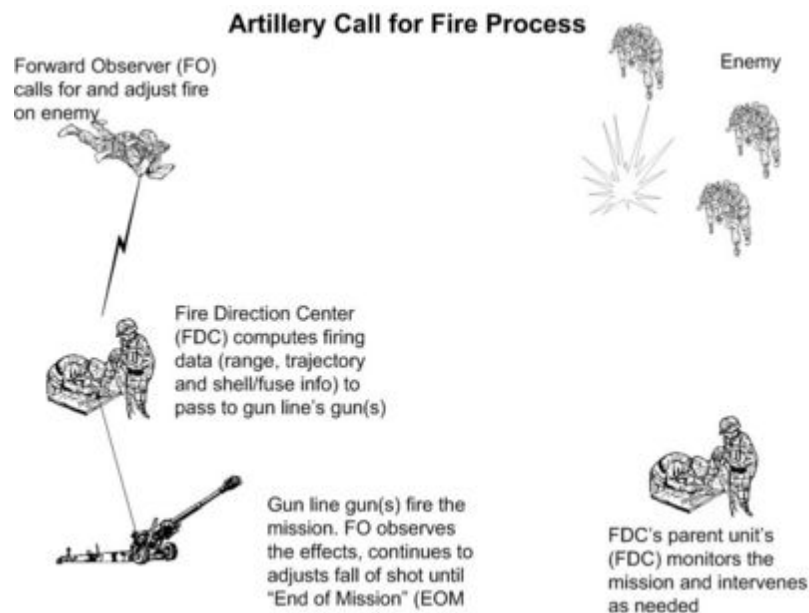


Fire Direction Center Operations in Viet Nam

This is how B Battery, 1st Battalion, 83rd Artillery's Fire Direction Center Operated during March 1968 through March 1969



FDC Operations in Viet Nam

Introduction

I decided to write this paper to explain the operation of a “typical” fire direction center in combat. This paper is written from my perspective while serving as the Section Chief and Chief Computer in the B Battery, 1st Battalion, 83rd Artillery Fire Direction Center (FDC) during 1968 and 1969. I’m writing this from memory only. Having said that, I spent about half of my 20 years in the Army working in an FDC, and while that was a long time ago, I think that what I’ve written is accurate.

I will start off by explaining the major elements of the Field Artillery team followed by the roles and responsibilities of the FDC section members. I will focus on their main responsibilities as it relates to getting firing data to the gun and getting the rounds on target. I will follow that by an example call for fire and explain the interaction of the team. Lastly, I will explain some of the tools and techniques we used in an attempt to shoot accurately. I will make every attempt to not get too bogged down into details; however, to really understand all that we did to get the data to the gun and a round on the target, some detailed discussion is necessary.

The Field Artillery Gunnery Team

The Field Artillery team consists of five major elements, each playing a distinctive and critical role.

The Fire Support Team

For a direct support (DS) artillery unit, the Fire Support Team (FIST) worked at company level in armor, infantry, and air cavalry units and was responsible for developing the fire support plan to support and protect the unit. Forward Observers (FOs) on the ground (FOs) or Aerial Observers (AOs) in the air used radios to call the FDC for fire support and adjusted that fire onto the target. Being an 8-inch battalion assigned to XXIV Corps Artillery with a general support (GS) or general support reinforcement (GSR) mission, most of our fire missions involved AOs. Once the fire mission was completed, the FO or AO would call in an “end-of-mission” and target assessment.

Target Acquisition Team

The radar platoon was responsible for acquiring targets and protecting the force by employing sophisticated target acquisition systems such as radars. The radar sections were the eyes that acquired enemy field artillery rocket and cannon fire and transmit the coordinates to friendly units for immediate suppressive fires. Radars were also used during FDC “registrations” procedures, which was a set of procedures we used to help compute more accurate firing data. I’ll talk about registrations later in this article.

The Fire Direction Center (FDC)

The FDC used a variety of automated and manual procedures to translate the call for artillery fire into the fire commands sent to the guns. A well trained FDC could generally get fire commands to a gun in less than a minute or two after receiving the call for fire. The battery FDC was the control center, or “brains,” of the gunnery team. The battery FDC received “fire orders” from the battalion FDC or calls for fire from observers. The battery FDC then processed that information by using technical fire direction procedures.

