

**NEWSLETTER  
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**IN THIS ISSUE**

- ◆ British Chieftain MBT
- ◆ History of the Master Gunner Program Pt 3
- ◆ Guerilla Submarines
- ◆ Mister Roberts
- ◆ Patton and the US Tank Corps Monument Update
- ◆ Battalion Information

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# PATTON BATTALION - USABOT

## ILLINOIS - INDIANA - KENTUCKY - TENNESSEE

Welcome 2023! Another new year. It is my hope that by the end of this year we will putting the Patton & the US Tank Corps monument project to rest. It would be great to finally conclude this chapter.

Before we get into part 3 of the Master Gunner Program I thought it important to look at an underlying issue in the research. It was not know to me that the British Chieftain was a 120mm tank that was built and produced before the 1973 Arab-Israeli War. So I thought it important to take a look at this Main Battle Tank and it L11 cannon a little closer.

We are into Part 3 of the Master Gunner History. I mentioned at the start that I wanted to cover up to 1976 and the first official class of the Master Gunner course so next month will be the final part of this history project. This project took shape when I found documents that shed light on the development of the program. Since then I have been handed documents to show the development. I have met with several Master Gunners and what I have found is that there were already a few NCOs who were tracking information and pretty much developing their own programs.

I would like to see a Master Gunner step in and look at the program in ten year sections. From 1976-1985, 1986-1995, 1996-2005, 2006 to 2015, 2016 to present. This would be leading up to the 50th anniversary of the Master Gunner program. It would be interesting to look at each of these 10 years at the changes in the program.

It would take someone with more knowledge about being a Master Gunner to do that. To look at improvements and changes. Plus look at the success during these periods. Or set backs if any.

Part 3 will pretty much cover 1975. With some letters provided and from conversations at the Master Gunner breakfast I attended we will look at the class, instructors, and some of the general information about the course. I have some letters from senior leaders talking about the course results. And finally I have found three articles in Armor Magazine that share some of the details as to why the Master Gunner Program was set up the way it was.

I read the book Guerilla Submarines and I think you will find out that it is a very interesting book.

Mister Roberts is the book that the movie was based off of. As it had always been a favorite of mine I just had to get it and read it. It was worth it.

KP Morris  
Patton 6

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[WWW.USABOT.ORG](http://www.usabot.org)  
[HTTPS://19SERIESCLOTHING.COM](https://19seriesclothing.com)

## The British Chieftain FV4201 Main Battle Tank

Before we dive into the Master Gunner History part 3 I wanted to give some insight here. As you and I have been digesting all this information on the development of the Master Gunner Program I kept seeing something that I just couldn't figure out. So over the past month I have made some discoveries.

One is making contact with a British SSGT troop leader on tanks & Regimental Gunnery Staff Sgt Alan Hodges, who was trained as a Long Range Gunnery Instructor on the Chieftain. We had some great talks on tanks and gunnery.

Before we move on we need to look at this vehicle. In the reports and letters we have read we keep seeing it mentioned that these officers are going to England to look at the 120mm gun. Now I kept asking myself why they were going to England for this as the only 120mm I knew of was the Rheinmatall which is German based. So here is a little lesson.



British Chieftain Tank FV4201. The Chieftain was a development of the legendary Centurion, which introduced the world to the MBT concept in 1945, dominated the battlefield in the Middle East and imposed its main gun as "the" NATO standard during the Cold War. The Chieftain's rifled Royal Ordnance L11A5 120 mm (4.72 in) gun was specifically tailored for it and also became the new NATO standard caliber.

The Chieftain originated from a British Leyland design of a new tank, dating as early as 1950, when the War Office requested a replacement for the Centurion, as the Medium Tank No 2. The Centurion itself was not seen as ideal in firepower since the arrival of Soviet heavy tanks armed with 120 mm (4.72 in) guns like the IS-3 and following models up to the T-10. The British Conqueror heavy tank (1955) tried to respond with a high velocity, long 120 mm (4.72 in) gun, but not surprisingly failed on the mobility aspect. The next tank had to have a heavier gun on a more mobile package.

Two main features had to be included, a brand new L11 120 mm (4.72 in) main gun, and protection by new thicker sloped armor, capable to sustain an impact from the new Soviet HEAT and improved AT rounds. It also had to be fitted with the new Leyland L60 engine.

Design of the Fv4201 started in 1958, and the first prototype was built in 1959. Six other prototypes and a pre-production series of 40 tanks followed from 1961 to 1963. It was eventually accepted for service in May 1963, officially designated the Chieftain Mark V MBT, accompanied by an order for the production of 770. In 1966 the first Mk.Is entered fully active service with the tank units.

The Chieftain emerged from a brand new hull and turret design. Apart from the tracks and some elements of the wheel train and some mechanical parts linked to the new engine, nothing was shared with the Centurion. The initial design combined some unique features, including a mantle-less turret, allowing superior depression angles. The turret was well sloped and roomy, allowing the loader, commander and gunner to be comfortably housed.

*So lets take a closer look at this main gun.* The muzzle velocity and accuracy of the new main Royal Ordnance L11A5 rifled gun easily compensated for the early lack of mobility. It fired separated ammunition with fully combustible bagged propellant charges. The turret was fitted, since the beginning, with a coaxial L7 and later L8A1 7.62 mm (0.30 in) machine-gun, with a second one in commander's cupola and a Marconi FV/GCE Mk.IV A cal.50 (12.7 mm) ranging gun was mounted over the main gun, capable of ranges up to 2400 meters (1.49 mi), but 1800 m (1.2 mi) was more usual. But at 2000+ meters machine guns cannot be used practically, and the gunner had to rely on visual magnification, his graduated sight and own skills. Ammunition comprised HESH (high explosive squash head) and APDS (armor-piercing discarding-sabot), with 62 rounds carried. It took more time to engage successive targets with it than with the contemporary fire control system of Leopard 1, which was based on an optical rangefinder.



## The British Chieftain FV4201 Main Battle Tank - Cont.

(Photo on lower right previous page) A "Sight, Laser Rangefinder Periscopic AFV Number 7 Mark 1", or laser rangefinder (LRF), as used on the British Chieftain. The main obstacle to accurate tank gunnery has always been not knowing the exact range to the target. Lasers were unaffected by weather or ballistics, and this one could be accurate to +/- 10m. Along with computerised Fire Control Systems they allowed engagement ranges to increase significantly.

*The Tank Museum (Bovington, Bovington Camp, UK)*

### Royal Ordnance L11A5

- Calibre: 120 millimetres (4.7 in)
- Barrel length 6.604 metres (21 ft 8.0 in) (55 calibres) (*L44 in M1A1 Abrams is 17ft*)
- Length overall 6.858 metres (22 ft 6.0 in)
- Weight: 1,778 kilograms (3,920 lb)
- Recoil distance: 37 centimetres (1 ft 3 in)
- Maximum range/velocity (APDS): 3,000 metres (3,300 yd), 4,495 ft/s (1,370 m/s)
- Maximum range/velocity (HESH): 8,000 metres (8,700 yd), 2,198 ft/s (670 m/s)
- Maximum rate of fire: 10 rounds/min<sup>[6]</sup>
- Sustained rate of fire: 6 rounds/min
- Elevation: +20/-10 on Chieftain Mk 2.

Unlike most tank weapons which fire a single fixed round, the round (projectile) and propellant are loaded separately. The propellant is in the form of a combustible "bag" charge (or later, a combustible charge case for armour-piercing rounds). This required the obturation to be provided by the breech rather than the cartridge case, as is the case in fixed rounds.

When first introduced, a 12.7 mm (.50 inch) in calibre ranging gun was fitted over the barrel of the L11. The projectiles for this ballistically matched those for the main armament out to 2,600 m (2,800 yd), at which point the tracer element burned out. This effectively limited the maximum range for the main gun to this distance. In the late 1970s, laser rangefinders replaced the ranging MG in British service, allowing engagements at longer ranges. However despite this, testing at the US Army Aberdeen Proving Ground concluded that engaging targets beyond 3 km (1.9 mi) is not practical due to round deviation.[citation needed] This is especially true against targets that are moving. In the Korean War British Army 20 pdr-armed Centurions were successfully shooting into bunker observation slits at ranges of 4,000 yards.

During Operation Granby an L11 on a British Army Challenger 1 scored the longest tank-to-tank 'kill' in military history, when it destroyed an Iraqi T-72 at a range of 5.1 km (3.1 mi).

### Variations of early Chieftain Tank.

- The Mk.1 (1965) first batch of 40 pre-production vehicles was so underpowered that the whole lot was quickly re-affected for training duties.
- The Mk.2 (1967) were fitted with a more powerful 650 hp engine.
- The Mk.3 was fitted with additional equipments, dry-air cleaner element, modified No 15 Mk 2 commander cupola, upgraded engine and gave birth to Mk 3/2 (Improved electrical equipment and air cleaners), Mk 3/3 (ER RMG, laser rangefinder, 720bhp engine & modified NBC pack), Mk 3/3P (Iranian version), Mk 3G (Prototype with turret air-breathing for engine aspiration), and the Mk 3S (Mk 3/G with turret air-breathing and commander's firing switch).
- The Mk.4 were two prototypes with increased fuel capacity and other minor modifications.
- The Mk.5 (1970) was the final production (based on the 3/3) version with a new 850 bhp engine and improved NBC protection (turret bustle).
- The Mk.6 (1979) was an upgraded version, a Mk 2 rebuilt to Mk 5 standards. All previous tanks were fitted to this new standard which introduced Clansman radios and many other improvements.

