
Operational Training Ranges Required Capabilities



US Marine Corps

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FOREWORD

Marine Corps operational training ranges consist of a complex infrastructure with multiple geographic locations possessing a wide array of capabilities. These training ranges must support a broad spectrum of mission-essential warfighter training. It is uniquely challenging to assess this diverse infrastructure's capacity to meet the current and emergent training requirements imposed on contemporary operating forces.

Marine Corps Reference Publication (MCRP) 3-0C, *Operational Training Ranges Required Capabilities*, is the source document for managers and operators of Marine Corps range complexes as well as Marine air-ground task force (MAGTF) commanders and staffs, joint forces, and other Services describing required capabilities for the entire Marine Corps range infrastructure. This publication categorizes and quantifies the required capabilities of Marine Corps operational training ranges. It also provides an overarching strategy for the ranges to ensure that range assets and capabilities are continuously available to support operations and training requirements—especially critical as the Marine Corps implements significant transitions in weapons, technology, and doctrine.

MCRP 3-0C recognizes the dynamic environment of today's Marine Corps and the one certainty in training and education: that such training must be a continuum which must evolve as needed to produce Marines who are capable of thriving in diverse and challenging operational environments. The infrastructure involved in this training must keep pace with operating force mission requirements and force modernization.

This publication supports mission-essential training in an unconstrained environment. It identifies short-term and long-range investment requirements and supports the development of new operational training ranges. MCRP 3-0C focuses on enhancing the effectiveness of operational training range support provided to warfighters and the stewardship of these vital resources for future generations of Marines.

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS.

A handwritten signature in black ink, appearing to read "George J. Flynn", with a long horizontal line extending to the right.

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OPERATIONAL TRAINING RANGES REQUIRED CAPABILITIES

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CHAPTER 1

MARINE CORPS RANGE PROGRAM

Marine Corps Range and Training Area Management Division [RTAM], Marine Corps Training and Education Command (TECOM) is responsible for the development and implementation of programs to sustain, upgrade, and modernize Marine Corps operational training ranges. These ranges support the achievement and maintenance of combat readiness, which is of utmost importance to the Marine Corps. The Corps has embarked upon a major investment program to sustain and modernize its operational training range infrastructure. This program does not include the facilities, sustainment, restoration, or modernization for the fixed property such as permanent buildings and structures.

Marine Corps Operational Training Range Resources

The Marine Corps relies on many land and airspace resources to accomplish training at all levels of the continuum—individual, unit, Marine air-ground task force (MAGTF), and joint. Its training range complexes are central to the training process. The Marine Corps also depends on extensive and extended access to non-Marine Corps training lands and airspace and extensive cross-Service utilization. In addition to access to other Services' ranges, the Marine Corps relies on other nations' ranges, non-Department of Defense (DOD) Federal lands such as Bureau of Land Management (BLM) property, and public and private non-Federal lands.

Marine Corps Range Complexes

Each component of the range training area (RTA) inventory is vital to Marine Corps training programs. Retaining access to it is a priority in training and range management efforts. The Marine Corps range inventory comprises a complex of ranges and associated airspace.

- Ground and air-to-ground (A/G) range complexes include—
 - ◆ Marine Corps Base (MCB), Quantico.
 - ◆ MCB, Camp Lejeune.
 - ◆ MCB, Camp Pendleton.
 - ◆ Marine Corps Air Ground Combat Center, Twentynine Palms.
 - ◆ MCB, Hawaii.
 - ◆ MCB, Camp Butler, Japan.
- Air combat and A/G ranges include—
 - ◆ Marine Corps Air Station (MCAS), Cherry Point.
 - ◆ MCAS Yuma/Bob Stump Training Range Complex.
 - ◆ MCAS Beaufort/Townsend Range.
- Other installations (small-arms ranges only) include—
 - ◆ Marine Corps Recruit Depot [MCRD], Parris Island.
 - ◆ MCAS, Miramar.
 - ◆ MCAS, Iwakuni, Japan.
 - ◆ Marine Corps Logistics Base (MCLB), Albany.
 - ◆ MCLB, Barstow.
 - ◆ MCAS, Beaufort.

Cross-Service Ranges and Other Training Areas

Some of the cross-Service ranges and other training areas used by Marine Corps training units are—

- Marine Corps Mountain Warfare Training Center Bridgeport, California—Marine Corps.
- Forest Service—United States Department of Agriculture.
- Camp Fuji, Fuji Maneuver Area, Japan—Japanese Self Defense Force.
- Eglin Air Force Base, Florida—US Air Force.
- San Clemente Island Range Complex, California—US Navy.
- Fort Bragg, North Carolina—US Army.
- Fort A.P. Hill, Virginia—US Army.
- Fort Irwin, California—US Army.
- Fort Pickett, Virginia—US Army.
- Pohakuloa Training Area, Hawaii—US Army.
- Southern California and Western Arizona—BLM.
- Foreign training areas:
 - ◆ Scotland—naval surface fire support (NSFS) qualification.
 - ◆ Norway—cold weather training and maritime prepositioning force operations.
 - ◆ Korea—mountain warfare training.
 - ◆ Denmark—electronic warfare (EW) training operations.
 - ◆ Australia—MAGTF fire and maneuver training.
 - ◆ Horn of Africa and West Africa—sustainment training.

Required Capabilities of Operational Training Ranges

This publication defines the required capabilities of the operational training ranges identified in the previous paragraph, which have been sustained and modernized under the Marine Corps Range Investment Program, to support mission-essential training in an unconstrained environment. Marine Corps organizations can assess the capabilities of component elements of each training range complex against the required capabilities for the applicable range classes to determine future range investment priorities.

CHAPTER 2

MARINE CORPS TRAINING CONTINUUM

Marine Corps training is built along a continuum that is well-defined and structured to provide combat-ready Marines, Marine Corps units, and MAGTFs. This continuum is constantly adapting to internal forces, such as funding, availability, personnel levels, societal changes, external forces, and identified threats. The training continuum consists of five major parts—

- Individual-level training.
- Common skills training.
- Skill progression training.
- Professional military education.
- Unit collective training.

Marine Corps training is based on defined tasks, conditions, and standards developed to ensure that training focuses on core competencies; is relevant in terms of expected missions and operational environments; and implements doctrinal and operational principles, such as expeditionary maneuver warfare. Training requirements are derived from the fundamental purpose of the Marine Corps—to provide combat-ready units as the Nation’s expeditionary force in readiness. The Marine Corps training system provides the means to attain combat readiness throughout military operations.

Training and Readiness Programs

The Marine Corps has established official training and readiness (T&R) programs for its ground and aviation units. The purpose of the T&R program is to provide the commander with approaches to individual and collective training for Marines, Marine Corps units, and the MAGTF. The goal is to develop unit warfighting capabilities that will

seamlessly integrate into MAGTFs, and then MAGTFs into joint task force operations. Because unit and individual readiness are interrelated, in that the purpose of individual training is to enhance unit readiness, T&R programs contain both individual and collective events. The Marine Corps T&R concept is built upon the following tenets:

- Building block approach to training.
- Identification of expected missions.
- Unit core capabilities and individual core skills.
- Organization of training tasks into executable events.
- Sustainment of training and unit evaluation.

The Building Block Approach

The goal of training is to achieve and maintain a threshold level of combat readiness, in core capabilities for units and sections and core skills for individuals, by accomplishing a series of progressively more challenging training events. The level of challenge for the individual and the unit increases as each training event builds on the preceding ones, from the simple to the complex.

Identification of Expected Missions

Training requirements are determined by expected missions. The T&R programs focus on training for the successful accomplishment of MAGTF missions across the range of military operations, including stability operations, contingency operations, and major theater war. It also focuses on operational environments, such as military operations on urbanized terrain (MOUT), extreme environments, and littoral warfare. The operational environment greatly affects how the Marine Corps plans and executes its training and

education programs. In particular, the factors of uncertainty, complexity, and the increasing concentration of the world's population within littoral and urban environments impact the continuum. The combination of these factors results in a marked increase in the number and types of tactical and operational tasks a Marine must be trained to execute.

Core Capabilities and Skills

In its building block approach to training, the T&R program identifies core capabilities and core skills for each military occupational specialty (MOS) and unit to be trained. Core capabilities are the essential collective functions that a unit must be capable of performing during extended contingency or combat operations. Core plus capabilities are advanced functions that are specific to the environment, mission, or theater. Core skills are essential individual skills that enable a Marine to perform in combat and qualify that Marine for an MOS. Core plus skills are those combat-focused skills that are specific to the environment, mission, rank, or billet, and are developed upon a Marine's assignment to an operational unit.

Train Through Executable Events

Training requirements for each type and level of training are contained in the T&R manuals, which describe specific training events to be accomplished to achieve combat readiness. These manuals are based on specific performance standards for mission-essential tasks designed to ensure proficiency in core competencies. Using the building block approach to training, T&R events are categorized according to the nature and scope of the training objectives:

- The 1000-level events consist of initial MOS training conducted at formal schools and provide core skill training to Marines of that MOS. Upon graduation, Marines have

completed all 1000-level events and are assigned an MOS.

- The 2000-level events occur when a Marine is assigned to an operational unit. This core plus skills training raises the proficiency of the individual Marine and builds upon core skills introduced in formal school. At the completion of 2000-level training, Marines have mastered the core skills in their specialties and are proficient enough in their MOSs to perform in combat. Units will normally train Marines through this level prior to operational deployment or major collective training exercises. This training also includes formal advanced individual MOS training completed at a formal school or on the job, called managed on-the-job training. Many MOSs require Marines to complete follow-on MOS training as they advance in rank and billet responsibility. This training is accomplished at appropriate intervals in a Marine's career.
- The 3000- to 4000-level events, or unit core capability, are collective events conducted at the lower echelons, such as sections, teams, and squads.
- The 5000- to 8000-level events, also called unit core capability, are collective events conducted at the higher echelons, such as platoon, company, battalion, and regiment.

Sustainment of Training and Unit Evaluation

Periodic demonstration of capabilities is required to ensure perishable skills are maintained so that the unit can accomplish its mission as part of the MAGTF. Proficiency and currency are two measures of training established in the T&R programs. Proficiency is a function of unit capability and individual skill that must be demonstrated to an evaluator. Currency is a T&R event's sustainment interval or period of time within which skills must be refreshed and re-evaluated.

Training Requirements

The following levels of training are essential to the preparation of Marine Corps combat readiness from the most basic unit level to the organizational level.

Individual-Level Training

Individual-level training is a transformation process that takes young men and women and molds them into Marines capable of winning the Nation's battles. This process is founded upon commonly shared individual-level training experiences that begin in recruit training or Officer Candidates School, continue through MOS skill training, and culminate when Marines arrive at their first operational unit. Individual-level training involves extensive physical training, marksmanship instruction, and demanding field problems designed to teach Marine Corps core values and basic concepts and assess the trainee's understanding of them. As Marines progress, they continue to receive training specifically designed to reinforce and supplement their MOS skills. They also receive professional military education commensurate with advances in rank to increase their understanding of warfighting.

Unit-Level Training

Upon assignment to a unit, Marines undergo training in collective skills based on tightly focused requirements defined by their unit's mission-essential tasks. As they move along the continuum, Marines focus less on individual skills and more on collective and unit-level skills, emphasizing their role within the MAGTF. Collective T&R events are designed to sustain individual skills while exercising the capabilities of the unit.

MAGTF Training

The following subparagraphs summarize training requirements for the Marine expeditionary unit

(special operations capable) (MEU[SOC]) and Marine expeditionary brigade (MEB).

Marine Expeditionary Unit (Special Operations Capable)

The MEU(SOC) is the standard, forward deployed Marine expeditionary organization. Current training requirements for the MEU(SOC) include training in the following core capabilities:

- Amphibious operations.
- Marine expeditionary unit (MEU)-level maneuvers ashore.
- Combined arms operations.
- Maritime special operations.
- Stability operations.
- Supporting operations.

Within those core capabilities, the MEU(SOC) must train to accomplish a variety of missions across a broad spectrum of tasks and operations.

Marine Expeditionary Brigade

In addition to the core capabilities and essential missions of the MEU, the MEB is the largest response force of the Marine Corps that is trained in live context and is the smallest MAGTF capable of forcible entry operations. As such, the MEB must be trained to perform those tasks that are inherent to its role as an operational-level warfighting force in the theater of operations. These tasks include forcible entry, amphibious operations, employment of combined arms with MEB-level maneuver, and operational logistics at the theater level. The MEB must also train to perform as both a joint task force headquarters and the rear area operations group.

Live Fire Training

In live fire training, Marine Corps aviation, ground, and logistic elements fire ordnance in a training environment from the aircraft, artillery, armored vehicles, mortars, and crew-served and

individual weapons they will use in combat. The unique benefit of live fire training is that it gives Marines a chance to apply the general skills learned in simulators and other types of training in a realistic operational environment. The accomplishment of critical tasks necessary for combat readiness is dependent upon the availability and capability of live fire ranges. These ranges are indispensable to the effective training of warfighters, whether that training is conducted using live or inert ordnance. Live fire training experiences help to span the gaps between the abstract subject matter learned in the classroom, the physical and mental skills learned in the safe and controlled environment of a simulator, and the stressful and dangerous environments into which Marines will have to deploy their weapons. Live fire training represents the best opportunity to prepare Marines to perform well in hostile and dangerous environments. Live fire training may be conducted in stand-alone training events or in conjunction with virtual, constructive, and nonlive fire maneuver training events.

Future Training Requirements— Evolving Marine Corps Tasks

The training continuum will change as needed to produce Marines who are capable of meeting diverse and challenging operational environments.

Tasks, conditions, and standards for future MAGTF training requirements will be driven by anticipated operational contexts and principles employing new systems and weapons, and characterized by—

- Extended range training operations to exercise capabilities.
- MEB live fire and maneuver exercises.
- Increased requirements for both small- and large-unit MOUT training.
- Significant enhancements to training and feedback/evaluation through instrumented range and target systems.
- Increased reliance on MAGTF sustainment training during deployment.
- Increased joint training.

Training and Readiness Standards and Range Requirements

Expeditionary maneuver warfare capabilities will enhance MAGTF mission capabilities. Tactics, techniques, and procedures are evolving to leverage new capabilities. Future training requirements will evolve across the range of Marine Corps tasks (MCTs). As mission capabilities increase in complexity from individual-level tasks to small-unit events and MAGTF training, range requirements for land, sea, and airspace increase proportionally.

CHAPTER 3

TRAINING REQUIREMENT IDENTIFICATION

The Marine Corps must be prepared to support tasking from the President of the United States, DOD and resulting DOD Universal Joint Task List (UJTL) (high-level, required strategic warfighting capabilities), joint tactical tasks (JTTs), and the Marine Corps Task List (MCTL). The UJTL, JTTs, and MCTL are the basis for all Marine Corps training requirements and are doctrinally based. They are also the basis for weapon systems development programs.

Joint Tactical Task List

Based upon Presidential tasking, DOD develops the UJTL. The United States Joint Forces Command (USJFCOM) uses the UJTL to develop specific statements of required tactical capabilities, the JTTs. The USJFCOM lists 13 JTTs, grouped into seven major task categories. Table 3-1 provides a sample of current JTTs.

Table 3-1. The Joint Tactical Task List.

JTT General Category	JTT Description*
Deploy/conduct maneuvers	Conduct passage of lines
	Conduct countermine operations
	Conduct mine operations
Share intelligence	Disseminate tactical warning information and attack assessment
Employ firepower	Coordinate battlespace maneuver and integrate with firepower
Perform logistics and combat service support	Provide sustainment
Exercise command and control	Conduct joint logistics over-the-shore operations
Protect the force	Execute personnel recovery operations
	Conduct rear area security
	Conduct noncombatant operations
	Provide for combat identification
	Conduct counter improvised explosive device operations
Operate in a chemical, biological, radiological, nuclear, and high-yield explosive environment	Conduct mission operations in a chemical, biological, radiological, nuclear, and high-yield explosive environment

*Not a complete list of applicable JTTs.

Universal Naval Task List and Marine Corps Task List

The Department of the Navy refines the UJTLs and JTTs applicable to naval warfare into statements of required tactical capabilities for Marine Corps units. These statements make up the MCTL, in which specific MCTs are grouped into six general categories applicable to specific warfighting concepts. Table 3-2 provides a list of the six MCTL categories and examples of their associated range-related MCTs.

