MCCDC Pamphlet

Experimental Marine Expeditionary Brigade Planner's Reference Manual

Marine Corps Combat Development Command (MCCDC)

U.S. Marine Corps

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UNITED STATES MARINE CORPS
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3300 Russell Road
Quantico, Virginia 22134-5069

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FOREWORD

1. PURPOSE. The *Experimental Marine Expeditionary Brigade Planner's Reference Manual* provides general planning considerations and planning factors for war gamers using an experimental Marine expeditionary brigade (MEB) in the 2007 time frame.

2. SCOPE. This manual is intended for use by MEB war gamers. It is designed to facilitate the planning effort by presenting general planning factors and considerations that may be used in an operational planning team. This manual does not negate the need for a careful mission, enemy, terrain and weather, troops available, and time available (METT-T) analysis. The data presented in the manual is intended to be a starting point only, and should be tailored to satisfy the requirements identified in the METT-T analysis.

3. SUPERSESSION. None.

4. CHANGES. Recommendations for improvements to this pamphlet are encouraged from commands as well as from individuals. The attached User Suggestion Form can be reproduced and forwarded to:

Commanding General (C 39)
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Quantico, Virginia 22134-5001

Recommendations may also be submitted electronically to:
opso@mstp.quantico.usmc.mil

5. CERTIFICATION. Reviewed and approved this date.

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Throughout this pamphlet, masculine nouns and pronouns are used for the sake of simplicity. Except where otherwise noted, these nouns and pronouns apply to either sex.

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Part I

Introduction

The information in this manual supports exercises and war games involving Marine Corps forces—specifically a Marine expeditionary brigade—during 2007.

The Marine expeditionary brigade (MEB) is the mid-sized MAGTF and is normally commanded by a brigadier general. The MEB bridges the gap between the Marine expeditionary unit (MEU), task-organized to provide a forward deployed presence, and the Marine expeditionary force (MEF), task-organized to fight and win the nation's battles. With 30 days of sufficient supplies for sustained operations, the MEB is capable of conducting amphibious assault operations and maritime prepositioning force (MPF) operations. During potential crisis situations, a MEB may be forward deployed afloat for an extended period to provide an immediate combat response. A MEB can operate independently or serve as the advance echelon of a MEF. The MEB command element is embedded in the MEF command element and identified by line number for training and rapid deployment.

The MEB can provide supported combatant commanders with a credible operational capability that is rapidly deployable and possesses the capability to impact all elements of the battlespace. If required, a MEB command element is capable of assuming the role of joint task force headquarters for small operations with additional MEF command element augmentation. As an expeditionary force, it is capable of rapid deployment and employment via amphibious shipping, strategic air/sealift, geographical or maritime prepositioning force assets, or any combination thereof.

The MEB command element normally is embedded in the MEF command element and identified by line number for training and rapid deployment. When the MEB is activated, designated personnel and equipment assigned to the MEF command element form the MEB command element.

There are four designated MEB command elements—

- 1st MEB, assigned within I MEF, and located at Camp Pendleton, CA.
- 2d MEB, assigned within II MEF, and located at Camp Lejeune, NC.
- 3d MEB, assigned within III MEF, and located in Okinawa, Japan.
- 4th MEB (Antiterrorist), assigned to II MEF, and located at Camp Lejeune, NC. This MEB is the only standing command element.

The forward deployed MAGTF (normally, but not exclusively, the MEU) will play a key role as the precursor for larger Marine Corps forces. The MEU (with augmentation) is prepared to transition to a MEB with its full range of additional forces and capabilities. The transition from the forward presence MEU to a MEB and ultimately to a MEF is a seamless operational concept that incorporates global sourcing, MPF, fly in echelon (FIE) and additional amphibious forces. If a MEU is already in the area of operations (AO) when a MEB is deployed, the MEU can be the advance echelon of the MEB command element. The duration and requirements for the MEU will need to be spelled out and coordinated through the respective combatant commander. Another option is for the MEU to remain independent but tasked to provide support to the MEB as required. The command relationship will be situation dependent.

1001. Capabilities

All MEBs have the following capabilities:

- Inherently expeditionary combined arms force.
- Robust and scalable command and control capability.
- A full range operational capability…forcible entry to humanitarian assistance.
- Task-organized for mission accomplishment.
- Capable of rapid deployment and employment by amphibious shipping, strategic air/sealift, or any combination.
- Sustainable.
- Brings increased command and control and significantly expanded battlespace functions and capabilities.
- Aviation element is capable of all six aviation functions: offensive air support, antiair warfare, assault support, air reconnaissance, electronic warfare, control of aircraft and missiles.
- Exercise command and control of aircraft and airspace.
- Full spectrum of expeditionary combat service support: supply, maintenance, transportation, general engineering, health services, services, messing.

1002. Organization

The MEB is a task-organized MAGTF normally composed of a command element, a reinforced infantry regiment, a composite Marine aircraft group (MAG), and a brigade service support group (BSSG). The task-organization of a MEB varies according to the mission, forces assigned, and the AO. MEB forces are designated in the activation order.

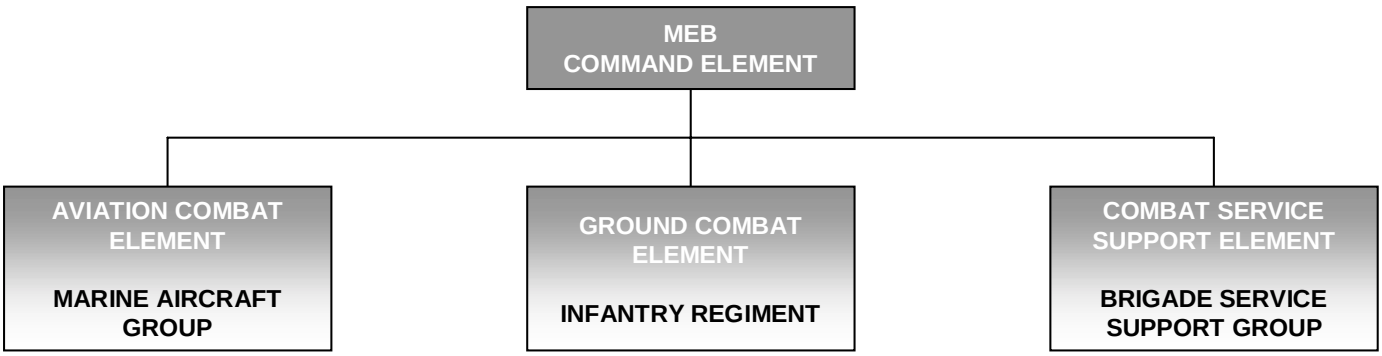


Figure 1-1. Marine expeditionary brigade organization.

a. Command Element

The MEB command element provides command and control for the elements of the MEB. When missions are assigned, the notional MEB command element is tailored with required support to accomplish the mission. Detachments are assigned, as necessary, to support subordinate elements. The MEB command element is fully capable of executing all of the staff functions of a MAGTF (administration and personnel, intelligence, operations and training, logistics, plans, communications and information systems, public affairs officer, staff judge advocate, comptroller, and OPSEC).

b. Ground Combat Element

The ground combat element (GCE) is normally formed around a reinforced infantry regiment. The GCE can be composed of from two to five battalion sized maneuver elements (infantry, tanks, light armored reconnaissance) with a regimental headquarters, plus artillery, AAA battalion, reconnaissance, anti-tank units, and engineers.

c. Aviation Combat Element

The aviation combat element (ACE) is a composite MAG task-organized for the assigned mission. It usually includes both helicopters and fixed-wing aircraft, and elements from the Marine wing support group (MWSG) and the Marine air control group (MACG). The MAG has more varied aviation capabilities than those of the aviation element of a MEU. The most significant difference is the ability to command and control aviation with the Marine Air Command and Control System (MACCS). The MAG is the smallest aviation unit designed for independent operations with no outside assistance except access to a source of supply. The ACE headquarters will be an organization built upon an augmented MAG headquarters or provided from other MAW assets.

d. Combat Service Support Element

The BSSG is task-organized to provide combat service support beyond the capability of the supported air and ground elements. It is structured from personnel and equipment of the force service support group (FSSG). The BSSG provides the nucleus of the landing force support party (LFSP) and, with appropriate attachments from the GCE and ACE, has responsibility for the landing force support function when the landing force shore party group is activated.

1003. Deployment

The MEB is deployed by a continuous flow of task-organized forces. As an expeditionary force, it is capable of rapid deployment and employment via amphibious shipping, strategic air/sealift, marriage with geographical or maritime prepositioning force assets, or any combination thereof. The MEB deploys with sufficient supplies to sustain operations for 30 days. The MEB may be comprised of units from MPF, air contingency force (ACF), or the amphibious task force (ATF).

1004. Employment

The MEB mission is to plan, coordinate, and conduct sustainable combined arms combat and other expeditionary operations across the spectrum of conflict. MEB tasks include:

- Forcible entry.
- Deploy to combatant commander's area of responsibility as part of a joint or combined force.
- Provide a nucleus joint task force headquarters.
- Enable follow-on forces.
- Be prepared to act as the Marine Corps Service component.
- Be prepared to serve as the advance echelon of a MEF.

1005. Maritime Prepositioning Force Marine Expeditionary Brigade

The MPF MEB is slightly larger than an amphibious MEB and more heavily equipped with armor and mechanized assets. It is capable of combat against a sophisticated mechanized force.

The prepositioning of MPF equipment afloat reduces strategic airlift requirements and global response time. MPF squadrons are afloat until "married up" with the MPF MEB. Marines are flown into the AO by strategic airlift.

The purpose of the MPF MEB is to rapidly project combat power into an area. Once established ashore, it can be operationally ready for combat within 10 days and capable of sustaining operations for 30 days. There are approximately 16,000 Marine and 900 Navy personnel assigned. MPF operations are a strategic deployment option.

Element	Composition
Command Element	Detachments from the MEF Headquarters Group, communications battalion, radio battalion, civil affairs, force reconnaissance, intelligence, and the Marine logistics group.
Ground Combat Element	A reinforced infantry regiment which can consist of the following: • Three to five infantry battalions. • Artillery battalion (REIN). • Tank battalion (-). • Combat engineer battalion (-). • Reconnaissance company. • Assault amphibian battalion (-). • LAR company (REIN).
Aviation Combat Element	Operates from supporting ships, existing sites ashore, or forward operating bases (FOBs). It is composed of a task-organized MAG which can consist of the following: • Rotary/fixed-wing aircraft squadrons. • Detachments from MACG organizations. • Detachments from MWSG squadrons. • Marine aviation logistics squadron (MALS).
Combat Service Support Element	Has supplies to support the MEB in combat for 30 days. Provides the full spectrum of combat service support capabilities to the MEB. Consists of a BSSG that is normally task-organized from permanent organizations of the FSSG.

Table 1-1. Maritime prepositioning force Marine expeditionary brigade.

1006. Amphibious Marine Expeditionary Brigade

The amphibious MEB is the mid-sized MAGTF. The CE, GCE, and selected units from the ACE and CSSE form the assault echelon of an amphibious MEB and deploy aboard Navy amphibious shipping as a balanced force. The remaining forces of the amphibious MB deploy as an assault follow-on echelon. There are approximately 14,000 to 15,000 Marine and 900 Navy personnel assigned, depending on mission and available shipping.

Element	Composition
Command Element	Detachments from the MEF Headquarters Group, communications battalion, radio battalion, civil affairs, force reconnaissance, intelligence, and the marine logistics group.
Ground Combat Element	A reinforced infantry regiment which can consist of the following: • Three to five infantry battalions. • Artillery battalion (REIN). • Tank companies. • Combat engineer company. • Reconnaissance company. • Assault amphibian company(s). • LAR company (REIN).
Aviation Combat Element	Operates from supporting ships, existing sites ashore, or FOBs. It is composed of a task-organized MAG which can consist of the following: • Rotary/fixed-wing aircraft squadrons. • Detachments from MACG organizations. • Detachments from MWSG squadrons. • MALS.
Combat Service Support Element	Has supplies to support the MEB in combat for 30 days. Provides the full spectrum of combat service support capabilities to the MEB. Consists of a BSSG that is normally task-organized from permanent organizations of the FSSG. The BSSG is organized to accomplish a specific mission.
Naval Construction Force	Task-organized to support the MEB's mission ashore. It is normally built around the assets of a naval mobile construction battalion.

Table 1-2. Amphibious Marine expeditionary brigade.

Part II

Organizations

2001. Marine Expeditionary Force and Major Subordinate Command Locations

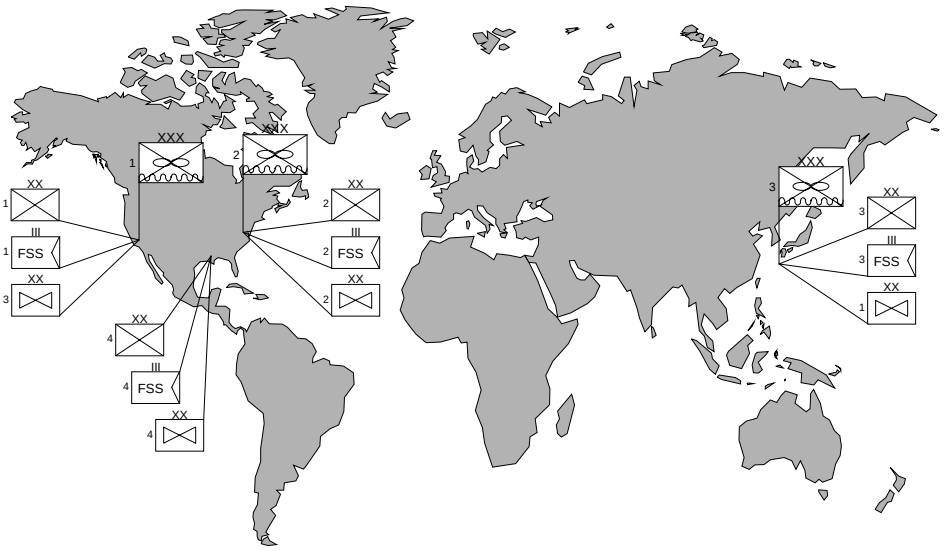


Figure 2-1. Marine expeditionary force and major subordinate command locations.

a. Marine Expeditionary Brigade Locations

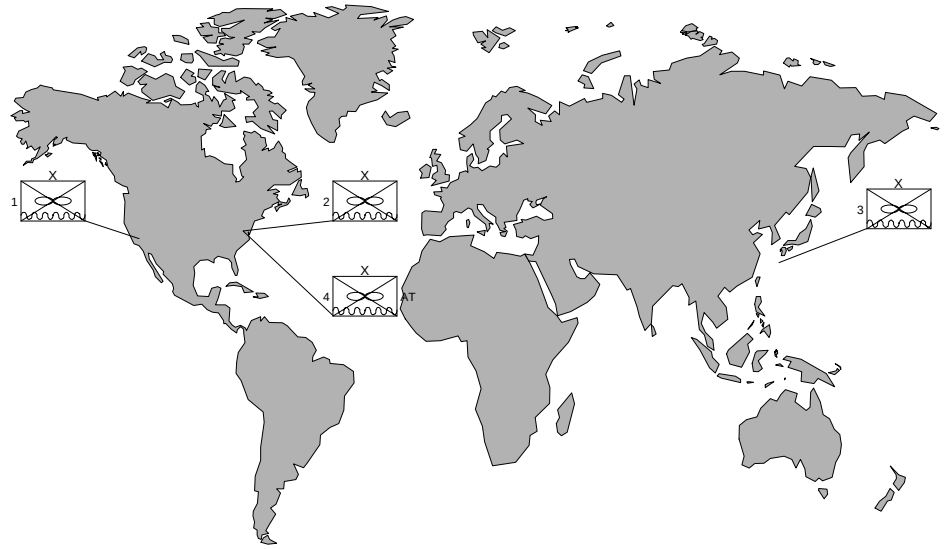


Figure 2-2. Marine expeditionary brigade locations.

b. Infantry and Artillery Regiment Locations

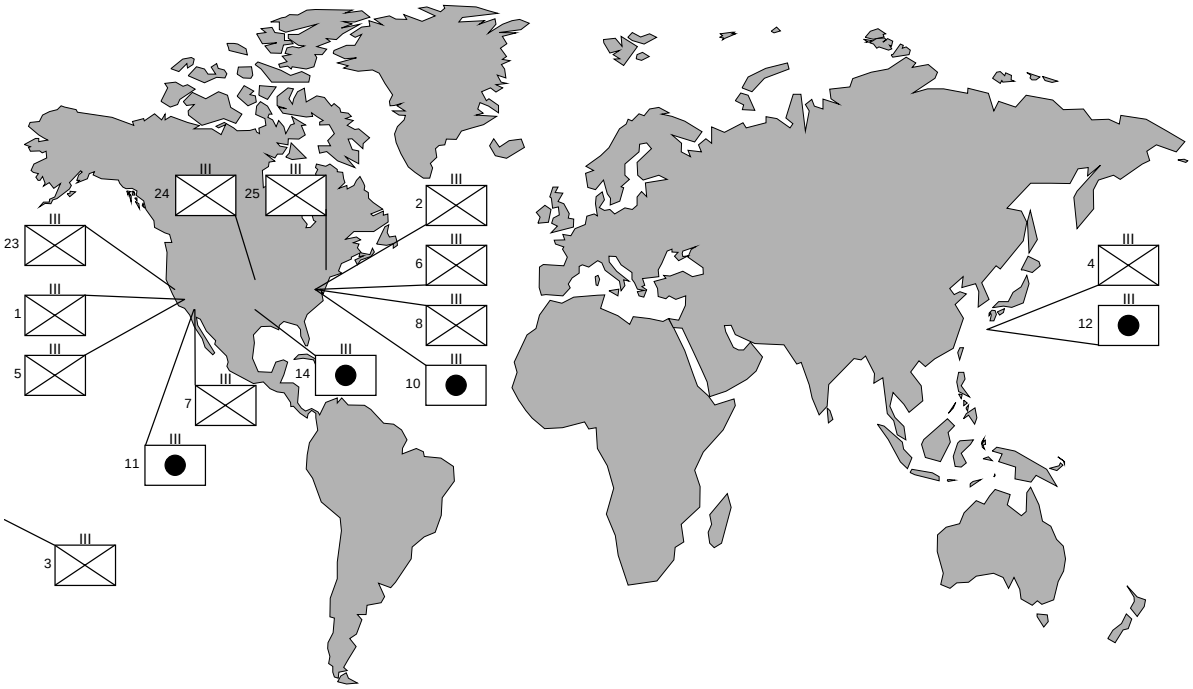


Figure 2-3. Infantry and artillery regiment locations.

c. Aviation Group Locations

Figure 2-4. Aviation group locations.

2002. Marine Corps Component Locations

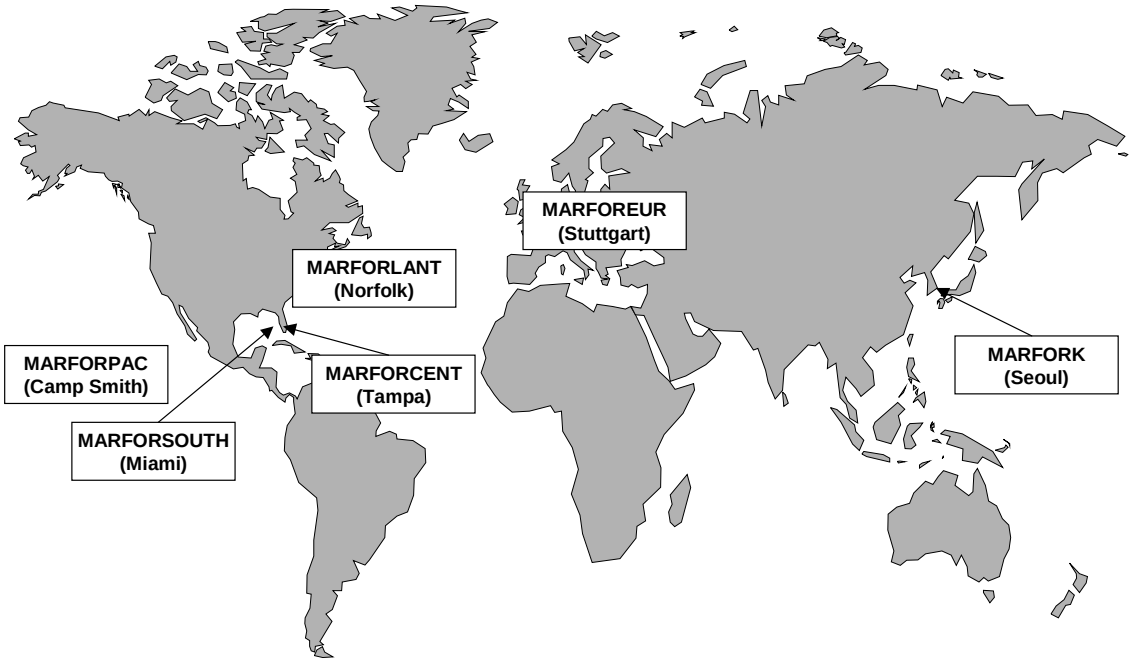


Figure 2-5. Marine Corps component locations.

2003. Marine Corps Forces Atlantic Organization

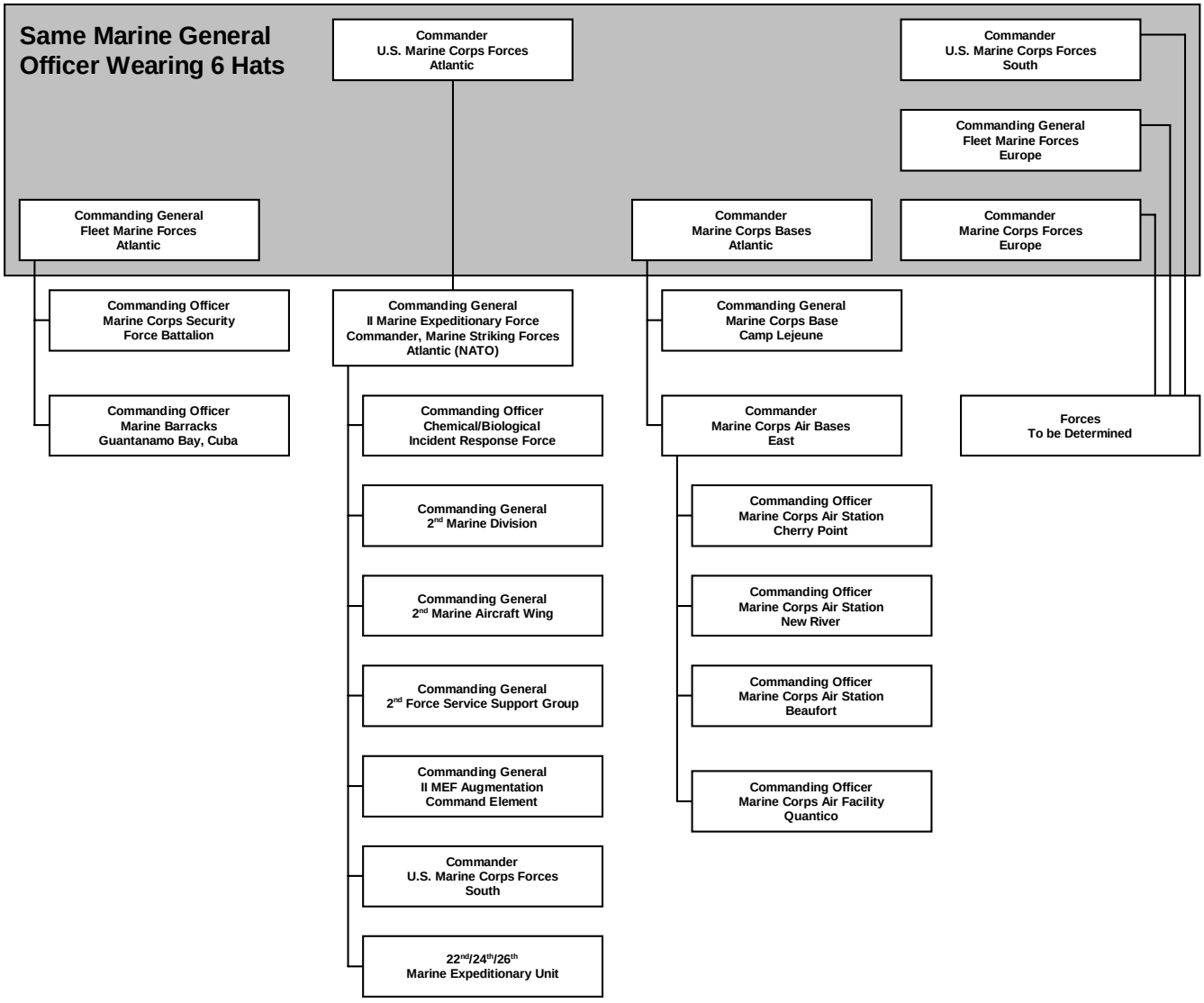


Figure 2-6. Marine Corps Forces Atlantic organization.

2004. Marine Corps Forces Pacific Organization

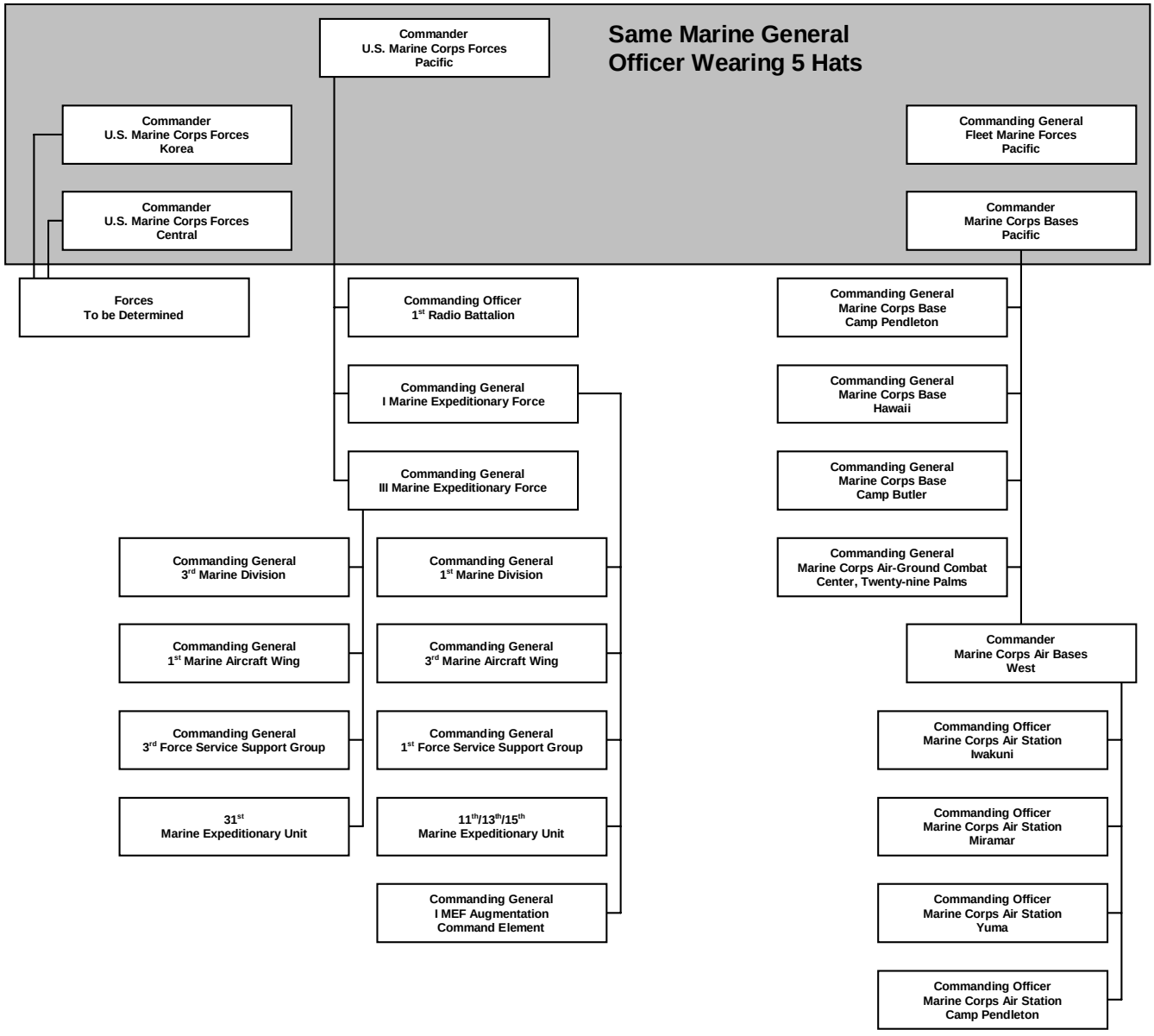


Figure 2-7. Marine Corps Forces Pacific organization.

2005. I Marine Expeditionary Force Organization

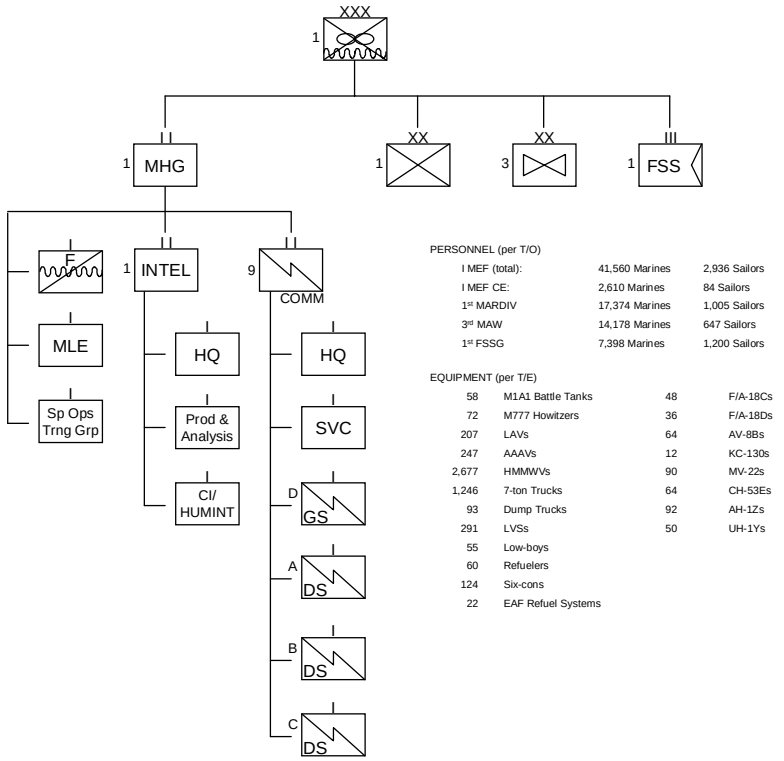


Figure 2-8. I Marine Expeditionary Force organization.

a. 1st Marine Division

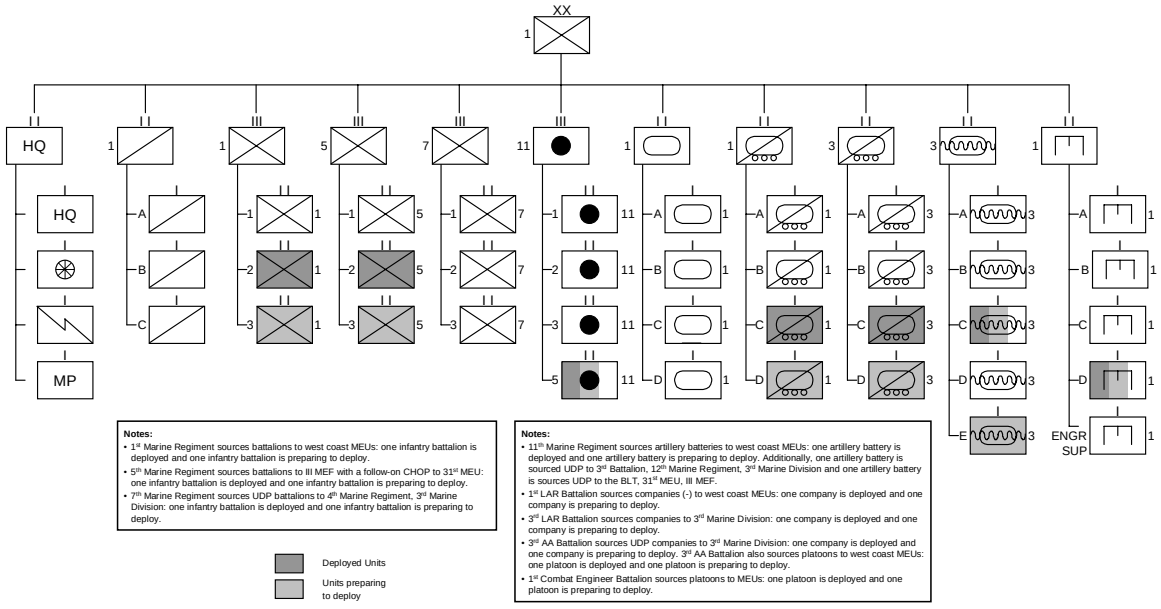


Figure 2-9. 1st Marine Division organization.

b. 3rd Marine Aircraft Wing

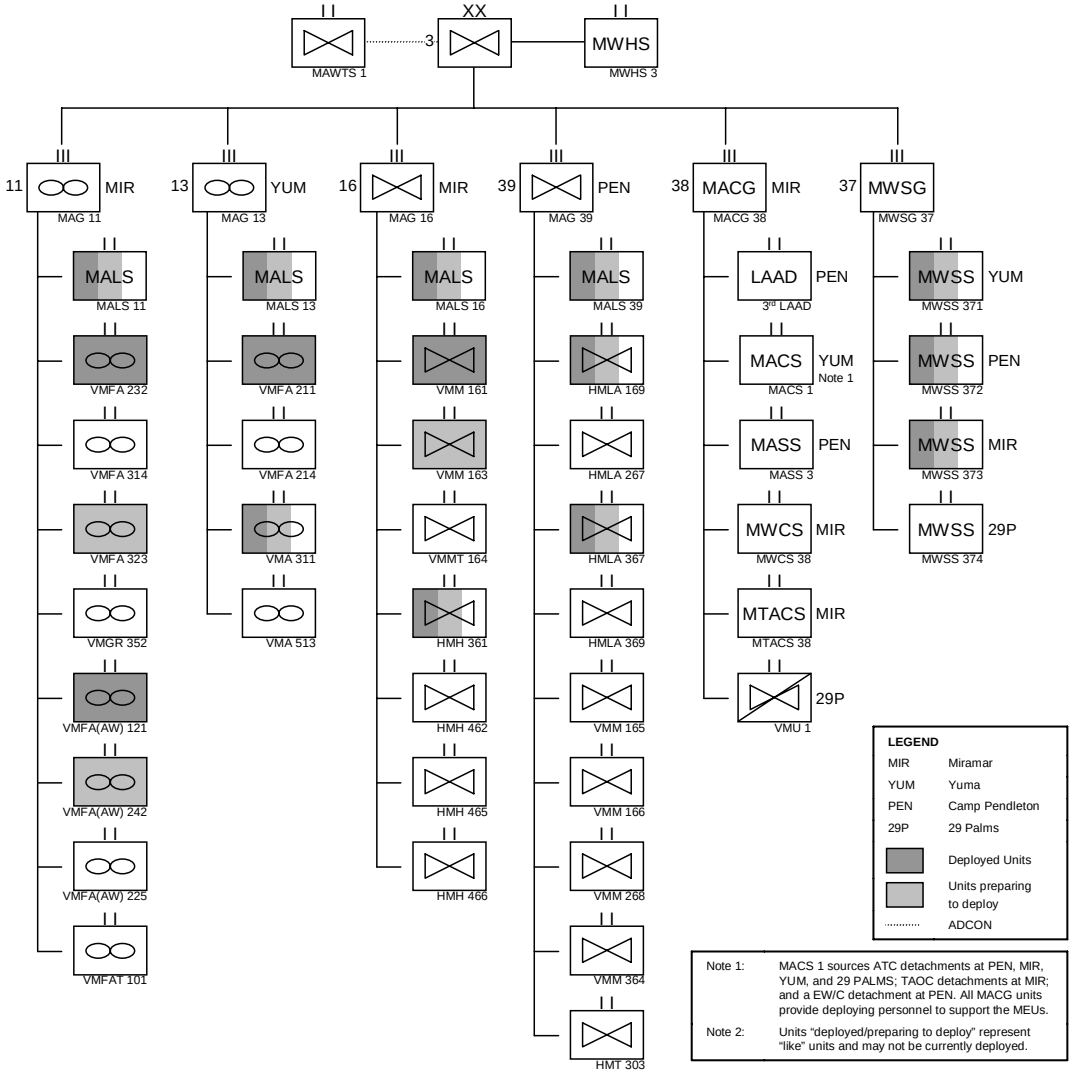


Figure 2-10. 3rd Marine Aircraft Wing organization.

c. 1st Force Service Support Group

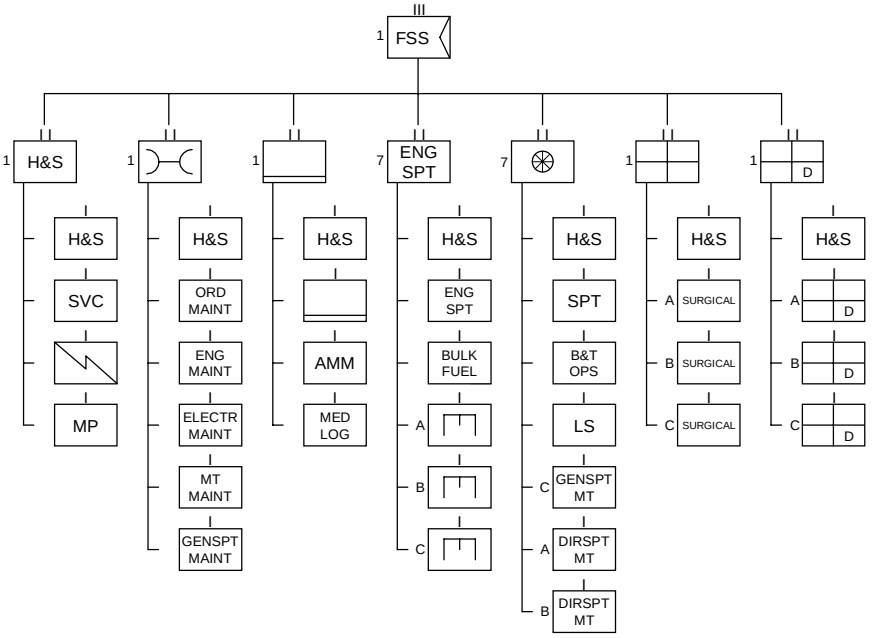


Figure 2-11. 1st Force Service Support Group organization.

2006. II Marine Expeditionary Force Organization

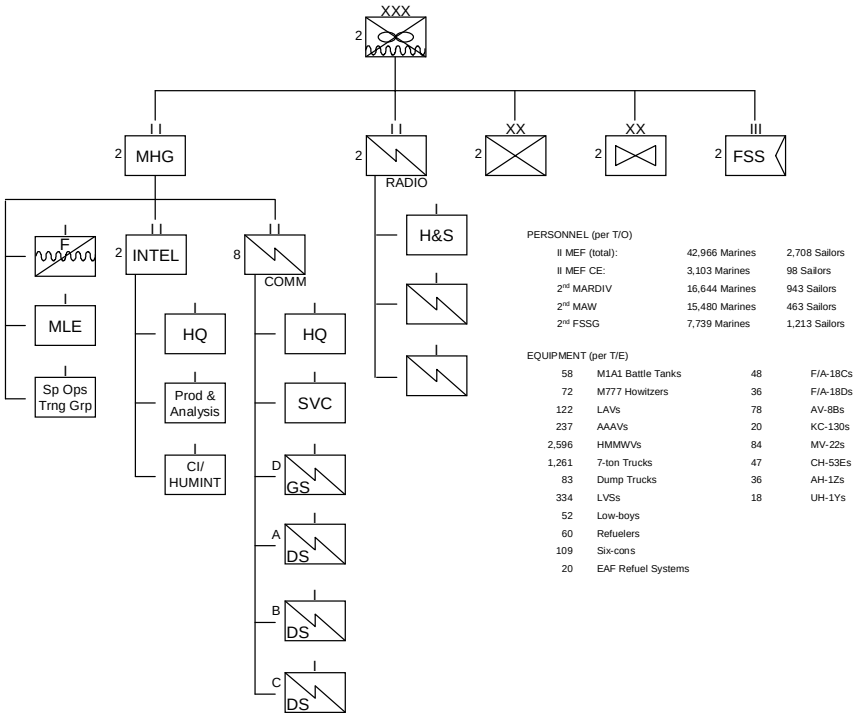


Figure 2-12. II Marine Expeditionary Force organization.

a. 2nd Marine Division

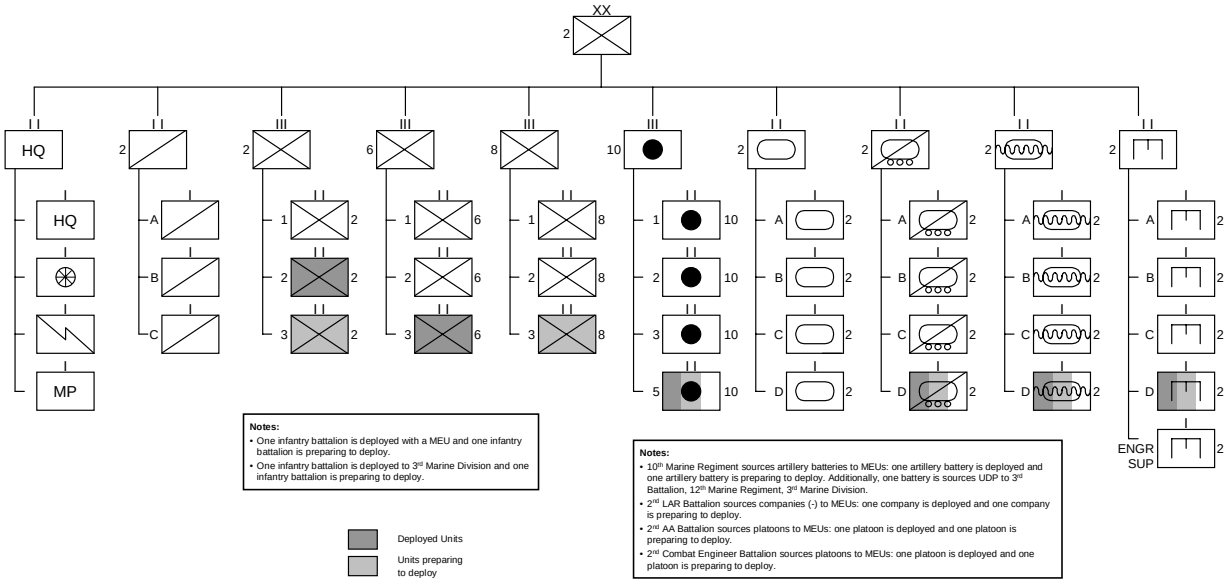


Figure 2-13. 2nd Marine Division organization.

b. 2nd Marine Aircraft Wing

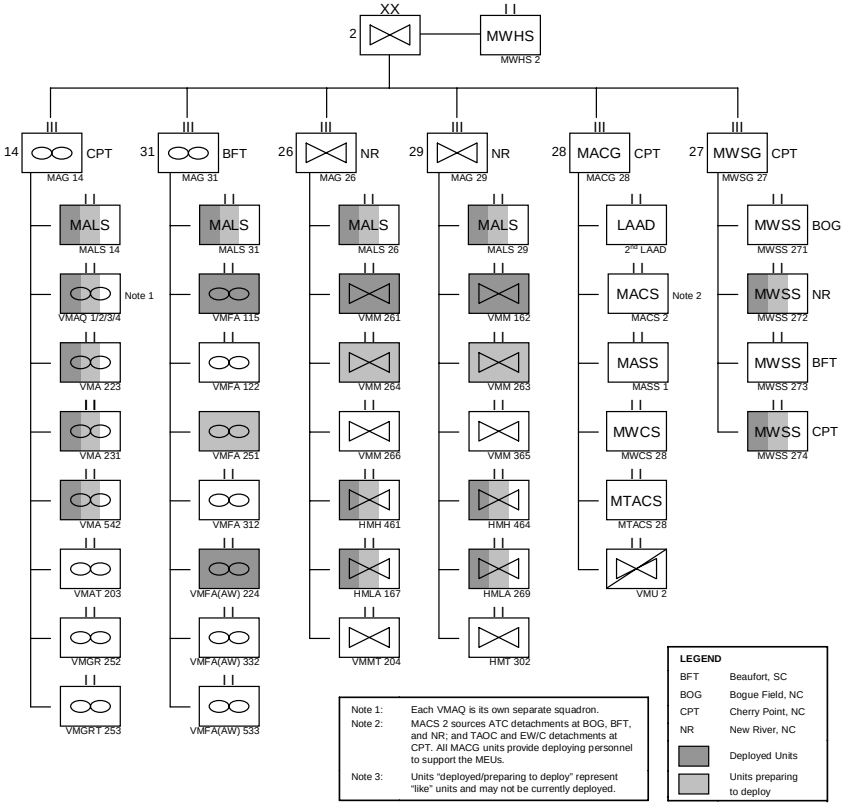


Figure 2-14. 2nd Marine Aircraft Wing organization.

c. 2nd Force Service Support Group

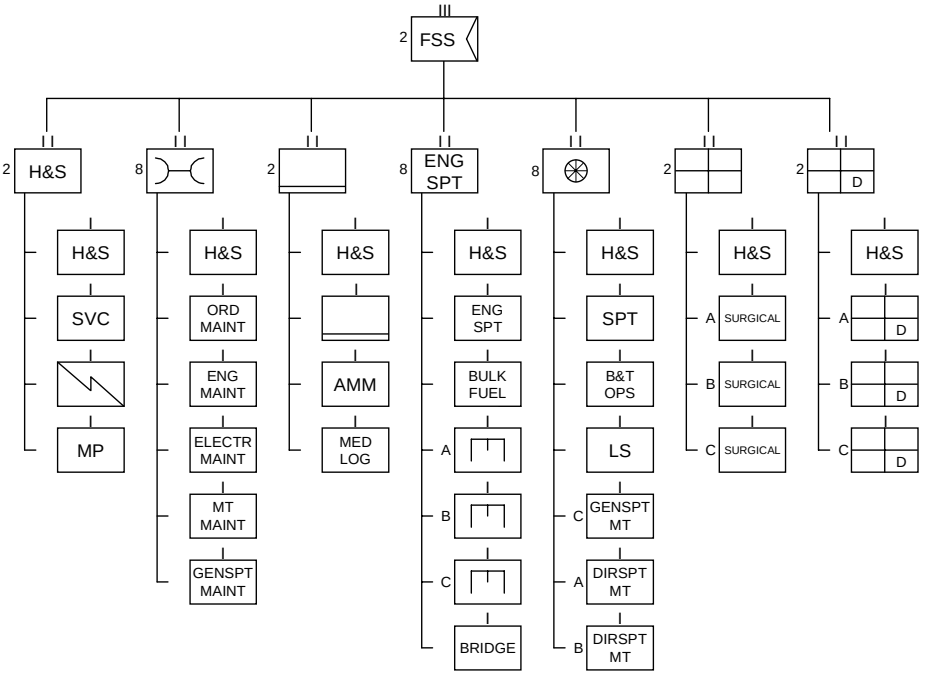
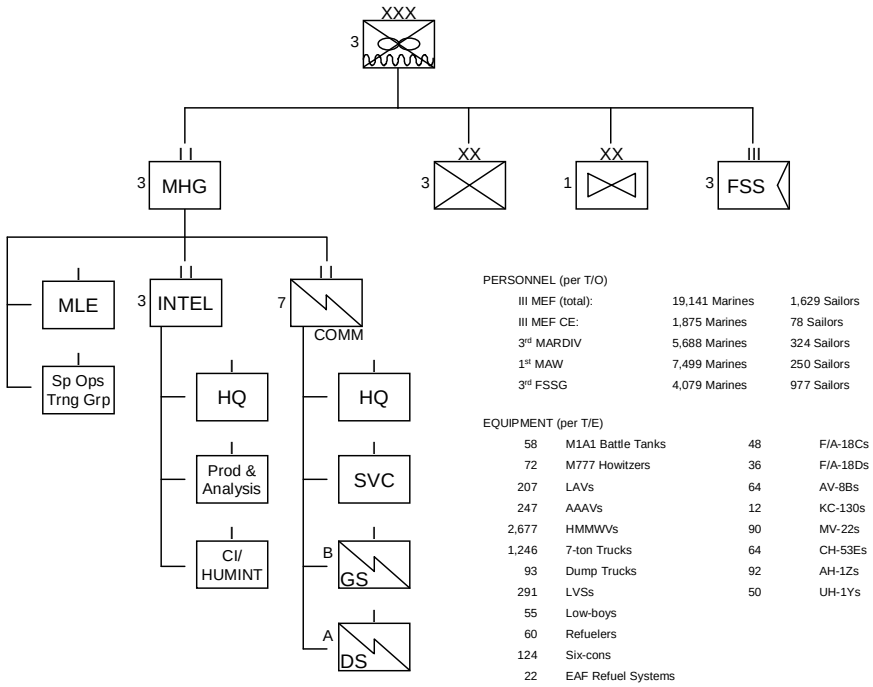


Figure 2-15. 2nd Force Service Support Group organization.

2007. III Marine Expeditionary Force Organization



PERSONNEL (per T/O)

III MEF (total):	19,141 Marines	1,629 Sailors
III MEF CE:	1,875 Marines	78 Sailors
3rd MARDIV	5,688 Marines	324 Sailors
1st MAW	7,499 Marines	250 Sailors
3rd FSSG	4,079 Marines	977 Sailors

EQUIPMENT (per T/E)

58	M1A1 Battle Tanks	48	F/A-18Cs
72	M777 Howitzers	36	F/A-18Ds
207	LAVs	64	AV-8Bs
247	AAAVs	12	KC-130s
2,677	HMMWVs	90	MV-22s
1,246	7-ton Trucks	64	CH-53Es
93	Dump Trucks	92	AH-1Zs
291	LVSs	50	UH-1Ys
55	Low-boys		
60	Refuelers		
124	Six-cons		
22	EAF Refuel Systems		

Figure 2-16. III Marine Expeditionary Force organization.

a. 3rd Marine Division

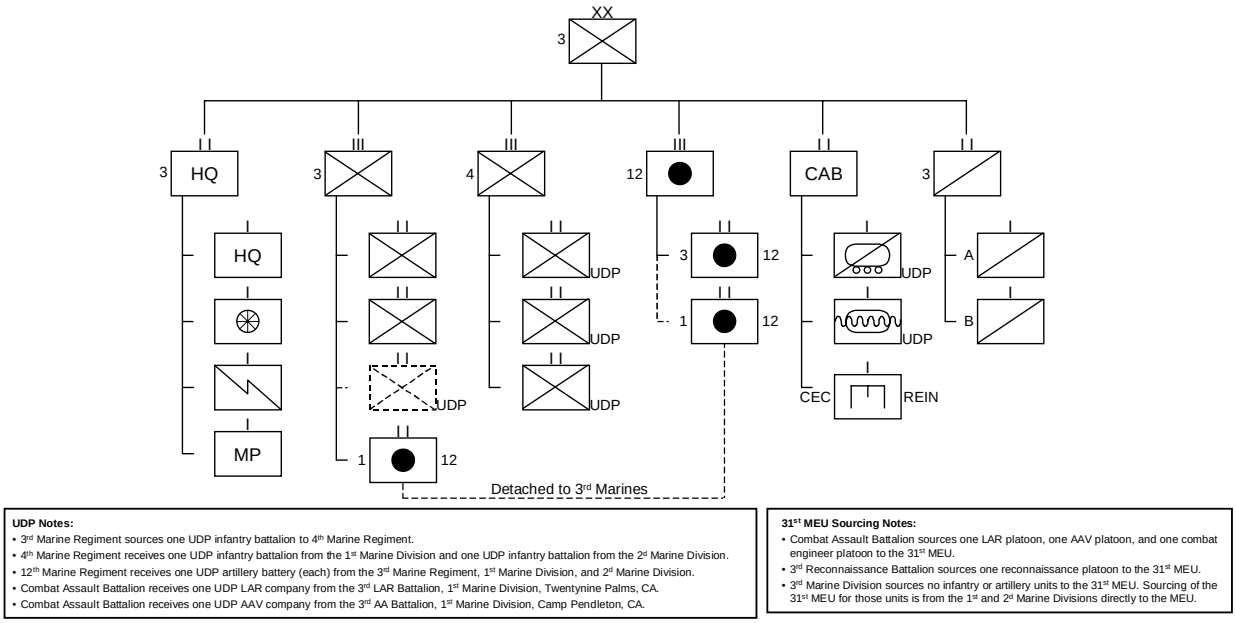


Figure 2-17. 3rd Marine Division organization.

b. 1st Marine Aircraft Wing

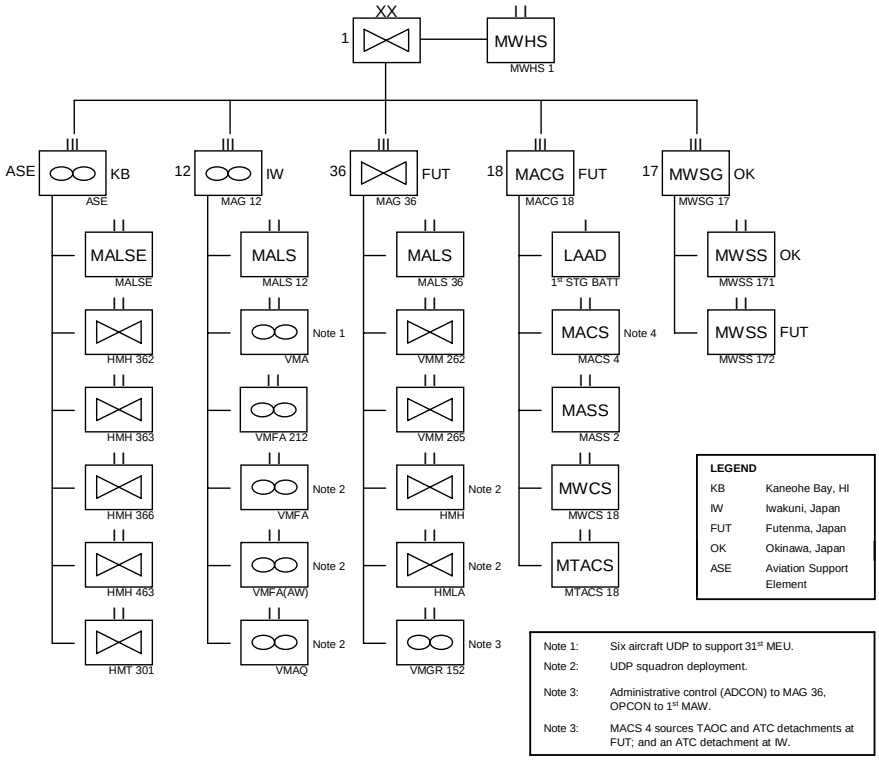


Figure 2-18. 1st Marine Aircraft Wing organization.

c. 3rd Force Service Support Group

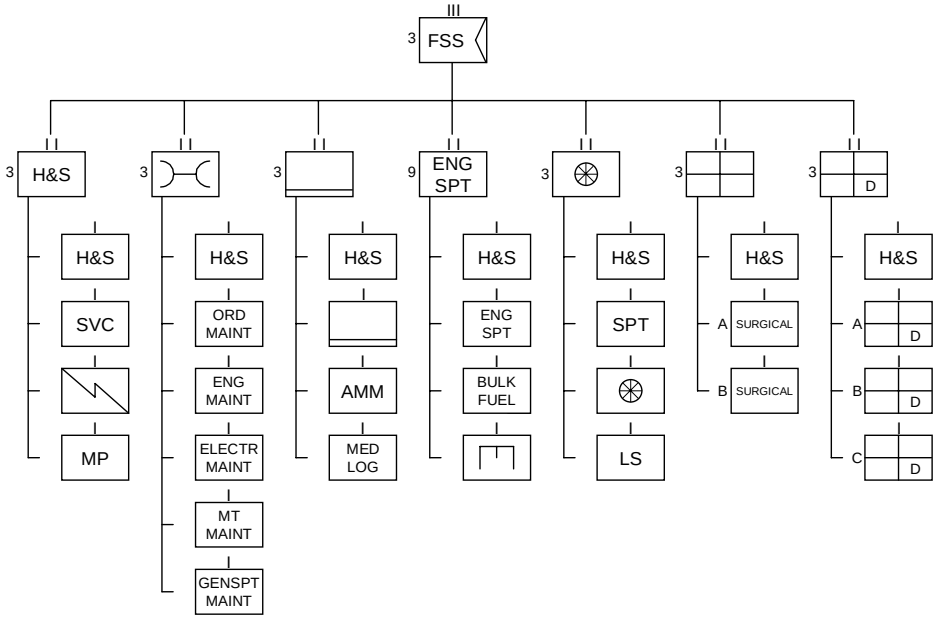
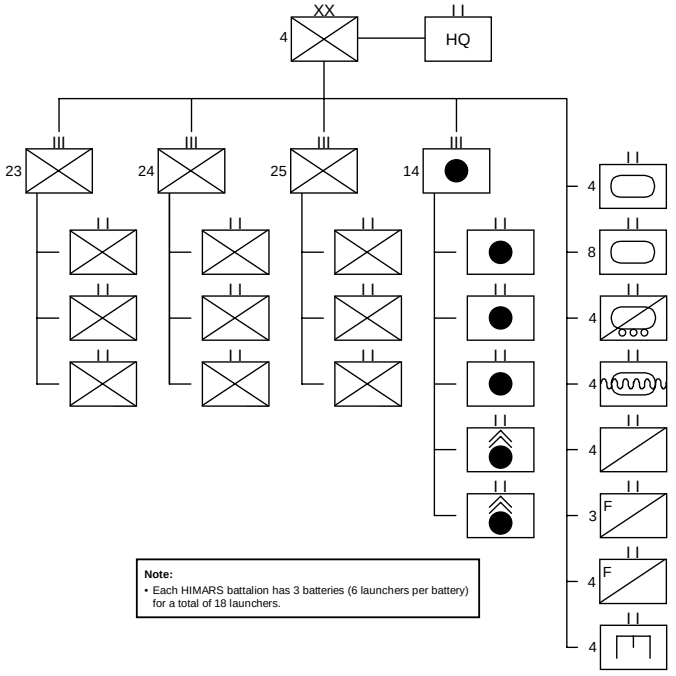


Figure 2-19. 3rd Force Service Support Group organization.

2008. Marine Corps Forces Reserve Organization

a. 4th Marine Division



HQ 23rd Marines San Bruno, CA	**HQ 24th Marines** Kansas City, MO	**HQ 25th Marines** Worcester, MA	**HQ 14th Marines** Fort Worth, TX
1st Bn, 23rd Marines Houston, TX	**1st Bn, 24th Marines** Detroit, MI	**1st Bn, 25th Marines** Devin, MA	**1st Bn, 14th Marines** Alameda, CA
2nd Bn, 23rd Marines Encino, CA	**2nd Bn, 24th Marines** Chicago, IL	**2nd Bn, 25th Marines** Garden City, NY	**2nd Bn, 14th Marines** Grand Prairie, TX
3rd Bn, 23rd Marines New Orleans, LA	**3rd Bn, 24th Marines** St. Louis, MO	**3rd Bn, 25th Marines** Brook Park, OH	**3rd Bn, 14th Marines** Philadelphia, PA
4th Tank Bn San Diego, CA	**8th Tank Bn** Rochester, NY	**4th CEB** Baltimore, MD	**4th Bn, 14th Marines** Bessemer, AL
4th AA Bn Tampa,FL	**4th LAR Bn** Camp Pendleton, CA	**4th Recon Bn** San Antonio, TX	**5th Bn, 14th Marines** Seal Beach, CA
4th Force Recon Co Reno, NV Honolulu, HI	**3rd Force Recon Co** Mobile, AL		

Figure 2-20. 4th Marine Division organization and unit locations.

b. 4th Marine Aircraft Wing

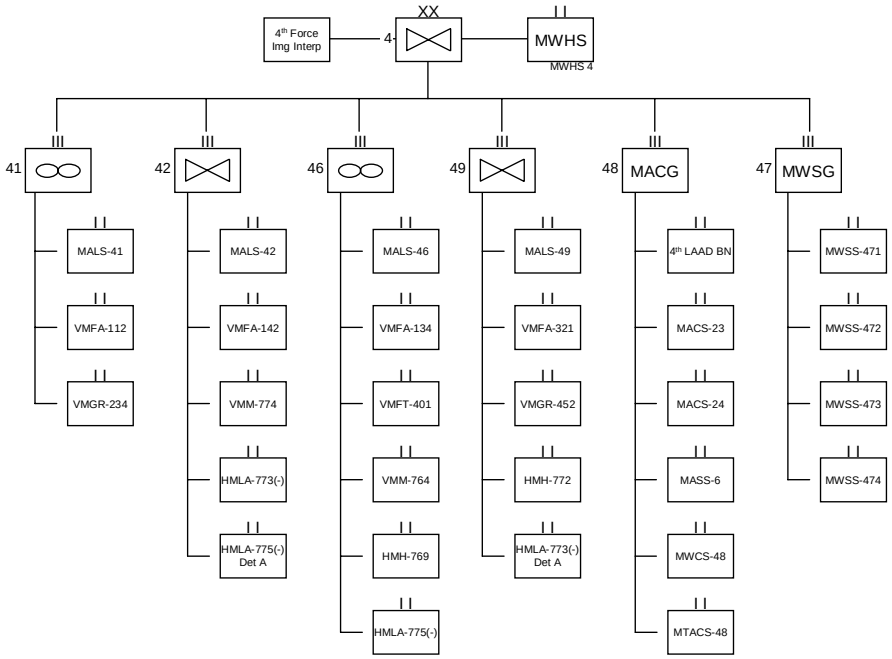


Figure 2-21. 4th Marine Aircraft Wing organization.

Andrews AFB, Wash DC MASD		**New Orleans, LA** MAW HQ 4th FIIU / 4th MAW Band / Civ Empl CNARF Staff			**Belle Chase, LA** MASD
MACG-48	**MWSG-47**	**MAG-41 (RW)**	**MAG-42 (RW)**	**MAG-46 (FW)**	**MAG-49 (RW)**
Great Lakes, IL MTACS-48 MWCS-48 MWCS-48 Det A (Rear)	**Selfridge, MI** MWSS-472 Det B (RW)	**Ft Worth, TX** MALS-41 (FW) VMGR-234 (12 KC-130T) VMFA-112 (12 F/A-18A)	**Marietta, GA** MALS-42 (RW) HMLA-773(-) (12 AH-1Z/6 UH-1Y)	**Miramar, CA** MALS-46 (FW) VMFA-134 (12 F/A-18A)	**Willow Grove, PA** HMH-772 (8 CH-53E)
Miramar, CA MWCS-48 Det A (Fwd) MASS-6 (Fwd)	MWSS-473(-) (FW)	**Minneapolis, MN** MWSS-471 Det A (FW)	**Atlanta, GA** VMFA-142 (12 F/A-18A)	**Camp Pendleton, CA** MAG-46 Det A (RW) HMLA-775 (-) (12 AH-1Z/6 UH-1Y)	**Johnstown, PA** HMLA-773 Det A (6 AH-1X/3 UH-1Y)
Ft Worth, TX MACS-24 ATC Det A	MWSS-471(-) (FW)		**Norfolk, VA** MAG-42 Det B (RW) VMM-774 (12 MV-22)		**Andrews AFB, Wash DC** MALS-49 Det A (RW) VMFA-321 (12 F/A-18)
Willow Grove, PA MWSS-474(-) (RW)			**Belle Chase, LA** MAG-42 Det C (RW) HMLA-775 Det A (6 AH-1Z/3 UH-1Y)	**Edwards AFB, CA** MAG-46 Det B (RW) VMM-764 (12 MV-22) HMH-769 (8 CH-53E)	**Ft Stewart, NY** MALS-49 Det B (RW) VMGR-452 (12 KC-130T)
Westover ARB, MA MASS-6 (Rear)	MWSS-474 Det B (RW)				
Marietta, GA LAAD Bn, H&S Det LAAD Bn, Btry B	MWSS-472(-) (RW)				
Aurora, CO MACS-23 MACS-23, TAOC	**Green Bay, WI** MWSS-471 Det B (FW)				
Cheyenne, WY MACS-23, EW/C Det	**Wyoming, PA** MWSS-472 Det A (RW)				
Damneck, VA MACS-24 MACS-24, TAOC	**Fresno, CA** MWSS-473 Det A (FW)				
Pasadena, CA 4th LAAD Bn LAAD Bn, H&S (-) LAAD Bn, Btry A	**Whidbey Is, WA** MWSS-473 Det B (FW)				
	Johnstown, PA MWSS-474 Det A (RW)				

Table 2-1. 4th Marine Aircraft Wing unit locations and assets.

c. 4th Force Service Support Group

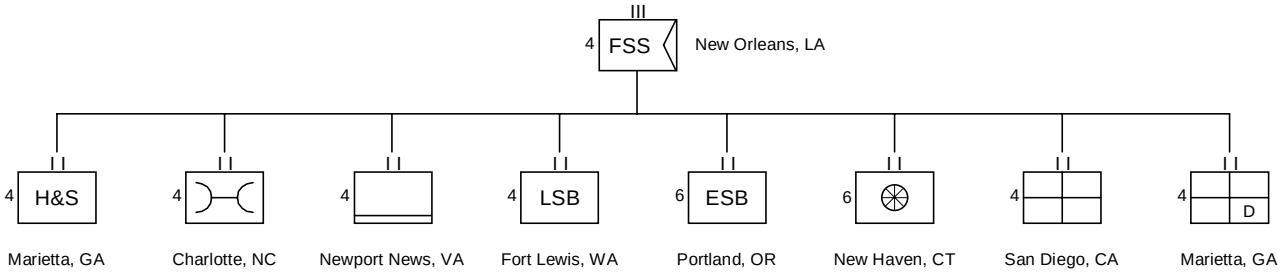


Figure 2-22. 4th Service Support Group organization and unit locations.

2009. Experimental Marine Expeditionary Brigade Organization

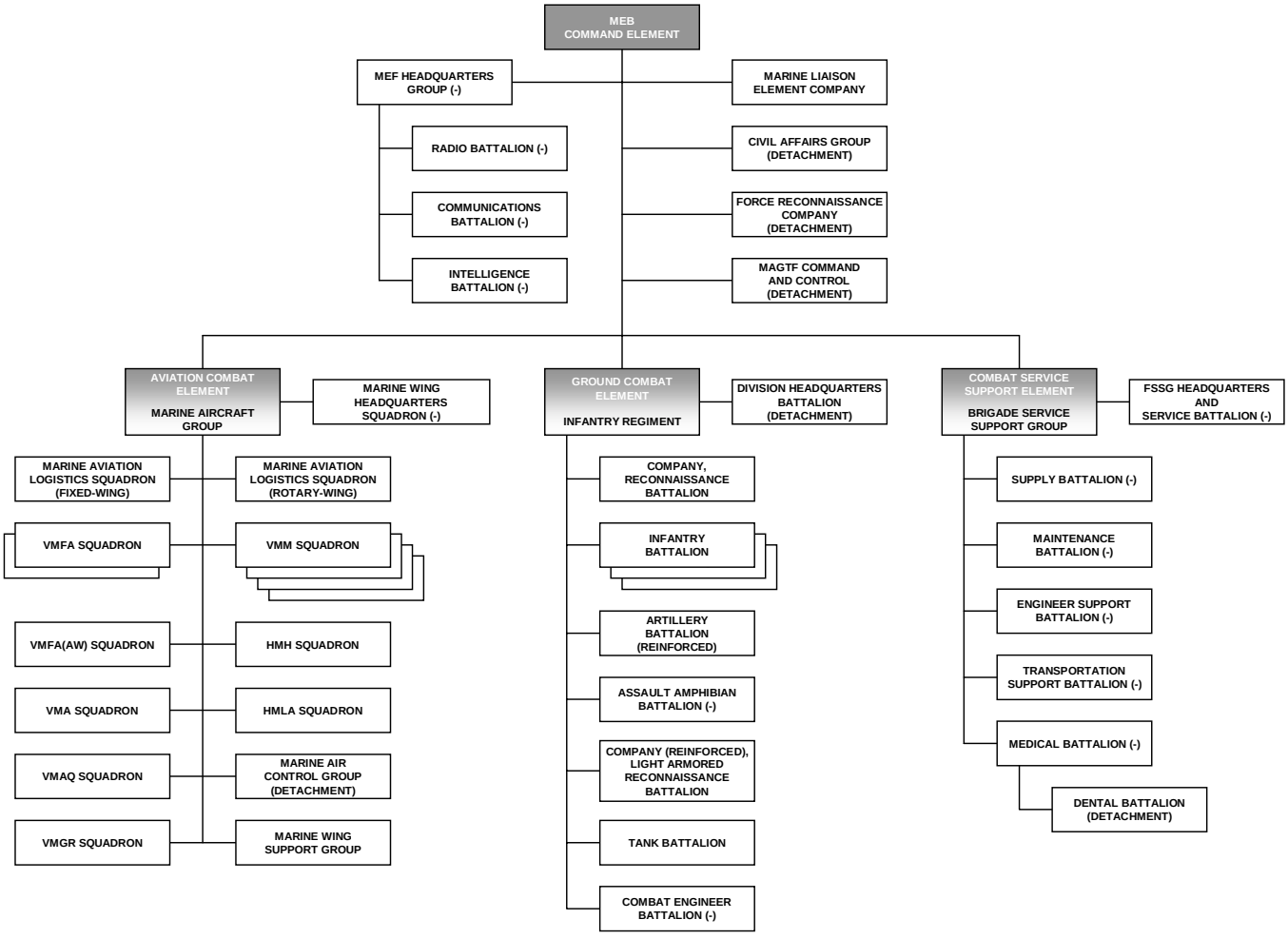
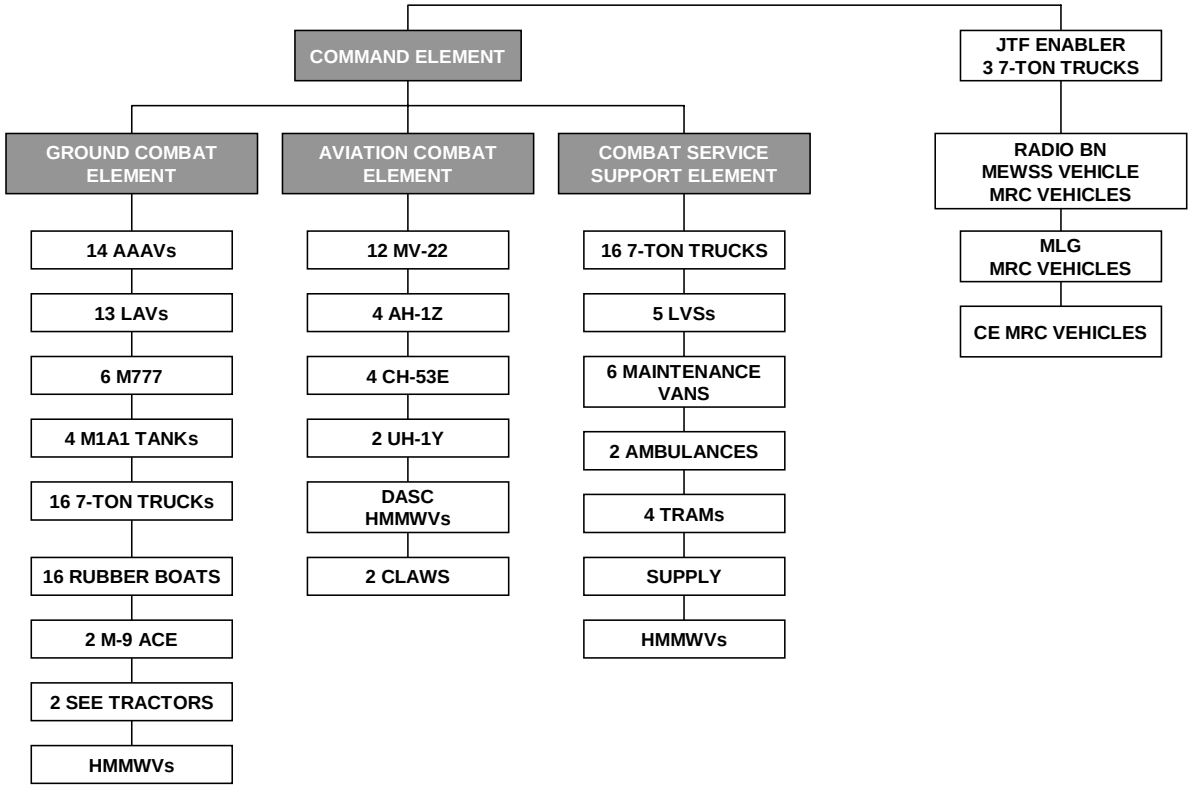


Figure 2-23. Experimental Marine expeditionary brigade organization.