<https://www.tanks-encyclopedia.com/coldwar/UK/chieftain.php>

One of the things I was interested in was the twist of the rifling on the guntube. I got the answer from Marjolijn Verbrugge of the The Tank Museum in Bovington, England.

The L11 is a rifled cannon with poly-groove plain section rifling and 32 grooves.

The groove/land ration is 2:1 and it's twist is 1 in 18 calibre, uniform, right hand. Some rude math here. A guntube 21ft long is 6,400.8mm. So if the twist is 1 in 18 caliber, that makes it 2,160mm to make a turn. 6,400.8 divided by 2,160 equals 2.963 twist out the tube.

## History of the Master Gunner Program - Part 3

Master Gunner courses will be taught in the Armor School starting in late February 1975. These courses will give noncommissioned officers (who have been selected by their commander) a thorough and complete knowledge of the tank weapons system, tank gunnery and gunnery training techniques.

The plan is to have school trained Master Gunner at the tank battalion/armored cav squadron level and eventually in the tank company/cav troop. This will give the commander an NCO qualified in all aspects of tank gunnery to assist in developing and implementing the unit's gunnery program, teach gunnery and to troubleshoot the program. The Master Gunner will be awarded a Master Gunner's ASI after successfully completing the course.

Prerequisites to attend the Master Gunners Course are:

- Highly motivated, 11E volunteers in the grade of E6 or above.
- Qualified on Table VIII within the past 24 months.
- Selected by unit commander.
- Two years retention by the unit that sent the individual to school after completion of the course.
- Security Clearance (SECRET)
- The Master Gunner candidate must be an individual who will be respected by his peers and *listened to* by his superiors.

The course will consist of about 45 per cent of the instructional effort on gunnery, most of which will be advanced gunnery, 35 per cent on turret maintenance, and 15 per cent on training management.

As can be seen, a great deal of time spent on the maintenance aspects of the turret. It is not intended that the course produce turret mechanics to turret mechanic supervisors, but an individual thoroughly familiar with turret maintenance so that he can assist the commander in keeping the unit's turrets in combat ready status. Which is necessary to good gunnery. During the course many of the subjects will be prepared and given by the student using training aids that normally are available in the unit. This will help prepare him for the instructor role when he returns to his unit. It will also give the student the opportunity to build up his personal tank gunnery library that he will start while at the school. Even after graduating, the Armor School will provide Master Gunners up-to-date gunnery literature so that the Master Gunner's library can always be kept current.

During the course, the Master Gunner candidate will have a requirement to develop a mode year round tank gunnery program for the type of unit which he will return.

*Armor Magazine, Jan-Feb 1975, Vol. LXXXIV, No. 1., pages 8-9.*

CSM (R) Jim Benham shared a copy of his letter to report to the Master Gunner Program.

Weapons Department  
US Army Armor School  
Fort Knox, KY 40121

12 February 1975  
SFC James Benham  
Co A, 2d Bn, 34<sup>th</sup> Armor  
4<sup>th</sup> Infantry Division Mech.  
Fort Carson, Colorado

Dear Sergeant Benham,

Your selection to attend the Master Gunner Course exemplifies the confidence of your commander in your leadership ability and expertise. We are assured that this distinction is well deserved and that your performance during this period will prove this acclaim to be duty warranted. The subjects being taught in this course are tailored towards the units in the field. We believe this will be an intellectually challenging course and physically vigorous. We envision that upon completion of the Master Gunner Course, you will be an invaluable asset to your present unit and to each future command with which you serve.

Inclosed is a of a catalog of subjects to be presented, a listing of instructors for the Master Gunner Program, a basic subject listing of categories tested in the Basic Skill Evaluation Examination, a list of personnel assigned to tank crews, and a map of Fort Knox and its facilities.

Preparations for your reception have been completed and we are waiting your arrival. If any questions arise prior to arrival, do not hesitate to call us and we will gladly provide you with the desired information. Billeting arrangements have been made. Upon arrival to Fort Knox you should report to Building 1481, located on Old Ironside Avenue.

James F. Gilmore  
Major, Armor  
OIC, Master Gunner



## History of the Master Gunner Program - Cont.

Students for M60A1 MG Class – 001, 12 students, 24 February – 16 May 1975

White, William J., MSG  
 Norris, Joe H., GNY/SGT USMC  
 Spinner, Harry D., SFC  
 Benham, James R., SFC  
 Purkhiser, James B., SFC  
 Roberts, Frank, SSG  
 Luper, Steven G., SSG  
 Payne, Everett, SFC  
 Guevera, Rudolph, SFC  
 West, James A., SSG  
 Porter, Ed W., SSG  
 Pass, James R., SSG  
 King, Bobby J., SFC  
 Waymire, Richard K., SFC  
 McMannes, Laster, SFC

M551 Sheridan Course – 8 students, 19 May – 8 August 1975.

M60A2 Course – 4 students, 11 August – 28 November 1975.

If you know of any of the students in either the M551 or M60A2 classes I would like to hear back so that I can add the names to the classes.

### Instructors

SSG Cash  
 SFC Telfar  
 SFC Eldridge  
 SFC Restrepo  
 SFC Fairfax  
 SFC Lilly  
 SFC Dular  
 SFC Serna  
 SSG Harrell  
 SFC White  
 SFC Copeland

This list of instructors may not be the full list and may be some that arrived in 1976.

One of the first tasks that the student will accomplish when arriving at the course will be to demonstrate his knowledge in basic gunnery skills. This will be done through a ten station examination (see figure 1.). This test should not prove difficult to the motivated NCO who knows basic tank gunnery.

Potential Master Gunners and commanders can keep abreast of Master Gunner developments by checking future editions of Armor Magazine.

FIGURE 1 (VALIDATION EXAM) (FOR M60A1 COURSE)

STATION 1 – VEHICLE IDENTIFICATION  
     GUNNER'S CREW DUTIES  
     SUBSEQUENT FIRE COMMAND  
     BATTLEFIELD FIRE COMMAND  
     SNAKEBOARD TRACKING EXERCISE  
 STATION 2 – MALFUNCTIONS —FAILURE TO LOAD  
     PREMATURE FIRING  
     FAILURE TO FIRE  
     FAILURE TO EXTRACT/EJECT  
 STATION 3 – REPLENISH OIL  
     CHECK COMPUTER CHECK  
 STATION 4 – M73/219 MACHINE GUN

## History of the Master Gunner Program - Cont.

STATION 5 – M85 MACHINE GUN  
 STATION 6 – TURRET POWER OPERATION  
           RANGE CARDS  
 STATION 7 – LOADING AND CLEARING M85  
           BORESIGHTING M85  
 STATION 8 – MISFIRE PROCEDURES  
           LASER SUBCALIBER EXERCISE  
 STATION 9 – RANGE FINDER OPERATION  
 STATION 10 – TANK GUN AMMUNITION

The pilot program will continue through June of 1975, with graduating classes scheduled for 7 March 1975, 11 April 1975, 16 May 1975 and 20 June 1975. Each course will be evaluated on an individual basis and lessons learned will be applied to subsequent courses. USAREUR will conduct an evaluation to determine the desirability of continuing the program. If the crew training concept is successful, it may have far reaching implications on the training methodology of the future.

*Armor Magazine, Jan-Feb 1975, Vol. LXXXIV, No. 1., pages 8-9.*

DEPARTMENT OF THE ARMY  
 HEADQUARTERS, FORT CARSON  
 AND  
 HEADQUARTERS, 4TH INFANTRY DIVISION (MECHANIZED)  
 OFFICE OF THE COMMANDING GENERAL  
 FORT CARSON, COLORADO 80913

AFZC-CG

JUL 7 1975

General Bernard W. Rogers  
 Commander  
 US Army Forces Command  
 Fort McPherson, Georgia 30330

Dear General Rogers:

I recently had the opportunity to observe a firing exercise using a graduate of the Pilot Master Gunners Course at Fort Knox. Using tanks with stabilized turrets and a "pick-up" crew, he was able to score first round hits on every target while firing on the move. It was an impressive demonstration of the effectiveness of both the stabilized turret and of the training received at the Armor School. I am using the two 4th Division NCO's who graduated from the Master Gunners Course to assist in training my tank crews. Already, their contribution to improving tank gunnery in the division has been significant.

I have requested from Fort Knox three spaces in the next scheduled Master Gunners Course. However, the feedback my staff has received indicates that there are no plans to conduct the course during the remainder of this year, and the future of the course is uncertain. Although the training is expensive, I feel that the benefits gained are well worth the resources used. I strongly recommend continued development of the program and scheduling of more courses as soon as practicable. My goal is to have a minimum of one Master Gunner in each of my tank battalions. The gain in the combat effectiveness of the division makes the Master Gunners Course a necessity rather than a luxury.

Sincerely,

John W. Vessey, Jr.  
 Major General, USA  
 Commanding

Commandant  
 US Armor School  
 Fort Knox, KY

CSM (R) Jim Benham was glad to see this letter as it was talking about him and another NCO, SFC Payne, that are mentioned. He had not seen this letter until I shared it with him recently. Jim said that he always knew that Gen Vessey supported the program but he was glad to see this letter. He said "That was me. We had just received a couple M60A1 AOS (Add on stab) tanks and the general wanted a demo. I threw together a crew and we fired the old TTVII to show how we could fire on the move. He was impressed."

