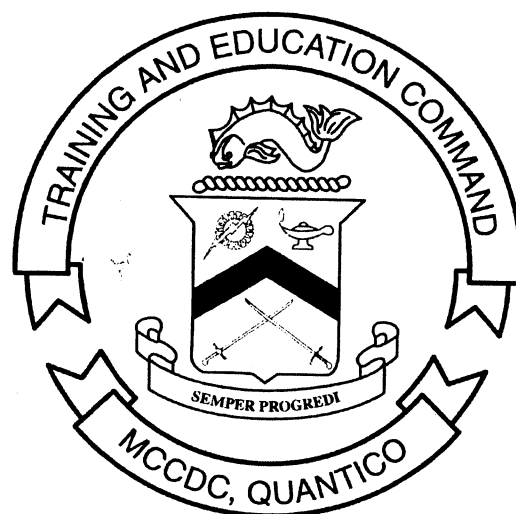
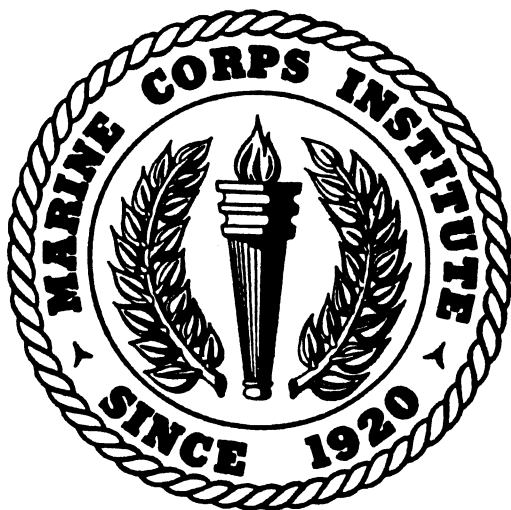


MARINE CORPS INSTITUTE



DESERT OPERATIONS

MARINE BARRACKS
WASHINGTON, DC



UNITED STATES MARINE CORPS

MARINE CORPS INSTITUTE
WASHINGTON NAVY YARD
912 POOR STREET SE
WASHINGTON, DC 20391-5680

03.54b
30 Mar 98

MCI 03.54b, DESERT OPERATIONS

1. **Purpose.** MCI course 03.54b, Desert Operations, has been published as a part of the Marine Corps continuing education program to provide distance training to all Marines.
2. **Scope.** MCI course 03.54b, Desert Operations, addresses information that all Marines should know. This information includes world desert familiarization; effects of the desert on individuals, equipment, operations, and training; wheeled/tracked vehicle maintenance and operation; and combat operations and support in desert environment.
3. **Applicability.** This course is intended for instructional purposes only. It is designed for use by all Marines.
4. **Recommendations.** Comments and recommendations on the contents of the course are invited and will aid in subsequent course revisions. Please complete the course evaluation questionnaire located at the end of the text and return it to:

Director (DLTD Spt Team)
Marine Corps Institute
Washington Navy Yard
912 Poor Street SE
Washington, DC 20391-5680

A handwritten signature in cursive script that reads "G. White".

G. WHITE
Lieutenant Colonel, U.S. Marine Corps
Deputy Director

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Student Information

Number and Title MCI 0354B
DESERT OPERATIONS

Study Hours 12

Course Materials Text

Review Agency 7TH Marine Regiment, MCAGCC
Twentynine Palms, CA 92278

Reserve Retirement Credits (RRC) 4

ACE Not applicable to civilian training/education

Assistance For administrative assistance, have your training officer or NCO log on to the MCI home page at www.mci.usmc.mil. Marines CONUS may call toll free 1-800-MCI-USMC. Marines worldwide may call commercial (202) 685-7596 or DSN 325-7596.

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Study Guide

Congratulations

Congratulations on your enrollment in a distance learning course from the Distance Learning and Technologies Department (DLTD) of the Marine Corps Institute (MCI). Since 1920, the Marine Corps Institute has been helping tens of thousands of hard-charging Marines, like you, improve their technical job performance skills through distance training. By enrolling in this course, you have shown a desire to improve the skills you have and master new skills to enhance your job performance. The distance learning course you have chosen, MCI 03.54b, *Desert Operations*, provides instruction to all Marines having duties that may require them to operate in a desert environment.

Your Personal Characteristics

- **YOU ARE PROPERLY MOTIVATED.** You have made a positive decision to get training on your own. Self-motivation is perhaps the most important force in learning or achieving anything. Doing whatever is necessary to learn is motivation. You have it!
- **YOU SEEK TO IMPROVE YOURSELF.** You are enrolled to improve those skills you already possess, and to learn new skills. When you improve yourself, you improve the Corps!
- **YOU HAVE THE INITIATIVE TO ACT.** By acting on your own, you have shown you are a self-starter, willing to reach out for opportunities to learn and grow.
- **YOU ACCEPT CHALLENGES.** You have self-confidence and believe in your ability to acquire knowledge and skills. You have the self-confidence to set goals and the ability to achieve them, enabling you to meet every challenge.
- **YOU ARE ABLE TO SET AND ACCOMPLISH PRACTICAL GOALS.** You are willing to commit time, effort, and the resources necessary to set and accomplish your goals. These professional traits will help you successfully complete this distance training course.

Continued on next page

Study Guide, Continued

Beginning Your Course Before you actually begin this course of study, read the student information page. If you find any course materials missing, notify your training officer or training NCO. If you have all the required materials, you are ready to begin.

To begin your course of study, familiarize yourself with the structure of the course text. One way to do this is to read the table of contents. Notice the table of contents covers specific areas of study and the order in which they are presented. You will find the text divided into several study units. Each study unit is comprised of two or more lessons, lesson exercises, and finally, a study unit exercise.

Leafing Through the Text Leaf through the text and look at the course. Read a few lesson exercise questions to get an idea of the type of material in the course. If the course has additional study aids, such as a handbook or plotting board, familiarize yourself with them.

The First Study Unit Turn to the first page of study unit 1. On this page you will find an introduction to the study unit and generally the first study unit lesson. Study unit lessons contain learning objectives, lesson text, and exercises.

Reading the Learning Objectives Learning objectives describe in concise terms what the successful learner, you, will be able to do as a result of mastering the content of the lesson text. Read the objectives for each lesson and then read the lesson text. As you read the lesson text, make notes on the points you feel are important.

Completing the Exercises To determine your mastery of the learning objectives and text, complete the exercises developed for you. Exercises are located at the end of each lesson, and at the end of each study unit. Without referring to the text, complete the exercise questions and then check your responses against those provided.

Continued on next page

Study Guide, Continued

Continuing to March

Continue on to the next lesson, repeating the above process until you have completed all lessons in the study unit. Follow the same procedures for each study unit in the course.

Seeking Assistance

If you have problems with the text or exercise items that you cannot solve, ask your training officer or training NCO for assistance. If they cannot help you, request assistance from your MCI distance learning instructor by completing the course content assistance request form located at the back of the course.

Preparing for the Final Exam

To prepare for your final exam, you must review what you learned in the course. The following suggestions will help make the review interesting and challenging.

- **CHALLENGE YOURSELF.** Try to recall the entire learning sequence without referring to the text. Can you do it? Now look back at the text to see if you have left anything out. This review should be interesting. Undoubtedly, you'll find you were not able to recall everything. But with a little effort, you'll be able to recall a great deal of the information.
- **USE UNUSED MINUTES.** Use your spare moments to review. Read your notes or a part of a study unit, rework exercise items, review again; you can do many of these things during the unused minutes of every day.
- **APPLY WHAT YOU HAVE LEARNED.** It is always best to use the skill or knowledge you've learned as soon as possible. If it isn't possible to actually use the skill or knowledge, at least try to imagine a situation in which you would apply this learning. For example make up and solve your own problems. Or, better still, make up and solve problems that use most of the elements of a study unit.

Continued on next page

Study Guide, Continued

Preparing for the Final Exam, continued

- **USE THE “SHAKEDOWN CRUISE” TECHNIQUE.** Ask another Marine to lend a hand by asking you questions about the course. Choose a particular study unit and let your buddy “fire away.” This technique can be interesting and challenging for both of you!
 - **MAKE REVIEWS FUN AND BENEFICIAL.** Reviews are good habits that enhance learning. They don’t have to be long and tedious. In fact, some learners find short reviews conducted more often prove more beneficial.
-

Tackling the Final Exam

When you have completed your study of the course material and are confident with the results attained on your study unit exercises, take the sealed envelope marked “**FINAL EXAM**” to your unit training NCO or training officer. Your training NCO or officer will administer the final examination and return the examination and the answer sheet to MCI for grading. Before taking your final examination, read the directions on the DP-37 answer sheet carefully.

Completing Your Course

The sooner you complete your course, the sooner you can better yourself by applying what you’ve learned! **HOWEVER**--you do have 2 years from the date of enrollment to complete this course.

Graduating!

As a graduate of this distance learning course and as a dedicated Marine, your job performance skills will improve, benefiting you, your unit, and the Marine Corps.

Semper Fidelis!

STUDY UNIT 1

THE WORLD'S DESERTS

Introduction. There is an old military saying that a man is not UA in the desert as long as he is in sight of camp, even though it may take three days by HMMWV to reach him. When we think of the word *desert*, the normal image conjured up in our minds is one of rolling sand dunes that extend as far as the eye can see (fig 1-1). Though this may be true of most deserts, there are also other kinds throughout the world, such as deserts made up mainly of salt and rock. In fact, there are more than fifty named deserts in the world and, although they cover nearly one-fifth of the earth's surface, only about four percent of the world's population lives there. In this study unit we will take a look at the different desert regions of the world and their natural and man-made characteristics.

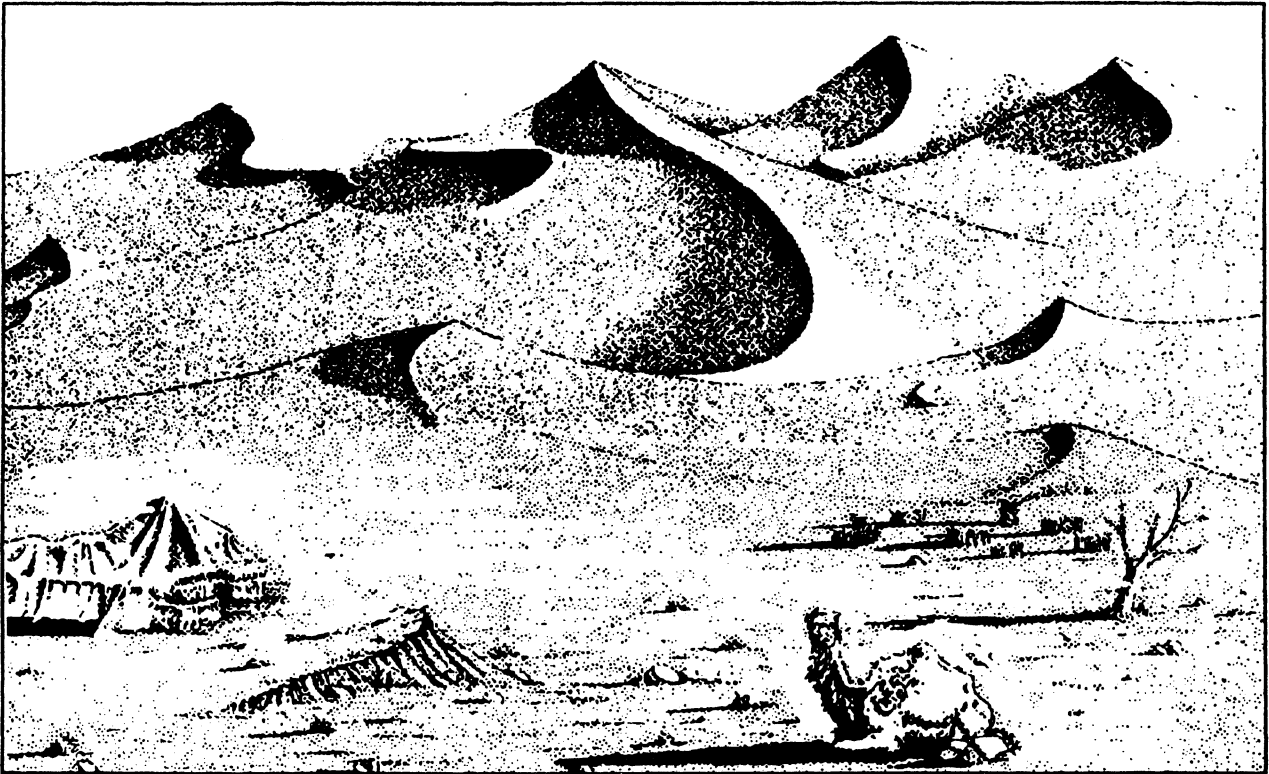


Fig 1-1. The rolling desert.

Lesson 1. DESERT REGIONS OF THE WORLD

LEARNING OBJECTIVES

1. Identify the nine major desert regions of the world.
2. List the three foreign deserts known for their military and political importance.
3. Identify why those three deserts are important both militarily and politically.

1101. Desert Regions

The Marine Hymn declares "every clime and place" and none is more challenging to live and operate in than the world's deserts. They have been the sight of major battles in the past and, in recent times, the focus of world attention. The nine major desert regions of the world include the Sahara, Arabian, Iranian, Gobi, Great Basin of North America, Great Australian, Atacama, Patagonia, and the Kalahari. Let's look at figure 1-2 for a better understanding of where they are located on a world map and at table 1-1 for information regarding each desert.

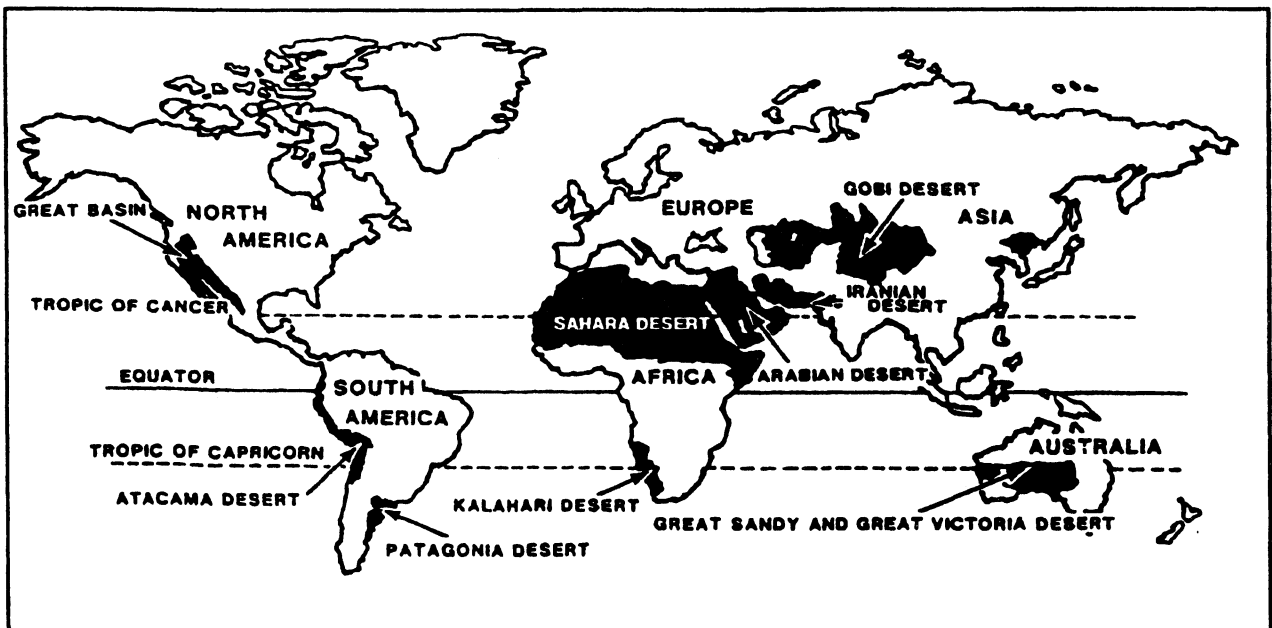


Fig 1-2. Locations of the major desert regions of the world.