The battery FDC performed the technical fire direction, while the battalion FDC performed mostly tactical fire direction. The difference you ask? Technical fire direction involved sending accurate fire commands to the gun sections (more on that later in this article). Tactical fire direction involved the planning, coordination, and management of fire missions. It also involved handing off the mission from the AO or FO to the battery FDC and checking the battery's technical solution before it was sent to the guns.

Battalion FDC also provided 'air clearance' to the battery FDC, which gave permission to shoot on a particular azimuth within a certain range of altitudes. It was kind of important that we did not shoot down any friendly aircraft. The battalion FDC also provided ground clearance to the battery FDC, which provide us with the assurance that we were firing at the enemy and not friendly forces. We could not shoot until we had both air and ground clearance and battalion FDC gave us a "data check." This often times delayed us, but we had no other choice.

Survey Section

The Survey section played a very vital role that often times went unnoticed. They provided the FDC with exact battery center locations, down to 100 hundredth of a meter. The FDC used the battery center location as a starting point for all of its technical fire direction calculations. The Survey section also provided grid locations for "registration points" and some targets. Without an accurate battery center location and registration points, it was extremely difficult to shoot with any reasonable sense of accuracy.

The Firing Battery

The firing battery served as the "muscle" of the gunnery team. The firing battery included the battery HQ, the howitzer sections, the ammunition section, and the FDC. The howitzer sections apply the technical firing data sent from FDC to the howitzer and ammunition. All other elements of the FA team: the FIST, radar, survey, and FDC served to enable the firing units to deliver devastating 8-inch artillery fire at the right time and place.

Organization of a Battery Fire Direction Center (FDC)

The battery FDC was organized to facilitate 24-hour operations. As a result we had two 12-hour shifts. We were always short staffed; therefore, some of us performed multiple roles. Having said that, the duties for a fully staffed FDC are described below:

Fire Direction Officer (FDO)

The FDO was responsible for all FDC operations. He was responsible for the training of all FDC personnel, supervising the operation of the FDC, establishing standing operating procedure (SOP), checking target location, announcing the fire order, and ensuring the accuracy of firing data sent to the guns.

Chief Fire Direction Computer

The chief fire direction computer was the technical expert and trainer in the FDC. He ensured that all equipment was on hand and operational, supervised the computation of all data, ensured that all appropriate records were maintained, and kept the FDO out of trouble. He ensured smooth performance of the FDC in 24-hour operations and functioned as the FDO in the FDO's absence. In fact for much of my year in Viet Nam, I ran one of the shifts because we only had one FDO. So I normally wore two hats, as an FDO and Chief Computer. As Chief Computer, I was primarily responsible for computing the firing data and sending fire commands to the gun.

Fire Direction Computer

The fire direction computer operated the Field Artillery Digital Automatic Computer (FADAC), when it was working. When we used FADAC, I independently computed the firing data manually to verify the FADAC computation. When we operated manually (without the FADAC), the fire direction computer became the "check" computer and independently verified that my computations were correct. He also recorded mission-related data and other information as directed. In a crunch, the "check" computer also served as the Horizontal Control Operator (HCO).

Horizontal Control Operator (HCO)

The HCO's primary responsibility was to setup and maintain the horizontal firing chart. To setup the firing chart, the HCO plotted known locations such as our battery center, other firing battery locations, registrations points, "friendly" villages, fire bases, LZs, target locations, no fire zones, and other locations.

Vertical Control Operator (VCO)

The VCO also maintain a horizontal firing chart and plotted the target location on a map to determine the target altitude. The VCO would use the difference in the battery's altitude and the target's altitude to compute and announce the "site."

The Radiotelephone Operator (RTO)

The RTO manned the radio and received the call for fire from battalion FDC or the fire mission from an observer. The RTO announced and recorded all information received throughout the fire mission. The RTO was normally the operator of the FDC's M577 command track. He also maintained the vehicle and the FDC-associated generators.

The "Adjust" Fire Mission

Battalion FDC or an observer would send us targeting information that consisted of the target location as grid coordinates; type of target (e.g., personnel in the open, personnel in bunkers, wheel vehicles, tanks, and the like); and the 'altitude' to the target in mils. The target attitude was the direction to the target from the observer's perspective. The observer would also provide other information, such as "danger close" if friendly troops were nearby.