**History of the Master Gunner Program - Cont.**

DEPARTMENT OF THE ARMY  
HEADQUARTERS JHMTED STATES ARMY FORCES COMMAND  
FORT MCPHERSON, GEORGIA 30330

AFOP—TA C3

21 July 1975

Dear Bill:

I recently received the inclosed letter from Jack Vessey indorsing the conduct of additional Master Gunner Courses at Fort Knox.

As you can note, Jack feels, and I agree, that the continued development of this program will do much to improve tank gunnery training within our units.

The good work being done by TRADOC is greatly appreciated.

Sincerely,

BERNARD W. ROGERS  
General, U. S. Army  
Commanding

General William E. DePuy  
Commander  
US Army Training and Doctrine Command  
Fort Monroe, Virginia 23651

HEADQUARTERS  
UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND  
OFFICE OF THE COMMANDING GENERAL  
FORT MONROE, VIRGINIA 23651

ATTNG-SC-C

5AUG 1975

Dear Bernie,

Thanks for your letter concerning the value of the Master Gunner Courses at Fort Knox. As you probably know, we only have resource approval to conduct the pilot classes. The DA concern, of course, is the high ammunition cost per student. Prior to continuation of the program, we must insure that our concept is cost effective and that we are giving our students the proper mix of training.

My initial impression of the worth of the program echoes Jack Vessey's thoughts and his letter will certainly be helpful in presenting our case to DA. In that regard, I hope to have sufficient evaluation data to support a recommendation to DA by late October or November, even though the last of the three pilot classes will not end until 18 December. If all goes well, Fort Knox should be able to begin the regular Master Gunner Courses in early CY 76, and our goal is to have one Master Gunner in each active tank battalion/cavalry squadron and each tank company/cavalry troop, starting at the battalion level first.

I certainly appreciate your personal interest in this program.

We must improve our tank gunner proficiency Army—wide, and I believe that we are on the right track with our Master Gunner concept.

Sincerely,

W. E. DePuy  
General, United States Army  
Commanding

General Bernard W. Rogers  
Commander  
US Army Forces Command  
Fort McPherson, GA 30330

## History of the Master Gunner Program - Cont.

While the Master Gunner Pilot program was beginning in February of 1975 the January-February issue of Armor Magazine had the first article about the program under the Forge the Thunderbolt section. (Which I used on pages 4, 5, & 6) In this same issue is an article about the M60A2 and I thought it important to share this article as there is a follow up article later in the year and some other articles that kind of relate to the Master Gunner Program and its development.

### **The M60A2 in Perspective: A Message to the Armor Community**

by Lieutenant Colonel Vernon E. Ebert

For a good number of years, the M60A2 concept and the tank itself have been examined, tested, retested, discussed and cussed. The latest (and last?) test of the tank has recently been completed and some 400 will be placed in our operational inventory in the near term. The time for hashing over the concept of this particular tank has ended. Likewise, the time has ended for speculations about its maintainability, "troop acceptance" and relative effectiveness. The time has arrived for accepting the M60A2 into our formations and applying ourselves toward its most effective and efficient utilization.

I write this message fresh from having commanded the first battalion of M60A2 tanks through their initial introduction into a TOE unit. This introduction consisted largely of a battalion size troop test of about six months duration (average 1,100 miles and about 100 rounds per tank) and a follow-on seven-week collection of materiel performance data (750 miles, 150 rounds per tank) of 24 tanks (including seven M60A1s). These tests resulted in a few fixes on the hardware and in the proposed training and logistic packages and the decision to move ahead with deployment to the field.

The essence of my message is that the M60A2 is a good tank and it can be maintained. The purpose of this is simply to spark some degree of enthusiasm for and confidence in the tank. The attitude toward the tank of those who find themselves in an A2 unit is of key importance in the success of that unit in effective maintenance and operations.

The same, of course, could be said of any piece of military hardware — for example, the M16 rifle — but the M60A2 is more sophisticated and complicated than any other tank and is therefore slightly more difficult to maintain and operate. A "good" M60A1 tank crew generally will have fewer maintenance problems and score higher in gunnery than a less motivated crew. The same "good" crew will likewise have fewer problems with the M60A2. The lesser crew may well bomb out completely in an A2. It requires slightly more detailed daily "care and cleaning" in order to remain fully effective in all of its unique systems; however, the time required for daily maintenance and operational checks need be no greater than that which should be taken on any tank.

To put it another way, positive motivation and quality of crew performance are far more important in keeping an A2 fully operational than in keeping an A1 fully operational.

### **DIAGNOSIS AND REPAIR**

With the greatly increased number of electrical components in the turret of the A2 you may expect an increased number of problems in that area, however, due to the duplication of controls and functions in these components the effect of this on operational readiness and, as important, on your trooper's attitude, need not be overwhelming or even too serious. The key here is quick, correct diagnosis of the malfunction and immediate availability of spare parts. Quick diagnosis depends upon experienced turret mechanics and maintenance supervisors who can rapidly execute the correct troubleshooting procedures. Schools can not fully provide this experience. Company or battalion mechanics (fresh out of school) will have gained the requisite experience only when the battalion has gone a good way into its initial gunnery session. (Lest this be a discouraging thought, have faith. The electrical/hydraulic challenge of the A2 turret brings out the very best in bright young turret mechanics. As problems repeat themselves and understanding of sub-systems increase, the turret becomes less of a monstrous enigma and more like a Model T Ford. With the assistance of more detailed flow diagrams and a more comprehensive fault isolation test set, both recommended as a result of the troop test, this aspect of maintenance should improve greatly.) The non-availability of some parts during our troop test became a major problem with respect to the attitude of the tankers toward the tank. If future units start their M60A2 program with the prescribed load list/ authorized stockage list (PLL/ASL) recommended by the troop test report, there should be no problem in this area. (The volume/cube of the recommended 70 plus lines of A2 peculiar parts and components will not greatly overtax the unit's storage and hauling capability. Also, there will most likely be a decrease in this recommended load as the result of some "fixes" being put on the system and perhaps more authorized local repair/DX. Presently, most of the sophisticated turret "boxes" must go to the depot level for repair.)

Most of the frequently higher failure rate will occur in components of the stabilization and fire control systems. A large number will be loose electrical connectors and other minor problems. As the tankers gain more experience and the quality control or shipment bugs get worked out, most of the minor problems will fade in significance, either because they have been repaired once or because correct diagnosis becomes the rule on recurring problems and quick repair is possible — again, an adequate PLL/ASL is an absolute must. Because the tank is slightly more difficult to maintain than the A1, crew daily maintenance checks in the turret and Closed Breech Scavenging System (CBSS) must be more carefully and consistently made than the average tanker is prone to do. Basically, though, the tank is a good one, considering its sophistication, and can be maintained — commanders must not let the progress of the necessary learning curve prematurely discourage their tankers and mechanics.

On the automotive and commo side, basically the same problem will arise as with the A1. The CBSS will present some minor leaks but these can usually be repaired quickly — often by the experienced crew. We had a slightly greater problem (than with the



## History of the Master Gunner Program - Cont.

A1) on voltage regulator and/or generator failure — but all of the tanks going to Germany will have an improved regulator (solid state) which should obviate the problem. Eventually most all M60 series tanks will have an improved regulator and generator.

### GUNNERY

In gunnery, two of the most important actions are careful, “by the book” aligning of the laser and boresighting the coax machine gun. We also had a major problem with the laser mounting bolts which periodically worked loose and dropped the laser out of alignment. New type bolts which should solve the problem are being tried in the 1/67 Armor at Fort Hood.

As with the hang out of battery problems experienced by some of the early units, careful test and correction procedures applied prior to shipment of the tanks should prevent the recurrence of these problems. This problem should not appear in future issues due to careful test and correction procedures being applied prior to shipment.

We experienced feeding problems with the coax and cupola mounted .50 caliber, which the experts were working on at the time of this writing. Careful and “by the book” coax mounting and feed mechanism adjustment is imperative. One major plus in this area is the fact that the M85 is fully and easily accessible from a buttoned up cupola and is fully powered and stabilized—a true pleasure to fire.

In training for stabilized gunnery, the loader and driver must be given more attention and drill. The gunner (as with the M551) should have ample practice with the M41-M42 conduct of fire trainer. Though the “new” turret and fire control configuration may initially scare the ex-M60A1 crewman, because of its seemingly over-complication, this feeling disappears with crew drills and firing. Except for loading, it is easier and quicker to get off a well aimed round with the A2 than with the A1. Motivated and knowledgeable crews will outshoot most of the M60A1 crews and will even show well, in comparison, when firing on the move over smooth terrain. The tremendous potential combat effectiveness of stabilized gunnery, with this tank, has yet to be fully exploited and, therefore, appreciated. The system is highly accurate — it remains to the crew (as always) to put it all together. (As a side note, the high firing crew in the 1/61, during the troop test qualification firing, consisted of an RA Transportation Corps second lieutenant, two truck drivers recently retrained as gunner and loader and one 1 IE10 as driver.)

### TACTICAL EMPLOYMENT

Special platoon fire distribution techniques have been developed for M60A2 platoons, and are outlined in TC 17-15-5, M60A2 Tank Unit Employment. The missile is deadly accurate and highly reliable (compared to the M551 system). The main gun (conventional round) is quite accurate out to a good distance — given a good zero and an experienced crew.