Table 1-1. Characteristics of the Nine Major Desert Regions of the World

DESERT	LOCATION	AREA	TEMPERATURE RANGE	ANNUAL RAINFALL	MILITARY/POLITICAL IMPORTANCE TO THE UNITED STATES
Sahara	Northern Africa	3,500,000 sq. mi. 9,100,000 sq. km.	52-109°F 10-43°C	8 inches 200 mm	Proximity to routes of international commerce.
Arabian	Arabian Peninsula of Southwest Asia	900,000 sq. mi. 2,331,000 sq. km.	54-124°F 12-51°C	4 inches 100mm	Proximity to routes of international commerce, oil resources, and large port facilities.
Iranian	Central and Eastern Iran	100,000 sq. mi. 260,000 sq. km.	17-125°F -8-51°C	4 inches 100 mm	Proximity to routes of international commerce. World "hot spot" due to long term political and religious unrest.
Gobi	Mongolia and Northeastern China	500,000 sq. mi. 1,300,000 sq. km.	-40-113°F -40-45°C	3-8 inches 70-200 mm	None
Great Basin of North America	Southwestern United States	190,000 sq. mi. 492,000 sq. km.	7-117°F -14-47°C	10 inches 250 mm	Besides being a vital part of the continental US, it has military training sites that duplicate the deserts of other continents.
Great Australian	45% of the Australian Continent	456,000 sq. mi. 1,152,000 sq. km.	53-115°F 12-46°C	5 inches 125 mm	None
Atacama	Northern Chile	54,000 sq. mi. 140,000 sq. km.	7-66°F -14-19°C	4 inches 100 mm	None
Patagonia	Southern Argentina	260,000 sq. mi.	12-113°F -11-45°C	5-17 inches 90-430 mm	None
Kalahari	Southwestern Africa	100,000 sq. mi. 260,000 sq. km	8-117°F -13-47°C	8-26 inches 200-660 mm	None

CHALLENGE

Let's take a little break and test your knowledge of some of the information covered in table 1-1. If you answer the following question correctly, you're ready to move on. Can you list the three desert regions located outside of the United States that have significant importance both militarily and politically?

If you listed the Sahara, Arabian, and Iranian deserts, you are correct! They are militarily and politically important because of their close proximity to routes of international commerce and for natural resources such as oil.

Lesson Summary. This lesson provided you with some basic information covering the nine major desert regions of the world. It also specifically identified which ones of the nine are most important both politically and militarily. Now let's move on and discuss the natural and man-made features that are characteristic of the desert.

Lesson 2. CHARACTERISTICS OF THE DESERT

LEARNING OBJECTIVES

1. Identify the natural characteristics of the desert including weather.
2. Identify the man-made characteristics of the desert.

1201. Natural Characteristics

a. Geographic relief. Deserts have a wide variety of geographic features at varying heights. The topography (terrain) of individual deserts can range from flat areas below sea level, as in Death Valley (part of the Great Basin of North America), to mountains exceeding 10,000 feet, as in the Atacama in Chile and the Sahara in Africa. Within this wide range of elevation limits can occur vast stretches of the flattest terrain on earth with the possible exception of some polar regions.

Other topographic features of deserts include thin soiled hillocks (small hills) and bare rock, severely eroded rock-strewn areas, shallow lakes, dry lake beds, salt marshes, wadis (dry washes), and fan formations, which are sediments deposited by moving water. Deserts are also marked by huge tracts of moving sand dunes where "waves" over 300 meters high advance by only centimeters each year. All this means that deserts display a more varied terrain than anywhere else on earth.

b. Soil. The desert is generally treeless and barren of grass because the lack of adequate rainfall or the erratic cycle of rainfall does not support the growth of plant matter which ultimately produces topsoil. Desert soil itself, however, is not always barren. This is clearly demonstrated by the success of irrigation in growing crops on large areas of some deserts by making water available on the surface. The topsoil of the desert is quite fertile in most valleys and deltas, but some desert areas have soil composed of sugar-fine sand, salt, gypsum, and alkali in which nothing but the hardiest of plant life can exist.

c. Weather and climate. Meteorological conditions common to all desert regions include drastic changes in temperature, sudden and violent windstorms, glaring sunlight, and inadequate rainfall. Much can be said about the extreme temperatures in the deserts, but one word sums it up nicely: **HOT.**

It should be no surprise, then, that the highest natural air temperatures recorded on earth have been recorded in deserts. In summer, daytime temperatures often range between 120 to 130° Fahrenheit (50°C).

Metal exposed to the direct rays of the sun can reach temperatures well beyond these figures. At night, drops in temperatures of 60 to 80°F (33 to 45°C) are common. Most desert areas record 32°F (0°C) or lower at some time during the winter, but the chill of the desert is more a morale consideration than a physical problem; it is uncomfortable at times but fortunately does not last long. In some desert areas, snow may come along with the chill, but it too does not last long.

Note: Summer in the Northern Hemisphere occurs from 21 June to 21 September; in the Southern Hemisphere, it occurs from 21 December to 21 March with February being the hottest month. This six-month difference in the hemispheric seasons is all-important when equipping and training forces in CONUS and planning their supplies and clothing for deployment to deserts below the equator, such as those in Australia, Chile, or southern Africa.

d. Wind. Windstorms like those that often occur in the Sahara can reach hurricane force. These winds show what a desert breeze can become given a running start from the Atlantic to the Mediterranean. The Seistan Desert in Afghanistan and Iran is noted for its "wind of 120 days" which blows in varying directions steadily from May through September. To even the hardiest of men, these winds alone can be a problem. Combined with blowing sand, they become even more treacherous.

e. Rain and water resources. Rainfall in the desert is a case of too much too quickly. Rainfall usually averages less than a foot a year, but the quota for 1 or 2 years may fall all at once. This normally occurs in the winter months with nearly disastrous results; the rainstorms come with little or no warning, turning dry stream beds within minutes into unfordable torrents. These quick and heavy rains transform the clay soils of the fertile plains and deltas into some of the softest mud known, justifying the many bridges which, in drier times, seem so unnecessary.

Since the seasonal or annual evaporation rate is greater than the seasonal or annual rainfall, deserts characteristically lack surface water resources. This means that you must never take your water supply for granted in the desert.

The lack of natural water resources in desert areas is a prime military concern. Since Roman times in North Africa, water draining from the higher slopes across intermediate plateaus has been dammed and drawn to the valleys and coastal towns by aqueducts. These aqueducts are true lifelines for the areas they supply; their destruction would endanger the survival of the people who inhabit the regions.

f. Vegetation. Scrubby vegetation is common in all deserts, but it seldom grows more than six feet high. Types of vegetation include brush, thorny trees, bushes, cactus-like plants, bunch grass, spinifex (grasses having stiff, pointed leaves), and matted plants. Vegetation in the desert is seldom adequate for large-scale shade, shelter, or concealment (fig 1-3).

Note: The lack of natural concealment may cause some Marines new to the desert to have a feeling of exposure and insecurity for a few days. This phenomenon, called agoraphobia, is defined as fear of open spaces. The condition usually fades with the individual's acclimatization, but in rare cases, agoraphobia can be an incapacitating psychological problem. Its victim could become a risk on small unit or solitary actions such as patrolling or guard duty.



Fig 1-3. Difficulty of natural concealment in the desert.

g. Insects and animals. Avoiding desert snakes and first aid treatment for their bites will be discussed in the next study unit. Smaller forms of life, mainly insects, can be more dangerous and cause more discomfort in deserts than the scarcity of food and water. Because of their ability to transmit diseases through bites and stings, you must be careful to avoid these insects.

Mosquitoes, flies, ticks, mites, chiggers, red bugs, lice, and parasitic worms carry virulent diseases. You can see that you must not take the presence of insects and animals in the desert lightly! Infections, even in minor cuts, are difficult to prevent and, once established, quickly become a medical problem. Precautions against snakes, spiders, scorpions, centipedes, caterpillars, bees, and wasps are much the same as those that should be taken anywhere else in the world.

1202. Man-made Characteristics

Man-made structures were few and far between in the open desert just a few years ago. Today, however, one sees in the form of mines, pipelines, and other industry related structures, many signs of man's attempt to exploit the resources found in these regions.

a. Roadways. On the open desert, roads and trails are scarce. Except for those roadways which link major cities, complex road systems aren't needed. Standard road systems, which have been used for centuries in northern Africa and the Near East, invariably have holy cities and shrines as their hub. In some areas, in addition to connecting the urban areas, the road systems lead to isolated villages and oases within the desert. Some deep gorges in the desert have been spanned by adapting existing railroad bridges for vehicle traffic. Most existing road systems are able to support two-way traffic, but they may have bottlenecks such as one-way bridges or tunnels, especially in higher elevations. In the few high passes through the desert mountains, snow accumulations usually close the roads or trails in the winter months.

b. Structures. In more developed countries like the United States, the desert is home to modern cities. In much of the rest of the world's deserts, buildings are of masonry construction; simpler dwellings are mostly of a mud and straw mixture. In general there is little natural fortification material readily available for expedient construction in the desert. Although many ancient ruins have survived for nearly 20 centuries in North Africa, for the most part, deserts in undeveloped countries are not marked to any degree by man-made construction.

c. Industry. Most deserts are tapped for some type of mineral resources and the elaborate mining, drilling, and quarrying plants built for this purpose are of both strategic and tactical importance. Some of the industry is native enterprise, but many of the activities are foreign-based and operate with the consent of local governments.

Since the oil crisis of the early 1970's, oil has become a precious commodity throughout the world; desert countries that have it have prospered and grown immensely since that time.

d. Agriculture. In much of the world, agriculture in desert and semi-desert regions is not the large-scale operation that it is in some of the desert regions of the United States. Orchards, grain fields, and cultivated cactus patches provide vital sources of food to a surprisingly large number of small villages in North Africa. Large, neatly laid out olive orchards, cultivated vineyards, and date palm plantations are usually located near population centers. With the development of new irrigation techniques, farmers have been able to reclaim some desert lands to expand their agricultural areas.

Lesson Summary. This lesson provided you with a basic knowledge of both the natural and man-made characteristics of the world's deserts. This information will give you a better understanding of what to expect should you deploy to one of these regions.

Unit Exercise: Complete items 1 through 5 by performing the action required. Check your responses against those listed at the end of this study unit.

1. List five of the nine major desert regions of the world.
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
2. Politically and militarily, the most important deserts in the world are
 - a. the Gobi, Sahara, Great Australian, and the Atacama.
 - b. the Sahara, Great Sandy, Arabian, and Iranian.
 - c. the Sahara, Arabian, and Iranian.
 - d. the Kalahari, Great Victoria, Patagonia, and Atacama.
3. Some deserts are considered more important politically and militarily than others because
 - a. some are larger than others.
 - b. some have greater populations.
 - c. some are near routes of international commerce and have precious natural resources.
 - d. some have greater agricultural development.

4. Natural characteristics of the desert include geographic relief, soil, weather and climate, insects and animals, vegetation, and
 - a. forests.
 - b. farming.
 - c. rain and water resources.
 - d. inland seas.
5. Man-made characteristics of the desert include roadways, structures, industry, and
 - a. oil tankers.
 - b. populations.
 - c. cars and trucks.
 - d. agriculture.

UNIT SUMMARY

In this study unit we discussed the nine major desert regions of the world. We also discussed both the natural and man-made characteristics of these deserts. With this accomplished, let's get to the meat of this course and talk about how desert conditions affect you, the Marine.

Study Unit 1 Exercise Solutions

	<u>Reference</u>
1. (Any five of these nine) Sahara Arabian Iranian Gobi Great Basin Great Australian Atacama Patagonia Kalahari	1101
2. c.	1101
3. c.	1101
4. c.	1201
5. d.	1202

STUDY UNIT 2

EFFECTS OF DESERT CONDITIONS ON THE INDIVIDUAL

Introduction. A survival expert once said, "The Arabs don't know much about surviving in the desert." Of course they don't, they just live there! You too can survive if you are properly equipped with the knowledge of the effects of desert conditions and their countermeasures. In this study unit, we will look at those areas that are important to every desert warrior including the effects of temperature, water and salt intake, first aid, health and hygiene, and insects and snakes common to desert regions. Let's get started!

Lesson 1. EFFECTS OF TEMPERATURE

LEARNING OBJECTIVES

1. Identify the effects of improper body heat balance.
2. Identify the purpose of acclimatization.

The extremes of desert temperature adversely affect personnel, which in turn can adversely affect military operations. During the day, operations requiring strenuous or prolonged physical exertion should be avoided to prevent heat casualties. Individual protection against desert cold at night during winter is necessary because temperature swings of more than 45° are not uncommon during these times.

2101. Temperature Extremes

a. The balance of body heat. The human body can live and remain effective in the desert as long as the body temperature stays within normal limits. The body produces heat even when it rests. This heat is in addition to the heat produced during exercise and ordinary activity. In the desert, the body gains heat directly from the sun as well as from the ground and air if they are hotter than the skin. The body must constantly balance this heat gain with heat loss or the body temperature will rise to levels at which the individual will suffer **brain damage** and possibly even **death**. Heat can be lost by contact with cooler air or by sweating; evaporation of sweat cools the skin and the blood which brings the body heat to the surface.

CHALLENGE

Let's test your knowledge of the information we've just covered. What are the two possible effects of improper body heat balance?

If you answered brain damage and possible death, you're correct. Let's move on!

b. Body temperature in the desert. For maximum efficiency, your internal body temperature must remain between 98 to 100°F (37-38° C) and your skin temperature should be approximately 35°C (92°F). Any internal temperature rise above the 98-100° range causes fever and rapid loss of efficiency; in fact, a 6 to 8° increase in the internal body temperature above the normal of 98.6°F for any extended period may cause death.

The physical factors listed below further explain the effects of high temperature on the human body.

