

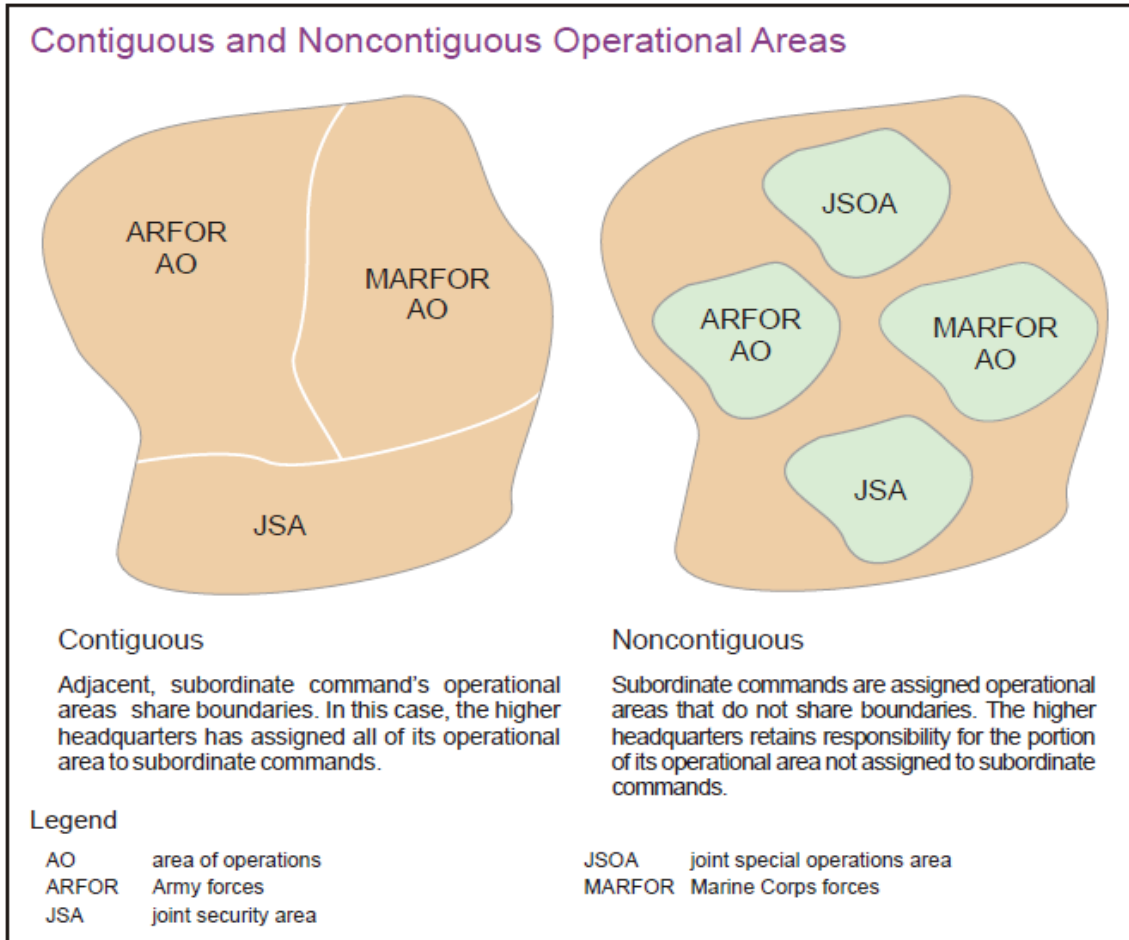
BATTLESPACE GEOMETRY

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[Close air support](#) (CAS) and [air interdiction](#) (AI) require maneuver control measures (MCMs) and fire support coordination measures (FSCMs) that are flexible, simple, effective, and relevant. Since counterland operations are normally conducted in conjunction with friendly land forces, mutual understanding of MCMs and FSCMs between air and land forces must be established to integrate [joint fires](#) and avoid friendly fire incidents. MCMs, such as boundaries, are used to establish common understanding regarding the responsible headquarters for a joint force commander (JFC) assigned volume within the theater. FSCMs are then established to enable common understanding by all forces providing fires within that volume of space. The Conflict Continuum may involve rapidly advancing ground maneuver or widely distributed ground operations; either of these approaches will require nonlinear FSCMs.