In task organizing, think first and foremost that you have a tank and not some narrowly useful, special, antitank weapon. Use Mission, Enemy, Terrain and Weather/Troops available, and if you expect long-range target acquisition and want to engage as early as possible, then put the A2s wherever they can do the job with their missiles. On the other hand, the capability to shoot on the move (machine guns and conventional 152mm) should not be forgotten. This capability suits the A2 to an offensive role in either a fast moving, attacking force or employed on a “final dash” into some enemy position or objective area. Simply put, just keep in mind the unique characteristics of the tank and that it is still a tank and not solely an antitank or infantry support weapon.

After having read this far, a present or potential A2 unit commander may have detected a challenge. It is that. He may wonder what people-resources he has or can expect to have to help him meet the challenge. Probably, the answer to that question is: the same numbers and quality of tankers that he has now or has known in the past. Hopefully, he will have a better cut on the quality of turret mechanics that he receives or sends to A2 turret school — but then he has usually needed at least more good turret mechanics than he had assigned to take care of his M60A1s. Also, he would no doubt have liked to have had a higher percentage of truly professional tankers in his A Is. The point is this: we must strive to upgrade the professionalism of all of our tankers and maintenance personnel regardless of what kind of tank they are working with. A professional tanker has very detailed technical understanding of the subsystems within his tank, appreciates and takes loving care of these subsystems and has the confident ability to outshoot anybody around.

The introduction of the M60A2 and, before long, the M60A3, simply accent the imperative to improve our professionalism. Some Army-wide personnel management changes might be made to help with this process, but the motivation to excel remains always in the hands of the platoon leaders, and company and battalion commanders, in that order of importance.

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*Armor Magazine, January-February, 1975, Vol LXXXIV, No. 1, pages 23-25.*

The Master Gunner Pilot was still going when the following article appears in *Armor Magazine*. It is a follow up of sorts to this article. It comes in the May-June issue of *Armor Magazine*. It is again talking about the M60A2 and the issues/problems with the tank, the crews, and solutions to issues being seen in the field.

### The Care and Feeding of the Modern Turret

By MAJ John B. Hubard

A revolution has occurred in our W tanks over the past decade. The older, simpler M48/ M60 series firecontrol systems are becoming antiquated. Newer, more sophisticated electronic marvels are taking their place: laser rangefinders (on the M60A2, and soon to be on the M551 AR/AAVs), solid state computers (M60A2), stabilization systems (M60A1, M60A2 and M551), guidance and control systems (M60A2 and M551), and even automatic laying devices (M60A2).

“Tis a shame,” say the old-timers as they remember the Battle of Range 42 with the M48s. The young, who cannot remember those days of yore, wonder how marvelous it must have been to have had all of a unit’s tanks operating for a Tank Crew Qualification Course. The revolution has taken years to land the marvels of electronic technology into our tank turrets, but the situation is not well in hand.

The introduction of electronic fire control componentry has created an untenable maintenance situation for the US Army. The purpose of this article is to identify the nature of this indefensible maintenance situation; and to offer some suggestions on how to correct it before we find ourselves operationally deadlined on the day the proverbial balloon goes up. Lest this last statement be misunderstood, it is not the purpose of this article to bemoan the arrival of electronic componentry in our turrets. The older, mechanical systems have finite limits to their improvement potential; and, to keep ahead in the tank gunnery race, we have no other choice than to exploit this technology with which our TV repairman has long been familiar. Rather, it is my feeling that the nature of an electronic system is so different from a mechanical system (upon which our present turret maintenance system is based), that a totally different approach must be taken. What is the problem?

The problem is that the present turret maintenance system (in terms of organization, skills, and number/ types of test sets) will not be able to support the electronic turrets in combat. As Lieutenant Colonel Ebert suggests in his article “*The M60A2 in Perspective*” (*ARMOR, January/February 1975*) the repair of these type turrets can be extremely difficult under the best of conditions in peace. In view of the accelerated training periods and limited “hands-on” experience characteristic of a mobilization (however limited), it is doubtful if this success can be achieved in combat. Let us now review why this situation exists.

In contrast to the mechanical systems of the older M48 and M60/M60A1 series turrets, a malfunctioning electrical component has no tell-tale sign to aid in locating the malfunction: no dripping oil, clunking gears, or whatever. Frequently, the first indication that an electrical component is faulty is the sudden realization by the crew that the computer or the rangefinder no longer works. A broken wire in a cable could be the culprit, yet to the ear and to the naked eye, nothing seems amiss. The person expected to locate and correct this malfunction is the company turret mechanic, an individual who is seldom more than an E-4 and who might have just arrived from CONUS. It is of interest to note, that as a guide for the designers the typical Army turret mechanic should not be expected to be able to read above a ninth-grade level. How then is this man expected to keep operating something as complicated as an M60A2 turret?

This problem has not been totally unanticipated. Early in the conceptual stages, the engineers decided to incorporate the modular replacement concept in the designs of the new fire control components. The various subsystems of a given computer, for example, were to be isolated into a series of “black boxes.” Test sets were to be designed which permitted easy identification of a malfunctioning black box. Hopefully, the organizational turret mechanic could identify and replace the malfunctioning black box (with repair of the box at a higher level of maintenance), thus quickly restoring the tank to an operational status. The idea was and is sound, but for a variety of reasons the turret mechanics of the mid-to-late 1960s had difficulty applying the procedure. By 1972, the alarmingly low operational availability of the M551 turret (the only “black box” vehicle in the inventory at that time) gave testimony to the fact that other measures were necessary. By 1973 the turret mechanic’s MOS structure had been revised and the Armor School was rapidly setting up turret mechanic’s schools for three MOSs: 45N for M48/M60 series turrets, 45P for M551 turrets, and 45R for the new M60A2 which was coming off the production line. The older 45K MOS was assigned to direct and general support level maintenance units, and the training was transferred to the Ordnance School at Aberdeen Proving Grounds. Therefore, we now find four MOSs repairing our turrets where only one existed before. Has this plan solved our problem?

Evidence collected during the tests of the M60A1E3, the M60A2 and the various “add-on” items for the M60A1 and M551 tanks, indicate that the problem has not been solved. Several considerations appear to have been forgotten:

- A psychological barrier exists for the mechanic about to repair an electronic system. As explained earlier in the article, the mechanic cannot “see” what he is dealing with. There are no oil leaks, bent or broken parts. In contrast, most young Americans learn at an early age how to repair purely mechanical systems. We change spark plugs, engine oil, or replace broken bicycle chains, but how many of us, as a youngster, ever repaired the electrical wiring in our house? Or repaired the television set? This lack of basic contact with electronics means that the turret mechanic does not normally have that innate understanding it takes to reason beyond the simple troubleshooting steps found in the technical manual (if he uses it).

- The troubleshooting steps found in most technical manuals are designed to isolate the malfunctioning component. What is the turret mechanic to do when a series of components malfunction and have overlapping symptoms? Under these conditions, considerable experience and the innate understanding described above is needed.

## History of the Master Gunner Program - Cont.

- Rarely is the organizational maintenance sergeant experienced in tank turret repair. This is a two-edged sword, for the maintenance supervisor can neither assist the new turret mechanic, nor can he properly supervise him. Tales of successful “dead beating” abound among turret mechanics. Even more because the motor sergeant is essentially an automotive mechanic.
- The test sets are not available to the turret mechanic when they are needed. Reasons are varied: the sets require calibration too frequently and the turn-around time is too great; the sets are easily damaged and repair or replacement takes months; the sets are locked up by the motor sergeant for “protection”; the sets are used so seldom that the turret mechanic loses his proficiency with them.
- Some test sets are not capable of diagnosing certain malfunctions. A series of turret oscillation problems were experienced during the summer of 1973 on an M60A1 /AOS tank at Fort Knox. The several stabilization test sets used reflected a perfectly functioning system each time, yet the turret continued to oscillate. After several days of puzzlement, the fault was discovered at the direct support level to be simply loose cables—something easily corrected by a company turret mechanic, if he could have isolated it. In another episode, a laser rangefinder test set was found to give different readings as it warmed up (which took about an hour). One wonders what effect a desert sun would have had on such a test set calibrated during a Detroit winter.
- Maintenance Allocation Charts (found in organizational level technical manuals) frequently allocate relatively minor repairs to direct support. How many engineers realize that this simple test allocation can result in a one- or two-week “down time” for a tank because the direct support unit is 20 miles to the rear, or too busy to get to it right away?
- Technical manuals are seldom used at the organizational level. Except for repair parts identification, it appears to be unethical for many mechanics (turret mechanics included) to read the appropriate repair instructions prior to starting work. Unfortunately, electrical circuitry must be troubleshot precisely as spelled out in the appropriate troubleshooting steps. To do otherwise could mean the malfunctioning component could be completely overlooked, or that damage to subcircuits would result. However, in view of the number of changes certain turret manuals have had (the M551 turret manual has had 11 changes since 1972), there is little wonder that some units might consider them worthless.
- MOS substitutions create untold havoc with a unit’s maintenance program. How many tank battalions today have turret mechanics assigned who have been trained on a tank the battalion does not have? Since tank turrets can be radically different, the substitution of an MOS 45R for a 45N is simply not possible. “But in a ‘good unit’, these things do not happen!” Right? Unfortunately, they do, but only to a lesser degree or in a slightly different form than in the better units. The author recently encountered a platoon leader who had established as a platoon SOP the policy of not turning on the stabilization system in his tanks. He felt he could never get the stabilization system repaired if it ever malfunctioned. Incredible! The solution to this problem will not be an easy one. The first difficulty, that of identifying the problem, hopefully has been accomplished by this article. The second difficulty, that of correction, will involve everyone in the Armor community whether they are an engineer, a tank commander or an instructor in the Armor School. As a possible first step on this thousand mile journey, the following solutions are offered:
  - Maintenance sergeants (MOS 63C) need instruction on turret maintenance so they can assist and better supervise their turret mechanics. Since most of these individuals are in grades E-6 and E-7, such training would be imperative for any unit issued the tanks.
  - The existing organizational turret mechanic’s courses should include one to two weeks of electrical theory as applicable to the tank turrets. Cross-training should be increased in order to partially offset assignment blunders.
  - Organizational turret repair manuals should include a chapter on how the turret and the turret components work. Rarely does a newly-trained turret mechanic keep notes from his schooling, yet eventually he needs to refer to something to help him figure out a problem not listed on the troubleshooting charts.
  - Extra test sets should be issued at tank battalion/cavalry squadron level to replace those test sets turned in for calibration or repair.
  - The rank of the turret mechanic should be raised to E-6 even at company level to encourage personnel to stay in the MOS as a career. Hopefully, hard-earned turret repair experience would not be lost from the maneuver battalion to DS/ GS units or to civilian life.
  - The creation of a separate turret maintenance section at battalion (organizational) level, such as now exists in missile battalions. This turret maintenance section would be led by an E-7 (MOS 45K), and would control the extra test sets mentioned above, as well as have on hand some test equipment presently found at DS-level. Three turret maintenance teams, each led by an E-5 (MOS 45K), would be assigned to the section and would provide backup support for the company turret mechanics. Some may say that the suggestions mentioned above are preposterous, yet there are unit commanders facing electronic turrets now, and many more who will face them in the future. All will marvel at the incredible performance of the tanks when the turrets function properly, but will soon learn to dread the day when something goes wrong. Turret maintenance problems of a vastly different nature are upon us, and a failure to take corrective action soon will result in tank units that can move — but not shoot. Such a tragedy.