The Universal Naval Task List (UNTL) is a single source document that combines the Navy Tactical Task List [NTTL] and the MCTL. As applied to joint training and readiness reporting, the UNTL/MCTL provides a common language that commanders can use to document their command warfighting requirements as mission-essential tasks. The UNTL's tactical level of war tasks are a compilation of Navy, Marine Corps, and Coast Guard tasks, written using the common language and task hierarchy of the UJTL. The

UNTL is architecturally linked to the UJTL, which includes strategic-national, strategic-theater, and operational levels of war tasks.

The UNTL/MCTL is designed as an interoperability tool for joint force and naval commanders to use as a master menu of tasks, conditions, and standards that provides a common language and structure for the development of naval and Marine Corps mission essential task lists [METLs]. The UNTL/MCTL, along with the Army and Air Force task lists, directly support the UJTL and joint mission-essential task list [JMETL] development. The UJTL (which includes the Service task lists) is the primary link to support joint training development, the Defense Readiness Reporting System, and future resource/weapon system procurement.

The MCTs could impact or be impacted by the Marine Corps training range infrastructure. Table 3-2 cross-references the JTTs to the applicable range-related MCTs. Table 3-3 provides a summary of the applicability of the range-related MCTs to the four Marine Corps range classes.

Table 3-2. JTTs Cross-Referenced to Range-Related MCTs.

JTT General Category	MCT Description*
Deploy forces and conduct maneuver	Conduct amphibious operations
	Conduct ship-to-objective maneuver
	Conduct offensive forms of maneuver
	Conduct amphibious assault
	Conduct offensive operations
	Conduct noncombatant evacuation operations
	Conduct mobility operations
	Conduct assault support operations
	Conduct defensive operations
	Conduct countermobility operations
	Conduct antiterrorism operations
Share intelligence	Collect data and intelligence
	Conduct reconnaissance and surveillance

Table 3-2. JTTs Cross-Referenced to Range-Related MCTs. (Continued)

JTT General Category	MCT Description*
Employ firepower	Conduct fires to destroy an enemy force
	Conduct anti-air warfare (offensive anti-air warfare)
	Integrate fire support with the scheme of maneuver
	Conduct direct fires
	Conduct indirect fires
	Attack deep targets
	Conduct close air support
	Conduct suppression of enemy air defenses
	Conduct air interdiction operations
	Conduct nonlethal fires
Perform logistics and combat service support	Conduct bulk liquid operations
	Coordinate material handling operations
	Conduct aerial delivery operations
	Conduct general engineering operations
	Provide combat service support services
Exercise command and control	Acquire, process, and communicate information and maintain status of operations
	Prepare plans and orders
	Direct, lead, and coordinate forces/operations
	Conduct information operations
	Conduct joint and coalition operations
Protect the force	Provide security
	Rescue and recover
	Perform consequence management
	Operate in a chemical, biological, radiological, nuclear, and high-yield explosive environment

*Not a complete list of MCTs.

Table 3-3. Applicability of Range-Related MCTs to Marine Corps Range Classes.

MCTs*	MCT Title	Marine Corps Range Classes			
		Individual Level	Unit Level	MAGTF Battalion / MEU Level	MAGTF Regimental / MEB Level
MCT 1	Deploy forces and conduct maneuver				
MCT 1.3.1.1	Conduct ship-to-objective maneuver			X	X
MCT 1.3.2	Conduct amphibious operations			X	X
MCT 1.3.2.3	Conduct amphibious assault			X	X
MCT 1.3.4	Conduct assault support operations			X	X
MCT 1.4.1	Conduct mobility operations		X	X	X
MCT 1.5	Conduct countermobility operations		X	X	X
MCT 1.6.1	Conduct offensive operations		X	X	X
MCT 1.6.2	Conduct offensive forms of maneuver	X	X	X	X
MCT 1.6.4	Conduct defensive operations		X	X	X
MCT 1.6.6.1	Conduct antiterrorism operations	X	X	X	X
MCT 1.6.6.6	Conduct noncombatant evacuation operations (NEO)			X	X
MCT 2	Develop intelligence				
MCT 2.2	Collect data and intelligence			X	X
MCT 2.2.9	Conduct reconnaissance and surveillance		X	X	X
MCT 3	Employ firepower				
MCT 3.2	Attack targets		X	X	X
MCT 3.2.1.3	Integrate fire support with the scheme of maneuver			X	X
MCT 3.2.2.1	Conduct fires to DISRUPT an enemy force		X	X	X
MCT 3.2.2.4	Conduct fires to DESTROY an enemy force		X	X	X
MCT 3.2.3.1.1	Conduct close air support (CAS)	X	X	X	X
MCT 3.2.3.1.2.1	Conduct air interdiction			X	X
MCT 3.2.3.2	Conduct anti-air warfare (offensive anti-air warfare)			X	X
MCT 3.2.3.2.1	Conduct suppression of enemy air defenses (SEAD)		X	X	X
MCT 3.2.4.1	Conduct direct fires	X	X	X	X
MCT 3.2.4.2	Conduct indirect fires	X	X	X	X
MCT 3.2.4.2.1	Attack deep targets	X		X	X
MCT 3.2.6	Conduct nonlethal fires			X	X
MCT 4	Perform logistics and combat service support				
MCT 4.1.2.4.1	Conduct bulk liquid operations		X	X	X
MCT 4.2	Conduct maintenance operations			X	X
MCT 4.2.2.8	Conduct recovery and evacuation operations			X	X
MCT 4.3.4	Conduct air delivery		X	X	X
MCT 4.3.6	Conduct material handling operations			X	X
MCT 4.4	Provide general engineering operations		X	X	X
MCT 5	Exercise command and control				

Table 3-3. Applicability of Range-Related MCTs to Marine Corps Range Classes. (Continued)

MCTs*	MCT Title	Marine Corps Range Classes			
		Individual Level	Unit Level	MAGTF Battalion / MEU Level	MAGTF Regimental / MEB Level
MCT 5.1.1	Provide and maintain communications		X	X	X
MCT 5.1.1.6	Relay communications			X	X
MCT 5.3.1	Direct operations		X	X	X
MCT 5.3.1.2	Exercise tactical command and control		X	X	X
MCT 5.3.2.1	Establish/conduct combat operations center (COC) operations			X	X
MCT 5.4.1.2	Conduct electronic warfare		X	X	X
MCT 6	Protect the force				
MCT 6.1	Provide security		X	X	X
MCT 6.1.1.5	Conduct convoy security		X	X	X
MCT 6.2.1	Conduct tactical recovery of aircraft and personnel			X	X
MCT 6.4.5	Conduct enhanced chemical, biological, radiological, nuclear, and high-yield explosive operations		X	X	X

*Not a complete list of MCTs.

Marine Corps Task List Categories

The following categories define Marine Corps capability requirements for combat missions, contingency operations, and readiness in the support of warfighting.

MCT 1.0—Deploy Forces and Conduct Maneuver

This category of tasks includes the employment of forces on the battlefield in combination with fire or fire potential. Maneuver is the movement of forces to achieve a position of advantage with respect to enemy forces. It is a dynamic element of combat designed to achieve surprise, psychological shock, physical momentum, and moral dominance, which enables smaller forces to defeat larger ones. This category also includes movement of combat and combat support forces. Specific examples of MAGTF training range-related MCT 1.0 activities include the conduct of amphibious operations, offensive and defensive actions, and mobility and counter-mobility operations.

MCT 2.0—Develop Intelligence

This category includes the planning and development of intelligence operations. Its goal is to develop intelligence required for planning and conducting tactical operations, including analyzing the enemy's capabilities, intentions, and vulnerabilities. Intelligence also refers to analysis of the environment, to include weather and the application of tactical decision aids and weather effects matrices on friendly and enemy systems and terrain. Collecting data and intelligence and conducting reconnaissance and surveillance are examples of training range-related MCT 2.0 activities.

MCT 3.0—Employ Firepower

Firepower is the collective and coordinated use of target acquisition data, direct and indirect fire weapons, armed aircraft of all types, and other lethal and nonlethal means against air, ground, and sea targets. This category of tasks includes artillery, mortar, and other non-line-of-sight fires.

It includes naval gunfire, NSFS, close air support (CAS), electronic attack, strike, air warfare, anti-air warfare (AAW), and interdiction. Specific examples of training range-related MCT 3.0 activities include the conduct of targeting, direct and indirect fires, and nonlethal engagement.

MCT 4.0—Perform Logistics and Combat Service Support

Logistics and combat service support sustain forces in the combat zone by providing health services and arming, fueling, fixing, moving, supplying, staffing, and maintaining visibility over equipment. This support is provided as necessary to US agencies and friendly nations and groups. Specific examples of training range-related MCT 4.0 activities include the conduct of maintenance operations, recovery and evacuation operations, air delivery operations, and general engineering operations.

MCT 5.0—Exercise Command and Control

This category of tasks involves maintaining visibility over and arranging personnel, equipment, and facilities during the planning for and the conduct of military operations. Specific examples of training range-related MCT 5.0 activities include providing and maintaining communications, directing operations, exercising tactical command and control, and establishing and conducting a combat operations center.

MCT 6.0—Protect the Force

This category of tasks includes those measures the force takes to remain viable and functional by protecting itself from the effects of or recovery from enemy activities. Specific examples of training range-related MCT 6.0 activities include providing security and conducting convoy security, assault support such as tactical recovery of aircraft and personnel operations, and enhanced chemical, biological, radiological, nuclear, and high-yield explosive operations.

CHAPTER 4

RANGE CLASSES AND ATTRIBUTES

Marine Corps Range Classes

The required capabilities for Marine Corps operational training ranges are divided into four separate range classes: individual, unit-level, MEU-level, and MEB-level. The range classes are aligned with the types of training conducted and the size of the units conducting the training. In addition, there are attributes consisting of operational elements, system characteristics, and information exchange requirements (IERs) and interoperability that are used to establish thresholds, objectives, and key performance parameters (KPPs) for the range classes.

Individual-Level Training Range

The individual-level operational training range supports individual training standards (ITS) for each element of a MAGTF, providing the basic training environment associated with the MAGTF aviation combat element (ACE), ground combat element (GCE), and logistics combat element (LCE). It also supports the basic infantry combat skills taught at the School of Infantry and specific training events associated with other formal schools.

Unit-Level Operational Training Range

The unit-level operational training range supports the set of small-unit offensive and defensive tactics and operations associated with expeditionary MAGTF forces against hostile or potentially hostile forces. It also supports all types of aircraft, weapons, special operations forces, landing forces, and ground forces employed in concerted military efforts. These efforts include operational maneuver from the sea (OMFTS) and

ship-to-objective maneuver (STOM). The unit-level operational training range supports tactics and operations associated with all training phases of small unit-level missions and employs varying degrees of immersion to better stimulate the combat environment.

MEU-Level Operational Training Range

The MEU-level operational training range supports the set of offensive and defensive tactics and operations associated with expeditionary MAGTF forces against hostile or potentially hostile forces. It also supports the aircraft, weapons, ordnance, special operations forces, landing forces, and ground forces employed in concerted military presence and engagement efforts such as OMFTS and STOM.

MEB-Level Operational Training Range

The MEB-level operational training range supports the set of offensive and defensive tactics and operations associated with small-scale contingency expeditionary MAGTF forces against hostile or potentially hostile forces. It supports all types of aircraft, weapons, special operations forces, landing forces, and ground forces that will be employed in concerted crisis response military efforts that are characterized by high-density, high-risk operations.

Marine Corps Range Attributes

The required capabilities for the Marine Corps training range infrastructure are measured using common attributes; specifically, operational elements, system of system characteristics, and IERs and interoperability.

Operational Elements

The Marine Corps training range infrastructure includes three operational elements: airspace, sea space, and land area.

Airspace

Airspace refers to any one of several types of controlled and uncontrolled airspace required to support range operations. Types of airspace could include restricted areas, warning areas, military operating areas, and air traffic control assigned airspace. Airspace is defined by horizontal, area, vertical, and temporal measurements wherein activities must be confined because of their nature or wherein limitations may be imposed on nonparticipating aircraft. The horizontal and area measurements are in nautical miles and square nautical miles, respectively. The vertical measurement is a linear measure described in feet, measured upward from the surface of the earth to some altitude above mean sea level. The temporal measurement is in days, hours, and minutes.

Sea Space

Sea space is an operating area defined by horizontal, area, and temporal measurements. The horizontal and area measurements are in nautical miles and square nautical miles, respectively. The temporal measurement is in days, hours, and minutes.

Land Area

Land area is also an operating area defined by horizontal, area, and temporal measurements. The horizontal and area measurements are in feet or miles and square miles/acres, respectively. MOUT training imposes special considerations associated with land area as it will also include a vertical dimension because of the requirement to accommodate both above- and below-street level training. The temporal measurement is in days, hours, and minutes.

System of Systems Characteristics

The Marine Corps range infrastructure includes a system of systems composed of six major components discussed in the following paragraphs.

Scheduling System

The scheduling system includes all necessary components and elements of a common range management system endorsed and fielded by headquarters Marine Corps. These elements include software applications. This system is used by range personnel and users to determine its capability, availability, and assignment for use. It also helps range management personnel to measure the range's usage.

Communications System

The communications system includes all necessary components and elements used by range personnel to establish and maintain secure and nonsecure, two-way, point-to-point, surface-to-surface (S/S), and A/G communications with range operators, range maintainers, and range users. It could also include interrange communications not covered by IERs and interoperability, radio transmitters, receivers, transceivers, communications antennas, interface devices, and cryptology equipment.

Meteorological System

The meteorological (MET) system includes all necessary components and elements used by range personnel and users for determining and displaying current weather conditions. This system includes weather observing equipment, weather data transmission systems, and weather information storage and display systems.

Target System

The target system comprises all necessary components and elements associated with presenting and controlling fixed and mobile land and air targets, target body, active and passive emitters and augmentation mounted on the

target to provide performance feedback to shooters, and target control systems. The target system could also include virtual targets generated by elements of the instrumentation system. Some typical targets are fixed and mobile targets and their associated ranges, such as bulls-eye, strafe, nontactical, tactical, and time-critical targets that support A/G, NSFS, artillery, mortar, antiarmor, and small arms tactics training and weapons expenditure.

Instrumentation System

The instrumentation system includes all necessary components and elements associated with event tracking, range control (RC), exercise control and coordination (EC&C), modeling and simulation (M&S), scoring, and debriefing/after action review (AAR). It also comprises elements such as radar, optical, global positioning, and tracking systems; data processing and display systems; threat and weapons system simulators, emulators, and employment models; automated and visual scoring systems; and recording, reconstruction, replay, and display equipment and facilities.

Opposition Force System

The opposition force (OPFOR) system includes all necessary live and virtual components and elements associated with presenting friendly event participants engaged in force-on-force and live fire training with a proactive and reactive enemy. The OPFOR is the key component of a training environment that replicates, to the greatest extent practical, the expected enemy order of battle in the planned area of operations. In many instances, the OPFOR will not be assigned to the range that is supporting the required range function; however, the OPFOR represents an integral and essential part of any range's ability to create a meaningful training experience. A typical OPFOR might be composed of any or all of the following elements:

- Aircraft and aircrew.
- Artillery and artillery crews.

- Armored vehicles and their crews.
- Combat and support ground personnel.
- Radar and electro-optical tracking equipment.
- Weapons systems, performance models created by the M&S system, and tactics associated with any of the five preceding bullets.
- Fixed or mobile targets.
- An electronic combat capability.
- The command and control element that allows the OPFOR to perform as a proactive or reactive enemy.

Electronic combat is one of the elements of an OPFOR that can be characterized quantitatively by frequency regardless of the location where the component is employed. An OPFOR may employ either offensive electronic attack or defensive electronic protection forms of electronic combat. The employment of the electronic combat weapons by the OPFOR creates a characteristic radio frequency (RF) signature that is referred to as an electronic order of battle (EOB). The capability of a range to recreate an EOB requires that the range be able to simulate the basic elements of electronic combat, which include—

- Search, acquisition, and tracking radars.
- Antiaircraft artillery systems.
- Surface-to-air missile (SAM) systems.
- S/S missile and artillery systems.
- RF (including optical) signatures related to weapons guidance systems.
- RF and optical jamming.

Electronic combat threats are characterized by levels according to the complexity or degree of integration. The four electronic combat threat levels are—

- Level one represents a limited number (1–2) of threat weapon system emitters used primarily for threat signal recognition. Its systems generate signals with sufficient realism and fidelity to stimulate friendly platforms' signal recognition, processing, and display systems.