2010. Notional Marine Expeditionary Unit Organization and Major End Items



Note: Some MEU structural organizations include 6 AV-8B Harriers at the expense of other airframes.

Figure 2-24. Notional Marine expeditionary unit organization and major end items.

2011. Maritime Prepositioning Ship Squadron

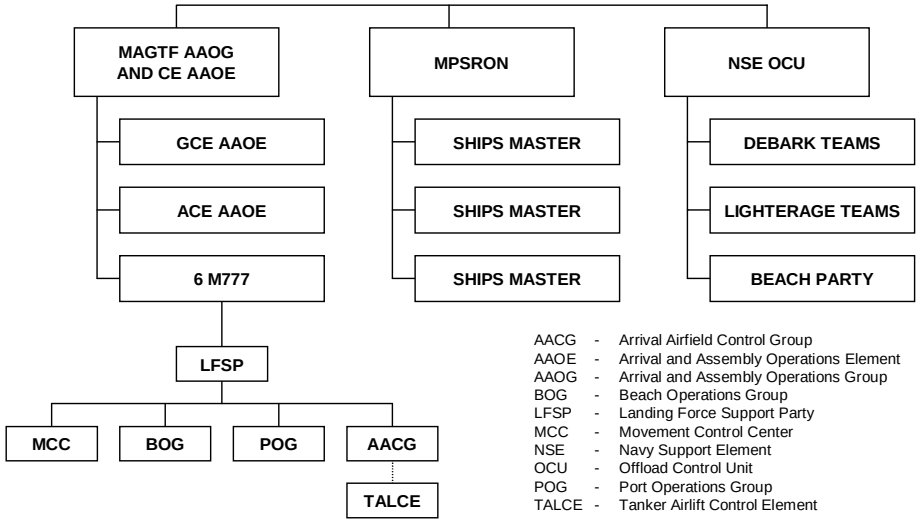


Figure 2-25. Maritime prepositioning ship squadron organization.

a. Maritime Prepositioning Ship Squadron Locations

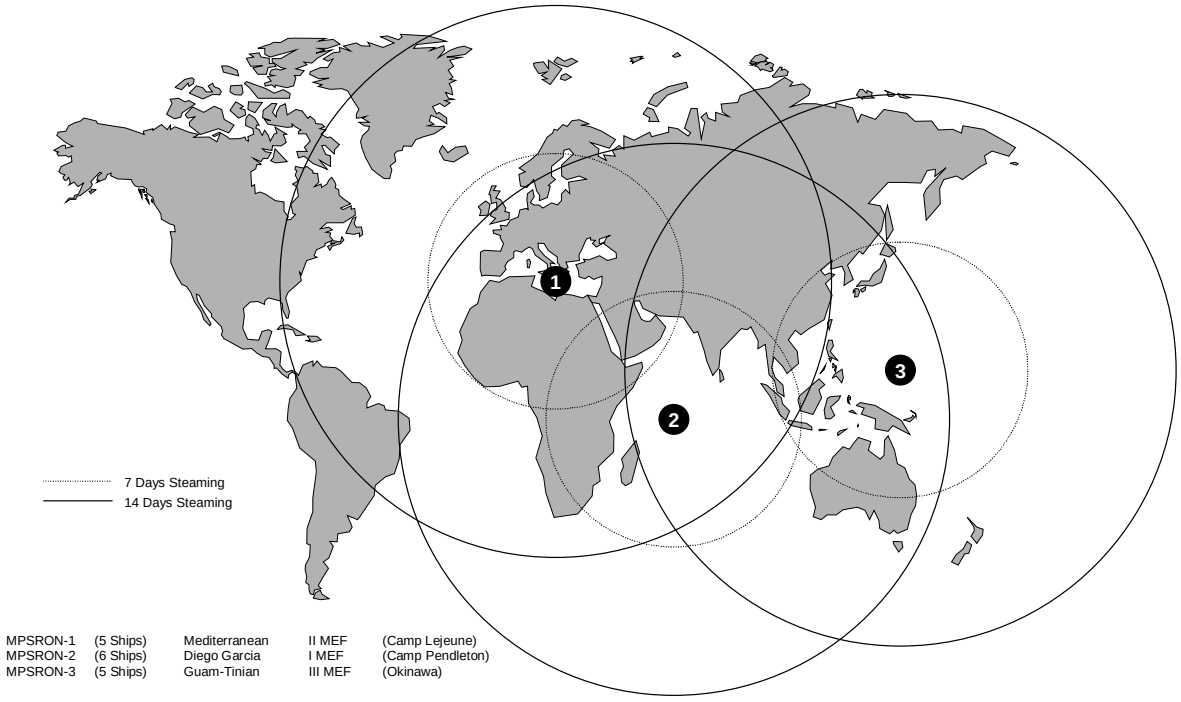


Figure 2-26. Maritime prepositioning ship squadron locations.

b. Phases of a Maritime Prepositioning Force Operation

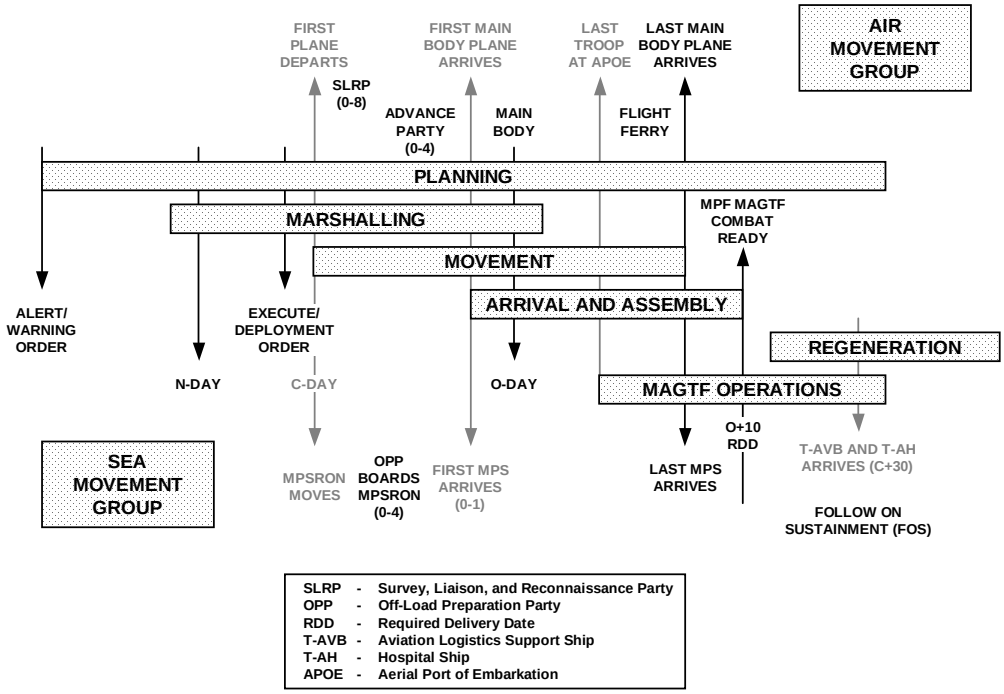


Figure 2-27. Phases of a maritime prepositioning force operation.

c. Naval Amphibious Group 1, 2, and 3 Organizations

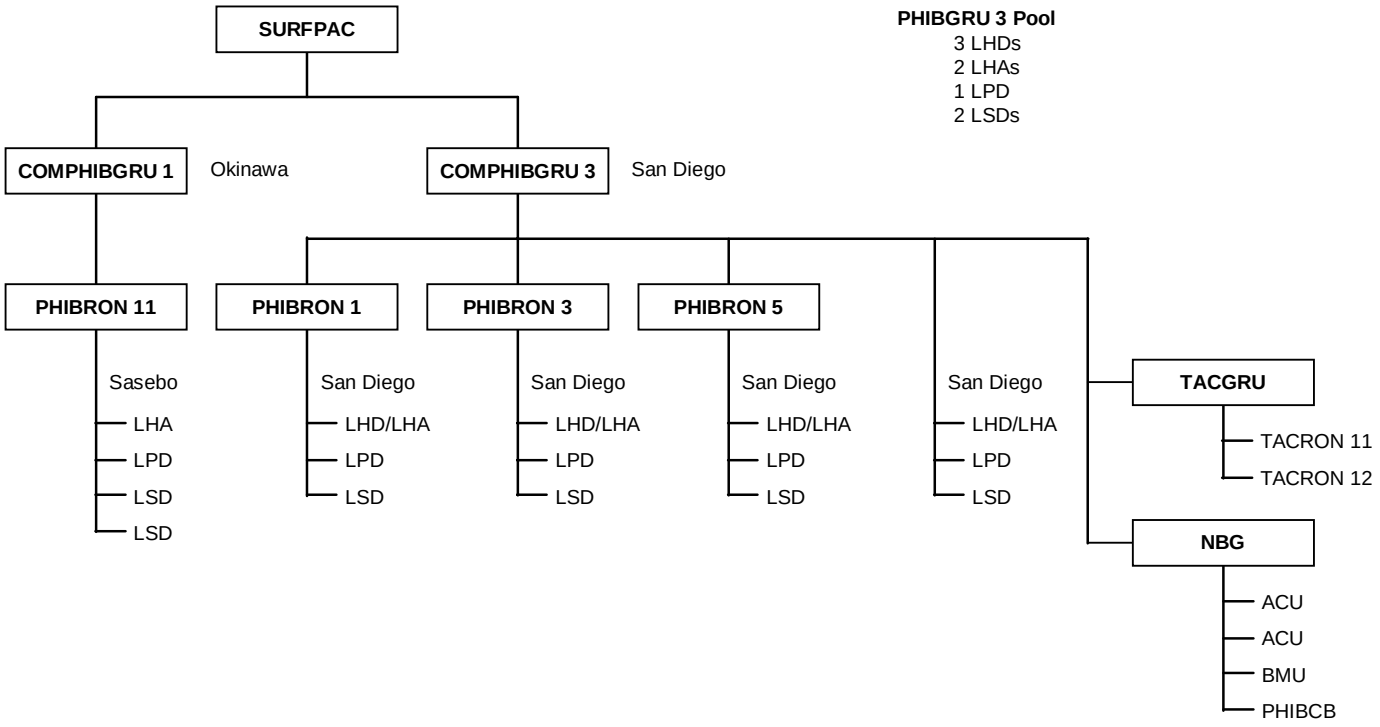


Figure 2-28. Amphibious Group 1 and 3 organization.

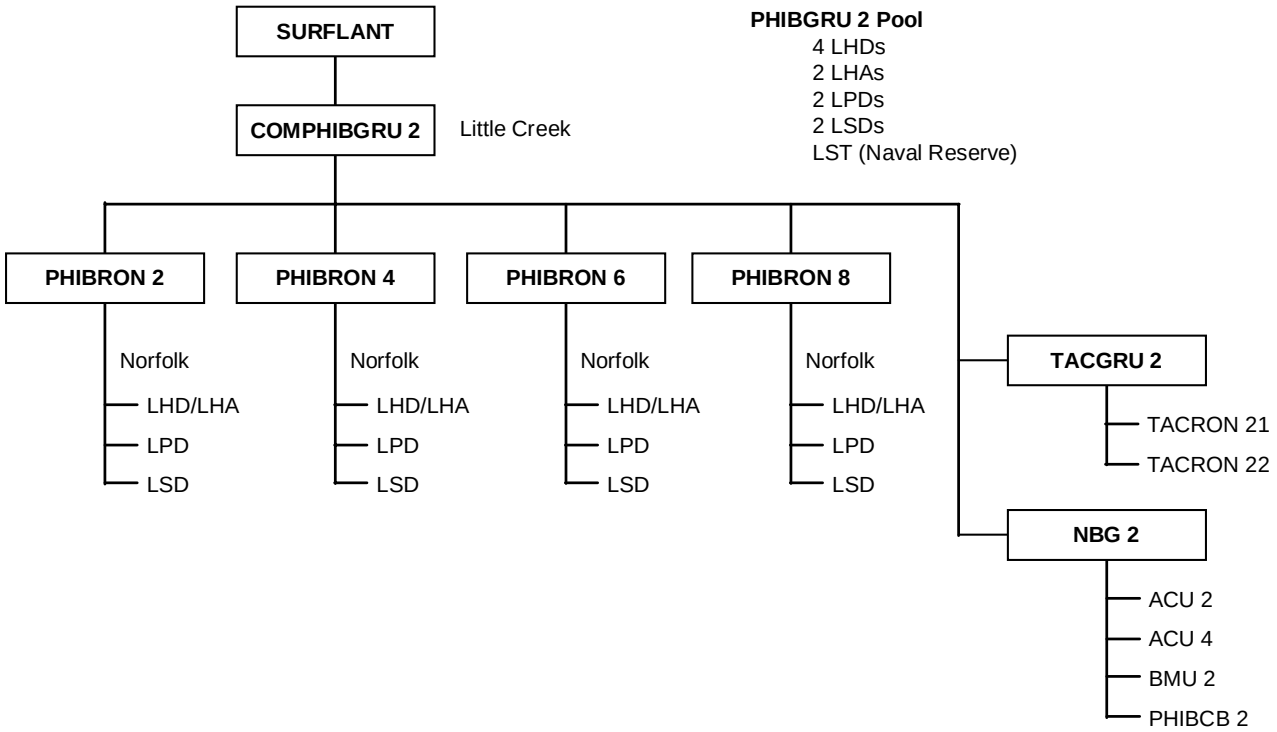
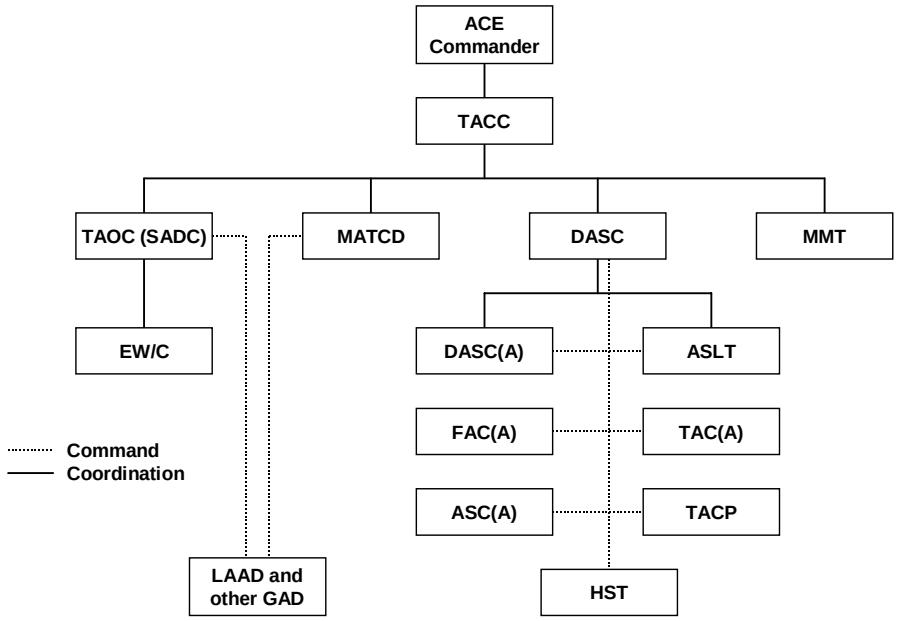


Figure 2-29. Amphibious Group 2 organization.

2012. Marine Air Command and Control System Organization



ACE	aviation combat element	LAAD	low altitude air defense
AD	air defense	MATCD	Marine air traffic control detachment
ASC(A)	assault support coordinator (airborne)	MMT	Marine air traffic control mobile team
ASLT	air support liaison team	SADC	sector air defense commander
DASC	direct air support center	TAC(A)	tactical air coordinator (airborne)
DASC(A)	direct air support center (airborne)	TACC	tactical air command center
EW/C	early warning and control site	TACP	tactical air control party
FAC(A)	forward air controller (airborne)	TAOC	tactical air operations center
HST	helicopter support team		

Figure 2-30. Marine Air Command and Control System organization.

2013. Engineer Forces

a. Combat Engineer Battalion

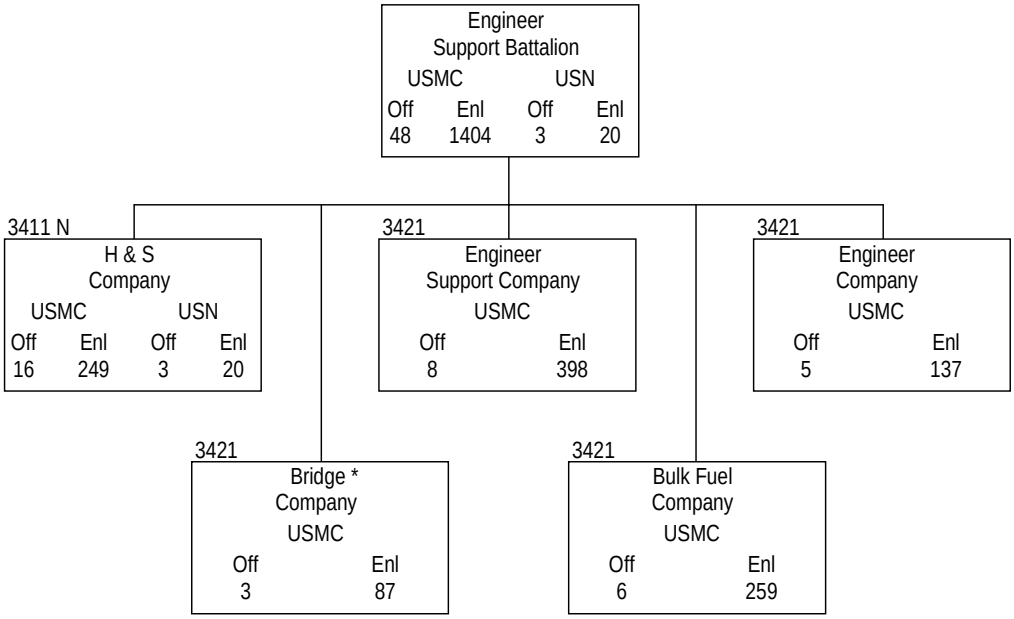
Major End Items	Quantity
Line Charge Launch Trailer	38
M9 Armored Combat Excavator (ACE)	16
SEE Tractor	15
621B Scraper-Tractor Wheeled	2
T5 Dozer (small)	18
D7 Dozer (medium)	5
10k lb Forklift with Bucket and Forks	10
7-Ton Truck	10
7-Ton Dump	24
HMMWV	15
40-Ton Tractor Trailer	3

Table 2-2. Combat engineer battalion equipment.

Selected tasks—

- Plan, organize, and coordinate the assault breaching of obstacles from the high-water mark inland.
- Employ assault bridging systems and other standard bridge systems.
- Expedient repair and reinforcement of existing bridges.
- Construct expedient, short-span bridges from local materials for ground combat operations.
- Expedient repair of existing roads and limited new construction of combat roads and trails.

b. Engineer Support Battalion



* Only 8th Engineer Support Battalion has an active bridge company.

Figure 2-31. Engineer support battalion organization.

Major End Items	Qty		Major End Items	Qty
Line Charge Launch Trailer	12		7-Ton Dump	38
M9 Armored Combat Excavator	5		HMMWV	69
SEE Tractor	5		40-Ton Tractor Trailer	2
621B Scraper-Tractor Wheeled	9		Mk18 Ribbon Bridge Trailer	24
T5 Dozer (small)	4		EROWPU	35
T7 Dozer (medium)	24		Fuel Storage System, 600k gallon	8
Road Grader	7		Concrete Mixer	3
Vibratory Compactor	4		10kw Generator	70
30-Ton Crane	5		30kw Generator	55
7 1/2-Ton Crane	10		60kw Generator	35
10k lb Forklift w/Bucket and Forks	12		100kw Generator	4
7-Ton Truck	8		Ribbon Bridge	4

Table 2-3. Engineer support battalion equipment.

Selected tasks—

- Surveying and drafting.
- Construct and maintain expeditionary airfields and main supply routes.
- Bulk fuel storage and distribution.
- Bridging.
- Vertical construction and horizontal construction.
- Bulk water production, storage, and distribution.

c. Marine Wing Support Squadron

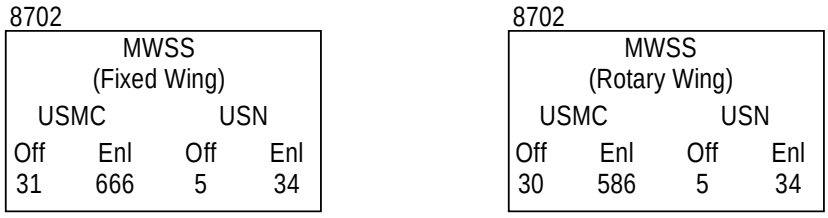


Figure 2-32. Marine wing support squadron organization.

Major End Items	Qty
T5 Dozer (small)	4
D7 Dozer (medium)	2 Fixed/5 Rotary
Road Grader	6 Fixed/2 Rotary
Vibratory Compactor	2 Fixed/1 Rotary
30-Ton Crane	2
4000 lb Forklift	13
10,000 lb Forklift w/bucket and forks	9 Fixed/8 Rotary
Excavator, Tracked	2 Fixed/1 Rotary
Helicopter Refueling System	2 Fixed/7 Rotary
Airfield Fuel Dispensing System	6 Fixed/4 Rotary
5,000 Gallon Semitrailor Refueler	10
ROWPU	12 Fixed/9 Rotary
7-Ton Truck, Long Bed	5
7-Ton Dump	6
LVS	18

Table 2-4. Marine wing support squadron equipment.

Selected tasks—

- Expeditionary airfield services to include repair, communications, lighting, and aircraft recovery.
- Refueling.
- Water purification, storage, and dispensing.
- Construction and maintenance of expedient roads.
- Construct expeditionary (AM2 matting) airfields.

d. Naval Mobile Construction Battalion

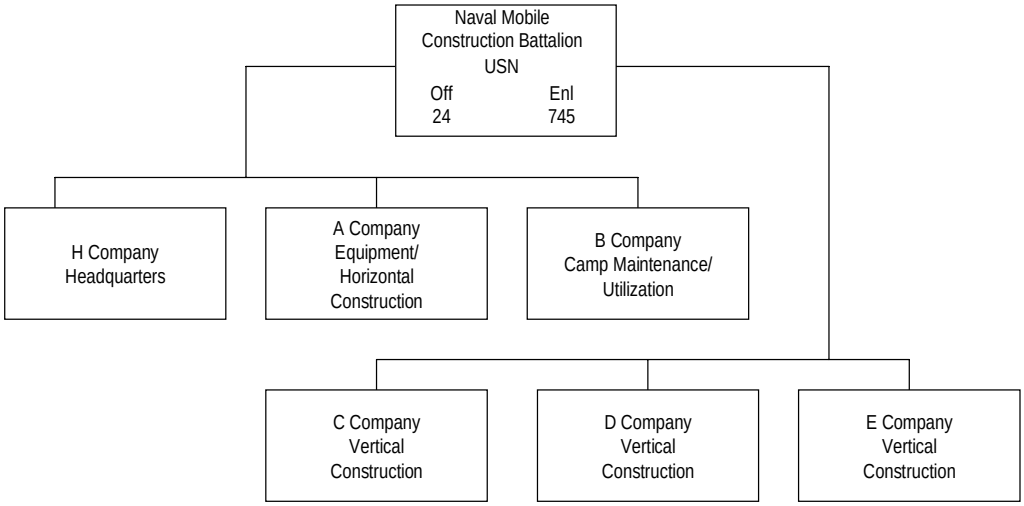


Figure 2-33. Naval mobile construction battalion organization.

Major End Items	Qty
Scraper	8
T5 Dozer (small)	2
D9 Dozer (large)	6
Road Grader	6
Roller Compactor	5
14-Ton Crane	2
35-Ton Crane	2
10,000 lb Forklift	10
12,000 lb Forklift	7
Excavator, Tracked	2
8-Ton Truck	24
8-Ton Dump	16
HMMWV	30
35-Ton Tractor Trailor	13
Fuel Storage Pillow, 10,000/3,000 gallon	4/3

Table 2-5. Naval mobile construction battalion equipment.

Selected tasks—

- Surveying and drafting.
- Improve beaches.
- Bridging.
- Vertical construction.
- Asphalt paving and other road construction.
- Construct expeditionary (AM2 matting) airfields.

2014. Small Craft Company

Small Craft Company			
USMC		USN	
Off	Enl	Off	Enl
4	74	0	2

Figure 2-34. Small craft company organization.

Major End Items	Qty
Riverine assault craft	17
Rigid raiding craft	47
Combat rubber reconnaissance craft	120
35-horsepower outboard motors	200
7-ton truck	12
HMMWV	10

Table 2-6. Small craft company equipment.

Part III

Equipment Capabilities

3001. Ground Weapons

a. Vehicles and Vehicle-Mounted Weapon Systems

System	Weapon	Cruising Range/ Duration Time/ Max Eff Range	Basic Load/ Fuel Capacity/ Number of PAX	Vehicle Speed/ Rate of Fire	Combat Weight	No. in Division
M1A1		279 miles	505 gal	42 mph hwy/30 off road	67 STONS	58
	120-mm	2,500 meters	40			
	.50 cal	1,500 meters	1,000			
	7.62 COAX	900 meters	10,000			
	Loader 7.62	900 meters	14,000			
	Smoke GL	30 meters	24			
LAV		410 miles	71 gal/6 PAX	62 mph	14.2 STONS	130
(AT)	TOW	3,750 meters	16			
	7.62-mm	900 meters	1,000			
	Smoke	30 meters	16			
(25-mm)	25-mm	2,000 meters	600			
	7.62-mm	900 meters	1,200			
	Smoke	30 meters	16			
(M)	81-mm	5,000 meters	99			
	7.62-mm	900 meters	1,000			
AAAV		300 miles land or 65 nmi water	400 gal/18 PAX	45 mph land/ 25 kts water	28.4 STONS	346 (320 P/ 26 C)
	30-mm	2,000 meters				
	7.62-mm	900 meters				
AVLB		290 miles	375 gal/60 ft span	30 mph hwy/10 off road	56.5 STONS	4
M9 ACE		230 miles	134 gal	30 mph/3 over water	27.5 STONS (w/ ballast) 18.5 STONS (w/o ballast)	
M2 Bradley Fighting Vehicle		300 miles	175 gal /3 + 6	42 mph hwy/30 off road	25.3 STONS	
	TOW	3,750 meters	7			
	25-mm APDS	1,700 meters	255			
	HEI-T	3,000 meters	675			
	7.62 COAX	900 meters	2,340			
	Smoke GL	30 meters	16			
	Thermal	2,000 meters				
M3 Cavalry Fighting Vehicle		300 miles	175 gal/2+3	42 mph hwy/30 offroad	24.7 STONS	
	TOW	3,750 meters	12			
	25-mm APDS	1,700 meters	425			
	HEI-T	3,000 meters	1,280			
	Smoke GL	30 meters	16			
	Thermal	2,000 meters				

Table 3-1. Vehicle-mounted weapon systems.

b. Individual and Crew-Served Weapons

Weapon	Range	Rate of Fire per min	Remarks	No. in Division
60-mm	3,500 meters	20 sustain/30 max		81
81-mm	5,700 meters	16 sustain/33 max		72
M777 (155-mm)	24,000 meters	2 sustain/5 max		72
TOW	3,750 meters	3	Thermal sight	186
Javelin	2,000 meters	1	Day/night, anti-armor, bunkers, helicopters Soft launch (from inside structures)	
Predator	600 meters	1	Day and night sights; Soft launch (from inside structures)	
M249 SAW	Max eff 600 m	750 normal/1,000 max		
M240 MG	Max eff 900 m	100 normal/200 rapid		
M203	350 meters			
9mm Pistol	50 meters			
40-mm Mk-19	2,200 m (max)/1,600 (eff)	40 sustained/60 rapid		
M142 MLRS	M26 rocket (10-32 km) M26A1 ER rocket (13-45 km) M26A2 ER rocket (13-45 km) TACMS BLK I (25-165 km) TACMS BLK !A (70-300 km) TACMS BLK II (35-140 km) TACMS BLK IIA (100-300 km)	1 launcher=155mm bn 2+ or 44 rounds 6 rockets in < 60 sec 1 missiles in < 20 sec Average 6 min to reload plus drive time to next firing position	644 M77 DPICM 518 M85 submunitions 644 M77 DPICM 900 submunitions 300 submunitions 6 BAT munitions 13 BAT munitions	6

Table 3-2. Individual and crew-served weapons.

c. Vehicle Summary

Vehicle Type	Fuel Capacity	Range	Mileage	Combat Weight	Payload
HMMWV	25 gal	300 miles	12 mpg	5,200 lbs	2,374 lbs
7-Ton	82 gal	300 miles	4 mpg	28,000 lbs	30,000 lbs onroad/14,000 lbs offroad
LVS	165 gal	300 miles	2 mpg	FPU - 25,300 lbs RBU – 21,800 lbs	40,000 lbs onroad/20,000 lbs offroad

Table 3-3. Vehicle summary.

Fuel/Sixcon planning factors notes:

- Fuel capacity for a sixcon is 900 gallons.
- Diesel fuel weighs approx 7 lbs per gallon.
- An empty sixcon weighs 2,630 lbs.
- A full sixcon weighs 8,930 lbs.
- A fuel pump weighs 2,300 lbs.
- The max cross-country load for a 7-ton is 14,000 lbs.
- A regular 7-ton can hold 2 sixcon (600 gals each) or 1 sixcon and 1 pump unit (cross-country profiles).

3002. Fixed-Wing Aircraft

A/C Type	Mission	Cruise Speed	Weapons Capabilities	Fuel End (Hours)	Combat Radius	Troops or Payload (lbs)	Remarks
AV-8B	OAS	320 KIAS	25-mm gun 2.75" rockets 5.0" rockets Mk 81/82/83 Rockeye, Napalm FAE, GATOR Laser Maverick GBUs Sidearm Sidewinder	1 + 00	100 nm with 20 minutes of loiter time	Typical mix (CAS): • 4 x Mk 82 • 25-mm gun (Load varies significantly with ordnance load and mission profile. For specifics, refer to NWP 3-22.5, *AV-8B Operations*.)	Models include Day Attack (DMI), Night Attack (NVD/FLIR) AV-8B II + Radar
F/A-18 C/D	OAS AAW	350 KIAS	20-mm gun 2.75" rockets 5.0" rockets Mk 81/82/83/84 Rockeye, APAM Walleye, HARM GBUs Sparrow Sidewinder Laser Maverick IR Maverick ATARS (D only)	1 + 30	200 nm with 30 minutes of loiter time	Typical mix (CAS): • 2 x Sidewinder • 1 x Sparrow or AMRAAM • 4 x Mk 83 • 20-mm gun	NVD/FLIR TAC(A)/FAC(A) Capable for F/A-18D
EA-6B	EW	300 KIAS	ALQ-99 tactical jamming pods HARM	1 + 45	225 nm	Typical mix: • 4 jamming pods	
KC-130J	Assault Support (AR)	270 KIAS	N/A	13 + 00 (DASC[A] configured 8-10 hours on station	1755 nm	92 pax or 76 troops (cargo with no pax, 6 pallets); DASC(A)	Radio relay, battlefield illumination
MV-22	Assault Support	230 KIAS	N/A	3 + 00	270 nm	24 pax / 8,000 lbs	Can lift HMMWV with reduced fuel load

Note 1: KIAS = knots indicated airspeed

Note 2: Fuel endurance in "hours + minutes"

Note 3: Combat troop payload based on 250 lbs per Marine

Note 4: Combat troops and payload vary with density altitude. Payloads based on standard day at sea level.

Note 5: All information contained in MCWP 3-24, Assault Support.

Table 3-4. General fixed-wing aircraft capabilities.

Mission Profiles		DASC(A) capable, radio relay, battlefield illumination, air delivery, air land delivery, aerial refueling, rapid ground refueling				
Air Delivery of Cargo and Personnel		Container delivery system Military freefal Heavy equipment Personnel staticline	Up to 16 bundles (32,274 lbs) 64 jumpers 42,000 lbs 64 jumpers			
Short Unimproved Airfield Operations		Size and strength of runway are performance/weight dependent. Standard is 3,500 ft by 60 ft				
Rapid Ground Refueling Flow Rates (lbs per min)		**Model**	**Point**	**IFR drogue**	**SPR panel**	**Pod**
		AH-1Z	1	59	34	49
			2	54	29	44
		MV-22	1	79	44	59
			2	69	35	49
		CH-53	1	66	40	56
			2	56	31	46
Air Land Delivery of Cargo and Personnel	**Cargo Configured Airframe**	**Passengers**	**Pallets**	**Troops**		
		0	6	0		
		92	1	76		
		72	2	44		
		52	3	33		
		41	4	32		
		24	5	16		
		70 litters with 6 attendants 74 litters with 2 attendants				
	Tanker Configured Airframe	**Passengers**		**Pallets**		
		40		1		
		24		2		
Aerial Refueling Transfer Rates (JP-5 at standard daytime temperature in lbs per min)			**1 Receiver**	**2 Receivers**		
		J tanker	2,040	2,040		

Table 3-5. KC-130J capabilities.

3003. Rotary-Wing Aircraft

A/C Type	Mission	Cruise Speed	Weapons Capabilities	Fuel End (Hours)	Combat Radius	Troops or Payload (lbs)	Remarks
CH-53E	Assault Support (Heavy Lift)	130 KIAS	2 x 50 caliber machine guns	4 + 00	200 nm	24 pax (15000 lbs)	Can external lift LAV with reduced fuel load
UH-1Y	Assault Support C2 CAS	130 KIAS	2.75" rockets GAU 16/17 gun(s)	3 + 10 (aux) 2 + 20 (aux) 1 + 30	150 nm 100 nm 50 nm	2 pax (500 lbs) 3 pax (750 lbs) 4 pax (1000 lbs)	Improved Air Command and Control System available, NTIS
AH-1Z	OAS	160 KIAS	TOW, Hellfire Sidewinder Sidearm 20-mm gun 2.75" rockets 5.0" rockets	3 + 30	90 nm with 30 minutes loiter time	Typical mix: • 4 x Hellfire • 4 x TOW • 8 x 5.0" rockets • 20-mm gun	NTS (FLIR) Laser designation/ranging systems

Note 1: KIAS = knots indicated airspeed

Note 2: Fuel endurance in "hours + minutes"
Note 3: Combat troop payload based on 250 lbs per Marine

Note 4: Combat troops and payload vary with density altitude. Payloads based on standard day at sea level
Note 5: All information contained in MCWP 3-24, *Assault Support*.

Table 3-6. Rotary-wing aircraft capabilities.

3004. Unmanned Aerial Vehicles

a. Organic MEB Systems

(1) RQ-2B Pioneer. The RQ-2B Pioneer contains an integrated digital flight computer and incorporates the common automatic landing system and a day TV color/forward-looking infrared payload, as well as a new digital autopilot.

Dimensions	Wing Span:	16.9 ft		
	Length:	14.0 ft		
	Height:	3.3 ft		
Weight Limitations	UAV (empty):	276 lbs	Fuel (full):	60 lbs
	Payload (max):	75 lbs	Max Takeoff:	429 lbs
Performance	Service Ceiling:	12,000 ft	Engine:	26 Hpwr
	Maximum Altitude:	15,000 ft	Fuel:	100 LL Aviation Gas
	Max Endurance:	4 hrs	Cruise Speed:	65 kts
	Max Range:	185 km	Max Speed:	110 kts
Launch and Recovery	Rolling Takeoff:			Approx 1000 meters
	Pneumatic Launch:			21 meters
	Rocket Assisted (RATO):			0 meters
	Arrested Recovery:			130 meters
	Short Field:			70 meters
	Shipboard Net Recovery:			0 meters
Concept of Employment	The VMU Squadron can support any sized MAGTF. Normal employment would be as an integral unit of the ACE in support of MAGTF operations. The squadron is capable of limited independent operations.			
Operations and Employment Considerations	Airspace deconfliction with other aircraft. Coordination with air officer (MAGTF, ACE, MAW, AOC).			
Operations and Employment Advantages	Small size; low radar cross section, low IR signature; long range; Wide temperature range (32 – 125 degrees F)			
Operations and Employment Disadvantages	Weather:	Rain degrades quality of TV camera picture Icing (no onboard deicing)		
	Wind Restrictions:			
		Head winds	25. kts w/gusts to 30 kts	
		Cross winds	15 kts w/gusts to 20 kts	
		Tail winds	5 kts (RATO/Pneumatic)	
		Airborne winds aloft	65 kts max	
Operations and Employment Vulnerabilities	AAA; Small arms fire (at low flying altitudes); Electronic Warfare (C Band emissions)			

Table 3-7. Pioneer capabilities.

(2) Dragon Eye. Dragon Eye consists of a man-portable, hand-launched autonomous air vehicle, and a wearable ground control station. To control the vehicle in flight and receive data, the Dragon Eye system uses an end user terminal (EUT+). The EUT+ is a ruggedized, wearable computer configured on a modular lightweight load-carrying equipment vest. Dragon Eye supports over-the-hill reconnaissance, surveillance, and target acquisition by small units (company sized and below). It is an organic asset that allows the user to establish mission priority. By providing payload data directly to the small unit, an unprecedented level of situational awareness will be achieved.

Dimensions	Made of lightweight Kevlar material, this system is designed to disassemble into five separate pieces, and intended to be carried in an individual Marine's ALICE pack.
Weight Limitations	Max Takeoff: 4.5 lbs
Performance	Fuel: Battery powered — Operational Alt: 500 ft AGL Max Endurance: 1 hr — Cruise Speed: 45 kts Max Range: 10 km — Max Speed: 45 kts
Launch and Recovery	Hand launch and recovery
Concept of Employment	Provide a Marine small unit leader with an organic UAV capable of conducting over-the-hill/over-the-next-building surveillance, and reconnaissance.
Operations and Employment Considerations	After being hand launched, Dragon Eye flies to pre-assigned GPS waypoints via an onboard autopilot, which has the ability to be reprogrammed in flight. Its sensors include full motion color, low light black and white, and infrared cameras, each having the capability to transmit a video LOS to a range of ten kilometers.
Operations and Employment Advantages	Small size; easily transported; expendable; interchangeable payloads; Low radar cross section, Low IR signature
Operations and Employment Disadvantages	Weather: Rain degrades quality of TV camera picture Icing (no onboard deicing) Wind Restrictions—unknown
Operations and Employment Vulnerabilities	AAA; Small arms fire (at low flying altitudes); Electronic Warfare

Table 3-8. Dragon Eye capabilities.

(3) Dragon Warrior. Dragon Warrior is equipped with an EO/IR sensor, laser range finder, and a laser designator. The flight profile is intended to operate fully autonomously while the payloads are controlled by a HMMWV-mounted ground control station. The entire system, aircraft and data link hardware fits into a single HMMWV.

Dimensions	Rotor Length: 8 ft Length: 7.0 ft
Weight Limitations	Payload (max): 25-35 lbs — Max Takeoff: 230 lbs
Performance	Max Altitude: 18,000 ft Max Endurance: 3-5 hrs — Cruise Speed: 65 kts Max Range: 50 miles — Max Speed: 110 kts
Launch and Recovery	Rolling Takeoff: Approx 1000 meters
Concept of Employment	Provide an over-the-horizon wide-band receiver/transmitter communications relay as well as a reconnaissance, surveillance and precision targeting capability to a Marine expeditionary unit/division/regiment.
Operations and Employment Considerations	Airspace deconfliction with other aircraft. Coordination with air officer (MAGTF, ACE, MAW, AOC)
Operations and Employment Advantages	Small size, Low radar cross section, Low IR signature Wide temperature range (32 – 125 degrees F)
Operations and Employment Disadvantages	Weather: Rain degrades quality of TV camera picture Icing (no onboard deicing) Wind Restrictions: Head winds — 25. kts w/gusts to 30 kts Cross winds — 15 kts w/gusts to 20 kts Tail winds — 5 kts (RATO/Pneumatic) Airborne winds aloft — 65 kts max
Operations and Employment Vulnerabilities	AAA; Small arms fire (at low flying altitudes); Electronic Warfare (C Band emissions)

Table 3-9. Dragon Warrior capabilities.

b. Joint Systems

(1) Joint Tactical UAV (Hunter). The Army accepted the Hunter in September 1995. In 1996, it was decided not to procure additional systems. The Hunter system, while retired, could be available for MEB operations.

Dimensions	Wing Span:	350.3 in		
	Length:	271.6 in		
	Height:	66.8 in		
Weight Limitations	UAV (empty):	1200 lbs	Fuel (full):	300 lbs
	Payload (max):	200 lbs	Max Takeoff:	1600 lbs
Performance	Service Ceiling:	12,000 ft	Engine:	2x750cc
	Maximum Altitude:	16,000 ft	Fuel:	Type 87 Mogas
	Max Endurance:	8-10 hrs	Cruise Speed:	70 kts
	Max Range:	125 km	Max Speed:	110 kts
Launch and Recovery	Rolling Takeoff:			Approx 2000 ft
	Pneumatic Launch:			21 meters
	Rocket Assisted (RATO):			0 meters
	Arrested Recovery:			130 meters
	Short Field:			70 meters
	Shipboard Net Recovery:			0 meters
Concept of Employment	Provide near-real-time IMINT within 200 km, extendable to 300+ km by using another Hunter as an airborne relay. Its mission is day and night reconnaissance, intelligence, surveillance, and target acquisition.			
Operations and Employment Considerations	Because of line-of-sight limits, the system's range and ability to see over terrain requires a second Hunter to relay imagery from the first vehicle. Airspace deconfliction with other aircraft. Coordination with air officer.			
Operations and Employment Advantages	Small size; Low radar cross section, Low IR signature; Long range Wide temperature range (32 – 125 degrees F)			
Operations and Employment Disadvantages	Weather:	Icing (no onboard deicing)		
	Wind Restrictions:			
		Head winds	25. kts w/gusts to 30 kts	
		Cross winds	15 kts w/gusts to 20 kts	
		Tail winds	5 kts (RATO/Pneumatic)	
		Airborne winds aloft	65 kts max	
Operations and Employment Vulnerabilities	AAA; Small arms fire (at low flying altitudes); Electronic Warfare (C Band emissions)			

Table 3-10. Hunter capabilities.

(2) Medium Altitude Endurance UAV (RQ-1B Predator). The Predator consists of four air vehicles, a ground control station, and a satellite link communication suite. It can be armed with Hellfire-C missiles. Sensor imagery is distributed through the Trojan Spirit II SATCOM system using the Joint Deployable Intelligence Support System (JDISS) and the Joint Worldwide Intelligence Communications System (JWICS). Live video is distributed through the Joint Broadcast System (JBS).

Dimensions	Wing Span:	48.7 ft		
	Length:	27.0 ft		
	Height:	6.9 ft		
Weight Limitations	UAV (empty):	950 lbs	Fuel (full):	665 lbs
	Payload (max):	450 lbs	Max Takeoff:	2250 lbs
Performance	Service Ceiling:	20,000 ft	Engine:	RQ-1B 105 hp
	Maximum Altitude:	25,000 ft		
	Max Endurance:	20 hrs	Fuel:	100 LL Aviation Gas
	Max Range:	400 nm	Cruise Speed:	65 kts
	Max Speed:	110 kts		
Launch and Recovery	Rolling Takeoff:			Approx 5000 ft
Concept of Employment	Employed in moderate risk areas to minimize the risk to humans (e.g., areas where enemy air defenses are not fully suppressed, open ocean, biological or chemical contaminated environments).			
Operations and Employment Considerations	Airspace deconfliction with other aircraft. Coordination with air officer (MAGTF, ACE, MAW, AOC).			
Operations and Employment Advantages	Long range, 16-24 hours on station time; Three sensors (day TV camera, infrared camera, and synthetic aperture radar for looking through smoke, clouds, or haze). Wide temperature range (32 – 125 degrees F)			
Operations and Employment Disadvantages	Weather:	Rain (degrades TV camera picture)		
		Icing (RQ-1A has no onboard deicing, RQ-1B has ice mitigation system)		
	Wind Restrictions:			
		Head winds	25. kts w/gusts to 30 kts	
		Cross winds	15 kts w/gusts to 20 kts	
		Tail winds	5 kts	
Operations and Employment Vulnerabilities	SAMs Electronic Warfare (C Band emissions)			

Table 3-11. Predator capabilities.

(3) High Altitude Endurance UAV (Global Hawk). The synthetic aperture radar/moving target indicator and electro-optical and infrared sensors provide near-real-time imagery to the joint force commander via satellite communication links. The system's ground segment is meant for missions requiring long-range deployment and wide-area surveillance or long sensor dwell over the target area, and imagery can be relayed in near-real-time.

Dimensions	Wing Span: Length:	116.0 ft 44.0 ft		
Weight Limitations	Payload (max):	2000 lbs	Max Takeoff:	25,600 lbs
Performance	Service Ceiling: Maximum Altitude: Max Endurance: Max Range:	25,000 ft 65,000 ft 35 hrs 12,000 nm	Engine: Cruise Speed: Max Speed:	Rolls Royce turbofan 100 kts 340 kts
Launch and Recovery	Rolling Takeoff:			Approx 3000 meters
Concept of Employment	Global Hawk can fly 3,000 miles to an area of interest, remain on station for 24 hours to survey a 40,000 square nautical mile area, and then return 3,000 miles to its operating base.			
Operations and Employment Considerations	Airspace deconfliction with other aircraft. Coordination with air officer (MAGTF, ACE, MAW, AOC).			
Operations and Employment Advantages	Low radar cross section, Low IR signature; Extremely long range and dwell time Wide temperature range (32 – 125 degrees F)			
Operations and Employment Disadvantages	Weather—none; all weather aircraft Wind Restrictions—unknown			
Operations and Employment Vulnerabilities	SAMs Electronic Warfare (UHF line of sight, UHF and Ku-band satellite links)			

Table 3-12. Global Hawk capabilities.

3005. Marine Air Command and Control System Radars

	3D/2D	Maximum Range	Maximum Altitude	Frequency	Ballistic Trajectories	MACCS Agency	Qty per MEF
AN/TPS-59 [1]	3D	400 nm	500,000 ft	D-Band	Yes	TAOC/EWC	2 (1 in III MEF)
Multi-Role Radar System (MRRS) [1]	3D	120 nm	40,000 ft	L-Band	No	TAOC/EWC	6
Advanced Surveillance Precision Approach Radar Control System (ASPARCS) Surveillance Radar	2D	120 nm	40,000 ft	S-Band	No	MATCD	3 (1 per MATCD)
ASPARCS Precision Approach Radar	2D	20 nm	20,000 ft	x-Band	No	MATCH	3 (1 per MATCD)
Note: Incorporate cooperative engagement capability/composite tracking network (CEC/CNT) ability to allow sensor netting (including with Navy ships).							

Table 3-13. Marine air command and control radar systems.

3006. Marine Air Defense

	Platform	Employment	Air-Air/ Surface-to-Air	Data Link	Radar	Communications
WEAPONS	F/A-18C/D Hornet	AAW-OAAW FAC(A) TAC(A) SEAD (w/HARM) OAS Night Attack	AIM-120 AIM-7 AIM-9 20mm gun	TADIL-C	APG-73 AN/AAS-38 FLIR Navigation FLIR	1 AN/ARC-210 UHF, VHF SINCGARS Havequick KY-67
	AV-8B Harrier II+	OAAW SEAD OAS Interdiction Night Attack	AIM-9 20mm gun	None	APG-63 FLIR Navigation FLIR	2 AN/ARC-182 UHF, VHF KY-58
	Stinger MANPAD Avenger LAV (AD)	Low altitude air defense	FIM-92D Stinger	GBDL	With RTU can use all Marine sensors and specific sister service sensors	MANPAD: • SINCGARS Avenger: • 2 SINCGARS LAV (AD): • HF and SINCGARS
	HMMWV (CLAWS)	Medium altitude air defense for maneuver units Cruise missile defense	AIM-120 (Max range: 20 km Max alt: 20,000 ft)	GBDL	With RTU can use all Marine sensors and specific sister service sensors	SINGARS
	Platform	**Mission**	**Type/Data Link**	**Band**	**Range**	**Altitude**
SENSORS	AN/TPS-59(V)3	Long-range surveillance (ABT/TBM) GCI	3D PPDL to ADCP	L	400nm	500k
	AN/TPS-63	Medium-range (gap-filler) surveillance (ABT) GCI	2D Remote Radar (VHF)	L	160nm	60k
	AN/MPQ-62 (CWAR)	Close-in, low altitude EW and cueing (ABT) GCI	2D GBDL	J	30nm	30k
	AN/UPS-3 (TDAR)	Short-range, low altitude EW and cueing	2D GBDL	L	10nm	10k
	AN/TPS-73	Air traffic control surveillance radar	2D TADIL-B	E	60nm primary 120nm secondary	60k
	Agency	**Mission**	**C2 System**	**Data Link**	**Comm/Sec**	**Reference**
Command And Control	TACC	Senior agency of MACCS ACE commander's CP	Common Aviation Command and Control System	TADIL A,B TADIL-J NATO Link 1	HF, UHF, VHF, Satcomm, Havequick, YES	MCWP 3-25.4
	TAOC	Control intercept of hostile aircraft and missiles Surveillance & ID of a/c within assigned sector Tactical ATC	Common Aviation Command and Control System	TADIL A, B, J ATDL-1 NATO Link 1	HF, UHF, VHF, Havequick, YES	MCWP 3-25.7
	MATCD	Air Traffic Control BDZ	ASPARCS	TADIL-B TADIL-J	HF, UHF, VHF, YES	MCWP 3-25.8

Table 3-14. Marine air defense capabilities.

3007. Communications Equipment

a. Ground Single Channel Radio

Frequency Band	MAGTF SCR Equipment Used	Operating Frequency Range	Typical Application
HF	AN/PRC104 AN/GRC-193 AN/MRC-138	2- 29.999 MHz	Radio line of sight and beyond/ long range
VHF	AN/PRC-68 AN/PRC-119 AN/MRC-145	30- 88 MHz	Radio line of sight and relay/ retransmission
UHF	AN/PRC-113 AN/VRC-83 AN/GRC-171	225- 400 MHz	Critical line of sight (ground to air)
	AN/PSC-3 AN/PSC-5		SATCOM footprint

Table 3-15. Ground single channel radio capabilities.

b. AN/MRC-142 Multi-Channel Radio

Frequency range	1,350- 1,850 MHz
Bandwidth	100 (125 optional) kHz
Channel rate	144, 288, and 576 kbps
Output power	Low: 300mW (25dBm) High: 3 W (35 dbm)
Frequency Stability	10 ppm
Orderwire channel	Analog: 300- 3,400 Hz Digital: 16 kbps

Table 3-16. AN/MRC-142 multi-channel radio.

c. AN/TRC-170 Multi-Channel Radio

Frequency Range	4.4- 5.0 GHz
Bandwidth	3.5 or 7.0 MHz
Transmitter power	1 kW
Diversity	Dual
Data Rates	Up to 4,608 kbps
Channel capacity (at 32kbps)	Up to 144 (includes overhead)

Table 3-17. AN/TRC-170 multi-channel radio.

d. SHF SATCOM Terminal System

Transmit frequency range	7900- 8400 MHz
Transmit bandwidth	40 MHz
Power Output	500 W (nominal)
Receive frequency range	7,225- 7,725 MHz
Receive bandwidth	500 MHz

Table 3-18. General SATCOM terminal capabilities.

	Balanced NRZ (kpbs)	Conditioned Diphase (kbps)	Unbalanced NRZ (kbps)	Low Rate Multiplexer	TRI-TAC Group (Digital Trunk Group)
AN/TSC-85	8-1152	72-1152	288; 576; 1152	8	3
AN/TSC-93	8-1152	8-1152	288; 576; 1152	3	1

Note: There are 12 channels per low rate multiplexer.

Table 3-19. SHF SATCOM terminal system.

e. Notional Air-Deployable Data Communications Package

Nomenclature	Quantity
Heavy HMMWV with shelter	2
Server Suite	4
Laptop (router)	2
Desktop suite (net management)	3
CISCO 4000 router	3
LAN repeater	3
Uninterruptible power supply	7
Channel service unit/data service unit modems	4
Asynchronous modems	2
KG-84C	8
KYK-13/digital transfer device	2
KOI-18	2

Note: Provides 35-50 users, NIPRNET, SIPRNET, and JWICS access.

Table 3-20. Notional air-deployable data communications package.

f. MEF Command Element Data Communications Package

Nomenclature	Quantity
7- ton truck with shelter	1
Server Suite	8
Laptop (router)	2
Desktop suite (net management)	5
CISCO 7000 router	3
Channel service unit/data service unit modems	4
Asynchronous modems	2
LAN repeater	8
Uninterruptible power source	11
KG-84C	20
KYK-13/digital transfer device	2
KOI-18	2

Note: Provides 50-200 users, NIPRNET, SIPRNET, and JWICS access.

Table 3-21. MEF command element data communications package.

g. MAGTF Telephone/Message Switches

Switch	Location Employed	Interface Devices	Terminal Devices
Telephone Switch AN/TTC-42	MEF	TCIM IP Routers	STU-III DSVT DNVT
AN/SB-3865	MEF/MSC/Regt/Group/Arty Bn		
Message Switch AN/MSC-63A AN/TYC-39 (via MOA with USAF)	MEF/MARFOR/MSC		Message servers

Table 3-22. MAGTF telephone/message switches.

h. Joint Task Force Enabler Equipment Package

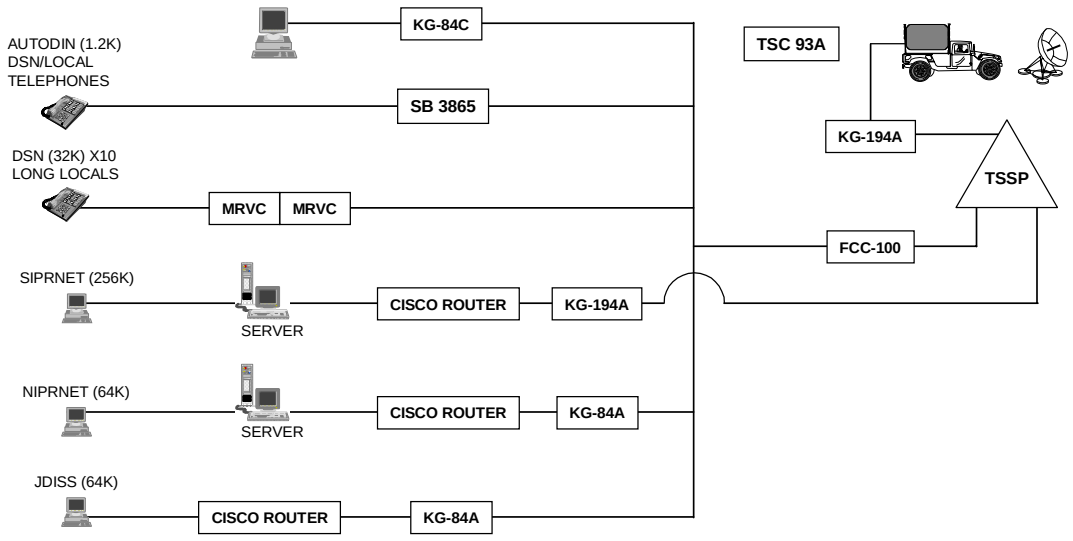


Figure 3-1. Joint task force enabler equipment package.

i. AN/PSC-5

The AN/PCS-5, SPITFIRE, complies with the Joint Chiefs of Staff mandate for all users to be demand assigned multiple access (DAMA) and advanced narrow band digital voice terminal (ANDVT) capable. The radio has the following capabilities—

Figure 3-2. AN/PSC-5 radio.

- Manpack radio.
- Embedded narrow/wide band secure voice and data.
- Embedded 5/25Khz DAMA.
- Non-DAMA backward compatibility.
- SATCOM/LOS communications.
- 30-400Mhz range.

j. LST-5C Lightweight Satellite Transceiver

An FM/AM, UHF transceiver used for half-duplex, line-of-sight or satellite communications suitable for man pack, vehicular or fixed-station applications. Using the built-in modem, the radio provides narrow-band (5KHz) at data rates of 1200 and 2400 bps.

Frequency Range	222 – 399.995 MHz		
Preset Channels	9		
Modulation	AM/FM BPSK/SBPSK		
Power Output	AM	Low	2 watts
		High	5 watts
	FM	Low	5 watts
		High	18 watts
	SEL Power adjustable in 2 watt steps, 2 to 18 watts in FM		
Major Components	Remote Control Unit LSRU-100 Antenna (LOS) Antenna, any 50 ohm impedance antenna Handset H250 Battery Case PTL-200 Receiver-Transmitter Power supply Interconnect Cable KY-57		

Table 3-23. LST-5C lightweight satellite transceiver.

k. AN/TSC-96 Fleet Satellite Communication Control

Provides terminal and transmission equipment in two shelters for three UHF satellite communications channels. One channel is secure, half-duplex teletype for Naval Modular Automated Communications (NAVMACS). One channel is secure, half-duplex digitized voice. One channel may provide either for multiplexed fleet broadcast channels from a group of 15 or an additional secure voice channel.

Frequency Range	225 – 3975 MHz		
Modulation	AM/FM FSK/PSK/CW		
Data Rate	75 – 9600 bps (PSK)		
	Transmit	75 bps (FSK) TTY 2400 bps (CV3333)	
	Receive	1200 bps (4 channel)	
Type Trans	Data, Voice, TTY		
Power Output	AM	30 watts	
	FM, FSK, PSK	100 watts	
Power Requirement	208 Vac, 60 Hz, 3-phase or 115 Vac, 60 Hz, 1-phase		
Size and Weight		OL-188	OZ-46
	Weight	7,000 lbs	2,000 lbs
	Dimensions	147” x 87” x 83”	85” x 79” x 70”
	Volume	615 ft^3	273 ft^3
Major Components	Data Processing Group OL-188(V)/TSC-96(V) in S-280 shelter Radio Set Group OZ-46/TSC-96(V) in S-280 shelter		

Table 3-24. AN/TSC-96 fleet satellite communication control.

l. SINCGARS Radios

Provides the primary means of command, control and communications for the MAGTF and is capable of transmitting voice and analog or digital data up to 16 kbps. Employs electronic counter-countermeasures to minimize vulnerability to enemy electronic warfare and provides secure communications with an integrated communications security device.

- PRC-119A man pack replaces the AN/PRC-77.
- AN/VRC-88 short range vehicular mounted RT with dismount kit replaces AN/GRC-160.
- AN/VRC-92A is two long-range RTs in one mount. When mounted it becomes an AN/MRC-145 replacing the AN/MRC-110A.
- AN/VRC-89A and AN/VRC-91A are vehicle-mounted with one long-range and one short-range RT. AN/VRC-91A comes with a dismount kit.

Characteristics	SINCGARS	AN/VRC-12
Frequency Range	30.000 – 87.975 MHz	30.00 – 79.95 MHz
Power Output	0.5 – 50 watts	0.5 – 35 watts
Channel Spacing	25 KHz	50 KHz
Number of Channels	2320 Frequencies	920 Frequencies
Tuning	8 SC and 6 FH	Manual tuning (442)
EP Capability	Frequency Hopping	None
Self Test	Yes	No
Crypto Device	Internal	External KY-57
Weight (man pack)	19.5 lbs	29 lbs with KY-57
Reliability	>3000 hours MTBF	>300 hours MTBF

Table 3-25. SINGARS and AN/VRC-12 comparison.

m. AN/TSQ-190(V) Trojan Special Purpose Integrated Remote Intelligence Terminal II

Trojan Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) II provides dedicated communications for intelligence information products to MAGTF command elements. It is a mobile SHF satellite communication system that uses commercial or military satellites to receive, transmit, and process secure, voice, data, video-conferencing, and facsimile communications. It provides fourteen channels of digital voice or data (SCI or GENSER) with a maximum aggregate data rate of 1.544 Mbps. LAN communications are supported by two separate ethernet LANs (SCI and GENSER). Routers provide access to the SIPRNET, JWICS, and DSCS. These capabilities provide dedicated communications for coordinating intelligence operations and analysis. The system consists of two heavy HMMWVs mounting standard integrated command post lightweight multipurpose shelters, trailer mounted power generation units, and a towed 2.4 meter (C, Ku-band) antenna. The first HMMWV contains the Trojan Spirit terminal; the second HMMWV is used as a maintenance shelter.

Hardware	FORCE Sparc 10 Workstation VME 6U Chassis 2 GB removable hard disk drive CD ROM Cyberchron CPC-5000 Laptop Motorola Codex Modem KIV-7 COMSEC devices	KY-68 Mobile Subscriber Equipment LST-5 UHF SATCOM CISCO 4000 Router Mackay IMMARSAT-M Mobile Radio Telephone TSP-9100A TEMPEST Facsimile Global Positioning System Receiver 18,000 BTU Environmental Control Unit
Software	Joint Deployable Intelligence Support System (JDISS) software All Source Analysis System (ASAS) software UNIX System 5, X-Windows/Motif SQL Database Transmission Control Protocol/Internet Protocol (TCP/IP) suite Windows NT 3.51	
Communications	C, Ku, and X-band Commercial Satellite LST-5 or AN/PSC-5 UHF SATCOM Terminal INMARSAT-M Terminal Commander's Tactical Terminal- Receive Only	
Power	Primary – 10 kW Tunnel Mounted Generator (component) Alternate – any 3-phase 120/208 Vac 50/60 Hz source	

Table 3-26. Trojan Special Purpose Integrated Remote Intelligence Terminal II.

Classification	Ship	Homeport/ (Current Assignment)	Max Spd	Troop Transport	Cargo Space	Well Deck Capability	Aircraft Capability	Weapons	Water Prod
Amphibious Transport Dock Mission: Transport and land Marines, their equipment and supplies by embarked landing craft or amphibious vehicles augmented by helicopters in amphibious assault.	USS Austin (LPD-4)	Norfolk	21 kts	917 Marines	7,269 ft^2 upper deck storage. Enough for 47 HMMWVs.	394' x 50' Enough for 9 LCUs, or 2 LCACs, or 9 LCMs, of 20 LVTs.	Up to 6 CH-46s 6 Spots	4 3" 50 cal (2) CIWS	100K gal storage 60,000 gal per day
	USS Ogden (LPD-5)	San Diego (5th Fleet)							
	USS Duluth (LPD-6)	San Diego							
	USS Cleveland (LPD-7)	San Diego							
	USS Dubuque (LPD-8)	San Diego							
	USS Denver (LPD-9)	San Diego							
	USS Juneau (LPD-10)	Sasebo (7th Fleet)							
	USS Shreveport (LPD-12)	Norfolk							
	USS Nashville (LPD-13)	Norfolk							
	USS Trenton (LPD-14)	Norfolk							
	USS Ponce (LPD-15)	Norfolk (6th Fleet)	22 kts	400 Marines	Enough for 52 AAAVs.	430' x 50' Enough for 3 LCACs, or 3 LCUs, or 9 LCMs, of 50 LVTs.	Helicopter platform only. 1 spot.	4 3" 50 cal 2 CIWS	
Dock Landing Ship Mission: Support United States Navy and Marine Corps amphibious operations including landings via Landing Craft Air Cushion (LCAC), conventional landing craft and helicopters, upon a hostile shore.	USS Anchorage (LSD-36)	San Diego							
	USS Portland (LSD-37)	Little Creek							
	USS Mount Vernon (LSD-39)	San Diego (7th Fleet)							
	USS Whidbey Island (LSD-41)	Little Creek	20+ kts	504 Marines Can surge an additional 102 Marines	5,000 ft^2 for Marine cargo. 12,500 ft^2 for vehicles.	440' x 50' Enough for 4 LCACs, or 3 LCUs, or 21 LCMs, of 64 LVTs.	Any helicopter. 2 spots.	2 25mm machine guns 2 CIWS	
	USS Germantown (LSD-42)	Sasebo (7th Fleet)							
	USS Ft McHenry (LSD-43)	Sasebo (7th Fleet)							
	USS Gunston Hall (LSD-44)	Little Creek (6th Fleet)							
	USS Comstock (LSD-45)	San Diego							
	USS Tortuga (LSD-46)	Little Creek							
	USS Rushmore (LSD-47)	San Diego (5th Fleet)							
	USS Ashland (LSD-48)	Little Creek							
	USS Harper's Ferry (LSD-49)	San Diego	20+ kts	402 Marines Can surge an additional 102 Marines	5,000 ft^2 for Marine cargo. 12,500 ft^2 for vehicles.	440' x 50' Enough for 4 LCACs. [LSD-50's well deck is 180' x 50', enough for 2 LCACs.]	Any helicopter. 2 spots.	2 25mm machine guns 2 CIWS	
	USS Carter Hall (LSD-50)	Little Creek							
	USS Oak Hill (LSD-51)	Little Creek							
	USS Pearl Harbor (LSD-52)	San Diego							

Classification	Ship	Homeport/ (Current Assignment)	Max Spd	Troop Transport	Cargo Space	Well Deck Capability	Aircraft Capability	Weapons	Water Prod
Amphibious Assault Ship Mission: Primary landing ships for major portions of the assault echelons of a MEF and MEB. Secondary role, using AV-8B Harrier and anti-submarine helicopters, perform sea control and limited power projection missions.	USS Wasp (LHD-1)	Norfolk	22 kts	1,600 Marines Medical: 6 operating rooms; 17 intensive care units; 550 ward beds	101,000 ft^2 with additional 20,000 ft^2 for vehicles. Enough for 5 M1A1s; 25 LAVs; 8 M777s; 68 trucks; 10 log vehicles.	267' x 50' Enough for 3 LCACs, or 12 LCMs.	42 CH-46s, 5 AV-8Bs. [Actual mix depends upon mission assigned] Can support any 9 helo spots.	2 NSSMS, 3 CIWS, 8 50 cals	
	USS Essex (LHD-2)	San Diego							
	USS Kearsarge (LHD-3)	Norfolk (6^{th} Fleet/26 MEU)							
	USS Boxer (LHD-4)	San Diego							
	USS Bataan (LHD-5)	Norfolk							
	USS Bonhomme Richard (LHD-6)	San Diego							
	USS Iwo Jima (LHD-7)	Norfolk							
	USS Tarawa (LHA-1)	San Diego	25 kts	1,900 Marines Medical: 4 operating rooms; 17 intensive care units; 300 ward beds	33,730 ft^2 for vehicles. 116,900 ft^2 for pallet stores. Enough for 200 vehicles.	Enough for 1 LCACs, 7 LCUs; or 17 LCMs; or 45 LVT.	9 CH-53s, 12 CH-46s, 6 AV-8Bs. [Actual mix depends upon mission assigned] 9 helo spots.	2 NSSMS, 3 5" 54 cal, 1 CIWS, 6 20mm MK67 AA guns.	140K gal per day
	USS Saipan (LHA-2)	Norfolk							
	USS Belleau Wood (LHA-3)	Sasebo (7^{th} Fleet)							
	USS Nassau (LHA-4)	Norfolk							
	USS Peleliu (LHA-5)	Norfolk (5^{th} Fleet/11 MEU)							
Dock Landing Ship (New Class) Mission: Support United States Navy and Marine Corps amphibious operations including landings via Landing Craft Air Cushion (LCAC), conventional landing craft and helicopters, upon a hostile shore.	USS San Antonio (LPD-17)	Norfolk	22 kts	800 Marines	25,730 ft^2 for ve0icles. 35,561 ft^2 for pallet stores.	Enough for 2 LCACs, or 1 LCU.	Any helicopter. 4 spots.	1 MK41 VLS 2 MK31 RAM 2 30mm MK46 guns 2 3" 50 cal	
	USS New Orleans (LPD-18)	San Diego							
	USS Mesa Verde (LPD-19)	Norfolk							
	USS Green Bay (LPD-20)	San Diego							
Tank Landing Ship Mission: Transport and land amphibious vehicles, tanks, combat vehicles, and equipment in amphibious assault.	USS Frederick (LST-1184)	Pearl Harbor (7^{th} Fleet)	20 kts	360 Marines	19,000 ft^2 Enough for 29 tanks 500 tons of vehicles.	N/A	Can handle all helos except CH-53s 1 spot.	4 3" 50 cal 1 CIWS	
	USS LaMoure County (LST-1194)	Little Creek							
Amphibious Command Ship Mission: To provide amphibious command and control in major amphibious operations.	USS Blue Ridge (LCC-19)	Yokosuka (7^{th} Fleet)	23 kts	700 Marines	N/A	N/A	1 SH-3G Can handle all helos except CH-53s 1 spot.	2 CIWS	
	USS Mount Whitney (LCC-20)	Norfolk (6^{th} Fleet)							
High Speed Vessel – Catamaran Mission: To provide amphibious command and control in major amphibious operations.	USS Dieppe (HSV-1)	Little Creek	42 kts	500 combat loaded Marines 1,000 non-combat loaded	33,000 ft^2 400-1,200 STONS (3,000 nmi to 1,200 nmi range)	N/A	Can handle all helos except CH-53s 1 spot.	MK31 RAM 25mm Bushmaster guns 3" 50 cal	N/A
	USS Gallipoli (HSV-2)	San Diego							

Table 3-27. Amphibious ships.

3009. Landing Craft

Designation	Ship Class	Well Deck Capacity
LHD	Wasp	3 LCACs, 2 LCUs, 6 LCM-8s, or 12 LCM-6s
LHA	Tarawa	1 LCAC, 4 LCUs, 7 LCM-8s, or 17 LCM-6s
LPD-4	Austin	1 LCAC, 1 LCU, 4 LCM-8s, or 9 LCM-6s
LPD-17	San Antonio	2 LCAC or 1 LCU
LSD-36	Anchorage	3 LCACs, 3 LCUs, 9 LCM-8s, or 18 LCM-6s (with mezzanine deck in, capacity is reduced to 2 LCACs, 1 LCU, 6 LCM-8s, or 12 LCM-6s
LSD-41	Whidbey Island	4 LCACs, 3 LCUs, 10 LCM-8s, or 10 LCM-6s
LSD-49	Harper's Ferry	2 LCACs, 1 LCU, 4 LCM-8s, or 9 LCM-6s

Note: Planning speed for amphibious task force is 12-13 knots.

Table 3-28. Amphibious ship well deck capabilities.

LCAC	• Cargo deck is 67’ x 27’. • Can load 1 M1A1 tank and 2 HMMWVs, 4 LAVs, or equivalent trucks. • With personnel transport module can haul 120 pax. • Payload capacity is 60 tons. • Max speed is 40 kts (planning speed is 30 kts). • Offload time is ~15 minutes. • Reload time is ~ 45 minutes.
LCU-1646 Class	• Cargo deck is 12.5’ x 25’. • Can load 2 M1A1 tank, or equivalent quantity of large vehicles, or 400 combat loaded troops. • Payload capacity is 180 tons. • Man speed is 12 kts. • Turnaround time (offload and reload) is roughly twice the time for an LCAC.
LCM-8 (steel hull)	• Cargo deck is 14’ x 42’. • Can load 4 HMMWVs, or 3 HMMWVs and 1 LAVs, or 150 combat loaded troops. • Payload capacity is 60 tons. • Max speed is 9 kts.
LCM-8 (aluminum hull)	• Cargo deck is 17’ x 42’. • Can load 1 M1A1, or equivalent quantity of large vehicles, or 200 combat loaded troops. • Payload capacity is 180 tons. • Max speed is 12 kts.
LCM-6	• Cargo deck is 37’ x 11’. • Can load 1 HMMWV and 1 7-ton truck, or 2 HMMWVs, or 1 LAV, or 80 combat loaded troops. • Payload capacity is 34 tons. • Max speed is 10 kts.

Table 3-29. Landing craft capabilities.

Note: LCUs and LCMs require a beach gradient of 1:20 to 1:60. A steeper slope may cause broaching, while flatter slope may cause grounding out.

Range		45 NM
Speed		25 KTS
Availability **LCACs per Day (from a total of 54)**		Day One – 52 Day Two – 49 Day Three – 46 Day Four – 43 Day Five - 40
Operating Time		16 hours per day per LCAC
Time per Sortie		Vehicle Load – 6 hours, 8 min Cargo Load – 8 hours, 36 min
Sorties per Day for Vehicles		2.6 sorties per LCAC per day Total = 104 LCAC sorties per day @ 40 LCACs per day
Sorties per Day for Cargo		1.86 sorties per LCAC per day Total = 74 LCAC sorties per day @ 40 LCACs per day
Personnel Capacity		24 Troops 180 w/PTM
Short Tons per Sortie		25 STONS 50 pallets (500 lbs per pallet)
Vehicles per Sortie		12 HMMWVs per sortie 4 LAVs per sortie 2 AAAVs per sortie 1 M1A1 per sortie 4 7-Ton Trucks per sortie 2 7-Ton Trucks, 2 M777 Howitzers, and 2 HMMWVs per sortie
Time Details		Transit (45 NM @ 25 kts) x 2 = 216 min Well deck Operations: • 62 min for vehicles • 120 min for cargo Beach Operations • 30 min for vehicles • 120 min for cargo Friction = 60 min Total = 368 min (for vehicles) or 516 min (for cargo)
Unit LCAC Sortie Requirements	**Infantry Regiment**	269 HMMWVs = 23 sorties 10 7-Ton Trucks = 3 sorties
	Tank Battalion	58 M1A1 = 58 sorties 95 HMMWVs = 8 sorties 23 7-Ton Trucks = 6 sorties 8 Fuel Trucks = 4 sorties
	LAV Battalion	110 LAVs = 28 sorties 29 HMMWVs = 3 sorties 23 7-Ton Trucks = 6 sorties 8 Fuel Trucks = 4 sorties

Table 3-30. Landing craft air cushion capabilities.