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*Armor Magazine, May-June, 1975, Vol LXXXIV, No. 3, pages 23-25.*

## History of the Master Gunner Program - Cont.

There are two articles in the September-October issue of *Armor Magazine* I will share.

### **Tank Gunnery Under Fire**

by Lieutenant Colonel Charles E. Honoré

In 1962, I was the commander of an armor company in the 3d “Marne” Infantry Division. Looking back, I can still vividly recall one of my tank commanders cradling his machinegun in his arms and asking it why it had failed to fire during that crucial time in his career. He was crying. I was no less upset because I was “betting my commission” that his crew and the others to follow would qualify.

Nineteen hundred seventy three found me back in the “Marne” Division. Now, I was the commander of an armor battalion. My battalion participated in two qualification gunnery periods. The first, in June and July of 1974, appeared to be much like my first experience 12 years earlier. However, when my unit joined the other battalions of the 64th Armor Regiment at Grafenwoehr in January and February of 1975, we were no longer “betting our commissions.” We were the first units in USAREUR to fire the revised Table VIII (Range 80) for qualification. Therein lies the purpose of this article; to report my observations of the changes that occurred in tank gunnery conducted by the 7th Army Training Center and the “Marne” Division.

A Table VIII range should enhance and accomplish crew proficiency. That is, teach the crew to shoot fast and accurately. Realism, in terms of duplicating a battlefield environment, is necessary, but not at the price of detracting from crew gunnery. Certainly, tank crews should ultimately be able to function offensively and defensively using sound tactical formations with gunnery techniques integrated before they are fully capable of accomplishing their mission. However, the Table VIII range, specifically Range 80, Grafenwoehr, should not be bastardized to the point where we are mixing gunnery with tactics so as not to fully accomplish either objective during the short time we are on the range.

We were the first unit in USAREUR to test the improved Range 80 at Grafenwoehr during qualification firing with both three- and four-man crews. For the first time, we used battlesight engagements, fired long-range engagement, fired the training-practice-discarding-sabot (TPDS-T) round, and exercised the option of firing one- or two-round engagements. These and other improvements, such as defilade positions and realistic targets, provided the tank crews with much better training than had been previously experienced. However, care must be taken to insure that too many innovations are not made in tank ranges, and that our purpose for being there — training — is not compromised. The following will point out what was good tank training and what wasn't, and what impacted on tank gunnery one way or the other from the viewpoint of an ex-battalion commander.

### **Range Scheduling and Operation**

Much has been said about decentralization of range operation, that is, to let the battalion commander run all ranges, including Table VIII. The “Marne” Division decided that since the changes in the range configuration would still be taking place upon our arrival and since the complications inherent in setting up a qualification course for the tanks with add-on-stabilization (AOS) would be an additional problem, the qualification range (Table VIII) would be run by a division range packet. Firing battalions would run all other ranges. Training was emphasized and crews failing to attain a combat-ready rating on their initial run would be permitted to renegotiate the course, providing range time and ammunition were available. This is the way it should be; a tank battalion should not be required to set up and operate the final qualification course; it doesn't have the assets to do it right, considering that when the first company arrives on Table VIII, there are other companies firing Table VII and possibly Table VI. To ask a tank battalion to operate Table VI, VII, and VIII at the same time is asking too much and detracts from the type of training that can be accomplished. Table VII should be run by a battalion team to free the company officers to train their crews and work with their platoons, instead of sitting in a tower most of the time. So giving the battalion commander a mission-type order to do his gunnery is asking him to do more than is reasonable to expect.

January is not an optimum month for gunnery. The days are short and the nights are too prone to fogging in quite early. Given his individual range schedule, the battalion commander spends 3 weeks fighting to get on a range ahead of his assigned date and fighting equally as hard to stay on that range for “just one more day” because he has spent the last 3 nights on “fog watch.” If the organization breaks down for 1 day, or the moving target falls off the tracks, or the weather is unfavorable; the end result is rushed, poor training and dog-tired crews who are not getting anything out of the little training they are receiving. The point to be made is that scheduling of ranges and tables is too often based on the optimum. Additional range time must be allocated to the battalions, to compensate for the unexpected.

It is conceivable that a company could spend 3 days on the Table IV zero complex getting a sure zero on all weapons and then move directly to Table VII for 7 days of concentrated gunnery/crew training. Conceivable, but not practical. However, Tables IV-VI could be considerably shortened and revised to give the unit the extra time desired on VII. There is no sense in four stationary “runs” on Table IV. Once a zero is established, all that is really needed is one run to verify. Spending 2 days and nights shooting at stationary white sheets is a waste of time and ammunition. However, the concept of Table IV could be changed to make it more worthwhile.

Table V does have a great bearing on a crew's performance on Table VIII, and is good gunnery training. If the train does not fall off the tracks too often, or the two far berms do not fog in too early, the table is not a great time consumer. We should retain it. If we

## History of the Master Gunner Program - Cont.

ever have to go to war, most of our targets will be moving anyway.

Table VI provides an excellent test firing of the machineguns. We fired one run on Table VI wearing protective masks. This is an opportune time to test the gas particulate units, find out how many you have, if they are operative and if the crews can function wearing protective masks.

We should save as many days and as much ammunition as possible on Tables IV-VI and use them on Tables VII and VIII. Use every minute of time available, but aim for the maximum amount of effective training in that minute. Rotate the crews during the day and night periods so they get a chance to sleep — and not just on the floor of the turret waiting to go downrange. Instead of 2 day runs on Table VII, make it 3 or hopefully 4 runs. This is the range where the most meaningful training is conducted.

### The New Scoring System

For a new scoring system, there were surprisingly few problems. It is still in the process of evolution, but in its raw form, it is still superior to the old system. In the past, the opening times were far too lenient, and if viewed as training for combat, the latest experience from the field has proven that speed is one of the keys to survival. The crews were required to beat the clock as well as the target, and those who could accomplish the latter and not the former failed to qualify. In view of this, we altered the scoring of Tables IV-VI. The old scoring system was scrapped because it was tied to the old qualification system, and a new method, using a sliding scale adjusted separately to each table, was devised. The objective was to obtain both speed and accuracy, and to begin instilling the need for “quick kill” into the crews as soon as possible. The system itself resulted in far lower scores on the lower tables than would have been obtained under the old system, but it was more consistent with Table VIII and better prepared the crews for it. Besides, scoring on the lower tables means little, it’s the training that counts.

Another new feature, under the revised system, was the TARGET CEASE FIRE and bonus points for achieving a first-round hit and bringing the second round back to the start line. The tank commanders were briefed to fire the first round as soon as possible (ASAP), but then not to fire the second round if the first round looked as if it was a hit. It was drilled into them on Table VII and it looked good until the qualification run and the “Range-80 Jitters” took their toll. It is difficult to sense a target hit through the smoke and blast, especially with HEAT and, when this difficulty was added to the pressures of qualification, the results were not always good. However, this system should be retained because it is realistic and requires the tank commander to make a decision he might well have to make while engaging multiple targets in combat.

Before the last tank in the division had crossed the start line, the hue and cry could be heard everywhere. *“The course is too hard!” “The qualifying percentage is set too high!”*

A representative sampling of scores from June was compared to the sliding point scale used in January and, although the points needed to qualify now equaled the same percentage as a distinguished score in the past, there are more points available. The two systems actually compared very closely when using the same score sheet. The key to qualifying still remains a good first-round time and a firstround hit — which is also the key to survival on the battlefield.

