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# Marine Artillery Survey Operations

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**U.S. Marine Corps**

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**Unless otherwise stated, whenever the masculine gender is used, both men and women are included.**

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FOREWORD

Marine Corps Warfighting Publication (MCWP) 3-16.7, *Marine Artillery Survey Operations*, sets forth the doctrinal foundation and technical information that Marines need to provide accurate and timely survey support. It covers a broad spectrum of issues from general knowledge to Marine-specific equipment.

As one of the five requirements for accurate predicted fire, survey is critical to the success of artillery (and ultimately maneuver) on the modern battlefield. Marine artillery surveyors support firing units *and* target acquisition assets, enabling indirect fires to mass effectively and deliver surprise observed fires and effective unobserved fires.

This publication applies to Marine air-ground task force (MAGTF) artillery commanders, their staffs, and personnel in the 0844/48 military occupational specialty (fire direction controlman), and field artillery operations chief billets, from battery through regiment, including infantry mortarmen.

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

EDWARD HANLON, JR.  
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# MARINE ARTILLERY SURVEY OPERATIONS

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# CHAPTER 1. FUNDAMENTALS

## SECTION I. MISSION AND DUTIES

The mission of the Marine artillery surveyor is to provide a common grid. This means that all fire support and targeting assets are oriented the same with respect to *azimuth, position, and elevation* to a prescribed accuracy. A common grid is based on the sum of the components of relative survey (the geodetic system, the coordinate system, and the map projection/grid system) of the operational area. See chapters 3 and 4 for detailed descriptions of these components.

Establishing a common grid is a command responsibility. A common grid does not apply to artillery only. It must be established throughout the battlespace and constantly maintained for use by all fire support assets. To provide a common grid is to provide data to the required accuracy that permits—

- Massing of fires; i.e., bringing more than one firing unit to bear against a common target at the same time without prior adjustment or registration of separate artillery units.
- Delivery of surprised observed fires; i.e., accurate and timely fires against enemy positions with no adjustment. If fires must be adjusted, the element of surprise is lost.
- Delivery of effective unobserved fires; i.e., effective and timely fires against enemy positions that are not observed (group and series targets or prep fires). Without survey, unobserved fires can only be effective if the target had been previously fired on.
- Transmission of target data from one unit to another; i.e., the ability of one firing unit to provide locations of adjusted targets to another firing unit for subsequent engagement by that unit or for massing fires.
- A firing unit to carry a registration forward to a new position. This is necessary when moving a battery from one primary position to another and when moving to an alternate or supplementary position. A common grid is also required between a firing position and an offset registration point.

All stations surveyed in the same network are relative to specific points regardless of the survey methods used (those points being the known control used to fix and adjust those networks). Stations surveyed from other points that have already been listed as common are relative to those stations within that unit's specified level of accuracy. For example, if a battalion survey section establishes a battery position (orienting station [OS] and end of orienting line [EOL]) from fourth order or higher common control, the battery position is common to the higher order control but at a fifth order accuracy.

All stations surveyed from a point whose location was obtained by hasty methods (map spot or hasty resection) or from absolute methods (military survey grade receiver [MSGR] 4000, precision, lightweight, GPS, receiver [PLGR]) are common to that point. However, they are not common to any local control. Stations not already common to another network can be made common by adjustment or by conversion to common control calculations.

For two stations to be considered common, they must meet the requirements of the previous paragraphs. They must be referenced to the same datum/ellipsoid and developed from the same map projection. The grid system or the coordinate system must be the same between the points. They must be from the same network or have been adjusted or converted to the same network.

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### Survey Operation Steps

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#### Planning

Survey planning begins with understanding the maneuver commander's intent and receiving the fire support coordinator's guidance. During planning, full consideration is given to the commander's concept of operations, priorities, the tactical situation, etc.

Aggressive survey planning that answers the questions who, what, where, when, why, and how is essential to mission success. See chapter 2.

## Coordination

Coordination is conducted at or through the combat operations center (COC). The survey information center (SIC) is the liaison with the topographic surveyors and non-artillery units requiring survey control. The coordination and planning effort at the COC is conducted by the highest echelon artillery survey officer in the area of operations. The survey plan is further coordinated with the next lower echelon survey officer and any survey officers with higher or adjacent commands as needed.

## Field Work

Survey field work is performed by the survey section using the methods and equipment to extend common survey throughout the command's area of responsibility as directed by the survey plan. Field work must be started immediately upon receipt of the survey order and be continuously and aggressively pursued until the survey plan is completed.

## Computations

Survey computations and field work are performed simultaneously. Computations are the use and calculations of all data needed to convert the field work to usable azimuths, positions, and elevations. This includes computations of conventional surveys, updating and adjusting position and azimuth data, calibrating kinematic global positioning systems (GPS) data, and adjusting static GPS data.

## Echelons of Survey

Three echelons of artillery survey exist: regiment, battalion, and battery as well as three accuracy levels: fourth, fifth, and hasty. The survey section's mission at each echelon determines what level of accuracy is required.

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## Regiment Survey Section

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The primary mission of regiment surveyors is to provide a common grid over the division area. This includes establishing initial control, recovery of existing control, and conversion to common control over stations not in the division network. The artillery regiment's survey section is the division's survey asset. The regiment survey section—

- Normally performs fourth order surveys. In some cases, they will be required to establish fifth order survey control for units not already covered by a battalion survey section or for units attached to the regiment.
- Establishes permanent survey control markers when necessary.
- Establishes and maintains an SIC to provide required data to lower echelon survey sections to conduct their survey missions.

## Establishing Initial Control

Usually, the tactical situation on initial entry of forces into an area will make the recovery of existing control impossible. However, survey operations must begin immediately at all levels. Establishing an initial common grid throughout the division area is of the utmost priority for surveyors. See figure 1-1.

Initial control is the first station or network of stations established in theater. Establishing initial control can be done by hasty means such as absolute GPS survey or by map spot. Initial control can also be established as a network by static GPS methods, kinematic GPS methods or position and azimuth determining system (PADS). In each case, a single absolute or map spot station is the controlling grid and usually only includes the battalion's position areas.

## Recovering Existing Control

The initial control will suffice to start an operation. But continuing that operation will require recovering existing control into the target and connection areas of the battalions and conversion of recovered control to the common grid throughout the entire division area. See figure 1-2.