Using the targeting information, the FDO would issue a fire order to the FDC. It consisted of the guns to fire; "adjusting" gun (usually the 'base piece') for an AO or FO controlled mission; special instruction, such as 'danger close use gunners quadrant'; the number of rounds to fire in effect (FFE); the projectile in effect; the ammunition lot and charge in effect; fuze in effect; and target number. As soon as the targeting information was received and before the FDO finished the fire order, everyone would have already gone into action because the targeting data provided all of the data needed to start. One of the very first actions was for the chief computer or FDO to announce 'FIRE MISSION' to the XO post and gun sections to get the ball rolling.

In the art and science of computing firing data, every member of the FDC had very specific roles and responsibilities. Everyone also had two jobs – their primary job and the job of checking the data or computations of someone else. Every member of the FDC was responsible for announcing some piece of vital information to rest of the team or for using that information to compute the firing data. Every piece of needed information was announced in a very specific order and in a very specific way so that there was no confusion, and every piece of information was vital and necessary to ensure timely and accurate fire.

If the FADAC were being used, the Fire Direction Computer would enter the targeting information into the FADAC. The FADAC provided the azimuth to target, deflection, quadrant, charge, and, if any, fuze setting; and usually within 30 to 45 seconds. The FADAC was quick and accurate, provided it was setup properly and the targeting information was entered correctly. For the remainder of this article, however, assume the FADAC is NOT being used and all of the firing data is being computed manually.

The HCO immediately plots the targeting information on the Horizontal Chart using a 'grid square'. The HCO would then determine and announce the chart data that consisted of the range to target in meters and the deflection to the target in mils. A good HCO could normally do this in about 15-20 seconds. If necessary, the HCO also determined and announced a new azimuth to target, which would require the guns to re-lay. Any change in azimuth was verified by the FDO. (If a new azimuth was need, the FDO would immediately announce that to the XO post.) The HCO would then place a circular 'target grid' over the target location and orient it along the observer's attitude to the target. This allowed to HCO to plot observer corrections from the view point of the observer.

At the same time, the VCO plotted the target location on his Horizontal Chart to determine his own chart data. When the HCO announced his chart data the VCO would announce "check" if his chart data matched the HCO's chart data within plus or minus 30 meters in range or 3 mils in deflection, or "correction" if either piece did not. The FDO would verify the HCO's plot when the data did not match to resolve the differences. I honestly had an excellent HCO and VCO so it was very, very rare for the data not to match. (Note: For their calculations, both the chief computer and the 'check' computer used the HCO's chart data once 'checked' by the VCO.)

Next the VCO plotted the grid coordinates on the Vertical Chart (map) using a grid square to determine the target altitude. The VCO and FDO would also inspect the target location to see if it was necessary to fire high-angle. In a perfect world, that information would be provided by the observer because they could see the target and the surrounding terrain, but it was up to the VCO and FDO to ensure that our rounds did not land on any intervening terrain, such as a big mountain in the way of our target. If high-angle was needed, the FDO would announce 'USE HIGH ANGLE'.

With the altitude, the VCO then used a 'Graphical Site Table' (which looked much like a slide rule but wasn't) to determine the 'site' in mils. A good VCO could usually do this in about 20 seconds. The site was used to compensate for any differences in the firing battery and target altitude (target height above or below the guns, i.e., plus or minus site respectively). The HCO would then determine the site as a double check.

While the HCO and VCO are doing their thing, the chief computer and 'check' computer are in a ready state waiting for the HCO's announcements of range, deflection, and azimuth, if needed, and the VCO's announcement of "check" on the HCO's chart data. Using the range to target and a Graphical Firing Table (GFT), both computers calculate the elevation to the target and then add or subtract the site (once announced by the VCO) to determine the quadrant. Both computers also used the GFT to determine a fuze setting, if needed. Both computers would also apply a 'deflection correction' to the deflection announced by the HCO to determine the firing deflection. The chief computer would announce the firing data to the entire FDC, for example:

"DEFLECTION 3645, QUADRANT 628"

This triggered several actions:

1. The 'check' computer would compare his firing data and announce check if it matched within plus or minus 3 mils or 'correction' when it did not. Both computers would recheck their data to resolve any differences. While rare, firing data difference did happen from time to time.
2. Once the firing data was 'checked', the RTO would relay that information to the battalion FDC so they could check our initial data. This was the only 'technical' fire direction check performed by battalion FDC.
3. The RTO would establish radio contact with the FO or AO, if not already done. Sometimes the AO or FO would tune to our radio frequency. At other times, battalion FDC would tell us which frequency to use and who to contact on that frequency.
4. The chief computer would send the fire commands to guns, awaiting air and ground clearance, and battalion FDC's data check.