### Battlesight Engagements

For the first time, we fired battlesight engagements. In the past, battlesight gunnery was something that was always included in the tactical SOP’s, but never practiced. We should retain this system of firing because it is an integral part of combat gunnery, and the high percentage of hits attained shows that it does work, but not the way TC 17-12-3 describes. The new “doctrine” calls for aiming at the base of the target where it appears to touch the ground, and if the first round does not hit, it will be short and easily adjusted. However, when the target is slightly above the firing tank — as on Range 80 at Grafenwoehr — firing low will consistently end in a round in the dirt. The aiming point that met with the most success was on the front slope, just below the turret ring.

### SABOT Gunnery: The Invisible Round

SABOT gunnery was badly needed, and should definitely be included in all future qualification courses. Only a very few gunners in the battalion had previously fired the round, and this is the round that is billed as the main tank killer on the battlefield. The immediate problem was how to properly engage a moving target with the round and hit it. The round was too fast to be sensed from the turret; by the time the blast and smoke had dissipated, the round had long since hit or missed the target. The gunners had to train sufficiently with SABOT to know exactly where to place the crosshairs for a target hit, but there was only a small amount of ammunition to train with.

First, a basic assumption had to be made. Due to the velocity and accuracy of the round, if the crosshairs were placed on the same spot on the target and two rounds were fired, they should both impact in the same area. Since it was impossible to sense the round, the decision was made to train for a first-round hit and under no circumstances fire a second round. It was to be a one shot, hit-or-miss proposition.

The second problem was where to put the aiming point and with what battlesight range setting? There was no data to draw on, and no ammunition to experiment with. The third obstacle was the gunner. He had a total of four rounds to fire prior to qualification, had to have a firm sight picture in his mind and know where the round would hit.

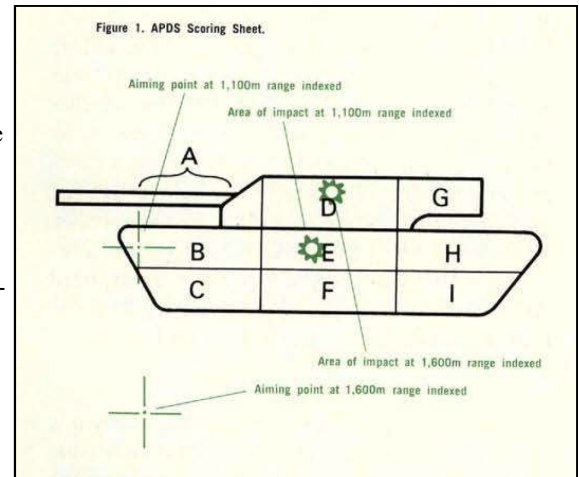
These problems were resolved using the training aid shown in Figure 1.

## History of the Master Gunner Program - Cont.

On Table VII, both the tank crew evaluator (TCE) on the tank and the scoring personnel in the bunker had a copy of the diagram. The gunner would fire one — and only one — round of SABOT per run

When he returned for the debriefing, he would point out to the TCE where he placed his crosshairs on the moving target, and the bunker personnel would call back the target hit using the letter designator of the area. When both were recorded on the diagram, the gunner knew exactly where the round was striking. By entering the range setting at the bottom and retaining copies of the diagram, it was evident by the end of the first day that the setting recommended in TC 17-12-3 would not work. With the suggested range of 1,600 meters indexed and firing at a moving target only 1,000-1,100 meters away, the aiming point had to be ahead of the target and well into the dirt. Even with such a drastic shift, the rounds were still impacting high; most of them directly on the turret. This was unacceptable for two reasons. First, the gunner was not actually leading the tank, but rather placing his crosshairs on the ground in abstract relation to the tank. Second, with target hits in the turret, the larger percentage of the target — the hull — was not being touched and to bring the aiming point down far enough to get hull hits placed it too far off the target for a consistent lead.

It was at this point, after controlled experimentation, that the battlesight range index was dropped down to 1,100 meters. With this range the gunner could apply more correct target-lead techniques and the rounds would impact in the hull, giving a better percentage of target hits due to increased target area. Using the technique described earlier, each gunner then found the aiming point that was best for him and his tank. The results achieved on Table VIII justified the procedures. Figure 1 depicts the aiming points and impact areas that resulted from the experiment.



### The 1,800-Meter Target and Improper Ranging

There was much talk of the extended ranges of the precision engagement on Table VIII and how they provided better training, that is true; however, the crews did not get enough practice at shooting at long-range targets on the lower tables. If the qualification range is to include targets out to 1,800 meters and beyond, then the earlier tables, in particular Table VII, **must** include longer range targets. A far-off target requires both a precision lay and even more precise ranging. At 1,200 meters, neither has to be perfect in order to get a hit, and when the crew fires out to 1,800 meters on Table VIII and uses the same essentially sloppy techniques that had worked so well over the past 3 weeks at lesser ranges, the result is a miss. One would not dream of sending a basic trainee out to the M-16 qualification range with 300-meter targets without spending numerous days beforehand practicing at that range. The same should be true for the tank.

Ranging by the tank commander was especially critical. It is imperative that home-station training include a surveyed ranging course with exact ranges to targets from multiple firing points. Good ranging is an exacting science that requires a great deal of repetition to perfect. Old tankers say that after the images come together, add a half twist, or add 100 meters etc. — and they are not wrong. Across the board, the HEP and tank commander engagements were continuously SHORT LINE.

### The Death of the Crew Cut List

This year, unlike others, the crew cut list was reduced from volumes to less than a dozen items. The rationale given was that it did not really matter what the crew did inside the turret, or what their methods were, as long as their methods worked and they could destroy the target. The old crew cut system was a pain primarily because of the nit-picky way it was carried out, but there is still a very real place for crew cut-scoring in a crew qualification. There must be a set standard applicable to all crews within a unit, so a man could get out of his tank and into another and begin functioning immediately. Crew cuts are not a hassle. They are a way of enforcing the proper methods of gunnery and crew drill, and if you find a crew that consistently commits crew errors, whether they are scored or not, you will usually find a crew that is disorganized and prone to confusion, and that habitually has slower opening times. When a crew cut is not enforced, it is difficult to convince the tankers that their own brand of shortcut is not the better way.

### The Three-and-One-Half-Man Crew

To train as many tank commander-gunner combinations as possible, and to exercise as much equipment as possible, without putting cooks and mechanics in the turrets, the “Marne” Division concept was to rotate drivers or loaders, allowing one crewman to function in two tank crews as long as both crews were in the same platoon. This was done to allow the nontankers, i.e., cooks and mechanics, to continue to function in their intended roles as they would do in the event of mobilization, and to train crews that could accept the fourth man upon mobilization. This system worked remarkably well and should be considered by all units that are manned below their required strength.

### The Three-Man Crew

When tasked by the division commander to fire one company of three-man crews to determine how much less effective they are than four-man crews, we attacked the problem with enthusiasm and curiosity. If we were to train three-man crews (with a substitute



## History of the Master Gunner Program - Cont.

fourth man) capable of accepting the fourth man upon mobilization, then it is only logical that we should have some idea of what to expect of the three men in combat until the fourth man arrives. We tested the three-man crews by comparing their performance to that of the four-man crew companies. If performance on Table VIII (Range 80, Grafenwoehr) is a true indicator of combat effectiveness, then the three-man crews would be much more effective than we, most tankers, had expected.

Their overall scores were in the top 50 percent of all the qualifying crew scores in the division, but, as expected, the areas in which they were inferior were important to survival in combat. By eliminating the gunner and the necessity for tank commander/gunner teamwork, the critical factor then becomes the development of the TC's skill in manipulating the tank commander's override. The three-man crews had slightly fewer first-round hits, less success on adjusting after a first-round miss, and were a little slower in getting off the first round in daytime. In three-man crew gunnery, the tank commander must develop in himself the skills normally shared by the TC and gunner; in combat, the TC would have to accomplish this under extremely difficult conditions. If Table VIII is a test of crew gunnery skills, and we think it is, then by hours of practice the TC can equip himself to do well on Table VIII, but whether or not he would do as well in combat cannot be tested. It is apparent that TC's of three-man crews are not capable of engaging multiple targets or acquiring single targets as well as four-man crews. Nevertheless, the performance of three-man crews on Table VIII was so much better than we expected that further study on the use and training of threeman crews certainly appears to be feasible.

### Summary

What has recently happened in tank gunnery is a giant step in the right direction. Obviously what has been written and said in recent times about the necessity of revising our thinking on tank gunnery has achieved some success. We have much more to do. For example, Table IX and Table X for section and platoon battle runs will be most welcomed to get us started working on distribution-of-fire problems. Engagement of multiple targets should continue to be explored.

Whatever the final arrangement for gunnery turns out to be, it should be developed with training in the forefront. Let us never go back to those days when you were "betting your commission" on how many tanks you could qualify.

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*Armor Magazine, September-October, 1975, Vol LXXXIV, No. 5, pages 19-23.*

In the same Sep-Oct issue was an interesting bit on the M60A1 gunnery in the Forge the Thunderbolt section of Armor Magazine.

### M-60A1 GUNNERY TIPS

The M-60A1 is one of the finest tanks in the world today. *It can outshoot any tank in existence* — if its crew understands the basic fundamentals of the *M-60A1* fire control system and ballistic characteristics of the rounds it can fire. Below are some of the more frequent problems encountered in *M-60A1* gunnery and ways of overcoming them.