3010. Navy Surface Ships

Ship Type	Primary Role	Air Search Radar Systems	Weapon Systems	ID Capabilities	Data Link Capabilities	Communications Capabilities	Aviation Capabilities
Aircraft Carrier (CV/CVN)	Fixed-wing aircraft operations	AN/SPS-48E (3D) AN/SPS-49 (2D)	NSSMS CIWS	Rotating IFF ACDS Block 0/1 (CV Auto ID) SEC CEC	TADIL-A TADIL-J TADIL-C ADSI	HF EHF UHF SATCOM SHF	No. and type fighter squadrons. (4) SH60F: Plane guard, dipping sonar, SAR
Guided Missile Cruiser (CG)	Battle group air defense	Primary: SPY-1B (3D) Secondary: AN/SPS-49 (2D)	TLAM SM2 Block 2/3 VL ASROC HARPOON 2 5" 54 CIWS SLQ 32 V3	Mast-mounted phased array IFF (Backup IFF mounted on SPS-49.) CEC	TADIL-A TADIL-J TADIL-C DNMFL HAWK Link	HF EHF UHF SATCOM	2 SH60B: OTH targeting, SAR
Guided Missile Destroyer (DDG)	Air defense	SPY-1D (3D)	TLAM SM2 Block 2/3 VL ASROC HARPOON 2 5" 54 CIWS SLQ 32 V3	Mast-mounted phased array IFF (Backup IFF mounted on SPS-49.)	TADIL-A TADIL-J TADIL-C DNMFL HAWK Link	HF EHF UHF SATCOM	Flight deck support landing and refueling helicopters.
Guided Missile Frigate (FFG)	Surveillance	AN/SPS-49 (2D) CAS Search	SM1 Block 6B HARPOON 3" 76 SLQ 32 V3	Rotating IFF mounted on SPS-49	TADIL-A HAWK Link	HF UHF SATCOM	2 SH60B: OTH Targeting, SAR
Spruance Destroyer (DD)	Anti-submarine Anti-surface	AN/SPS-40 (2D)	TLAM SLQ 32 V3	Rotating IFF	TADIL-A HAWK Link	HF UHF SATCOM	
Amphibious Helicopter Assault Ship (LHA)	Sea/air landing force assault	SPS-52 SPS-40B	CIWS	Rotating IFF NTDS	TADIL-A TADIL-J TADIL-C	HF EHF UHF SHF SATCOM	Helicopters Harriers
Amphibious Helicopter Dock Ship (LHD)	Sea/air landing force assault	SPS-48C SPS-52 SPS-49	NSSMS CIWS	Rotating IFF NTDS CEC	TADIL-A TADIL-J TADIL-C	HF EHF UHF SHF SATCOM	Helicopters Harriers
Amphibious Command Ship (LCC)	Command and control			Rotating IFF NTDS	TADIL-A TADIL-J TADIL-C	HF EHF UHF SHF SATCOM	

Table 3-31. Navy surface ships.

3011. Navy Air Defense

a. Navy Platform Air Defense

Platform	Strengths	Weaknesses
CG-47/DDG-51 Class	• ANSPY-1 multifunction, phased array, fire control quality radar. • Very rapid transition from SPY-1 silent to full radiate and full situational awareness. • Fast reaction, fully/semiautomatic combat systems. Initial detection to first missile movement in less than 10 sec. • Salvo rate of less than 2 sec per launcher (CG-52 and above with MK 41 VLS) • Mix of multiple SMs. • Max field of fire and min blockage zones • Must illuminate target only for a short duration prior to intercept. • AN/SPY-1 radar variable sensitivity feature allowing radar sensitivity to be tailored to threat RCS, environment, and tactical situation. • Weapons & ID doctrine capable of automatic and semiautomatic response/action. • Doctrine software assists w/ ID	• The system is designed for blue water and littoral operations however AN/SPY-1 configuration must be modified to look above the terrain to avoid causing excessive false targets from land clutter. These configuration changes may increase ship susceptibility to low and fast targets. • Once a target is engaged and the initial salvo fired, WCS will not allow the target to be reengaged (second salvo) until a kill evaluation has been completed. • AN/SPY-1 antenna height is lower than the AN/SPS-49 radar system resulting in reduced radar horizon. • DDG-51 Class are not equipped with a AN/SPS-49 radar (no secondary air search radar) • Must hold an AN/SPY-1 track. Cannot engage on a remote or AN/SPS-49 track unless equipped with CEC.
FFG-7 Class	• Good capability against (2 or less) medium and high altitude ASMs. • If equipped with the SM-1 BLK VIB and Mod 6 FCS good capability against low altitude ASMs. • Improved 2D air search radar. • High SM-1 salvo rate against a single target.	• Cycle time for SM-1 is relatively long. • Capability against low ASMs for Mod 2/SM-1 BLK VIA ships is poor. • Illuminator blockage zones are excessive. • Must illuminate target continuously during missile flight. • Long range air search radar is 2D. • Track capacity is limited.
DD-963 Class	• Very capable self defense system. • Adequate low flyer detection source Mk 23 TAS/NSSMS FCR in sector search. • Moderate field-of-fire blockage zones for NSSMS off port/starboard bow. • May be stationed in ID zone to supplement shotgun and provide additional air defense surveillance.	• Missile range is short. • Long range air search radar is 2D. • Must be within 1.5nm of MEU and on threat axis to provide realistic area defense.
CV/CVN	• Very capable self defense system. • Adequate low-flyer detection source Mk 23 TAS/NSSMS FCR in sector search. • Good long range 3D air search radar. • Good overland/near land detection system (AN/SPS-48E and AN/SPS-49 with AN/SYS-2) • Quick reaction modes.	• Self defense shipboard weapons systems only.
E-2C Hawkeye	• Altitude provides detection of low altitude targets out to the radar horizon. • Optimum over water detection and tracking capability. • Large airborne target detection capability out to 350nm. • Extensive IFF capability. • JTIDS type 2 • SATCOM capability.	• Limited concurrent, warfare area mission support (because of crew tasking). • Degraded detection capability over land. • Limited on-station time (3 to 4 hrs). • No link simulcast capability.
F-14A Tomcat	• Two man crew. • Speed/Range/endurance • Long range weapons • TCS-BVR capability. • APX-76 IFF interrogator • Multi-mission aircraft. • ARC-182 radio.	• High PRF radar degraded over land • Radar easily detected. • Large size. • Poor RWR/MWR/deceptive EA suite. • No all-weather/night ID capability. • No doppler-updated INS.
F-14B Tomcat	• All F-14A strengths. • Improved power plant. • Improved RWR/MWR	• Same as F-14A.
F-14D Tomcat	• AN/APG-71 radar with good over land performance. • Medium PRF. • Improved RWR/MWR • JTIDS • NCTR/BVR capability.	• System integration lacking. • Limited numbers in the fleet. • Limited deceptive EA. • Large size.
F/A-18 Hornet	• Multi-mission aircraft. • Medium PRF radar with good over land performance. • NCTR/BVR capability.	• Lack of range. • Lack of IFF interrogator. • Limitation of one man crew in high threat environment.

Table 3-32. Navy platform air defense capabilities.

b. Navy Aviation Air Defense Weapons

Aircraft Type	Primary Role	Air Search Radar Systems	Weapon Systems	ID Capabilities	Data Link Capabilities	Communications Capabilities	Combat Range
E-2C (Block II)	Air surveillance and aircraft control	APS-145	Detection range: over 300nm; over 2,000 tracks	IFF (M1-4) Limited ES capability, CID CAP	TADIL-A TADIL-J TADIL-C	HF UHF/VHF UHF SATCOM Havequick	4 hrs on station
F-14E/F	Air intercept, Strike	AWG-9 (A/B) APG-71 (D)	AIM-54 AIM-7 AIM-9 AIM-120 (D) 20 mm PGM Series	IFF TCS IRST (D)	TADIL-J (D) TADIL-C	UHF Havequick	1,400 nm with in-flight refueling
F-18C/D	Air intercept, Strike	APG-65	AIM-7 AIM-9 AIM-120 AGM-84 20 mm	NCTR (Electronic ID) IFF	TADIL-C	VHF UHF Havequick	575 nm with in-flight refueling
EA-6B	SEAD/Jamming EW intercept	APS-130	AGM-84	EW ID Comm intercept	TADIL-C	HF UHF/VHF Havequick	600 nm with in-flight refueling
S-3B	Antisurface warfare EW, Surveillance, Counter target	APS-137	AGM-65 AGM-84 Mk 80 Series	IFF (M1-4) EW ID	TADIL-A TADIL-C	HF UHF	1,800 nm with in-flight refueling
EP-3	EW, Communications	APS-116	N/A	IFF (M1-4) EW ID Comm ID	TADIL-A	HF UHF/VHF UHF SATCOM	2,000 nm
P-3C	Antisubmarine warfare, Antisurface warfare EW, Surveillance	APS-115/137	AGM-65 AGM-84 Torpedoes Mines Maverick SLAM	IFF EW ID	TADIL-A	HF UHF/VHF UHF SATCOM	2,070 nm

Table 3-33. Navy aviation air defense weapons.

3012. Army Air Defense

Weapons Characteristics	Army Patriot	Army SHORAD Avenger/Linebacker	Army SHORAD MANPADS
Targets	Air Defense: • Airplanes • Helicopters • UAV Missile Defense: • TBM • Cruise Missiles • TASM	Air Defense: • Airplanes • Helicopters • Cruise Missiles • UAV	Air Defense: • Airplanes • Helicopters • Cruise Missiles • UAV
Sensor range/ Planning range	90 km	40 km Sentinel Radar (Dependent on location of radar to Avenger) Onboard detection is visual or FLIR	Visual detection (dependent on location of radar to Avenger)
ID Capability	IFF Weighted system	IFF Visual	IFF Visual
Number of missiles loaded per launcher and platform	8 – 16	Division: • 12 (Avenger) • 8 (Linebacker) Armored Cavalry Regiment: • 6 (Linebacker)	Heavy Division: • 8 teams Armored Cavalry Regiment: • 12 teams
Number of missiles loaded per launcher and platform	PAC-2 (4)	Avenger (8) Linebacker (4) with 6 on-board reloads	2 ready to fire 4 reloads with each team
Coverage angle of supporting radar	Track 120 degrees Search 90 degrees	360 degrees up to 30k	360 degrees up to 30k
Engagement range (planning)	50 km	4 km	4 km

Table 3-34. Army air defense capabilities.

3013. Maritime Prepositioning Force

	MPSRON-1	MPSRON-2	MPSRON-3
Square Feet	608,893	607,975	608,740
Containers	2,311	2,020	2,311
Bulk Fuel (gals)	6,058,118	6,318,690	6,132,840
Bulk Water (gals)	374,808	424,620	395,976
Water Production (gal/day)	100,00	125,000	100,00

Table 3-35. Maritime prepositioning force capabilities.

	MPSRON-1 (II MEF)	MPSRON-2 (I MEF)	MPSRON-3 (III MEF)
Flag Ship	SS Obregon	MV Hauge	MV Lummus
Alternate Flag Ship	MV Bobo SS Kocal SS Pless	MV Phillips MV Baugh MV Anderson MV Bonnyman	MV Button MV Lopez MV Williams
MPF (E)	USNS Martin	USNS Wheat	USNS Stockham
Time to Persian Gulf	10 days	3 days	14 days
Time to Korea	21 days	14 days	4 days

Notes: SS = Steam Ship
MV = Motor Vessel
USNS = United States Naval Ship

Table 3-36. Maritime prepositioning force ships and steaming times.

3014. Joint Support Systems

The joint surveillance, target attack radar system (JSTARS) is an airborne multi-mode radar surveillance/target acquisition system to detect and track moving or fixed targets for attack by standoff weapons and aircraft. JSTARS provides target information for pairing direct attack aircraft and standoff weapons against selected targets. The system is capable of being cued by other reconnaissance, surveillance, and target acquisition systems; able to respond rapidly to worldwide contingencies; and provide surveillance and attack information in all light and near-all-weather conditions. The system reports enemy location, size, direction, rate, and type target.

The JSTARS uses the E-8C, a modified Boeing 707/300 series commercial airframe extensively remanufactured and modified with the radar, communications, operations and control subsystems required to perform its operational mission. The E-8C is a jam-resistant system capable of operating while experiencing heavy electronic countermeasures. The E-8C can fly a mission profile for 9 hours without refueling. Its range and on-station time can be substantially increased through in-flight refueling. The most prominent external feature is the 40-foot (12 meters) long, canoe-shaped radome under the forward fuselage that houses the 24-foot (7.3 meters) long, side-looking phase array antenna. It can be used both as a synthetic aperture side-looking radar to detect fixed surface targets or in a Doppler mode to detect moving vehicles on a time-sharing basis. Radar operating modes include wide area surveillance, moving target indicator (MTI), fixed target indicator (FTI) target classification and synthetic aperture radar. The antenna can be tilted to either side of the aircraft where it can develop a 120-degree field of view covering nearly 19,305 square miles (50,000 square kilometers) and is capable of detecting targets at more than 250 kilometers (more than 820,000 feet). In addition to being able to detect, locate and track large numbers of ground vehicles the radar has some limited capability to detect helicopters, rotating antennas and low, slow-moving fixed wing aircraft.

The radar and computer subsystems on the E-8C can gather and display broad and detailed battlefield information. Data is collected as events occur. This includes position and tracking information on enemy and friendly ground forces. The information is relayed in near-real time to the Army's common ground stations via the HAVE QUICK secure jam-resistant surveillance and control data link and to other ground command, control, communications, computers and intelligence (C4I) nodes beyond line-of-sight via ultra high frequency satellite communications. The JSTARS system includes the Army AN/TSQ-132 truck-mounted ground station modules and data link connectivity for transmitting raw radar data to the Army ground stations. Targeting information is transmitted to Air Force controllers on the ground via Joint Tactical Information Distribution System (JTIDS) and can also be provided directly to JTIDS equipped tactical aircraft.

3015. Intelligence, Reconnaissance, and Surveillance Assets

a. Ground Reconnaissance

UNIT	Operational Altitude or Range	Type Information Collected	Sensors and Maximum Range Collected	Comments (Missions, Roles, Type Reporting Produced, Sources)
Marine Corps Force Co Reconnaissance Team	4-6 days msn; range dependent upon terrain, climate, and team training.	HUMINT MASINT	• 7X50 binoculars • 10X scope (on the M40A1 rifle) • 20X spotting scope Max observation range 4K	**Missions/Roles**: Teams can also implant unattended ground sensors for the SCAMP Plt (MEF HQ). Radio equipment includes HF, VHF, SHF, and UHF. Missions include surveillance and reconnaissance and limited DA. Teams trained for operations in all environments. All teams can insert by air (military free-fall or static line, rappel, or fast-rope) surface craft, SCUBA or closed circuit, or by foot. **Reports**: SALUTE, SPOT, NATO formatted, or others as Div/MEF may require.
Marine Ground Reconnaissance Team	4-6 days msn; range dependent upon terrain, climate, and team training	HUMINT MASINT	• 7X50 binoculars • 10X scope (on the M40A1 rifle) • 20X spotting scope Max observation range 4K	**Missions/Roles**: Teams can also implant unattended ground sensors for the SCAMP Plt (MEF HQ). Radio equipment. Includes HF, VHF, SHF, and UHF. Missions include surveillance and reconnaissance. Teams trained for operations in all environments. Teams can insert by air (limited parachute, rappel or fast rope), surface craft, limited SCUBA, or by foot. **Reports**: SALUTE, SPOT, NATO formatted, or others as Div/MEF may require.
Marine Light Armored Reconnaissance (LAR) Battalion	410 miles	HUMINT	• Visual •	**Missions/Roles**: LAR provides the MAGTF with a mobile and survivable mounted and unmounted reconnaissance capability. In the LAV-25.
US Navy Sea, Air, Land Teams (SEALS)	Unlimited; dependent upon availability of re-supply by cache sites, aircraft, or other forces.	HUMINT	• 7X50 binoculars • 20X spotting scope • Other as required Max observation range 4K	**Missions/Roles**: Teams can conduct special reconnaissance (SR) in support of tactical, operational, or strategic goals. SR Teams can be reassigned FID, DA or other SOF-related missions as required. Teams can be assigned to the fleet commander or to the JSOTF (as part of the JTF). Teams trained for operations in all environments. All SEALS can be inserted by parachute (static line or military free fall), SCUBA or closed circuit, surface craft, or by foot. **Reports**: SPOT, SALUTE, NATO, or other as CINC/SFOB may require.
US Army SF (Special Reconnaissance)	Unlimited; dependent upon availability of re-supply by cache sites, aircraft, or other forces.	HUMINT	• 7X50 binoculars • 20X spotting scope • Other as required Max observation range 4K	**Missions/Roles**: In SR role, SF teams can conduct SR in support of tactical, operational, or strategic goals. SR Teams can be reassigned FID, DA or other SOF related missions as required. Teams trained for operations in all environments. All teams can insert by static line parachute; select teams can insert by SCUBA or HALO/HAHO. **Reports**: SPOT, SALUTE, NATO, or other as CINC/SFOB may require.
Combined Unconventional Warfare Task Force (CUWTF) Teams	Unlimited; dependent upon availability of re-supply by cache sites, aircraft, or other forces.	HUMINT	• As required Max observation range 4K	**Missions/Roles**: In SR role, SF teams can conduct SR in support of tactical, operational, or strategic goals. SR Teams can be reassigned to support environmental reconnaissance, armed reconnaissance, coastal patrol and interdiction, target and threat assessments, counterterrorism, unconventional warfare missions, and post-strike reconnaissance. Typically, CUWTF teams will work for CFC and are comprised of U.S. SF and Rangers, ROK SF and SEALS. **Reports**: As CFC may require.

Table 3-37. Ground reconnaissance assets.

ITEM	DESCRIPTION	
Combat Rubber Reconnaissance Craft	Primary function	A standard small, lightweight, inflatable, rugged boat to be used in performing various reconnaissance missions.
	Operational configuration	Length: 185 in. Width: 75 in. Height: 30 in. Weight: 265 lbs
	Power requirements	Improved Military Amphibious Reconnaissance System (I-MARS) 35 horsepower engine
Improved Military Amphibious Reconnaissance System	Primary function	Outboard motor for the Combat Rubber Reconnaissance Craft. The I-MARS 35 Horsepower Outboard Motor is a combination of the 35 horsepower Military Amphibious Reconnaissance System (MARS) outboard motor and a pump jet. The pump jet takes the place of the propeller in order to provide the user with a safer outboard motor. The I-MARS gives the Marine Corps the capability to insert and extract personnel from the shore with the CRRC more safely, and without degrading the overall performance of the old MARS outboard motor or CRRC. The I-MARS can be operated in any environment in which the MARS outboard motor previously has been used.
	Operational configuration	Length: 23 inches Width: 14 inches Height: 57 inches Weight: 119 pounds
	Petroleum, Oil, and Lubricants	Unleaded gas, 5 gallons per hour; 2 Stroke Outboard Motor Oil, 1/2 quart per hour
High Altitude High Opening Navigation Board	Primary function	To provide navigation during static line or military free-fall (MFF) High Altitude High Opening (HAHO) parachute operations. The HAHO Navigation Board integrates a chest-mounted console with a GPS operating through a 486 microprocessor and an LCD screen.
	Components	486 Microprocessor; Liquid Crystal Display (LCD) Screen PLGR Global Positioning System; Chest Console
Light Armored Vehicle-25	Primary function	Provide strategic mobility to reach and engage the threat, tactical mobility for effective use of fire power, fire power to defeat soft and armored targets, battlefield survivability to carry out combat and reconnaissance missions. The LAV-25 is an all-terrain, all-weather vehicle with night capabilities. It is air transportable via C-130, C-141, C-5 and CH-53 E. When combat loaded there are 210 ready rounds and 420 stowed rounds of 25 mm ammunition as well as 400 ready rounds and 1200 stowed rounds of 7.62mm. There are 8 ready rounds and 8 stowed rounds of smoke grenades. A supplementary M240E1 7.62mm machine gun can be pintle-mounted at the commander's station in the turret. The LAV-25 is fully amphibious with a maximum of 3 minutes preparation.
	Operational configuration	Length: 251.6 inches Height: 106.0 inches, (101.0 with pintle mount removed) Width: 98.4 inches (turret facing forward) Weight: 24,100 pounds Combat Weight: 28,200 pounds
	Capabilities	Range: 410 miles (660.1 kilometers) Speed: 62 mph (99.2 km/hr) Swim speed: 6 mph (9.6 km/hr)

Table 3-38. Ground reconnaissance support equipment.

Asset	Type Information Collected	Sensors and Maximum Range Collected	Comments (Missions, Roles, Type Reporting Produced, Sources)
Sensor Control Management Platoon (SCAMP) MEF HQ	ELINT MASINT	Tactical Remote Sensor System (TRSS)	**Missions/Roles**: Primary Purpose: Provide continuous all weather location determination and monitoring of activity within a given area of operation. **Sub-Functions**: Graphic depiction of objects through thermal graphic optics, classification through rotary-wing air-delivered sensors (i.e., tracked vehicle, rotary-winged aircraft, battlefield sounds, etc.) and hand employed ground sensors. **Equipment**: Each sensor mobile monitor system (SMMS) has two monitoring stations comprised of one IBM ThinkPad 770X using monitoring software developed for the Win NT environment. **Reports**: SALUTE or SENREPs (sensor reports). Positive identification and classification of detected activity. Strip charts and image displays.
MAGTF Electronic Warfare Support System (MEWSS) (Radio Bn)	SIGINT HUMINT	AN/MLQ-36A Mobile Electronic Warfare Support System Product Improvement Program	**Missions/Roles**: ESM/EA in support of the MEF. Can be lifted via CH-53E under ideal conditions, however weight is extremely close to NATOPS limits. MEWSS is specially configured LAV-25. The MEWSS is a wide-band intercept system mounted in an LAV, containing COMINT, ELINT, and precision geo-locating sub-systems. The COMINT system provides intercept, collection, and geolocation across a broad frequency range and a capability against a variety of modern threat communications emitters. The ELINT system provides interception, identification, and geolocation of non-communications emitters, including counter-battery and battlefield radar. The precision location system locates communications emitters to within targeting accuracy. **Reports**: SALUTE/SPOT/KL, or others as required.
Radio Reconnaissance Team (RRT) (Radio Bn)	SIGINT HUMINT	Radio Reconnaissance Equipment Program SIGINT Suite 2 (RREP SS-2)	**Missions/Roles**: ESM/EA in support of the MEF. Has insertion capabilities to conduct ESM/EA in support of advance force operations, as well as in support of MSPF/R&S operations with the MEU(SOC). Has capability to insert via helicopter (static line parachute/rappel/fast rope), surface craft, or foot. **Reports**: SALUTE/SPOT/KL, or others as required.
SIGINT Support Team (SST) (Radio Bn)	SIGINT HUMINT	AN/ULQ-19(V)2 Electronic Attack Set; AN/PRD-12 Direction Finder Set; AN/MYQ-8 TCAC-PIP; AN/USC-55 Commander's Tactical Terminal; Team Portable Collection System	**Missions/Roles**: ESM/EA in support of the MEF. Has capability to insert via helicopter (rappel/fast rope), surface craft, or foot. SIGINT support teams (SSTs) conduct SIGINT collection and DF operations. Personnel assigned to SSTs include SIGINT linguists (or voice intercept operators), manual-Morse, non-Morse, and ELINT collection and DF operators, Additionally, this element may contain MEWSS- or RRT-capable SSTs if the mission or situation warrants. **Reports**: SALUTE/SPOT/KL, or others as required.
Counterbattery Radar Platoon, Artillery Regiment	MASINT	AN/TPQ-36 (V)8 Firefinder Radar	The AN/TPQ-36 Firefinder Radar is a lightweight, small, highly mobile radar set capable of detecting weapon projectiles launched at any angle within selected 90-degree azimuth sectors over 360 degrees of coverage. The AN/TPQ-36 can locate simultaneous and volley-fire weapons. It can also be used to register and adjust friendly fire. Upon projectile detection, the weapon location is computed and is used to direct counter-battery fires. The system consists of an operational control group, OK-398/TPQ-36, and an antenna transceiver group, OY-71/TPQ-36. It is used by the artillery battalions to provide an effective capability to locate hostile weapons, both mortars and short- to medium-range weapons. Reports: Radar Reports.

Table 3-39. Ground MASINT and SIGINT assets.

b. Air Reconnaissance

Asset	Operational Altitude or Range	Type Information Collected	Sensors and Maximum Range Collected	Comments (Missions, Roles, Type Reporting Produced, Sources)
FA-18D	Max speed 1.8 MACH; Ceiling 50,000+ ft; max range with external fuel tanks 1,350 nm.	IMINT	Advanced tactical reconnaissance airborne system (ATARS); low altitude electro-optical (LAEO) and medium altitude electro-optical (MAEO) and infrared line scanner (IRLS) -LAEO alt: 300-3,000 ft -MAEO alt: 3,00-20,000 ft -IRLS alt: 2500-3000 ft	ATARS will provide near real time high resolution digital imagery in day, night, and all-weather conditions. The F/A-18D combines a real-time/near real-time imaging system, data storage, and data link. It consists of the ATARS with infrared and visible light sensors, two digital tape recorders, and a Reconnaissance Management System (RMS); an interface with the APG-73 Radar Upgrade (Phase II) which records synthetic aperture radar (SAR) imagery; and a digital data link mounted in a centerline pod. **Reports**: IPIRS; post-mission debriefs
FA-18E/F	Max speed 1.8 MACH; Ceiling 50,000+ ft; max range with external fuel tanks 1,350 nm.	IMINT	Shared Reconnaissance Pod (SHARP).	**Missions/Roles**: Tactical IMINT in support of fleet/CINC and the replacement for the F-14 TARPs. SHARP is electro-optical/infrared fully digital sensor pod that is data-link capable, with both a medium and high altitude collection capability. **Reports**: RECCEXREP, in-flight reports, IPIRS, post-mission debriefs.
P-3 Orion	Max Speed: 411 kts Cruise Speed: 328 kts Ceiling: 28,300 Max Mission Range: 2,380 nm; 1,346 nm with 3 hours on station at 1,500 ft.	MASINT	Directional Frequency and Ranging (DIFAR) sonobuoys; Magnetic Anomaly Detection (MAD)	**Mission Roles**: The P-3C is a land-based, long-range, anti-submarine warfare (ASW) patrol aircraft. The P-3C can carry a mixed payload of weapons internally and on wing pylons.
EP-3 Aries II	Max Speed: 411 kts Cruise Speed: 328 kts Ceiling: 28,300 Max Mission Range: 2,380 nm; 1,346 nm with 3 hours on station at 1,500 ft.	SIGINT	Airborne Reconnaissance Integrated Electronic System II (Aries II)	**Missions/Roles**: The EP-3E ARIES II is the Navy's only land-based SIGINT reconnaissance aircraft. The 11 aircraft in the Navy's inventory are based on the Orion P-3 airframe and provide fleet and theater commanders worldwide with near real-time tactical SIGINT. With sensitive receivers and high-gain dish antennas, the EP-3E exploits a wide range of electronic emissions from deep within targeted territory. **Reports:** COMINT and ELINT reporting.
EC-130E Compass Call; Senior Hunter/ Senior Scout and Senior Warrior	Max speed 299 kts at 20,000 ft. Ceiling: 20,000 ft. Range: 2,100+ miles	SIGINT	AN/APS 145 Radar; Airborne Collection Electronic Signals II (ACESII)	**Missions/Roles**: Commando Solo conducts psychological operations and civil affairs broadcast missions in the standard AM, FM, HF, TV and military communications bands. Missions are flown at maximum altitudes possible to ensure optimum propagation patterns. The EC-130 flies during either day or night, and is air-refuelable. A typical mission consists of a single-ship orbit that is offset from the desired target audience. The targets may be either military or civilian personnel. Secondary missions include command and control communications countermeasures (C3CM) and limited intelligence gathering. The three variants are EC-130 ABCCC, EC-130E Commando Solo, and the EC-130H Compass Call. **Reports**: SIGINT reporting.
RC-12D Guard Rail	Cruise speed 250+ kts 5+ hrs max endurance with 1,200 nm max range	SIGINT	AN/ARW-83(V) 5	**Missions/Roles**: Provides near real-time SIGINT and targeting information to tactical commanders throughout the battlespace with emphasis on deep battle and follow-on forces attack support. It collects selected low, mid, and high band radio signals, identifies/classifies them, determines source locations, and provides near-real-time reporting to tactical commanders. Targeting accuracy is also provided by the ELINT system. Ground to ground (including CTT) communications links also provide an interface with fixed locations and tactical users. Automated addressing to CTT field terminals provides automated message distribution to tactical commanders in near real time. Planned improvements include expanded COMINT/ELINT collection, LPI capability, embedded training, CTT (3 channel) retrofit, and automated reporting. **Reports**: SIGINT and ELINT reporting.

Table 3-40. Air reconnaissance assets (part 1 of 2).

Table 3-40. Air reconnaissance assets (part 2 of 2).

Asset	Operational Altitude or Range	Type Information Collected	Sensors and Maximum Range Collected	Comments (Missions, Roles, Type Reporting Produced, Sources)
RC-135 Rivet Joint	Unrefueled range 3,900 nm Speed: 500+ kts	SIGINT	Classified	**Missions/Roles**: The RC-135V/W Rivet Joint reconnaissance aircraft supports theater and national level consumers with near real time on-scene intelligence collection, analysis and dissemination capabilities. The mission crew detects, identifies and geolocates signals throughout the electromagnetic spectrum. The mission crew then forwards gathered information in a variety of formats to a wide range of consumers via Rivet Joint's extensive communications suite. The Rivet Joint fleet is currently undergoing significant airframe, navigational and powerplant upgrades and upgrade of the flight deck instrumentation and navigational systems to the AMP standard. The AMP standard includes conversion from analog readouts to a digital "glass cockpit" configuration. **Reports**: COMINT and ELINT reporting.
EA-6B	Max Speed: 500+ kts Range: 1,000 nm Ceiling: 37,600 ft	SIGINT	AN/ALQ-99 On-Board sensor (OBS) and Tactical Jamming System (TJS)	**Mission/Roles**: The EA-6B Prowler provides an umbrella of protection over strike aircraft, ground troops and ships by jamming enemy radar, electronic data links and communications. Designed for carrier and advanced base operations, the Prowler is a fully integrated electronic warfare system combining long-range, all-weather capabilities with advanced electronic countermeasures. The EA-6B's ALQ-99 OBS is used to collect tactical electronic order of battle (EOB) data which can be disseminated through the command and control system while airborne, and which can be recorded and processed after missions to provide updates to various orders of battle. The ALQ-00 TJS is used to provide active radar jamming support to assault support and attack aircraft, as well as ground units. **Reports:** ELINT reports.
E-8 JSTARS	Optimum orbit speed 390-510 kts Ceiling: 42,000 ft. TOT: 8 hrs max (unrefueled)	MTI and SAR	Joint Surveillance Target Attack Radar System (JSTARS)	**Missions/Roles**: JSTARS is an airborne battle management and command and control platform that conducts ground surveillance and target acquisition of enemy forces. Radar operating modes include wide area surveillance, moving target indicator, fixed target indicator target classification and synthetic aperture radar. From either side of the aircraft the antenna can cover nearly 50,000 square kilometers and is capable of detecting targets at more than 250 kilometers. In addition to being able to detect, locate and track large numbers of ground vehicles the radar has some limited capability to detect helicopters, rotating antennas and low, slow-moving fixed wing aircraft. **Reports**: N/A
E-3 Sentry (AWACS)	Optimum cruise speed 360 kts Max ceiling: 29,000+ ft. Max endurance: 8+ hrs	N/A	Classified	**Missions/Roles**: All-weather surveillance of aircraft in low, medium, and high altitude, C3 support for JTF, theater, and NATO air force commanders. **Reports**: N/A.
U-2	Max speed: 475+ kts. Max ceiling above 70,000 ft with 6,000+ nm range.	SIGINT or IMINT (wet-film or EO)	Classified	**Missions/Roles**: The U-2 provides continuous day or night, high altitude, all-weather, standoff surveillance of a battle area in direct support of U.S. and allied ground and air forces. In addition to high-altitude reconnaissance, the aircraft performs air sampling flights and, occasionally, search and rescue missions. **Reports**: Imagery reports.
Airborne Reconnaissance-Low	Unknown	SIGINT IMINT MTI-SAR		**Missions/Roles**: Was developed by Southern Command after requirement for a manned SIGINT and IMINT. Current version (RC-7B) designated the ARL-M, conducts IMINT, SIGINT, as well as provides MTI SAR data. **Reports**: TACREPs, RECCEXREPs, KL, SPOT Reports.

c. Ground or Sea Sensors

Asset	Operational Altitude or Range	Type Information Collected	Sensors and Maximum Range Collected	Comments (Missions, Roles, Type Reporting Produced, Sources)
Sensor Control Management Platoon (SCAMP) MEF HQ	N/A	ELINT MASINT	Tactical Remote Sensor System (TRSS)	**Missions/Roles**: Primary Purpose: Provide continuous all weather location determination and monitoring of activity within a given area of operation. **Sub-Functions**: Graphic depiction of objects through thermal graphic optics, classification through rotary-wing air-delivered sensors (i.e., tracked vehicle, rotary-winged aircraft, battlefield sounds, etc.) and hand employed ground sensors. **Equipment Reqs**: Each Sensor Mobile Monitor System (SMMS) has two monitoring stations located within that are comprised of one each IBM Thinkpad 770X using monitoring software developed for the Win NT environment. **Reports**: SALUTE or SENREPs (sensor reports). Positive identification and classification of detected activity. Strip charts and image displays.
MAGTF Electronic Warfare Support System (MEWSS) (Radio Bn)	N/A	SIGINT HUMINT	Classified	**Missions/Roles**: ESM/EA in support of the MEF. Can be lifted via CH-53E under ideal conditions, however weight is extremely close to NATOPS limits. MEWSS is specially configured LAV-25. **The MEWSS is a wide-band intercept system mounted in an LAV, containing COMINT, ELINT, and precision geo-locating sub-systems. The COMINT system provides intercept, collection, and geolocation across a broad frequency range and a capability against a variety of modern threat communications emitters. The ELINT system provides interception, identification, and geolocation of non-communications emitters, including counter-battery and battlefield radar. The precision location system locates communications emitters to within targeting accuracy.** **Reports**: SALUTE/SPOT/KL, or others as required.
Radio Reconnaissance Team (RRT) (Radio Bn)	N/A	SIGINT HUMINT	Classified	**Missions/Roles**: ESM/EA in support of the MEF. Has insertion capabilities to conduct ESM/EA in support of advance force operations, as well as in support of MSPF/R&S operations with the MEU(SOC). Has capability to insert via helicopter (static line parachute/rappel/fast rope), surface craft, or foot. **Reports**: SALUTE/SPOT/KL, or others as required.
SIGINT Support Team (SST) (Radio Bn)	N/A	SIGINT HUMINT	Classified	**Missions/Roles**: ESM/EA in support of the MEF. Has capability to insert via helicopter (rappel/fast rope), surface craft, or foot. **Reports**: SALUTE/SPOT/KL, or others as required.

Table 3-41. Ground or sea assets.

d. Processing and Production

ITEM	DESCRIPTION	
Intelligence Operations Server (IOS) Version 2	Primary function	The IOS provides semi-automated intelligence support to operations, all-source intelligence fusion at all command levels, and current information on the enemy, weather, and terrain. It facilitates timely information access; efficient imagery and local intelligence data fusion; rapid tactical intelligence production and dissemination; and access to joint, theater, and national intelligence.
	Operational configuration	The IOS architecture is scalable from a single, stand alone, portable workstation at the battalion/squadron level; to a four station, on line, moveable, intermediate suite at the MEU level; to a mobile mounted multi-station real time, service-wide intelligence communications link at the MEF level. The IOS will deploy either as a MEF IOS, in IOS suites, or as single IOS workstations. The MEF IOS serves as the hub of the Marine Air-Ground Intelligence System (MAGIS). It provides intelligence functionality to the echelon-tailored, MAGTF all-source intelligence fusion centers and is compatible with the DII COE. MEF IOS is a shelterized, mobile system with multiple analyst workstations in a client-server LAN configuration. IOS suites, for intermediate commands, are configured in either a two or a four workstation LAN. Single IOS workstations are for battalion and squadron-sized units.
AN/TSQ-130Tactical Control and Analysis System (TCAC) Product Improvement Program (PIP)	Primary function	TCAC PIP provides a fully capable SIGINT processing, production, and dissemination system. Its automated processing, analysis, and reporting capability aid in developing and disseminating SIGINT products from raw data collected by Radio Battalion sensors.
	Operational configuration	TCAC PIP is shelter-mounted on a heavy HMMWV. It includes three SUN workstations, tow SUN servers, and five radios (one HF, two VHF, one UHF, and one UHF SATCOM).
Tactical Electronic Reconnaissance Processing and Evaluation System (TERPES)	Primary function	TERPES supports the reception, processing, evaluation, and dissemination of electronic reconnaissance information from EA-6B aircraft and other theater and national ELINT sources. Data is received from EA-6B aircraft by data links, magnetic tape, and crew logs. TERPES also supports EA-6B mission planning, briefing and debriefing, and generates intelligence for strike mission planning. TERPES fused data from EA-6B mission with information from other national and theater sources to update the electronic order of battle and passes intelligence to the IOS for further processing and dissemination.
	Operational configuration	TERPES is housed in one 8-foot by 20-foot shelter that is dedicated to mission analysis, planning and support. It may be transported via commercial or tactical ground vehicle, shock-mounted air-ride, aircraft, or on an attachable mobilizer for short distances.

Table 3-42. Intelligence processing and production equipment.

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Part IV

Battlespace and Time

4001. Notional Maritime Prepositioning Force Operation Timeline

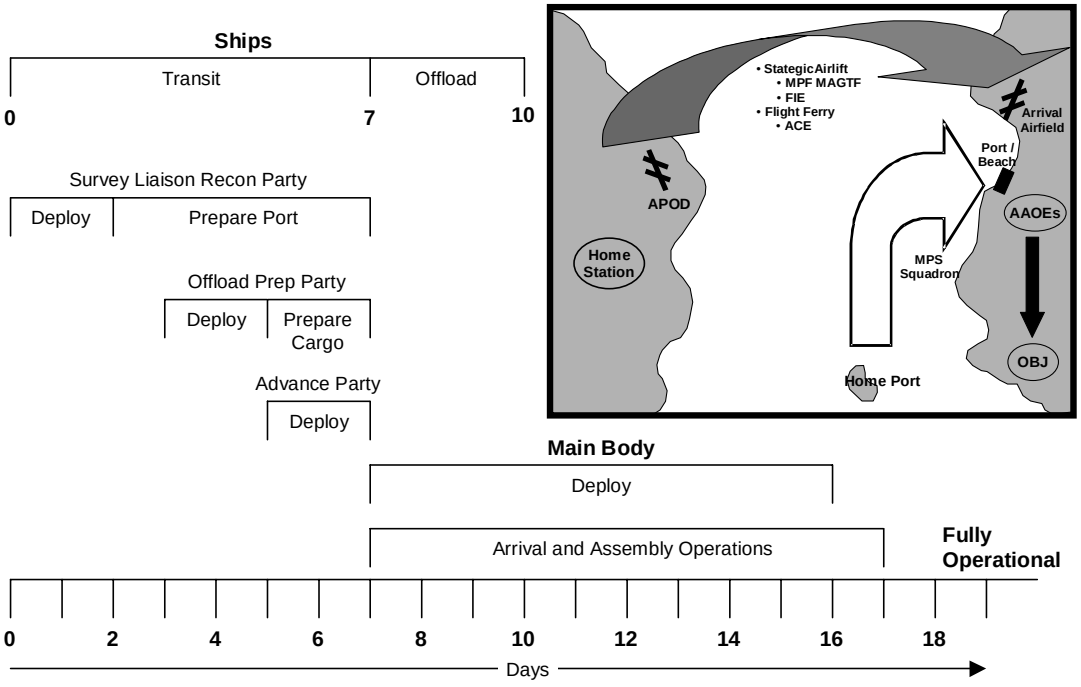


Figure 4-1. Notional maritime prepositioning force operation timeline.

4002. Aviation Forward Operating Base Considerations

a. Forward Operating Bases

In preferred order—

- Occupy host nation airfield.
- Use abandoned or captured airfields.
- Use roads, highways, or parking lots.
- Construct EAF (takes 2-3 weeks).

b. Forward Operating Base Classifications

- **Main Air Base**. A secure airfield capable of supporting sustained operations ashore. Can handle all aircraft up to and including C-5s, C-17, and C-141s. Includes IMA support.

- **Air Facility**. A secure airfield capable of supporting squadron-sized elements and OMA support. Can be an airfield, road segment, EAF, or clear and level ground. Can sustain combat sortie rate operations and support forward sites like FARPs.
- **Air Site**. A secure location where aircraft preposition to reduce response time. Operations limited to receiving and launching previously loaded aircraft awaiting pre-planned or immediate missions.
- **Air Point**. FARPs and lager points designed to support specific tactical missions. FARPs permit aircraft to rapidly rearm and refuel close to the battle to reduce response time. Lager points are locations at which aircraft marshal between missions.

c. Refueling Systems

Tactical Airfield Fuel Dispensing System (TAFDS)	Helicopter Expedient Refueling System (HERS)	M970 Refueler Trailer	SIXCON Tank Module

• 6x20,000 gal collapsible tanks.
• MWSS (FW) has 6 systems (720,000 gal).
• MWSS (RW) has 4 systems (480,000 gal).
• Can simultaneously refuel 12 aircraft.
• Can be established in 48 hrs.
	• 18x500 gal pods.
	• MWSS (FW) has 2 systems (18,000 gal).
	• MWSS (RW) has 7 systems (63,000 gal).
	• Helicopter transportable.
	• Can be established in 4 hrs.
	• Not for extended fuel support operations.
		• Each MWSS owns 10x5,000 gal trailers.
		• Good for FOB ops due to high mobility, but does not have good rough terrain capability.
		• Trailer Max capacities:
		  • 5,000 gallons for highway travel (Total capacity: 50,000 gal).
		  • 3,800 gallons for cross country travel (Total capacity: 38,000 gal).
			• 5x900 gal storage modules.
			• Moved by helicopter, LVS, 7-ton truck.

Table 4-1. Refueling system capabilities.

d. Maritime Prepositioning Force Support

T-AVBs	MPS
• T-AVB-3 USNS Wright (West). • T-AVB-4 USNS Curtiss (East). • Will arrive in AO 15-20 days after notification of movement. • Provides sealift of intermediate logistics support. Marries up with aircraft, personnel, and support prepositioned by FIE and MPS.	• Usually in theater before T-AVB. • When combined with FIE and FISP allowances, provides ACE 30 days of combat ops sustainment until arrival of T-AVB.

Table 4-2. Maritime prepositioning force support.

e. MALSP Support Packages

Fly-in Support Package (FISP)	Contingency Support Package (CSP)	Follow-on Support Packages (FOSP)
• Enabling packages (part of FIE). • Provide O-level spare part support (remove and replace). • When married w/support provided by MPS and FIE, provides 30 days combat flying.	• Augment FISPs. • Provides O & I level support (equipment, mobile facilities, spare parts & personnel) to sustain 90 days combat flying.	• Provides garrison level support. • Final building block of MALSP.

Table 4-3. MALSP support packages.

4003. Experimental Marine Expeditionary Brigade Laydown

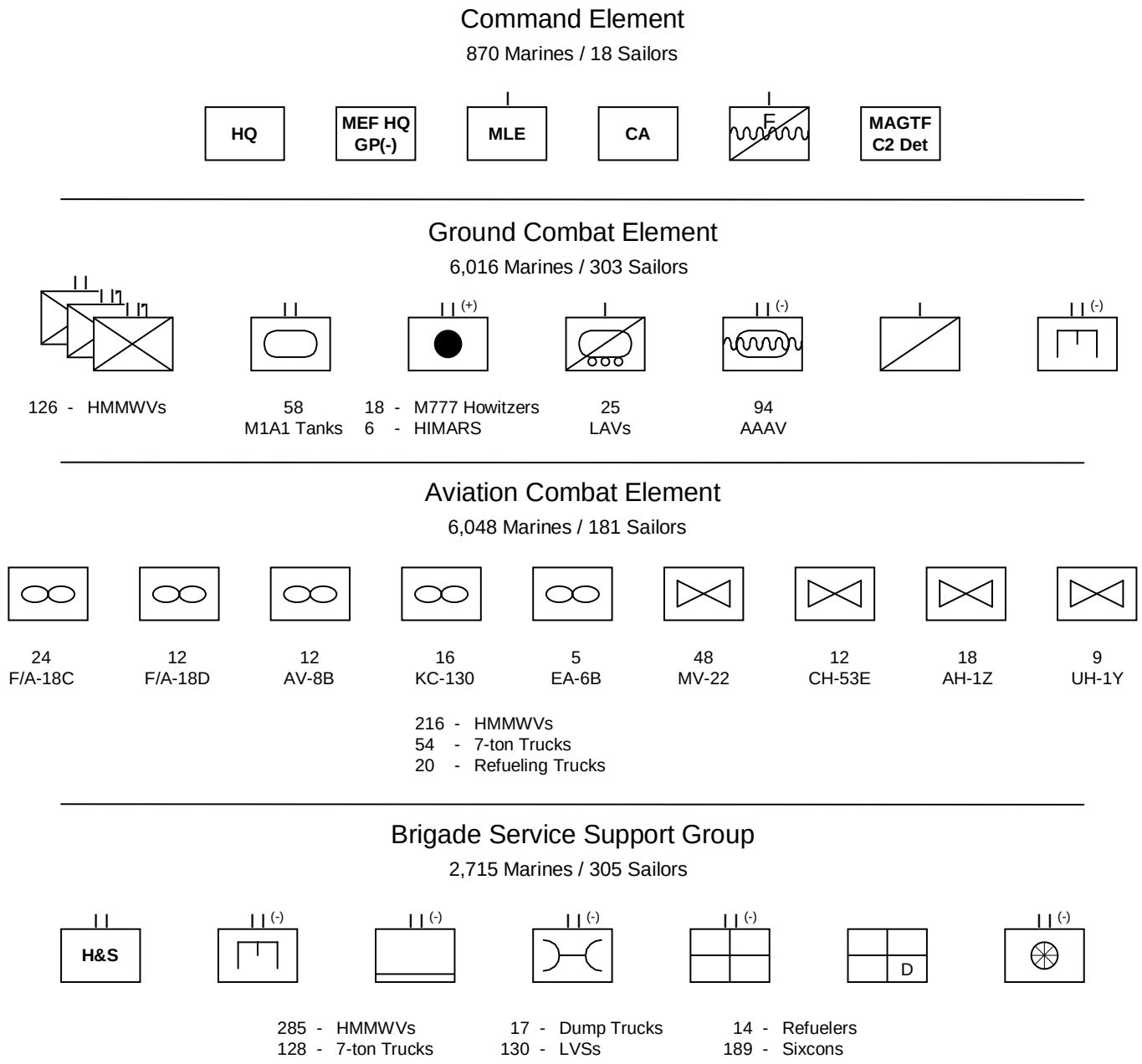


Figure 4-2. Experimental Marine expeditionary brigade laydown.

4004. Notional Experimental Marine Expeditionary Brigade Command Post Layout

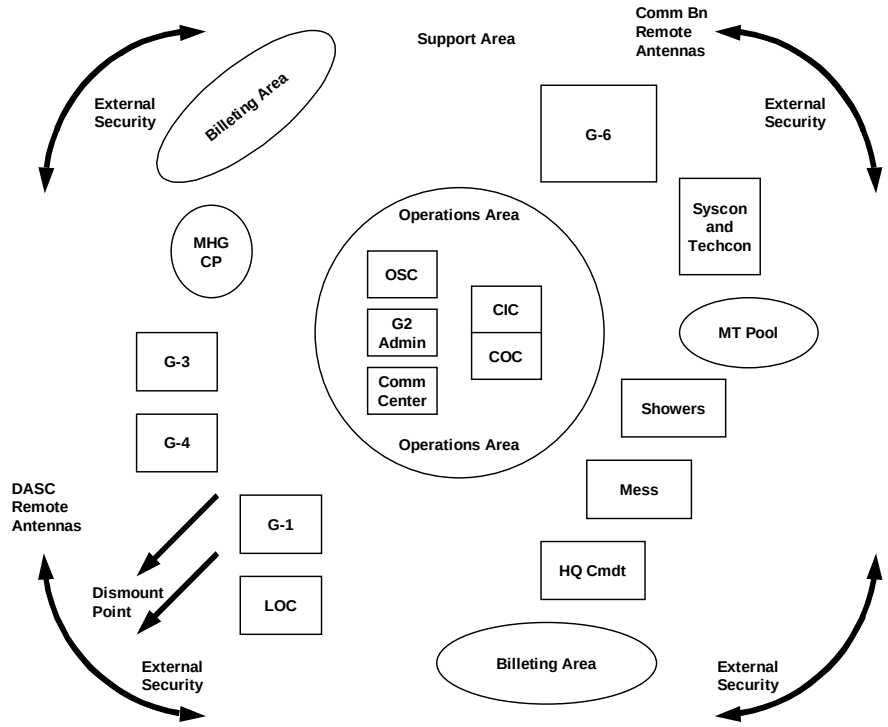


Figure 4-3. Notional experimental Marine expeditionary brigade command post layout.

4005. Rear Area Operations

a. Command and Control in Marine Corps Rear Areas

Three options for command and control of rear area operations are for the commander to:

- Retain command and control himself.
- Designate a rear area coordinator.
- Designate a rear area commander.

The commander determines how he will command and control rear area operations based on his analysis of METT-T factors. Additionally, he must consider how higher commanders will command and control rear area operations (e.g., battlespace, organization, force laydown) to ensure that his arrangements support their intent and concept of operations.

The rear area coordinator or rear area commander can be the commander's deputy, a member of the commander's staff, a subordinate commander, or an individual assigned to the command specifically for that purpose. The difference between a commander and a coordinator is the degree of authority. *Coordinating authority* allows the designated individual to coordinate specific functions or activities; in this case rear area functions. A coordinator has the authority to require consultation between agencies, but does not have the authority to compel agreement. *Command* includes the authority and responsibility for effectively using available resources and for planning the employment of, organizing, directing, coordinating, and controlling military forces for the accomplishment of assigned missions.

However the commander elects to command and control rear area operations, the rear area functions of security, communications, intelligence, sustainment, area management, movement, infrastructure development and host-nation support must be conducted.

- **Command and Control Retained by the Commander**. The commander may retain command and control of rear area operations himself. He might choose to do this when:

  - The scope, duration, or complexity of the operation is limited.
  - The battlespace is restricted.
  - The nature of the mission is fundamentally linked to the rear area, such as humanitarian assistance or disaster relief.
  - The enemy threat to rear area operations is low.
  - Retention is a logical early phase of an evolutionary process (e.g., initiation of operations).

- **Rear Area Coordinator**. The commander may elect to delegate control of some or all rear area operations to a rear area coordinator. He might choose to do this when:

  - The scope, duration, or complexity of the operation increases.
  - The assigned battlespace increases in size.
  - The enemy threat level in the rear area increases, thereby requiring a greater degree of coordination.
  - One person needs to focus on rear area operations so that the commander can concentrate on the close and deep fight.
  - The delegation of control over the rear area is the next logical phase of an evolutionary process (e.g., build-up of forces in theater).

- **Rear Area Commander**. The commander may elect to delegate control of some or all rear area operations to a rear area commander. He might choose to do this when:

  - The scope, duration, or complexity of the operation reaches a level that rear area operations demand a commander's full time and attention or exceeds the scope of a coordinator's authority.
  - The size of the assigned battlespace must be subdivided to effectively command and control.
  - The enemy threat level (Level III) in the rear area is significant enough that it requires a combined-arms task force (tactical combat force) to counter. (See table 3-4.)
  - He wants to assign authority for any or all of the rear area functions under a subordinate commander, with the customary authority and accountability inherent to command.
  - The designation of a rear area command is the next, and ultimate, phase of an evolutionary process (e.g., expansion of the battlespace).

Threat Level	Possible Threat	Response Force
Level I	Agents, sympathizers, terrorists, and saboteurs.	Unit, base, and base cluster self-defense measures.
Level II	Small tactical units, unconventional forces, and guerillas.	Self-defense measures and local response force(s) with organic supporting arms.
Level III	Large tactical units (air, helicopterborne, amphibious)	Tactical combat force.

Table 4-4. Threat levels and response forces.

b. Command and Control Facilities

The rear area coordinator or rear area commander normally establishes a facility from which to command, control, coordinate, and execute rear area operations. This facility normally contains an operations cell and a logistics cell to coordinate the following:

- Security forces (e.g., military police, tactical combat force).
- Fire support agencies.
- Support units (e.g., supply, engineer, medical).
- Movement control agencies.
- Other command and control facilities.
- Bases and base clusters.
- Other organizations as necessary (e.g., counterintelligence team, civil affairs group).

A rear area command and control facility may be located within or adjacent to an existing facility or it may be a single-purpose facility. When located within or adjacent to an existing facility, a rear area command and control facility may be able to use some of the existing facility's personnel and equipment, thus reducing the need for additional resources. Given the scope of rear area operations within a major theater of war, it may be necessary to establish a separate rear area command and control facility.

The following table shows the appropriate titles for rear area command and control organizations at the various Marine Corps command echelons. The commander establishes various rear area command and control organizations, but the naming of those organizations should conform to the table to promote common understanding.

Echelon	Title	Facility
Marine Corps component	Marine rear area coordinator (MRAC)	Marine rear area operations center (MRAOC)
	Marine rear area commander (MRACOM)	Marine rear area command post (MRACP)
MAGTF/major subordinate command	Rear area coordinator (RAC)	Rear area operations center (RAOC)
	Rear area commander (RACOM)	Rear area command post (RACP)

Table 4-5. Rear area command and control organizations.

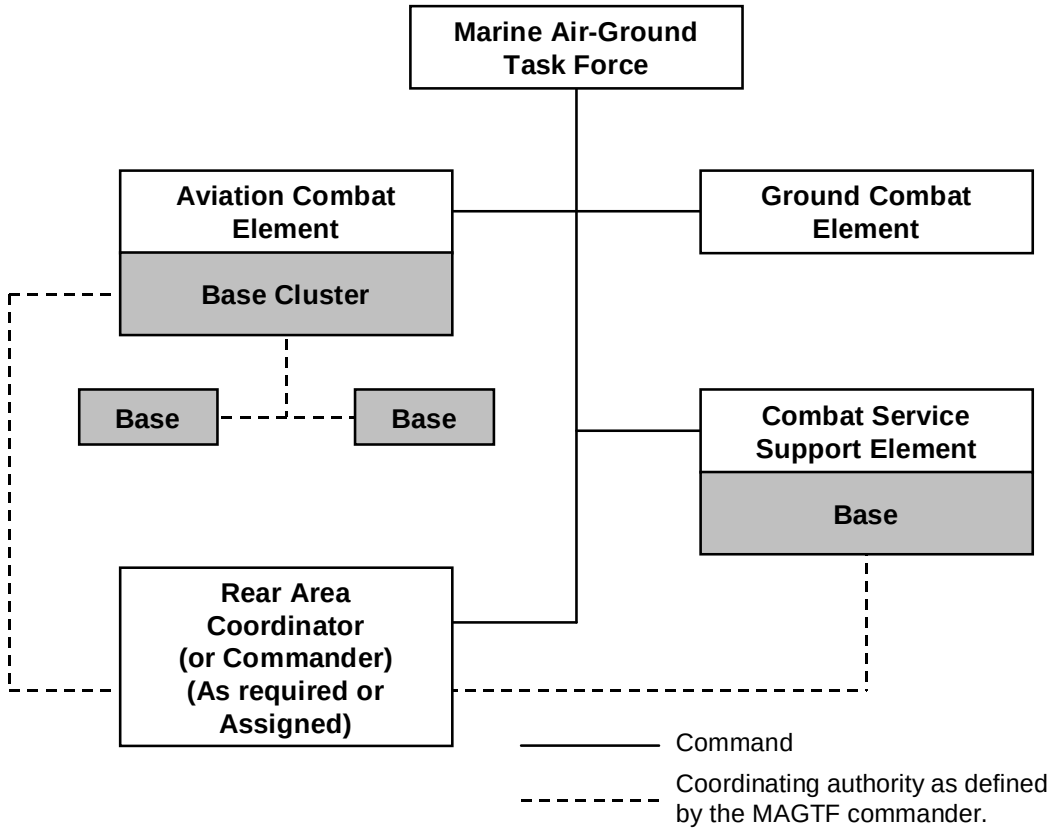
The rear area coordinator or rear area commander executes assigned tasks to ensure that rear area operations support the conduct of the tactical operations in the close and deep battle. The rear area command and control facility integrates and coordinates its activities with the main and forward command posts to ensure that the Marine Corps component or MAGTF commander has a better understanding of the battlespace and can influence and orchestrate the single battle.

The rear area command and control facility must have reliable communications and connectivity with the higher, adjacent, and subordinate headquarters involved in rear area operations. Connectivity to the joint rear area intelligence network, movement control infrastructure, and other support structures is vital to the successful conduct of rear area operations

c. Base Defense

Base and base cluster commanders are designated to enhance command and control within the rear area. Commanders are responsible for ensuring the integration of their plans and for the execution of base defense. Base and base cluster commanders conduct security operations through a base defense or base cluster operations center.

Unit or element commanders are assigned as base or base cluster commanders since they normally possess the personnel and equipment to command and control base defense operations. See figure 3-4.



In this example, the aviation combat element commander is assigned as the base commander where he is located. He also could be given the responsibility for other nearby smaller bases as the base cluster commander, such as—

- Marine aircraft groups and squadrons.
- Marine combat service support units.
- Marine ground combat units.
- Forces from other Services or nations.
- Nonmilitary U.S., allied, and host-nation personnel.

Figure 4-4. Example of a base defense command relationship.

- **Base Cluster Commander**. The base cluster commander is responsible for the security and operations of his base and for coordinating the security of all of the bases within his designated cluster. He integrates the defense plans of the bases into a base cluster defense plan. The commander will establish a base cluster operations center, normally within his existing operations center, to be the focal point for planning, coordinating, and controlling the base cluster defense.

- **Base Commander**. The base commander is responsible for everything that takes place within the base. For base defense purposes all forces—organic and tenant—within the base are under the base commander's operational control. The base commander establishes a base defense operations center, normally within his existing operations center, to assist in the planning, coordinating, integration, and control of defense activities.

  Subordinate commander's within the Marine component or the MAGTF may be designated as base commanders. They will be responsible for all operations within the boundaries of the base. They will also be responsible for coordination and communication with other higher and adjacent organizations.

4006. Tactical Control and Fire Support Coordinating Measures

These terms can be found in MCRP 5-12A, *Operational Terms and Graphics*.

Attack Position. The last position occupied by the assault echelon before crossing the line of departure.

Axis of Advance. A line of advance assigned for purposes of control; often a road or a group of roads, or a designated series of locations, extending in the direction of the enemy.

Base Unit. Unit of organization in a tactical operation around which a movement or maneuver is planned and performed; base element.

Battlefield Coordination Line. A fire support coordination measure that facilitates the expeditious attack of surface targets of opportunity between the measure (the BCL) and the FSCL. When established, it allows MAGTF aviation to attack surface targets without approval of a ground combat element commander in whose area the targets may be located. To facilitate air delivered fires and deconflict air and surface fires, an airspace coordination area (ACA) will always overlie the area between the BCL and the FSCL. Additionally, ground commanders may strike any targets beyond the BCL and short of the FSCL without coordination as long as those fires do not violate the established BCL ACA. While the BCL provides the MAGTF commander flexibility, the preferred method for attacking surface targets is by using a properly situated FSCL that permits maximum integration of air and surface fires.

Boundary. In land warfare, a line by which areas of responsibility between adjacent units/formations are defined.

Checkpoint. **1**. A predetermined point on the surface of the earth used as a means of controlling movement, a registration target for fire adjustment, or reference for location. **2**. Center of impact; a burst center. **3**. Geographical location on land or water above which the position of an aircraft in flight may be determined by observation or by electrical means. **4**. A place where military police check vehicular or pedestrian traffic in order to enforce circulation control measures and other laws, orders and regulations.

Contact Point. **1**. In land warfare, a point on the terrain, easily identifiable, where two or more units are required to make contact. **2**. In air operations, the position at which a mission leader makes radio contact with an air control agency.

Coordinated Fire Line. A line beyond which conventional surface fire support means (mortars, field artillery, naval gunfire ships) may fire at any time within the zone of the establishing headquarters without additional coordination. It is usually established by brigade or division but may be established by a maneuver battalion.

Coordinating Point. Designated point at which, in all types of combat, adjacent units/formations must make contact for purposes of control and coordination.

Direction of Attack. A specific direction or route that the main attack or center of mass of the unit will follow. The unit is restricted, required to attack as indicated, and is not normally allowed to bypass the enemy. The direction of attack is used primarily in counterattacks or to insure that supporting attacks make maximal contribution to the main attack.

Final Coordination Line. A line used to coordinate the ceasing and shifting of supporting fires and the final deployment of the assault echelon in preparation for launching an assault against an enemy position. Also called **FCL**.

Fire Support Coordination Line. A fire support coordination measure that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate,

supporting, and affected commanders. Fire support coordination lines (FSCLs) facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. An FSCL does not divide an area of operations by defining a boundary between close and deep operations or a zone for close air support. The FSCL applies to all fires of air, land, and sea-based weapon systems using any type of ammunition. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse effects on, or to the rear of, the line. Short of an FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander. The FSCL should follow well defined terrain features. Coordination of attacks beyond the FSCL is especially critical to commanders of air, land, and special operations forces. In exceptional circumstances, the inability to conduct this coordination will not preclude the attack of targets beyond the FSCL. However, failure to do so may increase the risk of fratricide and could waste limited resources. Also called **FSCL**. (JP 1-02)

Forms of Maneuver. Frontal attack, flanking attack, envelopment (single and double), turning movement, infiltration, penetration.

Line of Departure. **1**. In land warfare, a line designated to coordinate the departure of attack elements. Also called **start line**. **2**. In amphibious warfare, a suitably marked offshore coordinating line to assist assault craft to land on designated beaches at scheduled times.

Linkup Point. An easily identifiable point on the ground where two forces conduct a linkup meet. When one force is stationary, linkup points normally are established where the moving force's routes of advance intersect the stationary force's security elements. Linkup points for two moving forces are established on boundaries where the two forces are expected to converge.

Objective. The physical object of the action taken, e.g., a definite tactical feature, the seizure, and/or holding of which is essential to the commander's plan.

Phase Line. A line utilized for control and coordination of military operations, usually a terrain feature extending across the zone of action.

Restrictive Fire Area. An area in which specific restrictions are imposed and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. Also called **RFA**. (JP 1-02) In Marine Corps usage, the purpose of the restrictive fire area is to regulate fires into an area according to the stated restrictions.

Restrictive Fire Line. A line established between converging friendly surface forces that prohibits fires or their effects across that line. Also called **RFL**. (JP 1-02) In Marine Corps usage, the purpose of the restrictive fire line is to prevent interference between converging friendly forces without coordination with the affected force(s).

Tactical Area of Responsibility. A defined area of land for which responsibility is specifically assigned to the commander of the area as a measure for control of assigned forces and coordination of support. Commonly referred to as **TAOR**.

Types of Offensive Operations. Movement to contact, attack, exploitation, pursuit.

Types of Defensive Operations. Mobile defense and position defense.

Zone of Action. A tactical subdivision of a larger area, the responsibility for which is assigned to a tactical unit; generally applied to offensive action. See also **sector**.

4007. Notional Offensive Operations Schematic

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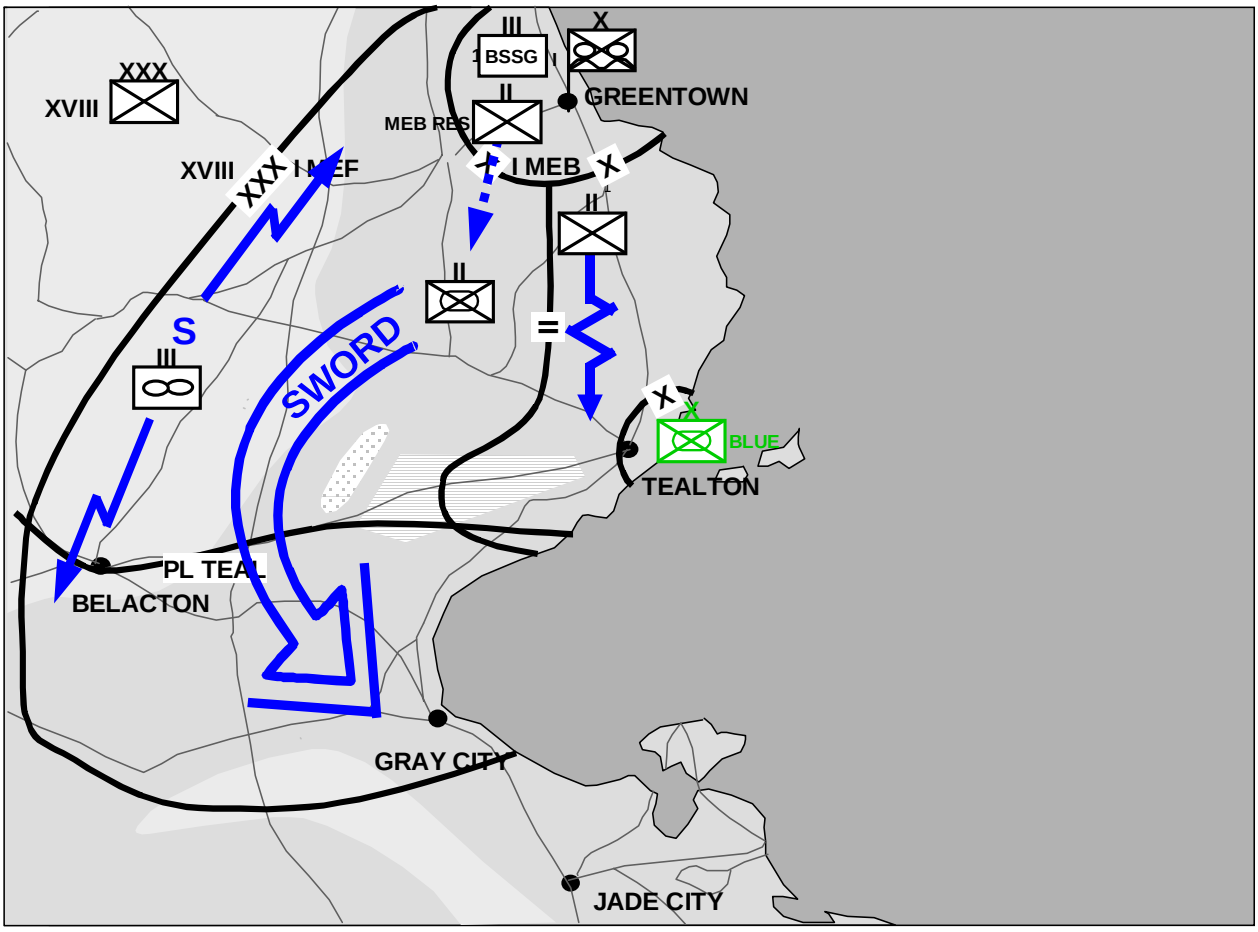

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Figure 4-5. Notional offensive operations schematic.

4008. Notional Defensive Operations Schematic

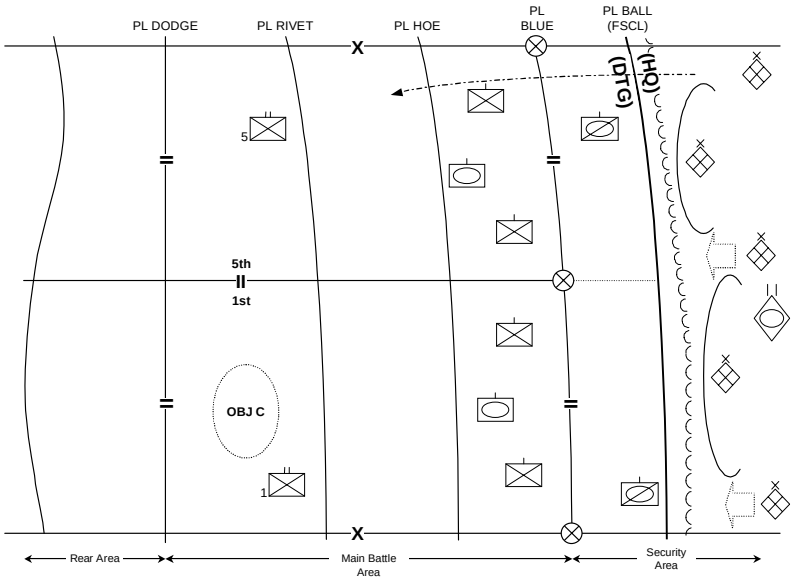

Figure 4-6. Notional defensive operations arrangement.

4009. Types of Defenses

a. Mobile Defense

A mobile defense is the defense of an area or position in which maneuver is used together with fire and terrain to seize the initiative from the enemy. The mobile defense destroys the attacking enemy through offensive action. The commander allocates the bulk of his combat power to mobile forces that strike the enemy where he is most vulnerable and when he least expects attack. Minimum force is placed forward to canalize, delay, disrupt, and deceive the enemy as to the actual location of our defenses. Retaining his mobile forces until the critical time and place are identified, the commander then focuses combat power in a single or series of violent and rapid counterattacks throughout the depth of the battlespace.

A mobile defense focuses on the destruction of the enemy by permitting him to advance into position that exposes him to counterattack by a strong, mobile reserve. It is characterized by minimal combat power forward and the bulk of combat power held in reserve for the decisive counterattack. A mobile defense requires mobility greater than that of the attacker. Marines generate the mobility advantage necessary in the mobile defense with organic mechanized and armor forces, helicopterborne forces, and Marine aviation. The commander must have sufficient depth within his area of operations to allow the enemy to move into his mobile defense. Terrain and space are traded to draw the enemy ever deeper into our defensive area, causing him to overextend his force and expose his flanks and lines of communication to attack. The success of the mobile defense often presents the opportunity to resume the offense and must be planned. Depth is required in a mobile defense in order to draw the enemy in and expose an exploitable weakness to counterattack. The following circumstances favor the conduct of a mobile defense—

- The defender possesses equal or greater mobility than the enemy.
- The frontage assigned exceeds the defender's capability to establish an effective position defense.
- The available battlespace allows the enemy to be drawn into an unfavorable position and exposed to attack.
- Time for preparing defensive positions is limited.

- Sufficient mechanized and aviation forces are available to allow rapid concentration of combat power.
- The enemy may employ weapons of mass destruction.
- The mission does not require denying the enemy specific terrain.

b. Position Defense

The position defense is a type of defense in which the bulk of the defending force is disposed in selected tactical positions where the decisive battle is to be fought. It denies the enemy critical terrain or facilities. A position defense focuses on the retention of terrain by absorbing the enemy into a series of interlocked positions from which he can be destroyed, largely by fires, together with friendly maneuver. Principal reliance is placed on the ability of the forces in the defended positions to maintain their positions and to control the terrain between them. The position defense is sometimes referred to as an area defense. This defense uses battle positions, strongpoints, obstacles, and barriers to slow, canalize, and defeat the enemy attack. The assignment of forces within these areas and positions allow for depth and mutual support of the force.

- **Battle Position**. A battle position is a defensive location oriented on the most likely enemy avenue of approach from which a unit may defend or attack. It can be used to deny or delay the enemy the use of certain terrain or an avenue of approach. The size of a battle position can vary with the size of the unit assigned. For ground combat units, battle positions are usually hastily occupied but should be continuously improved.
- **Strongpoint**. A strongpoint is a fortified defensive position designed to deny the enemy certain terrain as well as the use of an avenue of approach. It differs from a battle position in that it is designed to be occupied for an extended period of time. It is established on critical terrain and must be held for the defense to succeed. A strongpoint is organized for all-around defense and should have sufficient supplies and ammunition to continue to fight even if surrounded or cut off from resupply. The commander positions the bulk of his combat power in static defensive positions and small mobile reserves. He depends on his static forces to defend their positions. His reserves are used to blunt and contain penetrations, to counterattack, and to exploit opportunities presented by the enemy. The commander also employs security forces in the position defense. The commander conducts a position defense when—

  - The force must defend specific terrain that is militarily and politically essential.
  - The defender possesses less mobility than the enemy.
  - Maneuver space is limited or the terrain restricts the movement of the defending force.
  - The terrain enables mutual support to the defending force.
  - The depth of the battlespace is limited.
  - The terrain restricts the movement of the defender.
  - There is sufficient time to prepare positions.
  - The employment of weapons of mass destruction by the enemy is unlikely.