- (1) When the air and ground temperatures are above 35°C (92°F), you must lose heat to remain efficient. Under these conditions, you can lose heat only by sweating. As sweat evaporates, the skin surface is cooled; this heat loss cools the blood which in turn keeps the internal body temperature in an efficient range.
- (2) When you sweat, your body loses water. Although the human body is approximately two-thirds water, it contains no excess or reserve water; all the normal body water is required to provide the blood volume needed for efficient circulation. When body water is lost by sweating, the body begins to dehydrate unless the lost water is replaced. If the lost water isn't replaced, the body pays for that loss with reduced efficiency.
- (3) When the temperature reaches 43°C (110°F), a person walking at 3.5 mph loses 1½ quarts of water every hour. A person who has lost 2.5 percent of his body weight by sweating (about 1½ quarts of water) loses about 25 percent of his physical efficiency. At temperatures in the 90's and above, 15 percent dehydration (a loss of 9 quarts of water) can be fatal.

2102. Body Adaptation

The human body has its own way of adapting to environmental changes that it encounters. This adaptation process is known as acclimatization.

Acclimatization, as it applies to the desert, is defined as nature's way of adjusting the cooling system of your body to meet the strains imposed by desert heat. The acclimatization process usually takes thirty days to complete and similar acclimatization processes also work for altitude and humidity changes.

You are in certain danger of heat injury and possible death if you perform strenuous work or rigorous training before you have gone through a period of adjustment or acclimatization to the desert's harsh environment. The strain is real, even for Marines in good physical condition. The acclimatized Marine is alert, energetic, and free of the symptoms of heat stress. In contrast, the unacclimatized Marine who works too hard too soon in the heat may fatigue quickly and show symptoms of various heat injuries.

Lesson Summary. In this lesson we discussed the effects of extreme heat on the human body as well as the purpose of acclimatization. Let's move on and talk about water and salt requirements.

Lesson 2. WATER AND SALT INTAKE

LEARNING OBJECTIVES

1. Identify water intake requirements in a high heat environment.
2. Identify the purpose of salt for the human body.

Major General Collins of the Royal Army, commenting in 1941 on the Libyan Campaign, put the matter bluntly when he said, "Water has been and may be again the crux of the whole show." The general understood the importance of water to living and conducting military operations in the desert. The great truth is that water is the basic and greatest limiting factor for humans in the desert.

2201. Water Requirement

The body requires two to three times as much water to maintain water balance in the desert as it requires in the jungle with its high humidity. Your chief concern in the desert is to have as much water as needed to replace all that evaporates as sweat. The daily potable (drinkable) water requirements for a person vary according to physical activity, food eaten, and temperature.

a. High temperature requirements. During high temperatures, a person resting may lose as much as a pint of water an hour by sweating; if he is working, water loss (and requirement) will increase.

Units performing strenuous activities continuously may require more than 24 quarts of drinking water per man per day. For short periods of time (1 to 3 days), reduced quantities of water (11 or 12 quarts a day at a 100°F daily average temperature) may be sufficient.

b. Availability. Natural water resources in the desert are usually inadequate for sizable military operations. When drunk, untreated water can transmit diseases such as dysenteries, typhoid fever, and infectious hepatitis. Parasitic diseases such as small fever may be caught by wading, swimming, bathing, or washing clothes in irrigation ditches or similar water sources. Such water is non-potable (undrinkable) and must be purified before it is consumed. Usually, water for military forces must be transported from sources outside the desert and stored in special tanks and containers. Over the past few years, the process of desalinization (salt removal from seawater) has been perfected. Desalinization is now the main source for fresh water in many desert regions--the only limiting factor in this process is that the desert region must have a coast bordering the sea.

c. Restrictions on intake. Any restriction of water below the amount needed for efficient body cooling will result in rapid loss of efficiency, reduced ability to perform work, and deterioration of morale. If water restriction is prolonged, heat injuries will occur. Those who delay drinking until mealtimes may experience discomfort without any apparent advantage in water economy. Similarly, thirst is not a good indicator of water need. Frequent drinking, even when you're not thirsty, is the best practice. When the water supply is limited, discontinue normal daily activities during the hottest part of the day.

d. Water discipline. Since there will probably be some misunderstandings about water discipline, let's discuss this term. Water discipline is defined as:

- (1) The ability to endure thirst when necessary due to a shortage of water.
- (2) Drinking when ordered to do so, when water is scarce, so that the best value can be obtained from the limited water available.
- (3) Drinking only from authorized sources.

So, we can see that water discipline is imposed only in operational conditions in which water is scarce and it is necessary to make the best use of the water available. Drinking when ordered to do so may then be necessary, but under these circumstances, the small unit leader must pay particular attention to the physical condition of the troops involved.

e. Natural thirst. Since a Marine may be impaired by the loss of water and not feel the need to drink even when dangerously dehydrated, it is not advisable to leave the intake of fluids up to the individual. The small unit leader is responsible for the regular and timely administration of drinking fluids and the leader should do this according to plan when possible. In other words, make sure that everyone drinks by the numbers to ensure that they are taking in enough water to function properly and prevent heat injuries. The body uses frequent small drinks to replace the water loss more efficiently than it uses occasional large gulps.

f. Pre-drinking. Pre-drinking means drinking as much water as possible before exposure to heat and exertion. In the low-humidity, high-temperature desert environment, a significant pre-drinking capacity, possibly as much as two quarts, can be developed gradually. In low-humidity conditions, the bulk of this "pre-drunk" water will be available to the body and used for sweat because a person's urinary output decreases in the desert.

2202. Salt Requirements

Caution: To prevent adverse effects, any supplemental intake of salt should be supervised by medical personnel.

Salt holds liquids within body tissues. This in turn helps to slow and prevent rapid dehydration. Sweat contains about 0.2 percent salt and this salt must be replaced in the body.

a. Individual needs. While the diet normally contains an adequate amount of salt, additional salt (2 grams or 3 tablets) should be provided during the first few days of exposure to heat. The need is greater for unacclimatized individuals because their salt losses are greater. Among acclimatized individuals, the need for additional salt varies but excess salt intake should be avoided since it may cause increased thirst and gut wrenching nausea. Unless Marines are sweating continuously or repeatedly, they do not require extra salt. Extra salt in cooking and on the plate, coupled with sound training, will meet all necessary requirements.

b. Providing salt for large numbers. A convenient way to provide adequate salt for large numbers of personnel is to salt all drinking water to a concentration of 0.1 percent. This can be done as follows:

- (1) One pound of table salt to 100 gallons (370 liters) of water.
- (2) .135 kilograms (0.3) pound table salt to the Lyster bag, (36 gallons or 133 liters).
- (3) If available, one-fourth teaspoon table salt or two salt tablets to each canteen of water.

c. Use of salt tablets. Salt tablets may be taken as a substitute instead of the 0.1 percent salt solution mentioned above. Salt tablets are designed so that about one-half of the tablet is dissolved after 45 minutes and the rest over a period of about 3 hours. Excess salt intake in the form of salt tablets should be particularly avoided since it may increase thirst and cause nausea.

Note: Plain salt tablets contain cornstarch as a disintegrating agent. The plain salt tablet should not be ingested directly since it dissolves within two minutes. Salt in concentrated form is not readily absorbed and may cause nausea.

Lesson Summary. This lesson provided you with a basic understanding of salt and water requirements while in a desert environment. Let's move on and discuss the prevention of heat related injuries.

Lesson 3. PREVENTION OF HEAT RELATED INJURIES

LEARNING OBJECTIVES

1. Identify individual protective measures to prevent heat related injuries.
2. Identify the three types of heat injuries.
3. Match the three major types of heat injuries with their symptoms.
4. Match the correct treatment with each of the three major heat injuries.
5. Identify the purpose of good health and hygiene habits while in a desert environment.

Heat injuries may be expected whenever personnel are exposed to high temperatures. Although most heat injuries are relatively minor, the more serious ones are capable of causing severe impairment or even death.

2301. Individual Protective Measures to Prevent Heat Injuries

Note: The following procedures do not include water and salt requirements which were discussed earlier.

a. Recommended procedures. To survive in the desert and, at the same time, maintain physical and mental well-being and efficiency, practice the following procedures and make them a habit while you live there.

- (1) Except when the situation demands it, avoid hurried activity to conserve body fluids and energy. Plan work in advance and perform it at a steady pace with regular, short rest periods. During extreme heat, work should be scheduled to avoid any activity during the hottest part of the day.
- (2) It may be 30° to 45° cooler as little as one foot above the ground. When exposed to the sun, sit--do not lie--down. It will also be about 15° cooler 18 inches (47 cm) below the ground surface. If you plan a long stay, you might want to dig yourself a shallow fighting hole for coolness and to avoid the sun's direct rays.
- (3) Wear sunglasses during the daytime. Even if you feel that glare isn't bothering you, it still affects your ability to see objects at a distance and will also hamper your adaptation to night vision later.
- (4) Always wear clothing, headgear, and footwear to protect yourself from sunburn, heat, sand, insects, and snakes and to conserve body moisture. Wear your clothing loosely to aid air circulation and sweat evaporation. Always keep your head and body covered during the day, avoiding the direct rays of the sun. Shake articles of clothing vigorously before dressing to rid them of desert pests that commonly take refuge there.
- (5) Natural features such as caves, rock ledges, and cliffs provide the most accessible shelter from sun, heat, and wind. Avoid dry stream beds or canyons since they are subject to flash floods during and immediately following cloudbursts. The leeward side of boulders or hill masses offers natural shelter from sand storms.

b. Preventing overexposure. Overexposure of uncovered skin to sunlight causes sunburn, an effect of the ultraviolet rays of the sun. While severe cases of sunburn are quickly disabling and may be fatal, sunburn can also cause skin cancer years later. Shelter and clothing can help prevent sunburn, and gradually increasing the time of successive exposures to the sun is an important part of acclimatization. Do not rely on protective ointments, lotions, or creams alone because they do not fully protect against the harmful effects of the sun.

c. Preventing heat injuries. Heat injuries are usually preventable except under the most extreme conditions. Prevention depends largely on education, acclimatization, and the proper use of water, salt, and protective measures.

Seek medical advice when developing training programs. Plan to train all personnel to recognize the earliest symptoms of heat injuries and to apply the proper emergency first aid treatment for each heat related injury.

2302. Types, Diagnosis, and Treatment of Heat Injuries

The most important and dangerous heat related injuries are heat cramps, heat exhaustion, and heat stroke. Let's talk about their symptoms and treatment.

a. Heat cramps. Heat cramps are due to insufficient salt in the body.

(1) Symptoms

- (a) Muscle cramps in the arms and legs and/or stomach after prolonged exertion in hot weather
- (b) Wet skin and extreme thirst

(2) Treatment

- (a) Move the casualty to a shaded area or an improvised shelter.
- (b) Loosen the casualty's clothing.
- (c) Have the casualty drink at least one full canteen slowly.
- (d) Seek medical aid if the cramps continue.

b. Heat exhaustion.

(1) Symptoms

- (a) Weakness or faintness; dizziness; cool, pale (or gray), moist (clammy) skin; headaches; and loss of appetite
- (b) Heat cramps, nausea with or without vomiting, urge to defecate, chills (gooseflesh), rapid breathing (shortness of breath), confusion, or tingling of hands and feet

(2) Treatment

- (a) Move the casualty to a shaded area or improvised shelter and have him lie down.
- (b) Loosen or remove the casualty's clothing and boots unless in a chemical environment. Pour water on the casualty's body and fan him if it is a very hot day.
- (c) Elevate the casualty's legs.
- (d) Have the casualty drink at least one full canteen slowly.

- (e) Ensure that the casualty does not participate in strenuous activity for the remainder of the day.
- (f) Monitor the casualty until the symptoms are gone. If the symptoms persist, seek medical aid.

c. Heat stroke.

Warning: This is a medical emergency and can be fatal if not treated promptly and correctly. Inadequate sweating is a major factor.

(1) Symptoms

- (a) Flushed, hot, and dry skin; dizziness, confusion, headaches, seizures, and nausea. Rapid respiration and weak pulse.
- (b) Unconsciousness or collapse may occur suddenly.

(2) Treatment

- (a) Cool the casualty immediately by moving him into a shaded area or improvised shelter.
- (b) Remove clothing and protective garments if the situation permits.
- (c) Pour water over the casualty or immerse him in water and fan him to bring about the cooling effect of evaporation.
- (d) Massage the casualty's skin to promote circulation.
- (e) Elevate the casualty's legs.
- (f) Have the casualty drink water slowly.
- (g) Seek medical aid and transport the casualty to a medical facility as soon as possible.

Caution: DO NOT delay evacuation to start cooling measures. The cooling measures can be begun en route.

CHALLENGE

Before we move on, let's review what we've just discussed.
What are the three major types of heat injuries?

If you said heat cramps, heat exhaustion, and heat stroke, you're correct. If your answers were different from those just given or if you didn't get all three, you should go back and review this information before you move on.

2303. Health and Hygiene

Dysentery and other highly contagious diseases can drastically reduce the combat efficiency of a unit. Practicing good health and hygiene in a desert environment will prevent the spread of these diseases and maintain the efficiency needed in the field. Proper preventive measures combined with constant small unit leadership will help reduce the spread of diseases and infections. Remember, proper health and hygiene practices are everyone's responsibility.

a. Keeping clean. If a daily shower isn't possible, clean your hands and fingernails well before eating. If possible, sponge the face, armpits, crotch, and feet at least once a day. Use a toothbrush regularly. Soap, table salt, or baking soda make good substitutes for toothpaste. Rubbing the teeth and gums with a clean finger is another method of cleaning the teeth and massaging the gums. After eating, rinse your mouth with water if it's available.

b. Eye and skin care. Wear tinted goggles to protect your eyes from intense sunlight and wind driven sand. You'll need closed, tight-fitting goggles to prevent eye damage from dust. Blacken the area around the eyes. This will reduce the effect of glare, improve distance vision, and aid in adaptation to night vision. The desert wind dries exposed skin surfaces and causes chapping of the lips. Cuts and scratches become infected very easily but chapstick and protective ointments will provide some protection against these conditions.

c. Messing. With the exception of the increased need for water, the nutritional requirements for desert troops do not differ from those in other environments. The use of dehydrated rations permits lower bulk storage but requires additional supplies of water for rehydration; hence, dehydrated rations are a questionable advantage for desert units that are constantly on the move.

d. Mess sanitation. Intestinal diseases tend to increase among personnel living in the desert, but may be prevented by proper mess sanitation. This includes proper cleaning and disinfection of eating utensils, supervision of food handlers, proper disposal of garbage and waste, and protection of foods and utensils from the swarms of flies that are found everywhere. Use germicidal rinses to wash mess and kitchen gear when water is scarce or cannot be heated. Burn solid waste when the situation permits. Use soakage pits to dispose of liquid waste and fill them with soil before leaving the area.

e. Waste disposal. Use trench-type heads if the soil allows. In fixed and semi-fixed areas, heads can be constructed. If you use this method, the waste should be burned off regularly.

f. Insect and rodent control. Insects and rodents must be controlled to prevent the spread of disease. Preventive measures include protective clothing, insect repellents, space sprays, immunizations, and suppressive drugs.