CONTIGUOUS AND NONCONTIGUOUS OPERATIONAL AREAS

Operational areas may be [contiguous](#) or [noncontiguous](#). When they are contiguous, a boundary separates them. When operational areas are noncontiguous, they do not share a boundary; regardless of whether contiguous or noncontiguous, boundaries are used to determine areas of operations (AOs). Within assigned AOs, the commander assigned to that AO determines the priority, effects, and timing of fires within that AO. A noncontiguous operational area normally is characterized by a 360-degree boundary. The higher headquarters is responsible for the area between noncontiguous operational areas. The close area is the portion of a commander's area of operations assigned to the subordinate maneuver forces. Operations in the close area are operations that are within a subordinate commander's AO. A deep area is the portion of the commander's area of operations that is not assigned to subordinate units. Operations in the deep area involve efforts to prevent uncommitted enemy forces from being committed in a coherent manner. See figure, "Contiguous versus Noncontiguous Operations" below.



Contiguous and Noncontiguous Operational Areas (Source: JP 3-0)

LINEAR AND NONLINEAR OPERATIONS

In [linear](#) operations, commanders direct and sustain combat power toward enemy forces in concert with adjacent units. Linearity refers primarily to the conduct of operations along lines of operations with identified forward lines of own troops (FLOTs). In linear operations, emphasis is placed on maintaining the position of the land force in relation to other friendly forces. This positioning usually results in contiguous operations where ground forces share boundaries. Linear operations are normally conducted against a deeply arrayed, echeloned enemy force or when the threat to lines of communications reduces friendly force freedom of action. In these circumstances, linear operations allow commanders to concentrate and integrate combat power more easily.

In [nonlinear](#) operations, forces orient on objectives without geographic reference to adjacent forces. Nonlinear operations typically focus on multiple decisive points and are characterized by noncontiguous operations. Nonlinear operations emphasize simultaneous operations along multiple lines of operations from selected bases. Nonlinear operations place a premium on intelligence, air mobility, and sustainment. Often integrated with ground maneuver, swift aerial attack delivering concentrated,

precise fire against several decisive points can induce paralysis and shock among enemy troops and commanders. Operations JUST CAUSE, ENDURING FREEDOM, ODYSSEY DAWN, and UNIFIED PROTECTOR are examples of nonlinear operations. The joint forces orient more on their assigned objectives (for example, destroying an enemy force or seizing and controlling critical terrain or population centers) and less on their geographic relationship to other friendly forces. To protect themselves and achieve objectives, ground forces may rely on airpower to provide operational area awareness, mobility advantages, and freedom of action. Depending on the situation, the JFC may conduct linear or nonlinear offensive and defensive operations in contiguous and noncontiguous areas. Linear contiguous warfare typically characterizes large-scale combat operations and campaigns, while stability operations are usually nonlinear and noncontiguous.

BOUNDARIES

Various boundaries and coordination measures are used for [airspace control](#) and fire support coordination when planning and executing counterland operations. The measures help integrate air and ground maneuver, ensure deconfliction, avoid friendly fire, and identify which parts of the operational area require specialized control procedures. The JFC may define lateral, rear, and forward boundaries to define AOs for the various land components.

The following discussions center on [linear](#) boundaries and coordination measures that play a significant role in counterland operations.

Boundaries. Boundaries are used to define a component's AO and serve as the limit of an organization's responsibility. Within their designated AOs, component commanders not only integrate and synchronize maneuver and fires, but also designate target priority, effects, and timing of fires.

FLOT. The FLOT is a line that indicates the most forward positions of friendly forces during linear operations at a specific time. The FLOT normally identifies the forward location of covering and screening forces, historically the role of cavalry forces. The zone between the FLOT and the [fire support coordination line](#) (FSCL) is typically the area over which friendly ground forces intend to maneuver in the near future and is also the area within which ground force organic [fires](#) are employed. This zone is the area where air operations are normally executed through the [air support operations center](#) (ASOC).

FSCM. FSCMs are necessary to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces. FSCMs are divided into two categories: permissive and restrictive. Permissive FSCMs facilitate attacks and include [coordinated fire lines](#), free fire areas, and FSCL. Restrictive measures safeguard friendly forces and include no-fire areas, restrictive fire areas, restrictive fire lines, and airspace coordination areas.

When supporting the land-component commander, airpower operates within the confines of all [joint force land component commander](#) (JFLCC) FSCMs. In order to reduce the risk of friendly fire and still take advantage of airpower's inherent flexibility and versatility, FSCMs should be clearly defined, easily controlled, and not overly restrictive. For detailed information on FSCMs, see Joint Publication (JP) 3-03, [Joint Interdiction](#) and JP 3-09.3, [Close Air Support](#).