#### Frequent Short Rounds

Ranging error by the tank commander is the most common cause of short rounds. Test the tank commander's (TC's) ability to range on targets which have a known tank-to-target range. If the TC is ranging short, have him place the rangefinder into operation again to insure there are no mechanical problems with the rangefinder; then have him practice until he can range to within 30 meters of the measured tank-to-target range.

Improper use of the RANGE CORRECTION KNOB is a frequent reason for constant short rounds beyond the zeroing range. The RANGE CORRECTION KNOB compensates for gun tube wear by placing a small constant percentage of superelevation in the fire control system prior to firing. For example, let's say a gun tube has 200 equivalent full charge (EFC) rounds remaining, and the RANGE CORRECTION KNOB is on 0. The gun can be zeroed using the elevation boresight knob to compensate for lower muzzle velocity caused by the worn tube, but this will not compensate for the lower muzzle velocity at ranges beyond zero — as the operator's manual (-10 TM) tells you. The *proper* procedure is to index 2 on the RANGE CORRECTION KNOB while boresighting prior to zeroing. This will add a constant 2 percent of superelevation into the system, and with this additional 2 percent to compensate for gun tube wear, the round will now fly to the range indexed into the fire control system.

#### HEP Gunnery

HEP ammunition has long been cursed as inaccurate, erratic, and worthless against point targets. This can be overcome. Due to its low velocity (2,400 fps), the round drifts to the right and has a large angle of fall. The HEP reticle in the M-105D telescope was originally designed for M-393 HEP ammunition, but the majority of our present ammunition is M-393A2. While there are differences in the ballistic characteristics of these rounds, the telescope can still be used with a high degree of success by doing the following: *Zero the telescope by firing HEP, not HEAT or APDS.* The telescope compensates for drift, the M-32 periscope reticle does not. *Remember*, this will provide for great accuracy when firing HEP, but will destroy the APDS zero on the telescope, which is used as a secondary sight for APDS firing. To compensate for this, zero the M-32 with APDS (or, in training, TPDS-T), refer the telescope reticle to the zero sight picture, and record the elevation and deflection boresight knob settings; return to the M-32 and fire one HEP

## History of the Master Gunner Program - Cont.

round to find the HEP sight picture (this is important because the M-32 will be used on HEP targets at ranges less than 1,200 meters or greater than 3,200 meters); fire a zero exercise on the telescope with HEP. If HEAT or APDS must be fired from the telescope as a backup sight, the gunner can fire accurately by indexing the pre-recorded zero. (CAUTION: The present gunnery tables and CTA's do not provide HEP ammunition for zeroing the telescope. This ammunition will have to be drawn from the allowances for HEP engagements from other tables.)

*Use the telescope on all HEP engagements from scope is only graduated to 3,200 meters.* At less than 1,200 meters, the M-32 can be used with no aimoff and great accuracy. Beyond 3,200 meters, it must be used because the telescope is only graduated to 3,200 meters.

*Select the correct sight for long-range HEP gunnery.* When using the M-105 telescope and firing M-393A2 beyond 2,000 meters, aim slightly above center of mass to compensate for the difference between superelevation requirements of the M-393 HEP reticle and M-393A2 ammunition. The same applies when using the M-32 to fire M-393A2 ammunition if the HEP cam in the computer is for M-393. Between 3,200 meters and 3,900 meters, use the M-32 with a constant 5-mil left aimoff to compensate for drift and parallax.

*Compensate for effects of wind.* The HEP round is much more susceptible to wind speed and direction than APDS. Remember this and compensate for it. A good rule is to add 1 mil of aimoff into the wind for each 1,000 meters of range and each 10 miles per hour of wind. Example: With the wind from left to right at 20 m.p.h. and the target at 2,000 meters — use telescope aimoff of left 4 mils.

### Long-Range Gunnery

Aim slightly to the left to compensate for deflection parallax at long ranges (beyond 2,400 meters) when > firing HEAT, APDS, or HEP. After zeroing at 1,200 meters, when you place the M-32 periscope reticle on an aiming point at 2,400 meters, the gun is actually pointing 22.06 inches to the right of the aiming point. Therefore, a good rule of thumb is to apply 1-mil left aimoff at all targets beyond 2,400 meters when firing HEAT or APDS. Additionally, wind will cause significant drift in HEAT. Apply an additional ½ -mil aimoff per 1,000 meters range and wind speed of 10 m.p.h. Example: With the wind right to left at 20 m.p.h. and the target at 3,000 meters — use 1-mil left aimoff for parallax and 3-mils right aimoff for wind which equals 2-mils right aimoff.

### Turret Problems

For good gunnery, a dedicated turret mechanic is essential. Prior to firing, the turret mechanic and crew should perform a complete synchronization check, and complete a technical inspection of the sighting and fire control equipment. Once the turret is put into shape, the crew must keep it that way! In this regard, neither the rangefinder linkage nor the main gun tube were meant to be a chinning bar for the gunner or a handle for mounting or dismounting the tank!

*The M-60A1 is a fine tank and it can achieve rapid target hits if the equipment works and the crew operates it the way it was meant to be operated. Crew training and functional fire control are the keys to effective shooting.*

*Armor Magazine, September-October, 1975, Vol LXXXIV, No. 5, under Forging the Thunderbolt, pages 11-12.*

Next month we close out this history of the Master Gunner Program. 1976 was the year of the official First Glass of Master Gunners.

Before we close this part of the history I want to share some thoughts. As you can see from the history and the articles there was a lot going on from 1973-1976 in the Armor community. During this time MG Donn Starry was writing articles in Armor Magazine looking at the next war. All the while behind the scenes he was orchestrating the overall improvements needed based off the After Action Reports of the 1973 Arab-Israeli War.

The thing I find interesting is the very things that I always knew when I served. Knowledge is power. Knowing the FMs, TMs, and doctrine is the best value of anything. Knowing your equipment is the key to keeping it running. We have seen that the maintenance issue seems to be a key factor in the improvement of the gunnery programs.

One of the things I always said was After Action Reports drive future operations. This I learned from reading books on Delta Force. From studying the Army Rangers I learned that you must master the basics. Knowing the fundamentals is worth so much.

And the famous quote from Skidgel Hall, "Don't Overlook This Fact! The knowledge you gain here is not *EXCLUSIVELY* yours but rather it is given to you to *TAKE and IMPART* to others, in your present and future organizations."

## Guerrilla Submarines by Edward Disette

Guerrilla Submarines  
by Edward Disette & H. C. Adamson (Helen Lyon Adamson)

ISBN13: 9780345253255  
ISBN10: 0345253256  
ISBN: 9780345253255  
Publisher: BALLANTINE BOOKS  
Copyright 1972.  
236 pages  
13 photos

Here, for the first time is the full, astounding story of how a small group of daring American submariners supported the free Filipino guerrilla forces in their epic struggle with their Japanese oppressors in World War II. At the time it was a closely-held secret, but now it can be told. How, at the risk of their lives, US submariners kept the guerrilla supplied with arms, ammunition, medical supplies and other things necessary to the war and their morale.

Author

My Review

The first book I read on the guerilla fighting in the Philippines was the story of Col Ramsey who was with the Cavalry. The other book was about Col Volkman. Two very different stories about something I have never really hear much about growing up. I didn't really see any movies that covered the story of the guerilla fight. Two books that I highly recommend if you haven't read them.

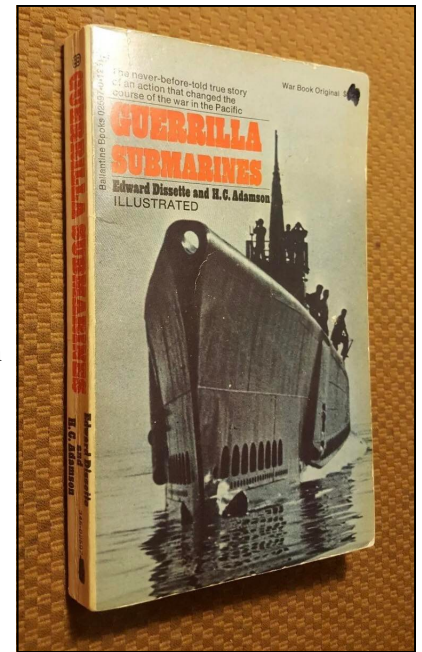
So I found this book while browsing EBay for books on Guerilla Warfare. When I saw the book I felt it was perfect for what I think we should be looking at in depth, Guerilla Amphibious Operations. My thought process is that in WWII we conducted Amphibious warfare and guerilla warfare but we need to combine the two. Well unbeknownst to me this book covers just that.

I was also about to learn about another man who should be known more, Commander Charles "Chick" Parsons. Have you ever heard of him? No, neither had I. When I started reading the book I had to stop and Goggle this guy because I could not believe what I was reading!

<https://chickparsons.com/> This website is run by his son Peter. How there is not a movie about this man and his exploits is beyond me. He pretty much orchestrated the radio network of the guerillas, used submarines to travel about the islands to meet with leaders and used submarines to shuttle supplies and personnel in and out of the Philippines.

I will say that the books by Ramsey and Volkman did mention the use of submarines but these authors really break down how the submarines were used to bring in tons and tons of supplies. Just an incredible look at a little known battle being waged under the nose of the Japanese Army.

One of the books mentioned as a source was the Volkman book but there is another book about Parsons that was written soon after the war. Rendezvous by Submarine, by Travis Ingham which was published in 1945. I have obtained a copy of that book and cant wait to read it.