Lesson Summary. This lesson provided you with a knowledge of the symptoms of heat injuries and measures for their prevention and treatment. We also discussed health and hygiene habits that should be practiced while in a desert environment. Let's move on to lesson 4 where we'll discuss various insects and snakes that may be encountered in the different desert regions of the world.

Lesson 4. DESERT INSECTS AND SNAKES

LEARNING OBJECTIVES

1. Identify specific insects commonly found in desert regions.
2. Identify the field treatment for insect bites and stings.
3. Identify specific snakes commonly found in desert regions.
4. Identify the field treatment for snake bites.

Insects and snakes are a fact of life, but perhaps more dangerous than the creatures themselves is the lack of knowledge that most of us have of them. The more you know about these creatures, the less fear of them you will have. Let's discuss some insects and snakes common to most deserts of the world (tables 2-1 through 2-8).

2401. Insects

a. Mosquitos and flies. In the desert, problems with mosquitos are essentially the same as those in other parts of the world; flies, however, are a particular hazard and nuisance in the desert. Flies carry disease and tend to swarm around areas where water is found or where food is prepared or eaten. Individual mosquito netting and insect repellents are the best protective measures available to combat both mosquitos and flies.

b. Scorpions. Distant relatives of spiders, scorpions inhabit virtually the same environments as spiders. Like spiders and most other insects, scorpions frequently venture into living areas. One of the easiest ways to prevent being bitten or stung is to simply shake out bedding before lying down and to shake out your clothing, boots, and socks before dressing. As a rule, scorpions armed with long, narrow pincers have deadlier stings than those with stout, heavy pincers. Table 2-1 discusses the characteristics of some of the scorpions commonly found in desert regions.

Table 2-1. Characteristics of Scorpions

Size:	Scorpions range from smaller than two inches (40mm) to seven inches (180 mm) long. A scorpion has eight legs, two large pincers, and a stinger in the tip of its upward-curved or curled tail.
Coloration:	Can range from light tan to red or dark brown
Traits:	Not aggressive, but will sting if disturbed. Primarily nocturnal (hunt insects at night). Uncoil stingers to erect or semi-erect position before stinging
Warning Signals:	Erect or semi-erect stinger
Habitat:	Live under stones, rubbish heaps, at the base of desert scrub brush, and around houses and other structures.

c. Spiders. There are countless types of spiders found in the world's deserts. In this study unit we will discuss just a few, including the black and brown widow spiders. The tarantula is a common spider in the desert, but as imposing as it may look, its bite is painful but not deadly.

Table 2-2. Characteristics of Widow Spiders

Size:	Widows range from $\frac{1}{2}$ to 1 inch.
Color:	Black (brown) with red or yellowish red stripes or spots. Both have the characteristic red "hourglass" markings on the underbelly.
Bite Symptoms:	Bite may not be felt or venom may cause local pain. As time passes, the action of the venom will cause pain throughout the body. Fever, nausea, and other symptoms may develop.
Traits:	Not aggressive but will bite when agitated.
Habitat:	Near houses and other structures, rubbish piles, trash dumps, etc.

Now that we've discussed some insects common to most deserts, let's look at the field first-aid treatment for insect bites or stings.

2402. Treatment For Insect Bites and Stings

Although it's unlikely that you or a fellow desert warrior will get bitten or stung by a desert insect, you should know the first-aid treatment procedures that you should follow. The steps listed in table 2-3 will familiarize you with the proper insect bite/sting treatment; let's examine them.

Table 2-3. First Aid for Insect Stings

STEP	ACTION
1 Calm Victim	Keep the victim calm and quiet, preferably lying down. Allow only necessary movement.
2 Clean Wound	If soap is available, wash the area of the bite or sting. Otherwise, rinse with water. -----DO NOT SCRUB!-----
3 Remove Stinger	If the stinger is present, remove it. Avoid scratching, rubbing, or additional irritation of the area.
4 Remove Jewelry	Remove jewelry that is at or near the location of the bite or sting. Jewelry such as rings may stop the flow of blood to a finger if the swelling becomes pronounced. Place jewelry in the victim's pocket.
5 Observe and Treat Reactions	Watch for signs of allergic reaction such as severe swelling and labored breathing. Perform lifesaving procedures if necessary. If severe and rapid swelling does develop, apply restricting tourniquets.

Warning: Should the victim exhibit severe or allergic reaction, evacuate immediately to a medical facility.

2403. Desert Snakes

Only a few snakes, such as the bushmaster and the mamba, are considered truly aggressive. Most snakes will not strike or bite unless they are stepped on, threatened, or otherwise disturbed. The snakes discussed in the following sections are arranged from the most dangerous to the least dangerous. If a Marine is bitten, positive identification of the snake will be extremely helpful to medical personnel. If possible, attempt to capture or kill the snake and take it, along with the victim, to the medical facility. DO NOT expose yourself unnecessarily to its bite while attempting to capture the snake! As I just said, this is the only time you should approach a snake except to remove it from living quarters. A good rule regarding snakes, or other wildlife for that matter, is "If it moves, or looks like it might move, don't mess with it." Any snake or insect bite can result in infection and possibly disease.

The caution stated in this rule reminds us to let common sense prevail when we encounter any desert wildlife. These animals are just that, wild life. There are many more desert snakes than those discussed, such as the common rattlesnake (rattler) of North America, but for the purpose of this lesson we will discuss some of the less familiar snakes that you may encounter.

The saw-scaled viper is commonly known as the carpet viper and is native to the Arabian and Iranian desert regions.

Table 2-4. Characteristics of the Carpet Viper

Name:	Carpet viper
Description:	Short and stout, it ranges from .4 to .9 meters long. Its head is wide with a blunt snout. Its back scales are tan, brown, olive, or reddish with white spots. Belly scales are white to pinkish brown with gray spots.
Bite Symptoms:	Pain and swelling at site. Victims bleed from the gums, nose, and kidneys.
Traits:	Nocturnal (hunts at night). Very alert, it strikes fast and often. When threatened it curls into "S" figures. Its bite is highly poisonous .
Warning Signals:	Rasping noise produced by rubbing its scales together as it coils
Habitat:	Barren, rocky, or sandy desert. Dry brush.

Table 2-5. Characteristics of the Egyptian Cobra

Name:	Egyptian cobra
Description:	Long and moderately stout, ranging from 1.5 to 2.5 meters in length. Its back is yellow, dark brown, or almost black. The head is always darker and dark bars appear across the neck and hood. Its belly is yellow and brown.
Bite Symptoms:	Pain and swelling at and near the site. Victim's heart and/or breathing may stop suddenly.
Traits:	May strike without warning. When it bites, it holds and chews savagely.
Warning Signals:	The snake may raise its head and spread its hood.
Habitat:	Found principally in areas with high rodent population--flatland, scrub brush, irrigated fields, rocky hillsides, and so on.

Table 2-6. Characteristics of the Desert Horned Viper

Name:	Desert horned viper
Description:	Thick body with a wide head and blunt snout. It ranges from .5 to .7 meters long and has scale covered "horns" above its eyes. Its back is pale or bluish gray to khaki with brownish blotches or narrow crossbands. Its belly is white and its tail is black.
Bite Symptoms:	Pain and swelling. Weakness and immobility two to three hours following the bite.
Traits:	The snake is a burrower. Sluggish during the day, aggressive at night.
Warning Signals:	None
Habitat:	Desert and other arid regions. Burrows into loose sand.

Table 2-7. Characteristics of the Puff Adder

Name:	Puff adder
Description:	Large, stout, heavy body, and a triangular-shaped head. It ranges from .9 to 1.3 meters long. Its back is brown or yellow with "V" shaped markings. It has very long fangs and a very short tail.
Bite Symptoms:	Severe pain and swelling, lowered blood pressure, and shock.
Traits:	The snake is easily excited.
Warning Signals:	Hisses. May also inflate its body so that it appears to be larger than it is.
Habitat:	Found throughout many desert regions. Infrequent in very wet or very dry areas.

Table 2-8. Characteristics of the Blunt-nosed Viper

Name:	Blunt-nosed viper
Description:	Very large fangs; its tail tapers abruptly. It can reach up to 1.6 meters in length. Its back is gray, gray-brown, or yellow. Brown circles with lighter centers also mark its back. Its belly is gray and the tail is pinkish-brown.
Bite Symptoms:	Bleeding from the wound. Immediate burning pain, swelling, and discoloration. Weakness and sweating.
Traits:	Calm during the day, but will strike when disturbed. Aggressive at night.
Warning Signals:	Information not available.
Habitat:	Mountainous regions, at elevations up to 2,000 meters. Other rocky and dry areas.

Now that we've discussed some of the lesser known snakes found in some of the world's deserts, let's move on and find out about the proper field treatment for snakebite. A good rule of thumb is to treat every snakebite as if it were poisonous and leave nothing to chance.

2404. Field Treatment For Snakebite

For several reasons, medical personnel no longer recommend cutting the snakebite wound and sucking the venom out. These reasons include the increased risk of infection, particularly in desert regions (because of airborne dust), and the fact that any suction applied must be maintained for at least one half hour. Follow the procedure in table 2-9 for treating snakebite.

Warning: Never give a snakebite victim food, drugs, alcohol, or other stimulants, including coffee or tea. Never attempt to cut open the wound or to suck out the venom.

Table 2-9. Treating Snakebite

STEP	ACTION
1 Calm Victim	Keep the victim calm and quiet, preferably lying down. Allow only necessary movement.
2 Apply a Tourniquet	Apply a tourniquet above and below the bite. Make the tourniquet tight enough to restrict or stop blood flow in and near the wound but not through arteries and veins . See table 2-10 on the next page for the proper application of tourniquets.
3 Immobilize	Immobilize the wounded extremity at or below heart level if possible. DO NOT ELEVATE THE WOUND . If you use a splint to immobilize the arm or leg, adjust as needed to compensate for the continued swelling of the wound area.
4 Apply Ice	If an ice bag is available, wrap it in a cloth and place it over the bite. DO NOT PACK OR WRAP THE WOUND AREA IN ICE . The ice is used to cool the area of swelling, not to freeze the wound.
5 Remove Jewelry	If the victim is wearing jewelry, remove it and place it in the victim's pocket.
6 Clean the Wound	When possible, clean the wounded area with soap and water. DO NOT APPLY ANY LOTIONS, OINTMENTS, OR CREAMS TO THE WOUND .
7 Seek Medical Help!	Get the victim to medical treatment as soon as possible. If you are bitten and are alone, walk to medical aid if necessary.

Table 2-10. Applying Tourniquets

IF...	THEN...
No swelling is present	Place tourniquet about 1 inch to either side of wound.
Swelling is present	Place tourniquets on the unswollen areas just beyond the upper and lower limits of the swelling.
Swelling extends beyond the restricting tourniquet	Place additional tourniquets, if available, at the limits of the new swelling and remove the old tourniquets.
You only have one tourniquet	Place it at the upper limit of the swelling between the heart and the wound and move it as necessary.
You only have two tourniquets	Remove the lower tourniquet and place it at the new upper limit of swelling. Move the remaining tourniquet to the new lower limit of the swelling.

Lesson Summary. This lesson provided you with the knowledge necessary to identify desert insects and snakes and to perform the proper field first-aid treatment for a sting or bite.

Unit Exercise: Complete items 1 through 18 by performing the action required. Check your responses against those listed at the end of this study unit.

1. If your body cannot balance heat gain with heat loss, you will
 - a. become acclimatized more quickly than normal.
 - b. never be susceptible to heat injury.
 - c. need to eat and drink more frequently.
 - d. suffer possible brain damage and/or death.

2. The process of gradually adjusting the cooling system of the body to the heat of the desert is known as
 - a. physical conditioning.
 - b. acclimatization.
 - c. body heat balance.
 - d. the effects of temperature.

3. At equal temperatures, the body requires _____ times as much water in the desert to maintain water balance than it does in a high humidity environment.
 - a. 2 to 3
 - b. $2\frac{1}{2}$ to $3\frac{1}{2}$
 - c. 3 to 4
 - d. 4 to 5

4. The purpose of salt in the human body is to
 - a. aid digestion.
 - b. increase sweat.
 - c. retain liquids.
 - d. enhance food flavor.

5. Which one of the following is an individual protective measure to prevent heat related injuries?
 - a. Drinking water only when you're thirsty
 - b. Resting in the exposed sun sitting up, not lying down
 - c. Engaging in vigorous physical activity immediately on arrival in the desert
 - d. Removing clothing to prevent overheating

6. The three major types of heat injuries are heat exhaustion, heat stroke, and
 - a. heat cramps.
 - b. heat flashes.
 - c. fainting spells.
 - d. swollen joints.

Matching: For items 7 through 9, match the heat injuries in column 1 with their symptoms in column 2. Place your answers in the spaces provided.

Column 1	Column 2
<u>Heat Injury</u>	<u>Symptom</u>
___ 7. Heat cramps	a. Weakness or faintness; dizziness, cool, pale, moist skin; headaches; and appetite loss
___ 8. Heat exhaustion	b. Flushed, hot and dry skin; dizziness, confusion, headaches, seizures, nausea; rapid respiration and weak pulse
___ 9. Heat stroke	c. Muscle cramps in arms, legs and/or stomach

Matching: For items 10 through 12, match the heat injuries in column 1 with their correct treatments in column 2. Place your answers in the spaces provided.

Column 1

Column 2

Heat Injury

Treatment

- | | |
|--|--|
| <p>___ 10. Heat cramps
___ 11. Heat exhaustion
___ 12. Heat stroke</p> | <p>a. Move casualty to a shaded area, remove clothing, and pour water on the casualty. Fan casualty, massage skin, elevate legs, have casualty drink water slowly, seek medical aid and transport to a medical facility as soon as possible.</p> <p>b. Move casualty to a shaded area, loosen or remove clothing, elevate legs, have casualty drink one full canteen slowly, ensure the casualty remains inactive for the rest of the day, monitor the casualty.</p> <p>c. Move casualty to a shaded area, loosen clothing, have casualty drink one full canteen slowly, seek medical aid if symptoms persist.</p> |
|--|--|
13. The purpose of practicing good health and hygiene habits in the desert is to
- a. reduce the need for bathing and related water use.
 - b. reduce the need for resupply of health and comfort items.
 - c. prevent the spread of disease and maintain combat efficiency.
 - d. increase the need for personnel inspections.
14. The following are insects specific to desert regions **except**
- a. various scorpions.
 - b. poisonous cicada.
 - c. black or brown widows.
 - d. various tarantulas.
15. The field treatment for insect bites and stings is to calm the victim, clean the wound, remove the stinger, remove jewelry at or near the bite, and
- a. apply a tourniquet.
 - b. apply pressure.
 - c. scrub the wound.
 - d. observe and treat reactions.