4010. Historical Planning Ratios for Array of Friendly Units

Friendly Mission	Ratio - Friendly to Enemy	Notes
Delay	1 to 16	
Defend	1 to 3	Prepared or Fortified
Defend	1 to 2.5	Hasty
Attack	3 to 1	Prepared or Fortified
Attack	2.5 to 1	Hasty Position
Counterattack	1 to 16	Flank

Table 4-6. Planning ratios for array of friendly units.

4011. Mine Countermeasures Terminology and Responsibilities

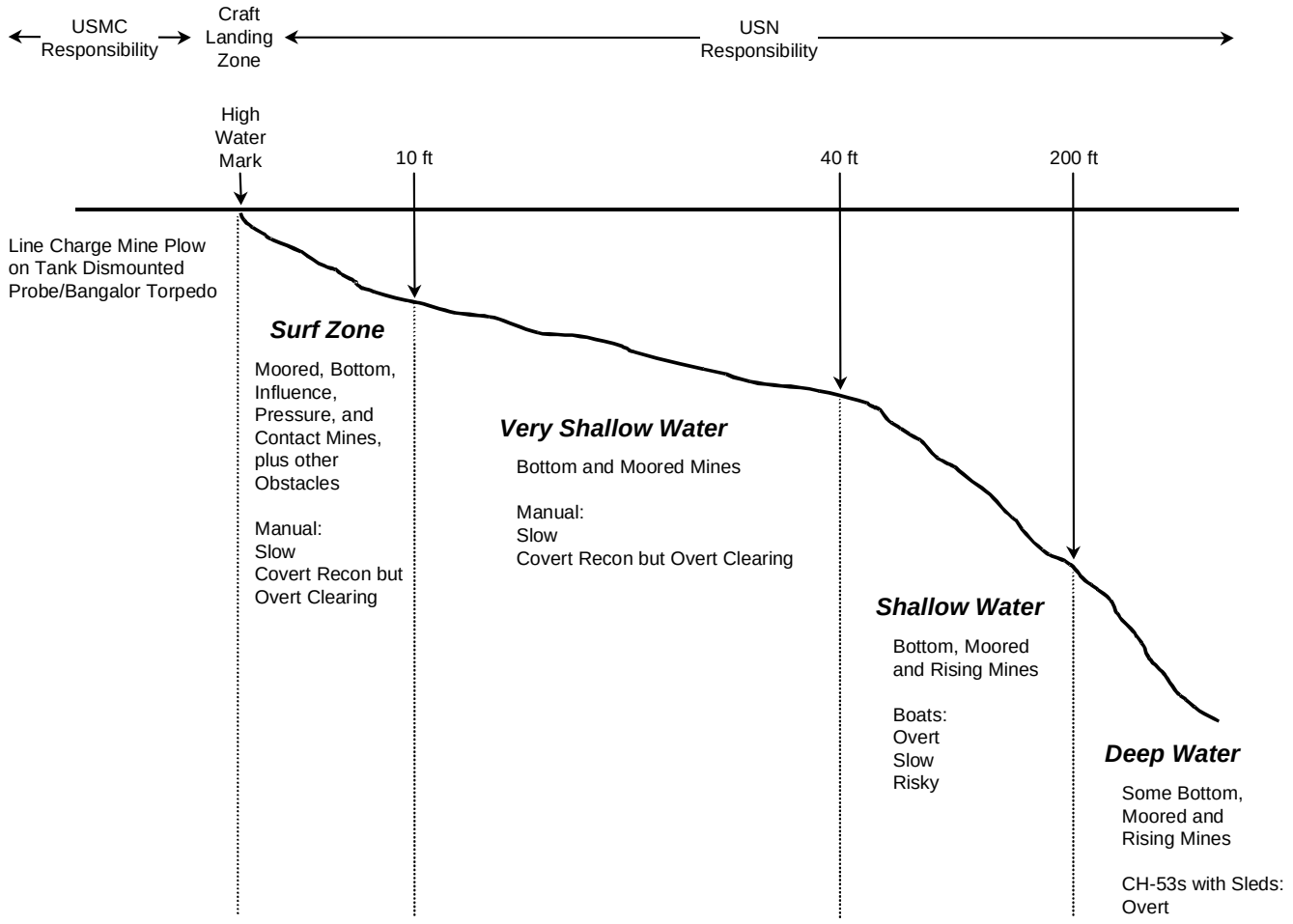

Figure 4-7. Mine countermeasures responsibilities.

4012. Weather Conditions – Sea States

Number	Description	Definition	Winds (kts)	Average Wave Height (ft)	Sea State Equivalent
1	Light Airs	Ripples with appearance of scales	1-3	0.05	0
2	Light Breeze	Small wavelets, glassy appearance	4-6	0.18	0-1
3	Gentle Breeze	Large wavelets, crests begin to break	7-10	0.6-0.88	1-2
4	Moderate Breeze	Small waves becoming large waves, white caps appear	11-16	1.4-2.9	2-3
5	Fresh Breeze	Many white caps, chance of sea spray	17-21	3.8-5.0	3-4
6	Strong Breeze	Large waves begin to form foam crests, extensive spray	22-27	6.4-9.6	4-5
7	Moderate Gale	Sea heaps up, white foam blows in streaks, spindrift is seen	28-33	11-16	5-6
8	Fresh Gale	Moderately high waves of greater length, foam is blown, spray affects visibility	34-40	19-28	6-7
9	Strong Gale	High waves, dense foam streaks, sea begins to roll	41-47	31-40	7-8

Table 4-7. Sea states – Beaufort Scale.

4013. Opposed Rates of Advance Tables

a. Division Opposed Rates of Advance

Degree of Resistance	Prepared Defense (2)						Hasty Defense (3)					
Attacker to Defender Ratio	Go Terrain		Slow-Go Terrain		No-Go Terrain		Go Terrain		Slow-Go Terrain		No-Go Terrain	
	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf
Intense Resistance 1:1	2	2	1	1	0.6	0.6	4	4	2	2	1.21	1.2
Very Heavy 2:1 (-)	5 to 6	4	2 to 3	2	1.5 to 1.8	1.2	10 to 12	8	5 to 6	4	3 to 3.6	2.4
Heavy 3:1	7 to 8	5	3 to 4	2.5	2.1 to 2.3	1.5	13 to 17	10	8	5	3.9 to 4.8	3
Medium 4:1	8 to 10	6	4 to 5	3	2.4 to 3	1.8	16 to 20	12	10	6	4.8 to 6	3.6
Light 5:1	16 to 20	10	8 to 10	5	4.8 to 6	3	30 to 40	18	20	9	9 to 12	5.4
Negligible 6:1	24 to 30	12	12 to 15	6	7.2 to 9	3.6	48 to 60	24	30	12	14.4 to 18	7.2

Table 4-8. Division opposed rates of advance (km/day).

Notes:

1. When there is surprise, multiply these figures by a surprise factor as follows:

- Complete Surprise x 5 (e.g. Germans at the Ardennes in 1944, Arabs in 1973).
- Substantial Surprise x 3 (e.g. German Invasion of Russia in 1941, Israelis' Invasion of Sinai in 1967).
- Minor Surprise x 1.3 (e.g. Allied Normandy landing in 1944, Pakistanis' attack on India in 1971).

The effects of surprise last for 3 days, being reduced by one-third on day 2 and two-thirds on day 3.

2. Prepared defense is based on defender in prepared positions (24 hours or more).
3. Hasty defense is based on 2 to 12 hours preparation time.
4. The ratios used here are to determine the degree of resistance. There is no direct relationship between advance rates and force ratios. However, sustained advances probably are not possible with a 3 to 1 ratio. Advance is possible against superior forces but cannot be sustained.
5. Rates greater than 6 to 1 will result in advances between these and the unopposed rates.

b. Brigade and Below Opposed Rates of Advance

Degree of Resistance	Prepared Defense (4)						Hasty Defense (5)					
Attacker to Defender Ratio	Go Terrain		Slow-Go Terrain		No-Go Terrain		Go Terrain		Slow-Go Terrain		No-Go Terrain	
	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf
Intense Resistance 1:1	0.6	0.5	0.5	0.3	0.15	0.1	1	0.8	0.8	0.5	0.4	0.2
Very Heavy 2:1 (-)	0.9	0.6	0.6	0.4	0.3	0.2	1.5	1	1	0.7	0.6	0.3
Heavy 3:1	1.2	0.7	0.75	0.5	0.5	0.3	2	1.2	1.3	0.9	0.8	0.5
Medium 4:1	1.4	0.8	1	0.6	0.5	0.5	2.4	1.4	1.75	1.1	0.9	0.8
Light 5:1	1.5	0.9	1.1	0.7	0.6	0.5	2.6	1.6	2	1.2	1	0.9
Negligible 6:1	1.7+	1+	1.3+	0.8+	0.6+	0.6+	3+	1.7+	2.3+	1.3+	1.1+	1

Table 4-9. Brigade and below opposed rates of advance (km/day).

Notes:

1. Units cannot sustain these rates for 24 hours.
2. The relative combat power ratio must be computed for the unit under consideration.
3. When there is surprise, multiply these figures by a surprise factor as follows:
   - Complete Surprise x 5 (e.g. Germans at the Ardennes in 1944, Arabs in 1973).
   - Substantial Surprise x 3 (e.g. German invasion of Russia in 1941, Israelis' invasion of Sinai in 1967).
   - Minor Surprise x 1.3 (e.. Allied Normandy landing in 1944, Pakistanis' attack on India in 1971).

The effects of surprise last for 3 days, being reduced by one-third on day 2 and two-thirds on day 3.

4. Prepared defense is based on defender in prepared positions (24 hours or more).
5. Hasty defense is based on 2 to 12 hours preparation time.
6. The ratios used here are to determine the degree of resistance. There is no direct relationship between advance rate and force ratios. However, sustained advances probably are not possible without a 3 to 1 ratio. Advance is possible against superior forces but cannot be sustained.
7. Rates greater than 6 to 1 will result in advances between these and the unopposed rates.

4014. Deployment Operations Team Requirements

- **Force List**
  - Assigned (MEB).
  - Apportioned (i.e., amphibious).
- **COA**
  - Means of force closure.
  - Timeline.
- **Designation of APOD/SPOD/DEST**
- **Priority of Force Closure (Capability Sets)**
- **Priority of Force Stand-Up**
- **Notional Timeline for Events and Due Dates**
  - 1 Nov DOT (0900, G-5 Conf Room)
  - 4 Nov DOT (MPF MAGTF II Data Due)
  - 9 Nov DOT (In-Progress Review)
  - 15 Nov DOT (In-Progress Review)
  - 19 Nov MCS MAGTF II (TPFDD) Data Due
  - 23 Nov JOPES Upload/MSC's Review
  - 26 Nov MEB CG Validation
  - 29 Nov Due Date to COMMARFOR

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Part V

Staff Planning Factors and Considerations

5001. Casualty Rate Estimation

The following method of casualty estimation provides only a rough figure. It is not as accurate as the official Marine Corps computer models (https://osprey.manpower.usmc.mil/web/manpower/manpower.nsf/mp/MPP-60+Main+Frames) and simulations that are available. This model uses an eight step process.

a. Step 1: Determine Combat Intensity Level

Use the METT matrix to determine the appropriate level for each of the four categories (mission, enemy, terrain, and troops).

Intensity Level	Mission	Enemy	Terrain	Troops
No Combat: Available forces are not committed. **(Index = 0)**	The MAGTF/Force level objective is clearly attainable. **(Score = 0)**	Enemy forces, regardless of size are not involved in combat operations. **(Score = 0)**	Terrain aspects of combat operations are not considered a factor. **(Score = 0)**	Friendly forces, regardless of size or composition, are not engaged in combat operations. **(Score = 0)**
Light Combat: Sporadic combat involving less than 30% of all forces' maneuver elements and less than 50% of all fire support means. **(Index = 1-36)**	Minimum risk involved in attaining the MAGTF objective. **(Score = 10)**	Overall enemy forces are inferior to friendly forces in strength, supporting arms, and tactical disposition with respect to the MAGTF objective. **(Score = 9)**	Weather severe and restricts operations. Visibility very poor. Minimum number of manmade/natural obstacles. Soil stability and trafficability facilitate maneuver. Topology dense and compartmented, offering cover and concealment for friendly forces. **(Score = 3)**	Less than 33% of friendly maneuver forces are involved in combat and less than 50% of the supporting arms are engaged. Friendly forces are significantly superior to enemy forces with regard to strong supporting arms and tactical disposition. **(Score = 8)**
Moderate Combat: Continuous combat during which employment of higher echelon resources to ensure accomplishment of the force mission is not required. 30-60% of all force maneuver echelons and over 50% of all fire support means are engaged. **(Index = 37-53)**	Moderate degree of risk in attaining the MAGTF objective. **(Score = 15)**	Enemy forces are inferior to friendly forces in strength, supporting arms, and tactical disposition with respect to the MAGTF objective, but are capable of delaying the MAGTF's accomplishment of the mission. **(Score = 14)**	Weather is marginally clear. Visibility allows limited view of forces. Limited number of manmade/natural obstacles. Soil stability and trafficability allow maneuver. Topology is rolling and partly wooded. **(Score = 4)**	About 33-50% of friendly maneuver forces are involved in combat and 50% of the supporting arms are engaged. Friendly forces are clearly superior to enemy forces at the objective area with regard to strength, supporting arms, and tactical disposition. **(Score = 12)**
Heavy Combat: All-out combat demanding total strength application such that possible employment of next higher echelon resources may be necessary to ensure accomplishment of the force mission. All fire support means and more than 60% of all force maneuver echelons are engaged. **(Index = 54-80)**	Attainment of the MAGTF objective is a high risk. **(Score = 21)**	Overall enemy forces are sufficient in strength, supporting arms, and tactical disposition to create a highly significant risk of not attaining at least one MAGTF preliminary objective. **(Score = 19)**	Weather is mostly clear. Visibility allows for almost unlimited view of forces. Terrain aspects of the objective area facilitate significant combat operations between enemy and friendly forces. Significant manmade/natural obstacles channel forces and concentrate supporting fires. Soil stability and trafficability limit maneuver. Topology is flat and open. **(Score = 5)**	Majority of the friendly maneuver forces are involved in combat and all supporting arms are engaged. Commitment of the reserve is imminent. Friendly forces are superior to enemy forces within the objective area with respect to strength, supporting arms, and tactical disposition. **(Score = 26)**
Intense Combat: Heavy, highly exposed forces to ensure accomplishment of the force mission. All fire support means and all force maneuver echelons are potentially engaged. **(Index = 81-100)**	A severe risk of not attaining the MAGTF objective. **(Score = 34)**	Enemy forces are equal to or superior to friendly forces in strength, supporting arms, and tactical disposition with respect to the MAGTF objective area. **(Score = 31)**	Weather is clear. Visibility is unlimited. Terrain aspects of the objective area facilitate maximum combat operations between friendly and enemy forces. Significant manmade/natural obstacles to channel forces and concentrate supporting fires. Soil stability and trafficability limit maneuver. Topology is flat and open. **(Score = 9)**	All friendly maneuver forces are involved in combat, reserve forces are committed. All supporting arms are engaged, commitment of the reserve of the next higher level of command is imminent. Friendly forces are equal to or inferior to enemy forces at the objective area with regard to strength, supporting arms, or tactical disposition. **(Score = 26)**

Table 5-1. METT matrix.

Next, locate the “score” within each selected box and record it on the worksheet. After recording all four scores, total them up and compare the total score to the “Intensity” column of the METT Matrix. Find the range of numbers that has the total score within and record the corresponding intensity level on the worksheet.

Mission Score	_____
Enemy Score	_____
Terrain Score	_____
Troops Score	_____
Total Score	_____
Intensity Level	_____

Table 5-2. Determine combat intensity level.

b. Step 2: Estimate Casualty Range for Ground Forces

After the combat intensity level has been determined in Step 1, locate the intensity level on the chart in Step 2 and record the corresponding casualties/thousands/day number into the worksheet.

Intensity	Low	Average/Mid	High
Light	1.03	1.98	2.93
Moderate	2.94	4.4	5.86
Heavy	5.87	8.37	10.86
Intense	10.87	14.05	17.22

Low	_____
Average/Mid	_____
High	_____

Table 5-3. Estimate casualty range for ground forces (thousands per day).

c. Step 3: Estimate Aviation Combat Casualties

Select the aviation combat intensity level per the following categories:

- **Intense**. All threat anti-aircraft systems are capable of engaging MAGTF aircraft at maximum rates of fire.
- **Heavy**. All threat anti-aircraft systems are capable of engaging MAGTF aircraft at sustained rates of fire (fewer MAGTF aircraft are exposed).
- **Moderate**. A moderate number of threat anti-aircraft systems are anticipated vs. MAGTF aircraft.
- **Light**. A minimum number of anti-aircraft systems are anticipated.

After choosing the aviation combat intensity level, select the appropriate column in the worksheet and record the figure. Transfer these figures to the "B" column of the second worksheet. The aviation planners should provide the estimated number of sorties per day which the MAGTF will fly in each mission category. Insert this information into the "C" column of the second worksheet. Multiply columns "B" and "C" and enter the product into column "D" to get aviation casualties in each mission category. Sum the figures in column "D" to get total aviation casualties.

	Combat Intensity Level			
Mission Category	**Intense**	**Heavy**	**Moderate**	**Light**
Close Air Support	0.04	0.03	0.02	0.01
Deep Air Support	0.18	0.12	0.07	0.02
Troop Transport	0.4	0.28	0.17	0.06
Resupply	0.12	0.08	0.05	0.02

Close Air Support	_____
Deep Air Support	_____
Troop Transport	_____
Resupply	_____

Table 5-4. Estimate aviation combat casualties per sortie.

A Mission Category	B Casualty Rate		C Sorties per Day		D Totals
Close Air Support	_____	X	_____	=	_____
Deep Air Support	_____	X	_____	=	_____
Troop Transport	_____	X	_____	=	_____
Resupply	_____	X	_____	=	_____
			Total Aviation Casualties	=	_____

Table 5-5. Estimate total aviation combat casualties.

d. Step 4: Estimate Casualties in Combat Service Support Forces

Casualties in the CSS are usually significantly lighter than those of the ground element. To account for them accurately, they must be separated from the ground combat elements and assigned a different casualty rate. Assess the risk to the CSS as either high, medium, or low. Transcribe the ground combat casualty rates from Step 2 onto the lines provided in line (a) of the Step 4 worksheet. Circle the assessed risk to the CSS on line (b). Select the corresponding formula and enter the corresponding ground casualty rate from line (a). Use the formula to determine the CSS (non-maneuver) casualty rate and the ground combat element casualty rate.

a.	_____ Low (a)	_____ Middle (b)		_____ High (c)
	(Copy the ground casualty rates from Step 2)			
b.	Assessed Overall CSS Risk:	Low	Middle (circle one)	High
Low:	0.015 X _____ =		_____ Non-maneuver casualties (per thousands per day)	
	0.985 X _____ =		_____ GCE Casualties (per thousands per day)	
Middle:	0.047 X _____ =		_____ Non-maneuver casualties (per thousands per day)	
	0.953 X _____ =		_____ GCE Casualties (per thousands per day)	
High:	0.047 X _____ =		_____ Non-maneuver casualties (per thousands per day)	
	0.953 X _____ =		_____ GCE Casualties (per thousands per day)	
Note: Use only one of the three formulas				

Table 5-6. Estimate casualties in combat service support forces.

e. Step 5: Determine Total Battle Casualties

Total battle casualties can now be calculated. First, transcribe the number for GCE and non-maneuver casualties from Step 4, and place them on the appropriate lines, (a) and (b), of the Step 5 worksheet. From the G-1, obtain the total strength of the MAGTF. Indicate this number in thousands. To calculate the total battle casualties per day, multiply (a) by (c), then (b) by (c), and add the results. This provides the ground and non-maneuver elements, then move the results obtained in Step 3 (total aviation casualties) to line (2), and add lines (1) and (2), entering the total on line (3). This is the total MAGTF casualties per day for the MAGTF.

a. Number of ground casualties (from Step 4) (per thousand per day)			_____ (a)
b. Number of non-maneuver casualties (from Step 4) (per thousand per day)			_____ (b)
c. The estimated MAGTF troop strength (per thousands per day)			_____ (c)
d. Total battle casualties per day:			
(1)	_____ [(a) x (c)] + _____ [(b) x (c)]	=	_____ (Ground + non-maneuver casualties)
(2)	Aviation casualties (from Step 3)	=	_____ (Aviation casualties)
(3)	Total battle casualties: [(1) + (2)] (per thousand per day)	=	_____ (TOTAL)

Table 5-7. Determine total battle casualties for the MAGTF.

f. Step 6: Allocation of Type of Casualty

Once the total number of casualties has been determined, they have to be distributed by type (killed in action (KIA), wounded in action (WIA), or died of wounds (DOW)). Part of the determination is speed of evacuation. In most cases the medical evacuation policy is "rapid." However, circumstances may require a delay in transporting casualties rearward. The longer the evacuation, the greater the increase in KIAs and DOWs. Once evacuation policy is determined, transfer the rates in the Step 6 Allocation of Type of Casualty table to the lines provided in the Step 6 worksheet. Copy the total battle casualty figure from Step 5 and apply it to each of the rates for KIA, WIA, and DOW (Note: The total of KIA, WIA, and DOW should equal the number from Step 5).

Type of Casualty	Rapid	After 6 Hours	After 24 Hours
KIA	0.195	0.26	0.32
WIA	0.789	0.7	0.6
DOW	0.016	0.04	0.08

Table 5-8. Anticipated casualty evacuation.

a. Casualty evacuation is anticipated to be:		Rapid	6 + Hours (circle one)	24 + Hours
b. Rates from Step 6 Table based on casualty evacuation plan:				
		_____ KIA	_____ WIA	_____ DOW
c. Allocation of casualties by type:				
KIA	_____ (total from step 5)	x _____ (KIA Rates)	=	_____ (KIA)
WIA	_____ (total from step 5)	x _____ (WIA Rates)	=	_____ (WIA)
DOW	_____ (total from step 5)	x _____ (DOW Rates)	=	_____ (DOW)
		Total Casualties	=	_____

Table 5-9. Allocation of type of casualty.

g. Step 7: Disease, Non-Battle Injury, Battle Fatigue, Missing in Action, Captured, and Administrative Losses

To calculate the disease, non-battle injury (NBI), battle fatigue (BF), missing in action (MIA), captured (CAP), and administrative loss (AL), use the total MAGTF strength in thousands (from Step 5c). Use the intensity level from Step 1. Multiply the numbers out to give the DNBI, BNI, BF, MIA, CAP, and AL casualties. The top two charts contain approved rates.

East Asia					
	Combat Intensity Level				
	None	Light	Moderate	Heavy	Intense
Disease	0.98	0.98	0.98	1.21	1.29
Non-Battle Injury	0.2	0.23	0.26	0.37	0.44
Battle Fatigue	0	0.13	0.29	0.63	0.9
Missing in Action	0.005	0.02	0.03	0.06	0.09
Captured	0.005	0.02	0.04	0.06	0.09
Admin Losses	0	0	0	0	0

Southwest Asia					
	Combat Intensity Level				
	None	Light	Moderate	Heavy	Intense
Disease	0.98	0.98	0.98	1.21	1.29
Non-Battle Injury	0.26	0.29	0.31	0.44	0.54
Battle Fatigue	0	0.24	0.53	1.09	1.57
Missing in Action	0.005	0.02	0.03	0.06	0.09
Captured	0.005	0.02	0.04	0.06	0.09
Admin Losses	0	0	0	0	0

Note 1: In tropical climates, the disease rate is approximately 1.35 times the average for temperate climates.
Note 2: In northern climates, disease rate is twice as high in early winter as in summer.

_____ Total MAGTF Strength (in thousands)	x	_____ Disease Rate	=	_____ Disease Casualties (per thousand per day)
_____ Total MAGTF Strength (in thousands)	x	_____ Non-battle Injury Rate	=	_____ Non-Battle Injuries (per thousand per day)
_____ Total MAGTF Strength (in thousands)	x	_____ Battle Fatigue Rate	=	_____ Battle Fatigue Casualties (per thousand per day)
_____ Total MAGTF Strength (in thousands)	x	_____ Missing in Action Rate	=	_____ Missing in Action (per thousand per day)
_____ Total MAGTF Strength (in thousands)	x	_____ Captured Rate	=	_____ Captured (per thousand per day)
_____ Total MAGTF Strength (in thousands)	x	_____ Admin Loss Rate	=	_____ Admin Losses (per thousand per day)

Table 5-10. Disease, non-battle injury, battle fatigue, missing in action, captured, and administrative loss casualties.

h. Step 8: Total Personnel Casualties

Sum up all the MAGTF casualty figures as indicated in the Step 8 worksheet.

Battle Casualties:	
KIA – Killed in Action (from Step 6):	_____
WIA – Wounded in Action (from Step 6):	_____
DOW – Died of Wounds (from Step 6):	_____
Other Casualties:	
DNBI – Disease Casualties (from Step 7):	_____
NBI – Non-Battle Injuries (from Step 7):	_____
BF – Battle Fatigue (from Step 7):	_____
MIA – Missing in Action (from Step 7):	_____
CAP – Captured (from Step 7):	_____
AL – Admin Losses (from Step 7):	_____

Table 5-11. Total MAGTF personnel casualties summary.

5002. Enemy Prisoner of War Evacuation

1. COLLECTION POINTS - Area where EPWs are held temporarily while awaiting evacuation to the rear. EPWs are sometimes interrogated for intelligence information. Sick or seriously wounded EPWs can be cared for by corpsmen or transferred to the closest medical facility. From collection points, EPWs are transported to various transfer points and from there to an MP-operated MAGTF holding facility.

- **Company-level Collection Point** - Tactical troops guard EPWs.
- **Battalion-level Collection Point** -
  - Collection points are usually established at the battalion level.
  - Established at a central location designated by the GCE commander.
  - Usually operated by MPs.

2. HOLDING AREAS - Holding areas can accommodate more captives and maintain captives longer than can collection points. Like collection points, holding points are temporary and must be able to move with little or no notice. Holding areas usually are located near a base or base cluster. An MP platoon or company usually operates a MAGTF holding area.

- A platoon can guard up to 500 captives.
- A company can guard up to 2,000 captives.

NOTE: In most cases, EPWs captured by Marines will be transferred to the U.S. Army for processing and internment. In the event the U.S. Army is not involved in the operation, the Marines will have to process the EPWs and guard them until they either are authorized to release the EPWs, or higher military authority makes arrangements to take charge of the EPWs.

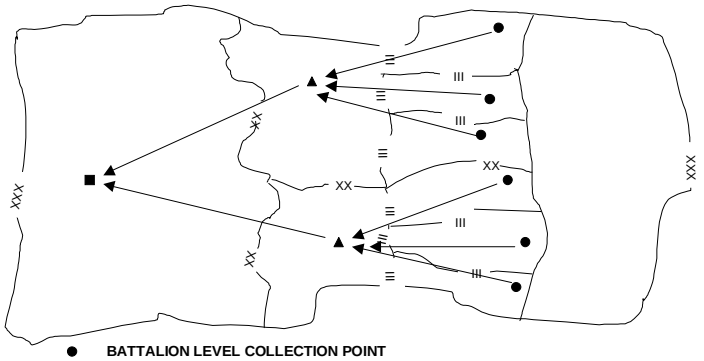


Figure 5-1. Enemy prisoner of war evacuation diagram.

5003. Medical Regulating Concept

a. Initial Concept

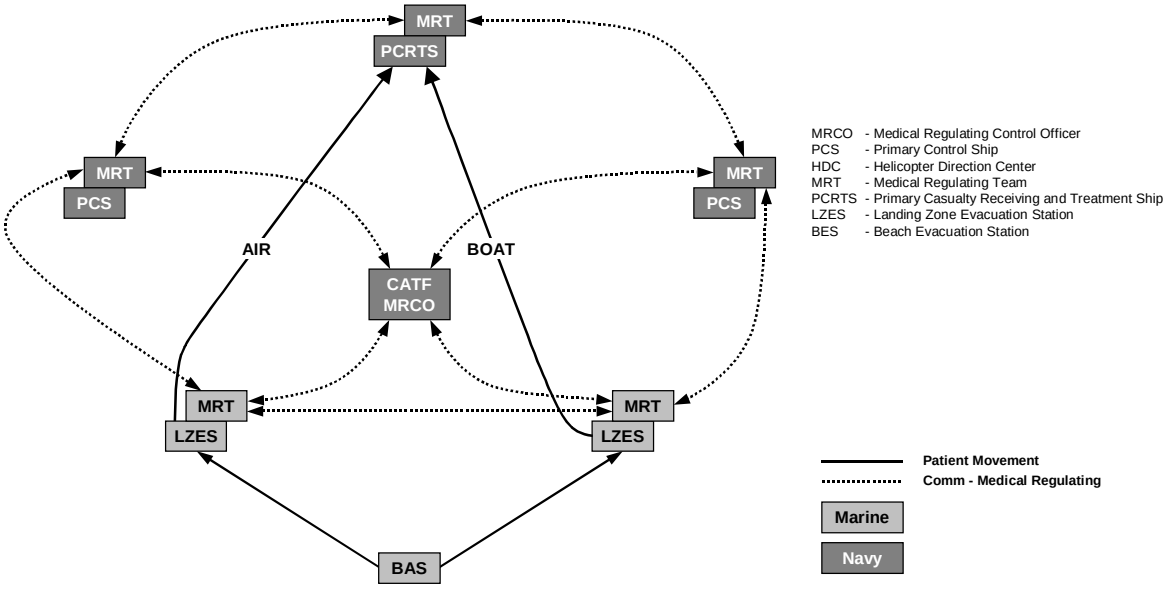


Figure 5-2. Initial medical regulating concept.

b. Mature Concept

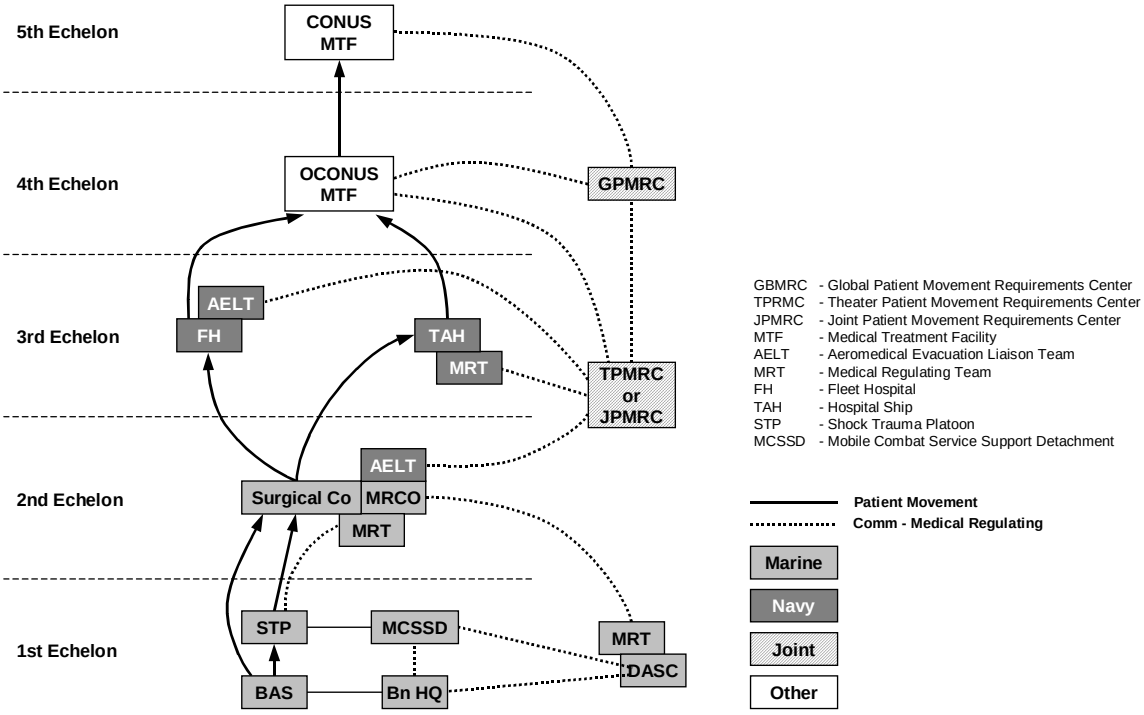


Figure 5-3. Mature medical regulating concept.

5004. Return to Duty Estimate Considerations

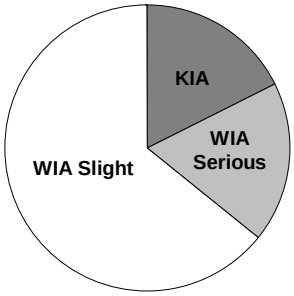


Chart shows breakdown of results of hits by enemy fire. Roughly 10% of the wounded can be returned to duty from 1st and 2nd echelon facilities.

When figuring in DNBI the RTD rate increases significantly. Will normally average around 40% from 1st and 2nd echelon facilities.

Longer evacuation policy will increase the number RTD but will require greater logistic support. Shorter evac policy will reduce RTD, require less logistics, but place more demand on evacuation assets.

Figure 5-4. Return to duty estimate considerations.

5005. Human Waste and Solid Waste Planning Factors

Port-a-John Planning Factor	6 Port-a-johns are required for each 150 persons and one additional for each 40 extra
Solid Waste Production (Trash) Planning Factor	On average, each person will produce 5.3 lbs of solid waste per day.

Table 5-12. Human and solid waste planning factors.

5006. Intelligence Considerations

a. Ground Reconnaissance

Using reconnaissance pull, reconnaissance elements are centrally controlled, identifying the surfaces and gaps in overall enemy dispositions. Early commitment of reconnaissance elements is required to fully develop the reconnaissance picture, and ensure a smooth flow of information. Pull operations are high tempo and a reserve must be maintained to support emerging reconnaissance requirements. Reconnaissance pull is easiest to execute early in an operation. It is difficult to support over a lengthy period of high-tempo operations.

Operations based on reconnaissance push use reconnaissance elements more conservatively. They are often used as a tactical resource, and generally with a shorter timeline. Reconnaissance forces tend to be used in direct support of tactical operations already planned. In sustained operations ashore, however, there is a natural tendency to use reconnaissance assets in this manner because timelines grow short and it becomes difficult to maintain the reserve necessary to support reconnaissance pull.

Reconnaissance assets are best employed in general support. The supported unit commander and his staff are usually best able to determine the best use of reconnaissance assets, provide the necessary support, and integrate reconnaissance information with other intelligence sources. Although placing reconnaissance assets in direct support of subordinate element or even attaching them to specific units is occasionally appropriate, in general such support relationships are inefficient.

Security and support considerations play a major role in deciding how to use reconnaissance elements. There is the danger that compromise of reconnaissance forces may lead to loss of surprise. During planning and rehearsal reconnaissance units must be able to isolate themselves from observation by both friendly and threat personnel to prevent any compromise of information, tactics and equipment. Teams themselves are lightly armed and have limited

self-defense capabilities. Unless assigned a direct action mission, they fight only to break contact. The supporting unit must assist any emergency extraction.

Reconnaissance assets are best employed early to support situation development and friendly course of action development and selection. When reconnaissance is initiated early in the planning cycle, planning and execution can be driven by the flow of solid, timely information and intelligence. If reconnaissance is delayed, situation development will generally be more uncertain and planning and execution will either take place in an information vacuum or be driven by the search for such information.

Sufficient time must be allotted for the detailed planning, preparation, and execution of reconnaissance operations. They are usually conducted over long distances and well in advance of the operations they will support. Insertion, mission execution, extraction means, and debriefing of reconnaissance elements are normally time consuming and often involve unavoidable delays—particularly if the operation is to remain undetected and uncompromised.

Robust and redundant intelligence reporting links and procedures should be established to facilitate the rapid flow of information between the reconnaissance forces and the supported commanders. The best solution is usually some form of broadcast reporting of information via direct links between ground reconnaissance units and the overall supported commander and other subordinate units that are in immediate need of the information or intelligence.

Unit	Mission	Insertion Method	Remarks
Force Reconnaissance Company	Conduct amphibious reconnaissance, surveillance, and limited-scale raids in support of the MAGTF, or JTFs as directed.	• Foot movement • Surface or subsurface swimming • Motor vehicles • Rotary- or fixed-wing aircraft • Static line or military free-fall parachuting • Helicopter rope suspension • Small boats/submarines • Landing craft • Commercial assets	All teams are capable of closed-circuit underwater breathing apparatus, open-circuit SCUBA, and submarine lock-out.
Radio Reconnaissance Platoon	Conduct signals intelligence (SIGINT)/electronic attack (EA) operations in support of the MAGTF for advance force, pre-assault, deep post-assault, and maritime special purpose force (MSPF) operations as assigned.	• Foot movement • Motor vehicles • Rotary- or fixed-wing aircraft • Static line parachuting • Helicopter rope suspension • Landing craft • Small boats • Commercial assets	The basic operating unit is the six-man radio reconnaissance team (RRT). Tasks include conduct of clandestine deep electronic reconnaissance operations, including communications intercept, radio direction finding, recording, analysis, and forwarding/reporting of enemy activity and other information of military significance.
Ground Sensor Platoon (GSP)	Plan, control, and manage the employment of unattended ground remote sensor equipment in support of the MAGTF.	• Hand emplaced • Dropped by rotary- or fixed wing aircraft	GSP consists of a headquarters section and three sensor employment sections (SES). Each SES consists of a section headquarters and two four-Marine sensor employment teams (SET). Sensors are seismic, magnetic, or infrared. Range is limited to line-of-site to radio relay to monitoring site.
Reconnaissance Battalion	Conductmphibious and ground reconnaissance operations in support of the ground combat element.	• Foot movement • Surface or subsurface swimming • Motor vehicles • Rotary- or fixed-wing aircraft • Helicopter rope suspension • Small boats/submarines • Landing craft • Commercial assets	The battalion consists of three reconnaissance companies. Each company consists of three platoons and each platoon contains three 6-Marines teams each, for a total of nine teams per company, or 27 teams from the entire battalion. All company's teams capable of diving with open-circuit SCUBA and closed circuit underwater breathing apparatus systems.
Light Armored Reconnaissance Battalion	Conduct reconnaissance, security, and economy of force operations and, within capabilities, conduct limited offensive or delaying operations that exploit the unit's mobility and firepower.	• LAV-25	The LAR battalion consists of an H&S company and four LAR companies. All variants of the LAV are transportable by helicopter, amphibious means, and tactical and strategic air transportation.
Scout/Sniper Platoon, Infantry Battalion	Find the enemy, gain and maintain contact; and report his location and activities; and, if the enemy achieves separation, reacquire his location and report on all activities of the enemy in proximity to the infantry battalion in accordance with commander's information requirements.	• Foot movement • Motor vehicles	Located within the S-2 section of the H&S company of the infantry battalion. It consists of four scout/sniper teams, each capable of performing all functions of the scout/sniper platoon. The ability of scout-snipers to penetrate into hostile areas to observe the enemy without being detected makes them uniquely suited to perform a wide variety of missions and essential tasks.
SEAL Teams	Conduct direct action, unconventional warfare, foreign internal defense, special reconnaissance, and counterterrorism operations, primarily in maritime and riverine environments.	• Surface or subsurface swimming • Rotary- or fixed-wing aircraft • Static line or military free-fall parachuting • Helicopter rope suspension • Small boats/submarines/SEAL delivery vehicle/Advanced SEAL Delivery System • Landing craft • Commercial assets	SEAL operations include sabotage, demolition, multisensor intelligence collection, hydrographic reconnaissance, and training and advising friendly military and paramilitary forces in the conduct of naval and joint special operations. Further, SEAL teams may be employed in direct support of conventional naval and maritime operations.

Table 5-13. Ground reconnaissance considerations.

b. Signals Intelligence

SIGINT operations are ineffective against systems that do not use radio frequency (RF) transmissions (e.g., fiber optics, land-line telephone systems, or other cabled systems). If the enemy conducts operations under enemy emission control (EMCON) conditions (e.g., radio silence), SIGINT operations will not be effective.

The standoff range for SIGINT operations is directly dependent on the characteristics of the terrain and the type, operating characteristics, and methods of employment of the enemy's electromagnetic systems. Some enemy electromagnetic systems require that SIGINT operations be close to the transmission origin, path, or medium. Other electromagnetic systems may be exploitable from farther away. Heavily wooded, mountainous or hilly terrain, and urban areas reduce the susceptibility of enemy transmissions to SIGINT collection. In these areas, generally, SIGINT elements must be closer to the enemy's transmission origin or medium.

Enemy signals that are complex or encrypted reduce the intelligence information available from the transmission. Complex signals (i.e., frequency hoppers) require special equipment for intercept and signals analysis. Encrypted signals require deciphering to reveal intelligence information. Deciphering simple encryption methods may be possible, but an enemy's use of complex encryption methods is currently beyond the scope of tactical SIGINT elements. SIGINT operations may be affected when enemy signals are being jammed. Before beginning jamming operations, consideration must be given to the intelligence value of the enemy's signal and the effects of its loss.

Many of the frequency ranges and power levels in use by military and paramilitary forces require line-of-sight (LOS) from transmitter to receiver. Generally, the higher the frequency used, the greater the LOS influence and the more critical the accurate placement of SIGINT collection and DF equipment. Lower frequencies (below 30 MHz) generally do not require LOS paths. Consequently, the placement of SIGINT collection and DF sites to exploit these frequencies may be located at greater distances from the target transmitters.

The power output of a transmitter is an important factor in receiving the signal. To intercept some low-powered signals, SIGINT collection and DF assets must be located closer to the adversary's transmitter, often requiring SIGINT collection and DF teams to either collocate with or closely follow forward MAGTF combat units. If the enemy uses highly directional antennas the SIGINT collection and DF site must be placed within the adversary's antenna radiating pattern.

Designator	Description	Frequency Coverage	Modulation
AN/MLQ-36 MEWSS	COMINT collect/process/analysis; EA	20-80 MHz (collection and DF, expandable to 500 MHz)	AM, FM, ICW, SSB, FSK
AN/MLQ-36A MEWSS-PIP	COMINT/ELINT collect/process/geolocation; EA	0.5 MHz - 40 GHz	Conventional, low probability of intercept
AN/PRD-12	Direction finder set, man packable	.5 - 500 MHz	AM, FM, ICW, SSB, FSK
AN/ULQ-19(V)	Electronic attack set; EA	20 - 79.975 MHz	FM
AR-2002	Commercial VHF/UHF frequency scanner; COMINT	25 - 550 MHz, 800 - 1300 MHz AM	AM, FM
AR-2500	Commercial HF/VHF/ UHF frequency scanner; COMINT	1 - 1500 MHz	AM, FM, CW, SSB
AR-3000	Commercial HF/VHF/ UHF frequency scanner; COMINT	0.1 - 2036 MHz	AM, FM, CW, SSB
EB-100	Receiver, miniport VHF/UHF; DF	20 - 1000 MHz intercept and DF	AM, FM
HEXJAMS	Hand-emplaced, expendable jammers; barrage jam	20 - 80 MHz	NA
HIDRAH	COMINT collection, DF	.1 - 1900 MHz intercept; 25 - 1000 MHz DF	AM, FM, USB, LSB, CW
IC-R71A	General coverage HF receiver; COMINT	0.1 - 30 MHz	AM, FM, CW
IC-R7000	General coverage VHF/UHF receiver; COMINT	25 - 1300 MHz	AM, FM, SSB
IC-R9000	General coverage HF/VHF/UHF receiver; COMINT	0.1 - 1999.80 MHz	AM, FM, CW, SSB
ICF-PR080	Comm HF/VHF handheld frequency scanner; COMINT	.15 - 108 MHz & 115.15 - 223 MHz	AM, FM, SSB
MPR-88	Receiver, miniport VHF/UHF, ruggedized; COMINT	20 - 1000 MHz intercept	AM, FM
R-2174(P)/URR	Radio receiver, general purpose, HF; COMINT	0.5 - 29.999 MHz	AM, FM, CW, SSB
RREP SS-1	COMINT collection, DF	1 - 2000 MHz intercept; 25 - 1000 MHz DF	AM, FM, USB, LSB, CW
RREP SS-2	COMINT collection, DF	.1 - 1900 MHz intercept; 25 - 1000 MHz DF	AM, FM, USB, LSB, CW
WJ-8616	Radio receiver, general purpose, HF; COMINT	0.5 - 29.999 MHz	AM, FM, CW, SSB
WJ-8618	Radio receiver, general purpose, VHF/UHF; COMINT	20 - 500 MHz	AM, FM, CW, pulse
WJ-8654	Radio receiver, general purpose, COMINT	.5 MHz - 1.0 GHz	AM, FM, CW, pulse

Table 5-14. Ground SIGINT equipment.

c. Air Reconnaissance

Although many of today's air reconnaissance aircraft have a self-defense capability, providing an escort allows more time for aircrews to concentrate on air reconnaissance while the escort aircraft focus on the enemy threats. When air reconnaissance aircraft provide their own self-defense, they may be less effective due to time taken away from the primary mission, and have higher fuel consumption rates, decreased maneuverability, and reduced air-to-air ordnance loads when carrying air reconnaissance sensors and air-to-ground ordnance.

Weather at the target area makes identification difficult and may change the positioning, altitude, and slant angles of air reconnaissance profiles to accomplish the mission. Low ceilings and poor visibility decrease air reconnaissance effectiveness and will possibly abort the entire mission. Battlefield obscurations (smoke, fire, debris) pose the same limitations as bad weather.

The aircrew proficiency should have a thorough knowledge and understanding of an enemy's ground tactical formations and make up. Visual search techniques, visual cues, and experience are all factors in determining the accuracy and completeness of air reconnaissance information. Quantity of information does not always compensate for quality of information.

Combat radius and loiter time will affect the ability of some aircraft to collect any near real time information. Aircraft time on station/combat radius is dependent on target distant factors and tanker availability. Aerial refueling reduces this limitation, but requires additional planning and coordination.

Real time information is crucial to maintaining good situational awareness. Communication plans should either provide for secure voice transmissions or provide codewords to pass information in the clear. Inflight digital transmissions dramatically increase the timeliness and value of collected information.

If the enemy is skillful in the art of camouflage, concealment, and deception, the aircrew should be extremely cautious of overly obvious sightings. This lack of camouflage may be a deception technique used to lure reconnaissance aircraft into AAA or SAM engagement zones. The enemy may also destroy or provide false targets to deceive accurate battle damage assessment.

Area/Panoramic coverage is used when an area cannot be covered at the desired scale using a single vertical strip. Area coverage employs a system of parallel strips that are merged together once developed. It is performed by one or more aircraft using the same or different sensors and can be performed at the same or different times. These images do not have a constant scale, so it is very difficult to take measurements; however, the center of the image provides a more accurate measurement than its perimeter. Area/panoramic imagery is extremely useful in search operations (scanning from horizon-to-horizon for new targets). If scale requirements are not critical, area/panoramic coverage vice multi-strip coverage is the preferred method of imaging large area targets.

Oblique sensor coverage tilts the axis of the sensor away from the vertical to obtain oblique sensor coverage. It can reveal objects that are camouflaged from overhead detection and does not require the aircraft to fly directly overhead the target. This reduces the possibility of aircraft loss due to enemy air defenses. Angular distortions can make precise measurements difficult. Oblique imagery can be taken at high or low oblique angles.

Sensor Type	Aircraft	Sensor	Capabilities
Infrared	F/A-18	ATARS Infrared Line Scanner (IRLS)	IRLS provides a high-resolution picture-like thermograph by showing the differences in radiating thermal energy.
		Targeting/Navigation FLIRs	Targeting FLIR has one and three-and-one-half X magnification and is slewable by the aircrew. The navigation FLIR is projected at a 1:1 ratio onto either the HUD or a cockpit display and is boresighted to the longitudinal axis of the aircraft.
		Advanced Targeting Forward Looking Infrared (ATFLIR)	ATFLIR will replace the targeting and navigation FLIRs and the laser designator tracker (LDT). ATFLIR's magnification is 30X. The ATFLIR will provide autonomous precision targeting coordinates to "smart" weapons, such as joint standoff weapons (JSOW) and joint direct attack munitions (JDAM). As with the older FLIR on F/A-18's, the ATFLIR will not be integrated to the ATARS architecture, but will have reconnaissance applications; its tapes will with their improved resolution and reliability be used to assist imagery analysts.
	Pioneer	MKD-400	FLIR sensor payload for the UAV. It will detect targets at 8km and recognize targets at 4km.
	UH-1Y	Navigation Thermal Imaging System	1:1 to 10:1 field of view; records on VHS tape.
	AH-1Z	Night Targeting System	2 to 50X magnification; records on SVHS or VHS tape.
	CH-53	FLIR	Can be viewed by aircrews; however, is not currently capable of being recorded.
	AV-8B	Navigational FLIR	Slaved to aircraft boresight.
Synthetic Aperture Radar (SAR)	F/A-18D	APG-73	Provides imaging capability at long standoff ranges in strip imaging or spot imaging modes. Included with sensors are two digital tape recorders for storing imagery, and a reconnaissance management set for controlling the system, processing, and formatting the data for recording and on-board playback and/or transmission to a ground station. A common data link is in a separate pod for attachment to the centerline weapon station for missions where data transmission airborne is required.
	AV-8B	APG-65 Radar	Loses ARBS capability in the nose to due to the radome.
Electronic	EA-6B	ALQ-99 Tactical Jamming System	The ALQ-99 effectively incorporates receivers and external pods for signals reception and transmission of jamming signals (principally associated with threat air defense radars and associated C2.
		USQ-113 Communications Suite	The USQ-113 provides the ability to collect, record, and disrupt threat communications and can either intercept and jam targeted signals of interest or intercept and digitally record signals of interest.
	FA-18	AGM-65F "Maverick," AGM-84E "SLAM," AGM-88 HARM	F/A-18's can use these weapon systems as electronic reconnaissance sensors to detect enemy electromagnetic radiations and record identified threats via its video tape recording system and be analyzed in-flight and after landing.
Optical	AV-8B	Angle rate bombing system (ARBS).	ARBS is a day-only system, capable of six X magnification, slews 35 degrees either side of the nose and from zero to 70 degrees depression angle. Records on propriety recording system
	F/A-18	KB-35A Strike Camera	KB-35A is a 35mm-film, 50mm lens system located on the aft end of the Laser Detector pod; it can record the target from four seconds prior to ten seconds after computed bomb impact. The camera is slaved to the target and cannot record any oblique imagery.
		ATARS Low Altitude Electro-Optical (LAEO) and Medium Altitude Electro-Optical (MAEO)	ATARS is a digital imaging system consisting of two electro optical sensors. The LAEO sensor and MAEO sensors cannot be used simultaneously; however, either can be used simultaneously with the IRLS. ATARS can transmit collected imagery while airborne via the common data link pod
		SHARP	SHARP is the replacement for TARPS beginning in 2003. Fully contained within a pod, mounted on the centerline stores station, it will consist of either a separate medium altitude/medium standoff dual band sensor and a high altitude/long standoff, dual-band sensor or a combination medium altitude/high altitude/long standoff, dual band sensor. The reconnaissance management set, solid-state recorder and data link will also be contained in the pod. The Marine Corps plans to procure the SHARP for the F/A-18C/D, with the high altitude/standoff sensor or the combination medium altitude/high altitude sensor, in 2003 in sufficient numbers to bring both ATARS and SHARP to a total of 31 systems. In subsequent years, the Marine Corps will replace ATARS with SHARP. This will provide a total of 28 pods by 2008 to equip each F/A-18D squadron with four pods.
	AH-1Z	Charged coupled device (CCD) low light level television (LLLTV)	Day TV camera
		Telescopic Sight Unit (TSU)	Day-only TV system capable of 5 to 13 times magnification.
	UH-1Y	Navigation Thermal Imaging System (NTIS).	Selectable 1:1 or 10:1 fields of view; can be recorded on VHS tapes.
	Pioneer	MKD-200	Day TV camera payload capable of detecting targets at 18km and recognizing or identifying targets at 3km.

Table 5-15 Aircraft sensors.

d. Dissemination

Intelligence is disseminated via one of two modes: broadcast or point-to-point:

- **Broadcast Mode**. When using the broadcast mode, intelligence that affects the majority of units is disseminated simultaneously to a broad audience. Successful use of broadcast modes depends upon several factors: judicious selection of what intelligence is disseminated; the ability of all pertinent users to monitor the broadcast; and the availability of a processing methodology to filter and select only that intelligence pertinent to user requirements. This mode offers the advantage of improving dissemination timeliness, but only if used with discipline, due to the risk of overloading MAGTF CIS pathways or burdening lower units' intelligence processing capabilities.

- **Point-to-Point Mode**. In this mode intelligence is disseminated to a specific user, normally in response to an IRs. From there it may be further disseminated as appropriate. Although this mode is generally slower than the broadcast mode, it allows for more intelligence focus and tailoring to specific user needs, reducing information overload of others. There is a risk that the intelligence meaning may become distorted as it is conveyed from one command to another. Examples of point-to-point modes include e-mail, voice radio or telephone, and courier. With a secure WAN or LAN, a majority of intelligence disseminated within the MAGTF may be by email. Below the MSC level, the majority of point-to-point dissemination is done by radio, wire communications or courier.

Within the MAGTF, especially for dissemination between the CE and MSCs, the IAS, the IOW, and MAGTF TDN are the key tools for electronic dissemination. IAS is available down to the maneuver battalion/squadron level. Communications connectivity between the MAGTF CE and the MSCs are predominantly provided by SATCOM, supplemented where practical with HF/UHF radios, troposcatter multi-channel radio systems, telephone systems and couriers. Communications connectivity below the regiment/group level depends principally on single channel radio primarily designed for voice traffic, with limited range and limited data capacities (1.2 Kbps to 16 Kbps). Although these units possess tactical data systems, their ability to exchange data traffic is limited due to the smaller bandwidth.

The MAGTF has access to IAS and JDISS (each with COLISEUM and other specialized applications) and connectivity with the full range of communications (JWICS/SCI-TDN, SIPRNET/S-TDN, NIPRNET/U-TDN, DSN, 44 DMS, voice radio and telephone, video-teleconferencing, etc.) via either MAGTF common communications or unique intelligence communications capabilities. Examples include the VMU squadron remote receive station (RRS), the radio battalion technical control and analysis center (TCAC) and the AN/MSC-63A special security communications central, the GSP's tactical remote sensor system, the imagery interpretation platoon's tactical exploitation group, the VMAQ squadron's TERPES, the CI/HUMINT automated tool set (CHATS), manpack secondary imagery dissemination (Manpack SIDS), Trojan Spirit II, and the JSTARS common ground station.

Net	Frequency	Purpose	Subscribers
MEB Ground Reconnaissance Command	UHF-SATCOM HF	Command and control of landing force ground reconnaissance operations and transmission of collected reconnaissance directly to the MAGTF commander or the MAGTF CE CIC.	• CE • Organic and direct support reconnaissance units • UAV squadron/detachment • GCE(s) • Other units, as required (e.g. radio battalion radio reconnaissance team (RRT), Navy special warfare teams, etc.)
MAGTF Alert/Broadcast	HF	Alert warning traffic or general traffic pertaining to all (or the majority) of the units on this net. Messages not of an alert warning type will be consecutively numbered upon transmission.	Designated units within the MAGTF major subordinate element(s)
MAGTF Intelligence	UHF-SATCOM HF VHF	Rapid reporting and dissemination of intelligence, collaborative planning of future MAGTF intelligence operations, and command and control of ongoing MAGTF intelligence and reconnaissance operations.	• CE • GCE(s) • ACE(s) • CSSE • Organic and direct support intelligence and reconnaissance units • UAV squadron/detachment
MAGTF Air Observation	UHF/VHF	Coordinate air observation and transmit information from air observers to MAGTF elements. May be used to adjust artillery or NSFS on an emergency basis.	• CE • Aerial observer • GCE • FSCCs • Artillery battery FDC • Supporting arms special staff (SASS)
MAGTF EW Coordination	HF	Coordinate EA and SIGINT activities.	• G-3/S-3 EWCC • OCAC • GCE • TACC • TAOC
MAGTF Defense Special Security Communications System (DSSCS) Entry	UHF-SATCOM HF Multiplex (MUX)	SCI data communication capability with external agencies. The supported commander usually provides the communication path (i.e., communications battalion or detachment), and the terminal equipment and personnel are provided by the radio battalion/SIGINT SSU special security communications element (SSCE).	MAGTF CE via the radio battalion/detachment special security communication element
MAGTF Special Intelligence Communications Net External	HF	Secure data communications channel for the exchange of SCI. The supported commander provides the communications path and terminal equipment and personnel are provided by the radio battalion.	• MAGTF CE via the radio battalion/SSU special security communication element • CJTF • CATF

Table 5-16. Command element intelligence, counterintelligence, and reconnaissance nets.

Net	Frequency	Purpose	Subscribers
MAGTF Critical Communications (CRITICOMM) Net	UHF-SATCOM VHF	Provide the supported commander with a channel to adjacent Service cryptologic agencies or cryptologic support group. The supported commander provides the communications path, and the terminal equipment and personnel are provided by the radio battalion/SSCE.	• MAGTF CE via the radio battalion/SSU SSCE • Higher HQ, adjacent HQ, and theater and national intelligence/SIGINT agencies
Radio Battalion/SSU Command and Control Net	HF/VHF	Command and control of subordinate radio battalion elements. The radio battalion provides the communications path, equipment, and personnel.	• Radio battalion operations control and analysis center (OCAC) Radio battalion OCAC liaison teams (OLT) company command elements • SIGINT support platoons (SSP) • SIGINT support teams (SST)
Theater Cryptologic Support Net	UHF-SATCOM HF	Rapid exchange of cryptologic information with the cryptologic elements of other organizations. The supported commander provides the communications path, and the terminal equipment is provided by the radio battalion/SSU.	• MAGTF (radio battalion/SSU) • Adjacent Service cryptologic elements • National cryptologic agencies • Joint/ATF cryptologic agencies
Radio Battalion CRITICOMM Net	UHF-SATCOM HF VHF	Provide CRITICOMM capabilities to physically separated battalion elements. The supported commander provides the communications path, and the radio battalion provides the equipment and personnel.	• Radio battalion OCAC • Radio battalion/SSU CCE (at least two)
Radio Battalion/SSU Collection and Reporting Net	UHF-SATCOM HF VHF	Provide command and control and SIGINT reporting capabilities for battalion/SSU collection operations.	• Radio battalion/SSU OCAC • Deployed collection/direction funding (DF) SSTs
Radio Battalion/SSU EA Control Net	VHF	Direction and control of radio battalion electronic countermeasures assets. The radio battalion provides the communications path, equipment, and personnel.	• Radio battalion/SSU OCAC • Deployed EA teams
Radio Battalion/SSU DF Flash Net	VHF	Provide the DF control station with a means of broadcasting DF flashes to the DF outstations. The radio battalion provides the communications path, equipment, and personnel.	• Radio battalion/SSU OCAC • Deployed DF SSTs
Radio Battalion/SSU DF Report Net	VHF	DF reporting from DF outstations to DF control. The radio battalion provides the communications path, equipment, and personnel.	• Radio battalion/SSU OCAC • Deployed DF SSTs
DF Data Net	VHF	Exchange DF information between outstations and DF control. The radio battalion provides the communications path, equipment, and personnel.	• DF outstations/SSTs • DF control (OCAC)
Tactical Receive Equipment and Related Applications Program Data Dissemination System	UHS SATCOM HF	Provide global surveillance information in time for sensor cueing and to provide indications and warning. Data is forwarded from sensor to communications gateways/relays for dissemination to worldwide military users via geosynchronous UHF satellite links. TDDS data sources include national and tactical sensor systems.	• Intelligence agencies • IOC • OCAC • SSES • ATFIC • ACE/VMAQ squadron
TACINTEL Broadcast Service (TIBS)	UHF SATCOM	Provide near-real-time intelligence from an open network of interactive participants by using multiple sensors and sources. TIBS participants include a wide variety of national and Service airborne, surface, and subsurface intelligence platforms.	• JTF, theater, and national intelligence organizations • IOC • OCAC • SSES • ATFIC • ACE/VMAQ squadron
Tactical Reconnaissance Intelligence Exchange System (TRIXS).	UHF SATCOM	Provide high-accuracy targeting data to multi-Service/joint Services command, control, and intelligence users. It supports full-duplex data and half- duplex voice connectivity between user terminals. It is designed to provide in-time intelligence reports focused on high-payoff ground threat targets. It is capable of providing maneuver, threat avoidance, targeting, mission planning, and sensor cueing support to commanders at all echelons. The network can accept input from up to five intelligence producers (Army Guardrail Common Sensor and Airborne Reconnaissance Low).	• JTF, theater, and national intelligence organizations • IOC • OCAC • SSES • ATFIC • ACE/VMAQ squadron
TACINTEL Net.	UHF	Transmission and reception of sensitive information sensor data and voice among collection and reporting units and detachments of the radio battalion, the MAGTF, and shipboard facilities, TACINTEL is an automated, high-speed data link.	• JTF, theater, and national intelligence organizations • Radio Bn/SSU OCAC • SSES
Radio Bn/SSU Mission Equipment Control Data Link (MECDL) Net	UHF	Control, coordinate, and monitor the mission equipment of the MEWSS. This net is used for internal MEWSS operations and for interface and cooperative operation with the Army intelligence and EW common sensor systems.	• MEWSS EA/SSTs • Army Guardrail Common Sensor • Army Ground-Based Common Sensor • Army Advanced Quickfix
Radio Bn/SSU DF Net	UHF	Control, coordinate, and report DF data.	• MEWSS EA/SST • Radio Bn/SSU OCAC • Army Technical Control and Analysis Element
Radio Bn/SSU Tasking and Reporting Net	VHF	Issue taskings/report results for Radio Bn elements employing the team portable collection system.	• Analyst subsystem • Collection outstations/SSTs
Radio Reconnaissance Command	UHF-TACSAT	Command and control of deployed RRTs; reporting of SIGINT collection and DF reports.	• Radio Bn/SSU OCAC • ATFIC (SSES) • RRTs
TROJAN SPIRIT II Net	C and Ku Band SATCOM	Receive, report, and disseminate intelligence information over a special-purpose satellite system.	• MAGTF CE (CIC/IOC/OCAC) • ATFIC (SSES) • External intelligence agencies and organizations
Force Reconnaissance Company Command	HF	Command and coordinate administrative and logistic requests of subordinate units.	• Force reconnaissance company reconnaissance operations center (ROC) • Subordinate units • Liaison personnel
Ground Sensor Platoon (GSP) Command	VHF	Command and control of GSP operations and for the coordination of GSP administrative and logistic support.	• IOC (SARC/GSP liaison and control element) • GSP/detachment HQ • Monitoring sites/deployed sensor employment squad (SES)/sensor employment team liaison teams • Others, as required

Table 5-16. Command element intelligence, counterintelligence, and reconnaissance nets (continued).

Net	Frequency	Purpose	Subscribers
Sensor Reporting Net	VHF	Rapid reporting of sensor data to supported units.	• IOC (SARC (net control)) • GSP monitoring sites • Supported units • Others, as required
GSP Data Transmission	VHF	Transmission of sensor data collected by remote sensor sites.	• GSP liaison and control element monitoring sites • IOC (SARC) • Remote sensor and sensor relay sites
Counterintelligence/Human Intelligence (HUMINT) Team(s) Command	HF/VHF	Command and control of counterintelligence teams and subteams, interrogator-translator teams and subteams, and HUMINT exploitation teams operations and the coordination of counterintelligence/HUMINT administrative and logistic support.	• IOC (SARC HUMINT liaison and control element) • Counterintelligence/HUMINT company/detachment command post • Deployed counterintelligence/HUMINT teams and HUMINT support teams (HST) • Others, as required
Counterintelligence/HUMINT Reporting Net	VHF	Rapid reporting of counterintelligence/HUMINT data to supported units.	• IOC (SARC (net control)) • Deployed counterintelligence/HUMINT teams and HSTs • Supported units • Others, as required

Table 5-16. Command element intelligence, counterintelligence, and reconnaissance nets (continued).

Net	Frequency	Purpose	Subscribers
GCE Ground Reconnaissance Company Command	HF/VHF	Command and control of ground reconnaissance operations and for reporting reconnaissance information from deployed reconnaissance elements/teams to the GCE G-2/S-2 (SARC).	• GCE HQ (G-2/S-2/SARC) • Reconnaissance units • LAR units • UAV squadron/detachment
GCE Intelligence	HF/VHF	Rapid reporting and dissemination of intelligence, collaborative planning of future intelligence operations, and command and control of ongoing intelligence and reconnaissance operations.	• GCE HQ (G-2/S-2 intelligence operations) • Infantry units HQs • Artillery units HQs • Reconnaissance units • LAR units HQs • Tank units HQs • Assault amphibian units HQs • Combat engineer units HQs • Attached/direct support intelligence units (radio battalion SSU, CI/IT teams and HSTs) • VMU squadron/detachment (RRS) • Attached combat and combat support units
LAR Battalion/ Company/Platoon Tactical 1	VHF/HF	Exercise command and control of subordinate units. Each echelon has its own tactical command (TAC) net.	• Unit HQ • Subordinate units and vehicles • Recovery vehicles (company net) • Liaison personnel • Attached units
Reconnaissance Battalion Command	HF/VHF	Exercise command and coordinate administrative and logistic support.	• Recon Bn ROC • Subordinate units • Patrols/support aircraft/vehicles • Supporting units • Liaison teams at supported units
Infantry Regiment Intelligence	VHF	Rapid reporting and dissemination of intelligence, collaborative planning of future intelligence operations, and command and control of ongoing intelligence and reconnaissance operations.	• Infantry regiment HQ • Infantry battalion HQs • Intelligence units (radio battalion SSU, CI/IT teams, HST) • Supporting and attached units • Regimental observation post
Scout-Sniper Command	VHF	Exercise command and control of battalion scout-sniper operations and report reconnaissance information collected by deployed teams.	• Battalion S-2, S-3 and FSC • Scout-sniper teams
Artillery Radar Telling	VHF	Exchange radar intelligence information and requests for surveillance of enemy counterfire weapons. May also be used for registration and adjustment of artillery fire.	• Countermortar radar sites • Artillery battalion and batteries
Artillery Regiment Survey/Metro	VHF	Exchange survey, meteorological, and ballistic information and data between survey teams and artillery units.	• Artillery battalions/batteries • Survey officers and teams • GCE main command post

Table 5-17 Ground combat element intelligence and reconnaissance radio nets.

Net	Frequency	Purpose	Subscribers
Antiaircraft Control	HF VHF MUX	Control SAM batteries. Types of information passed include: target assignments, fire direction orders, weapons status commands, battery status reports, and progress-of-engagement reports.	• TAOC(s) • EW/C • LAAD Battery CP/ADCP
Antiaircraft Intelligence	HF MUX	Used by SAM batteries to report targets acquired by the battery surveillance radar. TAOC passes selected early warning contacts to missile firing units. Combined with the antiaircraft control net when MUX is not available.	• TAOC(s) • Air defense fire units • EW/C • LAAD Battery CP/ADCP
Combat Information/Detection	HF MUX	Reporting of unidentified or hostile aircraft, including initial contact reports, tracking, amplifying, and final disposition. Multiple combat information/detection nets may be established for multiple TAOCs.	• TAOC(s) • Early warning/control activities • LAAD Battery CP/ADCP • Air defense fire units • DASC (as required) • MATCD (as required) • TACC/TADC • Other reporting agencies
Ground-Based Data Link	VHF	Air defense CP downlink of surveillance information to short-range firing units.	• ADCP • Short-range air defense • Remote sensors
Tactical Air Request/Helicopter Request	UHF-SATCOM HF VHF	Used by ground combat units to request immediate air support from the DASC. Intermediate ground combat echelons (FSCCs) monitor this net and may modify or disapprove a specific request. The DASC uses the net to brief the requesting unit on the details of the mission. Target damage assessments and HRs may be passed over this net. Multiple TAR/HR nets may be required, depending on the scope of close air support operations.	• DASC • TACPs • HDC • TAOC • Tactical air coordinator (airborne) • Forward air controller (airborne)
Defense Meteorological Satellite Program Satellite Imagery	SATCOM	An encrypted receive-only circuit to provide a direct readout of real-time satellite imagery from polar orbiting satellites of the Defense Meteorological Satellite Program.	• Deployed Marine wing support squadron (MWSS)
Fleet Multichannel Broadcast	UHF SATCOM	A receive-only circuit on channels 8 or 15 (environmental channels) of the satellite to provide weather bulletins produced by Navy regional centers.	• Deployed MWSS
Goldwing Communications	HF	A secure, in-theater, joint net that may be used for voice traffic but is primarily for transmitting and receiving alphanumeric weather data.	• Other-Service meteorological and oceanographic agencies • Deployed MWSS
Pilot to Metro	UHF	Exchange of meteorological information.	• Flying aircraft • Weather detachment at EAF
Tactical Alert	HF	Rapid dissemination of air-raid warnings.	• MAGTF HQ • GCE/ACE/CSSE HQ • Air control agencies
Television Infrared Observation Satellites Imagery	SHF	An unencrypted receive-only circuit to provide a direct readout of real-time satellite imagery from the National Oceanographic Atmospheric Administration.	• Deployed MWSS
Wing Intelligence	HF	Rapid reporting and dissemination of intelligence information.	• ACE G-2 • MAG S-2s • Squadron S-2s
UAV Command Net	HF VHF/UHF	Coordinate UAV activities.	• UAV squadron/detachment HQ • GCS • Launch and recovery site • Remote video terminal teams
UAV Primary Uplink Control/ UAV Secondary Unlink Control	G-Band	Control air vehicle and payload. Secondary link can provide the same control if primary link control is lost.	• Ground data terminal • Launch and recovery • Air vehicle
UAV Telemetry Downlink	G-Band	Provide real-time video display of target area and downlink flight control data.	• GCS • Launch and recovery site • Remote video terminal teams • Air vehicle
Tactical Digital Information Link A	HF/UHF 29	TADIL-A (Link-11) is used to exchange tactical data in real time among ships, aircraft, and shore sites. TADIL-A messages provide navigational data, surface and subsurface tracks, and operational orders. It is an encrypted half-duplex system and can be used on either H single- or dual-sideband or UHF frequencies. The exchange of digital information is accomplished by net-configured participating units under the control of a net control station (NCS). A net can be composed of as few as two units.	• TAOC • TACC • VMAQ squadron/TERPES
Tactical Digital Information Link B	VHF/UHF SHF Multichannel Radio	TADIL-B (Link-11B) is a full-duplex, point-to-point, encrypted system that simultaneously exchanges tactical data between two units. TADIL-B messages provide navigational data, surface and subsurface tracks, and operational orders. Participants on a TADIL-B network are called reporting units (RUs). Some RUs are capable of simultaneously linking with several other RUs. Those units that can redistribute the information received from one RU to another RU are also called forwarding units.	• TACC • TAOC • MATCD • VMAQ squadrons/TERPES
Tactical Digital Information Link J	UHF	TADIL-J (Link-16) is a secure, digital signal, nodeless data link which uses the joint tactical information distribution system (JTIDS) Class 2 and MIDS TDMA terminals over UHF radio and a KYV5 encryption device, and the J-Series Message Standard, defined by MIL-STD 6016. It is the DOD primary tactical data link for all Service command and control, intelligence, and where practical, weapon system applications.	• TACC • TAOC • Air defense units • External platforms (e.g., JSTARS, ABCCC, etc.)
Voice Product Net	UHF	Provides a communications means for forwarding nondigital intelligence information to other intelligence and operations elements.	• TACC • TAOC • EA-6B aircraft • VMAQ squadron/TERPES • External platforms (e.g., Rivet Joint, Compass Call, EP-3)

Table 5-18. Aviation combat element intelligence and reconnaissance radio nets.

Net	Frequency	Purpose	Subscribers
CSS Alert/Broadcast	HF 11	Alert warning or general traffic pertaining to all (or a majority) of the units. Messages not of an alert warning type will be consecutively numbered at the time of transmission.	• CSSE HQ • General support group • Direct support group • CSS detachments
FSSG/CSSE Intelligence	HF/VHF	Provide rapid reporting and dissemination of intelligence, collaborative planning of future intelligence operations, and command and control of ongoing and supporting intelligence and reconnaissance operations.	• CSSE HQ (S-2 intelligence operations) • CSSD combat service support operations centers

Table 5-19. Combat service support element intelligence and reconnaissance radio nets.

5007. Aircraft Sortie Rates

SQUADRON TYPE	AIRCRAFT per SQUADRON	SUSTAIN RATE	SURGE RATE	SORTIES (70% FMC)		SORTIES (80% FMC)		SORTIES (90% FMC)	
				SUSTAIN	SURGE	SUSTAIN	SURGE	SUSTAIN	SURGE
VMFA (F/A-18A/C)	12	2.5	4.0	20	32	23	36	27	44
VMFA(AW) (F/A-18D)	12	2.5	4.0	20	32	23	36	27	44
VMA (AV-8B)	12	2.5	4.0	27	44	32	52	35	56
VMAQ (EA-6B)	5	1.2	2.0	4	6	5	8	5	8
VMGR (KC-130)	12	1.2	2.0	9	16	11	18	13	22
VMM (MV-22)	12	2.5	4.0	20	32	23	36	27	44
HMH (CH-53E)	12	2.5	4.0	27	44	32	52	35	56
HMLA (AH-1Z)	18	2.5	4.0	30	48	35	56	40	64
HMLA (UH-1Y)	9	2.5	4.0	15	24	17	28	20	32

SURGE PENALTY				
Days of Surge	1	2	3	4
Surge Rate	4	3.5	3.0	2.5
Sustained Rate	2.5	2.0	1.5	1.0

Notes:

1. Sortie rates will fluctuate based on the types of missions flown, duration of missions, aircrew availability, and maintenance sustainment capability
2. Surge penalties: For each day of surge, the next day's surge and sustained sortie rates are reduced by 0.5. Additionally, the number of surge days will result in an equal number of sustained rate penalty days.