- Level two includes sufficient electronic combat emitters to provide multiple coordinated threats with accurate threat replication. Its systems support friendly sensor/countermeasures employment and targeting.
- Level three includes a high-density, multi-axis, coordinated threat environment of various types and capabilities throughout the exercise area. Its systems replicate the signal characteristics, geographic placement, operational doctrine, and command and control associated with coordinated threat operations.
- Level four includes a high-density, multi-axis, coordinated threat environment of various types and capabilities throughout the exercise area. Unlike electronic combat threat level

three, it provides reactive, coordinated threats from all axes and operators highly proficient in coordinated threat operations and tactics.

Information Exchange Requirements and Interoperability

The Marine Corps range infrastructure IERs reflect the information needs of both the range-related and nonrange-related systems supported. The IERs are the basis for ensuring the interoperability of the Marine Corps range infrastructure with other Services' ranges, systems, units, and forces in order to be able to operate together effectively.

CHAPTER 5

RANGE INFRASTRUCTURE

This publication establishes a common set of range operational elements and range-related systems and subsystems used to describe the required capabilities of a range infrastructure. These elements include a complex mix of geography and equipment to support numerous range users and range operations.

The suite of ranges, as listed in appendix A, defines the specific range requirements for each level of training. The suite outlines the maneuver/training area, impact areas, live fire ranges, aviation ranges, and MOUT complexes required to conduct training events as delegated in Marine Corps orders specifying ITS and promulgating T&R manuals. Where applicable, each individual range or training area is directly linked to a defined Deputy Commandant for Installations and Logistics (DC I&L) facility category code and RTA description or definition. Appendix A also includes the live fire range threshold land area requirements, by dimensions and total area for the various live fire ranges.

The appendix is intended to provide the baseline requirement for each level of training. Specific complex requirements, such as number and type of ranges for each complex, is dependent upon a complex or installation's defined mission, units to be supported, capacity, throughput, and the commander's discretion. The following paragraphs provide information on the five general types of ranges contained in appendix A, to include sources for dimensional and area attributes where available. Appendix B provides a list of additional range assets that are also essential to range infrastructure.

Maneuver/Training Areas

Maneuver/training areas and live fire and maneuver training area/ranges are defined by the level in which they support training: individual, unit, and MAGTF. Doctrinally-defined requirements outlined by Marine Corps ITS and T&R requirements or doctrinally-accepted US Army-defined training land requirements outlined in Training Circular (TC) 25-1, *Training Land*, are used to determine specific dimensions and overall area. Surface danger zones are used in determining the dimensions and area for the live fire and maneuver training area or ranges pursuant to Marine Corps Order (MCO) 3570.1B, *Range Safety*, and Department of the Army (DA) Pamphlet 385-63, *Range Safety*.

Impact Areas

There are three types of impact areas used as a baseline requirement at each training level—duded, nonduded, and temporarily duded:

- A duded, dedicated impact area has permanently delineated boundaries normally used to contain nonsensitive, high explosive, military munitions. A high hazard impact area is a permanently designated impact area used to contain sensitive, high explosive military munitions and is normally delineated within a dedicated impact area where access is restricted due to explosive safety hazards.

- A nondudded impact area has designated boundaries used to contain nonexplosive military munitions. These areas are primarily composed of small arms range safety fans and are available for maneuver when not used for military munitions training.
- A temporarily dudded impact area is primarily used to contain nonexplosive military munitions that may be temporarily used to contain nonsensitive, high explosive, military munitions. A temporarily dudded impact area should be capable of being cleared for maneuver. Impact area descriptions are delineated per the DC I&L facility category codes, Naval Facilities Engineering Command P-Publication P-72, *Department of the Navy Facility Category Codes*. This code listing is contained within DOD Instruction 4165.3, *Department of Defense Facility Classes and Construction Categories*.

Specific dimensions and area requirements for impact areas are not defined. These attributes are strictly determined by the types and frequency of fire support and aviation ordnance used at each individual range or complex.

Live Fire Ranges

Live fire range listings will differ through each level of training. Dimension and area calculations are derived from baseline attributes outlined in TC 25-8, *Training Ranges*. Individual range descriptions and baseline characteristics are defined by the appropriate facility category code.

Aviation Ranges

The required aviation range attributes are based upon the six functional areas of Marine aviation:

- Offensive air support (OAS).
 - ◆ Close air support.
 - ◆ Deep air support.
- AAW.
 - ◆ Offensive anti-air warfare.
 - ◆ Air defense.
- Assault support.
- Air reconnaissance.
- Electronic combat.
- Control of aircraft and missiles.

Dimensional and area attributes are directly derived from doctrinal ITS and T&R requirements. Training requirements for control of aircraft and missiles do not directly correlate to specific range requirements.

Military Operations on Urbanized Terrain Training Facilities/Complexes

The attributes of MOUT facilities or complexes are defined and listed in four categories: MOUT facility (small), MOUT facility (large), MAGTF-level MOUT facility, and military operations on urbanized terrain assault course (MAC). Description and characteristics of each type of facility are defined by facility category code.

CHAPTER 6

COMMON MARINE CORPS RANGE REQUIREMENTS AND ATTRIBUTES

There are six common Marine Corps range requirements and attributes: high-level required capabilities, IERs and interoperability, suitability, the scheduling system, the MET system, and the instrumentation system. The specific required capabilities associated with these common requirements and attributes are detailed in the following paragraphs.

High-Level Required Capabilities

The following high-level required capabilities, representing both thresholds and objectives, are applicable to all classes of ranges and all levels of training:

- Adequate airspace with absolute volume, clearances, and authorizations to allow the use of long-range platform sensors, tactics, and weapons associated with detection, classification, identification, and neutralization of hostile threats.
- The use of commercial-off-the-shelf (COTS) technology for hardware and software applications.
- A threat environment representative of the potential real-world area of operations.
- Sufficient (and usable) RF bandwidth for employing onboard sensors, communications, and intelligence collection and distribution systems.
- A communications system that includes RC, exercise control, and datalink circuits that allow the unimpeded exchange of secure and nonsecure intra- and inter-range information

and data among all range organizations, on- and off-range participants, and designated observers.

- An instrumentation system, independent of a fixed geographic location, that provides real-time observation; post-mission reconstruction; replay and debrief of participants' time, space, and position information (TSPI); and monitoring of weapon system status, employment, performance, and "kill" determination.
- A robust data collection, processing, and communications capability and capacity for depicting real-time force dispositions and maneuvering, key combat systems data, EC&C, and virtual range activities.
- For designated Joint National Training Capability (JNTC) ranges, compatibility with the JNTC concept, which includes a JNTC-compatible architecture for the exchange of low-latency live, virtual, or constructive data and information.

Information Exchange Requirements and Interoperability

Information Exchange Requirements

An IER characterizes the information exchanges to be performed by and with a proposed system of systems. A top-level IER identifies who exchanges what information with whom, why the information is necessary, and how the information exchange should occur. The top-level training range IERs identify the training range information that is exchanged to support training

range-related tasks. They also identify where the information exchange may occur between two or more training range information exchange nodes or between training range information exchange nodes and nontraining range information exchange nodes. The following information exchange nodes are included in the top-level training range IERs:

- Officer conducting the exercise (OCE)—the individual or set of individuals, who may be ashore or afloat, responsible for evaluating the performance of range participants for purposes of determining the participants' combat readiness.
- Participant—a friendly or OPFOR aircraft, ship, ground vehicle, personnel, or a command and control element and its on-board sensors and systems.
- RC—the facilities and equipment that provide real-time monitoring and control of on-range events and the range resources that support those events.
- Range scheduling (RS)—the facilities and equipment that are used to reserve a specific range period and assign specific range resources to support an on-range event.
- Range tracking (RT)—the facilities and equipment that are not associated with a specific range resource OPFOR weapon system but do provide TSPI of all on-range participant activities. The RT may include dedicated training range tracking systems, such as radar, optical, identification friend and foe, and instrumentation. It may also include off-range tracking systems, such as a fleet area control and surveillance facility radar or an air station approach control radar.
- Range electronic warfare (REW)—the ground-based facilities and equipment that generate RF signals to simulate or replicate an OPFOR EOB.
- Range targets—the facilities, equipment, and materials against which participants execute attacks and employ weapons. Targets, which could be air, ground, surface, or subsurface, also include the imbedded and remote scoring systems associated with them.
- Range Data Collection and Processing System (RDCPS)—the local and remote facilities and equipment that collect and correlate real-time information related to participant TSPI, RT, REW, targets, and range simulation (see table 6-1) activities. The RDCPS also includes the facilities and equipment used to perform real-time assessment of weapons engagements, including the probability of kill (PK) against both live and virtual targets.
- Range simulation—the facilities and equipment used to generate a virtual threat environment and virtual targets. The simulation could be a stand-alone system or within another system, such as targets or RDCPS.
- Range debriefing (RD)—the facilities and equipment used by participants and the OCE to view on-range events in real-time and to conduct post-mission review/AAR of on-range events. The RD facilities and equipment may be located at the range or at remote locations, either ashore or afloat.

The top-level training range IERs, which are universal across all levels of training, are presented in table 6-1. Critical IERs necessitate information exchange or the training in the indicated MCT will be impacted adversely.

Table 6-1. Marine Corps Training Range Top-Level IERs.

MCT	Event/Action	Information Characterization	Sending Node	Receiving Node	Critical (Y/N)	Notes
MCT 5	Request range period	Command & Control User ID, type and number of participants, training event name and number, range, time, ordnance planned, range support required	Participant OCE	RS RC	Y	
MCT 5	Range schedule confirmation	Command & Control User ID, range ID, time scheduled, exceptions to requested range support	RS	Participant OCE RC	Y	
MCT 5	Range check-in	Command & Control Participant ID, TSPI, available weapon systems information	Participant Targets REW	RC REW Targets RD RDCPS	Y	
MCT 1 MCT 1.3.1.1 MCT 1.3.2 MCT 1.3.2.3 MCT 1.3.4 MCT 1.4.1 MCT 1.5 MCT 1.6.1 MCT 1.6.2 MCT 1.6.6.1	Participant maneuver	Situational Awareness Participant ID, TSPI	Participant Targets RT	RDCPS RD RC OCE	Y	
N/A	Generation of a virtual target or threat simulation	Situational Awareness Target track data, EW, threat signal data	SIM	Participants RDCPS Remote RDCPS RD OCE	N	If JNTC event, would be distributed to JNTC enterprise
MCT 1.3.1.1 MCT 1.3.2 MCT 1.3.2.3 MCT 1.3.4 MCT 1.4.1 MCT 1.5 MCT 1.6.1 MCT 1.6.2 MCT 1.6.4 MCT 1.6.6.1	Weapon systems employment	Targeting Detection, targeting, tracking, weapon type, number of weapons, weapon release	Participant SIM REW	RDCPS RD Participant OCE	Y	Weapons fired by or against participant, live or virtual targets, or REW; includes all available sensor and weapons system data
All range-related MCTs	Data processing and correlation	Situational Awareness All available range data	RDCPS	Remote RDCPS JNTC Enterprise	Y	
MCT 3.2 MCT 3.2.2.1 MCT 3.2.2.4 MCT 3.2.3.1.1 MCT 3.2.3.1.2.1 MCT 3.2.3.2 MCT 3.2.3.2.1	Engagement outcome	Targeting PK and "kill" notification	RDCPS	Participant OCE RD	Real time–Y Post mission–Y	Applies to simulated weapons employment; requires weapons M&S

Table 6-1. Marine Corps Training Range Top-Level IERs. (Continued)

MCT	Event/Action	Information Characterization	Sending Node	Receiving Node	Critical (Y/N)	Notes
MCT 3.2 MCT 3.2.2.1 MCT 3.2.2.4 MCT 3.2.3.1.1 MCT 3.2.3.1.2.1 MCT 3.2.3.2 MCT 3.2.3.2.1	Weapons scoring	Targeting Weapons impact, weapon miss distance	Targets	Participant RC OCE RD	Real time—N Post mission—Y	
All range-related MCTs	Event monitoring and control	Situational Awareness All processed range data information	RDCPS	RC OCE RD JNTC Enterprise	Y	Event monitoring and control may be at the range (local) or at a remote location
MCT 1.3.1.1 MCT 1.3.2 MCT 3.2.1.3 MCT 3.2.3.1.1 MCT 4.1.2.4.1 MCT 4.2 MCT 4.3.4 MCT 4.3.6 MCT 4.4 MCT 5.3.1 MCT 5.3.1.2	Coordinated range operations	Tracking All processed training range data and information	RDCPS	JNTC Enterprise Remote RDCPS	JNTC ranges—Y Non-JNTC ranges—N	Transfer of data from one range to another to enable coordinated operations between remote range facilities
All range-related MCTs	Training event debrief/AAR	Situational Awareness All processed range data information	RDCPS	RD OCE JNTC Enterprise	Y	Debrief may be conducted at the host range (local) or at a remote location

ID=identification
SIM=simulation

Interoperability Key Performance Parameter

The top-level training range IERs are the basis for measuring the achievement of training range interoperability. The threshold for training range interoperability is the achievement of all critical top-level IERs, while the objective for training range interoperability is the achievement of all top-level IERs.

Suitability

Table 6-2 presents range suitability characteristics for the entire system of systems at any range. Threshold and objective are met concurrently in this table. These characteristics are applicable to all range classes and all levels of training.

Scheduling System

The scheduling system for ranges should allow potential range users access to a web-enabled database of descriptive information with individual range resources for the entire Marine Corps range infrastructure and the ability to submit a future schedule request for a range or training area. The objective for the scheduling system should be an interactive, web-enabled database through which ITS are interfaced with aircraft, surface combatant, subsurface combatant, and ground element training requirements. This objective, as required by T&R manuals, is described in the following paragraphs.

Table 6-2. Training Range Suitability Characteristics.

Characteristic	Threshold	Objective
Operational availability*	0.82%	0.85%
Mean time to repair	≤7.0 hours	6.5 hours
Mean time between failure*	100.0 hours	120.0 hours
Mean time between mission critical failure	125.0 hours	150.0 hours
Built-in test fault detection rate	80.0%	90.0%

*Indicates a KPP.

Pre-Event Module

The pre-event module for a range scheduling system should be capable of supporting unit-level queries based upon the type of training and the size of the unit to be trained. Based upon the query, the pre-event module should be capable of searching a database of the entire Marine Corps range infrastructure to identify and display which ranges or range complexes possess the specific training resources required to support the identified training event. The pre-event module should also be capable of indicating which of the qualified ranges have open range periods.

It should also identify competing requests for the same range period or range resources to affected range facility schedulers. Range schedulers would be responsible for adjudicating these conflicts and notifying requesting units of the results of their adjudication. The module should automatically generate a confirmation to the requesting unit confirming the scheduled period, training event to be supported, and list of range resources scheduled. This notification should identify any required resources that are not available for the scheduled range period.

The pre-event module should be flexible and responsive to late cancellations by scheduled

users. Upon notification of a cancellation, it should broadcast a range cancellation or availability notification to all interested subscribers to allow the greatest opportunity for the newly released range period to be rescheduled, rather than have the related range resources go unused.

Real-Time Event Module

The real-time event module should allow the range controller to enter into the scheduling system all event-related data prior to, during, and after the event. This data includes, but is not limited to, differences between requested range resources and actual range resources available at the start of the event; event start and stop times; number and types of participants; airspace, sea space, land area, and targets used; type and number of ordnance expended; and scoring.

Post-Event Module

The post-event module should interface with all other post-event reports and generate a summary of data collected by pre-event and real-time event modules. It should also automatically generate required range utilization reports in required formats, such as the report increment of the Range Facilities Management Support System.

Meteorological System

The MET system should collect and report present weather conditions, such as temperature, barometric pressure, cloud height, visibility, wind speed, wind direction, and sea state. Although present weather conditions at a range complex may result in an event cancellation due to target obscuration, the inability to employ some existing target designation/weapon guidance systems, or the anticipated impact of the weather conditions on environmental compliance requirements, it is reasonable to assume that future weapon systems capabilities associated with target detection and weapon guidance will prevent the need for on-site MET systems.

Instrumentation System

The instrumentation system at any range complex may exist as a stand-alone, dedicated system, or as a distributed set of capabilities that are embedded within other existing or stand-alone systems and subsystems. Regardless of the physical structure, range instrumentation will consist of the following six major elements that contribute to the training range environment at the individual, unit, MEB, and MEU levels.