16. Some snakes specific to desert regions are the saw-scaled viper, carpet viper, desert horned viper, puff adder, blunt-nosed viper, and the
- a. garter snake.
 - b. Egyptian cobra.
 - c. water moccasin.
 - d. gray bushmaster.
17. Listed below are six of the seven steps for the field treatment of snake bites. Which one is missing?
- (1) Apply a tourniquet.
 - (2) Remove jewelry.
 - (3) Clean the wound.
 - (4) Apply ice.
 - (5) Seek medical help.
 - (6) Calm the victim.
- a. Suck out the venom.
 - b. Induce vomiting.
 - c. Immobilize.
 - d. Bleed the wound.
18. A Marine has been bitten by a snake on his calf and the wound exhibits swelling. Where would you place the tourniquets?
- a. About 1 inch above the wound
 - b. About 2 inches on either side of the wound
 - c. Directly over the wound
 - d. Just beyond the upper and lower swelling limits

UNIT SUMMARY

This study unit provided you with basic but important knowledge of desert conditions and how they affect you, the individual desert warrior. We discussed acclimatization, heat effects, water and salt requirements, as well as hygiene habits, identification and treatment of heat injuries, identification of desert insects and snakes, and the field treatment of stings and bites. In study unit 3 we will discuss how desert conditions affect operations and training.

Study Unit 2 Exercise Solutions

1. d.
2. b.
3. a.
4. c.
5. b.
6. a.
7. c.
8. a.
9. b.
10. c.
11. b.
12. a.
13. c.
14. b.
15. d.
16. b.
17. c.
18. d.

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2302c(1)
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2302b(2)
2302c(2)
2303
2401
2402 Table 2-3
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2404
2404 Table 2-10

STUDY UNIT 3

DESERT TRAINING AND OPERATIONS

Introduction. Earlier, we said that the desert is relatively vast, developed areas are widely dispersed, terrain provides for little natural cover and concealment, and the weather is hostile to both personnel and equipment. These factors underscore the importance of increased training to the successful accomplishment of military operations in the desert. In this study unit you will focus on how the desert environment affects training and operations as well as on some useful techniques in land navigation, range estimation, concealment and camouflage, visibility, observation, the effects of the desert on weapons, and field fortifications.

Lesson 1. DESERT TRAINING AND LAND NAVIGATION

LEARNING OBJECTIVES

1. Identify the initial objective of desert training.
2. State in writing the reason land navigation is difficult in the desert.
3. Identify the most reliable method of desert land navigation.
4. List the four factors that adversely affect compass readings in the desert.
5. List the four important factors that must be considered when navigating in the desert.

3101. Desert Training

The initial objective of desert training is to prepare the individual, his equipment, and his unit for successful training operations and subsequent combat operations in a desert environment. This training should include thorough desert familiarization, acclimatization procedures, and other related medical information that the individual Marine will need to function effectively. Once the individual has the skills needed to exist in a desert environment, further training focuses on the unit and the mastery of the skills needed to accomplish the tactical mission. This instruction includes

- land navigation and range estimation,
- techniques and tactics peculiar to the desert environment,
- scouting and patrolling,
- call for fire and adjusting supporting arms,

- armor-infantry coordination, and
- any other training that may be deemed necessary.

The training should also provide a modification or improvement of skills obtained from previous basic and general individual training for combat in the desert.

3102. Navigating in the Desert

Due to the lack of well-defined landmarks, maintaining direction and location in the desert can be extremely difficult at times but is not impossible. Personnel at all levels should receive the proper equipment and thorough instruction in navigational methods and techniques before participating in desert operations; these methods and techniques are as important in the desert as they are any place else in the world.

a. Methods of navigation. There are a few navigation considerations in the desert that are worth mentioning. The simplest and most reliable method of navigation in the desert is known as dead reckoning. Dead reckoning is a way to find where you are located by continually plotting where you have been (fig 3-1). More exactly, dead reckoning consists of recording and plotting a series of courses, each measured as to distance and direction from a known starting point. The courses provide a plot from which you can determine your position at any time. In the desert, the direction traveled is determined with a compass and the distance is measured by counting paces or by reading the odometer of a vehicle.

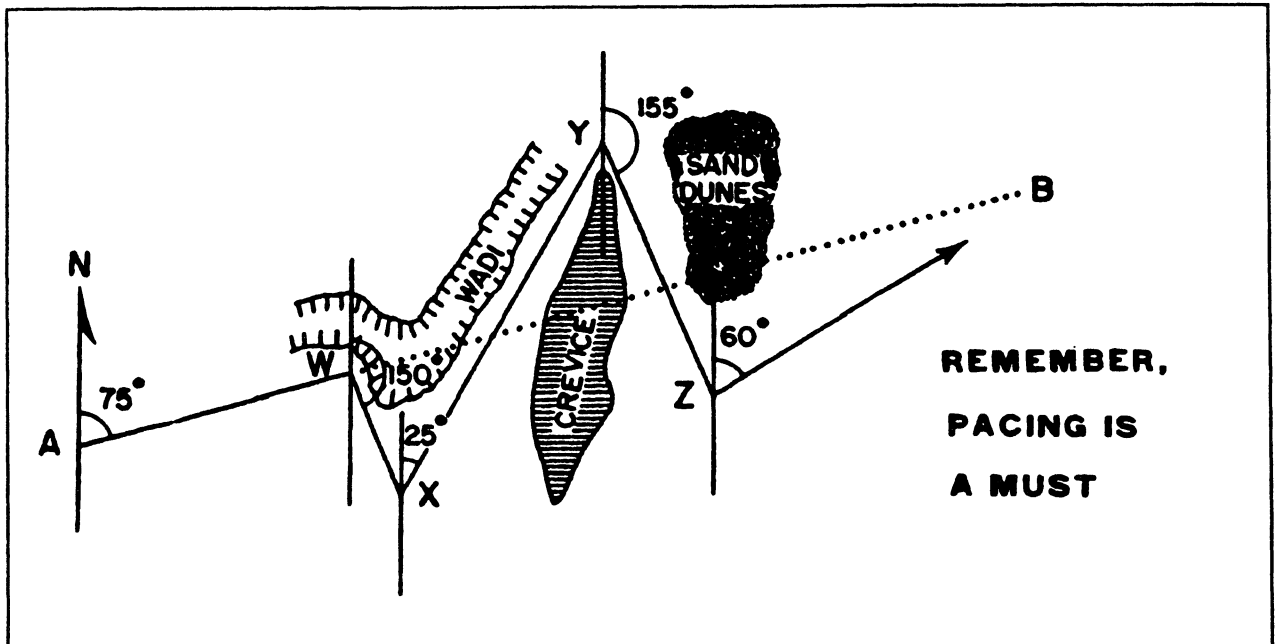


Fig 3-1. Dead reckoning.

b. Navigation considerations. A steering mark is any well-defined object in the direction of travel with which the navigator may guide or steer himself. It is easier to follow these marks than to steer continually by compass. A steering mark could be any permanent manmade structure, terrain feature or even a star. Check a moving steering mark, such as a star, every 10 to 15 minutes by compass.

c. Obstacles. There are few obstacles in the desert that will interfere with ground movement. Mountains and sand dunes are your primary concern. When traveling on an azimuth across an area with numerous sand dunes, pass around the dunes in an alternating manner, one detour to the left and the next to the right and so forth. This will keep you on your azimuth.

d. Navigation devices.

- (1) Compass. The compass is your most valuable and readily available navigation tool. In the desert, it will become even more important because of the lack of prominent terrain features. While the compass is an excellent navigational tool, there are four factors that can affect your compass readings:
 - (a) Condensation can fog the lens.
 - (b) Sand and grit will scratch the compass lens making it difficult to read if is left unprotected.
 - (c) Iron ore deposits in the desert can attract the magnetic needle and give a false reading. (You can obtain geology reports on iron deposits through your unit S-2.)
 - (d) The metal mass of vehicles can have the same effect as iron ore deposits on the compass so you should make readings at least 50 meters away from a vehicle.
- (2) Electronic navigation systems. Currently there are electronic navigation systems available in the Marine Corps inventory that can give you extremely accurate navigational information. Position location reporting system (PLRS), Magellan, and global positioning system (GPS) are three systems that you may be familiar with or have heard of. These systems enable you to find locations in grid coordinates to within fifteen meters on a given map. These devices were used successfully during operations Desert Shield and Desert Storm in Southwest Asia. As accurate and easy to use as these navigation aides are, they are not 100 percent foolproof. **Any complex electronic equipment exposed to the desert's harsh climate is subject to failure; you cannot rely on these devices exclusively which is why you first need a firm grasp on conventional land navigation skills. You need a backup should a malfunction occur.**

Lesson Summary. Now that you have been given information on desert training and navigation considerations in the desert, let's move on and look at camouflage and concealment as it pertains to desert operations.

Lesson 2. DESERT CAMOUFLAGE AND CONCEALMENT

LEARNING OBJECTIVES

1. Identify the basic principle of desert camouflage.
2. Identify two important position selection factors that must be taken into consideration in a desert environment.
3. Identify the two factors that govern dispersion.

3201. The Basic Principle of Camouflage

Since concealment in the desert is rarely achieved, the emphasis is placed on the proper use of camouflage and camouflage techniques. Proper camouflage measures can reduce the effectiveness of enemy observation and consequently of enemy operations. The basic principle of camouflage is to fit or blend into the existing ground pattern with minimum change to the original terrain (fig 3-2).

Continuous individual training must be conducted on every conceivable method of camouflaging personnel and material. The small unit leader must continually check for incorrect camouflage procedures and make on-the-spot corrections.



Fig 3-2. Blending into the terrain.

CHALLENGE

Let's test your knowledge on the information we've just covered. What is the basic principle of camouflage as it pertains to a desert environment?

If you said that the basic principle of desert camouflage is to fit or blend into the existing ground pattern with minimum change to the original terrain, you are correct! Let's move on and discuss camouflage and concealment considerations.

3202. Camouflage and Concealment Considerations

In the desert, you will encounter camouflage problems that require imagination and ingenuity to overcome. The lack of natural overhead cover, the increased range of vision, and the bright tone of the desert floor make position selection, dispersion discipline, and the skillful use of dummies and decoys important parts of your efforts to achieve deception or surprise.

a. General. Because natural concealment is lacking, camouflage is especially important in the desert. You'll have to use camouflage more extensively in desert areas than you would in normal terrain and artificial methods of camouflage are also more important. Camouflage from air or ground observation is also extremely difficult to achieve. Movement in daytime is greatly restricted because of the lack of cover and concealment from air attack; unavoidable dust clouds will betray any movement.

b. Equipment.

- (1) Ensure that all vehicles and weapons systems are equipped with camouflage net sets. The current nets the Marine Corps uses are **radar scattering drape nets** and come in colors to match both desert and wooded terrain. To hide equipment, make maximum use of shadows in broken ground, wadis, and dune areas, as well as the shadows cast by the vehicles and weapons. Use shadows carefully; if you do not use them properly, they will reveal the location and nature of the objects you are trying to hide. Dig vehicles and weapons in if possible to conceal, distort, and reduce their shadows.
- (2) A camouflage net that relies on concealment by casting irregular shadows to break up the form of the concealed object is useless in the desert.

To be more effective in the desert, a camouflage net must completely cover the object to be hidden. This type of netting relies on its imitation of the ground surfaces both in color and texture. The imitation of the ground surface makes the camouflaged object appear as if it is part of the terrain. Drape nets and drape net sets are the most practical type for this use in desert terrain. Older style flattop nets, with the camouflage pattern thinned out toward the outer edges, cast conspicuous shadows on the ground and should not be used.

Note: Aircraft are particularly difficult to camouflage because of their shape, large size and highly reflective surfaces.

c. Siting. Deciding the locations best suited for positioning fighting emplacements, vehicles, and any other items that need camouflage and/or concealment is known as siting. Key considerations when selecting those positions are the availability of natural camouflage materials and concealment opportunities. Valley floors usually have sparse natural cover. Dry washes with a thicker growth of vegetation offer better natural concealment and defilade from oblique observation. In general, it is necessary to hide "on top of the pattern," rather than under or behind it because of low cover (fig 3-3).



Fig 3-3. Hiding "on top of the pattern."

d. Dispersion. Lack of concealment increases the need for dispersion in desert areas. Individuals and units disperse as much as they possibly can consistent with the needs for security and mutual support (fig 3-4). **Security and mutual support** are the governing factors when deciding dispersion intervals. The greater the mobility of a unit, the greater the dispersion it can accept if adequate communication is available. As a general rule, separate vehicles by at least 150 meters during daylight. The interval between vehicles may be reduced at night for security reasons, depending on the amount of illumination and the ability of the enemy to observe friendly convoys and tactical positions.



Fig 3-4. Vehicles dispersed for security and mutual support (U.S. Army photograph).

3203. Vehicle Camouflage, Concealment, and Movement

a. Practically all movement in the desert is by vehicle which creates special concealment problems. Vehicle concealment is not just for personal or individual vehicle safety alone. If the enemy spots one vehicle, he will systematically search the area for others and may locate an entire convoy or unit, thus gaining information as to movement and intention. The possible destruction of an entire convoy or unit may result from poor camouflage discipline.

b. In bare deserts which consist of loose sand or stone and in places where vegetation is extremely sparse, the tracks left by wheeled vehicles are so faint that they are hardly noticeable beyond 500 meters by the unaided eye. Where the surface consists of patches of pebbles veined with bare, light-colored sand, however, vehicles crossing the patches push the pebbles down and leave two distinct paths of light sand exposed. Generally, if vehicle tracks are kept dispersed, they are inconspicuous to the unaided eye, provided a number of vehicles do not follow the same tracks.

c. Vehicles on a plain background are conspicuous by their tone and shadow, while vehicles in or near a patterned background are much less noticeable. It is desirable to blend the vehicle with the color and texture of the surrounding terrain.

d. Vehicle operators must be trained to understand and apply the simple rules of concealment.

- (1) Where vegetation is higher than the vehicle, place the vehicle under it.
- (2) Where a single tree or a small clump of trees does not provide sufficient concealment, park the vehicle in such a manner that the vehicle shadow is distorted by the tree shadow.
- (3) In less than tree-size vegetation, park the vehicle with its rear facing the sun and its front end touching the vegetation. The shadow is minimized by the cab and hood and further distorted by the plant.
- (4) In areas where there are low shrubs, position the vehicle among them so that the vehicle shadow is disrupted.
- (5) On broken ground, take advantage of the large rocks to distort the vehicle shadow.
- (6) Washes and other depressions are excellent locations for vehicles. Remember that these washes may become river beds during sudden rainstorms.

e. Treat metal surfaces on vehicles so that light reflection is kept to a minimum. Use camouflage paint or mud on all vehicles and equipment. If these materials are not available, apply grease or oil and sand and dust to dull metal surfaces. Treat the windshield and headlights, leaving small openings for vision. At halts, place some form of dull-colored covering or brush, if available, over the windshields and headlights to eliminate glare.

f. Avoid making numerous converging vehicle tracks because they reveal the location of important installations or command posts. To avoid this, follow designated routes when approaching these areas.