   For example: If the MAW surges its F/A-18s for three days, it will only be able to fly its F/A-18s at a sustained rate of 1.5 sorties a day for three days following the completion of the surge.

SURGE DAYS			PENALTY DAYS			RETURN TO NORMAL OPERATIONS
Day 1 Surge 4.0	Day 2 Surge 3.5	Day 3 Surge 3.0	Day 4 Sustained 1.5	Day 5 Sustained 1.5	Day 6 Sustained 1.5	Day 7 Sustained 2.5

Table 5-20. Aircraft sorties.

		200	500	1,000	2,000	3,000
Sorties Required	MV-22	4	14	28	56	84
	CH-53	3	5	10	20	30

Notes:
1. Sortie requirements based on legs less than 90 nmi.
2. Lift Requirements—
   MV-22: 24 Marines.
   CH-53E: 36 Marines.
3. Vehicles not included. If vehicles are to be lifted, assume one CH-53E per vehicle not available for troop lift.
4. Sorties shown should be combined to determine total sorties required (i.e., to lift 500 Marines, 21 sorties must be flown: 16 MV-22 and 5 CH-53).

Table 5-21. Number of Marines to be lifted.

5008. Marine Air Command and Control System

a. Forms of Control

	TACC	TADC	TAOC	EW/C	DASC	MATCD	MMT	FAC	FAC(A)	ASC(A)	TAC(A)
Command	X										
Air Control		X	X	X	X	X	X	X	X	X	X
Positive Control			X	X		X	X				
Procedural Control			X	X	X	X	X	X	X	X	X
Terminal Control			X	X		X	X	X	X		
Air Direction	X	X	X	X						X	X

Table 5-22. Forms of control exercised by Marine air command and control system agencies.

b. Movement and Set Up

	TACC	TAOC	EW/C	DASC	MATCD	MMT
Time to Set-Up (Hours)	24	24	4	2	18	2
Number of C-141Equivalents	TBD	TBD	2	3	TBD	1

Table 5-23. Marine air command and control system agency planning factors.

c. Service Function Comparisons

MARINE	NAVY	AIR FORCE	ARMY
TACC	TACC	AOC	DOCC
TAOC	FAWC	CRC	ADA TOC
EW/C	SAWC	CRE	ADA TAC
	CG/DDG		ADA
FSCC	SACC		FSE
DASC	ASCS	ASOC	G-3 AIR
DASC(A)		ABCCC	
TACP		TACP	FIST
TAC(A)		TAC(A)	FO
FAC(A)		FAC(A)	FO
	HAWKEYE	AWACS	

Table 5-24. Service function comparisons.

d. The Theater Air-Ground System

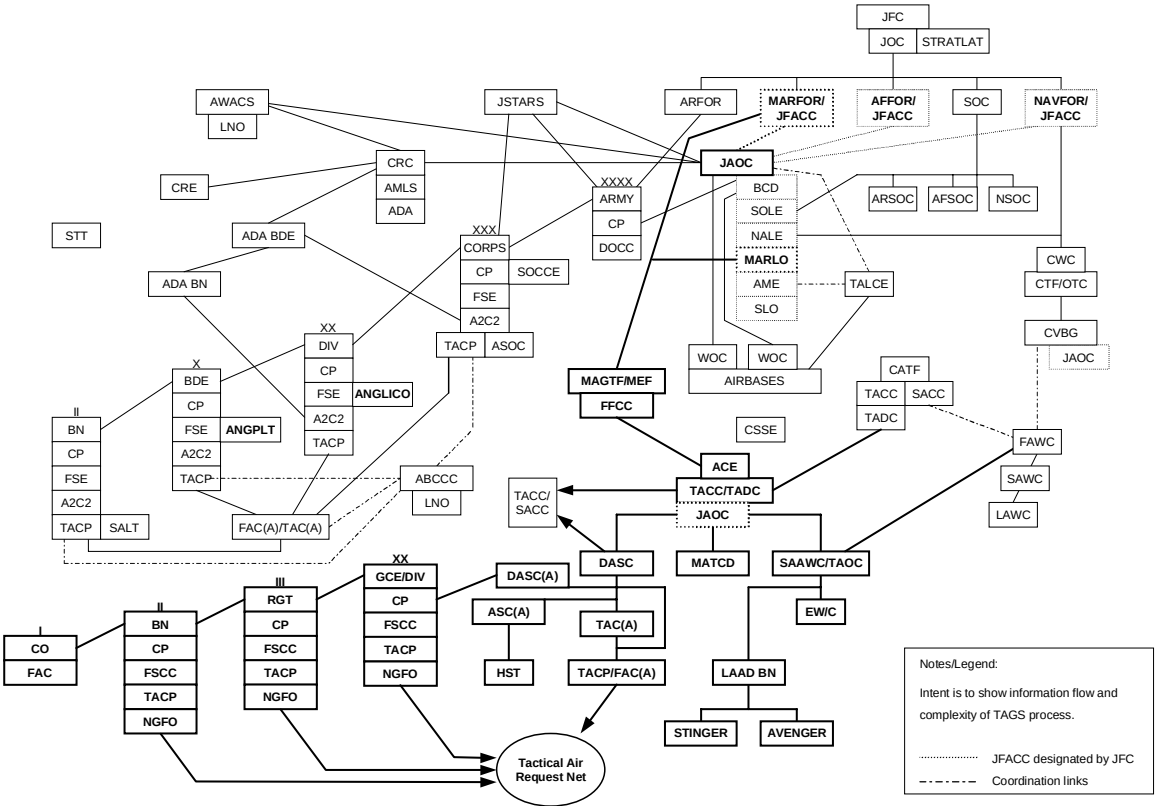


Figure 5-5. Theater air-ground system.

A2C2	Army airspace command and control
ADA	air defense artillery
AME	air mobility element
ASC(A)	assault support coordinator (airborne)
ASOC	air support operations center
AWACS	Airborne Warning and Control System
BCD	battlefield coordination detachment
CATF	commander amphibious task force
CP	command post
CRC	control and reporting center
CRE	control and reporting element
CVBG	carrier battle group
CWC	composite warfare commander
DASC	direct air support center
DOCC	deep operations coordination cell
EW/C	early warning/control
FAC	forward air controller
FAC(A)	forward air controller (airborne)
FAWC	fleet air warfare coordinator
FFCC	force fires coordination center
FSCC	fire support coordination center
FSE	fire support element
GLO	ground liaison officer
HST	helicopter support team
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JOC	joint operations center
JSTARS	Joint Surveillance Target Attack Radar System
LAAD	low altitude air defense
LAWC	local air warfare coordinator
MARLO	Marine liaison officer
MATCD	Marine air traffic control detachment
NALE	naval and amphibious liaison element
NGFO	naval gunfire officer
SAAWC	sector antiair warfare coordinator
SACC	supporting arms coordination center
SALT	supporting arms liaison team
SAWC	sector air warfare coordinator
SLO	space liaison officer
SOC	special operations command
SOLE	special operations liaison element
STRATLAT	strategic liaison team
STT	special tactics team
TAC(A)	tactical air coordinator (airborne)
TACC	tactical air command center
TACP	tactical air control party
TADC	tactical air direction center
TALCE	tactical airlift control element
TAOC	tactical air operations center
WOC	wing operations center

e. Notional Aviation Communications Architecture

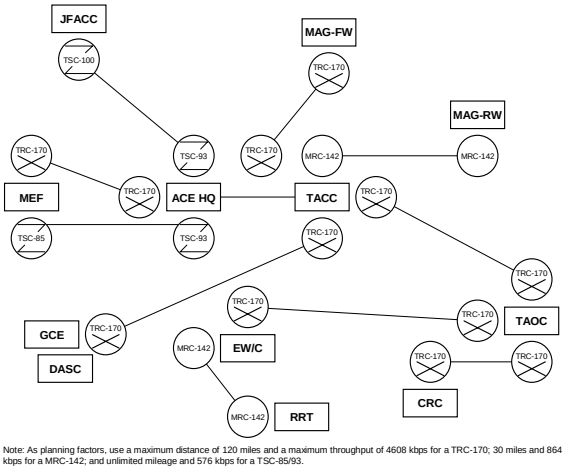


Figure 5-6. Notional aviation communications architecture.

5009. Artillery Planning Factors and Considerations

a. Artillery Organization for Combat

Organization for combat is a two-step process—

- Place units in a tactical organization to establish command relationships.
- Give units a tactical mission.

b. Fundamentals of Organizing for Combat

The fundamentals of organizing for combat include—

- Adequate support for committed maneuver units.*
- Weight the main attack in the offense or the most vulnerable area in the defense.*
- Facilitate future operations.*
- Ensure immediately available artillery support for the commander to influence the action.
- Maximum feasible centralized control.

* May be achieved by mission, ammunition, and positioning.

c. Establishing Command Relationships

- Strategic tailoring.
- Tactical tailoring.
- Command relationships include—
  - Organic.
  - Assigned.
  - Attached.
  - OPCON.

d. Tactical Missions (Inherent Responsibilities)

Arty Unit with Mission of:	Answers Calls for Fire in Priority from:	Establish Liaison with:	Establish Comm with:	Has as it's Zone of Fire	Furnishes Forward Observers	Is Positioned by:	Has its Fires Planned by:
Direct Support	1. Supported unit 2. Own observers 3. Higher artillery HQ	Supported unit (down to Bn level)	Supported unit	Zone of action of supported unit	To each company sized maneuver unit of supported unit	Unit commander as needed or ordered by higher artillery HQ	Develop own fire plan in coordination with supported unit
Reinforcing	1. Reinforced unit 2. Own observers 3. Higher artillery HQ	Reinforced unit	Reinforced unit	Zone of fire of reinforced unit	Upon request of reinforced unit	Reinforced unit or as ordered by higher artillery HQ	Reinforced unit
General Support	1. Higher artillery HQ 2. Own observers	No inherent requirement	No inherent requirement	Zone of action of supported unit	No inherent requirement	Higher artillery HQ	Higher artillery HQ
General Support Reinforcing	1. Higher artillery HQ 2. Reinforced unit 3. Own observers	Reinforced unit	Reinforced unit	Zone of action of supported unit to include zone of fire of reinforced unit	Upon request of reinforced unit subject to prior approval of higher artillery HQ	Higher artillery HQ or reinforced unit subject to prior approval by higher artillery HQ	Higher artillery HQ

Table 5-25. Artillery tactical missions (inherent responsibilities).

e. Essential Fire Support Tasks

Information	Example
Purpose: The friendly maneuver reason for the effects. Identifies friendly maneuver formation that will leverage the targeting effect and describes in space and time what the effect will accomplish.	Allow 5th Marines to destroy 1st echelon MRR in EA Red prior to the arrival of 2nd echelon MRR
Task: Descries the effects against a specific enemy formation's function or capability. Memory Aid: Task = Effect, Formation, Function	Delay 2nd echelon MRR for 30 minutes at TAI 1.
Method: Who does the task and when it's accomplished. Ties the detect function to the executor in space and time	STA TM 1 calls for FA delivered FASCAM after 1st echelon MRR passes through TAI 1. 2/11 emplaces medium density FASCAM minefield (AE 6000)
End State: The definition of success for the task. Attempts to quantify successful accomplishment of the task. Also provides the basis for the assess function and the decision to reattack or not.	2nd echelon MRR delayed at TAI 1 until 1st echelon MRR is destroyed

Table 5-26. Artillery essential fire support tasks.

f. Artillery Cannon and Rocket Characteristics

Asset	Max Range (m)	Max Rate of Fire	Sustained Rate of Fire	Ammunition Available
SP 155-mm Howitzer M109A5/A6	23,500 (RAP) 18,100 (w/o RAP) 28,100 (BBDPICM) 17,900 (DPICM)	4 rounds per minute	1 round per minute	HE, RAP, ICM, HE, ILLUM, DPICM, ADAM, NUC, WP, RAAMS, CPHD, SMK, SADARM
SP 227-mm HIMARS M142	Basic Range 32,000 (DPICM) ER MLRS 45,000 (DPICM)	1 round per 1.5 seconds	1 round per 4.5 seconds	DPICM, APAM
Towed 105-mm Howitzer M119A1	19,500 (IRAP) 11,500 (w/o RAP)	10 rounds per minute	3 rounds per minute	HE, WP, ILLUM, APICM, SMK
Towed 105-mm Howitzer M101A1	14,500 (RAP) 11,600 (w/o RAP)	10 rounds per minute	3 rounds per minute	AP, HE, ICM, RAP, HEP-T, ILLUM, HC, WP
Towed 105-mm Howitzer M102	15,100 (RAP) 11,400 (w/o RAP) 10,500 (BBDPICM)	10 rounds per minute	3 rounds per minute	AP, HE, ICM, RAP, HEP-T, ILLUM, HC, WP
Towed 155-mm Howitzer M777	40,000 (RAP) 30,000 (w/o RAP) 22,500 (HE M795) 28,200 (BBDPICM) 18,000 (DPICM)	4 rounds per minute	2 rounds per minute or as indicated by thermal warning device	HE, RAP, ICM, WP, ILLUM, DPICM, ADAM, NUC, RAAMS, CPHD, SMK, SADARM

Legend:

HEP-T	High explosive plastic tracer	SMK	Smoke
HESH	High explosive squash head	APAM	Anti-personnel anti-material
ILLUM	Illumination	CPHD	Copperhead
RAP	Improved rocket assisted projectile	WP	White phosphorous
MLRS	Multiple launch rocket system	NUC	Nuclear
TGW	Terminally guided warhead	DPICM	Dual purpose improved conventional munitions
BBDPICM	Base bleed dual purpose improved conventional munitions		

Table 5-27. Artillery cannon and rocket characteristics.

g. Indirect Fire Characteristics

Caliber	155mm	155mm	227mm
Model	M109A6	M777	M142 HIMARS
Max Range (m)	18,200	30,000	30,000
Ammunition	HE, DPIC, APCIM, SMK, NUC, RAP, FASCAM, CPHD, WP, ILLUM, SADARM	HE, DPICM, APICM, SMK, NUC, RAP, FASCAM, CPHD, WP, ILLUM	DPICM, APAM, ATACMS
Max Rate of Fire (rds per min)	4	4	1 rd/1.5sec
Sustained Rate of Fire (rds per min)	1	2	1 rd/4.5sec
Range of RAP	30,000	40,000	45,000 (ER) 165,000 (ATACMS) 300,000 (ATACMS Block 1A)
Minimum Range (m)	Direct Fire	Direct Fire	Direct Fire
Fuzes	PD, VT, MT, MTSQ, MT, Delay	PD, VT, MT, MTSQ, MT, Delay	ET
Illum Time (sec)	120	120	N/A
HE Eff Casualty Radius (1 rd in m)	50	50	100
FPF	6 guns 300m	6 guns 300m	N/A

Legend:

APERS	Antipersonnel	CHEM	Chemical
CPHD	Copperhead	ET	Electronic time
HE	High explosive	HEP	High explosive plastic
ILLUM	Illumination	MT	Mechanical time
NUC	Nuclear	PD	Point detonating
VT	Variable time	WP	White phosphorus
APICM	Antipersonnel improved conventional munition	DPICM	Dual-purpose improved conventional munition

Table 5-28. Indirect fire characteristics.

h. Infantry-Heavy Threat

DODIC	NOMEN	Offense		Defense	
		Quantity	Weight (lbs)	Quantity	Weight (lbs)
D003	Chg Spotting 155mm	57	135.3	13	30.8
D501	Proj 155mm ADAM-L M692	13	1420.2	24	2622
D502	Proj 155mm ADAM-S M731	26	2840.5	20	2185
D505	Proj 155mm ILL M485A2	13	1268.8	6	585.6
D510	Proj 155mm CPRHD M712	2	452.6	1	226.3
D514	Proj 155mm RAAM-L	11	1212.7	8	882
D515	Proj 155mm RAAM-S	5	551.2	12	1323
D528	Proj 155mm SMK WP M825	107	11101.2	113	11723.7
D532	Chg Prop 155mm RB M203	729	11882.7	248	4042.4
D533	Chg Prop 155mm RB/WB M119A1/A2	363	5916.9	144	2347.2
D540	Chg Prop 155mm GB M3A1	190	3106.5	68	1111.8
D541	Chg Prop 155mm WB M4A1	936	15303.6	386	6311.1
D544	Proj 155mm HE M107	593	59077.6	209	20821.6
D550	Proj 155mm SMK WP M110A1	36	3712.5	38	3918.7
D563	Proj 155mm HE DPICM M483A1	568	62054	132	14421
D579	Proj 155mm HERA M549A1	233	24173.7	55	5706.2
D864	Proj 155mm DPICM-ER M864	410	NA	150	NA
N285	Fuze ET M577	1211	3504.3	490	1417.9
N286	Fuze ET M582	103	345.6	50	167.8
N291	Fuze Proximity M732A2	148	380.1	52	133.5
N340	Fuze PD M739A1	654	2370.7	215	701.4
N532	Primer, Percussion M82	2219	275.1	864	104.9
N659	Fuze PD CP Mk399-1	12	39.6	4	13.2

Table 5-29. Infantry-heavy threat.

Notes:

- All quantities and weights are totals based upon an 18-gun M777 battalion.
- All quantities are amounts required per day.
- Quantities for offense are also the battalion's "basic allowance". Basic allowance is the ammunition recommended to be carried within the means normally expected to be available for combat operations.

Offense		Defense	
32	Battalion Mass Killing Missions (Bn 3 rnds)	11	Battalion Mass Killing Missions (Bn 3 rnds)
26	Minutes of Illumination	12	Minutes of Illumination
10	500m Smoke Screens (10 min duration)	10	500m Smoke Screens (10 min duration)
2	Point Targets Destroyed	1	Point Target Destroyed
3	200 x 200 Low Density Minefields (1SD, 2LD Low Angle)	3	200 x 200 Low Density Minefield (1SD, 2LD Low Angle)
1	200 x 200 Med Density Minefield (1LD Low Angle)	1	200 x 200 Med Density Minefield (1LD Low Angle)

Table 5-30. Artillery battalion infantry-heavy mission equivalents.

i. Armor-Heavy Threat

DODIC	NOMEN	Offense		Defense	
		Quantity	Weight (lbs)	Quantity	Weight (lbs)
D003	Chg Spotting 155mm	46	109.2	24	57
D501	Proj 155mm ADAM-L M692	9	983.2	24	2622
D502	Proj 155mm ADAM-S M731	23	2512.7	18	1966.5
D505	Proj 155mm ILL M485A2	6	585.6	5	488
D510	Proj 155mm CPRHD M712	3	578.9	1	226.3
D514	Proj 155mm RAAM-L	15	1653.7	12	1323
D515	Proj 155mm RAAM-S	2	220.5	7	7717
D528	Proj 155mm SMK WP M825	10	1037.5	10	1037.5
D532	Chg Prop 155mm RB M203	997	16251.1	502	8182.6
D533	Chg Prop 155mm RB/WB M119A1/A2	278	4531.5	144	2347.2
D540	Chg Prop 155mm GB M3A1	92	1504.2	47	7684.5
D541	Chg Prop 155mm WB M4A1	652	10660.2	340	5559
D544	Proj 155mm HE M107	393	39152.6	163	16238.8
D550	Proj 155mm SMK WP M110A1	3	309.3	438	412.5
D563	Proj 155mm HE DPICM M483A1	464	50692	240	26220
D579	Proj 155mm HERA M549A1	350	36312.5	214	22202.5
D864	Proj 155mm DPICM-ER M864	554	NA	240	NA
N285	Fuze ET M577	1138	3293	586	1695.7
N286	Fuze ET M582	92	308.7	54	181.2
N291	Fuze Proximity M732A2	98	251.7	41	105.3
N340	Fuze PD M739A1	593	1934.6	305	995
N532	Primer, Percussion M82	2009	249.1	1033	128.1
N659	Fuze PD CP Mk399-1	8	26.4	3	9.9

Table 5-31. Armor-heavy threat.

Notes:

- All quantities and weights are totals based upon an 18-gun M777 battalion.
- All quantities are amounts required per day.
- Quantities for offense are also the battalion's "basic allowance". Basic allowance is the ammunition recommended to be carried within the means normally expected to be available for combat operations.

Offense		Defense	
32	Battalion Mass Killing Missions (Bn 3 rnds)	14	Battalion Mass Killing Missions (Bn 3 rnds)
12	Minutes of Illumination	10	Minutes of Illumination
1	500m Smoke Screens (10 min duration)	1	500m Smoke Screens (10 min duration)
3	Point Targets Destroyed	1	Point Target Destroyed
1	200 x 200 Low Density Minefields (1SD, 2LD Low Angle)	3	200 x 200 Low Density Minefield (SD, Low Angle)
1	4200 x 400 Med Density Minefield (LD High Angle)	1	400 x 400 Med Density Minefield (LD, High Angle)

Table 5-32. Artillery battalion armor-heavy mission equivalents.

j. Composite Infantry/Armor Threat

DODIC	NOMEN	Offense		Defense	
		Quantity	Weight (lbs)	Quantity	Weight (lbs)
D003	Chg Spotting 155mm	52	123.5	19	45.1
D501	Proj 155mm ADAM-L M692	11	1201.8	25	2731.2
D502	Proj 155mm ADAM-S M731	25	2731.2	19	2075.8
D505	Proj 155mm ILL M485A2	10	9766	5	488
D510	Proj 155mm CPRHD M712	2	452.7	1	226.3
D514	Proj 155mm RAAM-L	13	1433.2	10	1102.5
D515	Proj 155mm RAAM-S	4	441	10	1102.5
D528	Proj 155mm SMK WP M825	64	6640	62	6432.5
D532	Chg Prop 155mm RB M203	848	13844.4	375	6112.5
D533	Chg Prop 155mm RB/WB M119A1/A2	325	5297.4	144	2347.2
D540	Chg Prop 155mm GB M3A1	146	2387.1	58	948.3
D541	Chg Prop 155mm WB M4A1	810	13243.5	362	5918.7
D544	Proj 155mm HE M107	504	50211	186	18530.2
D550	Proj 155mm SMK WP M110A1	21	2165.5	21	2165.5
D563	Proj 155mm HE DPICM M483A1	522	57028.5	186	20320.5
D579	Proj 155mm HERA M549A1	286	29672.5	135	14006.2
D864	Proj 155mm DPICM-ER M864	474	NA	195	NA
N285	Fuze ET M577	1178	3408.8	538	15556.8
N286	Fuze ET M582	98	328.9	52	174.5
N291	Fuze Proximity M732A2	126	232.6	46	118.1
N340	Fuze PD M739A1	126	232.6	46	118.1
N532	Primer, Percussion M82	2125	263.5	940	116.6
N659	Fuze PD CP Mk399-1	10	33.1	4	13.2

Table 5-33. Composite infantry/armor threat.

Notes:

- All quantities and weights are totals based upon an 18-gun M777 battalion.
- All quantities are amounts required per day.
- Quantities for offense are also the battalions “basic allowance”. Basic allowance is the ammunition recommended to be carried within the means normally expected to be available for combat operations.

Offense		Defense	
32	Battalion Mass Killing Missions (Bn 3 rnds)	13	Battalion Mass Killing Missions (Bn 3 rnds)
10	Minutes of Illumination	5	Minutes of Illumination
2	500m Smoke Screens (10 min duration)	2	500m Smoke Screens (10 min duration)
2	Point Targets Destroyed	1	Point Target Destroyed
1	200 x 200 Med Density Minefield	1	200 x 200 Med Density Minefield

Table 5-34. Artillery battalion infantry/armor mission equivalents.

k. Ammunition Transportation

General information—

- High explosive projectiles, copperhead projectiles, white bag, red bag, and green propellants, all fuzes and small arms ammunition can be stored and transported together. A576 .50 cal 4-and-1 link incendiary rounds are not to be stored or transported in this category.
- Illumination projectiles, primers, CS capsules, all pyrotechnics, and A576 .50 cal 4-and-1 link incendiary rounds can be stored or transported together.
- White phosphorous projectiles and felt wedge white phosphorous screening projectiles can be stored or transported together

Nomenclature	DODIC	No. per Skid	Dimension	Weight
HE	D544	8	27.12 x 13.62 x 32	798.072
Illumination	D505	8	27.13 x 13.63 x 23	782.64
White Phosphorous	D550	8	27.13 x 13.63 x 31	828.937
DPICM	D563	8	29.13 x 13.63 x 38	873.03
Copperhead	D510	1	61 x 11 x 11.38	205.03
RAP	D579	8	29.12 x 14.62 x 38	815.709
WP Screening	D528	8	27.12 x 13.62 x 31	881.848
M3, Green Bag	D540	80	49.5 x 37.5 x 36	1306
M4A1, White Bag	D541	50	55 x 40 x 44.5	1766
M119, Red Bag	D533	24	45.63 x 38.75 x 42.12	1172
M203A1, Red Bag	D532	24	48 x 38 x 36.63	1370
M825 Smoke	D528	8	27.12 x 13.62 x 31	830
RAAMS-L	D503	8	29.12 x 14.62 x 39.38	822
ADAM-L	D501	8	29.12 x 14.62 x 39.38	874
ADAM-S	D502	8	29.12 x 14.62 x 39.38	874

Table 5-35. Ordnance classification data.

Vehicle	Caliber	Projectiles	Propellants
7-Ton Prime Mover [1]	155mm	48	48
7-Ton Ammunition Truck	155mm	96	(GB) 366 (WB) 180 (RB and M119) 40
Ammunition Trailer	155mm	24	(GB) 112 (WB) 60 (RB and M119) 40
M190A3	155mm	36	36
[1] Combat-loaded. May be reduced by safety restrictions (net explosive weight) and vehicle load plan.			

Table 5-36. General ammunition transportation.

Notes:

- Based on pure loads and single-type items (e.g., GB propellant) on skids.
- Based on cross-country capacities. Data may be reduced by road conditions and vehicle hardening requirements.
- Based on high explosive projectiles.

Vehicle	Projectiles	Propellant		
		GB	WB	RB/119
7-Ton Prime Mover	48	48	48	48
7-Ton Ammunition Truck	96	336	180	120
Ammunition Trailer	24	112	60	40
Mk48 LVS	288	640	400	192
Mk48W/Mk14 LVS Table Combo	576	1280	800	384

Table 5-37. 155mm ammunition transportation.

Notes:

- Combat loading for a prime mover is just that, all components for a complete round are transported together as per the unit's SOP.
- Without a forklift, one Marine, on average, can offload one HE projectile per minute. For example, three Marines can offload 96 HE projectiles in an average of 32 minutes.

I. Artillery Employment Considerations in Built-Up Areas

Organization for Combat	Movement/ Positioning	Delivery of Fire	Security	Command and Control
Centralized control is required during initial phases; decentralized control is required during later phases to support semi-independent actions of small units	Movement should occur during night or periods of reduced visibility when possible. There are few displacements, often by platoon or section. Positions should be selected that minimize masking, provide several routes of escape, and afford as much cover and concealment as possible. Use of existing structures (garages, office buildings, highway overpasses) is recommended. Special techniques for emplacing howitzers, such as spades against a curb when the ground is not suitable for emplacement, may be required. Explosives may be required to soften emplacement of howitzers. Reconnaissance, selection, and occupation of position (RSOP) elements should be well armed because they may have to clear areas to be occupied. Extensive route reconnaissance is required. Target acquisition devices are somewhat degraded. Radars should be emplaced to cover likely areas of enemy indirect-fire weapon employment. Radars should not be placed in the midst of an urban area because of masking.	Both direct and indirect fires are delivered for supported units. Destruction of fortifications may require assault fire techniques. High-angle fires may be required. Need for accurate meteorological (MET) and survey data increases because most targets are point targets. Improved conventional munition and variable time (fuze) effects are reduced by structures, although they are effective against personnel on rooftops. HE delay is used for penetration effects. Illumination, chemical incendiary ammunition, and smoke are effective. Ammunition expenditures will be heavy. Lasers and PGMs permit destruction of targets with minimal rubbling of adjacent buildings. Tall building may hamper laser use. Batteries must be prepared for hasty survey techniques. Magnetic instruments are impaired.	Positions must be fortified.	Radio communications are impaired by buildings. Wire can usually be run overhead. Make use of civilian communications A greater use of messengers and prearranged audio and visual signals is required. MCWP 3-35.3

Table 5-38. Artillery employment considerations in built-up areas.

5010. FASCAM and Other Type Mine Information

a. Types of FASCAM and Self-Destruct Times

Type	Arm	Short	Long
ADAM/RAAM 36/9	2 min/45 sec	4 hrs M731(A1)/M741(A1)	48 hrs M692(A1)/M718(A1)
GEMSS (Flipper) Variable	45 min		5 or 15 days (set by operator)
Volcano 5AT/1AP	2 min	4 hrs (set by operator)	48 hrs or 15 days (set by operator)
MOPMS	2 min	4 hrs (set by operator)	Recycle to 15 days up to 4 cycles
GATOR AF: CBU89/22AP Navy: CBU78B 45A/15AP	2 min	4 hrs	48 hrs or 15 days (set by operator)
PDM	50 sec	4 hrs	
NOTES: 1. Mines begin self-destruct at 80% of laid life (i.e., 4 x 0.8 = 12 min). 2. At least 20% of mines have anti-handling devices.			

Table 5-39. Types of FASCAM and self-destruct times.

b. Situational FASCAM Employment Planning Time

Identify Enemy Actions	5 min
Make Execution Decision	2 min
Pass to Execute	2 min
Change Mission	5 min
Execute Obstacle	7-60 min
Arming	2 min
Total	**23-76 min**

Table 5-40. Situational FASCAM employment planning times.

Depends on minefield size, density, size firing unit, unit/MF angle, range, and number of rounds. Example: 4 guns, .003 density, 550 x 200 m, low angle, 15,500 m, BMA > 800 mils, 78 rounds = 20 min to fire

c. FASCAM Fire Planning

The standard size of a FASCAM minefield is 400 x 400 meters for high-angle, and 200 x 200 meters for low-angle.

Density	RAAM	ADAM	Anti-Tank Mines	Anti-Personnel Mines
.001 (low)	24	6	216	216
.002 (med)	48	12	432	432
.004 (hi)	96	24	864	864

Table 5-41. Fire planning FASCAM.

d. FASCAM Characteristics

Delivery System	Length (m)	Depth (m)	Self-arm Time	Self Destruct Time	Rounds or Canisters	Basic Load
Artillery 155MM (AP/AT) ADAM/RAAM M731/741 (4 hr) ADAM/RAAM M692/M718 (48 hr)	400 800	400 200	2 min or 45 sec (NOTE)	4 hr 48 hrs	DISRUPT: 24R + 6A FIX: 48R + 12A TURN: 48R + 12A BLOCK: 96R + 12A	155 battalion: • 180R (4 hr) • 90A (4 hr) • 162R (48 hr) • 36A (48 hr)
M38 Flipper (AP/AT) M74/M75	DISRUPT: 245 FIX: 245 TURN: 490 BLOCK: 490	70 70 245 245	45 min	5 days or 15 days	DISRUPT: 70 AT FIX: 70 AT TURN: 280 AT BLOCK: 280 AT/140 AP	5 mines per sleeve
GATOR A-10, F-16, or F/A-18	650	200	2 min	4 hr, 48 hrs, or 15 days	FIX: Two dispensers	FIX: Two dispensers per sortie
GEMMS (Trailer Dispensed)	DISRUPT: 250 FIX: 250 TURN: 500 BLOCK: 500	60 60 210 210	45 min	5 days or 15 days	DISRUPT: 105 AT FIX: 150 AT TURN: 600 AT BLOCK: 500AT	700 AT or 100 AP per dispenser
MOPMS (Box Perimeter Security)	70	35	2 min	4 – 12 hr	1 suitcase	2 per Engineer squad
VOLCANO (Helicopter)	DISRUPT: 1100 FIX: 1100 TURN: 550 BLOCK: 550	120 120 320 320	2 min	48 hrs, 5 days, or 15 days	160 canisters (one full load)	2 loads of 160 canisters per VOLCANO
NOTE: ADAM/RAAM mines identified by an “A1” suffix have a 45 second arming time. Older models have a 2 minute arming time.						

Table 5-42. FASCAM characteristics.

e. FASCAM Life Cycle

This chart is taken from FM 20-23, *Mine/Countermine Operations*.

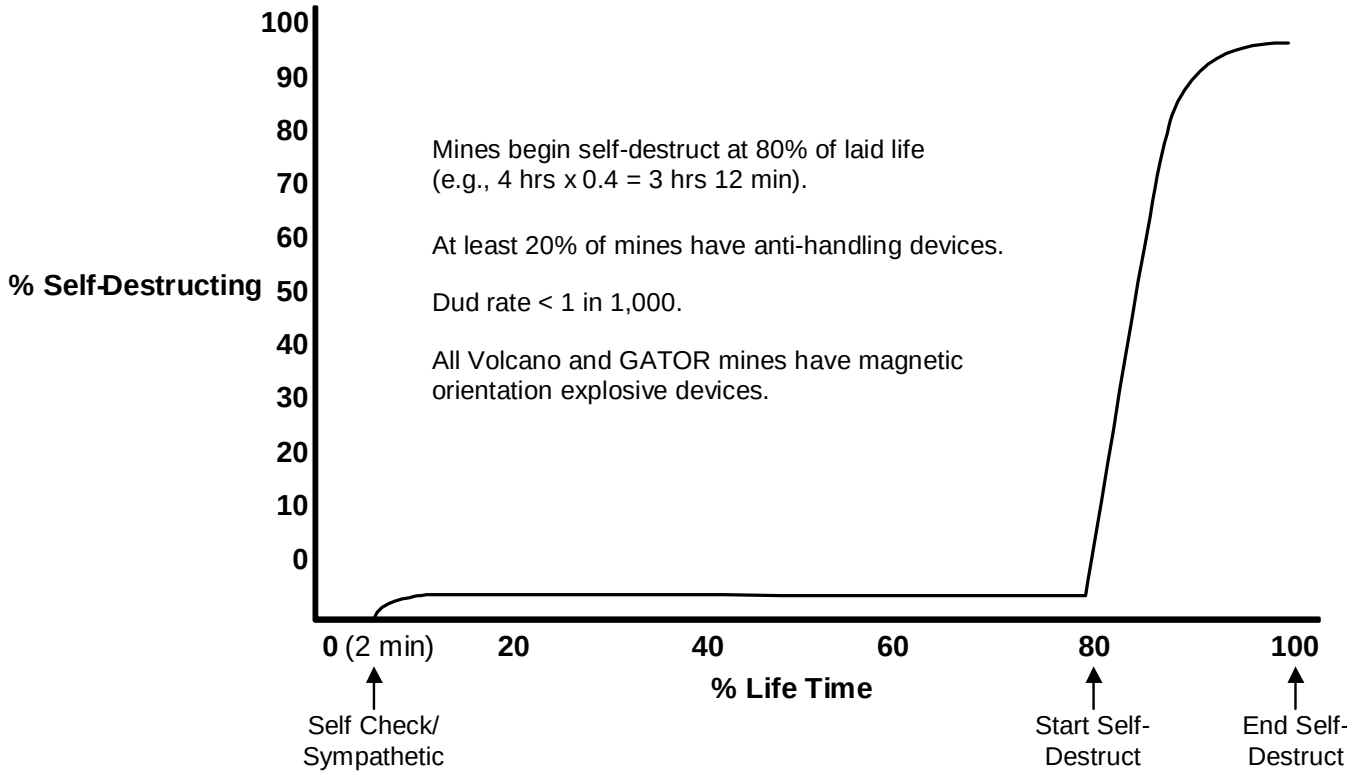


Figure 5-7. FASCAM life cycle.

f. Recommended Minefield Density

Purpose of Minefield	Harassment	Minefield Covered by Heavy Direct Fire	Minefield Covered by Light Direct Fire
Density Designation for Minefield Planning Sheet	Low	Medium	High
Density Mines	0.0001	0.002	0.004

Table 5-43. Recommended minefield density for shell RAAMS.

Purpose of Minefield	Used with RAAMS or Other at Obstacles or Harassment	Minefield Covered by Heavy Direct Fire	Minefield Covered by Light Direct Fire
Density Designation for Minefield Planning Sheet	Low	Medium	High
Density Mines	0.001	0.002	0.004

Table 5-44. Recommended minefield density for shell ADAM.

5011. Counterfire Radars

a. AN/TPQ-46A and AN/TPQ-47 Characteristics

		AN/TPQ-46A WLR	AN/TPQ-47 WLR
Range	Min	750 m	3,000 m
	Max	12,000 m (artillery/mortars), 24,000 m (rockets)	30,000 m (artillery/mortars), 50,000 m (rockets)
Search Sector	Min	230 mils	300 mils
	Max	1,600 mils	1,600 mils
		Extended azimuth search function up to 6,400 mils	
Accuracy		1st round fire-for-effect	1st round fire-for-effect
Emplacement Time		20 min *	30 min *
March Order Time		10 min or less *	15 min or less *
Transportation		Air external CH-53E (without vehicle)/ internal KC-130	Air external CH-53E/ internal KC-130
Screening Crest		15 – 30 mils	5 – 15 mils
Positioning		METT-T dependent	METT-T dependent

* Emplacement and march order times are a function of crew proficiency and may be shorter. The times shown are the ARTEP Standards.

Table 5-45. Counterfire radar characteristics.

b. AN/TPQ-46A Probabilities of Detection

	Range Bands (km)									
	0-8	8.1-12	12.1-16	16.1-20	20.1-24	24.1-28	28.1-34	34.1-40	40.1-46	46.1-54
Lt/Med Mortars (81mm)	0.9	0.78	0.67	0.56	0.46	0.35	0	0	0	0
Heavy Mortars (120mm)	0.94	0.84	0.78	0.73	0.7	0.65	0	0	0	0
Lt/Med Artillery (122/155mm)	0.84	0.67	0.57	0.47	0.37	0.27	0	0	0	0
Heavy Artillery (8 inch)	0.88	0.74	0.64	0.53	0.45	0.32	0	0	0	0
Rocket/SSMs	0.88	0.74	0.64	0.53	0.45	0.32	0	0	0	0
Mortar/Artillery Avg	0.89	0.76	0.66	0.57	0.49	0.4	0	0	0	0

Table 5-46. AN/TPQ-46A probabilities of detection.

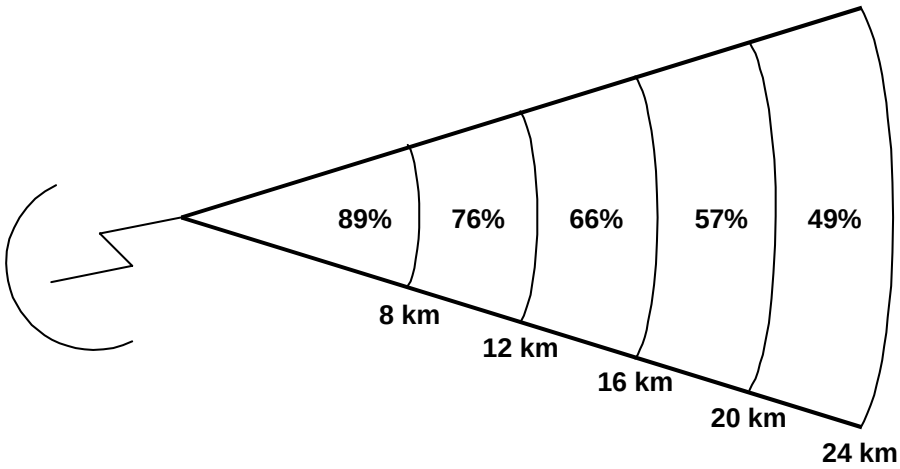


Figure 5-8. AN/TPQ-46A mortar, artillery, and rocket detection averages.

c. AN/TPQ-47 Probabilities of Detection

	PROBABILITY OF LOCATING	50% CIRCULAR ERROR PROBABLE	90% CIRCULAR ERROR PROBABLE
81mm Mortars	No specific data exists. Data indicates the AN/TPQ-47 can be expected to track mortars 4-19 km if mask angle allows for track visibility, and track velocity requirement is met.		
105mm Artillery Muzzle velocity: 207-684 m/s Quadrant elevation: 200-1100 mils	85%; 4-20 km 1600 mil coverage	35 m or 0.35% range, whichever is greater	90 m or 0.9% range, whichever is greater
155mm Artillery Muzzle velocity: 207-684 m/s Quadrant elevation: 200-1100 mils	85%; 4-25 km Center 1067 mils	35 m or 0.35% range, whichever is greater	90 m or 0.9% range, whichever is greater
175mm Artillery Muzzle velocity: 511-915 m/s Quadrant elevation: 200-1100 mils	85%; 4-30 km Center 1067 mils	35 m or 0.35% range, whichever is greater	90 m or 0.9% range, whichever is greater
8 inch Artillery Muzzle velocity: 249-594 m/s Quadrant elevation: 200-1100 mils	85%; 4-30 km Center 1067 mils	35 m or 0.35% range, whichever is greater	90 m or 0.9% range, whichever is greater
114mm Rocket Velocity at burnout: 381 m/s Quadrant elevation: 300-800 mils	85%; 4-20 km Center 1067 mils	70 m or 0.4% range, whichever is greater	175 m or 0.1% range, whichever is greater
762mm Rocket (Honest John) Velocity at burnout: 854 m/s Quadrant elevation: 300-800 mils	85%; 4-50 km Center 1067 mils	70 m or 0.4% range, whichever is greater	175 m or 0.1% range, whichever is greater
NOTE: This matrix is for planning in the absence of a 0803 target acquisition officer only. Whenever possible use a target acquisition officer and Firefinder Position Analysis System (FFPAS) which will take into consideration weather, terrain mask, target angular elevation rate, target angular azimuth rate, range, and track volume.			

Table 5-47. AN/TPQ-47 probabilities of detection.

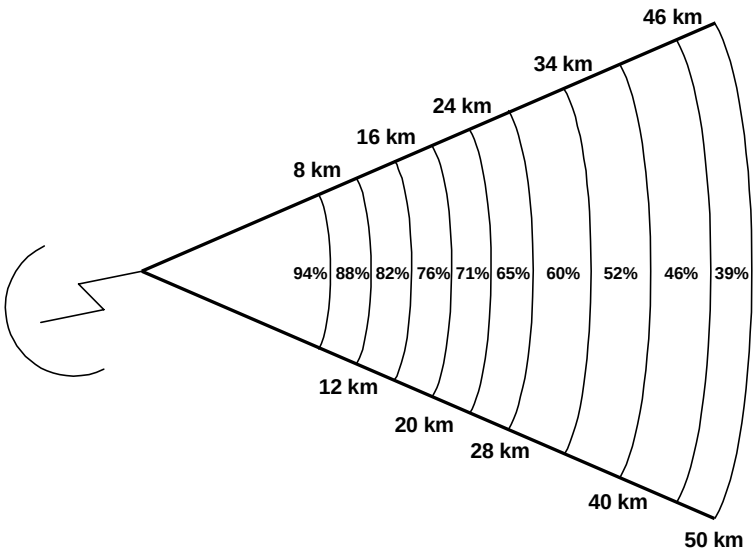


Figure 5-9. AN/TPQ-47 mortar, artillery, and rocket detection averages.

5012. The Targeting Process

Targeting is the process of selecting targets and matching the appropriate response to them, taking into account operational requirements and capabilities. It involves an analysis of the enemy situation, considering the commander's mission (task and intent) and capabilities available, to identify those critical enemy vulnerabilities which, if exploited, deny the enemy resources critical to his ability to resist.

Targeting is a continual decisionmaking process that begins with receipt of the mission and continues through the development and execution of the order. It is based on the friendly scheme of maneuver and tactical plan. It includes an assessment of the weather, terrain, and the enemy situation. This assessment then identifies those enemy units, equipment, facilities, and systems that must be attacked or influences to ensure success. Targeting includes specifying which targets are to be acquired and attacked, when they are to be acquired and attacked, and what is required to achieve the desired effects. Selected crucial targets are also identified for deliberate follow up action and analysis (combat assessment [CA]).

a. Decide, Detect, Deliver, and Assess

The Marine Corps uses the decide, detect, deliver, and assess (D3A) targeting methodology. While the following section discusses D3A as it applies to targeting, it is essential to realize how D3A applies to overall fire support planning. Targeting cannot be successful unless it is completely integrated into the fire support planning process. For example, the priorities established by the commander in the decide phase are not for targeting alone, but include his guidance for intelligence collection, fire support planning, and execution of fires. The four phases of D3A are inherently intertwined and overlapping.

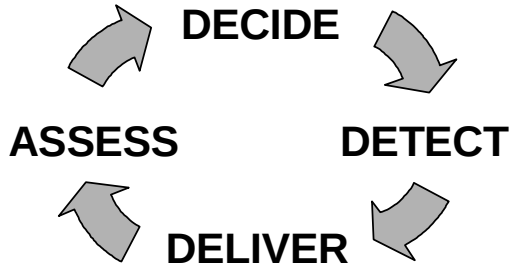


Figure 5-10. Marine Corps targeting methodology.

- **Decide**. The decide phase translates commander's intent into priorities and attack guidance. It provides the overall focus and sets priorities for intelligence collection and attack planning. The commander bases his initial guidance on the IPB. The IPB provides much of the information for the intelligence estimate and the targeting process. IPB is the foundation for the rest of the targeting process. It is a continuous and systematic method for analyzing the enemy, weather, and terrain in a geographical area. Targeting priorities must be established for each phase or critical event of an operation. For targeting to be successful, everyone must understand the unit mission, commander's intent, and the commander's planning guidance.

  A function of the decide phase is target value analysis (TVA). TVA provides a relative ranking of target sets, or categories using the following enemy characteristics: doctrine, tactics, equipment, organizations, and expected behavior. It also identifies high value targets (HVTs)—those assets the enemy commander requires to successfully complete his mission. In addition, fire planners identify high payoff targets (HPTs), a subset of HVTs, whose loss to the enemy will contribute to the success of the friendly COA.

  Some of the products of the decide function are—

  - **High Payoff Target List**. The prioritized list of HPTs used by the targeting board to develop the attack guidance matrix.
  - **Attack Guidance Matrix**. The attack guidance matrix tells how, when, and to what effect a HPT will be engaged. The attack guidance matrix is incorporated into the maneuver and fire support plans. It is the commander's attack guidance and is designed to support his plan. One attack guidance matrix rarely supports the needs of an entire force and may differ between the various echelons of command.

- **Requirements for BDA**. The commander specifies targets of a critical nature that require combat assessment to determine effects and stipulates how that BDA is determined. These requirements are incorporated into his commander's critical information requirements (CCIRs) and the collection plan.

The products from the decide function are incorporated into the fire support annex of the OPORD.

- **Detect**. The detect phase is designed to locate and identify HPTs identified in the decide phase. This is accomplished by executing the targeting collection plan. Target acquisition assets are tasked to collect information for target development. Sensors are focused on the characteristics of relevant targets and specific sensor requirements are established. Target priorities from the decide phase expedite processing of information. The products of this phase are actual targets and suspected targets.

  The G-2/S-2 is the principal figure in executing the collection plan. The commander's critical information requirements (CCIRs) are the goals of the collection plan and should incorporate fire support targeting requirements. The G-2/S-2 must work closely with the FSC to determine target location error (TLE), identification, and dwell time requirements for collection systems to produce valid targets. This should result in clear, concise taskings to target acquisition assets. As information for target development is collected, it is forwarded to the target intelligence section (TIS). Targets acquired or developed that are specified for attack are passed to the FSCC to engage under the attack guidance. Suspected targets are forwarded to the FSCC for tracking and correlation with other information for target development.

  A MAGTF generally has a wide variety of assets available to detect and identify targets. These can range from national intelligence collection assets, such as satellite photography, to a squad leader's shelling report (SHELREP). Generally, the FSC, following the guidance in the decide function, will request support from units with target acquisition assets normally employed in general support of the force. These include radio direction finding (radio battalion), counterbattery/counterfire radar (artillery regiment), visual reconnaissance and hand held aerial imagery (primarily UAV squadrons), multi-sensor imagery (UAV and F/A-18D squadrons), electronic reconnaissance (EA-6B squadrons), ground sensors (SCAMP), visual ground reconnaissance (division and force reconnaissance units), and prisoner of war interrogation (Interrogation Platoon, Intel Co). Pilot debriefs conducted by the ACE G-2 also provide a valuable source of targeting information.

  Other target acquisition assets in the MAGTF (artillery FOs, NSFS spot teams, and the surveillance and target acquisition (STA) platoon) are found at the battalion level and below. The primary mission of these assets is to support their parent units. Essential target information for reporting acquired targets consists of the reporting unit, time of acquisition, target location/size/activity, TLE, dwell time, and stationary or moving status. The FSCC can develop targets in their area of operations by monitoring calls for fire. Automated systems collect this information based on inputs received from observers and the supporting artillery FDC.

- **Deliver**. The main objective of the deliver phase is to execute the concept of fires/fire support plan on targets in support the commander’s plan. The deliver phase is comprised of a set of tactical and technical engagement solutions. The decision of whether or not to attack the target is based on the attack guidance matrix and the current situation. If the decision is made to not attack, but to track a target, it is passed back to the TIS. Other tactical considerations are how and when to attack the target. The technical solution specifies detailed attack requirements. Tactical and technical decisions can take place within separate fire support agencies (e.g., a regimental FSC makes a decision to attack an detected enemy command post with artillery and the artillery battalion FDC determines the appropriate ammunition and number of volleys to achieve the desired result). The keys to the deliver phase are well established procedures for execution, prior coordination, and rehearsals.

  When targets are identified by the FSCC for attack, the determination of when and how to attack a target is made considering attack assets available, their capabilities, the desired effects, and rules of engagement (ROE). This refined analysis produces the following tactical decisions: time of attack, desired effect, and the attack system to be used. Another important decision is the employment of combined arms in the attack of certain

targets, to include the employment of lethal and nonlethal fires (e.g., engagement of a target by artillery along with jamming or monitoring may be of greater benefit than simply firing at the target). Any remaining coordination with higher, lower, adjacent units, or other services is conducted at this time.

Once the tactical decisions have been made, the target is passed to the selected supporting arm for technical attack decisions. These decisions include the unit to conduct the attack, number and type of munitions, and response time. The supporting arm's ability to respond based on range, time on station, available munitions, and reaction time cannot be assumed but are functions of the prior coordination and the current situation.

The extent of the deliver function depends on time available, the target type, and attack guidance. Targets attacked immediately are prioritized in accordance with attack guidance. A time sensitive target (moving or short dwell time) may need tracking if it is not attacked within the appropriate response time. Planned targets may be attacked individually or incorporated into the appropriate fire plan; e.g., ATO, schedule of fires. When time is available, a thorough analysis is conducted for detailed consideration of targets. The authority to decide to attack is normally decentralized because of the need for responsiveness. When time is limited, the process may be greatly abbreviated.

- **Assess**. Combat assessment reveals whether or not the commander's guidance has been met and determines the overall effectiveness of force employment. It must be objective and measure the things that are important to commanders, not make important the things that are easily measurable. In the decide phase the commander approves the critical targets on which damage assessment is required and the type of surveillance desired. Fire support planners identify how damage assessment will be collected, considering limited assets and continued requirements for the detect phase. The degree of reliability and credibility of the assessment depends largely upon collection resources. CA will lead to reattack recommendations with the potential to change plans and modify commander's guidance. Combat assessment includes BDA and reattack recommendations.

  BDA is the timely and accurate estimate of damage resulting from the application of military force, lethal or nonlethal, against a target. It is primarily an intelligence responsibility, however, at the tactical level, BDA provides commanders a snapshot of targeting effectiveness and enemy status. In the targeting process, BDA helps to determine if reattack of a target is necessary. It may take many forms, including number of casualties, damage to equipment, target reaction to the attack (e.g., moving, hardening), or deception efforts.

  On the basis of BDA and target assessment, a determination is made whether or not the desired effects were achieved. This may apply to a specific target or to systems. Major factors incorporated into CA and reattack or modified attack guidance recommendations are the unit basic load, the required supply rate, and the controlled supply rate.

  The employment of fire support assets for reattack is coordinated the same way as employment of TA assets for detection. This is most easily done when assessment is planned, coordinated, and, when possible, executed concurrently with the attack. At lower levels, specific targets may be designated for assessment. When the attack of a target is controlled and observed by an FO, FAC, NSF spotter, or any other observer, separate tasking for assessment is not necessary. When active assessment is not possible, other measures can be used to assess effects on a target. For example, if an artillery battery were to be attacked, the appropriate measure of a successful attack might be the termination of firing by the target. If a target is of such importance that its destruction or neutralization must be confirmed before a planned course of action can be initiated or continued, then positive assessment must be accomplished regardless of risk.

b. Joint Targeting Process

The joint targeting process determines the employment of military force to achieve the JFC’s objective. Both operations and intelligence share this function. The joint targeting process includes the steps by which target intelligence and target materials are produced and applied to support operational decisionmaking and force

employment. The joint targeting process is depicted as a "cyclical process" with sequential phases. However, the joint targeting process is really a continuously operating series of closely related, interacting, and interdependent functions. It provides for a logical progression in the development of targeting solutions. It proceeds from the definition of the problem to an assessment of the solution. The cycle allows the targeting officer to test multiple solutions and refine both the understanding of the problem and the proposed solutions.

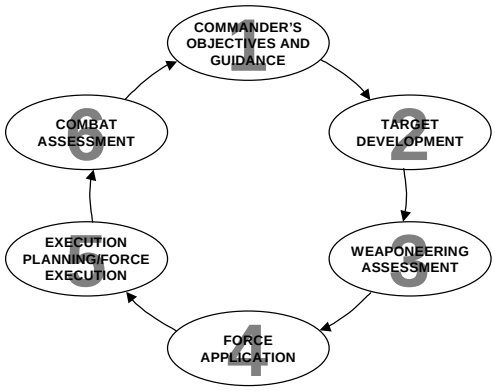


Figure 5-11. Joint targeting process.

Joint targeting is not a static, inflexible process, but rather a dynamic process that must be fluidly applied. Each phase of the process can directly affect other phases of the process. For example, CA directly affects subsequent force application if mission results prove inadequate. Likewise, weaponeering directly affects execution planning as weapons will influence execution tactics.

c. Joint Air Tasking Cycle

The joint air tasking cycle is a systematic process that matches available capabilities/forces with targets to achieve operational objectives. The cycle provides a repetitive process for the planning, coordination, allocation, and tasking of joint air missions/sorties, within the guidance of the JFC. The cycle accommodates changing tactical situations or JFC guidance, as well as requests for support from other component commanders. The joint air tasking cycle is an analytical, systematic approach that focuses targeting efforts on supporting operational requirements. Much of the day-to-day joint air tasking cycle is conducted through an interrelated series of information exchanges (through designated component liaison officers and/or messages), which provide a means of requesting and scheduling joint air missions.

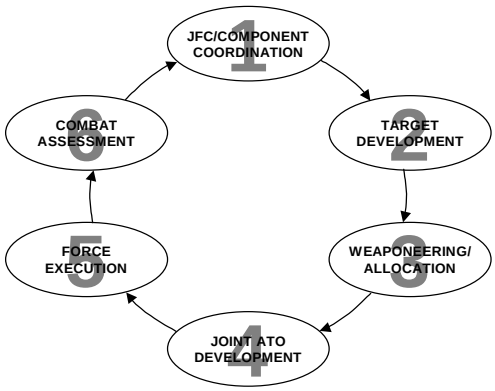


Figure 5-12. Joint air tasking cycle.

There are usually three joint ATOs at any time—

- The joint ATO in execution (today's plan).
- The joint ATO in production (tomorrow's plan).
- The joint ATO in planning (the following day's plan).

The following table shows the actions of the JFC and MAGTF during each of the joint air tasking cycle phases.

Joint Air Tasking Cycle Phase	Joint Task Force	MAGTF
Phase 1: JFC/Component Coordination	JFC's guidance and objectives (36-48 hours prior to air tasking day): • Targeting priorities. • JTL/JIPTL planning guidance. • Fire support coordinating measures. • Rules of engagement. • Definition of component direct support sorties. JFC's apportionment decision: • Total expected effort by percentage and/or priority that should be devoted to the various air operations and/or geographic areas for a given period of time. • Components informed through a guidance and intentions message.	Direct support plan submitted.
Phase 2: Target Development	Joint air operation center (combat plans) processes potential targets from the JIPTL. Components submit TGTINFOREPs: • No later than 26 hours prior to air tasking day. • Nominate targets, submit CA information, recommend no-strike targets, cancel, or renew targets.	The commander determines targeting objectives and priorities. The targeting board: • Receives MSC target nominations for deliberation, deconfliction, and prioritization. • Produces MAGTF target nomination list which includes direct support targets and common sourced target nominations.
Phase 3: Weaponeering/ Allocation	Weaponeering includes turning the JIPTL into the Master Air Attack Plan. During allocation the JFACC translates the apportionment decision into number of sorties. This is done through the exchange of ALLOREQs.	MAGTF submits AIRSUPREQs for preplanned targets for the next day's ATO. This is done no later than 24 hours prior to the air task day.
Phase 4: Joint ATO Development	SORTIEALOT sent by JFACC no later than 12-18 hours prior to air task day. It contains: • Revisions to component allocations. • Approval/disapproval of component requests. • Revisions to mission data. JFC and JFACC guidance, target worksheets, the Master Air Attack Plan and component requirements are used to finalize the joint ATO, SPINS, and airspace control order. The joint ATO is transmitted 12 hours prior to the air task day.	Submit direct support Marine ATO for integration into the joint ATO. Submit critical changes to target requests and asset availability.
Phase 5: Force Execution	JFACC directs execution and/or deconflicts all capabilities/forces made available for the joint ATO. Capabilities/forces not apportioned for tasking, but included in the joint ATO for coordination purposes, will be redirected only with the approval of the respective component commander or designated senior JAOC liaison officer.	Complete transition of joint ATO between future operations and current operations (both at the command element and the aviation combat element. Manage critical changes to target requests, priorities, and asset availability.
Phase 6: Combat Assessment	Done at all levels of the joint force. It determines if the required target effects are being achieved to meet the JFC's overall concept. JFACC/JFC staff continuously evaluate results of joint air operations and provide these results to the JFC for consolidation and overall evaluation of the current campaign.	MAGTF conducts assessment. Submit MISREPs, BDA reports, and TGTINFOREPs to the JFC.

Table 5-48. Actions during the joint air tasking cycle phases.

d. Targeting Process Comparison

While the Marine Corps targeting process differs from the joint targeting process and the joint air tasking cycle, each of the targeting processes achieve the same results. The MAGTF uses the D3A methodology for targeting within its AO using organic forces/capabilities. The MAGTF uses the joint targeting process for targeting outside their AO or when targeting inside their AO using other Services' forces/capabilities (other than joint air). The MAGTF interacts with the joint air tasking cycle during joint air operations.

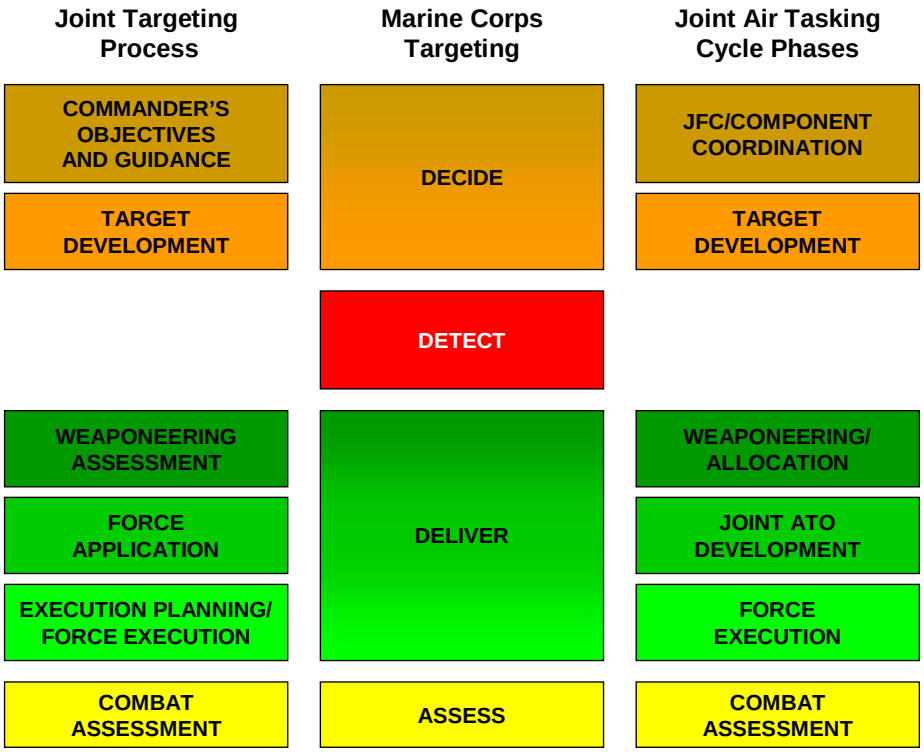


Figure 5-13. Targeting process comparison.

5013. Naval Surface Fire Support Planning Factors

a. Naval Gunfire Weapons Capabilities

	5"38	5"/54 NM 42/MK 45
Max Range (m)	15,900	21,887
Max Range (m) reduced charge	8,100	12,200
Ammo	HE/HC/ILL/WP/RAP	HE/HC/ILL/WP/RAP
Max Rate of Fire (rpgpm)	20	30/20
Sustained Rate of Fire	15	20/16
Fuzes	PD/MT/CVT/VT	PD/MT/CVT/DEL
Danger Close (m)	750	750
	Illumination	**Factors**
Burn Time (sec)	45	45 - 72
Rate of Fall (m/s)	10	10 /- 2

Table 5-49. Naval gunfire weapons capabilities.

b. Ship Armament

Ship Class	Gun Calibers	Number of Guns	Magazine Capacity	HE Bursting Radius (m)
CGN-9	5"/38	2	1,200	30
CG-26/CGN-35	5"/54	1	600	45
CGN-36/38/CG-47	5"/54	2	1,200	45
DD-963/DDG-2/99	5"/54	2	1,200	45
DDG-31/37/51	5"/54	1	600	45
DD-945	5"/54	3	1,800	45
FF-1052	5"/54	1	600	45
LHA-1	5"/54	2	1,200	45
FF-1098	5"/38	1	600	30

Table 5-50. Ship armament.

5014. NBC Defense Planning Factors and Considerations

a. Mission-Oriented Protective Postures

MOPP EQUIPMENT	MOPP LEVEL ZERO	MOPP LEVEL 1	MOPP LEVEL 2	MOPP LEVEL 3	MOPP LEVEL 4
Mask	Carried	Carried	Carried	Worn*	Worn
Overgarment	Available	Worn*	Worn*	Worn*	Worn
Overboots	Available	Available	Worn	Worn	Worn
Gloves	Available	Carried	Carried	Carried	Worn
* In hot weather coat or hood can be left open for ventilation.					

Table 5-51. Mission-oriented protective postures.

b. Chemical Agent Persistency at 70 degrees Fahrenheit

	GA / GF	GB	GD / HL	HD	VX
CARC	0.71	2.45	4.64	6.33	634
Sand	1.24	4.28	8.12	11.07	1109.5
Bare soil	3.19	11.02	20.88	28.45	2853
Alkyd paint	0.92	3.18	6.03	8.22	824.2
Information extracted from FMFM 11-17			Numbers = Hours		

Table 5-52. Chemical agent persistency at 70 degrees F.

c. Chemical Agent Persistency at 80 degrees Fahrenheit

	GA / GF	GB	GD / HL	HD	VX
CARC	0.71	2.45	4.64	6.33	634
Sand	1.24	4.28	8.12	11.07	1109.5
Bare soil	2.84	9.8	18.56	25.32	2536
Alkyd paint	0.92	3.18	6.03	8.22	824.2
Information extracted from FMFM 11-17			Numbers = Hours		

Table 5-53. Chemical agent persistency at 80 degrees F.

d. Chemical Agent Persistency at 90 degrees Fahrenheit

	GA / GF	GB	GD / HL	HD	VX
CARC	0.33	1.35	2.36	2.8	241
Sand	1.48	6.07	10.62	12.6	1084.5
Bare soil	1.32	5.4	9.44	11.2	964
Alkyd paint	0.42	1.75	3.06	3.64	313.3
Information extracted from FMFM 11-17			Numbers = Hours		

Table 5-54. Chemical agent persistency at 80 degrees F.

e. Detailed Equipment/Troop Decontamination Water Requirements

Item to be Decontaminated	Number of Items to be Decontaminated	Gallons of Water
Individual	1,000	28,500
Casualty	1,000	1,200 (+28,500)
Small vehicle	50	5,200
Large vehicle	50	7,500
Small jet/helicopter	12	1,800
Large jet	12	7,200

Table 5-55. Equipment/troop decontamination water requirements.

f. NBC Defense First-Aid Equipment

Medicants	Per man
Nerve Agent Antidote Kit (NAAK)	3 kits
Nerve Agent Pretreatment Pyridostigmine (NAPP)	1 blister pack
Convulsant Antidote Nerve Agent (CANA)	1 ea

Table 5-56. NBC defense first-aid equipment (individual issue).

g. NBC Defense Reference Publications

- JP 3-11, Joint Doctrine For NBC Defense, 10 Jul 95.
- FM 3-100, Chemical Operations, Principles, and Fundamental, 18 May 96.
- FM 3-3, Chemical and Biological Contamination Avoidance, 16 Nov 92, C1 29 Sep 94.
- FM 3-3-1, Nuclear Contamination Avoidance, 9 Sep 94.
- FM 3-4, NBC Protection, 29 May 92, C1 28 Oct 92, C2 21 Feb 96.
- FM 3-4-1, Fixed Site Protection, 16 Aug 89.
- FM 3-5, NBC Decontamination, 17 Nov 93.
- FM 3-6, Field Behavior of NBC Agents (Including Smoke and Incendiaries), 3 Nov 86.
- FM 3-7, NBC Handbook, 29 Sep 94.
- FM 3-9, Potential Military Chemical/Biological Agents and Compounds, 12 Dec 90.
- FM 3-11, Flame, Riot Control Agents and Herbicide Operations, 19 Aug 96.
- FM 3-14, NBC Vulnerability Analysis, 12 Nov 97.
- FM 3-18, Special NBC Reconnaissance (LB Team), 7 May 93.

- FM 3-19, NBC Reconnaissance, 19 Nov 93.
- FM 3-21, Chemical Accident Contamination Control, 23 Feb 78.
- FM 3-50, Smoke Operations, 4 Dec 90, C1 11 Sep 96.
- FM 3-101, Chemical Staffs and Units, 19 Nov 93.
- FM 3-101-1, Smoke Squad/Platoon Operations Tactics, Techniques, and Procedures, 20 Sep 94.
- FM 3-101-2, NBC Reconnaissance Squad/Platoon Operations TTP.
- FM 3-101-4, Biological Detection Platoon Operations Tactics, Techniques, and Procedures,1 Sep 00.
- FM 3-101-6, Biological Defense Operations, Corps/Company Tactics, Techniques, and Procedures, 1 Sep 00.
- FM 8-9, NATO Handbook on the Medical Aspects of NBC Defense Operations, 1 Feb 96.
- FM 8-10-7, Health Service Support in a Nuclear, Biological, and Chemical Environment, 26 Nov 96.
- FM 8-285, Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries, 22 Dec 95.
- TC 3-4, Chemical Battle Staff Handbook, 3 Oct 95.
- TC 3-4-1, Chemical Agent Monitor Employment, 17 Dec 91.
- TC 3-41, Protection Assessment Test System, 14 Jan 95.
- TC 3-8, Chemical Training, 29 Sep 94.
- TC 3-10, Commander's Tactical NBC Handbook, 29 Sep 94.
- Force XXI Doctrine. ANBACIS TTP and Tri-Mission Chemical Battalion/Company developed and used during the Nov 97 Advance Warfighting Experiment. FM 3-xx, Interim Digital Division NBC Operations will be developed to support fielded digital divisions. A Training Support Package (TSP) supporting both institutional (USACMLS) and unit training is being developed concurrently with the FM.
- NBC Toolbox. An NBC operational database on CD Rom and the World-Wide-Web. The address is: http://www.arl.mil/nbcweb. Contact the POC to obtain USERID and password.
- Dragon's Lair BBS. Chemical School BBS available at: http://mcclellan-cmls-bbs.army.mil/ Copies of draft manuals out for staffing will be posted on the BBS. Must register to request USERID and Password.
- Digitized Doctrine. All Army field manuals, ARTEP/MTP, GTA, etc., including all Chemical Corps FM 3-Series can be viewed at: http://www.atsc-army.org/. Manuals may be viewed online or downloaded in Portable Document Format (.PDF) readable using the Adobe Acrobat reader program available for free at: http://www.adobe.com/acrobat/ FM 3-Series publications have restricted distribution statements, therefore, our pubs are locked with a password. Authorized users may register on-line to obtain ID and password.
- Joint Doctrine. Copies of all joint doctrine, including both approved and draft JP 3-11 are available on the Joint Doctrine Homepage at: http://www.dtic.mil/doctrine/ Joint Pubs may be viewed online or downloaded in Portable Document Format (.PDF) readable using the Adobe Acrobat Reader program.

5015. Engineer Bridging Considerations

a. Ribbon/Assault Float Bridge

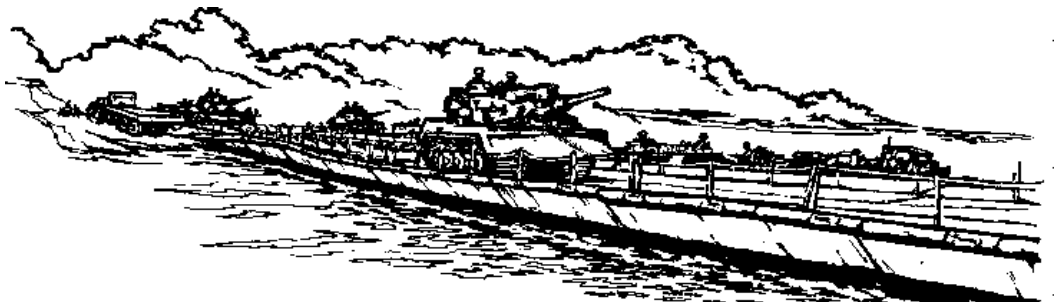


Figure 5-14. Ribbon/assault float bridging.

When making a determination to perform a tactical river or gap crossing you must consider the following:

- For gaps greater than 200 meters, rafting is generally more efficient due to currents and time to assemble.
- Assume all bridging must sustain Class 70 loads. Match the assets available to the need. If you can use a floating/ribbon bridge to meet your needs instead of a medium girder bridge (MGB), use it.

Length (ft/m)	Hours to Assemble	Class
252/77	1.0	70
125/38	0.5 (30 minutes)	70
75/23	0.3 (20 minutes)	70

Table 5-57. Ribbon/assault float bridge assembly.

One floating/ribbon bridge set has a maximum span of 252' or 77 meters, and can support up to class 70 loads. The assembly time is approximately 77m/hour. Army multi-role bridge companies rate 689' or 210 meters of ribbon bridge.

Bridge Type	Total	ESB/FSSG	MPF
Ribbon Bridge	4+6 rafts	6^{th} =0, 7^{th}=1, 8^{th}=3, 9^{th}=0	6 rafts/MPS 1, 2, 3
MGB	19	6^{th} = 4,7^{th}=2, 8^{th}=6, 9^{th}=4	3

Table 5-58. Number of bridge sets in major commands.

Notes:

- Feet/meter conversion: 1ft = .3048 meters, 1 meter = 3.2808 ft.
- Times are approximate. It generally takes more time and effort to move and offload bridging assets than it does to assemble.

These tables are for best case scenarios and must be adjusted for water current conditions.

River width (meters/feet)	100/328	150/492	300964	400/1,312
Minutes per round trip	8	10	16	20
Round trips per hour	7	6	3	3
Number of rafts per centerline	1	2	3	5

Table 5-59. River crossing capabilities.

River width (meters/feet)	500/1,640	600/1,968	800/2,824	1,000/3,280	1,200/3,936
Minutes per round trip	24	26	32	38	45
Round trips per hour	2	2	1	1	1
Number of rafts per centerline	5	6	6	6	6

Table 5-60. Raft crossing capabilities for longer span.

1 USMC Raft = 5 Interior Bays = 113 feet or 34 meters and two ramp bays, and can be assembled in 25 minutes. 1 Ribbon Bridge Bay is 22' 8"/about 7.1Meters.

Length (ft/m)	Hours to Assemble (2 story)	Class
151/47	18.0	70
102/31	12.5	70
75/23	9.5	70
50/15	6.25	70
25/8	3.0	70

Table 5-61. Medium girder bridge.

