

## From the Commandant's desk

As we go forward into 2014, there are some exciting things happening within the Field Artillery branch and school, particularly as we continue modernizing Field Artillery Fires and the Field Artillery Soldier of 2020 initiative.

2014 is going to be a balancing act as we capitalize on existing capabilities while carefully fostering new development throughout our force.

From instilling JFO training into our core BOLC instruction to Modernizing Gunnery, there are a lot of initiatives in the works while others have had a lot of progress.

As we have pressed forward in making progress with our initiatives, we have also had to make sure our TPPs and doctrine have followed accordingly. As a result, I am

excited to announce a fundamental change to our "Five Requirements for Accurate Predicted Fire."

Since World War I, our Five Requirements have stayed the same, but in this modern era of joint operations, Global Positioning Systems (GPS), digitized systems, and precision munitions, the validity of the Five Requirements was brought into question.

After a thorough examination by FCoE and USAFAS, our Five Requirements have now been amended to read the "Five Requirements for Accurate Fire."

In this edition there is an article entitled "The Five Requirements for Accurate Fire in the 21st Century" {Please see Page 3}. I invite you to read this article as it details the thought process and the reasoning behind the re-val-

idation of the Five Requirements.

Also in this edition, is an article on Forging Sabre 2013 {Please see Page 5}, an annual Field Artillery exercise that is conducted jointly with the Singapore Armed Forces. This exercise was a great success which gave Fires professionals valuable training experience in working in combined operations and proved our allied partner an opportunity to conduct training they cannot do in their country.

In closing, I would like to say this is definitely an exciting time to be a field artilleryman. We are truly on a great glide path to modernizing the Field Artillery.

Thanks for all you do.

*King of Battle!  
Fires Strong!*

*BG Chris F. Bentley*

**Purpose:** Founded in 2011, the *Redleg Update* provides past and present Field Artillery leaders with a monthly update of informational highlights to assist in their individual, collective and professional training efforts, as well as report on activities occurring throughout the Field Artillery community.

**Official Distribution:** The *Redleg Update* is distributed by the Commandant of the U.S. Army Field Artillery to key members of the Field Artillery chain of command across the U.S. Army. Past and current editions are also archived on FKN @

<https://www.us.army.mil/suite/files/34549741>

*Chris F. Bentley*

Chris F. Bentley  
Brigadier General, U.S. Army  
Commandant,  
United States Army Field Artillery School

**RFIs, Notes, and Notices:** To submit a Request for Information (RFI), please email the POC listed below. The FA Commandant's Office will acknowledge receipt of RFIs within 24 hours and will attempt to provide an answer within 72 hours.

**Points of Contact:** We appreciate those who have provided announcements, notices, articles and lessons learned.

Additionally, if you have a story of interest or wish to initiate a discussion on any topic or issue facing the Field Artillery community, contact Mr. John Folland, (580) 558-0831, or the editor of the *Redleg Update*, Ms. Sharon McBride, Field Artillery STRATCOM officer, (580) 558-0836.

Hot Link Legend:

Green = Open Source on WWW

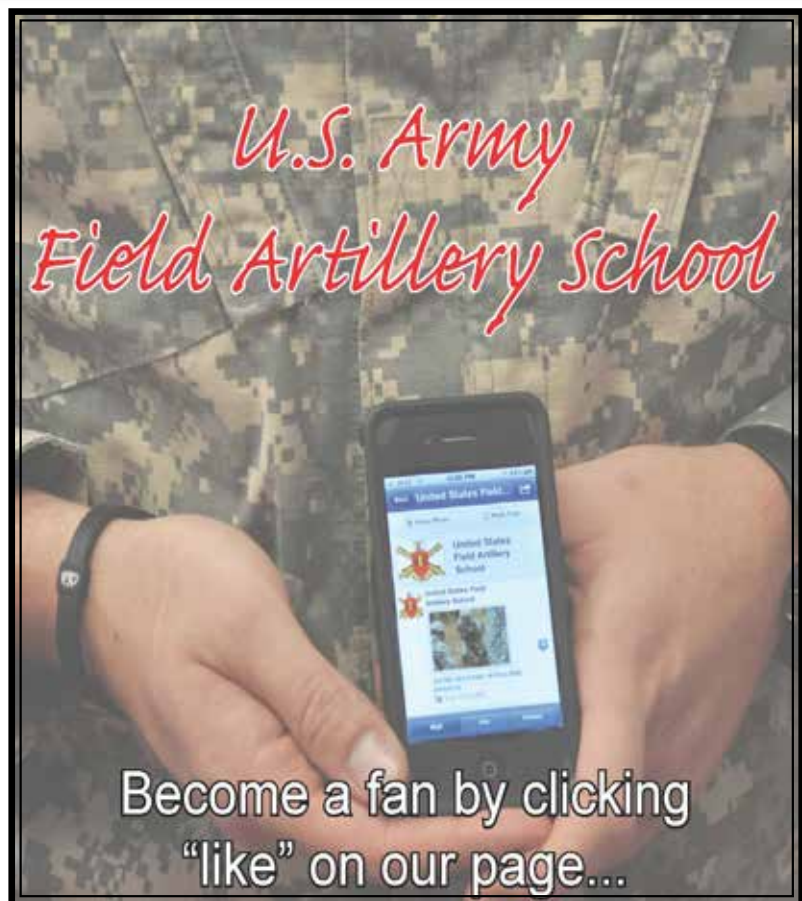
Red = CAC Card enabled  
on AKO/FKN



The "*Redleg Update*" is archived on FKN.

Log on with  
AKO credentials at

<https://www.us.army.mil/suite/files/34549741>  
to read or print past editions today.



"Like" us on Facebook

<http://www.facebook.com/fieldartilleryredleglive>

# The Five Requirements for *Accurate Fire* in the 21st Century

*By Capt Brock Lennon  
Deputy Branch Chief,  
Gunnery Department  
Officer Instruction Branch, Fort Sill*

Recently, the Fires Center of Excellence (FCOE) and the U.S. Army Field Artillery School announced changes to the “Five Requirements for Accurate Predicted Fire.” It has now been amended to read the “Five Requirements for *Accurate Fire*.”

The Five Requirements are listed as the following:

1. Accurate Target Location and Size,
2. Accurate Firing Unit Location,
3. Accurate Weapon and Ammunition Information,
4. Accurate Meteorological Information,
- and 5. Accurate Computational Procedures.

The Five Requirements, which have remained the same since World War I, have now been modified to reflect new systems and operational considerations, the use of digital weapon systems, and the use of precision and near precision munitions.

***The Five Requirements and their History.*** The Five Requirements for Accurate Predicted Fire have been the foundation for artillerymen to solve the gunnery problem. Prior to World War I, artillery utilized observed fire to achieve effects on target. Essentially the Battery Commander would identify the target and bring his battery’s fire to bear on the enemy through observing the impacts of the rounds. While effective in the delivery of fires on the battery or

battalion level after adjustment, this method did not allow for the massing of higher echelons.

It was the Germans who developed predicted fire technique. This allowed their artillery units to mass fires, up to the army echelon on targets without the requirement of adjustment. This allowed for massed, surprise fires and awarded a distinct tactical advantage. As with many tactical and technical innovations adopted by the United States, the method of predicting fire was borrowed from the German military and summarized in our Five Requirements for Accurate Predicted Fire.

However, the question arose about the continued validity of the Five Requirements in this modern era of joint operations, Global Positioning Systems (GPS), digitized systems, and precision munitions. While the FCOE did determine some updates, the basic methodology remains relatively unchanged. The physics behind the delivery of ballistic, level of effort, munitions has not transformed over time, however, new systems and operational considerations have created the need for extra considerations within the Five Requirements.

***1. Accurate Target Location and Size.*** Typically this is the observer’s responsibility, and this requirement allows the location of target to be plotted by the Fire Direction Center (FDC) in order to determine range, deflection, and vertical interval in relation to the firing unit. This aspect of the

requirement remains unchanged, however, it was determined that the requirement lacked concrete objectives in terms of the accuracy new target location assets can obtain. Foremost among the updates, the first requirement now spells out the requirements for accurately locating a target: Accurate Reference Location (either the sensor or a known point), Accurate Distance Derivation, Accurate Direction Derivation, Accurate Coordinate Determination, Accurate Altitude Derivation, and Accurate Target Description, Dimensions, and Disposition.

Additionally, the accuracy standard for reference location was set at  $\leq 10$  meters, or the accuracy provided by GPS. While all six of these requirements may or may not be utilized depending upon the target location method utilized, it was felt that there was a need to explicitly state the observer’s responsibilities.

It was decided that in terms of employing precision or near precision munitions, the standard for Target Location Error (TLE) in acquiring coordinates was set at the Joint definition for precision at  $\leq 6.5$  meters. It is important to note that the accuracy standards are just that, standards. This is not to say that a firing unit cannot achieve accurate first round fire for effect if the TLE is determined to be larger than expected. However, it primes both the



# The Five Requirements

Continued from Page 3

observer and the FDC to consider the effects of TLE in the tactical employment of fires when not meeting explicit standards.

**2. Accurate Firing Unit Location.** The second requirement remains the responsibility of the firing unit's leadership. Once the firing unit location is accurately determined, it is compared to the target location in order to derive range, deflection, and vertical interval. It is important to emphasize the determination of an accurate altitude for each howitzer as well as a sharp emphasis on directional control. However, none of this is new to artillerymen. With the advent of self-locating howitzers it is important for firing unit's leadership to understand that verification of both location and directional control for each howitzer are mandatory. The goal set forth by the working group for howitzer location is  $\leq 7$  meters Circular Error Probable (CEP). Once again, this is a goal that aligns with the accuracy provided by GPS integrated into our self-locating howitzers.