Discharge passengers 300 to 400 meters from the installation and have them walk the rest of the way. Then, proceed with your vehicle to a dispersal area. The path from the dispersal area to the installation must follow a devious, irregular course through as much cover as possible.

g. Dig vehicles in and conceal them further using nets and/or natural materials when time and the tactical condition permit.

3204. Digging In

One of the basic problems of concealment in the desert is the elimination of shadows. The best solution is to reduce the shadow by digging in (on the principle that lower objects produce shorter shadows) and by merging the shadow with nets or natural material. Where these measures are not practical, extensive dispersion consistent with tactical integrity and security is a solution. When terrain permits, digging in is a must for units that are halted for more than a few minutes; doing so helps prevent the loss of men and material in the case of air or artillery attack. Suitable ground for digging in should be a consideration in selecting assembly areas.

Lesson Summary. This lesson provided you with information on camouflage and concealment in the desert as well as some considerations that may greatly affect your mission in a desert environment. Lesson 3 will give you some insight on environmental effects on visibility, observation, and range estimation.

Lesson 3. VISIBILITY, OBSERVATION, AND RANGE ESTIMATION

LEARNING OBJECTIVE

Identify those environmental factors that affect visibility, observation, and range estimation in desert operations.

3301. Environmental Effects

While visibility is almost always good in the desert, appearances can often be very deceptive (fig 3-5). Objects frequently appear magnified and a distant hill may be twice as far away as it appears. Visibility and range estimation in the desert also depend, to a certain extent, on the time of the year and even the time of day you observe the object or objects. **Sunshine, dust, mirages, windblown sand, and moonlight** are the main environmental factors that affect visibility, observation, and range estimation in the desert. Laser and radar ranging devices are the most accurate way to determine range in the open desert.



Fig 3-5. Distances can be deceiving.

a. Effects caused by the sun. The brilliant desert sunlight reflected from the light-colored ground surface creates a strong glare. An observer with his back to the sun sees objects plainly and without the effects of their shadows but an observer looking into the sun is handicapped by glare and ground reflection. His depth perception may be impaired when objects cast shadows or are seen in haze. During winter, when the sun is low on the horizon, these effects are magnified. Consider these effects and, whenever possible, time attacks when the sun is to the Marines' backs.

b. Effects of dust and sandstorms on visibility and observation. During dust and sandstorms, observation from the air is impossible and ground visibility is sometimes less than 50 meters. If the storm is not too heavy, it may be advantageous to conduct offensive operations during the storm to gain surprise and reduce the defender's advantage of observation. During a storm of this nature, a unit can move unseen to gain a tactical advantage. Raids can also be planned and executed against enemy defensive positions under storm conditions. Operations of this nature are similar to those conducted at night. Enemy and friendly communication lines, supply installations, supply routes, and minefields or other obstacles covered by fire can be rendered ineffective during dust and sandstorms.

Control, maneuver, and large scale movements are difficult. Observed artillery fire and close air support may be impossible. This places greater importance on detailed preplanning and the establishment of prearranged times to control movement and fires.

c. Mirages and their effects. A mirage is an optical phenomenon produced in desert regions by a layer of hot air of varying density across which an observer sees reflections--usually inverted--of some distant object or objects. It normally occurs when an observer faces the sun. Mirages appear more often during the summer, although it is difficult to generalize under what conditions they will occur and what form they will take. Mirages are visible on a wide arc that increases as the sun rises, depending on the season and the hour of the day. A mirage makes ground observation difficult. During certain hours of the day, depending on wind and temperature, the mirage effect can create a desert haze which makes anything up to a height of 1 to 2 meters above the ground invisible. The general effect is to magnify objects, particularly in the vertical plane, making it especially difficult to identify vehicles (fig 3-6). Under certain conditions, mirages obstruct accurate vision as close as 500 meters or they distort distance vision.

d. The effects of wind. Dust and smoke created by wind, vehicles, and artillery fire reduce visibility. Vehicles moving downwind may be blinded by their own dust. The dust created by withdrawing units moving into the wind will obscure the units from enemy ground observation. To prevent eye injury, eye protection is a must during windstorms.

e. The effects of moonlight. Moonlight in the desert is normally much brighter than in other regions. Nights usually are very clear with no haze or glare. Aerial and ground observation and all types of movement are facilitated during periods of moonlight. On some nights, moonlight may provide equal or better observation than daylight.



a. How the tank appears.

b. What you will see.

Fig 3-6. Effects of a mirage on observation.

Lesson Summary. This lesson provided you with a brief look at some desert environmental effects on visibility, observation, and range estimation. Let's move on to lesson 4 and discuss weapons care and maintenance while in the desert.

Lesson 4. EFFECTS OF THE DESERT ON WEAPONS

LEARNING OBJECTIVE

Identify the proper amount of lubrication to be applied to weapons in a desert environment.

3401. Weapon Maintenance

a. General. The care and cleaning of all weapons is every Marine's responsibility and must be supervised constantly. When the temperature of the desert reaches 110°F, metal exposed to the sun's direct rays may "heat soak" to 140°F. For this reason alone, it is important to protect all weapons as much as possible. Before entering the desert environment, clean all individual weapons thoroughly to remove all excess oil. Apply a very thin coat of the proper lubricant to the internal working parts to facilitate functioning and avoid metal-to-metal wear. At night, when the temperature drops, condensation will form on your weapon. Wipe this moisture off to prevent rust from forming.

b. Protection from sand and grit. Windblown sand and fine grit damage and clog weapons causing malfunctions. Take adequate measures to avoid permanent damage to your weapons' operating parts. Protect muzzles and other apertures with suitable covers. Disassemble and clean all individual weapons with a dry cloth at a minimum of once a day if possible. Periodically inspect crew served weapons for signs of abrasion to exposed moving parts, e.g., tubes, slides, and bearing surfaces.

Cover stored weapons that cannot be cleaned daily with a protective coating of approved lubrication. Seal them in an airtight container if possible. Leave exposed weapon surfaces, such as recoil slides, somewhat dry rather than oiled since the mixture of the lubricant with sand contamination forms an abrasive paste that is far more damaging than operating with slightly dry surfaces. Use covers to prevent dust and sand from entering the breech and muzzle.

Lesson Summary. This lesson provided you with basic information regarding weapon care in a desert environment. Let's move on and discuss building field fortifications in the desert.

Lesson 5. FIELD FORTIFICATIONS

LEARNING OBJECTIVE

Identify the correct forward slope placement of field fortifications in a desert environment.

3501. Erecting Field Fortifications

a. General. When building field fortifications in desert terrain, make an effort to keep the upper or forward slope at ground level to prevent the enemy from identifying the position. Special difficulties arise in constructing firing positions for weapons with high silhouettes. You may have to locate these positions, if possible, on reverse slopes. Where this is not feasible, hold the weapons in mobile reserve or in supplementary positions and bring them forward to the primary firing positions as needed.

b. Preparation of field fortifications. It is extremely difficult to prepare field fortifications in the desert. Wherever the ground is stony, there is usually a hard surface layer of dense chalk. Under this surface layer, the ground is softer and therefore easier to work. In constructing field fortifications, it may be necessary to first clear or blast away this surface chalk layer. You can only do this kind of work if sufficient time and resources are available. Pile stones and rocks to form your fighting positions if a hasty defense is being established. When occupying a defense on steep slopes or in ravines, the softer sublayer may be more accessible, making digging easier.

c. Sub-surface ground water. Expect difficulties with underground water when digging in salt marshes. Even when the surface of the salt marsh appears to be dry, you may hit water at a depth of 1 meter or less.

d. Fighting positions. Fighting holes and shelters can be easily dug in the loose loam or clay found in depressions. Because of the absence of timber, construction work may present difficulties. Use sandbags, sand filled ammunition boxes, and expended shell casings torevet (support) vertical surfaces. Cover individual positions with any natural foliage that may be present, your individual poncho, shelter half, or a combinations of both.

Lesson Summary. This lesson provided you with some basic knowledge of building field fortifications in a desert environment and, most importantly, the proper placement of the forward slope to prevent enemy identification.

Unit Exercise: Complete items 1 through 17 by performing the action required. Check your responses against those listed at the end of this study unit.

1. Initial desert training should include _____, acclimatization procedures, and other related medical information.
 - a. desert familiarization
 - b. capabilities of equipment in the desert
 - c. tactics employed in desert warfare
 - d. the reason for specialized desert training
2. Land navigation is difficult in the desert due to
 - a. the rugged terrain.
 - b. the vastness of the desert itself.
 - c. the lack of well-defined landmarks.
 - d. erratic compass readings caused by the extreme heat.
3. The simplest and most reliable method of land navigation in the desert is
 - a. dead reckoning.
 - b. doglegging.
 - c. contouring.
 - d. resection.
4. A well-defined object that lies in the direction of travel and which a navigator may guide on is called a (an)
 - a. intersection point.
 - b. bench mark.
 - c. steering mark.
 - d. contour interval.
5. Four factors that can adversely affect compass readings in the desert are condensation fogging the lens, scratches on the compass lens if left unprotected, the metal mass of vehicles, and
 - a. electrical interference from high tension wires.
 - b. iron ore deposits found in the desert.
 - c. heat expansion of the compasses metal components.
 - d. reading difficulty caused by glare.
6. List the four factors that must be considered when navigating in the desert.
 - a. _____
 - b. _____
 - c. _____
 - d. _____

7. To keep from straying off your azimuth when navigating large sand dunes you should
 - a. go straight over the dune.
 - b. always detour to the left.
 - c. alternate detours right and left.
 - d. always detour to the right.

8. The decision of where to place a fighting position or vehicle for camouflage and concealment in the desert is referred to as
 - a. siting.
 - b. digging in.
 - c. camouflage.
 - d. cover and concealment.

9. What is the basic principle of camouflage in the desert?
 - a. Total concealment must be achieved
 - b. To duplicate the surroundings by color only
 - c. Use natural foliage only
 - d. To fit or blend into the existing ground pattern

10. All positioned vehicles and weapon systems should be equipped with
 - a. camouflage net sets.
 - b. connecting trenches.
 - c. extensive overhead protection.
 - d. sandbags on the sides.

11. The type of camouflage netting used by the Marine Corps is the radar scattering _____ net.
 - a. flattop
 - b. drape
 - c. smooth oblong
 - d. open flattop

12. The availability of natural camouflage materials as well as concealment opportunities are key considerations when determining
 - a. approach lanes.
 - b. range.
 - c. lateral limits.
 - d. position selection (siting).

13. The two main factors that govern dispersion are
 - a. vision and area to be covered.
 - b. ground cover and terrain.
 - c. security and mutual support.
 - d. noise and light discipline.

14. During daylight hours, vehicles should have at least a _____ meter dispersion interval between them.
 - a. 200
 - b. 150
 - c. 100
 - d. 50

15. The environmental factors that affect visibility, observation, and range estimation during desert operations are the sun, dust, mirages, moonlight, and
 - a. rain.
 - b. twilight or dusk.
 - c. cloud cover.
 - d. windblown sand.

16. The proper amount of lubrication applied to a weapon in a desert environment is
 - a. a liberal coating of all metal surfaces.
 - b. a very thin coat to internal moving parts only.
 - c. a heavy coat to internal moving parts only.
 - d. up to your discretion.

17. If possible, the correct forward slope placement of field fortifications in the desert should be
 - a. at an oblique angle to the ground.
 - b. slightly below ground level.
 - c. at ground level.
 - d. slightly above ground level.

UNIT SUMMARY

In this study unit we discussed the many problems that you may encounter during operations in a desert environment. Virtually all aspects of Marine Corps tactics meet with unique problems, which include the following:

- Land navigation becomes very difficult due to the lack of well-defined landmarks. Emphasis must be placed on individual navigation techniques including compass use, dead reckoning, and steering marks.

- Camouflage becomes very important and difficult because of the lack of natural features for cover and concealment. Drape net sets must be used.

- Dispersion is essential because of the vast terrain to be covered. Security and mutual support govern dispersion.

- Visibility and range estimation become serious problems because of sun glare, mirages, flat barren terrain, wind, and magnification of objects by the sun.

Study Unit 3 Exercise Solutions

Reference

1.	a.	3101
2.	c.	3102
3.	a.	3102a
4.	c.	3102b
5.	b.	3102d
6.	a.	3102
	b.	
	c.	
	d.	
7.	c.	3102c
8.	a.	3202c
9.	d.	3201
10.	a.	3202b(1)
11.	b.	3202b(2)
12.	d.	3202c
13.	c.	3202d
14.	b.	3202d
15.	d.	3301
16.	b.	3401a
17.	c.	3501a

STUDY UNIT 4

ARMORED AND WHEELED VEHICLE MAINTENANCE AND OPERATION

Introduction. As you have learned from previous study units, desert warfare requires mobility which comes mainly from tracked and wheeled vehicles. These vehicles will require continuous maintenance to remain operational. You, as a vehicle operator, are responsible for the care and safe operation of your vehicle. You have this responsibility if you are an MOS driver or are required to drive to meet mission needs. In this study unit you will focus on the maintenance and operating problems, procedures, and precautions that are of particular importance during desert operations. You will also focus on driving on desert terrain, operations planning, route reconnaissance, convoy operations, and other information that will help you be a better and safer desert driver.

Lesson 1. VEHICLE MAINTENANCE

As a vehicle driver, you are required to observe all operating precautions and to perform the daily, weekly, and monthly preventive maintenance checks and services outlined in the vehicle operator's manual. These checks and services may require a great deal of effort on your part, but the time spent on them will be repaid in reduced maintenance problems and hours saved on later repairs. Your ability to accomplish the mission may well depend on how thoroughly you have done the checks and services.

LEARNING OBJECTIVES

1. Identify the three most important elements concerning vehicular mobility in a desert environment.
2. Identify the three additional vehicle systems affected by the desert's harsh environment.

4101. Air, Fuel, and Lubrication System Maintenance

As figure 4-1 shows, clean air, fuel, and lubricants are the three most important elements concerning vehicles and their mobility in the desert. Without these elements, vehicle and armor unit performance becomes severely degraded. By performing basic preventive maintenance on the systems related to these elements, you can avoid malfunctions.

