depends on the lowest level.

There are some measures that we can implement immediately without having to wait for new equipment or changes to our policies. We talk about training as we plan to fight in all our tactical publications. We are constantly saying that the next war

will be a "come-as-you-are war." Then why don't we train as we would maintain in a combat environment? Start requiring vehicle operators to assist the unit mechanics with all repairs to their item of equipment? Send him with the vehicle to help in repairs when it goes to support. Would he be a better driver if he had to assist in the repair of the vehicle? Would he have a better appreciation for the capabilities of the vehicle and take better care of the equipment in the future if he knew he had to assist in the repair of the asset?

The Army cannot afford to let this critical initiative to improve the performance of PMCS die. We must give it the visibility and support of all commanders to ensure that we are maintaining our vehicles in a go-to-war condition and that we are doing it the smart way. Our system requires significant changes, we must accept that challenge and change the system. PMCS should be easy to perform and contain only those items that affect the ability of the equipment to perform its combat mission and operate safely during peacetime. The combat commander should be provided a simple PMCS system that meets his requirements on time. The logistician must support the combat commander with a system that will allow him to accomplish his mission. However, these two must work together to execute the plan. We have started the action in the right direction, now we must all insure that we follow through.

The work being performed by the DCSLOG, the General Officer Steering Committee and the Unit Maintenance Office at the Ordnance Center and School all provide indications of a positive trend in the way we are starting to maintain.

Summary.

The responsibility of maintaining our equipment in a constant state of readiness will continue to be a challenge in the future. Vehicles were getting more complicated. No longer are our mechanical assets simple devices easy to repair by personnel with rudimentary skills.

There have been numerous books written on strategy and tactics to support the new Air Land Doctrine. We emphasize the correct utilization of our modern equipment and the necessity to have the very latest design. However, there have been very few books written on the critical importance of maintaining this equipment once it is issued to the user. Too often these books are dull and read only by the maintenance personnel. Our leaders still haven't reached the point where they realize that a combat tank without operational fuel and ammunition support vehicles is just a large piece of iron. Our leaders in World War II realized the importance of such support, but this generation of leadership has been blessed with excess. We have not had to depend on a single method of support.

Our current maintenance challenges are exacerbated by the age of the fleet we must maintain. Our trucks are older than most of the soldiers who operate them. The major problem with our current maintenance policy is not that our soldiers cannot perform PMCS. The problem is with our current system and the lack of leadership. Soldiers today have the ability and motivation to perform whatever task we assign as long as the task is logical. They understand the importance of performing proper maintenance. They do not like to have us waste their time and require them to perform useless details. We have to operate smarter in the future.

Solution to the TM problem is CD-ROM type system, where all manuals are placed on an electronic storage disk. This would be read in a portable computer that could be taken with the mechanic to the vehicle. This same system could be built into the item of equipment with all pertinent information easily assessable by the operator and the mechanic. The information would be easy to update, extremely fast to find, and provide drawings and even the repair part number for easy reference. This same system should be capable of maintaining all required records for the item of equipment. A quick print out of information entered in this system would provide all data required to maintain our maintenance records.

Do we need to reestablish Saturday morning training for PMCS? If a person fails to perform proper PMCS, then we should have a system to encourage him to perform it correctly the next time. We all do things by training. If this is the problem, then the chain of command should be involved in training. Get the squad leaders, platoon sergeants out there teaching. The soldiers learn (or should learn) from his first-line supervisor. If a soldier is not performing to the standard, then have his leader train him. We should not establish another program where the commander must be the trainer. The commander should be the checker.

In 1970 retired Lieutenant General Joe Heiser, then the DCSLOG of the Army, addressed the DA Logistics Doctrine and Training Conference at Ft. Lee. His comments are just as valid today as they were twenty years ago. The problem he was addressing is the same one I have addressed above. We have been studying the problem for almost 50 years. Now is the time for action:

I've been in this business as an enlisted man and officer for 29 years and instead of it changing, it hasn't changed. We studied it until we were blue in the face; and then look at what we did with the studies. And I'll tell you that in logistics, I'm not talking tactics, but in logistics, we have changed very little over the whole course of that 28 years, except made it more complex. We will not be able to get away with that in a war with a sophisticated enemy the way we got away with it in

Vietnam with the kinds of problems we let ourselves into in Vietnam and every one them is according to doctrine. Now, by damn, we can't stand this again; we can't stand it economically, and we can't stand to get on a field of battle with it that way anymore. We just can't. Peace, Brother!²³

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