**3. Accurate Weapon and Ammunition Information.** The third requirement solves for the effect of interior ballistics. Under normal circumstances, a firing unit is able to determine the actual achieved muzzle velocity for a given projectile-fuze-propellant lot combination. The one update to this requirement is to expressly state the fuze in said combination. Once the fuze is considered, its effect on the projectile/fuze mean square weight can be determined, and a more accurate muzzle velocity variation can be determined.

**4. Accurate Meteorological Information.** The fourth requirement solves for the effect of exterior ballistics in terms of atmospheric conditions. By considering the atmospheric conditions of wind direction, wind speed, air temperature, and air pressure a firing unit can apply corrections to compensate for these conditions and achieve effects on target. The one update to this requirement is to state the Fire Direction Officer's responsibility of validating the Met Message.

**5. Accurate Computational Procedures.** The computation of firing data must be accurate. The effective delivery of fires requires balance between accuracy, speed, and other requirements. Accurate firing data is a function of procedure, training, and discipline. If all factors are performed correctly, the result is accurate

firing data and accomplishment of the mission. The working group determined that some of these accurate computational procedures must be expressly stated, as well as the inclusion of precision/near precision munitions considerations.

First is the requirement for a strict adherence to independent checks. This system of independent checks must be a continuous process, a discipline lived by all artillerymen rather than a simple set of rules. Independent checks include automated database verification for AFATDS, Centaur, and DFCS, and specific checks for each fire mission as it is processed.

When employing precision or near precision munitions, the elements of satellite datum availability, digital communications between the FDC and howitzers, and Target Location Error/Circular Error Probable limitations in aimpoint selection must be considered for effective employment.

**Predicted Fire is a Misnomer.** After review of the elements of the Five Requirements, the working group relooked the title. The title, formerly known as the Five Requirements for Accurate Predicted Fire, became a misnomer. In the past this title held true as the method of predicting the impact points of ballistic munitions. However, with the inclusion of precision and near precision munitions into the firing unit's inventory, there are instances where we are in fact not predicting the true trajectory of the projectile. This requires a shift in ideology and culture to fully appreciate each of the elements of the Five Requirements in achieving accuracy or precision standards for all munitions. A prime example of this is determining the firing data for an Excalibur projectile. To accurately determine the precision flight and a ballistic impact in a GPS failure, all elements of the Five Requirements must be met.

This new culture and ideology must embrace a precision mindset based on 80:10:10. 80 percent is set at the delivery of precision grid (10m TLE), 10 percent is set at the delivery of near-precision grid (50m TLE), and 10 percent set at unaided non-precision grid (200m TLE).

Thus, in order to cover all points the title was changed to The Five Requirements for Accurate Fire.

# Forging Sabre 2013

By SLTC Allan Tan  
Singapore LNO (Fort Sill)

Exercise Forging Sabre (XFS) 13 was successfully conducted by the Singapore Armed Forces (SAF) at Luke Air Force Base (AFB), Arizona from 2 to 17 Dec 2013.

It was a significant milestone exercise in the 3rd Generation SAF's transformation journey. The Combined Arms Division air-land integrated systems live firing exercise involved some 700 airmen and soldiers from the SAF, and assets such as F-16C/D, F-15SG, AH-64D, CH-47 and HIMARS.

The Assistant Commandant of the U.S. Army Field Artillery School, COL Martin Clausen visited the live firing exercise on 13 Dec 2013. He was hosted by the SAF Chief Artillery Officer, COL Terry Siow.

As part of the visit, COL Clausen was briefed on the planning, command, control and execution of the Division targeting operations at the Exercise Command Post based in Luke AFB.

He also visited the troops from the 23rd Singapore Artillery (SA) HIMARS Battalion at the Barry M. Goldwater Range in Gila Bend and witnessed the live firing mission by the HIMARS Platoon.

The HIMARS Bn was commanded by LTC Huang Miao Yi, who was a former graduate of the Basic Officer Leader Course at Fort Sill. In the SAF, there are no restrictions on women serving at the highest levels of command.



(Left )COL Martin Clausen, Assistant Commandt of the U.S. Army Field Artillery School, (right) LTC Huang Miao Yi, commander of the 23rd Singapore Artillery (SA) HIMARS Battalion talk during SAXFS 13. SAXFS 13 is a testimony of the good and longstanding defense relationship between Singapore and the United States. The SAF appreciates the support from our U.S. Army and U.S. Air Force counterparts in enabling us to train and hone our operational skills in a tough and realistic training environment.