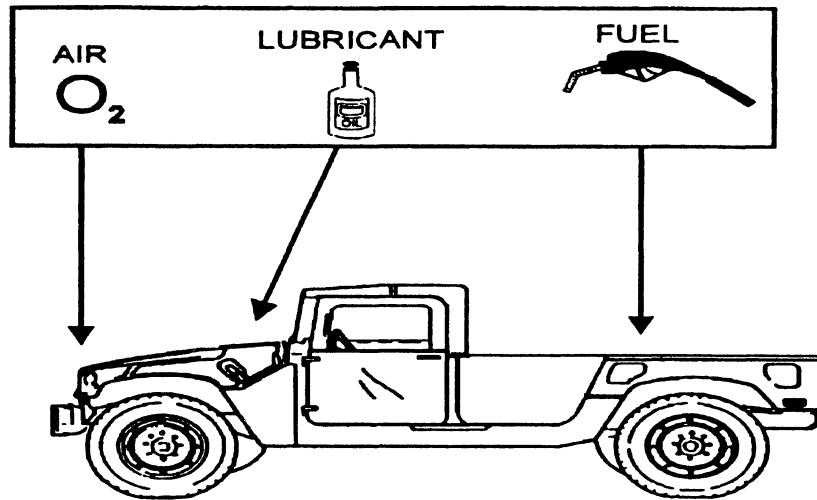


Fig 4-1. The three elements in desert vehicular mobility.

a. Air cleaner system. The air cleaner systems for all ground vehicles, whether tracked or wheeled, are fundamentally the same. They usually consist of an air intake, filter element(s), and connecting hoses or ducts. The key is to keep the filter as clean as possible and the system completely airtight between the filter and engine. This requires that the air intake system be properly sealed. If the air filter housing is not properly sealed, dust and sand will enter the system along with the filtered air and cause engine damage. Loose or missing clamps on hoses and ducts between the air cleaner and engine cause poor sealing. Such conditions are common, particularly after long periods of operation in the dry desert climate. You should routinely inspect the blower motors on vehicles such as tanks that are equipped with air cleaner blower motors. If a blower motor is inoperative, dust will accumulate in the filter, air flow will be restricted, and the engine will perform poorly and eventually overheat. Clean your air filters at least once daily or more often if necessary.

b. Fuel system. Clean fuel is as important as clean air. Although most fuel is reasonably clean when pumped into a vehicle's fuel cell (tank), it will not necessarily be clean when it reaches the engine. It may be contaminated in three ways. The first chance for contamination occurs during refueling operations. Clean the filler tube strainer and keep it serviceable and properly seated in the mouth of the filler tube. To prevent contamination at this point in the refueling operation, do the following:

- (1) Wipe the filler nozzle clean.
- (2) Cover the space between the nozzle and the mouth of the filler tube with a clean cloth.

The second chance for contamination is in the fuel cell itself. Fuel is again exposed to contaminating dirt or sludge normally found in the bottom of the cell. To minimize this problem, make sure the fuel cells are cleaned as part of the scheduled preventive maintenance services.

The last guard against fuel contamination is the fuel filter. If the filter is dirty or clogged, it will fail to remove impurities from the fuel and may eventually cut off the fuel flow altogether. Inspect fuel filters regularly and have them replaced before problems develop.

c. Lubrication system. Clean lubricants rank with clean air and fuel as critical elements in any preventive maintenance program. Regardless of the lubricant being used, the same basic considerations apply:

- (1) Keep lubricant containers clean and well sealed.
- (2) Never use containers that cannot be resealed.
- (3) Do not use dirty tools to apply lubricants.
- (4) Do not for any reason use lubricants that appear to be dirty or contaminated no matter how slightly.
- (5) Whenever you add oil or transmission fluid, use a clean cloth around the filler opening.

CHALLENGE
<p>So far, we've discussed the three critical elements that pertain to vehicle operation in the desert. What are they?</p> <p>_____</p> <p>_____</p> <p>_____</p>

If you said that the three critical elements are clean air, clean fuel, and clean lubricants, you're correct! Now, let's move on and look at the other vehicle systems affected by the desert's harsh environment.

4102. Vehicle Cooling, Electrical, and Suspension Systems

High temperatures, rough terrain, and sand all take a heavy toll on machinery in the desert. Let's discuss some considerations that will help us keep our cooling, electrical, and suspension systems functional.

a. Cooling system. Operating in the desert, more so than in any other environment, depends on the vehicle's cooling system. Although cooling systems vary greatly from vehicle to vehicle, they are all similar in the following maintenance requirements.

- (1) Keep coolant at the proper level. If it is too low, the vehicle can overheat; if too high, excessive pressure may cause coolant overflow or possible cooling system rupture.
- (2) Check cooling system hoses, lines, clamps, and belts daily for serviceability.
- (3) Use antifreeze in water-filled cooling systems to prevent freezing at night and overheating during the day.
- (4) Keep the coolant clean. Flush the cooling system annually or as required.
- (5) Service the external components of the vehicle cooling system.
 - (a) Check the radiator mounting brackets for tightness to prevent damage.
 - (b) Keep the radiator and oil cooler fins and screens clean to allow for adequate air circulation.
 - (c) Keep dirt and oil from caking on the engine and transmission. Caking will increase the chances of overheating. Steps to minimize caking and help prevent overheating are:
 1. Detect seepage and leaks early.
 2. Avoid spills when adding lubricants.
 3. Periodically wash or steam clean the engine.

b. Electrical system. The two major components of the electrical system are the generator/alternator and the storage battery.

- (1) Inspect the generator/alternator daily for secure mounting. Check the belts for wear and correct tension.
- (2) Check the storage batteries. They are extremely vulnerable to the desert's intense heat. Battery electrolyte (water and acid mixture) may evaporate quickly, resulting in discharge.

- (a) Keep the battery fill/vent caps serviceable and tight. Keep the cap vent holes dirt-free to help reduce pressure buildup and still allow for ventilation. Check the electrolyte level at least daily. Add distilled or mineral-free water as needed to bring the electrolyte in each cell to the proper level.
- (b) Keep terminals and posts free from oil, grease, and dirt.
- (c) Spray a thin coat of lacquer on the posts and terminals to prevent corrosion without attracting dust or sand.

Note: Extended or repeated periods of battery drain such as operating radios without the engine running, drastically reduce battery life. You should minimize battery drain by avoiding electrical equipment use whenever your vehicle is not running.

c. Track and suspension systems. Track and suspension systems suffer a great deal of abuse in the desert. Sand, hot dry air, and rock combine to punish both the metal and rubber components. Sand caught in the drive sprockets and idlers of tracked vehicles literally grinds these parts away. Shock absorbers become extremely hot and wear rapidly. The rubber parts of roadwheels, support rollers, and track pads become chunked and stripped away. You must compensate for the weakness of these materials by providing adequate replacement parts. Give special attention to these items:

- (1) Inspect the hub assemblies of tracked vehicle road wheels, support rollers, and idlers for indicators of bearing trouble. An extremely hot hub is an indicator of impending bearing failure.
- (2) Lubricate the suspension system of all tracked vehicles monthly or as required to meet the needs of desert operation.
- (3) Check the relief valves for proper functioning. An improperly functioning valve could result in ruptured seals and bearing damage.
- (4) Inspect wheeled vehicle tires daily for unusual wear, imbedded foreign debris, and signs of deterioration.

CHALLENGE

We've already discussed at length the importance of clean air, fuel, and lubricants and their related systems. What are the three other vehicle systems that require additional maintenance in a desert environment?

- a. _____
- b. _____
- c. _____

If you said that the three vehicle systems that require additional maintenance in a desert environment are the electrical, cooling, and suspension systems, you're correct! Let's move on.

Lesson Summary. In this lesson you learned the three most important elements of vehicular mobility and the three additional systems affected by a desert environment. Let's move on and look at motor transport and route reconnaissance for desert operations.

Lesson 2. MOTOR TRANSPORT PLANNING AND ROUTE RECONNAISSANCE

LEARNING OBJECTIVES

1. Identify the desired mobility percentage for landing forces to efficiently conduct desert operations.
2. Identify the purpose for conducting a route reconnaissance.

4201. Mobility Percentage

Motor transport planning considerations. The dynamic nature of desert operations and the large areas in which they are conducted require modifications of landing force organization to provide for increased mobility. Desert operations can be conducted most efficiently when the landing force is **100 percent** mobile. Although planning for desert operations is generally similar to planning for motor transport operations in other environments, you must take the following considerations into account:

- a. Desert operations require personnel who are acclimatized, physically fit, and trained to operate in the desert's harsh environment.

b. Operations in the desert cover long distances and are conducted over terrain that tends to channelize motor transport movements.

c. There are few developed roads and the similarity of terrain features make cross-country navigation difficult. Therefore, vehicle operators should be provided maps and must be proficient in land and vehicle navigation techniques.

d. Disperse vehicles during movements and at halts as a defense against air and artillery attacks.

e. Carry camouflage net sets on every vehicle since natural concealment will be almost non-existent.

f. Do not use vehicles with poor cross-country mobility.

g. Vary vehicle loading to meet the expected desert terrain.

h. Time and distance to be covered are also affected by terrain, making it one of the most important considerations in planning.

i. Conduct a thorough route reconnaissance before completing your plans and issuing orders.

4202. Route Reconnaissance

For motor transport operations, route reconnaissance is paramount to mission success. The purpose of route reconnaissance, as it pertains to motor transport operations, is to gather information concerning possible enemy activity, obstacles, route conditions, and critical terrain features along a specific route. Make a reconnaissance of all possible convoy routes, including the primary and alternates before you select a route. Be aware that you may have to select the route specified by higher headquarters or the convoy commander. Here are some important items to consider when planning for a route reconnaissance:

a. Ensure that the reconnaissance party is self-sufficient with supplies and equipment for the number of days and expected number of miles to be covered plus a safety factor of 25 percent. Be sure to include spare communications equipment and batteries.

b. Use a double safety factor (50 percent) to estimate water, food, and fuel supply.

c. Ensure that the men who make up the party have knowledge and experience in land navigation, desert driving, first aid, and survival techniques.

d. Have mechanics available to spot mechanical troubles and make on-the-spot repairs.

e. Use winch-equipped vehicles if possible.

f. Include engineers in the party to determine if route preparation is required.

g. Make the party aware of the ultimate mission. There might be a choice between routes--a long route that permits easy driving and little damage to equipment or a shorter route that may reduce time but increase vehicle wear and tear. Use the mission as the main factor in route selection.

Lesson Summary. In this lesson you learned the desired mobility percentage for landing forces to conduct desert operations and the purpose of a route reconnaissance. In the next lesson you will learn the types of convoy column formations and the additional considerations to remember during desert convoy operations.

Lesson 3. CONVOY OPERATIONS

LEARNING OBJECTIVES

1. Identify the three basic types of convoy column formations.
2. List the four additional considerations you need to remember during a desert convoy operation.

4301. Column Movement

As a vehicle operator in the desert, you will often find yourself driving in some type of convoy. We will discuss three basic types of column formations used in convoys. They are close column, open column, and infiltration column. Similar procedures apply when using any of these methods.

a. Close column. Each vehicle follows the vehicle ahead, leaving enough distance to prevent a collision. Set the distance by allowing a given operating gap or by complying with your unit's standing operating procedure. The gap or interval depends on road conditions, weather, terrain, and convoy security requirements. Close column formation facilitates column control and intra-column communications. Use the close column during blackout operations and over poorly marked routes when visual contact between vehicles is essential or in areas where hostile action is not imminent.

b. Open column. In open column formation, the distances between vehicles are increased to enhance dispersion. Use the open column formation in areas where enemy contact is likely or under difficult operating conditions. Ensure adequate dispersion by prescribing vehicle interval in the orders. An open column increases the degree of passive protection against enemy observation and attack. It also permits greater highway speeds with safety and flexibility.

c. Infiltration. In infiltration formations, vehicles are dispatched individually, in small groups, at irregular intervals, and at a rate that prevents vehicle massing. Determine the average distance between vehicles or groups by the rate they are dispatched. Infiltration may provide the best passive defense against hostile observation and attack but it provides the least active defense capability if individual or small groups of vehicles are attacked. Infiltration also lets you use routes on which heavy traffic normally prevents the entire unit from moving at once.

4302. Convoy Considerations

In principle, what is already known and practiced in vehicle convoys over highways applies to similar missions in the desert. Conduct of the road march is little changed except for a few details that are included primarily for safety reasons. Precise convoy spacing often has to be altered to meet desert conditions and convoy control will sometimes be difficult, but not impossible, to maintain. Open columns contribute to safety and increased security from air attack. The staggered formation can be used in the open desert to permit close spacing while keeping vehicles relatively free from the dust clouds of those ahead. The following are additional considerations you need to remember during desert convoy operations:

a. Night operations. The desert particularly lends itself to night operations because of lower temperatures and the fact that darkness offers increased concealment from enemy observation. Blackout lights may not be needed because the clear desert air makes night visibility exceptionally good. Night vision devices are not normally available for every vehicle operator; therefore, when operating under total blackout conditions, extreme care must be exercised.

b. Mess and quarters. Troops must be prepared to cook for themselves and should carry water and rations for a round trip operation on each vehicle, plus a safety factor in case a vehicle should become lost or disabled. Quarters are seldom available except at the base of operations and bivouacs are seldom made. Most convoy operations are on a round-trip, around-the-clock basis.

c. Disabled vehicles. Special problems arise when vehicles become disabled during convoy operations. Depending on the tempo of operations and the tactical situation, you may have to decide between the following:

- (1) Salvage only the cargo and abandon the vehicle for later recovery.
- (2) Demilitarize both cargo and vehicle to prevent enemy use.

This decision is made only when repairs cannot be made using the tools and spare parts on hand or when the tactical situation does not allow repairs. The unit standing operating procedure or march order must contain directives to cover all foreseeable problems of this kind.

d. Communications. Besides the usual convoy signals, signs, and markers, radio communication is a useful tool during desert operations. Convoy communication between lead and trail vehicles is desirable and can be carried out over short-range radios installed in those vehicles. Since radio waves carry great distances in the desert, communication security is a must. Transmit only when absolutely necessary and keep the transmissions as short as possible.

CHALLENGE
<p>In this lesson we discussed the three types of convoy column formations that you may encounter while participating in desert motor transport operations. What were they?</p> <p>_____</p> <p>_____</p> <p>_____</p>

If you said that the three types of convoy column formations are the close column, open column, and infiltration columns you are correct. Move on!

Lesson Summary. In this lesson you learned the three types of convoy column formations and four considerations during desert convoy operations. Let's move off-road and look at actual driving on desert terrain.

Lesson 4. DRIVING ON DESERT TERRAIN

Any vehicular operation can be severely hindered by poor driving. This is probably true in the desert more than in other environments. The desert driver must be skillful not only in handling his vehicle and in anticipating mechanical failure, but also in using common sense to select routes, choose speeds and select proper gears. Remember to rely on your skills as a vehicle operator and use good common sense when driving on any type of unfamiliar terrain. The majority of desert terrain you will operate on will be flat, but you may also encounter several other different types of terrain.

These different terrains pose the greatest driving challenge. For this reason we will discuss driving precautions as well as the different desert terrain characteristics.

LEARNING OBJECTIVES

1. Identify the precaution to take when your vision is obscured by dust while you are driving in convoy formation.
2. Identify the precaution to take when overtaking and passing slower vehicles under limited visibility (dusty) conditions.
3. Select the three types of desert terrain that should be avoided as navigation hazards.
4. List the four precautions and driving tips that will minimize the effects of desert terrain.