Advancements in data link technology and digital information have increased the potential for combat forces to effectively coordinate and conduct both linear and nonlinear operations. The expanded distances between friendly units in nonlinear operations require Airmen responsible for conducting CAS to continually evaluate the capabilities of the controlling ASOC to ensure adequate resources (manning, radios, frequencies, computer support, etc.) are available to meet the command and control (C2) needs of aircraft operating in ever-increasing dispersed AOs in the [joint operations area](#) (JOA).

FSCL. The FSCL is a fire support coordination measure established by the land or amphibious force commander to support common objectives within an area of operation, beyond which all fires must be coordinated with affected commanders prior to engagement. Short of the line, all fires must be coordinated with the establishing commander prior to engagement. The FSCL does not divide an AO by acting as a de facto boundary between close and deep operations or a zone for CAS. However, the air component uses the FSCL to divide sectors of control between the ASOC and [Airborne Warning and Control System](#) (AWACS) or [control and reporting center](#) (CRC) with the ASOC's sector of control being beneath the [coordinating altitude](#), from division's rear boundary to the FSCL and AWACS or CRC controlling forward of the FSCL. The FSCL applies to all fires from any domain, using any type of ammunition. Forces attacking targets beyond a FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid friendly fire. This coordination is normally conducted with the [air operations center](#) (AOC), via the Service and component liaisons within the AOC who represent the other affected commanders. Supporting elements attacking targets beyond the FSCL should ensure the attack will not produce adverse attacks on, or to the rear of, the line.

Operation IRAQI FREEDOM (OIF) FSCMs

As the most recent large-scale combat operation, OIF employed all the existing FSCMs. However, due to the lack of common understanding of usage of FSCMs, the initial FSCL was placed well beyond the range of land fires, in order to accommodate the anticipated rapid movement of land forces into Iraq.

The deep placement of the FSCL reduced the efficiency of airpower by overcomplicating the execution of AI missions. Ground forces and their associated tactical air control parties were incapable of detailed integration beyond the range of their organic fires because no one was able to observe enemy targets. Aircrews were still required to comply with CAS-centric, ASOC command and control procedures short of the FSCL. The time-consuming CAS clearance process (which is doctrinally necessary to avoid potential friendly fire incidents) hindered the expeditious attack of fleeting targets that were beyond the range of the organic artillery. As a result, the area between the maximum range of land fires and the established FSCL created a sanctuary for enemy forces.

The FSCL is often used as the forward limit of the airspace controlled by the ASOC. This mandates the various ASOCs and other [theater air control system](#) (TACS) components that have the required connectivity to monitor not only air activity out to the FSCL but also be able to monitor friendly and enemy ground positions, surface-to-air threats, and all other key aspects of situational awareness. Likewise, when any component attacks targets beyond the FSCL, it is necessary to coordinate with the other components to ensure deconfliction and prevent multiple assets attacking the same target. This deconfliction is normally done within the AOC because the AOC is the only headquarters that doctrinally contains liaison elements from all Services, components, and nations involved in the conflict, enabling it to rapidly coordinate the desired attack(s).

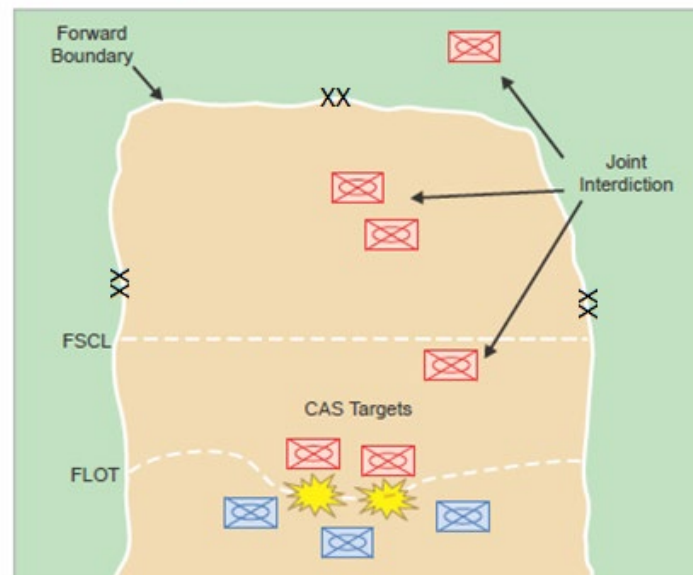
The optimum placement of the FSCL varies with specific circumstances, but typically it should be placed at or near the maximum range of organic artillery, where the ability to create effects on the battlefield shifts from the ground component's organic artillery capabilities to the air component. In this way, the FSCL placement maximizes the overall effectiveness of the joint force, and each component suffers only a small reduction in efficiency. To place the FSCL so deep or shallow that one component is given complete freedom to operate usually results in the other components being so restricted that overall joint effectiveness suffers. The proper