Tracking

Tracking provides event participants with TSPI. High fidelity TSPI, which is characterized by high update rates, mobile COTS-based display systems, and positional accuracy, is required by tactical aircraft, unmanned aircraft systems (UASs), and instrumented exercise weapons such as missiles. Low fidelity TSPI, which is characterized by lower update rates and positional accuracy, is typically useful only for nontactical aircraft, personnel, and ground units such as air cushion, armored, amphibious, or mechanized vehicles. These are ground-based display systems that are

not dependent upon specific equipment suites or fixed facilities.

The TSPI tracking systems should operate in an environment where the ground-based reception/display segments of the TSPI tracking systems are not tied to any fixed geographical position or facility. Rather, the ground-based reception/display segments of the TSPI tracking systems should be transportable to allow participant TSPI data to be received and displayed at any desired location, including shipboard.

The required capability for TSPI at any level of training will be indicated by the required maximum number of high fidelity and low fidelity TSPI tracks to be provided. The number of high fidelity and low fidelity TSPI tracks was derived from training requirements included in applicable training manuals, fleet exercise publications, and exercise scenarios associated with MCTs and expeditionary operations.

Range Control

Range control refers to the ability of range operations personnel to observe on-range event activities in real-time and provide directions to event participants or make the event-related data available to other observers. The required capability for RC at any level of training will be indicated as YES or NO for two separate display criteria: two-dimensional (2-D) and three-dimensional (3-D).

Exercise Control and Coordination

Exercise control and coordination refers to the ability of the exercise controlling authority to observe and control exercise event activities in real-time, provide directions to event participants, input flexibility into exercise scenarios, and make event-related data available to other observers in both real-time and post exercise situations. The required capability for EC&C at any level of training will be indicated as YES or NO for three

separate criteria: 2-D, 3-D for exercise controllers, and whether there is the potential to interface with the JNTC enterprise.

Modeling and Simulation

Modeling and simulation provides detailed system and equipment performance capability, such as search patterns, pointing angles, weapons fly-out profiles, lethality curves, RF and infrared spectral signatures, and PK for both friendly and OPFOR weapon systems. It also can simulate a system's RF characteristics to stimulate a weapon system's receiver, processing, and display systems. The M&S objective allows the range to recreate a virtual operational environment that emulates the intended area of operations, allowing event participants to experience the geographical details of the expected area of operations. The required capability for M&S for any level of training will be indicated as YES or NO for the following types of training scenarios: air to air (A/A), A/G, surface to air (S/A), and S/S, including ground operations.

Scoring

Scoring refers to the ability to detect and report the success or PK of live or virtual training weapons employed on the range. The required capability for scoring at any level of training is stipulated by type, feedback, and real time kill

notification (RTKN). The type of scoring is categorized as automatic or manual, the latter requiring human intervention to report the results of the weapons employment. If feedback is necessary, the required capability will stipulate whether that feedback should be provided in real time, post mission, or both. Finally, where a required capability for RTKN exists, the requirement will stipulate whether the RTKN should be reported automatically or by voice, the latter requiring a human observer intervention.

Event Debrief/After Action Review

Event debrief/AAR allows the system to take tracking, M&S, and scoring data from a given event and provide a detailed, post-event, interactive environment for event participants and observers to review, replay, assess, and critique the participants' performance. The required capability for event debrief/AAR at any level of training will stipulate whether the capability should be available locally at the host range, remotely at another range or location, or both. Remote event debrief/AAR should not require instrumentation system-specific equipment or a dedicated debrief facility; rather, it should be available to participants via wireless or broadband connection in a format compatible for display on personal computer/laptop technology at any location, ashore or afloat.

CHAPTER 7

REQUIRED INDIVIDUAL-LEVEL TRAINING RANGE CAPABILITIES

Individual-Level Training

Marine Corps individual-level training reinforces the basic combat infantry skills and supports personnel and platform training requirements associated with the Marine Corps ITS at the individual and progressive levels of training. The ITS describe the required essential core and core plus skills (1000- and 2000-level T&R events) for the basic building blocks required of Marines of the ACE, GCE, and LCE.

Aviation Combat Element

The individual-level training range supports crews of fixed- and rotary-wing aircraft that will deploy as part of the Marine expeditionary force (MEF). The fixed-wing ACE platforms include fighter, attack, electronic warning/electronic attack, and support aircraft. The rotary-wing ACE platforms include both transport and attack helicopters and vertical/short takeoff and landing aircraft (V/STOL). The ITS associated with these fixed- and rotary-wing aircraft platforms and individual Marine skills are described in the individual platform T&R manuals. There is also a ground support element within the ACE whose individual range requirements are very similar to that of the LCE. All LCE individual range requirements should be applied to ACE ground support element requirements.

Ground Combat Element

The individual-level training range supports the combat vehicle crews for tanks and amphibious and armored vehicles, artillery crews including those staffing battlefield rocket-launching

systems, and Marines assigned to individual and crew-served weapons within a MEF's operational and support units. The ITS associated with these GCE assets are described in formal curricula and outlined in each occupational field's T&R manual.

Logistics Combat Element

The individual-level training range supports individual vehicle and equipment crews, including trucks, refuelers, and expeditionary airfield refueling systems. The ITS associated with these platforms and the individual Marine skills are outlined in each occupational field's T&R manual.

Operational Concept

The operational concept for individual-level range requirements is assessed based on a comprehensive training scenario derived from the UJTL and directly linked to the MCTL. The MCTL then drives the individual T&R requirements as defined in ITS. The following operations and events from the operations list of the UJTL and their associated mission-essential tasks form the basis for assessment of the required range attributes:

- Reconnaissance, surveillance, and target acquisition.
- Command and control warfare.
- Information operations.
- Suppression of enemy air defenses.
- Joint interdiction.
- AAW.
- Forcible entry/expeditionary assault.
- Movement to contact.

- Attack.
- Pursuit.
- Exploitation.
- Rear area security.
- Defensive AAW.
- Area defense.
- Mobile operations.
- Delay.
- Withdrawal.
- Combat tactical recovery of aircraft and personnel.
- Deployment.
- Counterterrorism.
- Antiterrorism.

Individual-Level Suite of Ranges

The suite of ranges described in table 7-1 provides the baseline range requirements for each MAGTF element for individual level training.

Required Capabilities

Operational Elements

The Marine Corps range infrastructure’s operational elements are composed of airspace, sea space, and land area and are described at the individual training level.

Airspace

The airspace threshold is achieved for ACE A/G training with a 20 nm x 20 nm range extending from the surface to 25,000 ft. The airspace objective is achieved by the following GCE, ACE, and LCE training:

- Training for GCE and LCE requires a 12-hour, day/night period on a range with airspace that extends from the surface to 25,000 ft above ground level (AGL) to support the use of live fire mortars, artillery, and direct fire weapons.

Table 7-1. Individual-Level Suite of Ranges.

GCE Suite	
Maneuver/training area	Automated anti-armor tracking and live-fire range
Dedicated impact area—dudged	Tank/fighting vehicle stationary gunnery range
Impact area—nondudged	Indirect fire range
Impact area—temporarily dudged	Automated multi-purpose training range
Basic 10m–30m zero firing range	Fire and movement range
Automated field-fire (AFF) range	Automated infantry squad battle course
Rifle known-distance (KD) range	Live hand grenade range
Automated sniper field-fire range	Nonstandardized engineer qualification range
Pistol KD range	Light demolition range
Automated multi-purpose machine gun (MPMG) range	MAC
Automated grenade launcher range	MOUT collective training facility (small)
40mm (grenade) machine gun qualification range	Breacher range
ACE Suite	
Dedicated impact area—dudged	EW/combat range
Impact area—nondudged	Basic 10m–30m zero firing range
Impact area—temporarily dudged	Rifle KD range
OAS range	Pistol KD range
LCE Suite	
Dedicated impact area—dudged	Pistol KD range
Impact area—nondudged	Automated MPMG range
Impact area—temporarily dudged	40mm (grenade) machine gun qualification range
Basic 10m–30m zero firing range	Nonstandardized engineer qualification range
AFF range	Light demolition range
Rifle KD range	

The horizontal limits of the airspace should extend to 10 nm on either side of the training range land area

- Training for ACE requires the following:
 - ◆ The OAS range requires a 30-minute period on a 25 nm x 25 nm range with airspace that extends from the ocean's surface to 30,000 ft AGL. The area should be cleared for use of A/G gunnery, free-fall and guided A/G munitions, laser designating devices, and the expenditure of chaff and flares.
 - ◆ The AAW range requires a 30-minute period on a 20 nm x 50 nm range with airspace that extends from the surface to 50,000 ft AGL. The airspace must allow supersonic flight.
 - ◆ The assault support range requires a 30-minute period on a 20 nm x 50 nm range with airspace that extends from the surface to 25,000 ft AGL. The airspace must overlie a land area with significant topographical features. Area should be cleared for A/G gunnery, laser devices, and the expenditure of chaff and flares.
 - ◆ The air reconnaissance range requires a 30-minute period on a 20 nm x 50 nm range with airspace that extends from the surface to 50,000 ft AGL. The airspace must overlie a land area with significant topographical features. The airspace should allow supersonic flight.
 - ◆ The EW range requires a 45-minute period in an area 30 nm x 60 nm, from surface to 30,000 ft AGL and must allow the use of chaff and flares.

Sea Space

The sea space objective and threshold are achieved concurrently by the following criteria for GCE and LCE training: a day/night period of up to 12-hours in a 300 nm² area that is at least 10 nm wide, contiguous to the beachfront, capable of supporting amphibious vehicle and landing craft training, and that extends seaward to the simulated amphibious ready group (ARG)/expeditionary strike group (ESG) element

location. The objective and threshold for fixed- and rotary-wing day/night shipboard qualification ACE training are met with a 60-minute day/night period in a designated operational area extending from surface to 20,000 ft AGL.

Land Area

The land area threshold is achieved for ACE with land area dimensions of 10 nm x 10 nm. The land area objective is achieved by the following criteria for GCE, ACE, and LCE training:

- Training for the GCE requires a 12 hour period on a day/night area. Specific land area training has the following requirements:
 - ◆ Maneuver training requires a dedicated area of at least 68 mi² (176 km²) or 43,520 acres. These dimensions must also support amphibious training requirements that require a dedicated beachfront and are derived from the required area to support armor offense/threat situational training exercise and maneuver/land navigation (MCO 3500.100, *Tank Training and Readiness Manual*, MCO 3500.16, *Light Armor Reconnaissance Training and Readiness Manual*, and TC 25-1).
 - ◆ Suite of live fire ranges require an estimated 16 mi² area (41.44 km²) or 10,240 acres, to accommodate the defined list of individual-level ranges and their associated surface danger zones (SDZs). Land area requirements may be reduced dependent upon mission, type of units supported, and quantity of ranges needed based upon capacity and throughput.
- Training for LCE is the same as GCE except that live fire ranges require an estimated land area of 5 mi² (12.11 km²) or 2,992 acres to accommodate the defined list of individual-level live fire ranges to include all SDZs.
- Training for ACE requires a 30-minute period on a 20 nm x 20 nm range with significant topographical features. Land area should be cleared for the use of live or inert and live A/G

gunnery, precision and nonprecision, inert and live A/G munitions (up to 2,000 lbs). Land area should allow the use of chaff and flares, and be cleared for use of laser targeting and designating devices. Portions of the land area should be cleared for use as a designated landing zone (LZ) and/or drop zone (DZ). Live fire ranges require an estimated land area of 30 nm² (5 nm x 6 nm) to accommodate the defined list of individual-level live fire ranges to include all SDZs.

System of Systems

A system of systems supports the individual training range level and comprises communications, target system, instrumentation system, and OPFOR systems. The following descriptions include thresholds and objectives of the required capabilities.

Communications System

The communications system includes all necessary components and elements used by range personnel to establish and maintain secure and nonsecure, two-way, point-to-point, S/S, and A/G communications. These communications may include interranging communications not covered by IERs and interoperability, such as radio transmitters, receivers, transceivers, communications antennas, interface devices, and cryptology equipment. The threshold is met with at least one dedicated RC circuit and one dedicated exercise control circuit. The communications system's objective for the three training elements is met with two dedicated RC circuits and at least two dedicated exercise control circuits.

Target System

The threshold for ACE is met by having at least one target complex with at least one separate weapons target site that allows the use of live fire inert and live ordnance. The target system

objective for GCE, ACE, and LCE training is met by the following criteria:

- For GCE training, target sites can be composed of fixed, mobile, hard, and soft targets. They vary in size and composition to support live fire and indirect and direct fire weapon systems, and include small arms and armor/antiarmor. They should provide a shoot back capability and automated scoring. There should be static, moving, and pop-up targets arranged at fixed and variable distances and configured to represent various military operations, units, and capabilities. Moving target speed requirements are 2, 4, 6, and 9 mph with the ability to move 22 ft across frontage for engagement times. Targets should be of sufficient number and type to satisfy all basic-level ITS requirements for each Marine Corps individual infantry weapon system.
- Training for LCE is the same as GCE training, except targets should also support mine clearing operations, both deliberate and in-stride, and counter barrier operations.
- ACE training consists of at least one target complex with at least two separate weapons target sites that allow the use of live fire inert and live ordnance. The targets should be composed of scored, raked, and strafe ranges and representative CAS targets, and should include mobile land targets that can be engaged on any heading (180-degree engagement profile minimum). Each target site should include a minimum of four targets to support strike planning and execution, with a minimum of four desired mean points of impact (DMPs) per target.

Instrumentation System

Table 7-2 describes the concurrent objective and threshold for the instrumentation system at the individual training level. Its elements correspond to the instrumentation system discussion on page 7-5.

Opposition Force System

The OPFOR system for the GCE and LCE training threshold requires fixed and moving targets, at least some of which must be reactive.

For ACE training, the threshold must have no more than two live, fixed-wing, supersonic-capable threat aircraft. The OPFOR system objective for the three MAGTF elements is achieved through the following criteria, which includes the system's key performance parameters for all electronic combat required capabilities:

- Training for GCE requires a live, virtual, or constructive squad-sized ground force, at least a fire-team of which must be firing live rounds, and fixed and moving targets, at least some of which must be reactive.
- Training for LCE requires a live, virtual, or constructive squad-sized ground force, at least a fire-team of which must be firing live rounds, and fixed and moving targets, at least some of which must be reactive.
- For ACE training, there can be up to four live fixed-wing, supersonic capable threat aircraft with antiaircraft (A/A) gun and active A/A missile capability. All threat aircraft must be able to operate from the surface to the upper limit of the range airspace.

Table 7-2. Objective and Threshold for Individual-Level Instrumentation System.

Element	GCE Training	ACE Training	LCE Training
Tracking Time, Space, and Position Information			
High Fidelity	Not Required	6*	Not Required
Low Fidelity	Not Required	Not Required	Not Required
Range Control			
2-Dimension	Yes	Yes	Yes
3-Dimension	No	Yes	No
Exercise Control and Coordination			
2-Dimension	Yes	Yes	Yes
3-Dimension	No	Yes	No
JNTC	No	No	No
Modeling and Simulation			
A/A	No	Yes	No
A/G	No	Yes	No
S/A	No	Yes	No
S/S	Yes	No	Yes
Scoring			
Type	Auto or Manual	Auto	Manual or Auto
Feedback	Real Time	Real Time	Real Time
RTKN	Voice or Auto	Voice or Auto	Voice or Auto
Debrief/After Action Review			
Type	Both	Both	Both

*Includes 2 friendly and 4 OPFOR fixed-wing aircraft for air combat training and coordinated opposed strike training.

CHAPTER 8

REQUIRED UNIT-LEVEL TRAINING RANGE CAPABILITIES

Unit-Level Training

Marine Corps unit-level training supports personnel and platform core and core plus skills and capabilities associated with the basic Marine Corps fighting units. Unit-level training also incorporates T&R requirements for each element of the MAGTF. Accordingly, the Marine Corps unit-level training includes the training associated with the individual fighting unit elements of an ACE, GCE, and LCE.

Aviation Combat Element

The unit-level training range supports the basic ACE fighting unit. A squadron of similar type/model/series fixed- or rotary-wing aircraft is considered the basic fighting unit within the ACE. Squadron-level training supports the ITS and T&R requirements necessary to achieve a core-capable squadron. The ground support element within the ACE has unit range requirements similar to that of the LCE. All LCE unit range requirements should be applied to ACE ground support element requirements.

Ground Combat Element

The unit-level training range supports the ITS and individual T&R requirements associated with the smallest GCE that could be expected to be deployed into a hostile environment. The unit-level GCE is presumed to include a Marine infantry company, a tank platoon, an amphibious vehicle platoon, a light armored vehicle platoon, an engineer platoon, and an artillery battery. The infantry company may or may not be reinforced with amphibious vehicles, tanks, engineers, or artillery liaison officers.