MGB, 1 set = 102’ or 31M at 70 class.
MGB Link Reinforced (2 bridges) Max 151'/47M @ Class 70

Type Unit	Vehicle	5-Bay Raft Trips		Type Unit	Vehicle	5-Bay Raft Trips
Armor Bn	161	101		Mortar Plt	8	2
Mech Bn	153	65		Scout Plt	6	2
FA Bn (155)	165	61		Engr Plt	5	2
Engr Bn (ERI)	139	59		Div Cav Troop	24	16
ACR	208	110		ACR Troop	24	16
Tank Co	15	14		ACR Tank Co	15	14
Mech Co	15	7		ACR HQ	6	3
TF HQs	6	4		FA Btry (155)	18	9
FA Btry (ACR)	13	10		TF Cbt Trains	30	13

Table 5-62. Unit raft requirements (Army).

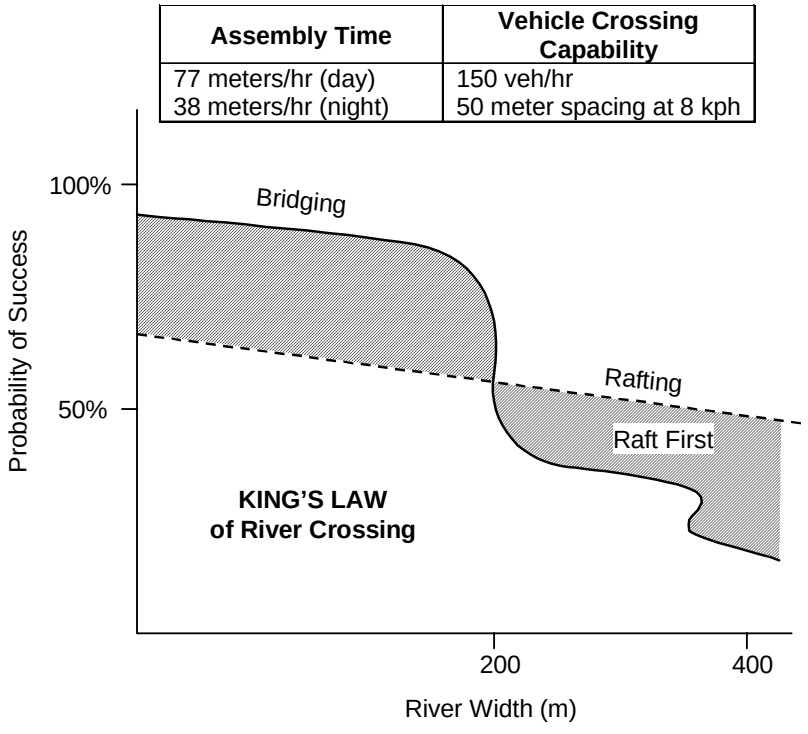


Figure 5-15. King’s Law of River Crossing.

b. Bailey M2 Bridge

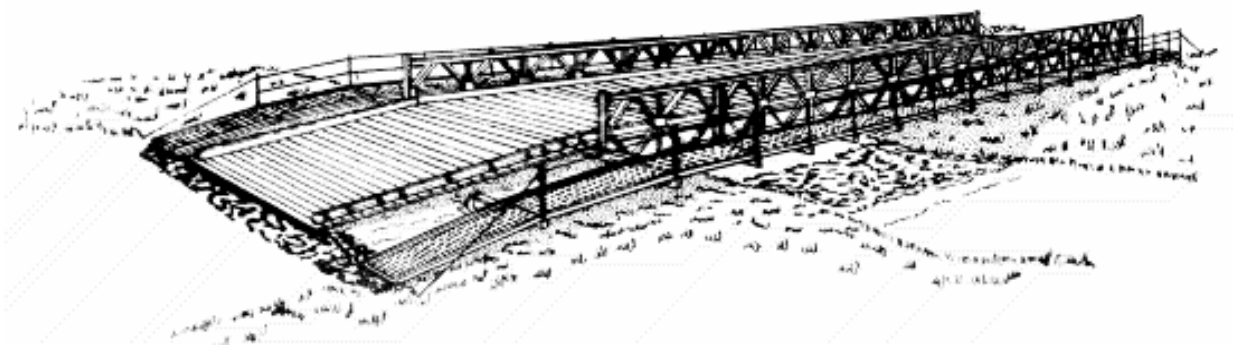


Figure 5-16. Bailey bridge.

The Bailey bridge is a through-type truss bridge, the roadway being carried between two main girders. The trusses in each girder are formed by 10-foot panels pinned end to end. In this respect, the Bailey bridge is often referred to as the "panel" or "truss" bridge. It is versatile. Standard parts can be used to assemble seven standard truss designs for efficient single spans up to 210 feet long and to build panel crib piers supporting longer bridges. There are no Bailey/M2 bridges in the USMC inventory. There are Bailey bridges in U.S. contingency stocks/ war reserve. Reference: FM 5-277

Truss/Story	Arrangement	Maximum Class 70 Length	
Single Single	SS	N/A	N/A
Double Single	DS	50ft	15m
Triple Single	TS	80ft	24m
Double Double	DD	110ft	34m
Triple Double	TD	120ft	37m
Double Triple	DT	140ft	43m
Triple Triple	TT	170ft	52m

Table 5-63. M2 Bailey bridge.

Type of Construction									
Span (ft/m)	SS	DS	TS	DD	TD	DT	TT	DT	TT
Construction by Manpower Only								Using One Crane	
40/12.1	1½								
60/18.3	1¾	2							
80/24.4	2	2¾	3						
100/30.5	2½	3	3½	4½					
120/36.6		3½	4	5	6½				
140/42.7		3¾	4½	5½	7½	11¾		10½	
160/48.8			5	6½	8½	13¾	19	11¾	16½
180/54.9				7	9½	14¾	21½	13½	18¼
200/61						16¾	24	14½	20½

Table 5-64. Estimated time for assembly (hours).

c. Armored Vehicle-Launched Bridge

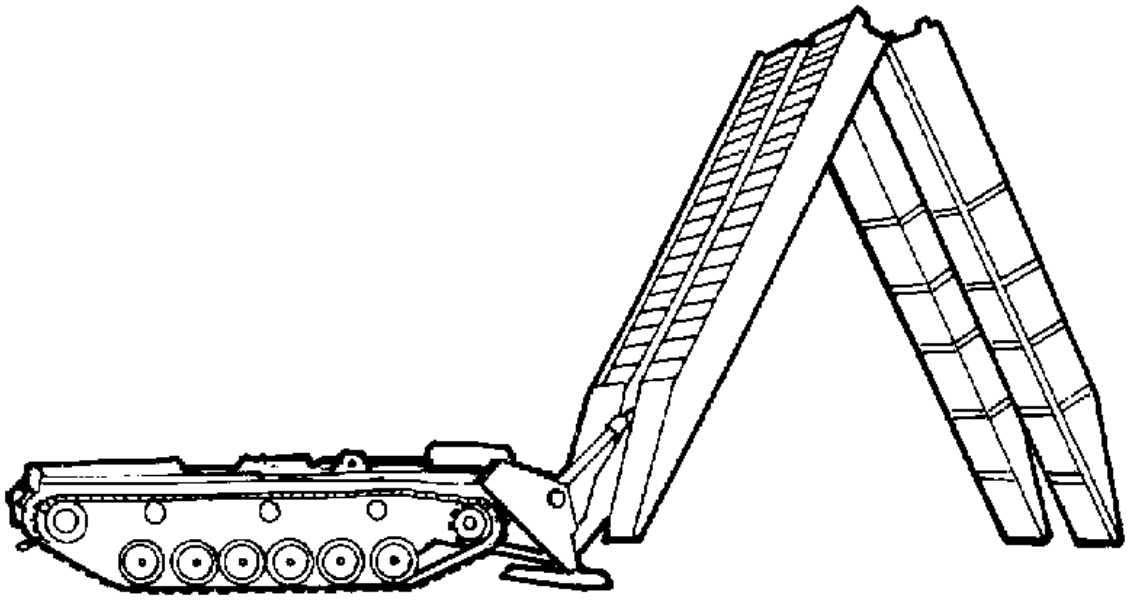


Figure 5-17. Armored vehicle-launched bridge.

The armored vehicle-launched bridge (ALVB) consists of three major sections: the launcher, the hull, and bridge. The launcher is mounted as an integral part of the chassis. The bridge, when emplaced, is capable of supporting tracked and wheeled vehicles with a military load. The bridge can be retrieved from either end. The roadway width of the AVLB is 12 feet. The bridge can be employed in two to five minutes, and retrieved in 10 minutes under armor protection.

MPS	I MEF	II MEF	Reserves	Stores	Total
6	6	6	3	34	55

Table 5-65. Armored vehicle-launched bridge/scissors bridge locations and quantities.

MPS	I MEF	II MEF	Reserves	Stores	Total
6	6	4	3	19	36

Table 5-66. M60 chassis locations and quantities.

The AVLB/scissors bridge can span a gap 57 feet with unprepared abutments and 60 feet with prepared abutments. The carrying capability is class 60. An upgrade program is underway to increase carrying capability to class 70.

The USMC maintains the AVLB within the tank battalions. The AVLB is on a modified M60 tank. No upgrade or change in chassis is planned. The Army maintains the AVLB within the engineer multi-purpose bridge company and uses engineers to operate it. The Army is developing a Heavy Assault Bridge to be mounted on an M1 tank.

5016. Engineer Breaching Considerations

See FMFM 13-7, *MAGTF Breaching Operations*, and FMFM5-34, *Engineer Field Data*.

a. Breaching Tips

- Find a bypass, if possible (use caution to avoid kill zones).
- Breach fundamentals:
- Need 2-Lanes for Battalion.
- Need 4-Lanes for Regiment.
- Space lanes at least 500m apart.
- Go for more lanes than you need.
- Attack flanks (weak points) of obstacles or defense.

The acronym **SOSRR** stands for—

- **S**uppress
- **O**bscure
- **S**ecure
- **R**educe
- **R**esupply

b. Breaching Sequence

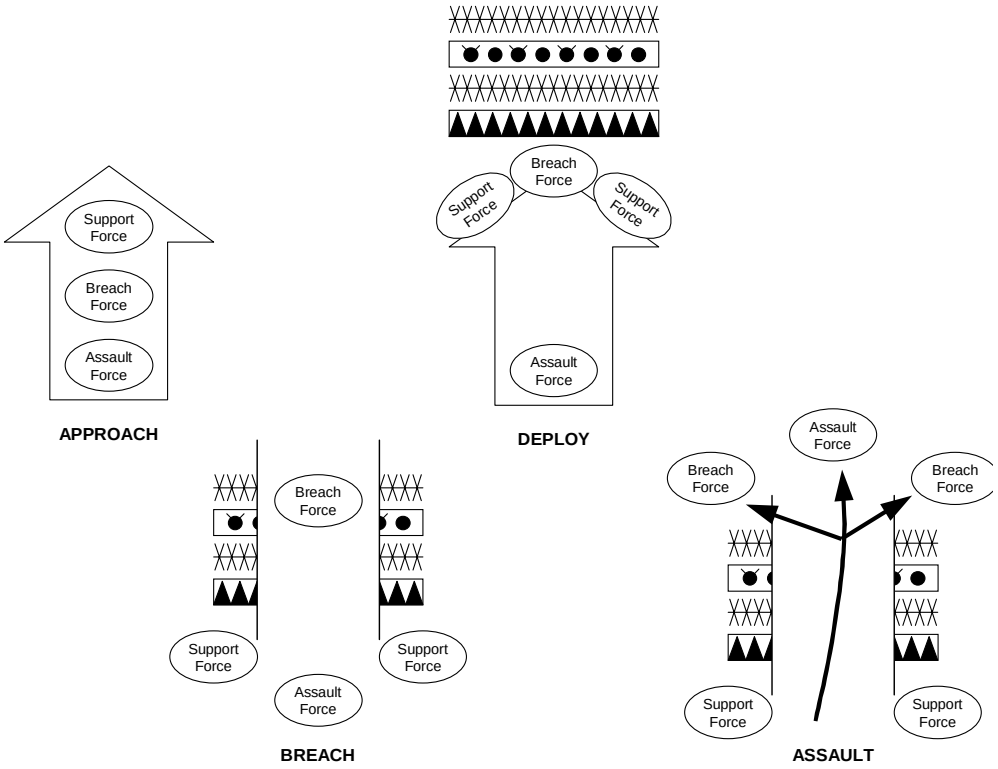


Figure 5-18. Breaching sequence.

c. Breach Complexity

This following table shows the complexity and time factors for expeditious planning of a breach when briefing at the division or higher level.

Action	Element	Time (Minutes)	Controlled By
Develop situation (verifying boundary of enemy obstacle system)	Force in contact	M to 2	S3/G3
Maneuver support force into overwatch position	Support	M + 2 to 15	Support CDR
Maneuver assault force into covered assault position	Assault	M + 2 to 15	Assault CDR
Call for artillery	DS artillery	M + 2 to 15	FSO
Build smoke	Mortars	M + 5 to 10	FSO
Suppress enemy with direct fires	Support	M +15 to 29	Support CDR
Suppress enemy with artillery fires	DS artillery	M + 10 to 29	FSO
Maintain smoke	DS artillery/mortars	M + 10 to 30	FSO
Maneuver breach force to breach location	**Breach**	**M + 20 to 23**	**Breach CDR**
Reduce obstacle prepare two lanes	**Breach**	**M + 23 to 30**	**Engineer Leader**
Place smoke pots	Breach	M + 23 to end of mission (EOM)	Breach CDR
Shift direct fires of f of the OBJ	Support	M + 29 to 30	Assault CDR
Shift indirect fires beyond OBJ	DS artillery	M + 29 to 30	Assault CDR
Assault to destroy enemy on far side of obstacle	Assault	M + 30 to 45	Assault CDR
Reorganize to continue mission	TF	M + 45 to EOM	S3
M= Contact with obstacle			

Table 5-67. Breaching complexity and time factors.

d. Breaching and Clearing Methods

From FM 5-34, Table 2-3 with modifications.

Nomenclature	Type	Mines Cleared	Weight (lbs)	Width Meters (ft)	Length Meters (ft)	Assembly Time	Employment Time in Minutes (Speed)
M193/M58A3 (Miclic)	Trailer Mounted	AT/AP	2900 ea	8 (26)	100 (328)	Crane and crew 35 min	4 (25 mph)
ML25 3 Shot (3 Miclics)	AAAV Mounted	A7/AP	2519 ea	8 (26)	300 (984)	Crane and crew 60 min	1 (30 mph)

Table 5-68. Explosive breaching and clearing.

Nomenclature	Type	Mines Cleared	Weight (lbs)	Width Meters (ft)	Preparation Time	Employment Time in Minutes (Speed)
Roller	Tank mounted	AT/AP	20,000	2 @ 1.1 (3.6)	Crane and crew 45 minutes	4 (5 mph)
Plow	Tank mounted	AT/AP	12,000	2 @ 1.8 (6)	Crane and crew 45 minutes	4 (3 mph)

Table 5-69. Mechanical breaching and clearing.

e. Breaching and Clearing Equipment

TAMCM	Nomenclature	Qty	Location
BO475	AN/PSS-12 Mine detector	38	CEB
BO589	M9 ACE	16	CEB
B1298	MK155 Line Charge Launcher	38	CE Bn and ES Bn
B1315	MK154 Line Charge (3 shot)	9	AAAV Bn
EO149	AVLB Bridge	6	Tank Bn
EO150	AVLB Chassis	4	Tank Bn
EO996	M1A1 Tank track width plow	16	Tank Bn

Table 5-70. Breaching and clearing equipment in a Marine division.

TAMCM	NOMEN	Qty	Location
N/A	D7 Armor kits	16	MCLB Albany
E0996	M1A1 Tank track width plow	72	MCLB Albany
F2069	M1A1 Tank rollers	7	MCLB Albany
F6031	Joint Service Flail System	3	MCLB Albany
U3031	Australian Mine Plows (for D8)	8	MCLB Albany
N/A	Mine clearing flail system	3	MCLB Albany
N/A	Towed assault bridging (TAB)	6	MCLB Barstow
N/A	Fascines	29	MCLB Albany
N/A	Fascines	42	MCLB Barstow

Table 5-71. Breaching and clearing equipment at Marine Corps Material Command.

5017. Engineer Obstacle Considerations

- Obstacles should support weapon systems.
- Obstacles should not impede our own mobility.
- Obstacles must hinder enemy movement.
- Obstacles are emplaced in depth, as resources will feasibly support considering time manpower and logistical complaints.

a. Hand Emplacement

	Disrupt	Turn	Fix	Block
Std Minefield Frontage (M)	250	500	250	500
Depth (M)	100	300	120	320
Time Required (Company)	30 min	1½ hrs	36 min	2 hrs

Table 5-72. Time to hand emplace minefield.

b. Minefield Design

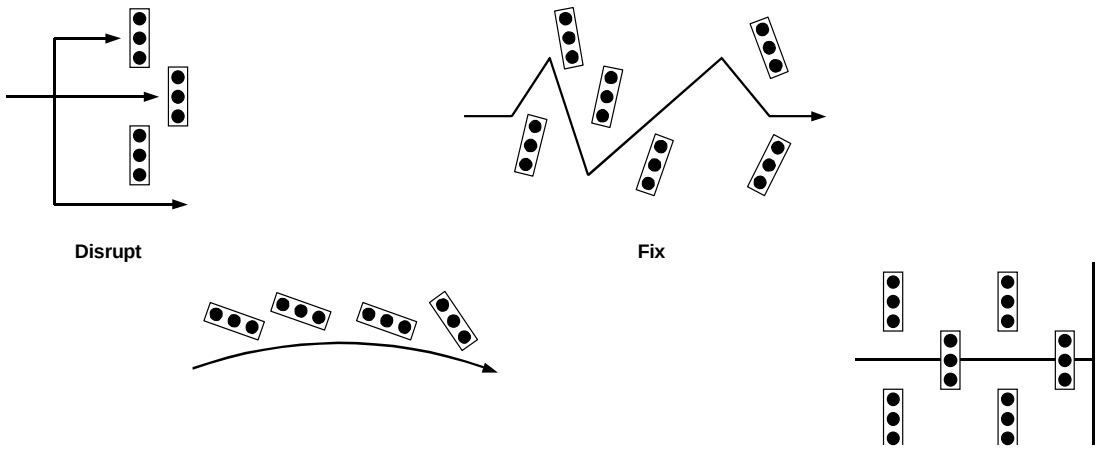


Figure 5-19. Minefield design.

Width of Avenue of Approach (m)	Disrupt	Turn	Fix	Block
500	0.5 hrs	1.4 hrs	1.0 hrs	4.0 hrs
1000	1.0 hrs	2.8 hrs	2.0 hrs	8.0 hrs
1500	1.5 hrs	4.2 hrs	3.0 hrs	12.0 hrs
2000	2.0 hrs	5.6 hrs	4.0 hrs	16.0 hrs
3000	3.0 hrs	8.4 hrs	6.0 hrs	24.0 hrs
4000	4.0 hrs	11.0 hrs	8.0 hrs	32.0 hrs
5000	5.0 hrs	14.0 hrs	10.0 hrs	40.0 hrs

Table 5-73. Company hours for hand emplacement.

The table below will be of value when developing counter mobility plans to ensure all obstacles are covered by fire.

Friendly	Max Eff
M203 Grenade launcher	160m
SMAW Multi Purpose Assault	450m
M16A2 Rifle	580m
DRAGON	1,000m
M249 Machinegun	1,000m
M60 Machinegun	1,100m
M2 - .50 CAL Machinegun	1,200m
MK-19 Grenade launcher	1,600m
AAAV – Bushmaster II 30mm	2,000m
AAAV – 7.62mm Machine Gun	900m
M240G- 7.62mm Machine gun	1,800m
LAV 25mm All Purpose Rounds	1,800m
LAV 25mm High Explosive	2,200m
JAVELIN	2,000m
Dragon Fire 120mm unassisted	9,000m
Dragon Fire 120mm rocket assisted	9,000m
60 mm MORTAR	3,500m (Illum) 3,200m (WP) 3,500m
81 mm MORTAR	5,800m (Illum) 5,100m (WP) 4,500m
AH-1Z - HELLFIRE	8,000m
M777 155mm	30km
M777 155mm (RAP)	40km
HIMARS – 227mm	32km
HIMARS – ATACMS	142km

Enemy	Max Eff
BMP1 – 73mm	800m
BMP2 – 30MM	1,000m
T55 – 100mm	1,500m
T62 – 115mm	1,600m
BTR – 14.5mm	2,000m
BRDM – 14.5mm	2,000m
BMP3 – 30mm	2,000m
T64 – 125mm	2,100m
T72 – 125mm	2,100m
T80 – 125mm	2,400m
T90 – 125mm	2,400m
BMP1 – AT3	3,000m
T80 – AT8	4,000m
BMP3 - 100mm	4,000m
BMP2 – AT4/AT5	4,000m
T90 – AT11	4,000m
BMD – AT4/AT5	4,000m
BMP3 – AT10	5,000m
152 mm Howitzer	12,400m
SM-240mm Mortar	12,700m
BM-21 MLRS	20,500m
130mm Field Gun	27,150m
M-203 mm Howitzer	30km

Table 5-74. Weapons ranges to determine obstacle coverage by fire.

Notes:

- 30mm main gun firing two different types of rounds:
  - All purpose round—2500m.
  - High explosive incendiary round—3000m.

c. Demolitions

Target	Material				Time (hrs)
	TNT (lbs)	Cratering Charge (40 lb.)	Shaped Charge (40 lb.)	Thermite Grenades (each)	Hours to destroy w/10 men
Highways: • Major bridge (over 400') • Minor bridge (up to 400')	 1200 800				 3 2
Tunnels	12,000				5
Road Craters: • 2-lane road (27') • 4-lane road (70')		 7 19	 2 12		 2 4

Railroads:
• Major bridge (over 400'):
  • Single track
  • Double track
• Minor bridge (under 400)
  • Single track
  • Double track
• Tunnel
• Terminal facilities
• Rolling stock (locomotive and 30 cars)
	
	3,000
	4,500
	
	2,000
	3,000
	12,000
	1,000
	50
				
				50
				125
					
					6
					6
					
					4
					4
					5
					4
					4

Airfields:
• Runway (per 1000')
• Fuel storage (per tank) :
  • Below ground
  • Above ground
• Radar/radio apparatus
	
	5,500
	
	400
	
	30
			
			25
			
			1
				
				1
				1
				10
					
					8
					
					1
					0.2
					0.5

POL Facilities: • Storage and handling • Refining facilities • Distributing facilities	 50 100 20	 15		 10 15 2	 1 1 0.2
Electric Power Denial: • Generator • Transformer station	 150 100			 10 25	 1 1
Telecommunications Denial: • Microwave Tower • Telephone exchange • Repeater/radio station • Satellite Dish	 25 25 50 25			 2 2	 0.1 0.2 0.2 0.1
Waterways Denial: • Lock • Levee wall • Dam (navigational)	 200 1,000	 15	 10		 1 2 2.5

Table 5-75. Destruction of operational targets.

Notes:

- For classification data, see FM101-10-3, paragraph 4-8.
- This table is intended as a guide for planning purposes only

5018. Engineer Survivability Considerations

	Number of D7G Dozers			
	2	**4**	**6**	**8**
LAR Plt (7 LAV 25)	16 hrs	8 hrs	6 hrs	4 hrs
LAR Co (25 LAV 25)	56 hrs	28 hrs	21 hrs	14 hrs
TANK Plt (4 M1A2)	9 hrs	5 hrs	4 hrs	2.5 hrs
TANK Co (14 M1A2)	32 hrs	16 hrs	12 hrs	8 hrs
FA Btry (6 155mm)	14 hrs	7 hrs	5 hrs	3.5 hrs
FA Bn (18 155mm)	40 hrs	20 hrs	15 hrs	10 hrs
AAAV Plt (6 AAAV)	14 hrs	7 hrs	5 hrs	3.5 hrs
AAAV Co (48 AAAV)	108 hrs	54 hrs	41 hrs	27 hrs

Table 5-76. Time required for the M9 Armored Combat Earthmover to complete a fighting position.

	Number of D7G Dozers			
	2	**4**	**6**	**8**
LAR Plt (7 LAV-25)	8 hrs	4 hrs	3 hrs	2 hrs
LAR Co (25 LAV-25)	26 hrs	13 hrs	10 hrs	6.5 hrs
TANK Plt (4 M1A2)	8 hrs	4 hrs	3 hrs	2 hrs
TANK Co (14 M1A2)	26 hrs	13 hrs	10 hrs	6.5 hrs
FA Btry (6 155mm)	10 hrs	5 hrs	4 hrs	2.5 hrs
FA Bn (18 155mm)	28 hrs	14 hrs	11 hrs	7 hrs
AAAV Plt (6 AAAV)	6 hrs	3 hrs	5 hrs	1.5 hrs
AAAV Co (48 AAAV)	48 hrs	24 hrs	18 hrs	12 hrs

Table 5-77. Time required for the M7G Dozer to complete a fighting position.

Whenever possible M9 ACEs and D7G Dozers should be employed in pairs or teams. This will increase productivity to about 2.5 for 2 blades.

If you are working an ACE or D7 Dozer for 4½ hours, here is how the time is apportioned for planning—

- 3½ hrs digging.
- ½ hr maintenance.
- ½ hour for moving/marking.

5019. Engineer Bulk Fuel Considerations

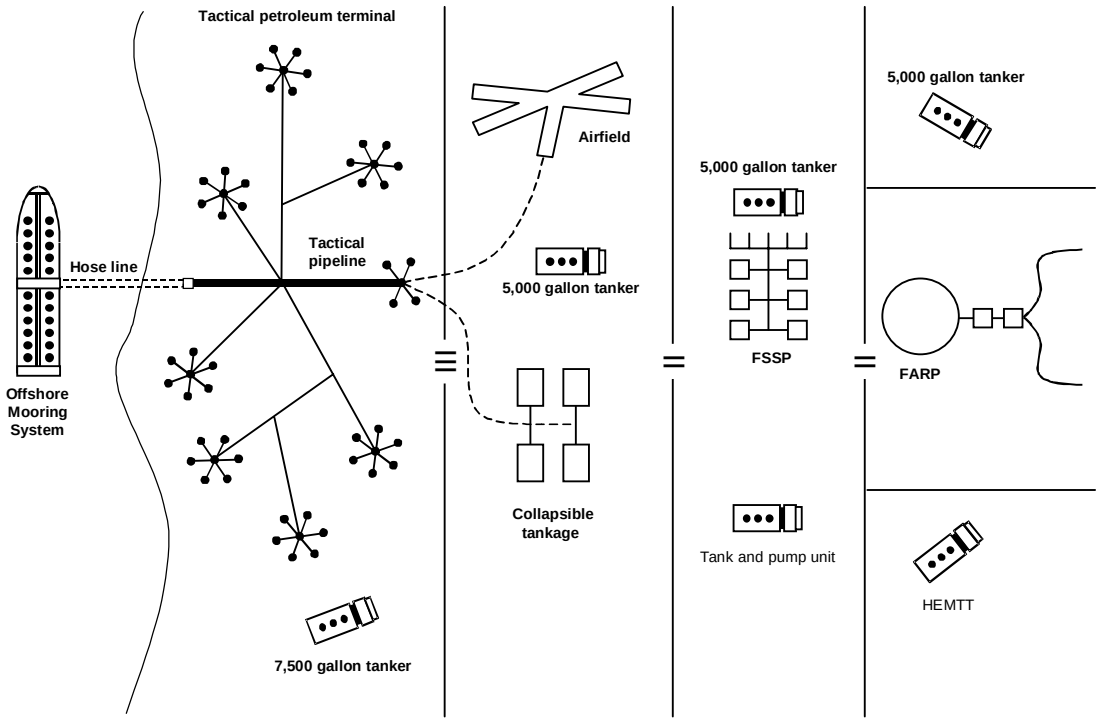


Figure 5-20. Typical bulk petroleum distribution in an undeveloped theater.

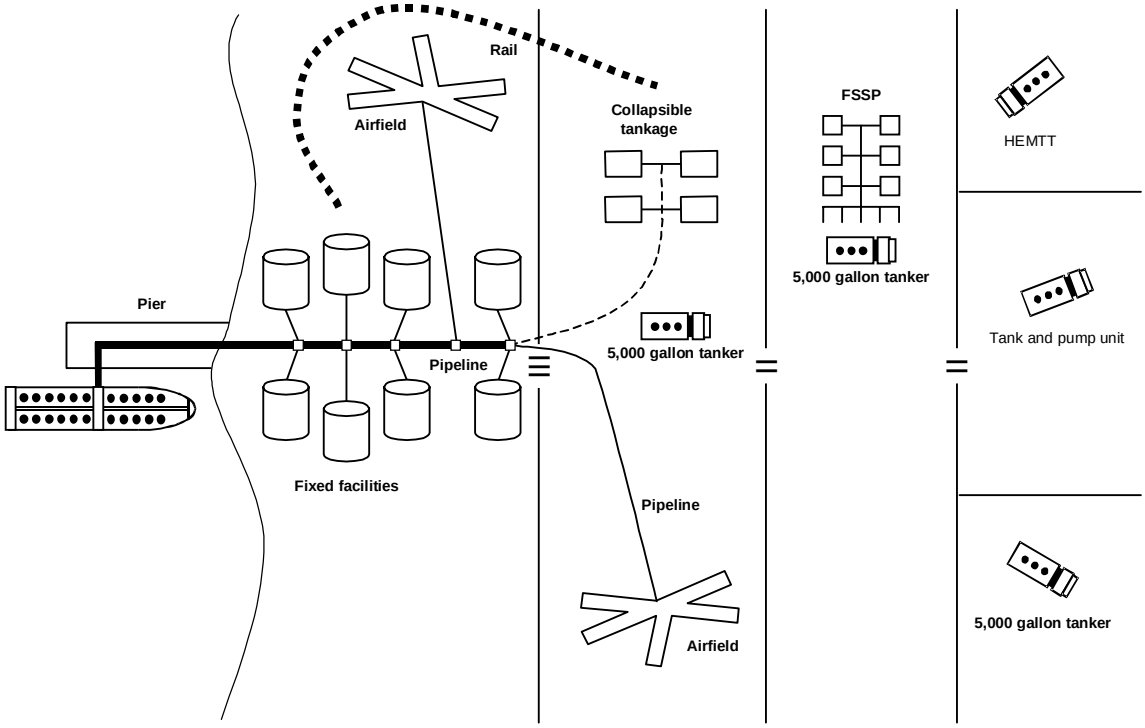


Figure 5-21 Typical bulk petroleum distribution in a developed theater.

a. Amphibious Assault Fuel System

It requires 16 amphibious assault fuel systems (AAFSs) to support a MEF. Each USMC bulk fuel Company rates 8 AAFSs. Two bulk fuel companies are required to support a MEF. The AAFS does not have aircraft refueling capabilities. (Note: The AAFS began undergoing a reconfiguration starting in FY00. The reconfigured AAFS will consist of a mix of 50k and 20k gallon fuel capacity fuel tanks and modification of its fuel receiving, transfer and issuing capabilities for increased efficiencies. It will require 4 reconfigured AAFS to support a MEF with 4 reconfigured AAFS per bulk fuel company. Only one bulk fuel company will be required to support a MEF.)

Capability		Current AAFS	Reconfigured AAFS
Storage		600,000 gal	1,100,000 gal
Receipt	Ship-to-shore	720,000 gal per day	720,000 gal per day
	From rail tanker	600,000 gal per day	1,100,000 gal per day
	From tanker trucks	600,000 gal per day	1,110,000 gal per day
	Bulk issues	360,000 gal per day	550,000 gal per day
	Retail issues	360,000 gal per day	550,000 gal per day
	Assault hose line bulk distribution	3.5 miles at 720,000 gal per day	See Hose Reel System
Note: All receipt, issue and transfer capabilities are based on a 20 hr operational day.			

Table 5-78. Amphibious assault fuel system.

b. Tactical Airfield Fuel Dispensing System

The tactical airfield fuel dispensing system (TAFDS) provides tactical aircraft refueling services (hot and cold) at MAGTF tactical aircraft bed-down sites, expeditionary airfields (EAF), and forward operating bases (FOB). A fixed-wing MWSS rates 6 TAFDS while a rotary-wing MWSS rates 4 TAFDS. It requires 1 fixed-wing and 1 rotary-wing MWSSs to support a MEB. The TAFDS includes a mix of 50k and 20k gallon capacity fabric fuel tanks. For the future reconfigured TAFDS, the fixed-wing MWSS will rate 3 TAFDS and the rotary-wing MWSS will rate 2.

Capability		Current TAFDS	Reconfigured TAFDS
Storage		120,000 gal	320,000 gal
Receipt	From AAFS assault hose line	720,000 gal per day	720,000 gal per day
	From tanker truck	120,000 gal per day	720,000 gal per day
	Issue	6 refueling points at 250,000 gal per day	12 refueling points at 500,000 gal per day
Note: All receipt, issue and transfer capabilities are based on a 20 hr operational day.			

Table 5-79. Tactical airfield fuel dispensing system.

c. Hose Reel System

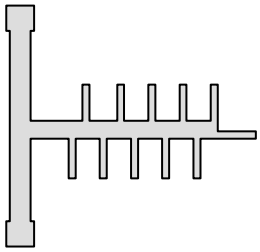
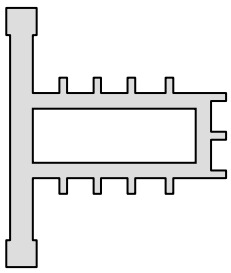
A hose reel system (HRS) consists of 6 inch diameter “lightweight” hose loaded on a reel that is mobile loaded on a 900 series tactical vehicle for deployment and recovery. Each HRS will consist of 11 hose reels with 2400 ft of hose per reel with an overall assault hose line distance of 5 miles per HRS. The lay rates for the HRS will be 2.0 to 2.5 miles per hour and a retrieval rate of 0.5 to 0.75 miles per hour. Each MEF rates 8 HRS for a total of 40 miles. The HRS has a 600 gal per min flow rate with up to 720,000 gal per day, as based on a 20 hr operational day.

Type	Storage Cap	Time to construct (earthwork)
Helicopter Expedient Refueling System (HERS)	10k gal	No earthwork required
Fabric Tank Linear Tank Farm	20k gal	2 D7 Dozer hours
Horse Shoe Tank Farm Layout	120k gal	3 D7 Dozer hours
Amphibious Assault Fuel System with Side-by-Side Linear Tank Farm Berms	600k gal	12 D7 Dozer hours
Fabric Fuel Tank Berm	50k gal	1 D7 Dozer hour
Horse Shoe Fuel Tank	50k gal	3 D7 Dozer hours

Table 5-80. Time to construct various tank farm configurations.

5020. Engineer Expeditionary Airfield Considerations

The storage of these assets on MPF ships have reduced the US deployment time to any theater of operations in the world from 9-10 weeks to 2-3 weeks. Edge clamps, cruciform stakes, and earth anchors are used to secure AM-2 matting to the ground. Portable aircraft arresting gear and marking systems are installed to form a complete airfield that enables air activity at night, in inclement weather conditions, and otherwise unprepared environments.

Configuration	Configuration Graphic	Equipment Needed	Time to Construct
96' x 96' VTOL pad		(1 each) F70 – Field Tool Kit 12' AM2 mat 6' AM2 mat Anchors and accessories H-Connectors	Crew of 16 can construct in 8 hrs
72' x 960' runway with 2 Integral 96' x 96' VTOL pads. Parking hides for 11 MV-22 (designed for 25' x 102'), no ordnance. Subgrade prepared to a minimum CBR of 25. Stakes are installed as vertical and horizontal load devices		(1 each) F70 – Field Tool Kit (224 pieces) F71 - 12' AM2 mat (209 pieces) F72 – 6' AM2 mat (6 sets) F74 – Anchors and accessories (4 sets) F77 – H-Connectors	**Site preparation:** A crew of 15 working 10 hrs per day can complete in 5 days with: • 2 graders. • 2 dump trucks. • 2 compactors. • 1 D7 dozer. • 2 TRAMs w/ buckets. • 3 6-10K forklifts. **Installation:** A Crew of 36 working 10 hrs per day can complete in 3 days.
72' x 960' runway with 2 Integral 96' x 96' VTOL pads. Parking hides for 11 AV-8B (designed for 32' x 56'). Net explosive weight of 3,000 lbs considered for each aircraft. Subgrade prepared to a minimum CBR of 25. Note: If any other type aircraft operate on this airfield, the configuration must be redesigned to accommodate new ordnance separation distance and aircraft clearance zones		(1 each) F70 – Field Tool Kit (267 pieces) F71 - 12' AM2 mat (267 pieces) F72 – 6' AM2 mat (6 sets) F74 – Anchors and accessories (6 sets) F77 – H-Connectors	**Site preparation:** A crew of 15 working 10 hrs per day can complete in 5 days with: • 2 graders • 2 dump trucks • 2 compactors • 1 D7 dozer • 2 TRAMs w/ buckets • 3 6-10K forklifts **Installation:** A Crew of 36 working 10 hrs per day can complete in 3 days.

Note: EAF assets allow for the design of an infinite number of FOB configurations. The three configurations used in this table do not represent any standard airfield configuration. There is no standard EAF configuration. Per the AM-2 Tech Manual, a 16 man crew can install 3,300 ft^2 per hour.

Table 5-81. Time to construct various expeditionary airfield configurations.

Type Aircraft	Minimum Parking Hide Requirements for Drive-In/Drive-Out (for 1 airframe)		Area Required for 8 Airframes	Time to Construct
F-18	Wing Span w/missiles Length Forward Clearance Aft Clearance Side Clearance Overall Area Required	41' 56' 63'6" 63'6" 7'6" 10,250 ft^2	81,984 ft^2	Crew of 16 working 10 hr days can complete in 2.5 days
MV-22	Width (Rotors Turning) Length (Rotors Turning) Forward Clearance Aft Clearance Side Clearance Overall Area Required	84' 58' 25' 25' 13' 11,880 ft^2	95,040 ft^2	Crew of 16 working 10 hr days can complete in 2.5 days
CH-53	Width (Rotors Turning) Length (Rotors Turning) Forward Clearance Aft Clearance Side Clearance Overall Area Required	79' 99' 65' 65' 13' 23,712 ft^2	189,696 ft^2	Crew of 16 working 10 hr days can complete in 6 days
UH-1Y	Width (Rotors Turning) Length (Rotors Turning) Forward Clearance Aft Clearance Side Clearance Overall Area Required	48' 58' 49' 49' 13' 11,388 ft^2	91,104 ft^2	Crew of 16 working 10 hr days can complete in 3 days
AH-1Z	Width (Rotors Turning) Length (Rotors Turning) Forward Clearance Aft Clearance Side Clearance Overall Area Required	48' 58' 49' 49' 13' 11,388 ft^2	91,104 ft^2	Crew of 16 working 10 hr days can complete in 3 days
AV-8B	Wing Span w/missiles Length Forward Clearance Aft Clearance Side Clearance Overall Area Required	32' 47' 50' 50' 8' 6,808 ft^2	55,200 ft^2	Crew of 16 working 10 hr days can complete in 2 days

Table 5-82. Time to construct expeditionary airfield parking hides for various aircraft.

5021. Engineer Water Storage/Production Considerations

a. Enhanced Reverse Osmosis Water Purification Unit

The enhanced reverse osmosis water purification unit (EROWPU) is a proven system that is capable of treating water from any available source. The purification process removes NBC contaminants from water, produce potable water from brackish shallow and deep well sources, and satisfactorily treat water from fresh, brackish, or seawater sources.

The engineer support battalion lists 35 EROWPUs on its table of equipment. The ROWPU is transported in an 8 ft by 8 ft by 10 ft rigid frame.

Production Rate	Sea water source: 600 gallons per hour Fresh water source: 1,800 gallons per hour
Weight	7,300 pounds
Length	120 inches
Width	96 inches
Height	96 inches
Power Source	30 KW generator

Table 5-83. Enhanced reverse osmosis water purification unit capability.

This system is used by all of the U.S. military Services and has performed well for the Marine Corps. During Operations Desert Shield/Storm the ROWPUs were used extensively and proved themselves to be reliable and capable. The EROWPU provides a truly expeditionary capability, allowing Marine units to acquire water from a multitude of sources.

b. Water Supply Support System

The water supply support system consists of modular components to provide flexible and responsive water support. The ability to alter the system configuration and the interchangeability of components allows for the creation of limitless combinations of tailored systems to meet any mission requirement. The table below lists major water supply support system allowances for the MEFs and MPSRONs.

	MPSRON 1	MPSRON 2	MPSRON 3	I MEF	II MEF	III MEF
Sixcon water pump module	55	55	55	89	89	60
Sixcon water tank module	215	215	215	300	264	204
3,000 gal collapsible tank	104	104	104	695	582	386
600 GPH EROWPU	41	41	41	121	101	56
Medium fresh water purify unit	0	0	0	35	32	20
500 gallon water drum	42	42	42	66	48	66
Forward area water point supply support system (FAWPSS)	7	7	7	11	8	11
350 GPM water pump	6	6	6	5	2	3
600 GPM water pump	6	6	6	2	2	2
Dual tank connection kit	16	16	16	7	5	5
Pump station	6	6	6	1	1	1
Storage assembly	2	2	2	0	0	0
Distribution point	2	2	2	0	0	0
10 mile segment kit	1	1	1	0	0	0
Hose assembly	128	128	128	20	20	20
50,000 gal water tank	18	18	18	4	4	4
20,000 gal water tank	13	13	13	6	6	3

Table 5-84. Water supply support system allowances.

5022. Movement Control Concept

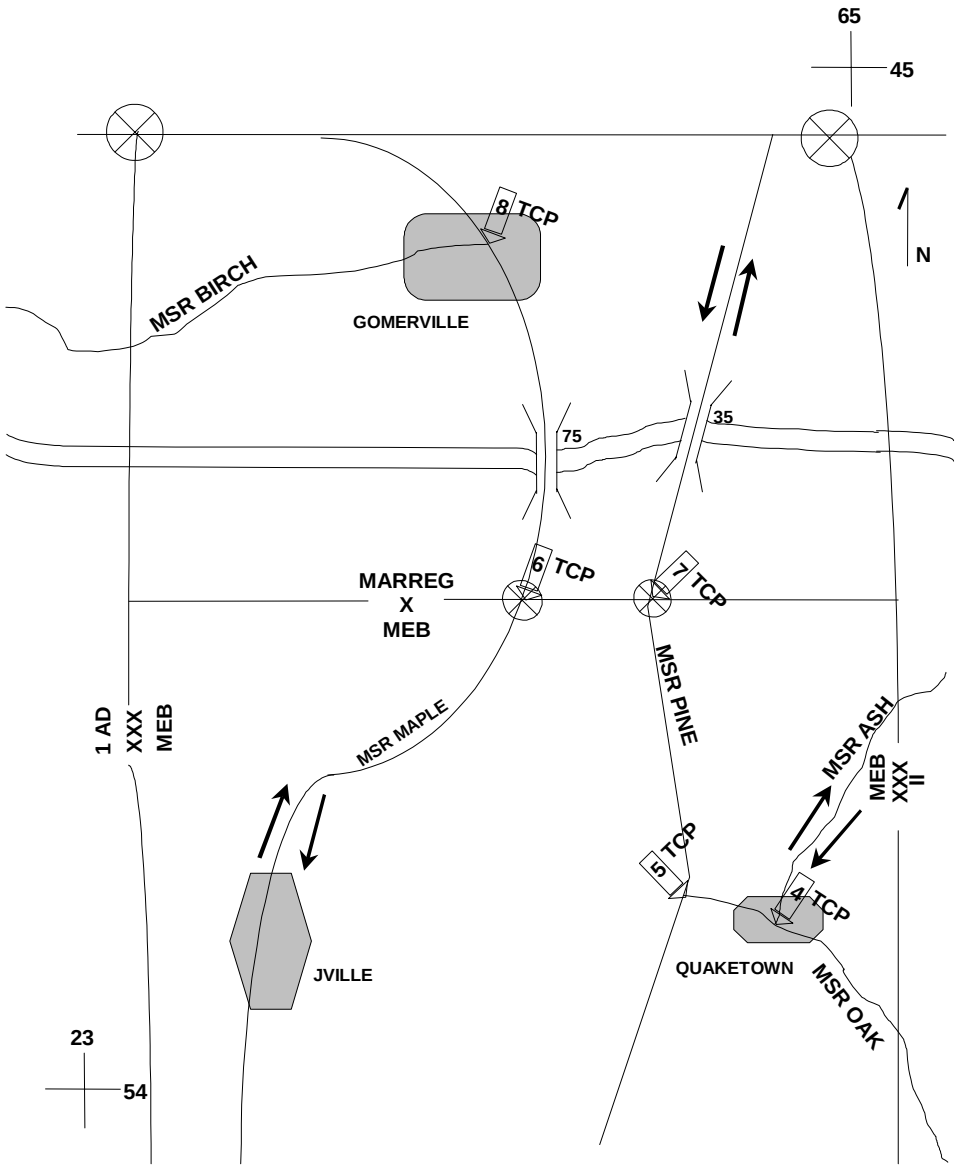


Figure 5-22. Movement control diagram.

5023. Movement Control Planning Factors

Movements are measured by calculating how long it takes to move a given distance. The three methods of measurement are speed, pace, and rate of march. They are defined as follows:

- Speed is the actual rate at which a vehicle is the actual rate at which a vehicle is moving at a given time as shown on the speedometer. It is expressed as KPH or MPH.
- Pace is the regulated speed of a convoy or an element as set by a lead vehicle, the pacesetter. It is constantly adjusted to suit road, terrain, and weather conditions. Pace is also expressed as KPH or MPH.

- Rate of march is the average number of kilometers traveled in a specific time period. It includes short periodic halts and short delays, but does not include long halts, such as those for eating meals or for overnight stops. It is expressed in KMH or MPH. Rate of march is used in movement calculations.

a. Time-Distance Factors

Time and distance factors are used to perform a wide range of calculations for planning highway movements. They can be used to develop movement tables and to conduct expedient planning and calculating to deconflict movement requests.

b. Distance Factors

Distance factors are expressed in kilometers or meters. The following terms are used to describe distance factors:

- *Length of any column or element of a column*- length of a roadway which the column occupies. It is measured from the front bumper of the lead vehicle to the rear bumper of the trail vehicle and includes all gaps inside the column.
- *Road space* - length of a column, plus any space (safety factor), added to the length to prevent conflict with preceding or succeeding traffic.
- *Gap* - space between vehicles, march units, serials, and columns. Gap is measured from the trail vehicle of one element to the lead vehicle of the following element. The gap between vehicles is normally expressed in meters. The gap between march elements is normally expressed in kilometers.
- *Lead* - linear spacing between the heads of elements in a convoy or between heads of successive vehicles, march units, serials, or columns.
- *Road distance* - distance from point to point on a route, normally, expressed in kilometers.
- *Road clearance distance* - distance that the head of a column must travel for the entire column to clear the release point (RP) or any point along the route. Road clearance distance equals the column's length or road space plus road distance.

c. Time Factors

Time is expressed in hours or minutes. The following terms are used to describe time factors:

- *Pass time (or time length)* - time required for a column or its elements to pass a given point on a route.
- *Time space* - time required for a column or its elements to pass any given point on a route plus any additional time (safety factor) added to the pass time.
- *Time gap*- time measured between vehicles, march units, serials, or columns as they pass a given point. It is measured from the trail vehicle of one element to the lead vehicle of the following element.
- *Time lead* - time measured between individual vehicles or elements of a column, measured from head to head, as they pass a given point.
- *Time distance* - time required to move from one point to another at a given rate of march. It is the time required for the head of a column or any single vehicle of a column to move from one point to another at a given rate of march.
- *Road clearance time* - total time required for a column or one of its elements to travel the road distance and clear a point along the route or the RP. Road clearance time equals the column's pass time or time space plus time distance.

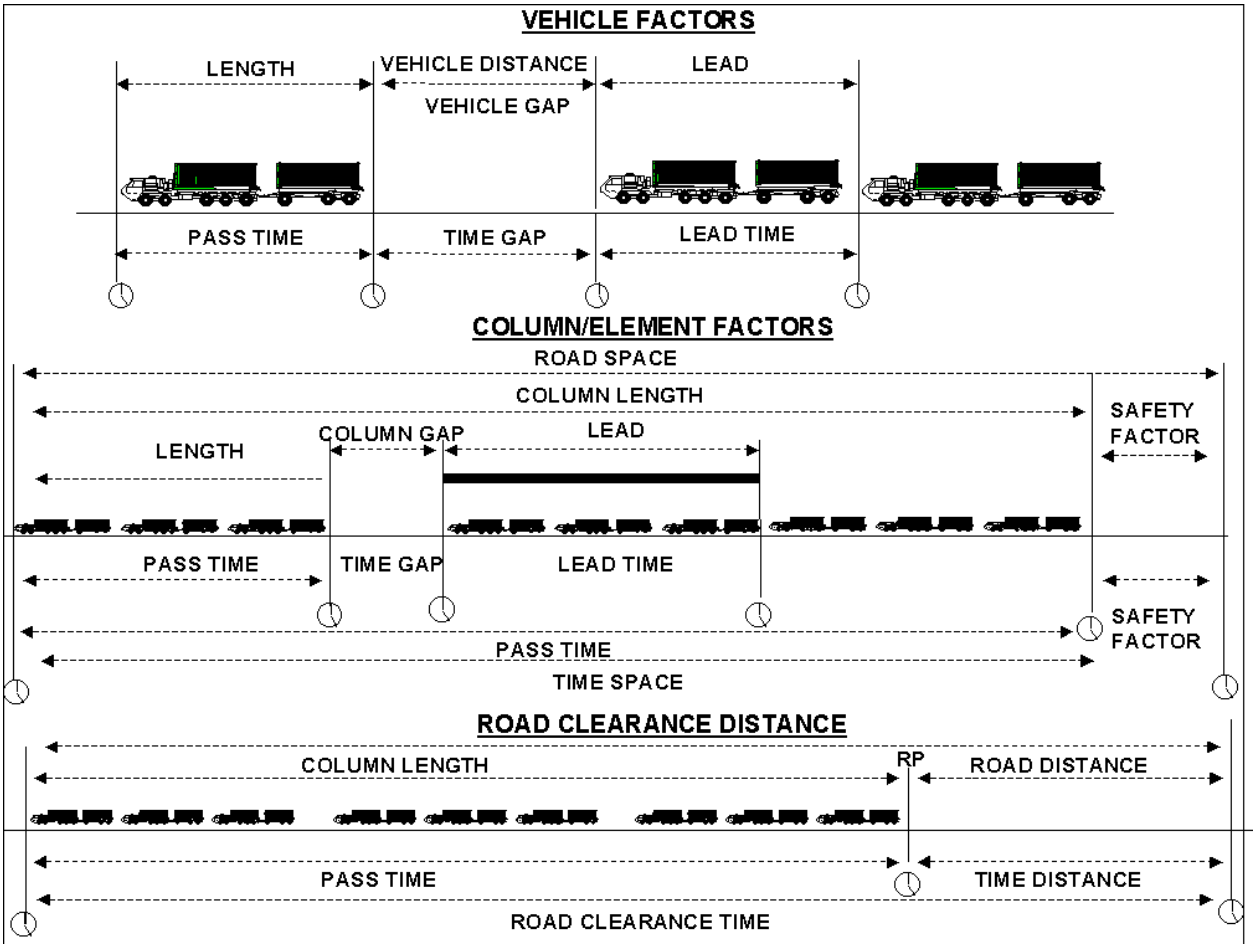


Figure 5-23. Time and distance factors.

d. Distance, Rate, and Time Calculations

Distance, rate, and time factors are used to make scheduling calculations for columns of any size. When two of the three factors are known, the third can be found by using one of the equations shown in the following figure. These factors are determined using the following formulas—

Distance equals rate multiplied by time. If the rate of march is 40 KMPH and time is 4 hours, the distance is 160 kilometers.

$$40 \times 4 = 160$$

Rate equals distance divided by time. If a convoy travels for 5 hours to complete a 190 kilometer trip, its rate of march is 38 KMPH.

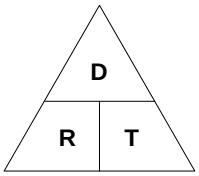
$$190 + 5 = 38$$

Time equals distance divided by rate. If the distance is 210 kilometers and the rate of march is 42 KMPH, the time is 5 hours.

$$210 + 42 = 5$$

e. Finding an Unknown Factor of Distance, Rate, or Time.

Divide a triangle as shown. To find an unknown factor, cover it. The uncovered portion of the triangle gives you the formula for finding the unknown.



For example, if the distance (D) is unknown, cover it and RT (rate x time) remains. If rate (R) is unknown, covering R leaves $\frac{D}{T}$. Do the same for time (T), and you find $\frac{D}{R}$.

f. Arrive and Clear Time Calculations

Arrive and clear times are not the same as time factors. The time factors measure a quantity of time or distance. Arrive and clear times represent actual time as displayed on a clock. The arrive time is the time the first vehicle in the column will arrive at a start point (SP), check point (CP), or RP. It is derived from the time distance. The clear time is the time the last vehicle in the column will clear that SP, CP, or RP.

- **Calculating Arrive Times**. The arrive time at the SP is the same as the SP time. To calculate the arrive time at the first CP, take the distance from the SP to the first CP, divide by the planned rate of march, and multiply by 60 (minutes). Add this time to the arrive time at the SP to determine the arrive time at the first CP.

  Example: Distance from SP to first CP: 10 km
  March rate: 50 KMIH

  Solution: 10 + 50 = .20 hrs x 60 = 12 min

  If the arrive time at the SP was 0800, then the arrive time at the first CP would be 0812.

  To calculate the arrive time at the second CP, take the distance from the first CP to the second CP, divide by the rate of march, and multiply by 60. Add the amount of time to the arrive time at the first CP to determine the arrive time at the second CP.

  Example Distance from first to second CP: 15 km
  March rate: 50 KMIH

  Solution: 15 + 50 = .30 hrs x 60 = 18 min

  If the arrive time at the first CP was 0812, then the arrive time at the second CP would be 0830. Continue this method to calculate the arrive time at succeeding CPs through the RP.

- **Calculating Clear Times**. To calculate the clear times at each CP, planner must determine the pass time. Calculating pass time requires four calculations: density, time gaps, road space, and pass time. These four calculations are determined using the following formulas:

  Density = 1,000/Vehicle gap + average length of vehicle

  Note: Vehicle gap is expressed in meters, representing the gap between vehicles. Average length of vehicle is expressed in meters, representing the average length of the most common vehicle in the column.

  Example: If the vehicle gap is 100 meters and the average vehicle length is 18 meters, then—

  $$\text{Density} = \frac{1{,}000}{100+18} = \frac{1{,}000}{118} = 8.5 \text{ vehicles per kilometer}$$

Time gaps = [(number of march units – 1) x (march unit time gap)] + [(number of serials - 1) x (serial time gap – march unit time gap)].

Example: If a column has two serials with two march units each and the gap between march units is 5 minutes and the gap between serials is 10 minutes, then—

Time gaps [(4 - 1) x 5) + [(2 - 1) x 5] = [3 x 5] + [1 x 5] = 15 + 5 = 20 minutes

$$\text{Road space} = \frac{\text{number of vehicles}}{\text{density}} + \frac{\text{time gaps} \times \text{rate}}{60 \text{ (minutes)}}$$

Example: number of vehicles = 87
Density = 8.5 per km
Rate = 50 KMH
Time gaps = 20

$$\text{Road space} = \frac{87}{8.5} + \frac{20 \times 50}{60} = 10.2 + 16.8 = 26.9 \text{ km}$$

$$\text{Pass time} = \frac{\text{roadspace} \times 60}{\text{rate}}$$

Example: Continuation from above.

$$\text{Pass time} = \frac{26.9 \times 60}{50} = \frac{1{,}614}{50} = 32.2 \text{ or } 33 \text{ minutes}$$

In this example, the clear time at the SP is 33 minutes after the first vehicle crossed the SP. If the arrival time at the SP is 0800 the clear time at the SP will be 0833. If the arrival time at the first CP is 0812, the clear time at the first CP will be 0845. Use this same method to calculate the arrive and clear times at succeeding CPs to the RP. This movement can be depicted as:

CP	Arrive Time	Clear Time
1	0800	0833
2	0812	0845
3	0830	0930

Table 5-85. Example clear and arrive times 1.

The pass time will stay the same throughout the route as long as the march rate and density do not change. If the march rate or density changes, then recalculate the pass time to determine the new clear time.

- **Rest Halts**. The march rate compensates for short halts, but does not include scheduled rest halts. Plan scheduled rest halts during the movement planning process. When planning rest halts, allow time to get vehicles off the road and staged, time to rest, and time to get vehicles back on the road. If you need 10 minutes for a rest halt, then schedule 15 minutes for the halt to ensure time to get vehicles on and off the road.

  If a rest halt is scheduled at a CP, the arrive time at the CP does not change. What changes is the clear time at that CP and the arrive and clear times at succeeding CPs. Adjust the clear time by the scheduled halt time. If a rest halt is scheduled between CPs, adjust both the arrive and clear times at the next CP by the scheduled halt

time. Continuing, with the previous example, if you plan a 15-minute rest halt between CP 2 and CP 3, you must adjust the times as follows:

CP	Arrive Time	Clear Time
1	0800	0833
2	0812	0845
3	0845	0918

Table 5-86. Example clear and arrive times 2.

Note the 15-minute delay in arriving and clearing CP 3. If you planned the rest halt at CP2, your adjustments would be as follows:

CP	Arrive Time	Clear Time
1	0800	0833
2	0812	0900
3	0845	0918

Table 5-87. Example clear and arrive times 3.

Note the 15-minute delay in clearing CP 2, arriving at CP 3, and clearing CP3.

The pass time will stay the same throughout the route as long as the march rate and density do not change. If the march rate or density changes, you must recalculate the pass time to determine the new clear time. Follow these guidelines to simplify calculations:

- Prepare and use conversion tables for changing US common distances to metric distances, number of vehicles to time length, and distance to time.
- Standardize variables to reduce calculation time. When possible, use standard march rates and density.

5024. Movement Planning Data

a. Unopposed Foot March

	Visibility	Rate of March (km/hr)	Normal March (8 hrs-km)	Forced March (12 hrs - km)
Roads	Day	4	32	48
	Night	3	24	36
Cross-Country	Day	2	16	24
	Night	1	8	12
Note: Computed on a 50-minute hour, allowing for 10 minute halt each hour.				

Table 5-88. Movement planning for unopposed foot march.

b. Unopposed Vehicle Movement Speed

	Visibility	M1/AAAV/BFV	Wheeled Vehicle
Maximum Unopposed Road Speed:	Day	40 km/hr	35 km/hr
	Night	30 km/hr	25 km/hr
Maximum Unopposed Offroad Speed	Day	20 km/hr	10-15 km/hr
	Night	10 km/hr	5-10 km/hr

Table 5-89. Movement planning for unopposed vehicle movement.

c. Opposed Vehicle Movement Speed (Delaying)

	Visibility	M1/AAAV/BFV	Wheeled Vehicle
Maximum Opposed Road Speed vs. Enemy Delaying	Day	6-10 km/hr	6-10 km/hr
	Night	2-4 km/hr	2-3 km/hr
Maximum Opposed Offroad Speed vs. Enemy Delaying	Day	4-6 km/hr	2-4 km/hr
	Night	2-3 km/hr	1-2 km/hr

Table 5-90. Movement planning for enemy delaying vehicle movement.

d. Opposed Vehicle Movement Speed (Defending)

	Visibility	M1/AAAV/BFV	Wheeled Vehicle
Maximum Opposed Road Speed vs. Enemy Defending	Day	1-2 km/hr	1-1.5 km/hr
	Night	1 km/hr	0.5-1 km/hr
Maximum Opposed Offroad Speed vs. Enemy Defending	Day	1-1.5 km/hr	.05-1 km/hr
	Night	.05-1 km/hr	.05 km/hr

Table 5-91. Movement planning for enemy defending vehicle movement.

e. Typical Pass Times for a Tactical Road March (U.S. Army)

	Heavy Division on One Route			Brigade on One Route		
Rate (km/hr)	40	30	25	40	30	25
Column Length (km)	301	245	180	70	55	40
Pass Time	7 hrs, 30 min	8 hrs, 15 min	7 hrs, 15 min	1 hr, 45 min	2 hrs	1 hr, 40 min

Table 5-92. Typical pass times for a tactical road march.

f. Movement Planning

Speed Miles/Km per Hour	Rates of March Miles/Km per Hour *	Minutes to Travel 1 Km*	Meters per Minute	Minutes to Travel 1 Mile*
10 mi/hr 16 km/hr	8 mi/hr 12 km/hr	5	200	7.5
10 mi/hr 15 km/hr	9 mi/hr 15 km/hr	4	250	7.5
15 mi/hr 24 km/hr	12 mi/hr 20 km/hr	3	333	5
20 mi/hr 32 km/hr	16 mi/hr 25 km/hr	2.4	417	3.75
25 mi/hr 40 km/hr	19 mi/hr 30 km/hr	2	500	3
30 mi/hr 48 km/hr	25 mi/hr 40 km/hr	1.5	667	2.4
35 mi/hr 56 km/hr	30 mi/hr 46 km/hr	1.3	767	2
40 mi/hr 64 km/hr	35 mi/hr 53 km/hr	1.13	883	1.5

This table provides the time required to travel 1 km or 1 mile while using specified march speeds.

* The travel times are calculated based upon rates of march (miles/km in 1 hour) and include time for scheduled short halts and time lost due to road and traffic conditions. The time for long halts must be added to the total time traveled (miles or km) by the travel time factor for 1 mile or 1 km for the designated speed.

Pass Time Computation:

Vehicles No. of Passage Points (PP)	= Vehicle per Passage Point
Rate of Movement (MKPH) Column Interval (X Km)	= Vehicle per Hour at PP
Vehicles per PP Vehicle per Hour at PP	= Pass Time

Table 5-93. Movement planning.

5025. Logistics Concept

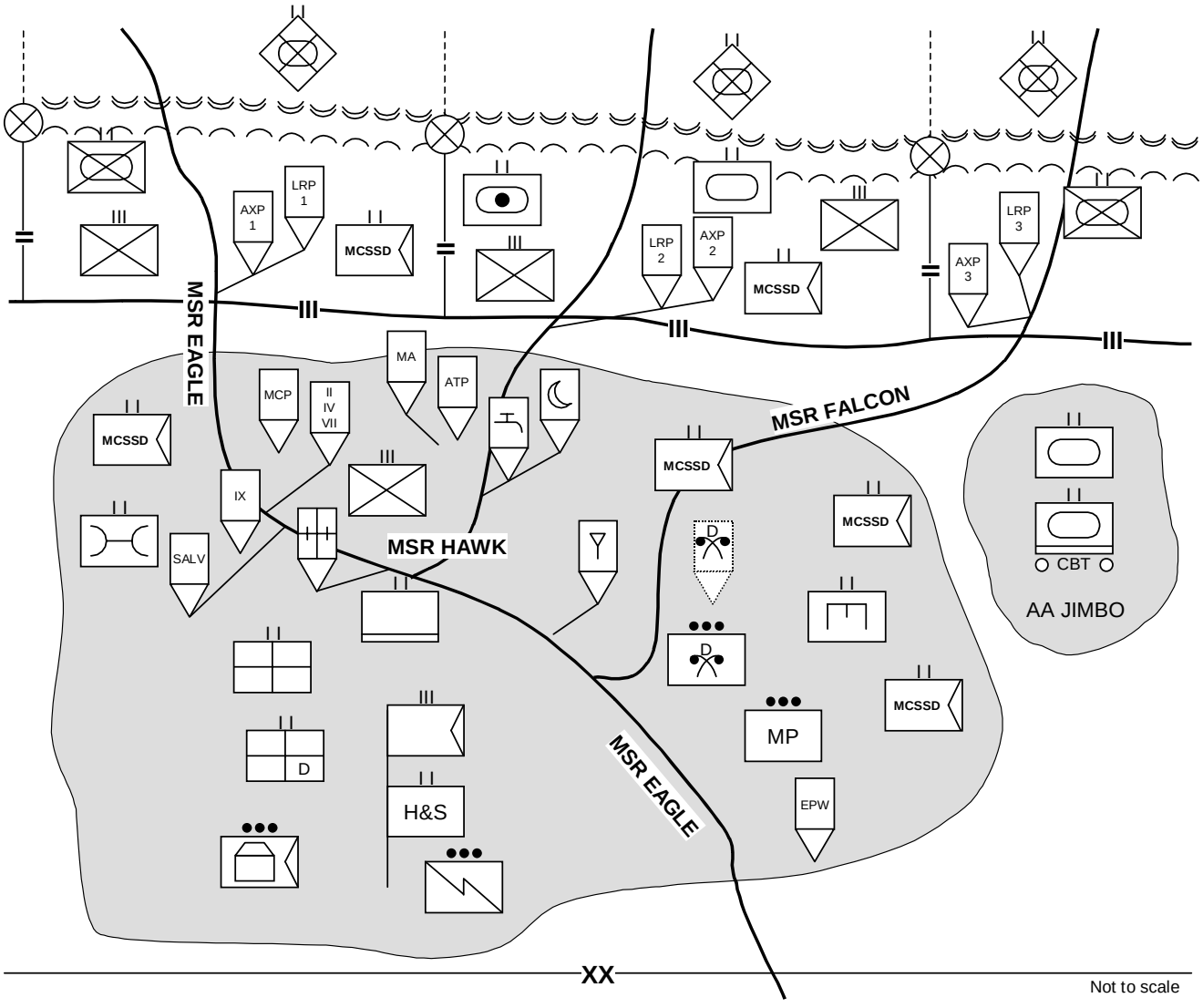


Figure 5-24. Logistics concept diagram.

5026. Logistics Planning Factors

a. Experimental Marine Expeditionary Brigade Daily Supply Requirements

	Daily	30 DOS	60 DOS
Class I (ton)	75	2,250	4,500
Class II (ton)	17	510	1,020
Class III (P) (ton)	4	120	240
Class II (B) (gal)	574,837	17,245,110	34,490,220
Class IV (ton)	51	1,530	3,060
Class V (ton)	700	21,000	42,000
Class VI (ton)	17	510	1,020
Class VIII (ton)	12	360	720
Class IX (ton)	14	420	840
Water (gal)	115,192	3,455,760	6,911,520
Mail (ton)	11	330	660

Table 5-94. Experimental Marine expeditionary brigade daily supply requirements.

b. Class I (Food)

A-Ration	2.549 lbs/meal
B-Ration	1.278 lbs/meal
MRE	1.860 lbs/meal
Volume per case MRE	0.83 ft^3
Ration Cold Weather	2.750 PMD
Health Comfort Pack	0.146 PMD

125 cases per 500 personnel
17.64 lbs per case
52 cases per new pallet
48 cases per old pallet
32 pallets per LCAC (single stack – to be used in 4-8 ft seas)
64 pallets per LCAC (double stack – to be used in 0-4 ft seas)
17.64 lbs x 52 cases = 917 lbs per 52 case pallet
17.64 lbs x 48 cases = 847 lbs per 48 case pallet
917 lbs per new pallet x 32 pallets = 29,344 lbs per LCAC (in 4-8 ft seas) = 14.67 STONS
917 lbs per new pallet x 64 pallets = 58,688 lbs per LCAC (in 0-4 ft seas) = 29.34 STONS
847 lbs per old pallet x 32 pallets = 27,104 lbs per LCAC (in 4-8 ft seas) = 13.55 STONS
847 lbs per old pallet x 64 pallets = 54,208 lbs per LCAC (in 0-4 ft seas) = 27.1 STONS

Table 5-95. Class I (food) planning factors for LCAC cargo movement.

c. Class I (Water)

Function	Daily GPM Requirements	
	Sustaining	Minimum
Drinking	1.5	1.5
Hygiene	1.7	1.0
Field Feeding	2.8	0.8
Medical treatment	0.4	.4
Subtotal	6.4	3.7
+10% Waste	0.6	0.4
Total	**7.0**	**4.1**

Table 5-96. Class I (Water) requirements for temperate zones.

Function	Daily GPM Requirements	
	Sustaining	Minimum
Drinking	3.0	3.0
Hygiene	1.7	1.0
Field Feeding	2.8	0.8
Heat Casualty Treatment	0.2	0.2
Medical Treatment	0.4	0.4
Subtotal	8.1	5.4
+10% Waste	0.8	0.5
Total	**8.9**	**5.9**

Table 5-97. Class I (Water) requirements for tropical zones.

Function	Daily GPM Requirements	
	Sustaining	Minimum
Drinking	2.0	2.0
Hygiene	1.7	1.0
Field Feeding	2.8	0.8
Medical Treatment	0.4	0.4
Subtotal	6.9	4.2
+10% Waste	0.7	0.4
Total	7.6	4.6

Table 5-98. Class I (Water) requirements for arctic zones.

Function	Daily GPM Requirements	
	Sustaining	Minimum
Drinking	3.0	3.0
Personal Hygiene	1.7	1.0
Field Feeding	2.8	0.8
Heat Casualty Treatment	0.2	0.2
Medical Treatment	0.4	0.4
Centralized Hygiene	1.8	0.0
Construction	0.5	0.0
Vehicle Maintenance	0.2	0.2
Aircraft Maintenance	0.2	0.2
Laundry	2.1	0.0
Subtotal	12.9	5.8
+10% Waste	1.2	0.6
Total	14.1	6.4

Table 5-99. Class I (Water) requirements for arid zones.

d. Class II (PMD)*

Southwest Asia (SWA)	2.091
Northeast Asia (NEA)	3.367

* Per Institute of Defense Analysis study on chemical defense equipment (CDE), 1986-1988, add the following CDE modifiers for:

- NATO +2.205 PMD
- NEA +3.270 PMD
- SWA +4.038 PMD

e. Class III (P): 0.51 PMD

	Assault (Gals/24 hrs)	Sustained (Gals/24 hrs)
MEB CE Total	12,708	12,690
Ground Combat Element	64,558	64,569
Aviation Combat Element	427,821	416,838
Brigade Service Support Element	69,750	69,771
TOTAL	**574,837**	**563,868**

Table 5-100. Class III (POL) requirements.

f. Class IV (PMD)

	NEA	SWA
Construction	3.67	3.80
Barrier	6.25	4.29
TOTAL	9.92	8.09

Table 5-101. Class IV requirements.

g. Class V(W)

Refer to Marine Corps Order 8010.1E: Class V(W) Planning Factors for Fleet Marine Force Combat Operations.

h. Class VI (PMD) (After D+60)

Temperate	Trop/Arid
2.06	3.40

Table 5-102. Class VI requirements (after D+60).

i. Class VIII (PMD)

SWA	NEA
1.47	1.10

Table 5-103. Class VIII requirements.

5027. Maritime Prepositioning Force Employment Considerations

The following items are considered for MPF employment—

- A secure environment.
- Adequate strategic airlift.
- Adequate aerial tanker support for Flight Ferry aircraft.
- Adequate offload forces (OPP, LFSP, AAOG, NSE) at the POD
- Suitable road network between the port and/or beach and the associated airfield.
- Recover and Launch B-747, C-141, C-17, and C-5 aircraft.
- Recover 30 AMC transport aircraft per 24 hour period.

- Provide for offloading of aircraft safely using available apron space.
- Provide an overflow area for passengers and cargo.
- Provide a helicopter buildup area.
- Provide minimal air traffic control activities.
- Operate tactical aircraft.
- A rotary-wing site that is both VFR and IFR capable.

If a usable port is available, the following should be considered—

- Accommodate the ship's stern ramp and vehicle weight to the pier.
- Allow ships with drafts up to 36.6 feet (Waterman Class) and 34.5 feet (AMSEA Class) pier side.
- Accommodate a surge offload of vehicles for staging or performing initial corrective maintenance at the MCC, as well as an area for staging containers at the Container Operations Terminal Lot (preferably hard stand).
- Accommodate the offloading of fuel, water, ammunition, and possible storage of same.

If no usable ports are available, the following should be considered—

- Instream offload of MPE/S with access to improved road networks.
- Provide sufficient staging/maintenance areas suitable for the offload of MPE/S.
- Increased offloading time and force standup.

Command relationships—

- MPS are operationally assigned to the FLTCINC or NCC of the appropriate unified combatant command.
- ADCON resides with COMSC
- Administrative direction and support of Navy and Marine Corps forces and the control of the MPE/S resides with the type commander.
- The initiating directive will specify the command relationships in the various MPF operational phases and ID the CNSF and the OPCON of forces assigned to the MPF mission.

Sustainability—

- A combination of prepositioned material and airlifted elements associated with a MEB for up to 30 days.
- A MEU sized MAGTF may be sustained for a greater amount of time depending on the size of the force and the number of MPS in support of the operation.