location for the FSCL shifts as artillery moves, from one phase of the operation to the next. FSCL placement should consider the ground scheme of maneuver and should account for the anticipated artillery placement based on unit rate of march, rather than the current ground force positions at the time the FSCL will be active. History has shown that placing the FSCL too deep can be detrimental to overall joint force effectiveness and may even provide the enemy a sanctuary from effective air attack.

The preponderance of lethal effects shifts from landpower to airpower near the maximum range of organic field artillery. Therefore, under all but the most rapid ground maneuvers, the FSCL is normally placed near the maximum range of tube artillery because airpower provides the most expeditious attack of surface targets beyond that point. To facilitate a rapidly moving battlefield, components should plan “on-call FSCLs” in advance of actual need that can be activated as the ground force moves. In the past, establishing the FSCL along an easily identifiable terrain feature has been critical to success. Modern technology has reduced the importance of aligning the FSCL with obvious terrain features, to make it easily identifiable from the air. Thus, simply planning to overlay the FSCL on preplanned maneuver phase lines is an optimal way to tie maneuver control measures and fire support coordination measures.

Although sometimes thought of as a JFLCC responsibility, FSCL placement should be based on the placement of the division(s) organic artilleries maximum range. This ensures all components can integrate and maximize effects in support of JFC objectives, and the designated AO owner, without creating the enemy sanctuary found during OIF. Joint doctrine does not define a depth or range for placing the FSCL in relation to the FLOT or forward edge of the battle area, as the location of the FSCL should be based on the placement of the cannon artillery, rather than the troops. This permits the theater commander to tailor FSCL placement according to specific battle conditions that optimize and facilitate joint operations.

Notional Joint Operations Area with Designated Land and/or Maritime Area of Operations



Legend
 CAS close air support
 FLOT forward line of own troops
 FSCL fire support coordination line
 troops in contact
 designated land and/or maritime areas of operations
 joint operations area

**Notional JOA with Designated Land and/or Maritime AOs
 (Source: Joint Publication 3-03)**

The FSCL is primarily used to establish C2 procedures for planning and execution purposes—it does not define mission types. Missions flown beyond the FSCL typically do not require oversight from the ASOC, because those missions are not in close proximity to friendly forces and thus beyond the distance where detailed integration is required. However, CAS missions can be flown in the portions of the operational area beyond the FSCL if friendly troops are operating beyond the FSCL and require support. When any component attacks targets beyond the FSCL, it is necessary to coordinate with the AOC, and their Service or component liaisons found within the AOC, to ensure deconfliction and to prevent multiple assets from attacking the same target. Ground forces, such as SOF teams that often operate beyond the FSCL, should have their locations coordinated with the appropriate TACS element for terminal attack control and have contact with a [special operations liaison element](#) (SOLE) at the AOC. Short of the FSCL, all missions typically require check-in with the ASOC while en route to the target area, for an update on potential targets, surface-to-air threats, and friendly troop locations. All air component short-of-the-FSCL missions, even those that usually do not directly support the ground component such as counterair or [strategic attack](#), normally contact the ASOC for situation updates and deconfliction while in the ASOC's airspace.

Battlefield Coordination Line (BCL)

The Marines put in place a supplementary BCL to speed “expeditious attack of surface targets of opportunity” between the BCL and the more distant FSCL as Marine doctrine defined it. A typical BCL extended 18.6 [kilometers] out from the FLOT—roughly the range of [155] mm artillery. Air strikes short of this line were typically Type I, II, or III CAS calling for varying degrees of control. Beyond the battlefield coordination line, the “kill boxes” could be opened more easily, and the DASC was able to put its brisk procedures into play.... All levels monitored the air requests and intervened only to stop them. The DASC was collocated with [the fire support coordination center], who updated the ground picture as the DASC personnel worked the air picture.... The Marines used procedural control with aircraft checking in at control points to give route headings which the DASC controller cross-referenced.... Aircrews quickly caught on to the fact that the DASC could give them targets fast.... Soon the flow of coalition strike sorties, planned and unplanned, far exceeded anything the Marine air planners thought the JAOC would give them.