Logistics Combat Element

The unit-level training range supports the ITS and individual T&R requirements associated with the smallest LCE that could be expected to be deployed into a hostile environment. The unit-level LCE is presumed to include a communications detachment, a transportation support detachment (TSD), a landing support detachment (LSD), an engineer platoon, a maintenance platoon, a health services detachment, a military police (MP) detachment, and task-organized units conducting convoy operations.

Operational Concept

The operational concept for unit-level range requirements are assessed based on a comprehensive training scenario derived from the UJTL and directly linked to the MCTL. The requirements will be further informed by emerging operational lessons in counterinsurgency and urban operations from current campaigns. The following operations and events from the operations list of the UJTL and their associated mission-essential tasks form the basis for assessment of the required range attributes:

- Reconnaissance, surveillance, and target acquisition.
- Exploitation.
- Rear area security.
- Command and control warfare.
- Defensive AAW.
- Information operations.
- Area defense.
- Suppression of enemy air defenses.
- Mobile operations.

- Delay.
- Joint interdiction.
- Withdrawal.
- AAW.
- Combat tactical recovery of aircraft and personnel.
- Forcible entry/expeditionary assault.
- Deployment.
- Counterterrorism.
- Movement to contact.
- Antiterrorism.
- Attack.
- Pursuit.
- Combined arms breaching.

Unit-Level Suite of Ranges

The suite of ranges described in table 8-1 provides the baseline range requirements for the MAGTF elements for unit-level training.

Required Capabilities

This paragraph identifies the required capabilities for the operational elements and system of systems for Marine Corps unit-level training ranges.

Operational Elements

The Marine Corps range infrastructure operational elements are composed of airspace, sea space, and land area.

Airspace

For the ACE, airspace threshold is met for A/A training with a 25 nm x 25 nm range that extends up to 45,000 ft AGL. For A/G training, that threshold is a 20 nm x 50 nm range that extends up to 35,000 ft AGL. The airspace objective is met by the following criteria for GCE, LCE, and ACE training:

- Training for GCE and LCE requires 24-hour, day/night period on a range with airspace that

extends from surface to 10,000 ft AGL, allowing for shoulder-fired SAM training. The horizontal limits of the airspace should extend to 10 nm on either side of the applicable training range land area.

- Training for ACE requires the following:
 - ◆ The OAS range requires a 30-minute period on a 25 nm x 50 nm range with airspace that extends from the surface to 40,000 ft AGL. Area should be cleared for use of A/G gunnery, free-fall and guided A/G munitions, laser designating devices, and the expenditure of chaff and flares.
 - ◆ The AAW range requires a 30-minute period on a 40 nm x 60 nm range with airspace that extends from the surface to 50,000 ft AGL. The range must support supersonic operations. Some portion of the airspace should overlay land area with significant topography. It is important to replicate, to the greatest degree practical, the topography of the planned area of operations. This required topographical fidelity could be achieved through the physical geographic location of the range or through a high-fidelity virtual environment generated and up-linked from a range subsystem or generated autonomously by on-board aircraft systems.
 - ◆ The assault support range requires a 30-minute period on a 20 nm x 50 nm range with airspace that extends from surface to 50,000 ft AGL. The area should be cleared for A/G gunnery, laser devices, and the expenditure of chaff and flares. The airspace must overlie a land area with significant topographical features.
 - ◆ The air reconnaissance range requires 30-minute period on a 20 nm x 50 nm range with airspace that extends from surface to 50,000 ft AGL. The airspace should allow supersonic flight. The airspace must overlie a land area with significant topographical features.
 - ◆ The EW range requires a 45-minute period in an area 30 nm x 60 nm, from surface to

30,000 ft AGL and must allow the use of chaff and flares.

Sea Space

The sea space objective and threshold for GCE, ACE, and LCE are met concurrently with a day/night period of up to 12 hours duration within a 300 nm² area that is at least 10 nm wide, is contiguous to the beachfront, is capable of supporting amphibious vehicle and landing craft training, and extends seaward to the simulated ARG/ESG element location. Meeting these criteria supports amphibious and amphibious-support training elements.

Land Area

The land area threshold is achieved with land area of 10 nm x 10 nm. The objective is achieved by the following criteria:

- Training for GCE requires a 24-hour period for maneuver, live fire and maneuver, and MOU training. Specific land area training has the following requirements:
 - ◆ Maneuver training requires a dedicated area of at least 144 mi² (373 km²) or 92,160 acres. The land area should include a dedicated beachfront for amphibious operations training. These dimensions are derived from 6 km x 24 km maneuver box requirement to

Table 8-1. Unit-Level Suite of Ranges.

GCE Suite	
Maneuver/training area	Breaching range
Unit-level instrumented live fire and maneuver training area/range	40mm (grenade) machine gun qualification range
Dedicated impact area—dudged	Automated anti-armor tracking and live fire range
Impact area—nondudged	Field artillery direct fire range
Impact area—temporarily dudged	Tank/fighting vehicle stationary gunnery range
Nonstandard small arms range	Indirect fire range
Basic 10m–25m small arms range	Field artillery direct fire range
Automated field-fire (AFF) range	Automated multi-purpose training range
Rifle known-distance (KD) range	Automated tank/fighting vehicle multi-purpose range complex
Automated sniper field-fire range	Fire and movement range
Pistol KD range	Squad defense range
Automated combat pistol/MP firearms qualification course	Automated squad battle course
Automated multi-purpose machine gun (MPMG) range	Automated platoon battle course
ACE Suite	
Dedicated impact area—dudged	EW/combat range
Impact area—nondudged	Basic 10m–30m zero firing range
Impact area—temporarily dudged	Rifle KD range
OAS range	Pistol KD range
LCE Suite	
Dedicated impact area—dudged	Rifle KD range
Impact area—nondudged	Pistol KD range
Impact area—temporarily dudged	Automated MPMG range
Maneuver/training area	40mm (grenade) machine gun qualification range
Basic 10m–30m zero firing range	Nonstandardized engineer qualification range
AFF range	Light demolition range

support nonlive fire mechanized infantry company maneuver training. The land area requirement may be reduced dependent upon mission, types of units supported, and quantity of ranges needed based upon capacity and throughput.

- ◆ Live fire and maneuver training requires the threshold and objective to be at least 260 mi² (672 km²) or 166,054 acres. The land area should include a dedicated beachfront for amphibious operations training and some or all of the land area should be cleared for the use of live indirect and direct fire weapons. Land area requirements may be reduced dependent upon mission, types of units supported, and quantity of ranges needed, which is based upon capacity and throughput. These dimensions are derived from a nominal 16 km x 24 km maneuver box requirement to support mechanized infantry company live fire and maneuver training.
- ◆ The MOUT training requires a dedicated MOUT facility, encompassing at least 7 mi², that combines a central urban area of at least 0.01 mi² (1 block x 1 block), an outlying suburban/residential area of at least .63 mi² (that extends at least .35 mi beyond the central urban area), and outlying facilities or villages of at least .8 square miles (that extend at least .2 mi beyond the outlying suburban area). The MOUT facility should also include a live fire training area of at least 3 mi² that includes a SDZ for ground and aviation direct and indirect weapon systems. The MOUT should include major avenues of approach connecting the suburbs and outlying villages with the central urban area. Outlying and suburban areas should simulate the local noncombatant populace and infrastructure. The live fire area of the MOUT should consist of a moderately developed urban area configured to support a coordinated live fire MOUT assault that employs individual, crew-served, and indirect-fire infantry weapons and precision use of indirect fire from airborne CAS and

ground based artillery. Per FM 3-06.11, *Combined Arms Operations in Urban Terrain*, one city block equals 175 m company frontage for MOUT.

- ◆ Suite of live fire ranges has an estimated land area requirement to accommodate the defined list of unit-level, live fire ranges to include all SDZs of 26 mi² (67.34 km²) or 16,640 acres.
- Training for LCE is the same as for the GCE except that the suite of live fire ranges has an estimated land area requirement of 5 mi² (12.11 km²) or 2,992 acres to accommodate the defined list of unit-level, live fire ranges to include all SDZs.
- Training for ACE requires a 30-minute range period on a dedicated land area with dimensions of 20 nm x 20 nm. The land area should be cleared for the use of live or inert A/G gunnery, inert precision or nonprecision A/G munitions up to 2,000 lbs, and live precision or nonprecision munitions (including cluster munitions) up to 1,000 lbs. The land area should be cleared for use of laser targeting and designating devices. Land area should have significant topographical features and multiple designated LZ/DZ areas. Suite of live fire ranges has an estimated land area requirement to accommodate the defined list of unit-level, live fire ranges to include all SDZs of 175 nm² (14 nm x 12.5 nm).

System of Systems

A system of systems supports the unit training range level and is composed of communications, target, instrumentation, and OPFOR systems. The following descriptions of these components include the threshold and objective of the required capabilities.

Communications System

For unit-level training, the communications system includes all the necessary components and elements used by range personnel to establish and

maintain secure or nonsecure, two-way, point-to-point, S/S, and A/G communications with range operators, range maintainers, and range users. The communications system could also include transmitters, receivers, transceivers, communications antennas, interface devices, and cryptology equipment. All range-related, two-way voice and data communications between range personnel and event participants can be classified into one of three types of communications circuits or networks: RC, exercise communications, and datalink. It is assumed that the requirement for any specific circuit also includes a requirement for sufficient assigned frequencies for that circuit.

The communications system threshold for the MAGTF elements is achieved with one dedicated RC circuit and two dedicated EC&C circuits. The objective is achieved with two dedicated RC circuits, at least one of which must support secure communications; at least three dedicated EC&C circuits, at least one of which must support secure communications; and EC&C circuits that must support communications with all airborne and ground participants.

Target System

The threshold for GCE and LCE training contains at least one target site. For ACE A/G training, it must contain one weapon site. The target system objective is achieved by the following criteria:

- Training for GCE consists of land-based fortified defenses, distributed throughout the range complex. At least two target sites composed of fixed, mobile, hard, and soft targets of varying type, size, and composition, which will support indirect and direct fire weapon systems to include small arms live fire. There should be static and pop-up targets configured to represent varying military operations, units, and capabilities. Structural and urban targets should require event participants to discriminate between valid and invalid targets in order to practice minimizing collateral damage. Urban targets must also
- Training for LCE requires a range complex with at least two target sites composed of fixed, mobile, hard, and soft targets of varying size and composition, which will support indirect and direct fire weapon systems, to include small arms live fire. There should be static and pop-up targets, configured to represent various military operations, units, and capabilities.
- Training for ACE requires the following:
 - ◆ The OAS and air reconnaissance targets require at least one range complex with at least two separate live/inert weapons target sites composed of raked and strafe ranges, structural targets, mobile targets, and targets located in revetments. Some of the structural targets should replicate congested urban areas, requiring event participants to discriminate between valid and invalid targets in order to practice minimizing collateral damage. Tactical target complexes should provide a minimum of four targets with four DMPIs per target, as well as present target identification and discrimination challenges to the aircrew. This does not apply to raked and strafe ranges. Tactical targets should possess visual, radar, and spectral signatures representing threat systems. Building structures, revetted targets, and moving targets must replicate, to the greatest degree practical, the physical characteristics and spectral signatures of the type of targets expected to be encountered in the projected area of operations. At least one target site must allow the use of inert weapons up to 2,000 lbs and live weapons (including cluster munitions) up to 1,000 lbs. At least some of

the targets should allow the use of laser designators.

- ◆ The AAW targets require gunnery banners or darts, which are subsonic and supersonic UASs that can operate from surface to 50,000 ft AGL. These UASs should be capable of being augmented to replicate the radar and spectral signature of anticipated threat aircraft and anti-ship and/or A/G missiles.
- ◆ EW range tactical target complexes should present target identification and discrimination challenges to the aircrew. This does not apply to raked and strafe ranges. Tactical targets should possess visual, radar, and spectral signatures representative of threat systems. Building structures and revetted and moving targets must replicate, to the greatest degree practical, the physical characteristics and spectral signatures of the type of targets expected to be encountered in the projected area of operations.

Instrumentation System

Range instrumentation describes the collection of facilities, equipment, software, and implementation methodologies used to schedule, monitor, deconflict, create, or reconstruct the training range environment and on-range events. The instrumentation enterprise at any range or range complex may exist as a stand-alone, dedicated system or as a distributed set of capabilities that are embedded within other existing or stand-alone systems and subsystems.

The required capabilities in table 8-2 are applicable to maneuver, fire and maneuver, and MOUT training. The threshold is achieved for

GCE (TSPI) with low fidelity 3 and for LCE (TSPI) with low fidelity 2. The system objective is achieved by the criteria in table 8-2. Its elements correspond to the instrumentation system discussion on page 8-7.

Opposition Force System

For the GCE and LCE threshold, there must be a live, virtual, or constructive platoon-sized ground force. The OPFOR system objective for the three MAGTF elements is achieved by the following criteria:

- GCE training requires a live, virtual, or constructive company-sized ground force, at least a platoon of which must be firing live rounds; a live, virtual, or constructive platoon-sized armored and/or mechanized vehicle force, at least a squad of which must be firing live rounds; and fixed and moving targets, at least some of which must be reactive. The electronic combat threat level is two.
- LCE training requires a live, virtual, or constructive company-sized ground force, at least a platoon of which must be firing live rounds. Requirements include fixed and moving targets, at least some of which must be reactive. The electronic combat threat level is two.
- ACE training requires up to two live, rotary-wing threat aircraft with A/A missile capability and up to four live, fixed-wing, supersonic-capable threat aircraft with A/A gun and active A/A missile capability. All fixed-wing threat aircraft must be able to operate from the surface to the upper limit of the airspace. Requirements include fixed, moving, and time critical targets, at least some of which must be reactive. The electronic combat threat level is two.

Table 8-2. Objective and Threshold for Individual-Level Instrumentation System.

Element	GCE Training	ACE Training	LCE Training
Tracking Time, Space, and Position Information			
High Fidelity	Not Required	8 ²	Not Required
Low Fidelity	6 ¹	2 ³	4 ⁴
Range Control			
2-Dimension	Yes	Yes	Yes
3-Dimension	No	Yes	No
Exercise Control and Coordination			
2-Dimension	Yes	Yes	Yes
3-Dimension	No	Yes	No
JNTC	No	No	No
Modeling and Simulation			
A/A	No	Yes	No
A/G	No	Yes	No
S/A	Yes	Yes	Yes
S/S	Yes	No	Yes
Scoring			
Type	Auto	Auto	Auto
Feedback	Both	Both	Both
RTKN	Voice or Auto	Voice or Auto	Voice or Auto
Debrief/After Action Review			
Type	Both	Both	Both

¹Provides for up to 6 platoons during coordinated live fire and maneuver training.

²Provides for up to 4 friendly and 4 OPFOR threat aircraft.

³Provides for up to 2 support (e.g., tanker/airborne early warning) aircraft.

⁴Provides for up to 2 convoys and 2 OPFOR threats.

CHAPTER 9

REQUIRED MEU-LEVEL TRAINING RANGE CAPABILITIES

MEU-Level Training

Marine Corps MEU-level training supports personnel and platforms of a MEU-sized MAGTF or its individual elements and T&R requirements for each element of the MEU. Accordingly, MEU-level training supports the training associated with ACE, GCE, and LCE units.

Aviation Combat Element

The MEU-level training range supports the T&R requirements associated with the complete aviation component of the MEU. A typical MEU ACE would include up to 6 fixed-wing attack aircraft, 20–24 attack and support helicopters, and an air support control element.

Ground Combat Element

The MEU-level training range supports the T&R requirements associated with the complete ground component of the MEU. A typical MEU GCE would include an infantry battalion, a tank platoon, an artillery battery, a light armored vehicle platoon, an amphibious vehicle platoon, an armored vehicle platoon, and a combat engineer platoon.

Logistics Combat Element

The MEU-level training range supports the T&R requirements associated with the complete combat service support components of a MEU. A typical MEU LCE would include a TSD/LSD, an engineer detachment, a maintenance detachment, an MP detachment, a communications detachment, and a health services detachment.