5028. Maritime Prepositioning Force (Enhanced) Capabilities

a. Table of Equipment Restoration

T/E restoration is a term used for USMC assets removed from the squadrons to make room for additional M1A1 tanks. The addition of an MPF(E) ship to each squadron enables the return of these items to the MPF program. T/E restoration assets vary by squadron based on each MEFs priorities but the bulk of the TAMCNs are for 7-ton trucks. (95 for MPS-1 and 3, 40 for MPS-2). Other gear includes bridging units and heavy engineer assets.

b. Expeditionary Airfield

The EAF is consists of two hundred and eighty containers of equipment and provides the capability to build a notional EAF 2000 FOB. This capability is designated to include: 96 foot wide by 3,850 foot long runway, 75 parking spaces

for tactical aircraft, 3 parking spaces for transport aircraft, fueling area and revetments, arresting gear, airfield lighting and visual landing aids, and arresting gear. The EAF is normally spread to three ships in the squadron in three modules, which support the following:

- **SHIP 1**: 471,683 sqft parking, R/W fuel pit, runway to support 18-CH53s, 18-MV22s, 24-A/UH-1s.
- **SHIP 2**: 445,000 sqft parking, R/W fuel pit, runway to support 12-CH53s, 12-MV22s, 12 A/UH-1s.
- **SHIP 3**: 445,000 sqft parking, F/W fuel pit, runway to support 20-AV8Bs, 14-F18.

Any reduction in the equipment identified will result in an equivalent reduction in capability (e.g., shorter/narrower runway, less parking, or no arresting gear). Three ships together can be configured to support C-5 aircraft.

c. Naval Mobile Construction Battalion

The naval mobile construction battalion (NMCB) pack-up consists of tools and equipment to support a 750 man Naval Mobile Construction Battalion aboard each squadron. Each battalion is divided into 5 capability sets: three core sets, one basic set, and one heavy set. A core is designed to support 250 Seabees with their tools and an assortment of construction equipment including dump trucks, dozers, graders, loaders, 5 tons, and an assortment of other construction gear. A basic module is designed to augment a core with additional camp support and vertical construction assets. The heavy module augments a core with additional horizontal or earth moving equipment. The NMCBs maintain their flexibility and can further deploy several detachments from a downloaded MPF packup.

The Seabee gear is usually loaded on three ships in a core, core-basic, and core-heavy configuration. Class IV (construction material) is not pre-positioned. Seabees have a wide array of construction capabilities that include: pre-engineered buildings, bunkers, towers, water purification, power generation, runways, piers, surveying and planning and well drilling. With FOE assets NMCBs can operate and construct batch plants, quarries, rock crushers, pile driving, and other specialized construction.

d. Fleet Hospital

Each MPF (E) squadron will contain a 500 bed fleet hospital (FH). The FH is broken up into two capability sets. The NEMSS (Naval Expeditionary Medical Support System) consists of material and equipment to construct a 150 bed hospital. This facility is capable of an average of 30 daily admissions and 14 daily operative procedures. It consists of 206 medical personnel and 68 support personnel. The NEMSS requires about 2 acres to setup.

The bulk of the 500 bed hospital is usually loaded on a different ship from the NEMSS. It will have the capability of an average of 80 daily admissions and 54 daily operative procedures plus 78 average daily specialty clinical care. It consists of 737 medical personnel and 241 support personnel. It requires 28 acres to setup.

5029. Maritime Prepositioning Force Engineer Equipment (Extract)

TACMN	Nomenclature	CE	GCE	ACE	CSSE	Total	MPSRON[1]	FIE
B0114	Bridge Erection Boat	0	0	0	4	4	4	0
B0152	Medium Girder Bridge	0	0	0	1	1	1	0
B0215	2½ Cubic Yard Bucket, GP	0	9	11	16	36	24	12
B0355	Compactor Ditcher	2	0	1	1	4	0	4
B0391	50k lb Rough Handling Container	0	0	4	10	14	14	0
B0395	250 cfm Air Compressor	0	5	4	9	18	10	8
B0443	30-ton Crane	0	0	2	7	9	8	1
B0446	7½-ton Crane	0	1	11	14	26	16	10
B0465	Decontamination Apparatus	2	0	12	0	14	0	14
B0570	500 gal Fabric Fuel Drum	0	0	0	56	56	56	0
B0589	M9 Armored Combat Earthmover	0	6	0	0	6	6	0
B0685	Amphibious Assault Fuel System, 600k gal	0	0	0	8	8	6	2

B0891	10 kw/60 Hz Generator	5	36	38	40	119	106	13
B0953	30 kw/60 Hz Generator	18	18	52	26	114	75	39
B1021	60 kw/60 Hz Generator	5	20	8	8	41	16	25
B1045	100 kw/60 Hz Generator	4	4	18	8	34	16	18
B1082	Road Grader	0	0	4	3	7	6	1
B1135	Helicoper Refueling System (HERS)	0	0	8	0	8	8	0
B1220	MoMat	0	0	12	66	78	78	0
B1292	Lt.Weight Decontamination Apparatus	2	42	14	18	76	49	27
B1298	Line Charge Launch Trailer	0	18	0	4	22	18	4
B1320	Minefield Marking Set	0	4	0	3	7	4	3
B1625	Ribbon Bridge Raft	0	0	0	2	2	2	0
B1720	MGB Link Reinforcement Set	0	0	0	1	1	1	0
B1785	420-C Roller	0	0	1	2	3	2	2
B1830	Chain Saw	2	12	15	16	45	31	14
B2085	Fuel Six-Con	4	49	41	76	170	48	122
B2086	Water Six-Con	4	4	12	209	229	215	14
B2130	3k Fabric Water Storage Tank	3	23	71	48	145	104	41
B2460	T-5 Dozer	0	4	4	4	12	12	0
B2462	D7 Dozer	0	4	11	13	28	17	11
B2464	Dozer with Multi-Bucket	0	0	4	3	7	4	3
B2482	SEE Tractor	0	8	3	2	13	6	7
B2561	Extended Boom Fork Lift	2	7	24	25	58	46	12
B2566	4,000 lb Fork Lift	0	7	10	14	31	24	7
B2567	10,000 lb Fork Lift	0	15	15	27	57	37	20
B2604	EROWPU	0	6	16	19	41	41	0
B2631	50,000 gal Water Tank	0	0	0	18	18	18	0
B2632	20,000 gal Water Tank	0	0	0	16	16	16	0
B2685	Welding Maching	0	6	5	7	18	15	3
D0235	40-ton Low Boy Trailer	0	4	7	13	24	15	9
D0881	Mk 18 Ribbon Bridge Trailer	0	0	0	20	20	20	0
D1072	7-ton Dump	0	10	10	29	49	49	0
E0149	AVLB – Bridge	0	6	0	0	6	6	0
E0150	AVLB – Chassis	0	4	0	0	4	4	0
FZ710	AM-2 Mat, 2 x 12' panels (432 sqft)	0	0	2268	0	2268	2268 [2]	0
FZ720	AM-2 Mat, 2 x 6' panels (216 sqft)	0	0	2268	0	2268	2268 [2]	0
ZXXX [3]	Arresting Gear Set	0	0	2	0	2	2	0

Note:
1. "Z" TACMNs in MPSRON column represent Enhanced MPS quantities.
2. Present AM-2 quantity is 245 (FZ710) and 244 (FZ720) for MPSRONs 2 and 3 only.
3. Arresting Gear Set is made up of six TACMNs.

Reference: NAVMC 2907 of January 1998 (except Z TACMN).

Table 5-104. Maritime prepositioning force engineer equipment (extract)

5030. Maritime Prepositioning Force Offload Planning Data

a. Time Requirements

Navy Day (Offload Day – 1)

	Hours
Offload Side Loadable Warping Tug (SLWT) and LCM-8s	1.5
Moor-Anchors	6.0
Offload Other Lighterage	5.0
Position Ships Ramp	0.5
Assemble Causeway Section Powered (CSP) and Non-Powered (CSNP)	3.5
Install Fenders	1.5
Discharge AAAVs	2.0
Install POL/Water Systems	9.0
Assemble Roll-On/Roll-Off Discharge Facility (RRDF)	36-40
Discharge RTCHs	3.0
Remove Hatch Cover	1.0

Table 5-105. Maritime prepositioning force offload time requirements.

b. Lighterage Characteristics

	CSP	CSNP	SLWT	LCM-8
Length (ft)	90	82	82	74
Beam (ft)	21	22	21	21
Loaded draft (ft)	4	4	5.2 (aft)	
Capacity (tons)	70	100	N/A	65
Speed (knots):				
Empty	10	N/A	N/A	12
Loaded	7	N/A	N/A	9

Table 5-106. Lighterage characteristics.

c. Causeway Ferry Capacities

	Vehicles	Containers
CSP + 3	18	23
CSP + 2	13	16
CSP + 1	8	9
LCM-8	2	0

Table 5-107. Causeway ferry capacities.

d. Bulk Fluid Offload Times

5,000 feet from shore	700 gpm
10,000 feet from shore	300 gpm

Table 5-108. Bulk fluid offload times.

5031. Typical Principle End Items on MPSRON to Support a MEU and a MEB

Ordnance	
LAV-AT	2
LAV 25	5
LAV LOG	1
LAV-R	1
AAAV	14
M1A1	4
Armed HMMWV TOW	8
M777 Howitzer	6

MT/Comm Equipment	
Armed HMMWV	11
LVS Power Unit	15
LVS Wrecker	1
LVS Trailer	12
7 Ton Truck	52
P-19	2
HMMWV	87
MRC-110	15
MRC-138	10
MRC-142	4
M970 Refueler	6

Engineer Equipment	
EROWPU	8
RTCH	4
D7	4
EBFL	3
TRAM	4
M9 ACE	2
MC1150 Tractor	1
Line Charge	1
Sixcons (Water)	17

Table 5-109. Typical major principle end items aboard a MPSRON to support a MEU.

Ordnance	
LAV-AT	4
LAV-25	14
LAV-LOG	3
LAV-R	3
AAAV	109
M1A1	58
HMMWV (TOW)	72
M777 Howitzer	30

MT/Comm Equipment	
Armed HMMWV	57
LVS Power Unit	109
LVS Wrecker	4
LVS Trailer	53
7 Ton Truck	282
P-19	8
HMMWV	473
MRC-110	65
MRC-138	60
MRC-142	21
M970 Refueler	26

Engineer Equipment	
EROWPU	41
RTCH	14
D7	17
EBFL	46
TRAM	37
M9 ACE	6
MC1150 Tractor	7
Line Charge	18
Sixcons (Water)	111

Table 5-110. Typical major principle end items aboard a MPSRON to support a MEB.

5032. Command, Control, Communications, and Computers Planning Considerations

Command, control, communications, and computers (C4) planning is inextricably linked with operations planning. The goal of C4 planning is to support mission accomplishment. The process C4 planner's use is generally the same regardless of the mission or geographical area. The checklist can be applied to other C4 staffs—single-Service, subordinate component, and multinational. Numerous sources of information may be used to answer the checklist questions:

- Existing operation plans and operation orders.
- The MAGTF and joint force commander's CBAE.
- Area studies.
- Unit files.
- MCWP 6-2, MAGTF Command and Control.
- MCWP 6-22, Communications and Information Systems.
- MCWP 6-23, Information Management.
- CJCSM 6230.01, C4 Planners Handbook.
- CJCSM 6231, Manual for Employing Joint Tactical Communications.
- CJCSM 6230.04, Manual for Employing Revised Battlefield Electronic CEOI Systems.
- CJCSM 6230.05, Joint Have Quick Planners Manual.
- DISA Contingency Plan.
- Joint Communications Support Element Planning Guide.
- Lessons-learned from previous operations and exercises to include JULLS.
- CJCSI 6111.01, C4 Systems Description.
- TPFDD schedule.
- Joint Pub 5-00.2, Joint Task Force Planning Guidance and Procedures.

a. Common Questions

These questions apply to any mission. They elicit background information, and each serves as a data point to answer other questions. This list of questions is not all-inclusive. These questions should be asked repeatedly throughout the planning process as C4 planners adapt to an evolving operational and tactical situation. They provide a framework for supporting C4 planning for each phase of an operation, focusing C4 planners on the mission and how the JFC intends to accomplish it.

Parameters

- What is the JTF mission?
- What is the signal and/or communications unit mission?
- What is the geographic operational area?
- What is the JFC's estimate of the mission and vision (intent and concept of operations) to accomplish it?
- What are the JFC's C4 requirements?
- Who are the subordinate component and supporting forces? What are the command relationships?
- How will the forces deploy (means of transport), and what is the deployment timeline?
- Are there any transport and/or lift restrictions (availability of assets, departure and arrival locations)?
- Are there any satellite landing rights?
- When are the operations planning meetings scheduled? How will C4 planning meetings fit into this schedule? Has DISA been involved regarding coordination of technical requirements?
- Are there any planning constraints?
- Are there any special C4 requirements? Who has them?
- What national space-based assets are required and/or available to support the operation? Has a USSPACECOM Joint Space Support Team been contacted?
- What C4 capabilities are available to the joint force: SHF and/or UHF commercial satellite, DSCS, fleet satellite communications, MILSTAR satellite terminals, JWICS, MILSTAR, HF and VHF radio, tropospheric and LOS microwave systems, LANs and WANs, AUTODIN, DISN, land mobile radio, personal communications systems?
- What frequencies are available for the joint operations area?
- What are the general COMSEC requirements? Will the Intertheater Communications Security Package (ICP) be used? Who will draft the callout message?
- Who is the potential adversary? What are their capabilities to conduct offensive information warfare? Does a joint force plan exist to counter the threat?
- What are the releasability requirements for multinational operations?

Subordinate Component Forces

- Where will their C4 nodes be located?
- What are their C4 requirements?
- What are their C4 capabilities?
- What type of C4 systems do they have (power, frequency bands, interoperable and compatible with other subordinate components' equipment, mobility)?
- Who is the component C4 staff point of contact for planning and technical management and direction?
- Are there special C4 requirements resulting from the mission and the JFC's estimate, intent, and concept of operations?
- Are subordinate and supporting C4 plans consistent with the supported JFC's C4 plan?

Supporting Forces and Activities

- What is the mission of the supporting forces and/or activities (this includes allies and coalitions)?
- What are their C4 capabilities?
- What information does the supported JFC need from the supporting forces and/or activities (intelligence, weather, imagery, mapping, deployment) and how will it be accessed?
- What C4 support will the supporting forces or activities require from the supported JFC?

Non-organic C4

- DISA.
- Does the operational area have a DISA regional control center or field office?

- Who is the DISA point of contact?
- What is the DISN infrastructure in the operational area?
- Are sufficient gateways available? What are the interface requirements to access the gateways? Is the equipment available?
- Is telecommunications service priority and/or national security emergency preparedness involving authority provided and current?
- What are the anticipated DSCS and commercial satellite requirements?
- Has modeling of space networks been initiated by DISA?

Commercial Networks

- Are commercial networks available for use? Who can approve access to them? Are funds available? Has DISA been contacted to ensure required lead times for normal allocations? (1) Satellite (2) Data (3) Voice?
- What special interfaces are required to access the commercial network and where are the access points?
- What are the locations and types of switches in the commercial network? What are their technical parameters?
- Where are the locations and types of systems providing the backbone transmission network?
- What type of power is used—voltage, current, commercial grid, or generator?
- Does the operational area have a cellular network? What are the transmission media, frequency band, and interface requirements?
- What are the system standards? Is the system available for use?
- CJCS controlled C4 assets.
- What CJCS controlled assets are available?
- What capabilities are available?
- Will JCSE support be required in the operational area, or will other defense and commercial assets be sufficient?
- Will JCSE support be needed for en route communications?
- Has a CJCSI 6110.01, "CJCS-Controlled Tactical Communications Assets," support request for CJCS controlled C4 assets been submitted?
- What are the JCSE's logistic support and electrical power requirements?
- What are the JCSE airlift considerations, allocations, and/or priority?

Other C4 Support

- Is C4 support needed from specialized communications units?
- Who are the points of contact and what are the request procedures?
- What are the units' C4 capabilities and limitations?

b. Planning Activities

This section assumes that the basic questions have been answered and covers high-level and detailed C4 planning. Although these functions are listed separately, they are concurrent rather than sequential actions. The planners interact to refine the planning products, C4 estimates, Annex K, and joint communications-electronics operating instructions.

High Level Planning

- What nodes will be necessary to provide a global C4 network and where will they be located?
- Which nodes will have to be connected?
- What transmission media will be used to interconnect the nodes?
- What types of C4 equipment will be located at each node (equipment strings, interoperability of the equipment)?

- What are the frequency requirements for each node? How will the frequencies be allotted (joint, multinational, and subordinate components)? Are there potential frequency conflicts?
- What are the call signs and/or words for each node?
- What units will provide, install, operate, and maintain the equipment for each node? What is their operational readiness status?
- What lift assets are available to deploy these units? When will the units deploy and activate the nodes or network?
- Is the deployment schedule of C4 assets consistent with the phases of the plan? Will it permit the provision of C4 support when and where needed?
- What is the phased buildup of C4I in the operational area?
- Has C4 scheduling information been added to the time-phased force and deployment data and/or time-phased force and deployment list?
- Have the JFC and J-3 been informed of potential C4 shortfalls and recommended solutions?
- How will keying material be managed(ordering, generation, storing, distribution, transferal, and destruction)?What are the procedures for handling compromises? Is a COMSEC logistics management activity needed in the joint operations area? What access will allies have to U.S. COMSEC?
- Are network and node diagrams available?
- Have special C4 requirements been addressed (search and rescue, special operations forces, en route C4, embarkation and debarkation connectivity)?
- How will the joint, JSOTF, subordinate component, and supporting forces networks interface with non-organic networks (DISN, commercial, JCSE)?
- When and where will the joint communications control center be established?
- Are the subordinate component, JSOTF, and supporting C4 plans consistent with the joint C4 plan?

Detailed Planning

Circuit Switches

- Does a circuit switch network diagram exist that shows information about the switch and circuit switch network connectivity (switch type, area code, trunk groups, capacity)?
- How does the switch route calls: flood, deterministic, or circuit switch routing task execution plan?
- Where do circuit switches need to be located? How will they be connected?
- What special features or restrictions will be imposed on subscribers? Who will authorize and enforce these restrictions?
- Where are the Defense Switched Network (DSN) interfaces? Are precedences authorized? By whom?
- How will subscriber assistance be handled?
- Where is the greatest anticipated traffic load? Does sufficient capacity exist to handle it?
- What types of status reports are required, and when will they be submitted?
- How will traffic metering and network loading be measured, modeled, and managed?
- Who will publish telephone directories and how will they be distributed?
- How will morale, welfare, and recreation calls be accommodated?

Data Networking

- What is the anticipated JTF component data requirements?
- Has automation been planned and/or engineered into the network (x.25, IEEE802.3, TCP/IP)?
- What and/or where are the network identifications and gateways?
- Will data of various classifications “ride” a secure tactical backbone? How will traffic of various classifications be controlled and managed? Are multi-level information systems security initiative devices needed and are resources available?

- What is the joint architecture topology?
- Who is the joint data networks manager?
- What are the NIPRNET, SIPRNET, and JWICS connectivity requirements?
- What Integrated Tactical Strategic Data Networking points of presence will be used? Has a gateway access request been submitted in accordance with DISA contingency and/or exercise plans?
- What is the addressing scheme?

Message Switches

- Where are the message switches required?
- What is the trunking plan?
- What is the network connectivity of all message switches?
- Have routing indicators been developed and routing tables established?
- Is this an R and/or Y network?
- Has a plain language address directory been created?
- How will special category traffic be handled? Who will be authorized to have access?
- What are the intra nodal and inter nodal terminals?
- What types of status reports are required and when will they be submitted?
- What AUTODIN Switching Centers are connected to the message switch?
- Who is the Automated Message Process System Security Officer?
- Who will act as the AUTODIN controller?

Transmission Systems

- Are the circuit requirements, routing, channelization, and other parameters identified in high-level planning valid? Have satellite access requests been submitted? Have frequency requests been approved and published?
- What are the characteristics and connectivity of multi-plexers in the network? Are they compatible?
- What are the timing requirements for the network components? How will timing be accomplished?
- What types of status reports are required and when will they be submitted?

Video Teleconferencing

- What data rate is to be used?
- Who are the participants?
- What is the schedule?
- Who is providing the bridging and maintenance communications unit?

c. Technical Management and Direction

Joint Communications Control Center

- What are the operational procedures for the JCCC?
- How will the JCCC be manned?
- What reports will be required, how often will they be required, and when will they be submitted?
- How will network reconfiguration be accomplished?
- Who are the points of contact at the subordinate control centers?
- Who will submit the telecommunications service request and telecommunications service order?
- Who will coordinate changes to connectivity with the DISN? With the commercial networks?

- What kind of statistics will be kept? Who will analyze them? What will be done with them?
- How will changes caused by the evolving tactical situation be handled?
- Can the JCCC direct changes within subordinate component networks to optimize C4 within the joint operations area?
- Where is the boundary between technical direction and operational direction?
- How will frequency deconfliction be managed? How can potential conflicts be anticipated?
- Who will control frequency spares and authorize their use?
- Who manages the allocated satellite bandwidth used by the geographic joint forces?

Joint Communications Support Element

- Who is the JCSE point of contact?
- How will JCSE participate in the technical management process?
- Are there any special reporting requirements for systems provided by the JCSE?

d. Other Planning Functions

Spectrum Management

- What are the provisions and procedures for frequency planning and use for opposed and/or unopposed entry operations into an operational area?
- What frequency allotments and assignments are available for the operational area?
- Can the allotted and assigned frequencies support the equipment deployed to the operational area (communications, computer LANs and/or WANs, sensors, surveillance radars, GPS, airspace control radars)?
- Will the frequencies work (propagation and topographic analyses)?
- Does the allocation and assignment of frequencies to subordinate component commands contribute to mission accomplishment?
- What are the enemy capabilities to interfere with allotted and assigned frequencies? Does a joint plan exist to counter the threat?
- How will meaconing, interference, jamming, and intrusion (MIJI) be reported?
- Who will submit MIJI reports to the Joint Spectrum Center (JSC)?
- Will the JCCC resolve electromagnetic interference issues? Will JSC support be required to resolve interference issues?
- Are sufficient spare frequencies available?
- What emission control measures will be applied?
- Will the JFC implement an electronic deception plan? Are sufficient frequencies available to support this plan?

Security

- Will the cryptographic equipment interoperate?
- What are the keying material requirements?
- Does a key management plan exist?
- How will cryptographic compromises be detected and corrected?
- What computer security measures will be employed on the LANs and WANs in the operational area?
- How will access to the various networks be controlled (electronic and physical)?
- Have COMSEC emergency destruction procedures been established?
- What is the logistics plan for the cryptographic equipment?
- Are equipment and keymat sufficient to support planned and unplanned operations?
- Have key change times been established and promulgated?

- Have provisions been made for over-the-air-rekeying where applicable?
- Is an ICP available? Is it needed?
- What will we transition to and when?
- What is the foreign information warfare threat facing the C4I system?
- Are virus detection software applications installed and operational? Are passwords issued and in use? Has a contingency plan been developed to guide recovery actions if data is modified or destroyed by unauthorized intrusions?
- Do remotely accessed computer systems possess features to identify users and substantiate their identification before allowing information to be processed?

e. Exercise Timeline

The below list is a suggested timeline for execution of tasks to be accomplished during exercises. While not as inclusive of the items above, the timeline provides the planner with the relative relationship of key planning events.

Task	Date
Assign C4 planner	D-365
Concept development conference	D-355
Activate MAGTF plain language address	D-350
Initial planning conference	D-250
Identify initial host nation support	D-250
Annex K (Draft) distributed at initial planning conference	D-250
GMF architecture diagram (rough)	D-250
Switching architecture diagram (rough)	D-250
Data architecture diagram (rough)	D-250
JECG architecture support	D-250
Identify minimum C4 systems	D-250
Activate exercise addressee indicator group (after initial planning conference)	D-250
Identify reserve/Air National Guard requirements	D-210
Draft combined/joint communications control center organization	D-200
Main planning conference	D-190
Decision on COMMEX	D-180
Advanced concept technology demonstrations planned	D-180
New system implementation plans (GBS, DMS, MSS, Medical (tele-medicine))	D-180
Designated approval authority assigned	D-180
Identify personnel shortfalls	D-180
Publish JCCC manning table of organization	D-170
Publish software and protocols (e.g., JTAC, GTN, NTS/RPS, COP, TACCIMS)	D-170
Final planning conference	D-150
Finalize host nation support requirements	D-150
TPFDD synchronization	D-120
SIPRNET tunneling (joint staff waivers) to JFC (foreign connections to the SIPRNET including MLS	D-120
Promulgate CMS intent-to-use message	D-120
Annex K (Final draft) (changes from final planning conference)	D-120
Components provide frequency requirements	D-120
Request for service	D-100
Submit SIPRNET accreditation package	D-100
Components submit initial UHF/EHF/SHF satellite access requests to JFC	D-90
COMEX	D-90
Consolidated frequency request from JFC to appropriate JFMO	D-90
Submit Intertheater Communications Security Package request	D-90
JFC submit equipment shortfall request to combatant commander in CJCSI 6110.01 format	D-90
Tactical area codes	D-60
Technical control conference	D-60
Master net list requirements	D-60

Call sign/call words	D-60
GMF architecture diagram (final)	D-60
Switching architecture diagram (final)	D-60
Data architecture diagram (final)	D-60
Submit request for JCSE equipment	D-45
Consolidated SHF/GMF satellite access request	D-30
Consolidated UHF satellite access request	D-30
Consolidated EHF satellite access request	D-30
Request GENSER four-letter R/I	D-30
Publish Annex K (Final)	D-30
Publish formal phone directory	D-20
SAA/ODMs published	D-20
ADVCOMs	D-4/5
Final COMEX, on station	D-2/3
Execute	D-Day
Redeployment plan	D+5

Table 5-111. Exercise timeline.

5033. Information Operations Considerations

a. Basic Considerations

- Coordination with higher headquarters: combatant commander is the ultimate information operations (IO) coordinator: What IO activities must be approved by theater (or higher) authorities? Does the MEB have knowledge of the joint force IO plan? Does the MEB IO plan conflict with the joint force IO plan? Has the MEB IO cell coordinated IO plans with the joint force IO cell? Have all available assets been considered for employment? Has the use of joint air assets: been coordinated in a timely manner (required to be in ALOREQ? Request 24-30 hours prior to ATO to be executed? (e.g., JPOTF, JSOTF, JFACC assets [EC-130H Commando Solo, leaflet drops, other (EW, deception)]). Does the IO cell have fulltime intelligence support?
- **MEB IO Planning**. Are all IO activities integrated into a single coherent IO plan that supports the MEB commander's intent (e.g., concept of decisive action)? Has the MEB requested expertise from relevant supporting commands (e.g., Joint Information Operations Center (JIOC), JWAC, FIWC, LIWA) to assist in IO planning? Are nodal analysis tools available/employed for offensive IO planning?
- **MEB IO Execution**. Has the MEB established IO representation in current operations with procedures for ensuring their receipt of critical information? Has the MEB IO cell established measures of effectiveness and a means for branch/sequel planning and tasking of relevant IO assets (e.g., physical destruction and EA)? Is there dedicated intelligence support to the IO cell?
- USSPACECOM provides IO support (especially computer network attack/defense) to regional CINCs.

b. Deception

Tools for deception planning: objective, target, story, means, and feedback. Does the plan have limited distribution (close-hold)? Has the MEB conducted basic risk vs. gain analysis? Is the deception story feasible, and does the target have the ability to detect, assess, and react to the deception story?

c. Psychological Operations

Greatest weapon is truth—resist use of PSYOP to deceive (compromises PSYOP credibility). Combatant commander retains approval authority for all themes; JPOTF and other components retains majority of assets. Maximize reachback capability for cultural intelligence.

d. Electronic Warfare

Has the IO cell provided input to/coordination with the joint restricted frequency list (JRFL), MEB targeting board? Has intelligence gain/loss analysis been conducted with respect to targets selected for electronic attack?

e. Physical Destruction

Are IO targets integrated with the overall IO plan and presented at the targeting boards to be integrated with the plan for fires? Has intelligence gain/loss analysis been conducted?

f. Information Assurance

Joint INFOCON determination; MEB vulnerability assessment; active and passive information security measures.

g. Operations Security

COG/CV analysis contributes to identification of EEFIs; analysis of threat collection capabilities, indicators of EEFIs linked directly to active and passive OPSEC measures in relevant MEB plans?

h. Special Information Operations

Does the MEB have a means to coordinate with and employ national capabilities to ensure its success? Are these activities coordinated with the IO concept of support and the MEB plan?

i. Civil Affairs

Is the MEB civil affairs officer or representative engaged in IO planning? Are civil affairs actions coordinated with the IO concept of support?

j. Public Affairs

Is the MEB public affairs officer or representative engaged in IO planning? Are public affairs actions coordinated with IO activities? Are public affairs and related considerations factored into the overall IO plan?

k. Legal Considerations

Is there appropriate legal expertise available at the MEB to resolve any of the various legal consequences of the IO concept of support?

Part VI

Key Terms and Graphics

6001. Command Relationships

The authority vested in a commander must be commensurate with the responsibility assigned. There are various levels of authority used for U.S. military forces. There are four command relationships—combatant command, operational control, tactical control, and support. The other authorities are coordinating authority, administrative control, and direct liaison authorized. An overview of command relationships is shown in figure 5-1.

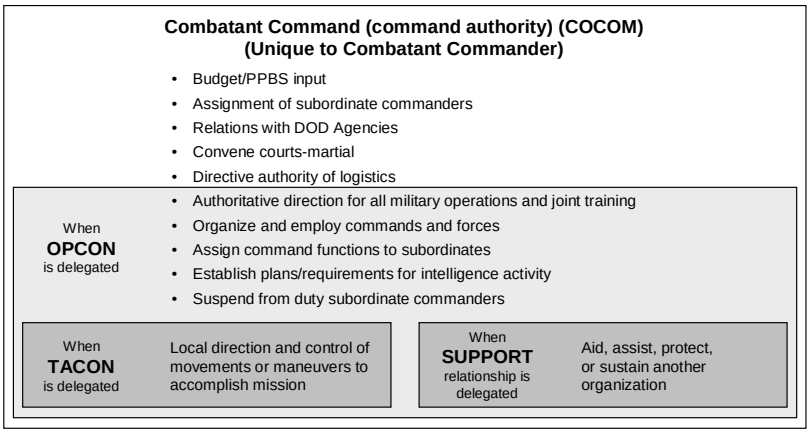


Figure 6-1. Command relationships.

a. Combatant Command (Command Authority)

Nontransferable command authority established by Title 10 ("Armed Forces"), United States Code, Section 164, exercised only by commanders of unified or specified combatant commands unless otherwise directed by the President or the Secretary of Defense. Combatant command (command authority) cannot be delegated and is the authority of a combatant commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant command (command authority) should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Combatant command (command authority) provides full authority to organize and employ commands and forces as the combatant commander considers necessary to accomplish assigned missions. Operational control is inherent in combatant command (command authority). Also called **COCOM**. (JP 1-02)

b. Operational Control

Transferable command authority that may be exercised by commanders at any echelon at or below the level of combatant command. Operational control in inherent in combatant command (command authority). Operational control may be delegated and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over

all aspects of military operations and joint training necessary to accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions. Operational control does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called **OPCON**. (JP 1-02)

c. Tactical Control

Command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed and, usually, local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at any level at or below the level of combatant command. Also called **TACON**. (JP 1-02)

d. Support

Support is a command authority. A support relationship is established by a superior commander between subordinate commanders when one organization should aid, protect , complement, or sustain another force. (JP 0-2) Categories of support include—

- **General Support**. That support which is given to the supported force as a whole and not to any particular subdivision thereof. (JP 1-02)
- **Mutual Support**. That support which units render each other against an enemy, because of their assigned tasks, their position relative to each other and to the enemy, and their inherent capabilities. (JP 1-02)
- **Direct Support**. A mission requiring a force to support another specific force and authorizing it to answer directly the supported force's request for assistance. (JP 1-02)
- **Close Support**. That action of the supporting force against targets or objectives which are sufficiently near the supported force as to require detailed integration or coordination of the supporting action with the fire, movement, or other actions of the supported force. (JP 1-02)

e. Other Authorities

Other authorities outside the command relations delineated above include:

- **Administrative Control**. Direction or exercise of authority over subordinate or other organizations in respect to administration and support, including organization of Service forces, control of resources and equipment, personnel management, unit logistics, individual and unit training, readiness, mobilization, demobilization, discipline, and other matters not included in the operational missions of the subordinate or other organizations. Also called **ADCON**. (JP 1-02)
- **Coordinating Authority**. A commander or individual assigned responsibility for coordinating specific functions or activities involving forces of two or more Military Departments or two or more forces of the same Service. The commander or individual has the authority to require consultation between the agencies involved, but does not have the authority to compel agreement. In the event that essential agreement cannot be obtained, the matter shall be referred to the appointing authority. Coordinating authority is a consultation relationship, not an authority through which command may be exercised. Coordinating authority is more applicable to planning and similar activities than to operations. (JP 1-02)
- **Direct Liaison Authorized**. That authority granted by a commander (any level) to a subordinate to directly consult or coordinate an action with a command or agency within or outside of the granting command. Direct liaison authorized is more applicable to planning than operations and always carries with it the requirement of keeping the commander granting direct liaison authorized informed. Direct liaison authorized is a coordination relationship, not an authority through which command may be exercised. (JP 1-02)

6002. Possible Command Relationships for MAGTF Units

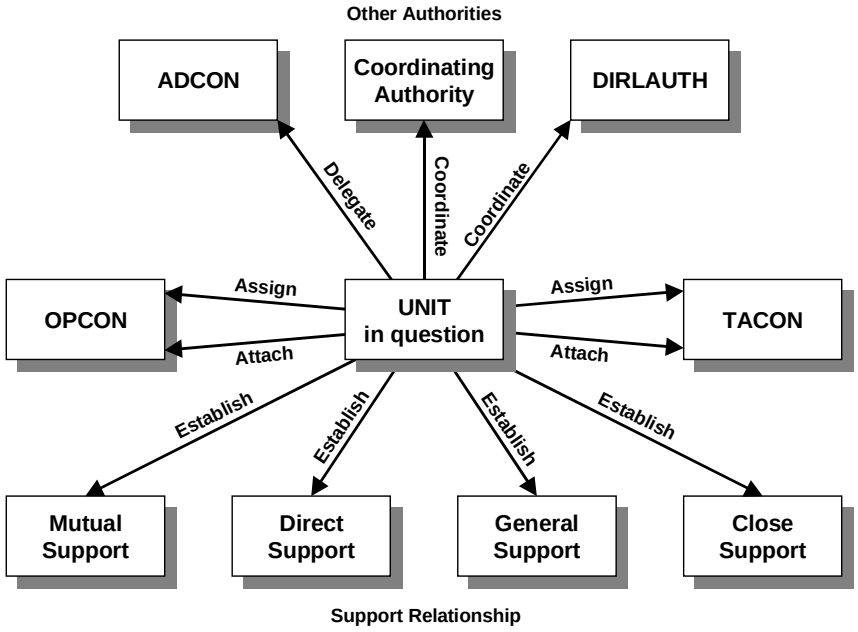


Figure 6-2. Command relationships for MAGTF units.

6003. Tactical Tasks Definitions

The following are commonly assigned MAGTF tactical tasks that may be specified, implied, or essential tasks. These tactical tasks define the actions that commanders may take to accomplish their mission. See MCRP 5-12A, *Operational Terms and Graphics*, for more information. Examples of enemy oriented tactical tasks include—

- **Ambush**. A surprise attack by fire from concealed positions on a moving or temporarily halted enemy.
- **Attack by Fire**. Fires (direct and indirect) to destroy the enemy from a distance, normally used when the mission does not require or support occupation of the objective. This task is usually given to the supporting effort during offensive operations and as a counterattack option for the reserve during defensive operations. The assigning commander must specify the intent of fire—destroy, fix, neutralize, or suppress. **[A clear purpose must accompany the assignment of the task attack.]**
- **Block**. To deny the enemy access to a given area or to prevent enemy advance in a given direction or on an avenue of approach. It may be for a specified time. Units assigned this task may have to retain terrain. **[A force assigned the task of "block" should be assigned the degree of success to be achieved (the size of force to be blocked) and/or a specified time frame in support of its purpose.]**
- **Breach**. To break through or secure a passage through a natural or enemy obstacle. **[A force assigned the task of "breach" should know what size force is to be passed through the breach.]**
- **Bypass**. To maneuver around an obstacle, position, or enemy force to maintain the momentum of advance. Previously unreported obstacles and bypassed enemy forces are reported to higher headquarters. **[A unit assigned the task "bypass" should also be given *bypass criteria. Bypass criteria* is a measure during the conduct of an offensive operation established by higher headquarters that specifies the conditions and size under which enemy units and contact may be avoided.]**
- **Canalize**. The use of existing or reinforcing obstacles or fires to restrict enemy operations to a narrow zone. **[The tasked unit should be given the physical limits of the narrow zone, the size of the force to be canalized, and desired duration of the task.]**

- **Contain**. To stop, hold, or surround enemy forces, or to keep the enemy in a given area and prevent his withdrawing any part of his forces for use elsewhere.
- **Cover**. Offensive or defensive actions to protect the force.
- **Defeat**. To disrupt or nullify the enemy commander's plan and overcome his will to fight, thus making him unwilling or unable to pursue his adopted course of action and yield to the friendly commander's will. **[When assigning the task of defeat, a statement that describes end state conditions should be used to define task completion ("By defeat I mean …").]**
- **Destroy**. Physically rendering an enemy force combat-ineffective unless it is reconstituted. **[The degree of destruction should be specified in terms of observable enemy capabilities and not simply in terms of numbers and percentages. *Destroy* as an interdiction objective (attack effect) calls for ruining the structure, organic existence, or condition of an enemy target that is essential to an enemy capability (MCRP 3-16A). *Destroy* as a fires effect requires that a target physically be rendered combat ineffective or so damaged that it cannot function unless restored, reconstituted, or rebuilt. Setting automated fire support default values for destruction such as 30% does not guarantee the achievement of the commander's intent. The surviving 70% may still influence the operation. Destruction missions are expensive in terms of time and material. Consider whether neutralization or suppression may be more efficient.]**
- **Disrupt**. To integrate fires and obstacles to break apart an enemy's formation and tempo, interrupt his timetable, or cause premature commitment or the piecemealing of his forces. **[A force assigned the task "disrupt" should normally be assigned the degree of success to be achieved and/or the duration of the "disruption" in relationship to its purpose. In targeting, the force *disrupts* enemy plans by precluding effective interaction or the cohesion of enemy combat and combat support systems. In Air Force interdiction doctrine, disrupt forces the enemy into less efficient and more vulnerable dispositions.]**
- **Exploit**. Take full advantage of success in battle and follow up initial gains. Offensive actions that usually follow a successful attack, designed to disorganize the enemy in depth. **[A force assigned the task of "exploit" should normally be assigned the degree of success to be achieved and/or the duration of the "exploitation" in relationship to its purpose.]**
- **Feint**. An offensive action involving contact with the enemy to deceive him about the location or time of the actual main offensive action.
- **Fix**. To prevent the enemy from moving any part of his forces either from a specific location or for a specific period of time by holding or surrounding them to prevent their withdrawal for use elsewhere. **[The size of the force to be fixed, the duration of the task, and where to fix the enemy should be specified.]**
- **Guard**. To protect the main force by fighting to gain time, while also observing and reporting information. **[A force is assigned the task to "guard" as one of the tasks in security force operations. Before assigning a unit the task of "guard", planners should ensure that they specify the scope of the task in terms of time and terrain. A guard force normally operates within the range of the main body's indirect fire weapons.]**
- **Interdict**. An action to divert, disrupt, delay, or destroy the enemy's surface military potential before it can be used effectively against friendly forces. **[A force assigned the task of "interdict" should normally be assigned the degree of success to be achieved (i.e., the effect desired relative to enemy capabilities) and/or the duration of the "interdiction" in relationship to its purpose.]**
- **Neutralize**. To render the enemy or his resources ineffective or unusable. **[A force assigned the task of "neutralize" will normally be assigned a specific time frame or degree of neutralization to be achieved in relationship to its purpose. Neutralization effects should be described in terms of observable enemy activity. Planners should avoid articulating neutralization effects in terms of numbers or percentages whenever possible. Neutralization fire results in enemy personnel or material becoming incapable of interfering with an operation or COA. Key questions planners must ask are when and how long does the commander want the target to be neutralized. Most planned fire missions are neutralization fires.]**
- **Penetrate**. To break through the enemy's defense and disrupt his defensive system.
- **Protect**. To prevent observation, engagement, or interference with a force or location. **[A force assigned the task "protect" should be assigned the degree of success to be achieved and/or the duration of the "protection" in relationship to its purpose.]**

- **Reconnoiter**. To obtain, by visual observation or other methods, information about the activities and resources of an enemy or potential enemy.
- **Rupture**. To create a gap in enemy defensive positions quickly.
- **Screen**. To observe, identify, and report information, and only fight in self-protection. **[A unit assigned the task "screen" may be required to maintain surveillance; provide early warning to the main body; or impede, destroy, and harass enemy reconnaissance within its capability without becoming decisively engaged. The scope of task should be articulated in terms of time and terrain.]**
- **Support by Fire**. Where a force engages the enemy by direct fire to support a maneuvering force using overwatch or by establishing a base of fire. The supporting force does not capture enemy forces or terrain.

Examples of terrain oriented tactical tasks include—

- **Clear**. The removal of enemy forces and elimination of organized resistance in an assigned zone, area, or location by destroying, capturing, or forcing the withdrawal of enemy forces that could interfere with the unit's ability to accomplish its mission. **[The degree of success to be achieved should be specified by describing what is meant by "organized resistance" (see bypass criteria above).]**
- **Control**. To maintain physical influence by occupation or range of weapon systems over the activities or access in a defined area. **[The area to be controlled and duration of the task should be specified.]**
- **Occupy**. To move onto an objective, key terrain, or other man-made or natural terrain area without opposition, and control the entire area. **[A unit assigned the task "occupy" should be assigned the duration of the "occupation" in relationship to its purpose.]**
- **Reconnoiter**. To secure data about the meteorological, hydrographic, or geographic characteristics of a particular area.
- **Retain**. To occupy and hold a terrain feature to ensure it is free of enemy occupation or use. **[A unit assigned the task of "retain" should be given a specific timeframe in relationship to its purpose.]**
- **Secure**. To gain possession of a position or terrain feature, with or without force, and to prevent its destruction or loss by enemy action. The attacking force may or may not have to physically occupy the area. **[The attacking force may or may not have to physically occupy the area. Conditions should be established that define when a position or terrain feature is "secured." Usually, conditions can be expressed in terms of observable enemy activity.]**
- **Seize**. To clear a designated area and gain control of it. **[A unit assigned the task of "seize" will usually have to gain physical possession of a terrain feature from an enemy force. Note that the task "clear" is imbedded within the definition of the task "seize." See the definition of "clear" for specific planning considerations.]**

Examples of friendly force oriented tactical tasks include—

- **Breach**. To break through or secure a passage through a natural or friendly obstacle. **[A unit assigned the task of "breach" should know what size force is to be passed through the breach.]**
- **Disengage**. To break contact with the enemy and move to a point where the enemy cannot observe nor engage the unit by direct fire.
- **Displace**. To leave one position and take another. Forces may be displaced laterally to concentrate combat power in threatened areas.
- **Exfiltrate**. The removal of personnel or units from areas under enemy control.
- **Follow**. The order of movement of combat, combat support, and combat service support forces in a given combat operation.

In special circumstances, the above tasks may be modified to meet the requirements of METT-T. The commander must clearly state that he is departing from the standard meaning of these tasks. One way this can be done is by prefacing the modified task with the statement, "What I mean by [modified task] is…"

Tactical tasks are assigned based on capabilities. The GCE has the inherent capability to execute all the MAGTF's tactical tasks. The CSSE has the capability to execute those tactical tasks essential for it to provide sustainment to the MAGTF. The ACE has the capability to execute many of the MAGTF's tactical tasks. However, it cannot secure, seize, retain, or occupy terrain without augmentation by the GCE. Weather and task duration may significantly affect the ACE's ability to execute assigned tactical tasks.

MCWP 0-1

6004. Purposes for Tactical Tasks

The following are commonly assigned purposes for tactical tasks. These define the purpose of the assigned tactical task. They ensure a common understanding of the mission as well as unity of effort. The purpose has to be unmistakably clear and endure beyond contact with the enemy. They allow the subordinate commander to accomplish the purpose of the assigned task. The following are examples (not all inclusive) of doctrinal purposes—

- Allow
- Deceive
- Enable
- Prevent
- Support
- Cause
- Deny
- Influence
- Protect
- Surprise
- Create
- Divert
- Open
- Restore

6005. Selected Key Map Symbology

FM 101-5-1/MCRP 5-12A, *Operational Terms and Graphics*, establishes the procedures for the Army and Marine Corps in the use of land-based warfighting symbology. The manual describes the use of symbols for maneuver command and control. The intent of this section is to provide the user a ready reference for the use of routine and commonly used symbols. It is not intended to be a replacement for, or as complete as the above mentioned manual.

Size Indicator	Meaning
▬	Installation
⌀	Team/Crew
●	Squad
● ●	Section
● ● ●	Platoon/Detachment
I	Company/Battery/Troop
I I	Battalion/Squadron
I I I	Regiment/Group
X	Brigade
X X	Division
X X X	Corps
X X X X	Army
X X X X X	Army Group / Front
X X X X X X	Region

Table 6-1. Unit size and installation indicators.

a. Unit Symbol Modifiers

The following unit symbols are for use on situation maps, overlays, and annotated aerial photographs. A symbol is composed of three components: a frame (geometric border), a fill, and an icon. Frames are geometric shapes used to display affiliation. Affiliation refers to whether the warfighting object being represented is a threat. The basic affiliation categories are friendly, unknown, neutral, and enemy. The unknown frame shape is normally used only for aircraft and ships.

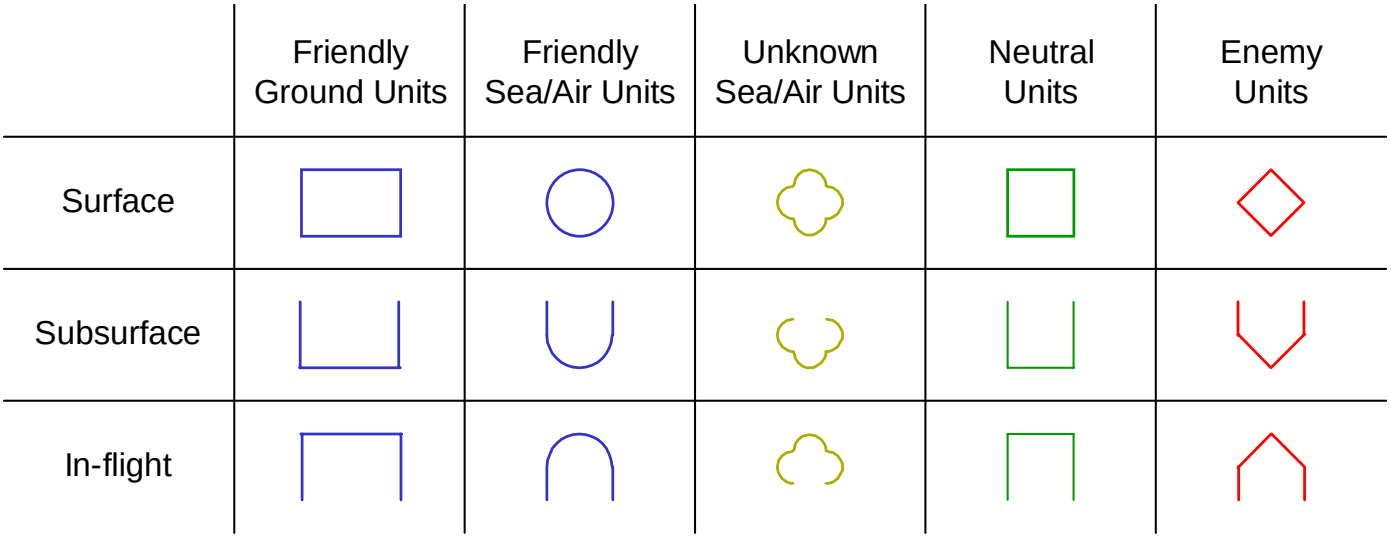


Figure 6-3. Unit, installation, and site symbol frames.

Fill refers to the area within the frame. If color is used in a symbol, it shall indicate affiliation. Generally, black is used for the frame, icon, and modifiers when symbols are displayed on a light background. White is used for these elements when displayed on a dark background. A color fill can be used if an icon is displayed within the area of the frame.

Affiliation	Hand-Drawn	Computer-Generated
Friend, Assumed Friend	Blue	Cyan
Unknown, Pending	Yellow	Yellow
Neutral	Green	Green
Enemy, Suspect, Joker, Faker	Red	Red

Table 6-2. Fill colors.

The icon is a “role indicator” that shows the warfighting function the unit performs either on the ground, in the air, or at sea. An example is the crossed rifles which represent an infantry unit.

b. Friendly Unit Symbols

Unit symbol modifiers are combined with basic unit function (branch) symbols to create a composite symbol that represents a unique type of unit. All modifiers are placed in either the center of the frame, upper half, or above the basic function symbol. In addition to the modifier symbols, text may be used inside the symbol frame to further clarify the symbol. The following are examples of friendly unit symbols with modifiers.

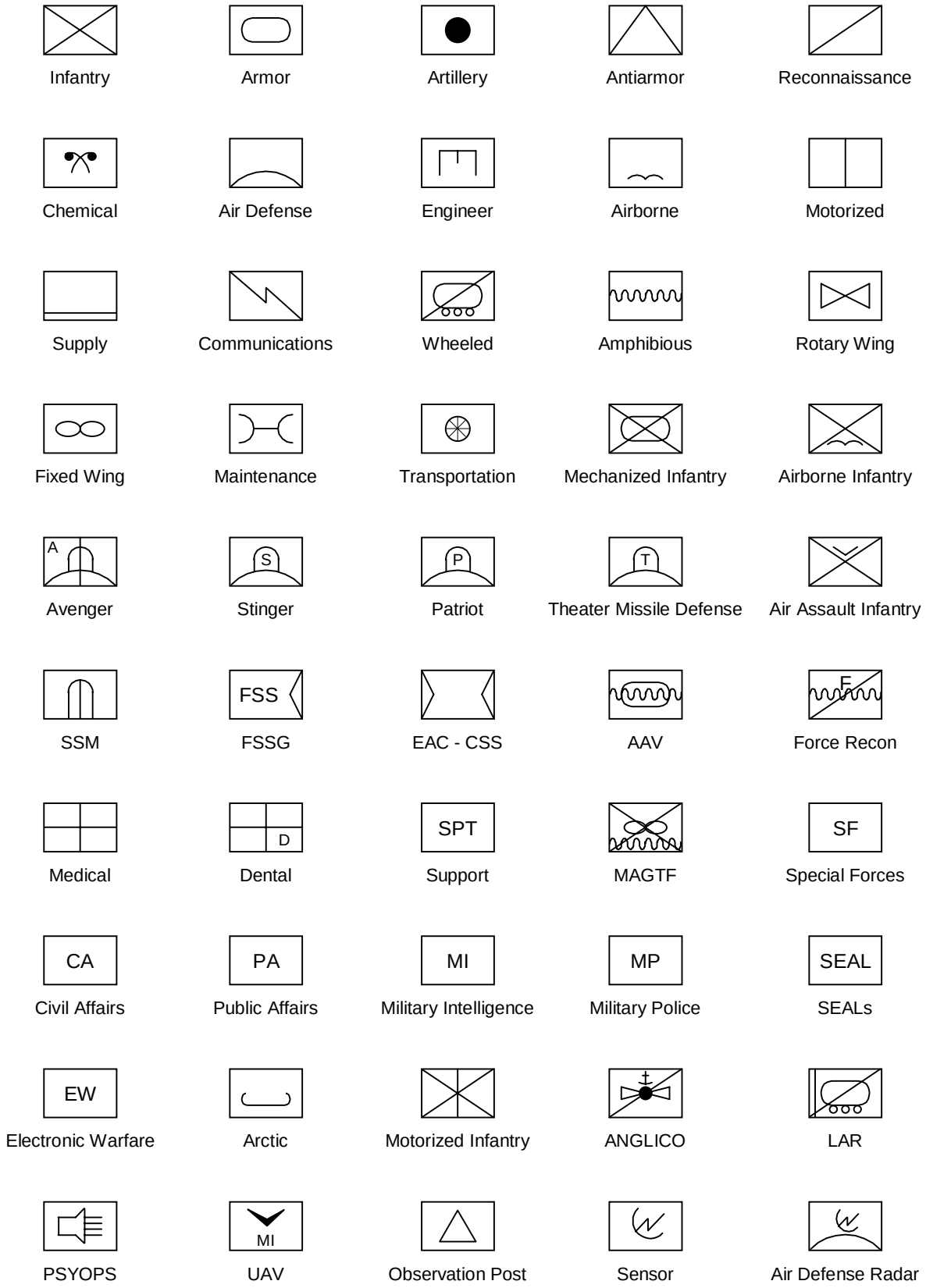


Figure 6-4. Friendly unit symbols.

c. Enemy Unit Symbols

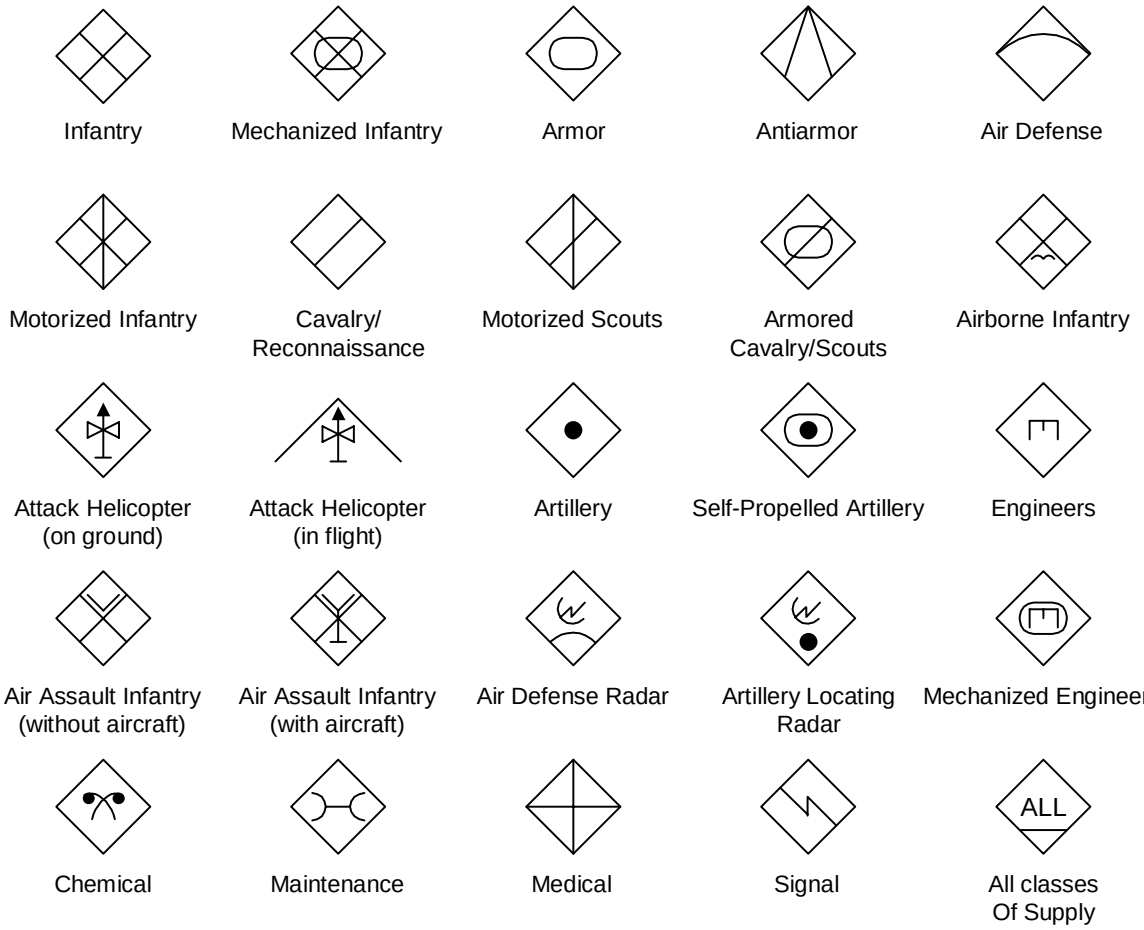


Figure 6-5. Enemy unit symbols.

d. Classes of Supply

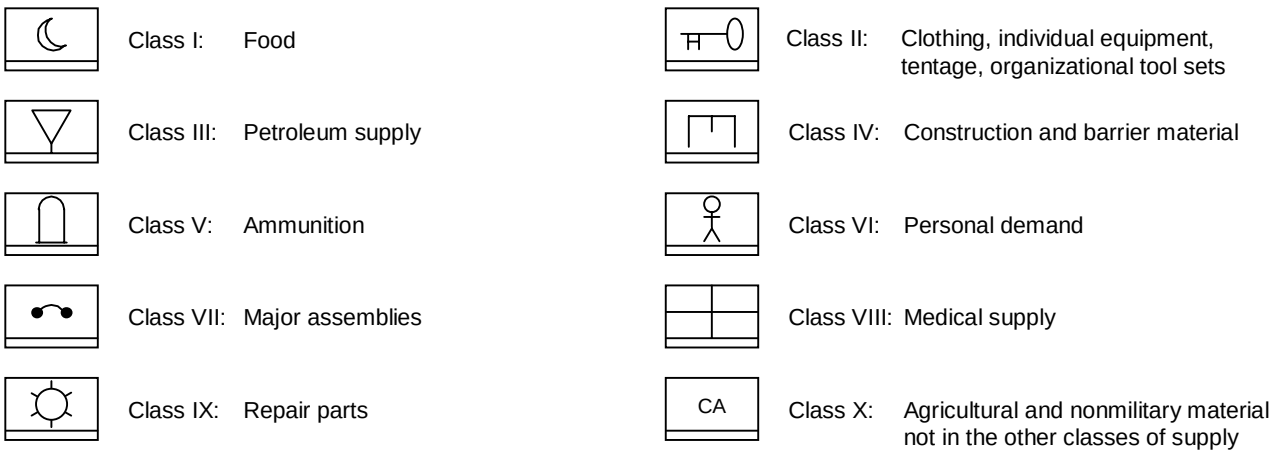


Figure 6-6. Class of supply symbols.

e. Tactical Mission Graphics

Tactical task graphics are for use in course of action sketches, synchronization matrixes, and maneuver sketches. They do not replace any part of the operation order or operations overlay. The graphics should be scaled to fit the map scale and size of unit for which they are being used. Where practical, the tactical mission graphic should connect with the decision graphic or unit graphic at the center of the bottom of the symbol.

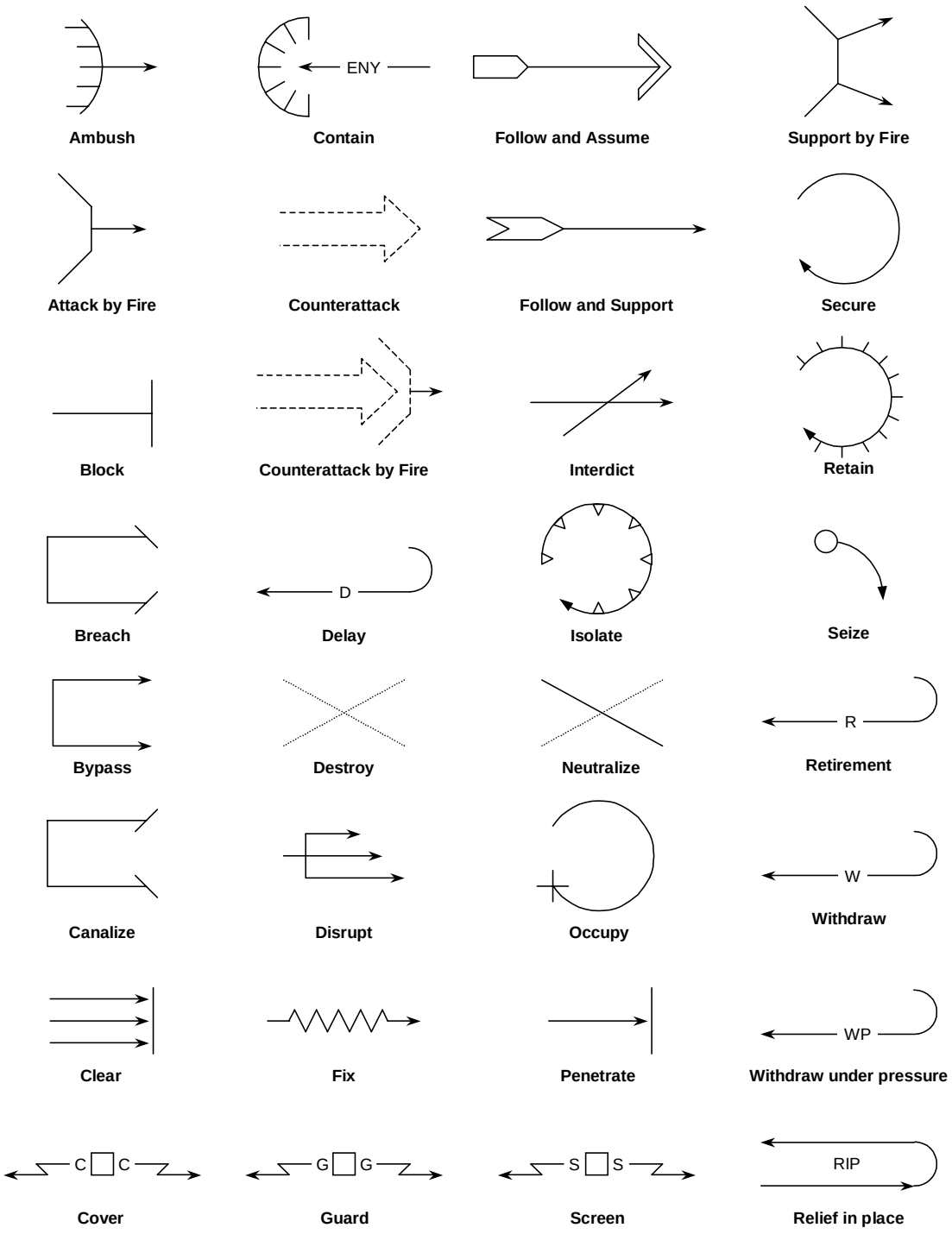


Figure 6-7. Tactical mission graphics.

Appendix A

References

A-1. Key Unit Telephone Numbers

Location	DSN Phone	Commercial Phone
MARFORLANT C/S	836-1533/1600	(751) 836-1533/1600
G1	836-1541	(751) 836-1541
G-2	836-1600	(751) 836-1600
G-3	836-1620	(751) 836-1620
G-4	836-1647	(751) 836-1647
G-5	836-1701	(751) 836-1701
G-6	444-6256	
MARFORPAC C/S	315-477-8616/1621	(808) 477-8616/1621
G-1	315-477-8515	(808) 477-8515
G-2	315-477-8445	(808) 477-8445
G-3	315-477-8628	(808) 477-8628
G-4	315-477-8324	(808) 477-8324
G-5	315-477-8567	(808) 477-8567
G-6	315-477-8494	(808) 477-8494
MARFORRES C/S	678-1581/1582	(504) 678-1581/1582
G-1	678-5627	(504) 678-5627
G-2	678-6950	(504) 678-6950
G-3	678-6067	(504) 678-6067
G-4	678-1348	(504) 678-1348
G-6	678-1364	(504) 678-1364
MARFORSOUTH C/S	567-2600	(305) 437-2600
G-1	567-2601	(305) 437-2601
G-2	567-1855	(305) 437-1855
G-3	567-2603	(305) 437-2603
G-4	567-2604	(305) 437-2604
G-5	567-2605	(305) 437-2605
G-6	567-2606	(305) 437-2606
I MEF C/S	365-9101/9209/9104	(760) 725-9101/9209
G-1	365-9206	(760) 725-9206
G-2	365-9223	(760) 725-9223
G-3	365-9145	(760) 725-9145
G-4	365-9162	(760) 725-9162
G-5	365-5715	(760) 725-5715
G-6	365-9179	(760) 725-9179
II MEF C/S	751-8952/8200/8956	(910) 451-8952/8200
G-1	751-8135	(910) 451-8135
G-2	751-8039	(910) 451-8039
G-3	751-8987	(910) 451-8987
G-4	751-8409	(910) 451-8409
G-5	751-8187	(910) 451-8187
G-6	751-8949	(910) 451-8949

Location	DSN Phone	Commercial Phone
III MEF C/S	315-622-7753	
G-1	315-622-7744	
G-2	315-622-7316	
G-3	315-622-7718	
G-4	315-622-7784	
G-5	315-622-7717	
G-6	315-622-7267	
1st FSSG C/S	365-5825/5966	(760) 725-2825/5966
G-1	365-5854	(760) 725-5854
G-2	365-5101	(760) 725-5101
G-3	365-6841	(760) 725-6841
G-4	365-1148	(760) 725-1148
G-6	365-5845	(760) 725-5845
2nd FSSG C/S	751-2702/2826	(910) 451-2702/2826
G-1	751-5739	(910) 451-5739
G-2	751-5708	(910) 451-5708
G-3	751-3914	(910) 451-3914
G-4	751-3342	(910) 451-3342
G-6	751-3838	(910) 451-3838
3rd FSSG C/S	315-637-3502/3522/3360	
G-1	315-637-2615	
G-2	315-637-1651	
G-3	315-637-1934	
G-4	315-637-2118	
G-6	315-637-1814	
4th FSSG C/S	678-0651	(504) 678-0651
G-1	678-6505	(504) 678-6505
G-3	678-6530	(504) 678-6530
G-4	678-6520	(504) 678-6520
G-6	678-4990	(504) 678-4990
1st MARDIV C/S	365-5423/6119	(760) 725-5423/6119
G-1	365-3847/3453	(760) 725-3847/3453
G-2	365-2883	(760) 725-2883
G-3	365-4439/3280	(760) 725-4439/3280
G-4	365-3505/2833	(760) 725-3505-2833
G-6	365-5059/2366	(760) 725-5059/2366
2nd MARDIV C/S	751-8470/8155	(910) 451-8470/8155
G-1	751-8159	(910) 451-8159
G-2	751-8249	(910) 451-8249
G-3	751-8152	(910) 451-8152
G-4	751-8064	(910) 451-8064
G-6	751-8053	(910) 451-8053
3rd MARDIV C/S	315-622-9574	
G-1	315-622-9422	
G-2	315-622-7336	
G-3	315-622-9592	
G-4	315-622-9050	
G-6	315-622-9489	
1st MAW C/S	315-645-7320/3285	
G-1	315-645-0742	
G-2	315-645-3840	
G-3	315-645-3161	
G-4	315-645-3198	
G-6	315-645-2301	

Location	DSN Phone	Commercial Phone
2nd MAW C/S	582-2341	(252) 582-2341
G-1	582-4134	(252) 582-4134
G-2	582-2883	(252) 582-2883
G-3	582-2341	(252) 582-2341
G-4	582-3400	(252) 582-3400
G-6	582-5058	(252) 582-5058
3rd MAW C/S	267-7291	(619) 577-7291
G-1	267-7403	(619) 577-7403
G-2	267-4752	(619) 577-4752
G-3	267-4504	(619) 577-4504
G-4	267-7472	(619) 577-7472
G-5	267-7353	(619) 577-7353
G-6	267-7416	(619) 577-7416
MAWTS-1		
S-1	951-6382	(520) 341-6382
S-2	951-2653	(520) 341-2653
S-3	951-2915	(520) 341-2915
S-4	951-2577	(520) 341-2577
S-5	951-3572	(520) 341-3572
S-6	951-5353	(520) 341-5353
MSTP	278-2818/2906	(703) 784-2818/2906
MEF Branch	278-6401/6450	(703) 784-6401/6450
BSTF	278-5156/5157	(703) 784-5156/5157
USSPACECOM Space Ops Center	692-5527	(719) 554-5527
Naval Space Ops Center	249-6500	(540) 653-6500
Naval Space Support Teams	249-6160	(540) 653-6160

A-2. Useful Web Pages

a. Department of Defense

Secretary of Defense	www.dtic.mil/defenselink
Joint Chiefs of Staff	www.dtic.mil/jcs
U. S. Marine Corps	www.usmc.mil
U. S. Navy	www.navy.mil
U. S. Air Force	www.af.mil
U. S. Army	www.army.mil
USJFCOM	www.jfcom.mil
USCENTCOM	www.centcom.mil
USEUCOM	www.eucom.mil
USPACOM	www.pacom.mil
USSOUTHCOM	www.southcom.mil
USSOCOM	www.socom.mil
USSTRATCOM	www.stratcom.mil
USTRANSCOM	www.transcom.mil
USSPACECOM	www.spacecom.af.mil/uspace
Def Fuel Sup Center	www.dfsc.dla.mil/main/dfschome.htm
DISA	www.disa.mil
DLA	www.dla.mil
DOD Terms & Dictionary	www.dtic.mil
DOD Information Center	www.dtic.mil

b. Doctrine

USMC Doctrine	www.doctrine.quantico.usmc.mil
MSTP	www.mstp.quantico.usmc.mil
Joint Doctrine	www.dtic.mil/doctrine
USA Doctrine	www-tradoc.army.mil
USN Doctrine	www.nwdc.navy.mil
USAF Doctrine	www.usafdoctrine.maxwell.af.mil
Center for Army Lessons Learned	call.army.mil

c. Government

White House	www.whitehouse.gov
DOS	www.state.gov
DOT	www.dot.gov
FAA	www.faa.gov
FEMA	www.fema.gov
FHWA	www.fhwa.dot.gov
GSA	www.gsa.gov
Maritime Administration	marad.dot.gov
U. S. Coast Guard	www.dot.gov/dotinfo/uscg

d. Marine Corps Bases

MCLB Barstow	www.bam.usmc.mil
MCAGCC	www.29palms.usmc.mil
MCB CP PEND	www.cpp.usmc.mil/jpao/home.htm
MCRD SD CA	www.mcrdsd-usmc.com
MCAS Miramar	www.miramar.usmc.mil
MCAS Yuma	www.yuma.usmc.mil
MARFORRES	www.marforres.usmc.mil
MCLB Albany	www.ala.usmc.mil
MCB Quantico	www.quantico.usmc.mil
MARFORLANT	www.marforlant.usmc.mil
MARFORPAC	www.mfp.usmc.mil
MCAS Cherry Point	www.cherrypt.usmc.mil
MCAS New River	www.lejeune.usmc.mil/mcasnr
MCB CP Lejeune	www.lejeune.usmc.mil
MCAS Beaufort	www.bft.usmc.mil
MCRD PI SC	www.parrisisland.com
MCB Hawaii	www.mcbh.usmc.mil
MCAS Iwakuni	www.iwakuni.usmc.mil
MCAS Futenma	www.futenma.usmc.mil
MCB CP Butler	www.okr.usmc.mil

e. Marine Corps Units

I MEF	www.cpp.usmc.mil/IMEF/imef%20home%20main.htm
II MEF	www.iimef.usmc.mil/
III MEF	www.iiimef.usmc.mil/
11th MEU	216.71.22.141/
13th MEU	www.usmc.mil/13meu
15th MEU	www.usmc.mil/15meu
22nd MEU	www.usmc.mil/22ndmeu
24th MEU	www.usmc.mil/24meu
26th MEU	www.usmc.mil/26meu
31st MEU	www.usmc.mil/31meu

f. U.S. Transportation Command

USTRANSCOM (PAO)	ustcweb.safb.af.mil
AMC	www.safb.af.mil/hqamc/pa
MSC	www.msc.navy.mil
MTMC	mtmc.army.mil

g. Miscellaneous

Aircraft Mission Tracking	www.trip.com
Aircraft Distance Calculator	jfast.prg.utk.edu/Port2PortAirDist/default.asp
Airfield Suitability	www.amc.af.mil/do/doa/doas.htm
AMOC Briefs	www.amwc.af.mil
Amphibious Ships	www.chinfo.navy.mil/navpalib/factfile
Blount Island Command	www.matcombic.usmc.mil
GTN	www.gtn.transcom.mil
GTN CLASSIFIED	www.gtn.transcom.smil.mil
MIT (MPF Info Tool)	http://mit.altservices.com
MAPS	http://maps.yahoo.com/yahoo
Per Diem Rates	www.dtic.mil/perdiem/
Ports	www.portguide.com
Systems	mcsd.ala.usmc.mil/homepage.html
TCAIMS II	www.tcaimsii.belvoir.army.mil
Travel Claim	www.psasd.navy.mil/travel.html

A-3. Planning Quick Reference Table

Marine Corps Planning Process: mission analysis, COA development, COA war game, COA comparison and decision, orders development, transition.