**—Dr. Rebecca Grant,
“Marine Air in the Mainstream,” *Air Force Magazine*, June 2004**

Resulting from the OIF FSCL placement beyond organic fires capabilities, the Marine Corps utilized a supplemental fire support coordination measure (FSCM) for the Marine-controlled AO, called a [battlefield coordination line](#) (BCL). The BCL facilitates the expeditious attack of ground targets of opportunity between the BCL and the too-far-away, OIF-like, FSCL. Unlike the FSCL, the BCL is used by the Marine Corps to help delineate CAS and deep air support, which is a Marine term that includes AI procedures. Because the BCL is set at the maximum range of organic tube artillery, any sorties flown short of the BCL are typically designated as CAS. This allows counterland airpower to attack ground targets beyond the BCL using minimal coordination procedures with ground forces.

Kill Box.

Purpose. A kill box is a three-dimensional FSCM, normally built through the combined use of a FSCM (for the ground) and an [airspace coordinating measure](#) (ACM) (for the air), used to facilitate the integration of fires. A kill box is a measure, not a mission. Kill boxes are established to support interdiction efforts as part of the JFC's joint targeting process. Kill boxes allow lethal attack against surface targets without further coordination with the establishing commander and without the requirement for terminal attack control. When used to integrate air-to-surface and subsurface/surface-to-surface indirect fires, the kill box will have appropriate restrictions. These restrictions provide a three-dimensional block of airspace in which participating aircraft are deconflicted from friendly surface fires. The restrictive measures also prevent nonparticipating aircraft and maneuver forces from entering the kill box. The objective is to reduce the coordination required to fulfill support requirements with maximum flexibility (permissive attributes), while preventing friendly fire incidents (restrictive attributes). Fires executed in a kill box should comply with ROE and law of war targeting constraints; designation of a kill box is not authorization to fire indiscriminately into the area.

Establishment. Supported component commanders establish a kill box in consultation with superior, subordinate, supporting, and affected commanders. Requirements for kill boxes and other control measures are determined using normal component targeting and planning processes and are established and approved by commanders or their designated staff. Information about the type, effective time, duration, and other attributes will be published and disseminated using existing voice and digital C2 systems. Component commanders, acting on JFC authority, establish and adjust kill boxes within their AO/JOA in consultation with higher, subordinate, supporting, and affected commanders. For an in-depth discussion, see Air Force Tactics, Techniques, and Procedures (TTP) 3-2.59, [Multi-Service TTP for Kill Box](#).

Kill box C2. The AOC is the [air component commander](#)'s primary element for planning, coordinating, and employing air component controlled kill boxes consistent with the JFC's intent. Regardless of the component requesting the use of a kill box, because all kill boxes are established to conduct AI, all components coordinate with the AOC prior to entering or engaging targets in a kill box. This is normally done through the various liaison elements attached to the AOC, (e.g., the battlefield coordination detachment ,

the [naval and amphibious liaison element](#), the [Marine liaison element](#), and the SOLE). Once a target nomination results in an allocation of air assets to perform AI, the kill box is established through coordination with the airspace control authority's airspace team and the applicable land or maritime component commander. The resulting airspace coordinating measure and FSCM is promulgated to the JFC's forces via the airspace control order. Through the air tasking order, the AOC tasks airpower to enter and engage targets in kill boxes, in support of Service/component target nominations, without further coordination with other components.

C2 of airpower in these situations is conducted through the TACS previously discussed. For kill boxes and the resulting AI or [strike coordination and reconnaissance](#) (SCAR) missions that are short of the FSCL, the air component's AI or SCAR missions will check in with the ASOC. This is because the ASOC is normally the airspace control element of the TACS, responsible for all air component operations short of the FSCL, including, but not limited to, CAS and AI. The AOC maintains responsibility for AI and CAS, via airborne or ground-based TACS elements, for the airspace control of those air component missions that are beyond the FSCL.

A kill box is an FSCM that may contain other measures within its boundaries (e.g., [no-fire areas](#), [restricted operating zones](#), and [airspace coordination areas](#)). Restrictive FSCMs (those FSCMs established to safeguard friendly forces) will always have priority over the permissive FSCM (established to facilitate killing a target) when established within a kill box.