Operational Concept

The operational concept for MEU-level range requirements is assessed based on a comprehensive training scenario derived from the UJTL and directly linked to the MCTL. The following operations and events from the UJTL's operations list and its associated mission-essential tasks from the MCTL form the basis for assessment of the required range attributes:

- Reconnaissance, surveillance, and target acquisition.
- Command and control warfare.
- Information operations.
- Suppression of enemy air defenses.
- Joint interdiction.
- AAW.
- Forcible entry/expeditionary assault.
- Mobile operations.
- Delay.
- Movement to contact.
- Withdrawal.
- Attack.
- Combat tactical recovery of aircraft and personnel.
- Pursuit.
- Deployment.
- Exploitation.
- Counterterrorism.
- Rear area security.
- Defensive AAW.
- Area defense.
- Antiterrorism.

MEU-Level Suite of Ranges

The suite of ranges described in table 9-1 provides the baseline range requirements for MEU-level training. These ranges can be augmented based upon mission, type of units supported, training capacity, and throughput.

Required Capabilities

The required capabilities for the operational elements and system of systems for MEU-level training ranges are defined in terms of objective and threshold requirements.

Operational Elements

The Marine Corps range infrastructure’s operational elements of airspace, sea space, and land area are described in this section at the MEU training level.

Airspace

The airspace threshold is achieved by a 50 nm x 50 nm range with airspace that extends from the surface to 45,000 ft AGL. The objective is achieved by at least a 24-hour day/night period on a 50 nm x 80 nm range with airspace that extends from the surface to 50,000 ft AGL. The airspace must allow supersonic operations and at least some portion of the airspace should overlay land area with significant topography and significant LZ/DZ. Where the airspace overlays the training range land area, the horizontal limits of

the airspace should extend at least 10 nm beyond the horizontal limits of the land area.

The required length of the time in the airspace range will increase to 5 days (120 hours) to support large-scale operations such as the special operations capable (SOC) exercise or ARG exercise. It is important to replicate, to the greatest degree practical, the topography of the planned area of operations. This required topographical fidelity could be achieved through the physical geographic location of the range or through a high fidelity virtual environment generated and up-linked from a range subsystem or generated autonomously by on-board aircraft systems. Deconfliction between artillery and air operations must be affected through range control and the direct air support center (DASC) or fire support coordination center (FSCC). All airspace should be scheduled in 30-minute blocks.

Sea Space

The sea space objective and threshold are achieved concurrently through at least a 24-hour, day/night period in a 7,500 nm² area including an area at least 15 nm wide, contiguous to the beachfront, capable of supporting amphibious vehicle and landing craft training, extending seaward to the ARG/ESG element location, and supporting ocean-based training elements. The required time period in the sea space will increase to 5 to 7 days to support large-scale operations such as the SOC, ESG, or ARG exercises. The cumulative requirement for large-scale MEU operations is a 5 to 7 day period (both day and nighttime periods). The requirement includes a

Table 9-1. MEU-Level Suite of Ranges.

MEU-level maneuver/training area	OAS range
MEU-level instrumented live fire and maneuver training area/range	AAW range
Dedicated impact area—dudged	Assault support range
Impact area—nondudged	Air reconnaissance range
Impact area—temporarily dudged	EW range
Field artillery indirect fire range	MOUT collective training facility (large)
Nonstandardized engineer qualification range	MEU-level MOUT collective training facility
Light demolition range	

cumulative total of 36,000 nm² littoral sea space and an area at least 15 nm wide that is contiguous to the beachfront. This area must be capable of supporting amphibious vehicle and landing craft training and extend seaward to the simulated ARG/ESG element location.

Land Area

The land area objective and threshold are achieved concurrently with at least a 24-hour, day/night period to support maneuver or live fire and maneuver and MOUT training. The required length of the time on the land area will increase to 5 days (120 hours) to support large-scale operations such as the SOC or ARG exercise. Land area requirement may be reduced or increased dependent upon mission, type of units supported, and quantity of ranges needed based upon capacity and throughput.

Maneuver. Threshold and objective requirements should include at least 150 mi² (96,000 acres) that covers a dedicated beachfront for amphibious operations training. Minimum land area requirements are derived from a nominal maneuver area of 5 mi x 30 mi (8 km x 48 km) to support a contiguous MEU-sized maneuver operation (see US Army TC 25-1).

Live Fire and Maneuver. The threshold requirement is at least 739 mi² (1,914 km²) or 472,960 acres. The objective requirement is 985 mi² (2,552 km²) or 630,613 acres. Both should include a dedicated beachfront for amphibious operations training. Some or all of the land area should be cleared for use of live NSFS, A/G, naval special warfare, indirect, and direct fire weapons for both service and training practice ammunition. Minimum land area requirements are derived from a nominal maneuver area of 18 mi x 41 mi (29 km x 66 km) to support a contiguous MEU-sized live fire and maneuver operation using training ammunition and associated SDZs. Maximum requirements derived from a nominal maneuver area of 18 mi x 55 mi (29 km x 88 km) to support a contiguous

MEU-sized live fire and maneuver operations using service ammunition and associated SDZs (see US Army TC 25-1 and MCO 3570.1B).

MOUT. The land area should include a MOUT facility, encompassing at least 15 mi², that combines a large central urban area of at least .1 mi² (3 blocks x 3 blocks), an outlying suburban/residential area of at least 6.3 mi² (that extends at least 1.1 mi beyond the central urban area), and outlying facilities or villages of at least 8 mi² (that extend at least .485 mi beyond the outlying suburban area). The MOUT facility should also include a live fire training area of at least 3 mi² that includes a SDZ for ground and aviation direct and indirect weapon systems.

The MOUT should include major avenues of approach connecting the suburbs and outlying villages with the central urban area. Outlying areas should include a nonoperational airfield with tower and hangers and a port/industrial complex that includes warehouses, power plants, and other industrial structures. Suburban area structures should simulate the local noncombatant populace and infrastructure. The live fire area of the MOUT (which should be incorporated within the central urban area, suburban area, or outlying area) should consist of a moderately-developed urban area configured to support a coordinated live fire MOUT assault that employs individual, crew-served, urban breaching (to include demolition charges), and indirect-fire infantry weapons and precision use of indirect fire from airborne CAS and ground-based artillery. Per FM 3-06.11, one city block equals 175 m company frontage for MOUT. A 3-block x 3-block area equals 525 m x 525 m. The live fire area includes a 300 m x 300 m urban area surrounded by a 7,000 m radius SDZ.

System of Systems

A system of systems supports MEU training ranges and is composed of communications, target, instrumentation, and OPFOR systems. Descriptions of these components include thresholds and objectives of the required capabilities.

Communications System

The communications system includes all necessary components and elements used by range personnel to establish and maintain secure and nonsecure, two-way, point-to-point, S/S, and A/G communications. This communication could also include interranging communications not covered by IERs and interoperability, which comprises radio transmitters, receivers, transceivers, communications antennas, interface devices, and cryptology equipment. The communications system threshold for the three MAGTF elements is achieved with three RC circuits and five EC&C circuits. The objective is achieved by the following criteria:

- There must be five RC circuits, at least three of which must support secure A/G, ship-to-shore, and point-to-point communications.
- At least five exercise communications circuits are needed to support communication with ground, airborne, service support, surface participants, and exercise evaluators/controllers.
- At least three of the circuits should support secure communications.

Target System

The threshold is achieved by having at least three separate A/G target sites. At least one target site must allow the use of heavy precision and non-precision weapons. The target system objective is achieved by the following criteria:

- There should be exposed beach obstacles and fortified beach defenses and NSFS targets. All targets should be cleared for engagement with live fire inert weapons and at least some of the targets should be cleared for engagement with live fire live ordnance, including NSFS weapons.
- There should be land-based fortified defenses distributed throughout the range complex.
- There should be target sites composed of fixed and mobile, hard and soft targets in varying size and composition that are representative of varying military operations, units, and capabilities.

The target sets should support live fire, air- and surface-launched indirect and direct fire weapon systems, to include small arms live fire. At least some targets should be pop-up and reactive in nature and provide scoring feedback. All targets should possess representative visual, radar, and spectral signatures.

- Ground targets should be of sufficient number and type to satisfy ITS requirements for individual, crew served, and indirect-fire infantry weapons; 120mm and 25mm weapon systems; demolitions and explosives; and all wheeled/tracked vehicle-mounted systems associated with MEU-level MAGTF units.
- There should be at least six separate target sites to accommodate live fire inert and live A/G weapons, with at least four targets per site, composed of representative threat targets to include vehicles, structural targets, targets in revetments, and moving targets. There should be a minimum of four DMPs per target.
- Structural and urban targets should require event participants to discriminate between valid and invalid targets to practice minimizing collateral damage. Urban targets must also support ground fire and maneuver operations.
- At least two target sites must allow the use of heavy precision and nonprecision weapons. These targets must allow the use of live fire inert weapons up to 2,000 lbs, live fire live weapons (including cluster munitions) up to 1,000 lbs, and laser targeting devices.

Instrumentation System

The required capabilities in table 9-2 are applicable to maneuver, fire and maneuver, and MOUT training. Range instrumentation describes the collection of facilities, equipment, software, and implementation methodologies used to schedule, monitor, deconflict, create, or reconstruct the training range environment and on-range events. The instrumentation enterprise at any range or range complex may exist as a stand-alone, dedicated system or as a distributed set of capabilities that are embedded within other existing or stand-alone systems and subsystems.

The system's objective and threshold for the instrumentation system are achieved concurrently by the criteria in table 9-2, its elements corresponding to the instrumentation system.

Opposition Force System

The OPFOR objective and threshold are achieved concurrently by a live, virtual, or constructive battalion-sized ground force, at least a company of which must be firing live rounds; a live, virtual, or constructive company-sized armored or

mechanized vehicle force, at least a platoon of which must be firing live rounds; and up to four fixed- or rotary-wing threat aircraft, at least two of which must be firing live rounds. All threat aircraft must have A/A missile capability. Fixed-wing threat aircraft must have A/A gun and active A/A missile capability and be capable of supersonic flight and operating to the upper limit of the airspace. There must be fixed, moving, and time-critical targets, at least some of which must be reactive, and the electronic combat threat level is three.

Table 9-2. Required Capabilities of the MEU-Level Instrumentation System.

Attribute	MAGTF MEU-Level Training Range
Tracking Time, Space, and Position Information	
High Fidelity	26 ¹
Low Fidelity	24 ²
Range Control	
2-Dimension	Yes
3-Dimension	Yes
Exercise Control and Coordination	
2-Dimension	Yes
3-Dimension	Yes
JNTC	Yes
Modeling and Simulation	
A/A	Yes
A/G	Yes
S/A	Yes
S/S	Yes
Scoring	
Type	Manual or Auto
Feedback	Both
RTKN	Voice or Auto
Debrief/After Action Review	
Type	Both

¹ Will support up to 22 friendly air assets (up to 12 assault support aircraft and 10 fixed-wing aircraft) and 4 OPFOR air assets.

² Assumes a platoon (of ground forces or vehicles) is the smallest unit for which TSPI is required.

CHAPTER 10

REQUIRED MEB-LEVEL TRAINING RANGE CAPABILITIES

MEB-Level Training

This large-scale training supports not only the personnel and platform core capabilities associated with the individual elements of a MEB, but also the combined T&R requirements of the fully integrated MEB. Accordingly, MEB-level training supports MEB ACE, GCE, and LCE units.

Aviation Combat Element

The MEB-level training range supports the T&R requirements associated with the individual fixed- and rotary-wing platforms, portions of or complete fixed- and rotary-wing squadrons, and the complete aviation component of a MEB, such as a Marine aircraft group (MAG). The MAG fixed-wing elements include fighter, attack, electronic warning/electronic attack, and support aircraft. The MAG rotary-wing elements include transport and attack aircraft and V/STOL platforms.

Ground Combat Element

The MEB-level training range supports the training requirements associated with the individual and overall ground warfighting components of a MEB GCE. A typical MEB GCE is composed of a regimental combat team (RCT)/regimental landing team (RLT). The RCT/RLT will include three Marine infantry battalions, a tank company, an amphibious vehicle company, an armored vehicle company, a combat engineer company, and an artillery battalion.

Logistics Combat Element

The MEB-level training range supports the T&R requirements associated with the individual and complete combat service support components of a MEB LCE. A typical MEB LCE is composed of a brigade service support group that includes a communications platoon, a TSD/LSD company, an engineer company, a maintenance company, a health services company, and an MP company.

Operational Concept

The operational concept for MEB-level range requirements are assessed based on a comprehensive training scenario derived from the UJTL and directly linked to the MCTL. The following operations/events from the UJTL's operations list and its associated mission-essential tasks from the MCTL, form the basis for assessment of the required range attributes:

- Reconnaissance, surveillance, and target acquisition.
- Command and control warfare.
- Information operations.
- Suppression of enemy air defenses.
- Joint interdiction.
- Defensive AAW.
- AAW.
- Area defense.
- Forcible entry/expeditionary assault.
- Mobile operations.
- Delay.

- Movement to contact.
- Withdrawal.
- Attack.
- Combat tactical recovery of aircraft and personnel.
- Pursuit.
- Deployment.
- Exploitation.
- Counterterrorism.
- Relief in place.
- Passage of lines.
- Rear area security.
- Antiterrorism.
- River crossing.

MEB-Level Suite of Ranges

The suite of ranges described in table 10-1 provides the baseline requirement for MEB-level training. The suite of ranges can be augmented based upon mission, type of units supported, training capacity, and throughput.

Required Capabilities

The following required capabilities for the operational elements and system of systems for MEB-level training ranges are defined in terms of objective and threshold requirements.

Operational Elements

The following Marine Corps range infrastructure’s operational elements of airspace, sea

space, and land area are described at the MEB training level.

Airspace

The airspace threshold is achieved with a 50 nm x 50 nm range with airspace extending from the surface to 45,000 ft. For GCE, ACE, and LCE training, the airspace objective is achieved by a 24-hour, day/night period on a 50 nm x 80 nm range with airspace that extends from the surface to 50,000 ft AGL. At least some portion of the airspace should allow supersonic operations and should also overlay land area with significant topography. Its horizontal limits should extend at least 10 nm beyond the horizontal limits of the land area. The airspace should be scheduled in 30-minute blocks and the required length of the time in the range airspace may increase to 10 days (240 hours) to support large-scale combined arms exercises and operations.

It is important to replicate, to the greatest degree practical, the topography of the planned area of operations. This required topographical fidelity could be achieved through the physical geographic location of the range or through a high fidelity virtual environment generated and up-linked from a range subsystem or generated autonomously by on-board aircraft systems. Deconfliction between artillery and air operations must be effected through the DASC or FSCC.

Sea Space

The sea space objective and threshold are achieved concurrently by at least a 24-hour, day/night period

Table 10-1. MEB-Level Suite of Ranges.

MEU-level maneuver/training area	OAS range
MEU-level instrumented live fire and maneuver training area/range	AAW range
Dedicated impact area—dudged	Assault support range
Impact area—nondudged	Air reconnaissance range
Impact area—temporarily dudged	EW range
Field artillery indirect fire range	MOUT collective training facility (large)
Nonstandardized engineer qualification range	MEB-level MOUT collective training facility
Light demolition range	

in a 10,000 nm² area at least 15 nm wide, contiguous to the beachfront, capable of supporting amphibious vehicle and landing craft training, that extends seaward to the ARG/ESG element location, and supports ocean-based training elements. The required time in the sea space will increase to 7 to 10 days to support large-scale operations such as the joint task force exercise. The cumulative requirement for large scale MEB operations is 7 to 10 days (both day and nighttime) that includes a cumulative total of 36,000 nm² littoral sea space at least 15 nm wide and contiguous to the beachfront. This space should also be capable of supporting amphibious vehicle and landing craft training and extend seaward to the simulated ARG/ESG element location.

Land Area

Land area requirement may be reduced or increased dependent upon mission, type of units supported, and quantity of ranges needed based upon capacity and throughput. The land area objective and threshold are achieved concurrently by at least a 24-hour, day/night period in an area to support maneuver or live fire and maneuver and MOUT training.

Maneuver. Threshold and objective requirements are at least 300 mi² (192,000 acres) and include a beachfront for amphibious operations training.

Live Fire and Maneuver. Threshold requirement is at least 892 mi² (2,310 km²) or 570,813 acres. Objective requirement is 1,189 mi² (3,080 km²) or 761,085 acres. Both should include a beachfront for amphibious operations training. Some or all of the land area should be cleared for live fire NSFS, A/G, naval special warfare, indirect, and direct fire weapons with both service and training practice ammunition.