Actions Upon Receipt of Mission	The CG and C/S consider the division of labor between the G-3 and the G-5:**Time:** Relative to what is being executed in current operations and what is future operation's planning horizon. **Purpose:** Is the purpose the same for future tasks, within the current or subsequent phases, such that G-3, Future Operations is the logical choice for planning. **Major Tactical Tasks:** Major tasks (Linkup, RIP, POL, JLOTS, etc.), of such complexity, that require long lead-time and coordination with forces external to the MEB. **Area of Operations:** Change in area of operations requiring a different set of considerations with respect to terrain and enemy. **Command Relationships:** Changes in command relationships requiring coordination beyond that of what is currently in place. **CG's guidance to C/S, G-3, and G-5 may include decisions on the following:** Assessment of division of labor between G-5 and G-3 in order to prevent duplication of effort. Where does the CG want the G-5 to focus his planning efforts. Does the CG want the G-5 to think beyond the next MEB mission? What are the CG's future concerns? What should the G-5 produce and hand off to G-3, FOPS. Planning horizon based on Time Available: Is it better to have the G-5 coordinate and shape issues for the MEB or dedicate time to detailed planning that may be best planned by G-3 FOPS. Planning Horizon based on achieving the assigned purpose: While G-3 plans and executes towards one purpose, G-5 plans towards the next purpose.
Commander's Orientation	The battle staff provides the necessary information for the CG to review HHQ warning order or OPORD, intelligence estimate and IPB products (MCOO, doctrinal template). Commander issues initial guidance relative to **commander's battlespace area evaluation (CBAE)**: battlespace, COG, commander's intent, and CCIRs.
Mission Analysis	Establish time line. Review initial guidance, CBAE and update MCOO. Review HHQ mission and intent. Determine the enemy and friendly **purpose** of the operation. Identify specified and implied tasks (annotate reference/page number). Determine essential tasks. Draft mission statement. Determine area of interest (AOI) in relation to AO. Review restraints (cannot do) and constraints (must do) (annotate reference/ page number). Review significant assumptions required to continue planning. Determine requests for information (RFIs). Determine priority intelligence requirements, recommended CCIRs, and review resource shortfalls. Determine subject matter expert shortfall. Enemy and friendly COG/CV analysis (enemy COG prevents you from achieving your purpose). Throughout planning allow OPT members time to brief respective commanders and staff principals. G-2 develops HVTs.
Mission Analysis Brief	Review commander's initial guidance. Situation update, AO/AOI, intelligence estimate (terrain, weather, threat COAs). HHQ mission and intent. Review purpose, specified, implied, and essential tasks (with references/page). Proposed mission statement. Review shortfalls. Have G2 present enemy COA models. Review enemy and friendly COG. Recommend CCIRs. Issues for the commander. Once the mission statement is approved, draft and issue warning order (mission, commander's intent, task-organization, earliest time of movement, etc.). Start incorporating planning products within the JOPES basic orders format. Begin staff estimates and convene the Red Cell.
COA Development	Commander issues planning guidance with respect to COA development, and decisive (results beyond itself) and shaping actions. Review MCOO, doctrinal and situation template, and enemy COA models. Graphically array friendly and enemy forces. Develop the relative combat power assessment. **Develop initial COAs by working backward from the purpose of the operation, the end state conditions that achieve the purpose, enemy COG/CV, to decisive and shaping actions and reserves. Consider types of offensive operations and forms of maneuver that can lead you to a decision.** Think time and space at the MEB level—deep, close, rear operations. Determine which forms of maneuver best exploit the combined arms of the MEB across the entire battlespace. Where do you want to force, accept, or refuse battle. Develop HVTs into HPTs. Review the commander's planning guidance against the COA. Ensure that the COA is: **suitable** (accomplishes the mission [purpose] and complies with the commander's guidance), **feasible** (accomplish mission with available time, space and resources), **distinguishable** (significant different from other COAs in forms of maneuver or attacking enemy COG through CVs), **acceptable** (accomplishes an advantage that justifies the cost in resources), **complete** (accomplishes the all tasks in accordance with the commander's guidance). **Brief the initial COA** to the commander, ensure that representatives from the Red Cell are present. Make necessary modifications. Refine graphics (boundaries, LD, phase lines, ground and air axis, assembly areas fire support measures, ME/SE/Res) and **write COA narratives** (write broad overview of the operation as a CONOPS (MSC – ACE,GCE, FSSG tasks) as conducted in phases or stages with end state for each. Tasks and purpose of the ME/SE/Res). **Reserves** should be organized based on anticipated capabilities.
COA Development Brief	Review Commander's planning guidance, intelligence update, mission, commander's intent, Updated facts and assumptions, relative combat power assessment, COA graphics and narratives (read the narrative and have a pointer work the map), recommended additions to CCIRs and PIRs. Pending issues for the commander. Recommended wargaming analysis and evaluation criteria.

COA War Game	Commander updates intent, guidance, CBAE, and CCIRs as part of the commander's war game guidance. Includes friendly and threat COAs to be war gamed against specific (most likely and dangerous) enemy COAs. List of critical events (decisive action, shaping, link up, passage of lines, enemy counter attack…) that need to be war gamed, and level of the war game (one or two levels down). The commander establishes the evaluation criteria based upon principles of war (MOOSE MUSS), main effort, enemy COG, purpose of the operation…. Red Cell and OPT prepare synchronization matrixes for their COAs. Review the commander's guidance and evaluation criteria with the OPT and Red Cell. Evaluate the friendly COAs against enemy COAs and not against other friendly COAs. Review war game rules and technique—post the designated enemy COA overlay on the map, post the friendly COA overlay on the map, determine if events are simultaneous or chronological, determine the affects of shaping (JFC and enemy) on the forces. Begin the war game by establishing time of the event and weather conditions, conduct as many moves as necessary to achieve desired results. Record the time and results of the friendly and enemy moves, and collect data to satisfy the commander's evaluation criteria. Update synchronization matrix and decision support template and matrix (event template with projected enemy positions, NAIs, TAIs, and DPs). Identify and record, time, critical events, decision points, branches, and sequels. Validate HPTs. Identify resource shortfalls, and additional RFI, PIRs, and CCIRs. Identify and develop measures of effectiveness for assessment. **Validate assessment criteria's and MOEs for tasks.** Brief respective staff sections to develop and refine staff estimates.
COA War Game Brief	Mission, intent, commander's evaluation criteria, war gamed COA, narrative and task organization, war gamed significant events and results (just the facts), decision points, any branches and sequels, validated assumptions, additional CCIRs and PIRs, resource shortfalls, commander's issues (track the ones resolved), commander's evaluation criteria as it pertains to each COA.
COA Comparison and Decision	The commander, principle staff, and subordinate commanders examine and evaluate the COAs using the commander's evaluation criteria, staff estimates, and estimates of supportability. The commander may select a COA, modify a COA, develop a new COA by combining favorable elements of all the COAs, or discard and begin staff planning anew. Upon making a decision, the commander reviews the COA in detail (critical events and decision points) with subordinate commanders and principle staff. Issue warning order.
Orders Development	The C/S coordinates the principle staff to assist the G-3 in developing the OPORD. The mission statement (goes in para. 2 of the OPORD), commander's intent (para. 3a), COA narrative (refined into a concept of operations [para. 3b]), CCIRs (para 3e), staff estimates (refined into appropriate annexes), specified and implied tasks (with a purpose assigned to subordinates in para 3c), synchronization matrix (refined into an execution matrix), and other products from the planning process become the basis of the OPORD. Conduct an orders reconciliation to review the entire order to ensure that the basic order and all its annexes are properly linked and in agreement. Conduct an "orders crosswalk" to ensure that the order is also linked to higher and adjacent. Identified branches are further planned to become FRAGOs. Decision support template and matrix along with other intelligence and IPB products are provided to subordinate commands.
Transition	Designed to shift from planning to execution. The commander or C/S provide transition guidance. During transition, the commander conducts a transition/execution drill to envision flow of events with subordinate commanders. He may require the subordinate commanders to give a confirmation brief of their understanding of the mission and intent and their CONOPS. In internal transition, the plan is transitioned by future ops to current ops. The OPT reviews the detailed plan or order with all the staff section current ops reps. This brief may consist of an orientation, intelligence update, IPB, HHQ mission and intent, mission, commander's intent, CCIRs, T/O, and concept of operations, subordinate tasks, coordinating instructions, identified branches and sequels, decision support tools, pending issues. Current ops should conduct an execution drill.
Red Cell	Convene the Red Cell as soon as possible. As the "thinking enemy," the Red Cell receives threat COAs (most dangerous/most likely) from the G-2 and prepares these COAs for the war game. Based on threat capabilities, the Red Cell should have the following representation: maneuver, fires, and intelligence. The Red Cell leader is designated by the commander and does not necessarily have to be an intelligence officer. The Red Cell, G-2, and the OPT must constantly exchange information during the planning process.
Warfighting Functions	Maneuver, intelligence, logistics, command and control, force protection, and fires
Center of Gravity	COG is a source of strength (MCDPs & 0-1). COGs may shift by phase or by COA. For example if the enemy is defending, his COG may be artillery; whereas, if the enemy is delaying, his COG maybe his counterattack force—armor. At the tactical level, if the enemy COG does not prevent you from achieving your purpose, then it may not be a COG. **Remain focused on the purpose**, the attack of the enemy COG is only important if it leads you to that purpose.
Commander's Intent	Purpose, method, and end state
CCIRS	Information required by the commander that directly affects his decisions and dictates the successful execution of operational or tactical operations. CCIRs normally result in the generation of three types of information requirements: **priority intelligence requirements** (PIR), **essential elements of friendly info** (EEFI), **friendly force information requirements** (FFIR). CCIRs should be linked to decisions, assessment criteria's, and branch plans.
On-order; Be Prepared Missions	An **on-order** mission is a mission **to be executed**, except that the **exact time and place may not be known**. The force assigned the mission is a committed force, it will develop plans, allocate resources, task organize, and position forces for execution. It must be mentioned in the CONOPS. A **Be-prepared** mission is a mission assigned that **might be executed**. It will be executed **only if something else has or has not been successful; linked to an event**. No resources are allocated for a BPT mission. In the priority of planning, it will be planned after any other assigned on-order missions.

Forms of Maneuver and Types of Operations	**Forms of maneuver**: frontal attack—flank attack—envelopment (single/double)—turning movement—penetration—infiltration. **Types of offense:** movement to contact, attack (hasty, deliberate, spoiling, counterattack, raid, feint, demonstration), exploitation, pursuit. **Types of defense**: mobile (orients on the destruction of the enemy through offensive action) and position (deny enemy access to critical terrain for a specified period of time). **Forms of defensive maneuver**: defend and retrograde. **Forms of retrograde:** delay, withdrawal (under pressure and not under pressure), retirement. **Forms of reconnaissance:** zone, area, point, route, recon in force. **Forms of security:** screen (observe and report), guard (T/O to operate apart and protect the main force), cover (prevent surprise and deceive the enemy).
Defense Operations	Security area (FLOT [no screening or guard forces forward of—should have a BHL for these forces]—FEBA [area where ground combat units are deployed, excluding screening and covering forces]). Main battle area (FEBA—rear boundary of forward subordinate units). Rear area (area forward from the assigned rear boundary to the rear boundary of the main battle area). **Position defense**: denies the enemy access to terrain. **Mobile defense**: orients on the enemy force. **Defend in sector or battle position**. Task-organized **counterattack force and reserves.**
Phases—Stages— Parts	Name each in sequence—pre-hostilities, lodgment, shaping, combat operations, decisive ops, exploitation, stabilization, follow through, post hostilities, redeployment. Each state should have an end state or conditions that determine transition to the next.
Amphibious Operations	**Types:** assault, demonstration, raid, withdrawal. Assault forces and assault follow on echelon. **PERMA:** planning, embarkation, rehearsal, movement, assault. **Considerations:** mission (purpose of amphibious assault—fix, deceive, or fight in depth, are operations sequenced or simultaneous), objectives, who is the CATF and does he have the ability to control the AOA, if established. If no AOA how and who controls the battlespace. AOA (immature theater)/AO (mature theater), command relations, air control, supporting ops, boundaries, linkup, deception, pre-assault ops, advance force ops, MPF, logistics (afloat or JLOTS). What are the conditions for transfer of authority ashore. Is NAVFOR the supported or supporting commander during execution of the amphibious operation? **Advance force operations** (org within the ATF that precedes to prepare the obj area—recon, mines…), **pre-assault operations** (conducted in obj area before the assault phase begins by the ATF forces), supporting operations (coordinated by the CATF to shape the enemy by joint forces—deception, battlespace dominance, mines outside the AOA, MIO, special operations).
Military Operations Other Than War	**Principles:** objective, unity of effort, security, restraint, perseverance, and legitimacy. **Types:** arms control, combating terrorism, DOD support to counterdrug operations, enforcement of sanctions/maritime intercept operations, enforcing exclusion zones, ensuring freedom of navigation and overflight humanitarian assistance, military support to civil authorities, nation assistance/support to counterinsurgency, NEOs, peace operations (peace enforcement, peacekeeping operations, operations in support of diplomatic efforts), protection of shipping, recovery operations, show of force operations, strikes and raids, support to insurgency.
Linkup Operations	Conducted during an amphibious operation by forces landed by surface or aviation means, relief of an isolated unit, join other US or allied forces. May be conducted to complete an encirclement of envelopment of an enemy force, join an attacking force with a force inserted in the enemy rear. Assist in the breakout of an encircled friendly force. Forces may be moving towards each other, or may be stationary. May be part of an offensive or defensive operation. HQ directing the linkup must establish the command relationships and responsibilities of the forces involved. Liaison is established through planning and continues throughout the operation. Coordinate the scheme of maneuver and control measures. Location of primary and alternate linkup points. Fire support measures increase or decrease as the forces converge. Actions following the linkup. G2 must employ R/S assets near linkup points. Axis of advance of the moving force must intersect the security element of the stationary force. Stationary force removes obstacles, provides guides, and establishes assembly areas for the reorganization of the linkup forces. A restrictive fire line (RFL) may be required to preclude fires from the convergence of forces affecting each other. As the linkup become imminent, the RFL is moved as close to the stationary force as possible to allow maximum freedom of action for the linkup force (moving force should control fires). Both FSCC should clear fires not observed or under terminal control. Upon linkup, responsibility for fire support is transferred to the designated commander. If the linkup force is to continue operations with the stationary force, then a single commander for the overall force must be designated. FM 71-100 Div Ops
Obstacle Crossing	Natural or manmade. **Hasty or deliberate**. **Suppress**, **obscure**, **secure**, and **reduce**. Support force to isolate the obj, breach force creates lanes within the obstacle belt. Assault force dislodges the enemy. **M-155 MICLIC**: 100m x 16m. Expect 50% equipment loss for the breach force. Mechanical reduction 10 minutes per 100m minefield.
Passage of Lines	Must facilitate another tactical operation. Conducted to continue and attack, envelop an enemy force, pursue a fleeing enemy, or withdraw a security or main battle force area. Use multiple passage lanes. Should be rapid to minimize vulnerability. Stationary unit conducts aggressive counter recon. Engineer support from stationary unit to guide the passing force through obstacles along the FLOT. Control measures (battle handover line, axis of advance, rearward assembly areas). Passing unit FSC coordinates the fires. Stationary unit assists in CASEVAC, EPWs, civilian control, route priority and traffic control. Higher command coordinates responsibility of control of zone or sector or mutually agreed by stationary and passing commanders. Deception and smoke are planned. Combat support is integrated into the plan to support the movement of the passing unit. Route priority is given to the passing unit. Exchange intelligence, tactical plans, SOPs, security measure during passage, priorities of route and facilities and provisions for movement control, exchange of LNOs, and obstacle plan.

Relief in Place	Can be conducted simultaneously over the entire sector or staggered over time. Executed from front to back or back to front, given METT-T and the amount of forces employed along the FLOT (minimum forces along the FLOT, relief rear to front and vice versa). Time of relief, sequence of units, advance parties, fire support coordination, air defense, passage control (initially unit being relieved has TACON upon relieving unit, exchange of equipment…).
Maritime Prepositioning	Secure area with adequate ports (drafts, overhead clearance, and throughput [roads…]), and adequate strategic airlift. One MPSRON supports a brigade size MAGTF force of approx. 18,800 Marines and sailors for 30 days. All classes of supplies except IV, VI and X. **MPSRON-1** Mediterranean Sea, **MSPRON-2** Indian Ocean (Diego Garcia), **MSPRON-3** Pacific Ocean (Guam). **M1A1**: 58; **LAVs**: 25; **AAAVs**: 109; **HMMWVs**: 129 (72 w/TOW), **Stingers**: 45; **EROWPUs**: 41; **Trucks (7-ton)**: 489, **MHE**: 121; 30 days sustainment. **Sorties** for MEB fly in echelon: CE 12; GCE 35; CSSE 30; ACE 151. Naval support element (NSE) 6. Offload 7-9 days dependent on ship type. Backload 9-10 days.
Rear Operations	**Functions**: **communications, intelligence, movement, area management, security, sustainment, infrastructure development, host nation support**. Dedicate intelligence assets to rear area. Today's deep fight may be tomorrow's rear area. Reserve regiment assigned as the TCF. **Levels: 1.** (Agents, terrorists, saboteurs….) Threat can be defeated by base/base cluster self-defense. **2.** (Small tactical units, unconventional forces….) Beyond base self-defense capability but can be defeated by response forces (MP) with supporting arms. **3.** (Large tactical units—air/heliborne, amphibious….) Requires commitment of combined arms tactical combat forces (TCF). **Active and passive defensive measures**. SROE and LNO to FOPS. If FSSG is the RAC than they must have assets assigned for fire coordination and security
Intelligence Preparation of the Battlespace	**Doctrinal template**: Enemy order of battle. **Situation template**: Enemy based on terrain and environment. **Event template**: NAI with enemy COA for developing a collection plan. **Combined event template**: Red and blue forces COA. **Decision support template**: A product of wargaming, projected enemy COA with DPs/NAI/TAI. **MCOO**: modified combined obstacles overlay: mobility corridors, objectives avenues of approach, likely location of enemy obstacle system, defensible terrain, likely engagement area, key terrain, built up areas and civil infrastructure, etc. **HVT**: Essential for the enemy to accomplish the mission. Developed by the G-2. **HPT**: Enemy targets, when destroyed, help us accomplish the mission. Developed by the G-3.
Information Operations, Information Warfare, and Command and Control Warfare	Integrated plans to degrade enemy decisionmaking capabilities while protecting ones own IO/IW/C2W includes: **deception, psychological operations, physical destruction, electronic warfare, operational security, civil affairs. Defensive IO/IW/C2W methods include: OPSEC, information assurance, CI, counterPSYOPS, and counter deception**. C2W implies tactical measures while IW is operational information operations
MOPP Conditions	**1**: Over garment worn, carry the rest of the protective gear. **2**: Wear boots. **3**: Protective mask and hood. **4**: Gloves and liners, over garment is closed and hood pulled down. Joint Service Lightweight Integrated Suit Technology MOPP suit lasts 30 days and 24 hrs contaminated. Account for a factor of 1.5 longer to accomplish this under MOPP conditions. FM 3-4, NBC Protection.
Air Defense Weapons Control Status	**Weapons free**: Weapons fired at any target not positively recognized as friendly. **Weapons tight**: Fired at targets recognized as hostile. **Weapons hold**: Fired in self-defense.
Levels of Authority	**COCOM**: non-transferable command authority established by law. **OPCON**: transferable authority to accomplish assigned missions; does not include authority for logistics, administration, discipline, internal organization, or unit training. **TACON**: local direction to accomplish assigned tasks. **ADCON**: administrative and logistics. **DS**: Support another force and to answer directly to the supported force's request for assistance. **GS**: Support given to the supported force as a whole and not any subdivision thereof. **GSR**: Arty mission, support the force as whole while providing reinforcing fires for another arty unit. **Attached**: Temporary placement of units or personnel in an organization. **Mutual support and close support**
Liaison Officers, Representatives, and Augments	**Liaisons:** represent the sending unit's capabilities, plans, and concerns. He must be able to understand how his commander thinks, and convey his commander's intent, mission, concept of operations, and concerns. LNOs should have the requisite rank, authority, clearances and communication connectivity to function properly. LNOs should have the depth in personnel to conduct sustained operations. **Representatives:** Work for the sending unit and provide short term, as required input into the planning process. They are expected to be the SME for the function they represent. **Augments:** Work for the receiving commander or staff and usually fill an MOS/TE shortfall requirement for the gaining unit.
Fire Support	**FSCL**: Established by the land or amphibious commander to coordinate fires of air, ground, or sea weapons systems. Must be coordinated with appropriate air commander (keep in mind the ATO cycle its impact to rapidly change FSCLs). Supporting elements may fire beyond without coordination but should inform appropriate ground commander. Coordination required behind the line. **CFL**: A line beyond which conventional fire support means may fire at any time without additional coordination. **RFL**: Established between two converging forces, established by the next higher common commander. **RFA**: Fires that exceed imposed restrictions may not be delivered without approval.
Days **Hours**	**C-day**: deployment to commence; **D-day**: commencement of hostilities; **R-day**: redeployment; **S-day**: 200,000 selected reserve to active duty for 90 days; **T-day**: National Emergency 1,000,000 reserve call up for 24 months; **W-day**: hostile government may commence operations. **Hours: H**: commencement of operation on D-day; **L**: hour at which deployment commences on C-day. (ref: JP1-02, under Time)
DEFCON 1-5	**DEFCON 5** being normal while **DEFCON 1** being maximum readiness of military forces.

Collaborative Planning Systems	**GCCS:** Global Command and Control System. **JDISS:** Joint Deployable Intelligence System (fed by GCCS requires SIPRNET). **JMCIS/UB:** Joint Maritime Command Information System/Unified Build. **IAS:** Intelligence Analysis System. **TCO:** Tactical Combat Operations. **C2PC:** Command and Control Personal Computer. **CTAPS:** Contingency Theatre Automated Planning System. **TBMCS:** Theater Battle Management Core Systems (Replacing CTAPS). **AFTADS:** Advanced Field Artillery Tactical Systems. **TMS:** Target Management System. **JOTS:** Joint Operational Tactical System. **JOTS 1 (TDBM):** Track Database Manager. **COP:** Common Operating Picture (CINC). **CTP:** Common Tactical Picture (Component and Below). **DII COE:** Defense Information Infrastructure Common Operating Environment.
Classes of Supply	**I** Rations, **II** Individual Equipment, **III** POL, **IV** Construction, **V** Ammunition, **VI** Sundry Items, **VII** Major End Items, **VIII** Medical/Dental, **IX** Repair parts, **X** Materials for Non-Military Programs.
Weapons Systems	**MI-AI**: 300 miles (505 gal: 300 miles), weight 70 tons, range 120mm–3,000m, 14 per company; **T-72**: max range 2000m; **M2 BFV**: 300 miles (175 gal) 25mm chain gun 14 per company; **TOW**: 3,750m, **Hellfire**: 7,000m; **Longbow** 20K; **Javelin**: 2,000m; **60mm Mortar** 3,500; **81mm Mortar** 5,800; **155mm Arty** 30,000m, Rap 40,000m; **MLRS** 32K –100K(ATACMS); **Stinger missile**: 15,000m; **Patriot**: 160 km; **Hawk**: 80 km; **JSTARS:** approx. 200miles by 200miles coverage. **TLAM:** 1,000 lb warhead; **JDAM:** Joint Direct Attack Munitions–Satellite Guided.
Armor Division	Total Vehicles 5,314. If the Div moves without DISCOM it requires 662 Km on one route. With DISCOM 729 km. (Ref CGSC ST 100-3).
Armored Cavalry Regiment	**2d ACR -- Light UH-60:** 10; **OH-58**: 33; **HMMWV TOWS:** 108; **HMMWV SCOUT:** 180; **155mm Towed:** 24; **120mm Mortar:** 18. **3rd ACR – Heavy M1A1:** 123; **CFV M3:** 125; **CEV:** 3; **Javelin:** 24; **Mortar 120mm:** 18; **OH-58:** 24; **AH64:** 16; **EH60:** 3; **UH60: 18**; **Avenger:** 6; **Stinger:** 10; **155mm SP:** 24
USMC Tank Battalion	**M1-A1:** 58 (66-72 tons). Co 14 x 4 (12 M88AI Rs & 6 AVLBs, 4 M60A1 Bridge Armored vehicle). 5-Tons: 38; TOW HMMWV: 26
LAR Battalion	**LAV 25:** 60; **LAVC2**: 8; **LAV-AT:** 16**; LAV-M**: 8; **LAV-L:** 16; **LAV-R:** 6; TOTAL 114. **7-Ton Truck**: 13; **LVS:** 3**; Wrecker:** 2**; HMMWV**: 24 **LAR CO: LAV 25:** 14; **LAV-M:** 2; **LAV-T:** 4; **LAVC2:** 1; **LAV-R:** 1; **LAV-L:** 3 CO 25 x 4 Weight 28,000lbs empty; CH53E carries 30,000lbs 50 miles.
AAAV Battalion	**AAAVPs:** 213, **AAAVCs:** 14; **AAAVRs:** 6. **Bn** = 4 AAAV Cos. **CO**: 44Ps; 3Cs; 1R. CO D in 29 Palms. Combat Assault Bn in Okinawa has 1 AAAV CO
Air Defense	**Patriot**: 160 km. **Patriot radar** Alt 80K, **acquisition range** 160K. **Engagement range** 60K. Should be employed no more than 20K from unit. Mutual support 15K. BN: 5 Btry; 8 launchers per btry; 32 missiles per btry. **AVENGER** acquisition range 10K; engagement range 5K. Mutual support distance 3K. 8 missiles per vehicle. **Stinger Missile**: 15,000m. **CLAWS**: 80 km.
Intelligence Collection Platforms	**Rivet Joint:** communications intelligence and electronic intelligence. **Quickfix: EH 60–**tactical communication intelligence and electronic intelligence; DF and electronic attack in low frequency spectrums. **Compass Call:** Jammer. **Commando Solo: C-130**–psychological operations and broadcaster.
Tactical Ballistic Missiles	**SCUD B:** Range:300K, Payload:2,200lbs, CEP: 400 to 1000m, Warhead: Conv/Chem. **SCUD C:** Range:500K, Payload:1,500 lbs, CEP: 400 to 1000m, Warhead: Conv/Chem. **Nodong 1:** Range:1000K, Payload:2,200lbs, Warhead: Conv/Chem. **Nodong 2:** Range:1500 - 2000K, Payload:2,200lbs, Warhead: Conv/Chem. **M18:** Range:1000K, Payload:880lbs. **M9:** Range: 600K, Payload:1100lbs, CEP: 300m, Warhead: Conv. **CSS-2/DF-3**: Range:3000K, Payload:3000lbs, CEP: 1000m, Warhead: Conv/Nuc. **Jericho 1 (**Israel**):** Range:500K, Payload:1,100lbs, Warhead: Conv/Chem. **Frog 7:** Range:70K, Payload:960lbs, CEP: 400m, Warhead: Conv/Chem. **Sakr-80** (Egypt)**:** Range:80K, Payload:440lbs, Warhead: Conv. **Vector** (Egypt)**:** Range: 600K, Payload:1000lbs, Warhead: Conv. **BGM – 109 TOMAHAWK:** Range:1300K, Payload:1000lbs, CEP: 10m, Warhead: Conv/Nuc. (Ref CGSC ST 100-3).
Attack Helicopters	**AH-1Z:** Missiles: 8/ 20mm, Range: 480k; **AH-64:** Missiles: 16/30mm, Range: 480k—aux tanks 800k; **OH-58:** Missiles: 4/.50cal, Range:413k. (Ref CGSC ST 100-3).
Utility Helicopters	**UH-60:** Troop: 13 (20 without seats), Range: 592K, Internal: 2,600lbs, External: 8000lbs. **CH-47:** Troop: 33 (100 without seats), Range: 717K, Internal: 20,200lbs, External: 30,000lbs. **CH-53E:** Troop: 35 (55 with center seats), Range: 620m, refueling – Indefinite, Internal: 31,000lbs, External: 33,000lbs. **MV-22:** troop: 18 (24 combat), range: 700nm, internal: 10,000lbs, external: 10,000lbs. **UH-1**: troop: 9, range: 200K, internal:1,500lbs.
Functions of Marine Aviation	**Offensive air support** (CAS and DAS); **antiair warfare** (offensive AAW and air defense); **assault support; air reconnaissance; electronic warfare; control of aircraft and missiles**

A-4. Combat Service Support Considerations in Intelligence Preparation of the Battlespace

a. Terrain Implications

Can the terrain support combat service support operations?

- Are host nation (HN) assets available for logistics operations?
- Any existing structures/built-up areas present?
- Any usable medical facilities
- Is there any overhead storage/work areas?

What are the ground avenues of approach that could interfere with combat service support operations? Offensive operations could produce by-passed or stay behind enemy elements that must be recognized and averted by combat service support assets to be able to maintain continuous support.

Where are the infiltration lanes that could be used by the enemy?

- Identify and locate the routes the enemy could use to move insurgents, light infantry, and/or unconventional warfare units into the combat service support AO.
- Is there any area in the combat service support AO that could provide concealed positioned to these enemy units

Identify possible avenues of approach, LZs, DZs, and MSR ambush locations in the combat service support AO.

b. Weather Implications

What will be the effect on the entire road network (hard surfaced and unimproved road surfaces) as a result of different types of precipitation (rain, snow, fog/mist, ice) and temperature?

- Will a rain soaked unimproved dirt road support the weight of fuel LVSs or 5K tankers? How about a MK48/M1000 trailer loaded with a M1A1 weighing 135 tons?
- How will an iced over hard surface MSR effect logistics operations?
- Will an unplowed, snowed over MSR affect combat service support travel time?

Will the temperature have any effect on—

- Friendly forces Class II (clothing)?
- Classes of supply?
- Storage of Class I and VIII?
- Consumption of Class III (bulk and packaged) or IX (filters, tire chains, batteries, starters)?
- Production of potable water (frozen pipes, iced over ponds, creeks, etc)?

How would poor visibility/illumination affect—

- Enemy infiltration.
- Force protection.
- Driving/resupply activities (slower convoy speeds, accidents).

c. Other Implications

Security—

- Does the area offer adequate cover/concealment?
- Do we have observation/overwatch positions along possible avenues of approach/LZs?
- Can we disperse our assets to reduce possible collateral damage?
- Can we minimize our unit's signature?

General—

- Does the area afford good communications?
- Is the road network adequate and trafficable? Can the terrain support movement within the AO for the vehicles that will occupy it?
- Is the AO in proximity to the MSR, not on the MSR but near it? By doing so it reduces unit signature and might take the unit off an avenue of approach.
- Potable water/raw water source location (available, frozen over).
- Access to MEDEVAC LZ?
- Existing bridges capable of handling fully loaded LVSs, 5K tankers and M88s or MK48/M1000 trailers evacuating M1s?
- What is the height clearance for overhead bridges?
- Any water/rail capability.

d. Considerations in Developing the Modified Combined Obstacle Overlay

- Does the terrain offer an area suitable for logistics operations?
- Is it away from possible avenues of approach and mobility corridors?
- Is this area close to a useable road network?
- Does the MSR travel through primary or secondary engagement areas?
- Are there any obstacles that could restrict/divert combat service support operations such as bridge restrictions, choke points, road surface/trafficability concerns?

A-5. Combat Service Support Considerations in the Mission Analysis

The questions logistics planners and operators should always be able to answer are—

- Where are we on the battlefield?
- Why are we here?
- How do we support from here?
- How do we get support from here?
- How long do we need to provide support for?
- When, to where, and in what sequence do we displace to ensure continuous operations?

The following is a type of methodology for logistics planners at all levels. It is based on a requirement, capability, shortfall, analysis, and solution model. This methodology can be used in logistics course of action (COA) development when the unit is developing its concept of support. This process is meant to complement the Marine Corps Planning Process.

a. Requirements

- What method is used to determine logistics requirements? (For example, personnel density, equipment density, planning factors, operating tempo, combination, etc.)
- What is the source of the requirements determination calculations? (For example, Marine Corps orders, casualty estimator, historical data, etc.)
- What units are you supporting for this mission? Will it change during the operation?
- Identify implied logistics tasks based on the tactical plan. What are the ramifications of river crossings, pauses, deep attacks, etc.?
- Is there an NBC threat?
- What do you need?
- How long will you need it?
- Where do you need it?
- What do you need to put it there? (For example, fuel bladders/bags, materiel handling equipment, etc.)
- How will you get it there?
- When do you need it there?
- How long will it take to get it there?
- How soon will it be available to move there?
- Where is it coming from?
- What do you need to do with it before moving it where you need it? (For example, does it have to be containerized, broken down, segregated, separated, disassembled, configured, or reconfigured before movement?)

    - How long will that take?
    - What are the requirements for that?

- Does it have to move again after it gets there? Who will move it from there?
- What are the competing demands for this requirement?
- What is required to offload it when it gets there?
- Does anything need to be done with it once it gets there? (For example, does it have to be unpacked, assembled, etc.?)
- What has to be done to move it once it is there?
- Does this requirement have special employment considerations? (For example, require a large, level area of land or a fresh water source; be located near an MSR; need refrigeration; require dedicated transportation; etc.)
- How often will the commodity, supply, or service be required? How often must it be replenished?
- Does the requirement have preparatory activities? (For example, engineers to make berms for a fuel bags, airfield matting for forward arming and refueling points (FARPs), road and pad construction for a CSSA.)

    - What is the expected duration of the required preparation?
    - How do you request the preparation and who approves it? (For example, engineer work has to be approved through channels.)
    - What support is required for the preparatory activities?

b. Capabilities

- What are the units available that have the capability to fulfill the requirement?
- Is more than one unit required to provide the capability?

- What are the overall receipt, storage, and issue requirements for my area of support for this particular commodity, supply, or service?
- Will this capability be used to weight the battle logistically?
- What is the total short ton (STON)/gallon/other distribution capability by mode? Line haul? Local haul? Other? What distribution planning factors were used?
- How many locations require this capability?
- Are any units with this capability already committed?
- Are any units with this capability due in? When?
- Can a unit deploy elements (sections or detachments) to place the capability where it is required?
- Does the unit have unique management/employment considerations?

c. Comparison/Shortfall

- If there is no shortfall, go to the *analysis* portion of this methodology.
- Which requirements exceed capabilities?
- For requirements that exceed capabilities, is it overall or in a particular area, region, or time?
- How much is the shortfall in terms of units of measurement (STONs, gallons, square feet)?
- What does the shortfall equate to in terms of days of supply?
- At what point in the battle is the requirement expected to exceed the capability?
- What is the type of shortfall? Is it a supply availability shortfall, a resource (equipment, materials handling equipment (MHE), personnel, facilities, man-hours, etc.) shortfall, or a distribution shortfall?

d. Analysis

The analysis process has to occur for all support operations even if there is no shortfall. The logistic planner has to determine how to support the operation.

- What is the earliest the support operation can begin?
- What is the latest the support operation can begin?
- Is it better to be early or late?
- What is the purpose of the support? (For example, is the purpose to build stocks at GS, to sustain a force for a given period of time at DS, or to resupply a user?)
- Will support be provided from a fixed location or from a forward logistics detachment?
- What is the significance of the shortfall?
- What is the potential impact of the shortfall?
- What is the expected duration of the shortfall?
- What is the cause of the shortfall (battle loss, time-phased force deployment sequence, etc.)?
- If the shortfall is a *supply availability* shortfall, consider the following:

    - Is the shortfall only at this level or is at higher levels as well?
    - Is it a result of higher commands' efforts and support priorities?
    - Is the supply available at other echelons and, if so, where?
    - How long will it take to get here?
    - Is there an acceptable alternative, a substitute, or an alternative source of supply?

- If the shortfall is a *resource shortfall* (equipment, MHE, personnel, facilities, man-hours, etc.), consider the following:

- Can similar resources be diverted or obtained from somewhere else?
- Is host nation support a viable alternative?
- How specialized is the shortfall resource?
- Can a secondary military occupational specialty (MOS) be used?
- Does a sister service or coalition partner have the capability?

- If the shortfall is a *distribution shortfall*, consider the following:

  - Is the shortfall due to a lack of assets or to a time-distance problem?
  - Does the shortfall capability require special handling or any special distribution requirements?
  - Are there any alternative distribution modes?
  - Are host nation distribution assets available?
  - Are sister service/coalition assets available? Are they compatible? (For example, European and SWA host nation fuel tankers are metric and require a coupler adapter to interface fuel bags or U.S. tankers.)
  - Are there any airfields, field landing strips, or helipads near the requirement?

- How will logistics capability be echeloned forward? Which units will be tasked to establish forward logistics bases?

e. Solutions

- Determine the most workable solutions based on analysis.
- Ensure support plan is fully integrated into concept of operations.

A-6. Combat Service Support Considerations in Course of Action Development

Focus on logistical factors that constrain the tactical operations—

- Key is to identify and eliminate any COA that is not supportable.
- Identify limitations that planners must be concerned with.
- Class IV availability for barrier plans or Class V CSR versus RSR.
- Identify the cost or risk in terms of resources for each COA.
- Update logistics, personnel, and casualty estimates as additional information becomes available.
- Key questions for the combat service support planners are:

  - Will CSS support be required to relocate during the operation?
  - Are the line haul or local haul distance factors exceeded?

Specific items to focus on for COA development—

- CSSA, BSA locations.
- MSR plan for resupply of the units.
- Barrier plan and its effect on resupply; location of the Class IV point.
- Will the CSSA need to move to support the COA?
- Are any mobile detachments required?

A-7. Combat Service Support Considerations in Course of Action Wargaming

Focus on ensuring critical combat service support items are included on the synchronization matrix—

- Update logistics, personnel, and casualty estimates as additional information is obtained.
- The war game will validate, change, or invalidate parts of or the entire logistics, personnel, and casualty estimate.
- Estimates applied during wargaming help to ensure COAs are supportable and feasible.
- Wargaming helps CSS planners synchronize tactical logistics functions to support a tactical operation.
- It determines the timeframe support must be provided to enable the combat forces to accomplish their mission.
- During the war game, the CSS planner can prepare the logistics portion by function of the synchronization matrix. This ensures all critical CSS actions are addressed.
- Wargaming helps determine specific events that are critical before the battle and provides estimates of peak consumption, times and distances supply convoys must travel, battle losses and casualties.
- Wargaming also helps to deconflict terrain.
- Determine adjustments to consumption factors based on war game results.

A-8. Combat Service Support Considerations in Course of Action Comparison and Decision

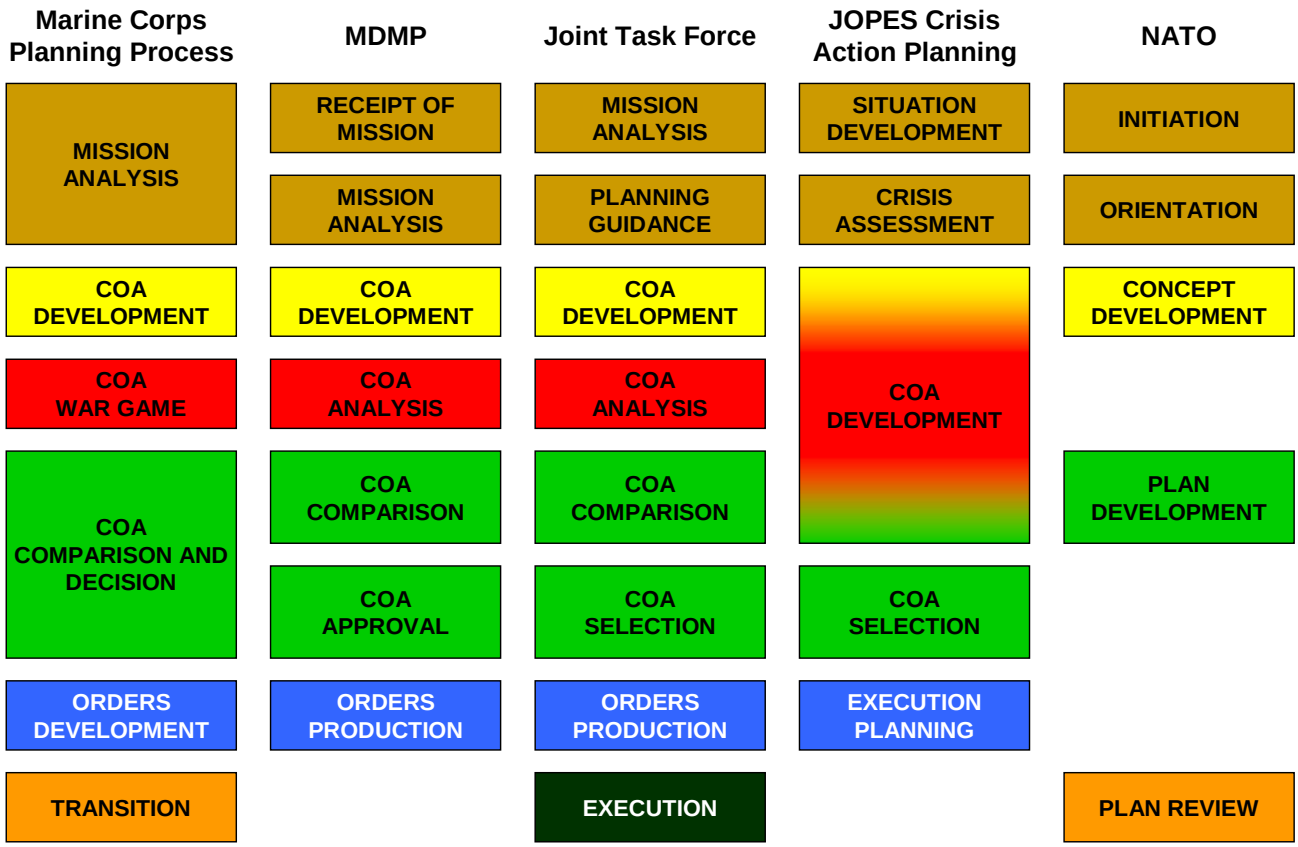
Develop meaningful and descriptive criteria for comparing COAs—

- Which COA has higher/lower casualty estimates and subsequent need for replacements?
- Which COA has higher/lower consumption rates of Class V?
- Which COA has higher/lower consumption rates of Class III (Bulk)?
- Which COA has higher/lower battle damage estimates requiring increased recovery and evaluation of combat/combat support/combat service support systems?
- Which COA has longer LOCs requiring possibly more transportation assets?
- Which COA has increased sustainment requirements (Class IV, Combat Health Support)?
- Which COA presents higher degree of risk in the potential loss or destruction of combat service support assets and resources?

When determining decision criteria, combat service support planners must—

- Provide the commander information to properly weigh all issues before making a decision.
- Ensure the commander fully understands the costs and risks that exist in a COA.

A-9. Comparison of Marine Corps Planning Process to Other Planning Processes



Note: Like steps of each planning process are shaded in the same manner.

Figure A-1. Comparison of the Marine Corps Planning Process to other planning processes.

A-10. Frequency Bands

Abbreviation	Band	Frequency Range
ELF	Extremely Low Frequency	Below 3 KHz
VLF	Very Low Frequency	3 KHz – 30 KHz
LF	Low Frequency	30 KHz – 300 KHz
MF	Medium Frequency	300 KHz – 3 MHz
HF	High Frequency	3 MHz – 30 MHz
VHF	Very High Frequency	30 MHz – 300 MHz
UHF	Ultra High Frequency	300 MHz – 3 GHz
SHF	Super High Frequency	3 GHz – 30 GHz
EHF	Extremely High Frequency	Above 30 GHz
NOTES: KHz = Kilohertz = one thousand cycles per second MHz = Megahertz = one million cycles per second GHz = Gigahertz = one billion cycles per second		

Table A-1. Frequency bands.

A-11. Customary/Metric Conversion Factors

Linear Measure		
English System		**Metric System**
1 inch	=	2.54 centimeters
1 foot	=	0.3048 meters
1 yard	=	0.9144 meters
1 mile	=	1.6093 kilometers
0.3937 inch	=	1 centimeter
1.0936 yards	=	1 meter
0.6137 miles	=	1 kilometer
Liquid Measure		
English System		**Metric System**
1 fluid ounce	=	29.573 milliliters
1 quart	=	0.94635 liters
1 gallon	=	3.7854 liters
0.033814 fluid ounce	=	1 milliliter
0.26417 gallon	=	1 liter
Weight Measure		
English System		**Metric System**
1 troy pound	=	0.37324 kilograms
1 avoirdupois pound	=	0.45359 kilograms
1 short ton (0.8929 long tom)	=	907.18 kilograms 0.90718 metric ton
1 long ton (1.1200 short tons)	=	1016.0 kilograms 1.0160 metric tons
2.2046 avoirdupois pounds	=	1 kilogram
1.1023 short tons 0.98421 long tons	=	1 metric ton
Square Measure		
English System		**Metric System**
1 square foot	=	9.2903 square decimeters
1 square yard	=	0.83613 square meter
1 square mile	=	2.5900 square kilometers
1.1960 square yards	=	1 square meter
0.38608 square miles	=	1 square kilometer
Cubic Measure		
English System		**Metric System**
1 cubic foot	=	0.28317 cubic meter
1 cubic yard	=	0.76455 cubic meter
1 cubic mile	=	4.16818 cubic kilometers
1.3079 cubic yards 35.315 cubic feet	=	1 cubic meter
0.23990 cubic mile	=	1 cubic kilometer

Table A-2. Conversion factors.

Appendix B

Abbreviations

B-1. National Distinguishing Letters

The following letters are used in unit titles wherever it is necessary to identify a NATO nation (e.g., 1 (UK) Armd Div):

- BE Belgium
- CA Canada [1]
- DA Denmark
- FR France
- GE Germany
- GR Greece
- IC Iceland
- IT Italy
- LU Luxembourg
- NL Netherlands
- NO Norway
- PO Portugal
- SP Spain
- TU Turkey
- UK United Kingdom
- US United States

Note: The national distinguishing letters for Canada are not used to identify Canadian Army units which have the words ‘Canada’ or ‘Canadian’ in their official title.

B-2. Abbreviations

AAAV	advanced amphibious assault vehicle
AAFS	amphibious assault fuel system
AAW	antiair warfare
ABCCC	airborne battlefield command and control center
ABT	air breathing threat
ACE	aviation combat element; armored combat earthmover
ACP	Allied Communications Publication
ADA	air defense artillery
ADA TOC	air defense artillery tactical operations center
ADAM	area denial artillery munitions
ADCON	administrative control
ADCP	air defense communications platform
ADNS	automated digital network system

ADP	automated data processing
AFATDS	Advanced Field Artillery Tactical Data System
AIS	automated information system
AL	administrative loss
AM	amplitude modulation
ANDVT	advanced narrow band digital voice terminal
AO	area of operations
AOC	air operations center
AOI	area of interest
APOD	aerial port of debarkation
ASC(A)	assault support coordinator (airborne)
ASLT	air support liaison team
ASOC	air support operations center
ASUW	antisurface warfare
ASW	antisubmarine warfare
ATARS	advanced tactical airborne reconnaissance system
ATC	air traffic control
ATDL	Army tactical data link
ATF	amphibious task force
ATLASS	Asset Tracking Logistics and Supply System
ATM	asynchronous transfer mode
ATO	air tasking order
AUTODIN	Automatic Digital Network
AVLB	armored vehicle launched bridge
AWACS	airborne warning and control system
BDA	battle damage assessment
BDZ	base defense zone
BFV	Bradley fighting vehicle
BPSK	binary phase shift key
BVR	beyond visual range
C2W	command and control warfare
CAP	combat air patrol
CAS	close air support
CBAE	commander's battlespace area evaluation
CBIRF	Chemical/Biological Incident Response Force
CCIR	commander's critical information requirements
CEC	cooperative engagement capability
CEOI	communications-electronics operating instructions
CFV	cavalry fighting vehicle
CGS	common ground station
CI	counterintelligence
CID	combat identification
CIWS	close in weapons system
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
CLAWS	complementary low altitude weapon system
CMS	communications security material system
COA	course of action
COC	combat operations center

COCOM	combatant command
COE	common operating environment
COG	center of gravity
COP	common operational picture
COTS	commercial off the shelf
CPOG	chemical protective overgarment
CPU	central processing unit
CRC	control and reporting center
CRE	control and reporting element
CSNP	causeway section nonpowered
CSP	causeway section powered
CSSE	combat service support element
CTAPS	contingency theater automated planning system
CTT	commander's tactical terminal
CV	critical vulnerability
CWAR	continuous wave acquisition radar
DACT	data automated communications terminal
DAMA	demand assigned multiple access
DASC	direct air support center
DASC(A)	direct air support center (airborne)
DEERS	Defense Eligibility Enrollment Reporting System
DII	defense information infrastructure
DIRLAUTH	direct liaison authorized
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DMS	Defense Message System
DNS	Domain Name System
DNVT	digital nonsecure voice terminal
DOCC	deep operations coordination cell
DOW	died of wounds
DP	decision point
DSCS	Defense Satellite Communications System
DSN	Defense Switched Network
DSVT	digital subscriber voice terminal
DTC	digital technical control
DWTS	Digital Wideband Transmission System
EAF	expeditionary airfield
EEFI	essential elements of friendly information
EFST	essential fire support task
EMCON	emission control
EPLRS	enhanced position location reporting system
EPW	enemy prisoners of war
EROWPU	enhanced reverse osmosis water purification unit
EW/C	early warning/control
FAC(A)	forward air controller (airborne)
FACP	forward air control post
FARP	forward arming and refueling point
FASCAM	family of scatterable mines

FFCC	force fires coordination center
FFIR	friendly force information requirement
FH	frequency hopping
FIE	fly in echelon
FIST	fire support team
FIWC	Fleet Information Warfare Center
FLIR	forward looking infrared
FLTSAT	fleet satellite
FLTSATCOM	fleet satellite communications
FM	frequency modulation
FMC	full mission capable
FO	forward observer
FSCC	fire support coordination center
FSCL	fire support coordination line
FSE	fire support element
FSK	Frequency shift key
FSSG	force service support group
GBAD	ground based air defense
GBDL	ground based data link
GBS	Global Broadcast System
GCCS	Global Command and Control System
GCE	ground combat element
GCI	ground controlled intercept
GCSS	Global Combat Support System
GENSER	general service (message)
GMF	ground mobile forces
GOTS	government off the shelf
GPS	global positioning system
GTN	Global Transportation Network
HEMTT	heavy expanded mobile tactical truck
HERS	helicopter expeditionary refueling system
HPT	high payoff target
HST	helicopter support team
HVT	high value target
IAS	Intelligence Analysis System
IFF	identification friend or foe
IFSAS	interim fire support automated system
INMARSAT	International maritime satellite
IO	information operations
IOS	Intelligence Operations System
IP	internet protocol
IW	information warfare
JANAP	Joint Army, Navy, Air Force publication
JCATS	Joint Conflict and Tactical Simulation
JCCC	joint communications control center
JCS	Joint chiefs of staff
JCSE	Joint Communications Support Element

JDISS	Joint Deployable Intelligence Support System
JIC	Joint Intelligence Center
JMCIS	Joint Maritime Command Information System
JOPES	Joint Operation Planning and Execution System
JSTARS	Joint Surveillance Target Attack Radar System
JTF	joint task force
JTIDS	Joint Tactical Information Distribution System
JWICS	Joint Worldwide Intelligence Communications System
KIA	killed in action
LAAD	low altitude air defense
LCAC	landing craft air cushioned
LCC	amphibious command ship
LCM	landing craft, mechanized
LCU	landing craft, utility
LHA	general purpose amphibious assault ship
LOS	line-of-sight
LPD	amphibious transport dock
LPH	amphibious assault ship
LSD	landing ship dock
LST	landing ship, tank
LVS	logistics vehicle system
MACCS	Marine air command and control system
MACG	Marine air control group
MAFC	MAGTF all-source fusion center
MAGTF	Marine air-ground task force
MANPAD	man-portable air defense
MARFORLANT	Marine Corps Forces, Atlantic
MARFORPAC	Marine Corps Forces, Pacific
MATCD	Marine air traffic control detachment
MCPP	Marine Corps planning process
MDMP	military decision making process
MEF	Marine expeditionary force
MEWSS	mobile electronic warfare support system
MIAG	modular integrated avionics group
MLG	Marine Liaison Group
MMT	Marine air traffic control mobile team
MOE	measures of effectiveness
MOOTW	military operations other than war
MOPP	mission-oriented protective posture
MOS	military occupational specialty
MOU	memorandum of understanding
MP	military police
MPF	maritime pre-positioning force
MPF(E)	maritime pre-positioning force (enhanced)
MPS	maritime prepositioning ships
MPSRON	maritime pre-positioning squadron
MRAC	Marine rear area coordinator
MRACOM	Marine rear area commander

MRC	mobile radio communications
MSC	major subordinate command
MSCS	multiple source correlation system
MSE	mobile subscriber equipment
MSR	main supply route
MTACCS	Marine tactical command and control sections
MTBF	mean time before failure
MTWS	MAGTF Tactical Warfare Simulation
MWCS	Marine wing communications squadron
MWSG	Marine wing support group
MWSS	Marine wing support squadron
NAI	named area of interest
NAVMACS	Naval Modular Automated Communications
NBI	non-battle injury
NCC	naval component commander
NEA	northeast Asia
NEMSS	naval expeditionary medical support system
NIIRS	National imagery interpretation ratings scale
NIPRNET	Unclassified but Sensitive Internet Protocol Router Network
NOC	network operations center
NSSMS	NATO Sea Sparrow Missile System
OIR	other information requirements
OPCON	operational control
OPSEC	operations security
OPT	operational planning team
OSCC	operational systems control center
OTH	over the horizon
PCS	portable control station
PEI	principle end item
PGM	precision guided munitions
PIR	priority information requirement
PLA	plain language address
PLAD	plain language address directory
PLGR	precise lightweight GPS receiver
PLRS	Position Location Reporting System
PMD	pounds per man per day
POTS	plain old telephone system
PPDL	point to point data link
PSK	phase shift key
PTM	personnel transport module
RAAMS	remote anti-armor mines system
RCS	radar cross section
RFI	request for information
ROC	rehearsal of concept
RRDF	roll-on/roll-off discharge facility
RRS	remote receive station
RRT	radio relay team

RT	receiver-transmitter
RTD	returned to duty
SADC	sector air defense commander
SAR	search and rescue
SAR/FTI	synthetic aperture radar/fixed target indicator
SATCOM	satellite communications
SCI	sensitive compartmented information
SCR	single channel radio
SIDS	secondary imagery dissemination system
SINCGARS	single-channel ground and airborne radio system
SIPRNET	SECRET Internet Protocol Router Network
SLCP	ship's loading characteristics pamphlet
SLRP	survey, liaison, and reconnaissance party
SLWT	side loadable warping tug
SMART-T	Secure Mobile Anti-Jam Reliable Tactical Terminal
SPIRIT	special purpose integrated remote intelligence terminal
SPOD	seaport of debarkation
SSM	surface to surface missile
SWA	southwest Asia
SYSCON	systems control
T/E	table of equipment
T/O	table of organization
TAC(A)	tactical air coordinator (airborne)
TACC	tactical air command center
TACON	tactical control
TACP	tactical air control party
TADC	tactical air direction center
TADIL	tactical digital information link
TAFDS	tactical airfield fuel dispense system
TAI	target area of interest
TAOC	tactical air operations center
TARGET	Theater Analysis and Replanning Graphical Execution Toolkit
TASS	tactical automated switching system
TBM	theater ballistic missile
TBMCS	theater battle management core system
TCO	tactical combat operations
TCP	tactical control party
TEG	tactical exploitation group
TERPES	Tactical Electronic Reconnaissance Processing and Evaluation System
TTY	teletype
UAV	unmanned aerial vehicle
ULCS	unit-level circuit switch
URL	uniform resource locator
VLS	vertical launch system
WAS/MTI	wide area surveillance/moving target indicator
WIA	wounded in action

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Appendix C

Operations Orders Formats (Pull-Out Pages)

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OPERATION PLAN/ORDER FORMAT

CLASSIFICATION

(No change from oral orders)

Copy no.__ of __ copies
I MEB
GREENTOWN, BLUELAND
17 Apr 2001
ABD-1

OPERATION ORDER 0002-01 (OPERATION SHARP SWORD) (U)
BASIC ORDER (U)

(U) REFERENCES:

(a) Maps and Charts: Series ONC, sheet G-2 (ORANGELAND, BLUELAND), edition 12

(b) USCINCPAC Planning Directive, 27 March 2001

(U) TIME ZONE: Zulu

(U) TASK ORGANIZATION. Annex A

1. (U) Situation

a. (U) General. With the failure of deterrence, Blueland forces crossed the Orangeland border and have been successful in their initial battles.

b. (U) Battlespace. See Appendix 18 to Annex C.

c. (U) Enemy Forces. See Annex B and current INTSUMs.

d. (U) Friendly Forces.

2. (U) Mission. On order, I MEB, as the main effort, conducts offensive operations to defeat enemy forces in zone in order to restore the Blueland border. Be prepared to continue offensive operations into Orangeland to destroy remaining Orangeland offensive military capabilities.

3. (U) Execution

a. (U) Commander's Intent

b. (U) Concept of Operations. This operation will be conducted in three phases.

c. (U) Tasks

(1) (U) 9th Marine Regiment (REIN)

(2) (U) Marine Aircraft Group 15

(3) (U) 1st Brigade Service Support Group

(4) (U) 11th Marine Expeditionary Unit

(5) (U) Rear Area Commander

d. (U) MEB Reserve

e. (U) Commander's Critical Information Requirements

f. (U) Coordinating Instructions

4. (U) Administration and Logistics

5. (U) Command and Signal

a. (U) Command Relationships. See Annex J (COMMAND RELATIONSHIPS).

b. (U) Command Posts and Headquarters

c. (U) Succession to Command

d. (U) Signal. See Annex K (COMMAND, CONTROL, AND COMMUNICATIONS SYSTEMS)

ACKNOWLEDGE RECEIPT

EDWARD A. CRAIG
Brigadier General, USMC
Commanding

Annexes:

A - Task Organization
B - Intelligence
C - Operations
D - Logistics
E - Personnel
F - Public Affairs
G - Civil Affairs
H - Meteorological and Oceanographic Operations
J - Command Relationships
K - Command, Control, and Communications Systems
L - Environmental Considerations
M - Geospatial Information and Services
N - Space Operations
P - Host Nation Support
Q - Medical Services
S - Special Technical Operations
U - Information Management
W Aviation Operations
X - Execution Checklist
Z - Distribution

OFFICIAL:
s/
M.B. TWINING
Colonel, USMC
AC/S G-3

CLASSIFICATION

CLASSIFICATION. As appropriate, centered at page top and bottom.

HEADING

Changes from Oral Orders. Used when oral orders regarding this operation previously issued. Enclosed in parentheses. Example: "(No change from oral orders except paragraphs 3b and 3f.)" Omitted in plans. Omitted in orders when no oral orders issued.

Title. Numbered consecutively for a calendar year. Two or more issued on same day are given consecutive numbers. Joint operation plan or order is so designated. Code name if any, as shown.

References. Documents (maps, charts, photomaps, SOPs, etc.) necessary for understanding must be available to recipients. Entry always included (use "References: None" when applicable). Map entries include series number, country, sheet names or numbers, edition, and scale.

BODY

Time Zone. If same for the place of issue and execution, and will be same throughout execution, entry may be omitted. If time zone is different in area of execution (frequently occurs in amphibious or air-transported operations), state when indicated time zone becomes effective.

Task Organization. May be shown in the following ways:
1. As an unnumbered entry before paragraph 1, Situation. Used when entire command of issuing headquarters is organized into task organizations for a particular operation, and task organizations are too complicated to be shown using other methods.
2. If there is no change to previous task organization, show "No Change."
3. Under the proper subparagraph of paragraph 3; simplest, and therefore preferred, method in continuing ground combat situation. Show "No Change except paragraph 3b... "
4. As an annex when lengthy; e.g., division or higher. Used in amphibious operations (permits early dissemination and assists concurrent planning). Also used where planning precedes operation by a considerable period of time.
(In 1 and 4 above, the organization of the issuing headquarters, including service and administrative groupings which will perform normal functions, is the first entry. Following that, each task groupment which is to receive a tactical mission is shown in the sequence in which the missions are assigned in paragraph 3).

General. For plans only; describe the general politico-military environment which would establish the probable preconditions for execution of the plan.

Battlespace. The higher commander's AO and the command's areas of interest, influence, and operations described by physical area and forces of concern.

Enemy Forces. Enemy information vital to entire command or likely to affect accomplishment of mission is shown. May refer to intelligence annex, operation overlay (if enemy information shown), intelligence summaries, etc. Contains disposition, intent, objectives, vulnerabilities, COGs, and COAs.

Friendly Forces. Information on own forces having bearing on operation (higher, adjacent, and supporting). Artillery listed as first supporting unit and then others alphabetically. May reference annex or operation overlay.

Paragraph 4. Logistics and personnel information, and instructions for the operation. Usually refers to appropriate annexes.

Paragraph 5. Instructions to establish and maintain command and signal procedures.
1. Command Relationships. Used when a large operation, or relationships are unusual. Otherwise omitted.
2. Command Posts and Headquarters. May reference operations overlay for locations.
3. Succession to Command. Designates the succession of command for the operation.
4. Signal. Usually references Annex K and other communication publications such as SOP or CEOI. Includes instructions or restrictions about comm-elec such as radio restrictions or pyrotechnic signals.
5. Use additional subparagraphs to show location and time of opening comm centers, recognition and identification instructions, code words and names, and liaison.

Annexes. Appended to and form a portion of the completed plan/order. Pertain to particular concept, subject, or coordination aspect too voluminous, of insufficient general interest, or in irregular form (overlays, graphs, or tables) for body of plan/order. Contributes to brevity and clarity of parent document. The form for annexes is provided. Sequence and lettering must not be changed. Annexes may be omitted when not required. Annexes are designated by capital letter, amplified where necessary by appendices to annexes, tabs to appendices, and enclosures to tabs.

To satisfy JOPS format requirements, titles of paragraphs and subparagraphs must remain as shown in this example.

HEADING

Copy Number. Assigned by issuing headquarters to each copy. Log maintained of specific copies issued to addressees.

Official Designation of Command. Use code name if required for security.

Place of Issue. May be code name, postal designator, or geographic location (including map coordinates). Always capitalized.

Date/Time. Day, month, and year order is signed, issued, and becomes effective, unless specified otherwise in Coordinating Instructions paragraph.

Message Reference Number. Allows acknowledgement in the clear. Assigned by originator. Consists of letters, numbers, or combination. Has no connection with message center numbering system. Annexes issued separately are assigned different numbers.

BODY

Paragraph 2. Clear concise statement of tasks and purpose of the operation. State the who, what, when, where, why, and as much of the how as necessary. No subparagraphs. Always stated here even if shown on operation overlay or map.

Commander's Intent. Commander's personal statement of the purpose of the operation.

Concept of Operations. A summary statement of how the operation will be accomplished. Amplifies paragraph 2. May be shown graphically or published as an appendix to Annex C. Specific unit designations are not used.

Tasks to Subordinate Elements
1. Each unit, organic or attached, or tactical grouping that is executing a tactical task is assigned a separate numbered subparagraph. All tactical tasks must be listed in the body of basic orders.
2. List tasks for major subordinate elements as follows:
- Offensive order: Ground combat units (infantry first followed by artillery and combat support units numerically or alphabetically); aviation combat units or elements (aircraft units, combat support, combat service support); combat service support units or elements.
- Defensive order: Units or elements closest to the enemy are listed first. Ground and aviation combat units in the forward defense area are then listed in numerical order followed by other units alphabetically.

3. Each tactical task assignment may show first the assets (attached or in support) available to the unit or element for the operation. Then tasks are enumerated.
4. Priority must be stated if missions are multiple and priority of accomplishment is desired.
5. If all instructions to unit are shown on operations overlay, list unit after proper subparagraph number and reference Operation Overlay Appendix.

CCIRs. Identify information commander has deemed critical to maintaining his situational awareness, planning future activities, and assisting in timely and informed decisionmaking.

Coordinating Instructions. Final subparagraph in 3. Contains instructions common to two or more units, coordinating details and control measures applicable to the command as a whole, and time or conditions when plan is to be executed. Refers to annexes or references for coordinating details when appropriate. Communications instructions shown in paragraph 5 only.

ENDING

Acknowledgement Instructions. Included in every order and separately issued portions. Ensures that recipients receive and understand the order.

Signature. Original signed by the commander or chief of staff/executive officer.

1. Original signed by Commander.

Name
Rank, USMC
Commander

2. Original signed by chief of staff/executive officer

BY COMMAND OF COLONEL X

Name
Rank, USMC
Title

Authenticated by G/S-3 when commander's or executive officer's signature is on original only; G/S-3 authentication appears on all other copies.

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Organization for Combat is a commander's visualization of how he will group organic and attached combat, combat support, and combat service support elements for employment with other supporting forces to support his scheme of maneuver, and the command relationships to most effectively control his organization. It is determined after consideration of the unit's mission, missions assigned to subordinate units, terrain and enemy strength in each subordinate unit area, and the amount of combat power, including maneuver and fire support units, available to the unit commander. The organization for combat and the scheme of maneuver are developed concurrently. The task organization graphically portrays the command relationships and the assignment of means for the accomplishment of the mission. The G/S-3 prepares the task organization after considering the recommendation of appropriate unit commanders. Its purpose is to establish groupings into which the command will be divided to accomplish its mission and to establish command relationships. These groupings may be shown, if simple, in paragraph 3 of the Basic Order. If complex, the task organization will be shown in a separate annex or just before paragraph 1 of the Basic Order.

BODY

The task organization is always Annex A. The capital letter designation is followed by the title of the Basic Order, and then by the annex title.

References. Documents (SOPs, etc) necessary for understanding, must be available to recipients. Entry always included (use "References: None" when applicable).

Time Zone. If same for the place of issue and execution, and will be same throughout execution, entry may be omitted. If time zone is different in area of execution (frequently occurs in amphibious or air-transported operations), entry must state when indicated time zone becomes effective.

Time attachment and detachment effective shown here and in subparagraph 3f (Coordinating Instructions) of Basic Order.

The first entry is the organization of the issuing headquarters (underlined). Unless indicated by BLT, etc., the normal unit designator should be used with (REIN) and/or (-) to indicate attachments and/or detachments.

Those units to which no specific tactical mission is to be assigned, and which are not assigned to any other tactical groupings are shown at the beginning of the task organization indented under the issuing headquarters.

Units attached to a task group are indented under task group heading.

The task organization can include major weapon systems. This information may be useful to other Services and nations.

Artillery units are similarly listed. Terms such as DS and GS, however, have additional meaning to these units. (See MCWP 3-16, Marine Artillery Support.

Common commander for reserve is listed opposite Reserve group heading.

Reserve variations:
1. If there is no common commander and units have separate missions:

MEF Reserve	
1st Bn, 6th Mar	LtCol Jones
3d Bn, 25th Mar	LtCol Roberts

2. If a unit is going to be in reserve in some foreseeable time, it will be listed under the Reserve as well as being listed in its normal sequence.
3. If task organization of unit were to remain the same:

MEF Reserve	
1st Bn, 6th Mar (Eff on relief)	LtCol Jones

4. If task organization of unit were to change:

MEF Reserve	
1st Bn (REIN), 6th Mar (Eff on relief)	LtCol Jones
1st Plt, 2d Tank Bn	
1st Plt, 2d LAR Bn	

Acknowledgement Instructions. Included in every order and separately issued portions. Ensures that recipients receive and understand the order.

Signature. Original signed by the commander or chief of staff/executive officer.

1. Original signed by Commander.

Name
Rank, USMC
Commander

2. Original signed by chief of staff/executive officer

BY COMMAND OF COLONEL X

Name
Rank, USMC
Title

Authenticated by G/S-3 when commander's or executive officer's signature is on original only; G/S-3 authentication appears on all other copies.

GUIDE FOR TASK ORGANIZATION ANNEX

CLASSIFICATION

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GREENTOWN, BLUELAND
17 Apr 2001
ABD-1

ANNEX A TO OPERATION ORDER 0002-01(OPERATION SHARP SWORD) (U)
TASK ORGANIZATION (U)

(U) REFERENCES: None

(U) TIME ZONE: Zulu

(All attachments effective 170001Z Apr 2001)

1st Marine Expeditionary Brigade (MEB) — BGen Craig
- 1st MEF Headquarters Group (-)
- 5th Marine Liaison Element Co
- 5th Civil Affairs Group (Det)
- 1st Force Reconnaissance Co (Det)

9th Marine Regiment (REIN) — Col Murray
- 1st Bn 9th Marine Regiment
- 2nd Bn 9th Marine Regiment
- 3rd Bn 9th Marine Regiment
- 3rd Bn 15th Marine Regiment (REIN)
- 5th Tank Battalion
- 5th AAAV Battalion (-)
- 5th Combat Engineer Battalion (-)
- Company A (REIN) 1st Light Armored Reconnaissance Battalion
- Company A 5th Reconnaissance Battalion

Marine Aircraft Group 15 — Col Cushman
- MWHS 3 (-)
- MAG 15
  - MALS 15 (-) (REIN)
  - VMFA 501
  - VMFA 502
  - VMGR 552
  - VMFA(AW) 525
  - VMA 555
  - VMAQ 5
- MAG 66
  - MALS 66 (-) (REIN)
  - VMM 665
  - VMM 666
  - VMM 667
  - VMM 668
  - HMH 561
  - HMLA 556
- MACG 51 (-)
- MWSG 37 (-)

1st Brigade Service Support Group — Col Saunders
- 5th H&S Battalion (-) 1st FSSG
- 5th Supply Battalion (-)
- 5th Maintenance Battalion (-)
- 5th Engineer Support Battalion (-)
- 5th Transport Support Battalion (-)
- 5th Medical Services Battalion (-)
- 5th Dental Battalion (Det)

MEB Reserve — TBD

ACKNOWLEDGE RECEIPT

BY COMMAND OF BRIGADIER GENERAL CRAIG

EDWARD SNEDECKER
Colonel, USMC
Deputy Commander

OFFICIAL:
s/
M.B. TWINING
Colonel, USMC
AC/S G-3

CLASSIFICATION

HEADING

Copy Number. Assigned by issuing headquarters to each copy. Log maintained of specific copies issued to addressees.

Official Designation of Command. Use code name if required for security.

Place of Issue. May be code name, postal designator, or geographic location (including map coordinates). Always capitalized.

Date/Time. Day, month, and year order is signed, issued, and becomes effective, unless specified otherwise in Coordinating Instructions paragraph.

Message Reference Number. Allows acknowledgement in the clear. Assigned by originator. Consists of letters, numbers, or combination. Has no connection with message center numbering system. Annexes issued separately are assigned different numbers.

BODY

Indicate names of commanders of the parent organization and principal units included in paragraph 3 of the Basic Order.

Terms such as RLT, MEU, and MEF (Fwd) are task organizations. If no such term is used, a unit that has been task organized is indicated by the addition of (-) (Rein), as appropriate, to its normal unit designator, such as "1st Marine Division (-) (REIN)." The (-) indicates that a substantial part of an organic unit (or units) has been detached. The (Rein) indicates that a substantial part of a nonorganic unit (or units) has been attached.

Notice that units are depicted in different forms in this task organization:
1. In this particular task organization, the 2nd Bn 9th Marine Regiment has no attachments or detachments; thus, it appears simply as "2nd Bn 9th Marine Regiment."
2. Whenever a unit detaches any part of itself to another for attachment, a parenthetical minus is inserted after its title. In this example, 5th Combat Engineer Battalion has detached a platoon to the reserve, thus, the designation "5th Combat Engineer Battalion (-)."
3. Conversely, several units have been attached to Company A 1st Light Armored Reconnaissance Battalion; thus, it appears in the task organization as "Company A (REIN) 1st Light Armored Reconnaissance Battalion." The parenthetical note is place immediately after the title of the specific unit receiving reinforcement. Whenever an organization attaches another, the augmented unit is reinforced.
4. An organization can be both minus and reinforced. In this example, MALS 15 deployed without all of its organic units, but it has also been reinforced with reserve units, thus its complete designation becomes "MALS 15 (-) (REIN)."
5. A unit may be assigned operational or tactical control over another unit. This relationship is indicated by the use of OPCON or TACON following the title of the subordinate unit.
6. A tactical mission of general support (GS) or direct support (DS) may also be assigned.

Careful cross-checking is mandatory in task organizing to ensure that no unit is lost in the shuffle. As a rule, insert a minus whenever a detachment is made, and IMMEDIATELY record the corresponding attachment assignment to the unit receiving the attachment.

For units with no table of organization (e.g., task groups, aircraft wings and groups) list all subordinate units.

Each unit tasked with a tactical mission in the Basic Order is listed and underlined. The commander of each underlined unit is indicated by name. Successive subordinate echelons of particular tactical groupings are indicated by indentations beneath the underlined unit.

Subordinate units which are assigned tactical missions are underlined and listed in appropriate sequence. This sequence will depend on tow factors: the type of units being assigned missions and the type of mission (offensive or defensive). This sequence should parallel the sequence of mission assignments in paragraph 3 of the Basic Order. The sequence of listing major subordinate elements of a command is as follows:
1. Offensive Order. Ground combat units (infantry first followed by artillery and combat support units numerically or alphabetically); aviation combat units or elements (aircraft units, combat support, combat service support); combat service support units or elements.
2. Defensive Order. Units or elements closest to the enemy are listed first. Ground and aviation combat units in the forward defense area are then listed in numerical order followed by other units alphabetically.
3. Reserve. Always listed last.

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