Example:

"BATTERY ADJUST, SHELL H.E., CHARGE 7, FUSE QUICK, DEFLECTION 3645, QUADRANT 628, #2 ONE ROUND, BATTERY 1 ROUND IN EFFECT"

Once we had received all necessary clearances from the battalion FDC, had radio contact with the observer, and the battery reported ready to fire, the chief computer would announce 'FIRE' to the adjusting piece.

When the gun fired, the RTO would announce 'SHOT OVER' to alert the observer. The observer would announce 'SHOT OUT' as an acknowledgement. When the round was approximately 5 seconds from the target, the RTO announced 'SPLASH OVER' to warn the observer. The observer would announce 'SPLASH OUT' as an acknowledgement.

Rarely, did we hit the target on the first shot, or second, or third for that matter for many reasons which I won't go into. It was up to the observer to send corrections to the FDC that would place rounds on the target. Corrections were sent as ADD or DROP and LEFT or RIGHT so many meters. For example, ADD 400, LEFT 200.

The observer announced corrections to the RTO who in turn read them back. This triggered basically the same activities used to compute the initial firing data:

1. The HCO and VCO plot the corrections on their respective horizontal charts. The HCO announces the new range and deflection and the VCO 'checks' the data.
2. Both computers recalculate the firing data; the chief computer announces the firing data and the 'check' computer 'checks' the data.
3. The chief computer then sends new fire commands to the gun.
4. The adjust piece reports ready and the chief computer commands '#2 FIRE'
5. The RTO sends 'SHOT' and 'SPLASH' as before.
6. If necessary, the observer sends in more correction
7. Steps 1 through 6 are repeated until the observer requests 'FIRE FOR EFFECT'.
8. The chief computer then commands 'BATTERY 1 ROUND FIRE FOR EFFECT' to instruct the entire battery to shoot the number of rounds specified.

9. Once the battery reports ready to fire, the chief computer announces, "BATTERY, FIRE."
10. The RTO send 'SHOT' and 'SPLASH' as before.
11. When all rounds are expended, the XO or chief of firing battery reports 'ROUNDS COMPLETE' to the FDC. The RTO announces 'ROUNDS COMPLETE' to the observer.
12. The observer then sends 'END OF MISSION (EOM)' or requests additional fire. If EOM, the observer sends in a target assessment, e.g., number of KIAs, bunker destroyed, three trucks burning, and the like.
13. The chief compute announces 'END OF MISSION' to the gun sections.
14. The RTO sends EOM to battalion FDC with the target assessment
15. The 'check' computer does some house keeping things, like update the ammo counts and recording the target assessment.
16. The VCO and HCO update their respective charts by recording the target location and assigning it the target number.

Types of Fire Missions

The battalion FDC or observer decided on the type of effect or fire support needed on a particular target. There are three types of fire: destruction, neutralization, and suppression.

Destruction

Destruction is intended to put a target out of action permanently. Direct hits with high-explosive (HE) or concrete-piercing (CP) shells are required to destroy hard materiel targets. Usually, destruction requires large expenditures of ammunition and is not considered economical. We used this type of fire to destroy bunkers - this type of fire was rarely used.

Neutralization

Neutralization is intended to knock a target out of action temporarily. It can be achieved by use of any type of shell-fuze combination suitable for attacking a particular type of target. Neutralization does not require an extensive expenditure of ammunition and is the most practical type of mission. Most of our missions were neutralization fire.

Suppression

Suppression of a target limits the ability of the enemy personnel in the target area to perform their jobs. Firing HE/VT created apprehension and confused the enemy. The effect of suppressive fires usually lasts only as long as the fires are continued. Suppression requires a low expenditure of ammunition; however, since its effects are not lasting, it was unsuitable for most targets.

Categories of Indirect Fire

Indirect fires are divided into two basic categories: observed and unobserved.

Observed Fire

Observed fire is fire for which the points of impact or burst were controlled by an observer. Most of our missions were observed fire were the observer "adjusted" our fire onto the target.

Observed fire usually resulted in the observer sending a target damage assessment (TDA) report to the FDC at end-of-mission.

Unobserved fire

Unobserved fire is fire for which the points of impact or burst were not observed. It involved predicting where targets were, or would be, and shooting at them. The term "H&I" (harassing and interdiction) was used to describe the target packages we received from battalion FDC for our nightly unobserved fire missions.

FDC Tools and Techniques

PENDING