Parsons with General MacArthur.

## Mister Roberts by Thomas Heggen

Mister Roberts

by Thomas Heggen

ISBN13: 1110000019291

ISBN: 1110000019291

Publisher: POCKET BOOKS INC

Published 1946

Illustrated by Samuel Hanks Bryant

221 pages

17 Illustrations

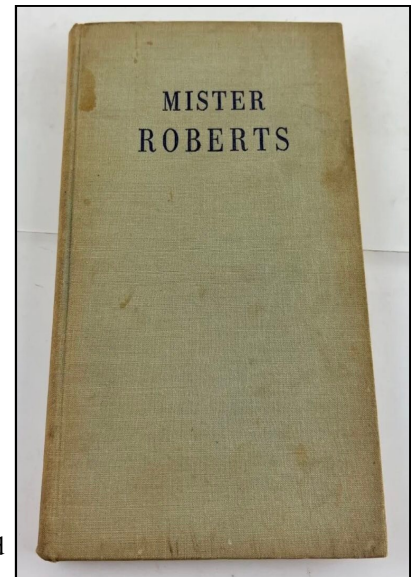
### The Author

Thomas Heggen (December 23, 1918 – May 19, 1949) was an American author best known for his 1946 novel *Mister Roberts* and its adaptations to stage and screen.

After attending Oklahoma City University, Oklahoma State University, and graduating from the University of Minnesota, where he was classmate of Max Shulman, Thomas R. St. George and Norman Katkov, with a degree in journalism, Heggen moved to New York City and became an editor for *Reader's Digest*.

He joined the U.S. Navy immediately after the attack on Pearl Harbor and was commissioned as a lieutenant in August 1942. For the duration of the War, he served on supply vessels in the North Atlantic, the Caribbean and the Pacific, the latter as assistant communications officer on the cargo ship *USS Virgo* and also the *USS Rotanin*.

During his 14 months aboard the *Virgo*, Heggen wrote a collection of vignettes about daily life on the ship, which he described as sailing "from Tedium to Apathy and back again, with an occasional side trip to Monotony". Like his fictional alter ego Doug Roberts, he felt "left out" of the War and butted heads with his commander, a coarse martinet who repeatedly denied his requests for transfer to a destroyer. The fictional "Captain Morton" of the movie and dramatizations was Naval Reserve Lieutenant Commander Herbert Ezra Randall, a Merchant Marine officer. According to *Naval History* magazine, Randall "had disdain for the ways of the Navy. Like his fictional "Old Stupid" counterpart, Captain Randall did own two palm trees, and like the characters Doug Roberts and Ensign Pulver, Heggen threw them over the side."



### My Review

Yes, this is the book that led to the Broadway Play which became the 1955 movie *Mister Roberts* with James Cagney, Henry Fonda, William Powell & Jack Lemmon. So they always say the book is better than the movie, or sometimes. *Mister Roberts* was always a favorite movie and I watch it any time I see it on. The book gives you a little more insight into some of the characters and varies some of the stories. I was laughing until I cried at some parts of the book just like the movie. If you have never read the book it was well worth the small amount of money paid for it and it will make the movie a little better next time I watch it.



### Patton Monument Report for 2023

As of January 15, 2023, the Monument fund has \$26,501.00.

Total in Monument Account: \$26,501.00.

The Bourg Tee Shirts we have on hand. **(UPDATED)**

**Large:** Yellow - 2, **2XL:** Yellow - 2, Tan - 2, OD - 3, **3XL:** Yellow - 2, Tan - 2, OD - 1, **4XL:** Yellow - 1.

M4 Tee Shirt

**Large:** Tan - 1.

**2XL:** Tan - 1

**New Mugs!!!**

We now have the 15oz Red Ball Express mug and the new 15oz Treat'em Rough Mug!

**Lapel Pins**

We are looking at \$12 each for these.



**Patton Battalion Funds / Memberships / Dues**

The Patton Battalion, as of January 15, has 438 members on our battalion Facebook page. Out of those 451 members we are currently at 93 paid members. The Patton Battalion has \$0.43 in funds in the PayPal account. We have \$415.46 in the Patton Operating account. Battalions funds are \$415.46. There are no Monument funds in the Battalion account as of this time.

In order to be a paid member of the battalion you must be a paid member of USABOT National. Again, a paid first year membership of \$15.00 which gets you a free battalion patch. Since we now have the battalion patch in the larger size both in color and subdued you have a choice as to which one you want free with your paid membership.

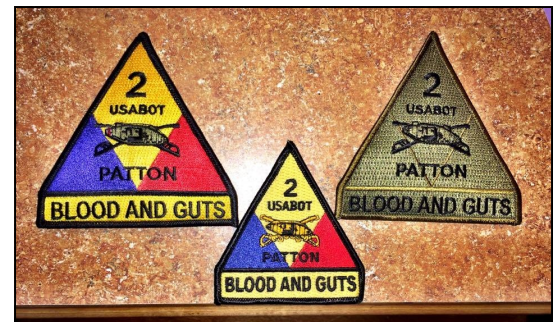
Both patches are also available for \$5 EA.

Your annual membership renewal will be \$10.00 every year after that. **Annual dues for the battalion are now due in June of each year!**

You can pay for your battalion membership through Paypal at: **pattonbattalion@outlook.com** or **patton.battalion@usabot.org**.

If you don't have a Paypal account you can send a check or Money Order to:

**Patton Battalion - USABOT**  
1432 Flood Road  
Shelbyville, KY 40065



**ATTENTION**

**USABOT Memberships can be renewed and purchased By mail at**

**USABOT**  
68 West Marion ST  
Doylestown, OH 44230

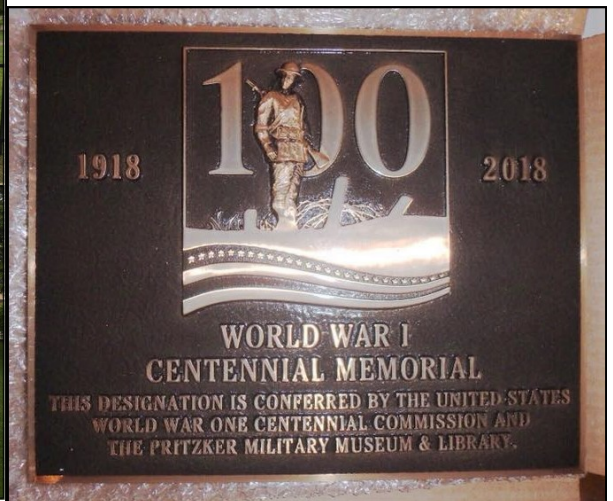
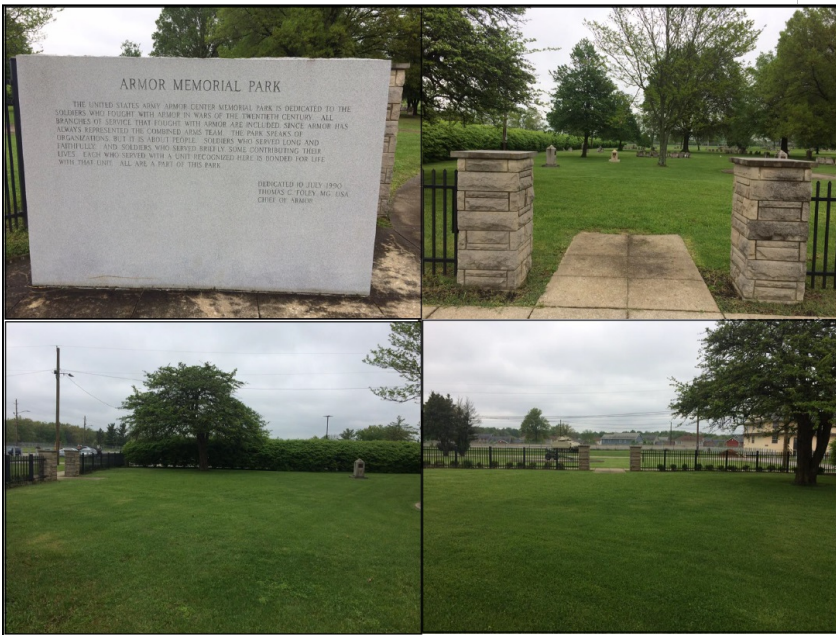
**Make checks payable to USABOT**  
**If at all possible try to go the USABOT Store Online and register there so that the G4 can track.**

**WWW.USABOT.ORG**

# Patton Joins the US Tank Corps Monument

The US Tank Corps shirts we still have few tees left!

<https://19seriesclothing.com/>







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Be sure to check us out on  
Twitter @pattonbattalion



Coming up in the February Issue - More of the history of the Master Gunner Program.

Upcoming Events

**US Cavalry & Armor Association Chapter Fort Knox** - Stable Call monthly meeting, 3rd Thursday of every month, Location TBD - Fort Knox, KY.

**Indiana Military Museum Schedule 2023**

- The Great War Event, April 1-2, 2023
- WWII Event Spring - TBD
- WWII Event Fall - TBD
- Vietnam War Event - TBD

**Eleventh Annual Tanker Homecoming** - Tucson, AZ. Dates TBD.

**Gainey Cup** - Ft Benning, GA, 1-5 May 2023.

**Operation Anvil - Battle for Southern France 1944-** Phil Moore Park, Bowling Green, KY.

**Patton and the US Tank Corps Monument** - Fort Knox - **TBD**