MOUT. There should be a dedicated 150 mi² MOUT facility that combines a large central urban area of at least 1 mi² (9 blocks x 9 blocks), an outlying suburban/residential area of at least 63 mi² that extends at least 3.5 mi beyond the

central urban area, and an outlying facilities or villages area of at least 80 mi² that extends at least 2 mi beyond the suburban/residential area. The outlying areas should include a nonoperational airfield with tower and hangars and a port/industrial complex that includes warehouses, power plants, and other industrial structures. Suburban area structures should represent the local noncombatant populace and infrastructure. The MOUT should include major avenues of approach connecting the suburbs and outlying villages with the central urban area. The MOUT complex should also include a ground and aviation live fire training area of at least 3 mi². This area should consist of a moderately developed urban area that will accommodate a coordinated combined arms, live fire MOUT assault. The live fire training area should accommodate the employment of individual, crew-served, and indirect-fire infantry weapons, as well as the use of precision indirect fire from airborne CAS and ground-based artillery.

The required length of the time in the land area may increase to 10 days (240 hours) to support large-scale combined arms exercises and operations. Minimum land area requirements are derived from a nominal maneuver area of 10 mi x 30 mi (16 km x 48 km) to support a contiguous MEB-sized, nonfiring maneuver operation (see US Army TC 25-1). Maximum land area requirements are derived from a nominal maneuver area of 22 mi x 41 mi (35 km x 66 km) to support a contiguous MEB-sized, live fire and maneuver operation using training ammunition and associated SDZs. Maximum requirement derived from a 22-mi x 55-mi (35 km x 88 km) maneuver area to support a contiguous MEB-sized, live fire and maneuver operation using service ammunition and associated SDZs (see US Army TC 25-1 and MCO 3570.1B). According to FM 3-06.11, the MOUT frontage for a single infantry company is one city block. The live fire area includes a 300 m by 300 m urban area surrounded by a 7,000 m radius SDZ.

System of Systems

Communications System

The communications system includes all necessary components and elements used by range personnel to establish and maintain secure and nonsecure, two-way, point-to-point, S/S, and A/G communications. This communication could also include interranging communications not covered by IERs and interoperability, which comprises radio transmitters, receivers, transceivers, communications antennas, interface devices, and cryptology equipment. The communications system threshold for the three MAGTF elements is achieved with three RC circuits and five EC&C circuits. The objective is achieved by the following criteria:

- There must be five RC circuits, at least three of which must support secure A/G, ship-to-shore, and point-to-point communications.
- At least five exercise communications circuits are needed to support communication with ground, airborne, service support, surface participants, and exercise evaluators/controllers.
- At least three of the circuits should support secure communications.

Target System

The threshold is achieved with at least four separate A/G target sites. At least three target sites must support heavy precision and nonprecision weapons. Two targets must allow the use of inert weapons up to 2,000 lbs. The target system objective is achieved by the following criteria:

- There should be exposed beach obstacles and fortified beach defenses and NSFS targets. All targets should be cleared for engagement with live fire inert weapons and at least some of the targets should be cleared for engagement with live fire live ordnance, including NSFS weapons. These criteria support ocean-based training elements.

- There should be land-based fortified defenses distributed throughout the range complex.
- There should be target sites composed of fixed and mobile, hard and soft targets in varying size and composition that are representative of varying military operations, units, and capabilities. The target sets should support live fire, air- and surface-launched indirect and direct fire weapon systems, to include small arms live fire. At least some targets should be pop-up and reactive in nature and provide scoring feedback. All targets should possess representative visual, radar, and spectral signatures.
- Ground targets should be of sufficient number and type to satisfy ITS requirements for individual, crew-served, and indirect-fire infantry weapons; 120mm and 25mm weapon systems; demolitions and explosives; and all wheeled/tracked vehicle-mounted systems associated with MEU-level units.
- There should be at least eight separate live fire inert and live A/G weapons target sites, with at least four targets per site, composed of representative threat targets to include vehicles, structural targets, revetted targets, and moving targets. There should be at least four DMPis per target.
- Structural and urban targets should require event participants to discriminate between valid and invalid targets to practice minimizing collateral damage. Urban targets must also support ground fire and maneuver operations.
- At least four target sites must allow the use of heavy precision and nonprecision weapons. These targets must allow the use of live fire inert weapons up to 2,000 lbs, live fire live weapons (including cluster munitions) up to 1,000 lbs, and laser targeting devices.

Instrumentation System

Range instrumentation describes the collection of facilities, equipment, software, and implementation methodologies used to schedule, monitor, deconflict, create, or reconstruct the training range environment and on-range events. The

instrumentation enterprise at any range or range complex may exist as a stand-alone, dedicated system or as a distributed set of capabilities that are embedded within other existing or stand-alone systems and subsystems. The threshold for tracking (TSPI) mandates high fidelity at 56. The system's objective is achieved by the criteria in table 10-2. Its elements correspond to the instrumentation system discussion on page 10-6.

Opposition Force System

The OPFOR system objective and threshold are achieved concurrently by a live, virtual, or constructive brigade-sized ground force, at least a

battalion of which must be firing live rounds; a live, virtual, or constructive battalion-sized armored or mechanized vehicle force, at least a company of which must be firing live rounds; up to eight fixed- or rotary-wing threat aircraft, at least four of which must be firing live rounds. All threat aircraft must have A/A missile capability. Fixed-wing threat aircraft must have A/A gun and active A/A missile capability, be capable of supersonic flight, and be operational to the upper limits of the airspace. There must be fixed, moving, and time critical targets, at least some of which are reactive. The electronic combat threat level is four.

Table 10-2. Required Capabilities of the MEB-Level Instrumentation System.

Attribute	MAGTF MEB-Level Training Range
Tracking Time, Space, and Position Information	
High Fidelity	72 ¹
Low Fidelity	100 ²
Range Control	
2-Dimension	Yes
3-Dimension	Yes
Exercise Control and Coordination	
2-Dimension	Yes
3-Dimension	Yes
JNTC	Yes
Modeling and Simulation	
A/A	Yes
A/G	Yes
S/A	Yes
S/S	Yes
Scoring	
Type	Manual or Auto
Feedback	Both
RTKN	Voice or Auto
Debrief/After Action Review	
Type	Both

¹ Will support up to 48 friendly air assets (24 assault support aircraft and 24 fixed-wing aircraft) and 16 OPFOR aircraft.

² Assumes a platoon (of ground forces or vehicles) is the smallest unit for which TSPI is required.

CHAPTER 11

JOINT NATIONAL TRAINING CAPABILITY

Joint National Training Capability Concept

Joint training integrates more than one Service into a military force operating under a single combatant commander. In 2002, the DOD initiated a Training Transformation [T2] program to develop and implement the concepts and infrastructure that are essential elements in preparing US forces to conduct future joint effects-based operations. Focusing on collective training, the JNTC helps to prepare forces by providing units and command staffs with an integrated live, virtual, and constructive training environment with appropriate joint context that allows accurate, timely, and relevant training in support of specific operational needs. It can be used to train forces against a general threat, to conduct mission rehearsal against a specific threat, or to experiment with new doctrine, tactics, techniques, procedures, joint operations concepts, and equipment. The goal of the JNTC is to create and sustain an environment in which units and individuals receive joint operations training at the strategic, operational, and tactical levels, and, using a global network of joint training facilities and facilitators, combine existing military exercise elements with live forces to create a more realistic and valuable training experience.

Joint National Training Capability Process

Training Program Accreditation

To maximize training audience exposure and help ensure consistency of a realistic joint training

environment, the support and involvement of combatant command, Service, and components nominated and selected training programs will be required. The JNTC will work collaboratively with combatant commands, Services, and components to identify and accredit programs that can plan and execute joint training.

Accreditation is a process to determine that a combatant command, Service, or component training program or organization has the capability to conduct training on joint tasks. The process will serve as the vehicle to provide oversight and evaluation of existing joint context capabilities and the ability of training programs to provide a realistic joint training environment.

Site and System Certification

As part of the JNTC concept, sites and systems will be required to create a realistic joint environment for training/mission rehearsal of joint tasks. These sites and systems will require certification of their capability to support their joint training role. Like accreditation, this certification process is conducted by the Joint Warfighting Center in collaboration with TECOM. The purpose of certification is to ensure that all the technical elements required to create a realistic environment to train joint tasks are sufficient, available, operational, and interoperable. Certification deals with sites and systems, and is event independent, but is related to joint task requirements. Certification standards are derived from specified joint tasks and current and emerging DOD technical guidelines, policy, and JNTC standards. They vary depending on the many systems and sites.

The Test and Training Enabling Architecture

The JNTC will use the test and training enabling architecture (TENA) as the foundation for JNTC-certified test and training range instrumentation. Test and training enabling architecture will provide the software architecture and applications to enable interoperability among—

- Range systems.
- Facilities.
- Simulations.
- Command, control, communications, computers, intelligence, surveillance.
- Reconnaissance systems.

The end-state TENA will allow event-related, real-time, and post-event information to be shared between both TENA-compliant and non-TENA-compliant range infrastructures. There will be three key components of the end-state TENA architecture:

- TENA Middleware will provide the high performance, real-time, low-latency communications infrastructure.
- TENA Repository will contain all the information relative to TENA that is not specific to a given logical range.
- TENA Logical Range Data Archive will store and provide for the retrieval of all of the information associated with a specific logical range event.

Logical Range

A logical range is a suite of TENA resources, sharing a common object model, that works together for a given range event. A logical range for any JNTC event may include geographically separated ranges or range complexes, simulators, command centers, or data collection and distribution centers.

Required Joint National Training Capability Range Capabilities

The Services maintain training ranges and operating areas necessary to satisfy core Service training requirements. The Services' maintenance of training ranges and operating areas frequently results in the development and fielding of unique instrumentation for the operating platforms and a wide variety of infrastructure necessary to create the training environment, capture "ground truth," assess activity and performance, and provide feedback to the training audience in a timely manner. Examples include position information collection systems, weapons scoring, threat emitters, OPFOR equipment, communications, and exercise surveillance and support systems. Providing and modernizing such training functionality and capabilities are the responsibilities of the Services.

These established capabilities form the baseline of a modern range infrastructure. It is this baseline that forms the foundation of the JNTC, from which investments will selectively expand and connect Service training ranges and instrumentation systems to create joint capabilities. An example of creating joint capabilities is adding the systems for fixed-wing aircraft tracking and weapon-engagement scoring to the infrastructure at an Army range to enable accredited, joint training events.

Occasionally, modifications will be required to service training support systems to incorporate joint functionality. The overall intent is a future interoperability end state where Service and joint integrated live, virtual, and constructive training systems are routinely interconnected to support joint training and mission rehearsal events. It includes a global infrastructure capability, which enables distributed joint training across DOD sites, simulation centers, and RTAs.

APPENDIX A

MARINE CORPS SUITE OF RANGES

Table A-1 contains the Marine Corps suite of ranges and training areas. Range and training area facility codes, as applicable, are listed or indicated as pending (XXXXX).

The dimensions and land areas listed in table A-2 are for the nominal makeup of live fire ranges as

listed in TC 25-8 and used in the calculation of the threshold land area requirement. These dimensions do not account for capacity or throughput considerations and are general in nature. Also, these dimensions do not necessarily fully account for the unmitigated SDZs of the weapons associated with these ranges.

Table A-1. Marine Corps Suite of Ranges.

		Individual Level	Unit Level	MEU Level	MEB Level
Maneuver/Training Area	Maneuver/training area (XXXXX)	X	X		
	MAGTF-level maneuver/training area (XXXXX)			X	X
	Unit-level instrumented live fire and maneuver training area/range (XXXXX)		X		
	MAGTF-level instrumented live fire and maneuver training area/range (XXXXX)			X	X
Impact Area	Dedicated impact area—dudded (XXXXX)	X	X	X	X
	Impact area—dudded (17430)	X	X	X	X
	Impact area—nondudded (17431)	X	X	X	X
Live Fire Ranges	Nonstandard small arms range (17502)		X		
	Basic 10m–25m zero firing range (17510)	X	X		
	Automated field-fire range (17520)	X	X		
	Rifle known-distance (KD) range (17550)	X	X		
	Automated sniper field-fire range (17561)	X	X		
	Pistol KD range (17570)	X	X		
	Automated combat pistol/MP firearms qualification course (17572)		X	X	

Table A-1. Marine Corps Suite of Ranges. (Continued)

		Individual Level	Unit Level	MEU Level	MEB Level
Live Fire Ranges	Automated multi-purpose machine gun (MPMG) range (17582)	X	X		
	40mm (grenade) machine gun qualification range (17620)	X	X		
	Automated anti-armor tracking and live fire range (17641)	X	X		
	Field artillery direct fire range (17650)		X		
	Task/fighting vehicle stationary gunnery range (17660)	X	X		
	Mortar range (17670)	X	X		
	Field artillery indirect fire range (17671)		X	X	X
	Automated multi-purpose training range (17711)	X	X		
	Automated tank/fighting vehicle multi-purpose range complex (17722)		X		
	Fire and movement range (17730)	X	X		
	Squad defense range (17740)		X		
	Automated infantry squad battle course (17751)	X	X		
	Automated infantry platoon battle course (17753)		X		
	Live hand grenade range (17810)	X	X		
	Engineer explosive training range (17820) (17821) (17830)	X	X	X	X
Aviation Ranges	Offensive air support range (XXXXX)	X	X	X	X
	AAW range (XXXX)	X	X	X	X
	Assault support range (XXXXX)	X	X	X	X
	Air reconnaissance range (XXXXX)		X		
	EW range (XXXXX)	X	X		

Table A-1. Marine Corps Suite of Ranges. (Continued)

		Individual Level	Unit Level	MEU Level	MEB Level
MOUT Facilities/Complexes	MOUT assault course (17760)	X	X		
	MOUT collective training facility (small) (17962)	X	X		
	MOUT collective training facility (large) (17963)			X	X
	MAGTF-level MOUT collective training facility (XXXXX)			X	X

Table A-2. Live Fire Range Characteristics.

Live Fire Range	Dimension (m)	Area (km ²)
Nonstandard small arms range	200 x 5,000	1
Basic 10m–25m zero firing range	200 x 2,000	.4
Automated field-fire range	520 x 5,000	2.6
Rifle known-distance (KD) range	500 x 2,000	1
Automated sniper field-fire range	600 x 5,000	3
Pistol KD range	120 x 1,000	.12
Automated combat pistol/MP firearms qualification course	120 x 1,000	.12
Automated multi-purpose machine gun (MPMG) range	1,200 x 5,200	6.24
Automated grenade launcher range	500 x 2,500	1.25
40mm (grenade) machine gun qualification range	500 x 2,500	1.25
Automated anti-armor tracking and live fire range	1,000 x 5,000	5
Field artillery direct fire	1,000 x 5,000	5
Tank/fighting vehicle stationary gunnery range	1,000 x 4,000	4
Indirect fire range - mortars (not including 120mm rifled bore mortar)	2,000 x 6,000	12
Indirect fire range - field artillery (including 120mm rifled bore mortar)	12,500 x 25,000	312.5*
Automated multi-purpose training range	1,000 x 4,000	4
Automated heavy tank/fighting vehicle multi-purpose range complex	1,500 x 6,000	9
Fire and movement range	500 x 1,000	.5
Squad defense range	100 x 1,000	.1
Automated infantry squad battle course	1,000 x 2,000	2
Automated infantry platoons battle course	1,500 x 5,000	7.5
Live hand grenade range	80 x 30	.0024
Nonstandardized engineer qualification range	500 x 500	.25
Light demolition range	500 x 500	.25
MAC	300 x 1,500	.45

*Estimate based upon rectangular shape.

APPENDIX B

ADDITIONAL TRAINING INFRASTRUCTURE

Table B-1 is a list of additional range assets that are essential to range infrastructure.

Table B-1. Additional Training Infrastructure.

		Individual Level	Unit Level	MEU Level	MEB Level
Additional Training Infrastructure	Gas chamber (17230)	X	X		
	Land navigation course (17412)	X	X		
	Personnel equipment drop zone (17440)		X	X	X
	Mine warfare area (17905)	X			
	Wheeled vehicle drivers course (17906)	X	X		
	Tracked vehicle drivers course (17907)	X			
	Amphibious vehicle training area (17908)	X			
	Air transport mockup (17911)	X			
	Rappelling training area (17917)	X	X		
	Road/airfield construction training site (17918)	X			
	Floating bridge site (17922)		X		
	Water supply training area (17924)		X		
	Medium heavy equipment training area (17931)		X		
	Decontamination training site (17932)	X	X		
	Petroleum, oil, and lubricant training site (17933)		X		
Fire fighting and rescue training areas (17951)	X	X			

APPENDIX C

GLOSSARY

PART I: ACRONYMS AND ABBREVIATIONS

A/A	air to air	km	kilometer
AAR	after action review	KPP	key performance parameter
AAW	antiair warfare	lb	pound
ACE	aviation combat element	LCE	logistics command element
A/G	air to ground	LSD	landing support detachment
AGL	above ground level	LZ	landing zone
ARG	amphibious ready group		
BLM	Bureau of Land Management	m	meters
CAS	close air support	M&S	modeling and simulation
COTS	commercial off-the-shelf	MAC	military operations on urbanized terrain assault course
DA	Department of Army	MAG	Marine aircraft group
DASC	direct air support center	MAGTF	Marine air-ground task force
DC I&L	Deputy Commandant for Installations and Logistics	MCAS	Marine Corps air station
DMPI	desired mean point of impact	MCB	Marine Corps base
DOD	Department of Defense	MCLB	Marine Corps logistics base
DZ	drop zone	MCO	Marine Corps order
EC&C	exercise control and coordination	MCT	Marine Corps task
EOB	electronic order of battle	MCTL	Marine Corps Task List
ESG	expeditionary strike group	MEB	Marine expeditionary brigade
EW	electronic warfare	MEF	Marine expeditionary force
FSCC	fire support coordination center	MET	meteorological
ft	foot/feet	MEU	Marine expeditionary unit
GCE	ground combat element	MEU(SOC)	Marine expeditionary unit (special operations capable)
IER	information exchange requirement	mi	mile
ITS	individual training standards	MOS	military occupational specialty
JNTC	Joint National Training Capability	MOUAT	military operations on urbanized terrain
JTT	joint tactical task	MP	military police
		mph	miles per hour
		nm	nautical mile
		NSFS	naval surface fire support

OAS	offensive air support	SDZ	surface danger zone
OCE	officer conducting the exercise	SOC	special operations capable
OMFTS	operational maneuver from the sea	S/S	surface to surface
OPFOR	opposition force	STOM	ship-to-objective maneuver
PK	probability of kill	2-D	two-dimensional
RC	range control	3-D	three-dimensional
RCT	regimental combat team	T&R	training and readiness
RD	range debriefing	TC	training circular
RDCPS	Range Data Collection and Processing System	TECOM	Training and Education Command
REW	range electronic warfare	TENA	test and training enabling architecture
RF	radio frequency	TSD	transportation support detachment
RLT	regimental landing team	TSPI	time, space, and position information
RS	range scheduling	UAS	unmanned aircraft system
RT	range tracking	UJTL	Universal Joint Task List
RTA	range training area	UNTL	Universal Naval Task List
RTKN	real time kill notification	US	United States
S/A	surface to air	USJFCOM	United States Joint Forces Command
SAM	surface-to-air missile	V/STOL	vertical and/or short takeoff and landing aircraft

PART II: TERMS AND DEFINITIONS

air reconnaissance—The acquisition of information by employing visual observation and/or sensors in air vehicles. (JP 1-02)

antiair warfare—That action required to destroy or reduce to an acceptable level the enemy air and missile threat. Antiair warfare integrates all offensive and defensive actions against enemy aircraft, surface-to-air weapons, and theater missiles into a singular, indivisible set of operations. It is one of the six functions of Marine aviation. Also called **AAW**. (MCRP 5-12C)

assault support—The use of aircraft to provide tactical mobility and logistic support for the Marine air-ground task force, the movement of high priority cargo and personnel within the immediate area of operations, in-flight refueling, and the evacuation of personnel and cargo. Assault support is one of the six functions of Marine aviation. (MCRP 5-12C)

aviation combat element—The core element of a Marine air-ground task force (MAGTF) that is task-organized to conduct aviation operations. The aviation combat element (ACE) provides all or a portion of the six functions of Marine aviation necessary to accomplish the MAGTF's mission. These functions are antiair warfare, offensive air support, assault support, electronic warfare, air reconnaissance, and control of aircraft and missiles. The ACE is usually composed of an aviation unit headquarters and various other aviation units or their detachments. It can vary in size from a small aviation detachment of specifically required aircraft to one or more Marine aircraft wings. In a joint or multinational environment, the ACE may contain other Service or multinational forces assigned or attached to the MAGTF. The ACE itself is not a formal command. Also called **ACE**. (MCRP 5-12C)

close air support—Air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces. Also called **CAS**. (JP 1-02)

combat readiness—Synonymous with operational readiness, with respect to missions or functions performed in combat. (JP 1-02)

combat service support—The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistic systems, it includes but is not limited to that support rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield. Also called **CSS**. (JP 1-02)

command and control—The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called **C2**. (JP 1-02)

constructive training event/component—A training event/component involving simulated people and simulated systems that can take place as a stand-alone event or be integrated with a live or virtual training event/component.

datalink circuit—A circuit that provides encrypted or unencrypted two-way data communication between or among range systems. See also **range communications system**.

deep air support—Air action against enemy targets at such a distance from friendly forces that detailed integration of each mission with fire and movement of friendly forces is not required. Deep air support missions are flown on either side of the fire support coordination line; the lack of a requirement for close coordination with the fire and movement of friendly forces is the qualifying factor. Also called **DAS**. (MCRP 5-12C)

direct air support center—The principal air control agency of the US Marine air command and control system responsible for the direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with ground forces and other supporting arms. It normally collocates with the senior fire support coordination center within the ground combat element and is subordinate to the tactical air command center. Also called **DASC**. (JP 1-02)

doctrine—Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application. (JP 1-02)

electronic warfare—Military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Electronic warfare consists of three divisions: electronic attack, electronic protection, and electronic warfare support. Also called **EW**. (JP 1-02)

event debrief/after action review instrumentation—Devices that recreate exercise control and coordination, tracking, modeling and simulation, and scoring data from a given event to a degree that will allow a detailed, post-event, interactive

environment for event participants and observers to review, replay, assess, and critique the participants' performance. Also called **event debrief/AAR instrumentation**.

exercise communications circuit—A circuit that provides encrypted or unencrypted two-way communication between or among exercise control personnel, range event participants, evaluators, and headquarters personnel via wireless, acoustic, or radio frequency relay technologies.

exercise control and coordination instrumentation—Devices that provide real-time observation and post-mission reconstruction or major exercises through data set collection, storage, processing, and sharing. Exercise control and coordination instrumentation may also provide live targets and target control. Also called **EC&C instrumentation**.

ground combat element—The core element of a Marine air-ground task force (MAGTF) that is task-organized to conduct ground operations. It is usually constructed around an infantry organization but can vary in size from a small ground unit of any type, to one or more Marine divisions that can be independently maneuvered under the direction of the MAGTF commander. It includes appropriate ground combat and combat support forces, and in a joint or multinational environment, it may also contain other Service or multinational forces assigned or attached to the MAGTF. The ground combat element itself is not a formal command. Also called **GCE**. (MCRP 5-12C)

hostile environment—Operational environment in which hostile forces have control as well as the intent and capability to effectively oppose or react to the operations a unit intends to conduct. (JP 1-02)

infantry battalion—A ground combat organization consisting of a headquarters and service company, a weapons company, and three or four rifle companies. It is the basic tactical unit within

the Marine Corps and is organized and structured to plan, conduct, and control ground operations to include the integration and terminal direction of aviation support of the ground battle. When required, rifle companies can be reinforced with tank, light armored, assault amphibian, and/or combat engineer units. Infantry battalions fight the battle as subordinate organizations of the infantry regiment or as the ground combat element of a Marine expeditionary unit. The battalion is foot mobile unless reinforced. To perform its role in combat, it requires air defense and aviation support from Marine aviation and service support from a combat service support organization. (MCRP 5-12C)

live training event/component—A training event/component involving real people and real systems in a real/natural environment that can be augmented with virtual or constructive training events/components.

logistics combat element—The core element of a Marine air-ground task force (MAGTF) that is task-organized to provide the combat service support necessary to accomplish the MAGTF's mission. The logistics combat element varies in size from a small detachment to one or more Marine logistics groups. It provides supply, maintenance, transportation, general engineering, health services, and a variety of other services to the MAGTF. In a joint or multinational environment, it may also contain other Service or multinational forces assigned or attached to the MAGTF. The logistics combat element itself is not a formal command. Also called **LCE**. (MCRP 5-12C)

Marine air-ground task force—The Marine Corps' principal organization for all missions across the range of military operations, composed of forces task-organized under a single commander capable of responding rapidly to a contingency anywhere in the world. The types of forces in the Marine air-ground task force (MAGTF) are functionally grouped into four core elements: a command element, an aviation

combat element, a ground combat element, and a logistics combat element. The four core elements are categories of forces, not formal commands. The basic structure of the MAGTF never varies, though the number, size, and type of Marine Corps units comprising each of its four elements will always be mission dependent. The flexibility of the organizational structure allows for one or more subordinate MAGTFs to be assigned. In a joint or multinational environment, other Service or multinational forces may be assigned or attached. Also called **MAGTF**. (MCRP 5-12C)

Marine Corps Task List—a comprehensive list of Marine Corps tasks, doctrinally based, designed to support current and future mission-essential task list development. (MCRP 5-12C)

Marine expeditionary brigade—A Marine air-ground task force (MAGTF) that is constructed around a reinforced infantry regiment, a composite Marine aircraft group, and a combat logistics regiment. The Marine expeditionary brigade (MEB), commanded by a general officer, is task-organized to meet the requirements of a specific situation. It can function as part of a joint task force, as the lead echelon of the Marine expeditionary force (MEF), or alone. It varies in size and composition and is larger than a Marine expeditionary unit but smaller than a MEF. The MEB is capable of conducting missions across the full range of military operations. In a joint or multinational environment, it may also contain other Service or multinational forces assigned or attached to the MAGTF. Also called **MEB**. (MCRP 5-12C)

Marine expeditionary force—The largest Marine air-ground task force (MAGTF) and the Marine Corps' principal warfighting organization, particularly for larger crises or contingencies. It is task-organized around a permanent command element and normally contains one or more Marine divisions, Marine aircraft wings, and Marine logistics groups. The Marine expeditionary force is capable of missions across the range of military operations, including amphibious

ous assault and sustained operations ashore in any environment. It can operate from a sea base, a land base, or both. In a joint or multinational environment, it may also contain other Service or multinational forces assigned or attached to the MAGTF. Also called **MEF**. (MCRP 5-12C)

Marine expeditionary unit— A Marine air-ground task force (MAGTF) that is constructed around an infantry battalion reinforced, a helicopter squadron reinforced, and a task-organized logistics combat element. It normally fulfills Marine Corps' forward sea-based deployment requirements. The Marine expeditionary unit provides an immediate reaction capability for crisis response and is capable of limited combat operations. In a joint or multinational environment, it may contain other Service or multinational forces assigned or attached to the MAGTF. Also called **MEU**. (MCRP 5-12C)

Marine expeditionary unit (special operations capable)—The Marine Corps' standard, forward-deployed, sea-based expeditionary organization. The Marine expeditionary unit (special operations capable (MEU[SOC]) is a Marine expeditionary unit, augmented with selected personnel and equipment, that is trained and equipped with an enhanced capability to conduct amphibious operations and a variety of specialized missions of limited scope and duration. These capabilities include specialized demolition, clandestine reconnaissance and surveillance, raids, in extremis hostage recovery, and enabling operations for follow-on forces. The MEU(SOC) is not a special operations force but, when directed by the President and/or Secretary of Defense, the combatant commander, and/or other operational commander, may conduct limited special operations in extremis, when other forces are inappropriate or unavailable. In a joint or multinational environment, it may also contain other Service or multinational forces assigned or attached to the Marine air-ground task force. Also called **MEU(SOC)**. (MCRP 5-12C)

modeling and simulation instrumentation— Devices that create an artificial training operational environment, replicating to the greatest degree possible the expected area of operations. Also called **M&S instrumentation**.

objective—The desired level of performance of a range-related system or subsystem. An objective must be equal to or greater than the threshold.

offensive air support—Those air operations conducted against enemy installations, facilities, and personnel to directly assist the attainment of MAGTF objectives by the destruction of enemy resources or the isolation of the enemy's military forces. Offensive air support is one of the six functions of Marine aviation. Also called **OAS**. (MCRP 5-12C)

operational environment—A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. (JP 1-02)

operational training—Training that develops, maintains, or improves the operational readiness of individuals or units. (JP 1-02)

range—1. The distance between any given point and an object or target. 2. Extent or distance limiting the operation or action of something, such as the range of an aircraft, ship, or gun. 3. The distance that can be covered over a hard surface by a ground vehicle, with its rated payload, using the fuel in its tank and its cans normally carried as part of the ground vehicle equipment. 4. Area equipped for practice in shooting at targets. In this meaning, also called **target range**. (JP 1-02)

range communications system—A two-way voice and data communications system used between or among range personnel and range event participants. A range communications system is classified into one of three types of communications circuit: range control, exercise communications, or datalink. See also **datalink**

circuit; exercise communications circuit; range control circuit.

range control circuit—A circuit that provides two-way communication among range personnel via wireless point-to-point, landline, or web-based technology. These circuits are typically not encrypted. Also called **RC circuit**.

range control instrumentation—Devices that support the range scheduling, operations, and safety functions by providing range operations personnel with the ability to schedule range events, make modification to a scheduled range event, ensure range activities are consistent with range clearances, provide real-time range deconfliction, and observe and collect real-time data related to on-range event activities. Also called **RC instrumentation**.

range instrumentation system—The collection of facilities, equipment, software, and implementation methodologies used to schedule, monitor, deconflict, create, or reconstruct the training range environment and on-range events. See also **event debrief/after action review instrumentation; exercise control and coordination instrumentation; modeling and simulation instrumentation; range control instrumentation; scoring instrumentation**.

range tracking—A system that detects friendly force and opposing force event participants' location and movement on the range and develops a position history of those movements.

range modernization—Investments that will allow the Marine Corps to train for tomorrow's requirements.

range sustainment—Investments that allow the Marine Corps to continue to support its existing training requirements.

range and training area—A designated government facility or land, water, and airspace set aside, managed, and used for training and recre-

ational purposes, research and development, testing and evaluation of military munitions and explosives, other ordnance or weapon systems, and instruction of military personnel in their employment.

range upgrade—Investments that improve a range's ability to support existing training requirements.

readiness—The ability of US military forces to fight and meet the demands of the national military strategy. Readiness is the synthesis of two distinct but interrelated levels. a. **unit readiness**—The ability to provide capabilities required by the combatant commanders to execute their assigned missions. This is derived from the ability of each unit to deliver the outputs for which it was designed. b. **joint readiness**—The combatant commander's ability to integrate and synchronize ready combat and support forces to execute his or her assigned missions. (JP 1-02)

scoring instrumentation—Devices that detect and report the success or projected lethality of live or virtual training weapons employed on the range.

stability operations—An overarching term encompassing various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief. (JP 1-02)

surface danger zone—Exclusion areas identified to protect personnel from weapons firing during training. Also called **SDZ**.

threshold—The minimum acceptable operational performance value of a range-related system or subsystem.

Universal Joint Task List—A menu of capabilities (mission-derived tasks with associated condi-

tions and standards, i.e., the tools) that may be selected by a joint force commander to accomplish the assigned mission. Once identified as essential to mission accomplishment, the tasks are reflected within the command joint mission essential task list. Also called **UJTL**. (JP 1-02)

Universal Naval Task List—A combination of the Navy Tactical Task List and the Marine Corps Task List that contains a comprehensive hierarchical listing of the tasks that can be

performed by a naval force, describes the variables in the environment that can affect the performance of a given task, and provides measures of performance that can be applied by a commander to set a standard of expected performance. (MCRP 5-12C)

virtual training event/component—A training event/component that involves real people and simulated systems, typically in a real/natural environment.

APPENDIX D

REFERENCES

Army Field Manual (FM)

3.06-11 Combined Arms Operations in Urban Terrain

Army Training Circulars (TC)

25-1 Training Land

25-8 Training Ranges

Department of Defense Instruction (DODI)

4165.3 Department of Defense Facility Classes and Construction Categories

Department of the Army Pamphlet (DA Pam)

385-63 Range Safety

Marine Corps Orders (MCOs)

3500.16 Light Armor Reconnaissance Training and Readiness Manual

3500.100 Tank Training and Readiness Manual

3570.1B Range Safety

Naval Facilities Engineering Command P-Publications (NAVFAC P-Pub)

P-72 Department of the Navy Facility Category Codes