4401. Desert Driving Precautions

Driving in intense heat over long distances and for extended periods of time will be monotonous and tiring. Safe operation on desert roads and cross country will require that operators remain alert in spite of the monotony. There are other factors that will influence your ability to drive in the desert and complete your mission. Use the following precautions to make you a better and safer desert vehicle operator:

- a. Each vehicle in a convoy/formation will raise a cloud of dust that will obscure the vision of following vehicles. To overcome this, increase vehicle intervals as much as possible to allow for clear vision consistent with convoy/formation security.
- b. Take great care when overtaking and passing slower vehicles when dust obscures the roadway and possible oncoming vehicles. As a precaution, turn your lights on to increase the visibility of your vehicle when meeting and passing a vehicle under dusty conditions, but do this only if the tactical situation permits.
- c. To avoid unnecessary accidents, never drive into an existing dust cloud that hangs low on the road. Slow moving or stopped vehicles may be on or near the road and hidden by the dust.

4402. Terrain To Avoid

Although the desert seems relatively plain, there are several different types of terrain that you may encounter. Sand dunes, deep soft sand, and salt marshes are three that we will discuss. These terrain features have little military value and offer no real cover or concealment opportunities. Avoid these terrains if at all possible due to the navigation hazards they present.

Their military value comes when they are used against the enemy to channelize enemy movement.

a. Sand dunes. Unless you have lived on a coast, you may not be aware that windblown sand accumulates in a variety of characteristic forms and that any appreciable accumulation may be called a dune.

- (1) A true dune is defined as one capable of moving freely and existing independently of any fixed surface object.
- (2) Some dunes are caused by fixed obstructions in the path of the wind such as brush, outcrops, cliffs, and projecting rocks. Unlike true dunes, these dunes depend for their existence on the obstacle that forms and anchors them.
- (3) With the exception of salt marshes and deep sand, dunes pose probably the greatest driving hazard. Unless a dune road has been previously traveled, make a foot reconnaissance to determine navigability. Ordinarily, you should avoid operations over dunes and select an alternate route.

b. Deep, soft sand. Deep, soft sand may be found anywhere in the desert, but becomes more prevalent in heavily traveled areas. Although troublesome, soft sand is seldom deep enough to prevent the passage of wheeled vehicles, provided drivers understand how to negotiate it and take adequate precautions against becoming bogged. If at all possible, avoid soft sand due to the additional strain that it places on vehicles. If you **must** stop your vehicle in deep, soft sand, do so on the downhill slope. Gravity will help you begin forward movement.

c. Salt marshes. Salt marshes are found in depressions both along both the coast and further inland. When wet, they are impassable, but when dry, salt marshes can be negotiated by light vehicles. Before attempting to cross a salt marsh even with light vehicles, a careful foot reconnaissance is absolutely necessary. Again, avoid dunes, soft sand, and salt marshes and plan alternate routes.

4403. Effects of Terrain

You can make the effects of desert terrain negligible if you take the proper precautionary steps. Here are a few precautions and some driving tips to help you minimize the effects of the desert terrain.

a. Decrease tire pressure for maximum support on soft sand. Re-inflate tires after returning to hard surface roads. Prolonged driving on partially deflated tires will cause overheating and sidewall damage.

b. Ensure that tools and cargo are properly secured to prevent shifting during movement.

c. Travel with or across the direction of the prevailing wind to reach your destination.

(1) Follow corridors parallel to dune crests.

(2) Ascend the windward sides (2 to 3° grades) and descend the leeward sides (as steep as 60°) of sand dunes.

During descent:

1. Keep vehicle wheels straight to the front because any sharp turn may cause the vehicle to overturn.

2. DO NOT touch the brake pedal if at all possible. You must not let the vehicle wheels "lock up" as you descend. If brakes are applied on the descent, the vehicle will have a tendency to turn sideways. If you encounter hard clumps of sand or grass, the vehicle will overturn. The best way to descend a sand dune is to first stop on the crest of the dune, shift into low gear, and drive the vehicle at its own rate down the dune slope.

d. Take special precautions while driving over terrain with boulders and large rocks. It is very difficult on both men and vehicles.

(1) Select your route carefully.

(2) Use good judgment in determining ground clearance. Large rocks will damage the undercarriage, oil pan, and fuel tanks.

(3) Avoid "high centering" your vehicle on rough terrain. This will cause the vehicle's wheels to come completely off the ground.

Lesson Summary. In this lesson you learned the correct precautions to take when driving in convoy formation. You also identified the types of terrain that you may encounter. And finally, you learned some precautions and driving tips that will minimize the effects of desert terrain operations.

Unit Exercise: Complete items 1 through 10 by performing the action required. Check your responses against those listed at the end of this study unit.

1. The three most important elements concerning vehicular mobility in the desert are clean air, clean fuel and clean

- | | |
|-----------------|----------------|
| a. lubricants. | c. additives. |
| b. preventives. | d. detergents. |

2. Three additional vehicle systems affected by the desert's harsh environment are the cooling, electrical, and _____ systems.
- a. power steering
 - b. suspension
 - c. brake
 - d. pneumatic
3. What is the desired mobility percentage for landing forces to efficiently conduct desert operations?
- a. 50%
 - b. 75%
 - c. 90%
 - d. 100%
4. The purpose of route reconnaissance, as it pertains to motor transport operations, is to gather information concerning possible enemy activity, route conditions, critical terrain features and _____ along a specific route.
- a. weather conditions
 - b. navigation aides
 - c. obstacles
 - d. possible bivouac sites
5. The three types of basic convoy column formations used in desert operations are
- a. Skirmishers, echelon, and wedge.
 - b. Staggered, diamond, and inverted.
 - c. Close, open and infiltration.
 - d. Herringbone, "V", and coil.
6. List the four additional considerations you need to remember during a desert convoy operation.
- a. _____
 - b. _____
 - c. _____
 - d. _____
7. Your vision is obscured by dust while driving in convoy formation. What is your best course of action?
- a. Increase vehicle interval to allow for clear vision.
 - b. Speed up so you can see the vehicle in front of you.
 - c. Apply your brakes and come to a full stop.
 - d. Pull your vehicle over to the shoulder and stop.

8. While driving you encounter a slow moving vehicle that you must pass. Conditions are dusty and vision is limited. What precaution should you take before attempting to pass?
- a. Sound your horn repeatedly and force the slower vehicle to move over.
 - b. Stay behind the slower vehicle.
 - c. Drive your vehicle over the shoulder and pass on the right.
 - d. Turn on your headlights to increase your vehicle's visibility and pass with extreme caution.
9. Three types of desert terrain that should be avoided as possible navigation hazards are sand dunes, deep soft sand, and
- a. salt marshes.
 - b. gullies.
 - c. corrugated roads.
 - d. reverse slopes.
10. List the four precautions and driving tips that will minimize the effects of desert terrain.
- a. _____
 - b. _____
 - c. _____
 - d. _____

UNIT SUMMARY

In this study unit you learned the special maintenance and operation requirements of wheeled and tracked vehicles in a desert environment. You also learned motor transport planning and route reconnaissance and convoy operation considerations. Finally, you learned precautions to take when driving on desert terrain. In study unit 5 you will cover combat operations in the desert.

Study Unit 4 Exercise Solutions

	<u>Reference</u>
1. a.	4101
2. b.	4102
3. d.	4201
4. c.	4202
5. c.	4301
6. a. Night operations	4301
b. Mess and quarters	
c. Disabled vehicles	
d. Communications	
7. a.	4401a
8. d.	4401b
9. a.	4402
10. a. Decrease tire pressure for maximum support on soft sand.	4403
b. Ensure that tools and cargo are properly secured to prevent shifting during movement.	
c. Travel with or across the direction of the prevailing wind to reach your destination.	
d. Take special precautions while driving on terrain with boulders and large rocks.	

STUDY UNIT 5

COMBAT OPERATIONS, ORGANIZATION, AND SUPPORT IN THE DESERT

Introduction. In this study unit you will learn the fundamentals of the task organization and function of forces as they relate to planning and conducting offensive and defensive desert operations. An interesting example of organizing forces to support an operation is the Israelis' use of independent units during the October 1973 Middle East War. Each unit was organized to be self-sustaining and responsible for its own food and fighting equipment. When an enemy position was captured, the Israelis would pick up the captured supplies and usable equipment and move on. If the Israelis lost a tank, they would find a usable enemy fighting machine and put it to their own use. Their logistical units were never far behind their attack force. The high success rate of these blitz type operations depended largely on task-organized road construction teams which made logistical support possible. The Israelis could build a road almost as fast as the offensive units could advance, making resupply and maintenance a reality on the front lines.

Lesson 1. FUNDAMENTALS OF DESERT OPERATIONS

LEARNING OBJECTIVE

List the seven fundamentals of desert warfare.

5101. Lessons Learned

Our most recent desert war was Operation Desert Storm. From an analysis of Desert Storm and other desert campaigns, we have developed some important lessons that we can classify as generally accepted fundamentals of desert operations. The following are seven of these fundamentals:

- a. Mobility is critical in desert warfare.
- b. The air element, if unchecked, dominates the desert battlefield because of the following factors:
 - (1) Target location is simplified in open terrain.
 - (2) Weather and visibility for flying are usually excellent.
 - (3) Air superiority offers opportunities for
 - (a) aggressive reconnaissance,
 - (b) isolation of the battlefield,
 - (c) elimination of the enemy's ability to execute good command and control, and

(d) destruction of the enemy's own air support.

c. In the desert, lines of communication are extremely vulnerable for the following reasons:

- (1) Mechanized forces operate more effectively when they have lines of communication that are totally secure.
- (2) Intermittent road networks and the absence of population centers simplify identifying and disrupting lines of communication.

d. Forces are normally deployed over a broad front but must be able to concentrate when moving into the attack.

e. Night operations in the desert are necessary to ensure mission success. Two of the many benefits of night fighting are the added freedom of movement and increased element of surprise.

f. Logistical support will require imaginative concepts. Time schedules and plans for moving supplies developed for other environments are of little value in the desert because of the absence of roads, the difficulty of navigation, and the threats of enemy air, special weapons, and mobile ground forces.

g. The threat of air, artillery, and NBC attack makes dispersion essential. The scarcity of cover and concealment increases the importance of dispersion and deception to reduce vulnerability.

CHALLENGE
<p>Before we move on, let's see how well you remember the information that we've just covered. List the seven generally accepted fundamentals of desert warfare below.</p> <p>a. _____</p> <p>b. _____</p> <p>c. _____</p> <p>d. _____</p> <p>e. _____</p> <p>f. _____</p> <p>g. _____</p>

If you remembered all of the following fundamentals, you remembered well! If you didn't, you may want to review.

- a. Mobility is critical in the desert.
- b. The air element, if unchecked, dominates the battlefield.
- c. Lines of communication are extremely vulnerable.
- d. Forces are usually deployed over a broad front.
- e. Night operations are necessary to ensure mission success.
- f. Logistical support will require imaginative concepts.
- g. The threat of air, artillery, and NBC attack makes dispersion essential.

Let's move on!

Lesson Summary. In this lesson you learned seven of the fundamentals of desert warfare. This information is a basic review of some important lessons learned during previous desert operations. Let's move on and examine the task organization of forces for desert combat.

Lesson 2. TASK ORGANIZATION FOR DESERT COMBAT

LEARNING OBJECTIVES

- 1. Identify the basis for which a military force should be task organized for combat missions.
- 2. Identify the three most common Marine Air-Ground Task Force organizations found in the two Fleet Marine Forces.
- 3. Identify the five considerations used when task organizing units for combat.
- 4. Identify the three classes of infantry-armor combined forces.

5201. General Organization

The basis for organizing a military force is the force's overall combat mission or task. The Marine Corps generates maximum combat power by deploying highly mobile, responsive, combined forces against the enemy. Each unit has its own special characteristics which make it suitable for desert fighting and which complement the special characteristics of other units to form a more powerful combined force. Let's look at the "big picture." That picture includes the three most common Marine Air Ground Task Forces (MAGTF's), the considerations for organizing by task, and the organization and function of the divisions.

a. The "big picture." To perform amphibious operations, Fleet Marine Force (FMF) elements are typically employed as Marine Air-Ground Task Forces (MAGTF's). The three basic MAGTF organizations are as follows:

- (1) The Marine Expeditionary Force (MEF). The MEF is the largest task force. It consists of a command element, ground combat element (division), aviation combat element (wing), and a combat service support element (FSSG) and is organized and equipped to conduct large-scale combat operations.

When required, the Marine Corps can also task organize FMF units into two smaller MAGTF's. Those smaller forces are the Marine Expeditionary Brigade and the Marine Expeditionary Unit.

- (2) Marine Expeditionary Brigade (MEB). The Marine Expeditionary Brigade consists of an infantry regiment, a Marine Aircraft Group (MAG), and a Brigade Service Support Group (BSSG).
- (3) The Marine Expeditionary Unit (MEU). The Marine Expeditionary Unit consists of an infantry battalion, helicopter squadron, and MEU Service Support Group (MSSG).

Now that we have a better understanding of the overall "big picture," let's focus more on organizational considerations for the elements of the Marine division.

b. Organizational considerations. The factors considered in task-organizing for any type of operation are the same. The commander's first step is to estimate the overall situation before beginning the organization process. He asks for information about the following:

- (1) The mission (task)
- (2) The enemy situation
- (3) The status of combat, combat support, combat service support, and aviation units
- (4) The control capabilities of all units
- (5) The characteristics of the area of operation

5202. Division Organization and Functions

First, we'll review the elements of the organization and then we'll look at the way they function in combat.

a. Division organization. The division itself is composed of and supported by combat support, combat service support, and aviation combat elements.

- (1) The **combat support** elements organic to the Marine division are the artillery regiment and the following **battalions**: tank, assault amphibious vehicle (AAV), reconnaissance, combat engineer, and light armored infantry (LAI).
- (2) The Marine division depends on the Force Service Support Group (FSSG) of the MEF as its primary source of **combat service support**. The commander must fully use the organic capability of the division before requesting support from the FSSG. The organic elements found in the division include medical, landing support, maintenance, supply, messing, and motor transport units.

Note: Combat support and combat service support units of the division are organized to permit attachment to subordinate combat units (infantry companies, battalions, or regiments). Therefore, the organization of combined arms task groups is centered around the infantry regiment or battalion. This organization permits flexibility in task groupings for many of the situations encountered in desert fighting.

Combat service support units help the division achieve maximum mobility for desert operations by doing the following:

- (a) Relieving combat units of many supply and maintenance functions
 - (b) Providing flexible support services to meet ever-changing requirements
- (3) The **aviation combat element** (helicopter and fixed wing) support for the division is provided by Marine Air Wing (MAW) units of the MEF. Aviation units furnish both combat support and combat service support to task-organized forces in the desert. Aviation units are an element of all MAGTF's; however, they are not attached to forces within the division.

Note: Assigning operational control of either observation or transport helicopters to ground units for a given period of time does not constitute attachment.

b. **Combat functions.** Each element of the division is organized and trained for specific tasks. The mission of the infantry is to destroy the enemy by fire and maneuver. To accomplish this mission, Marine desert forces are usually either foot-mobile or mechanized (fig 5-1).

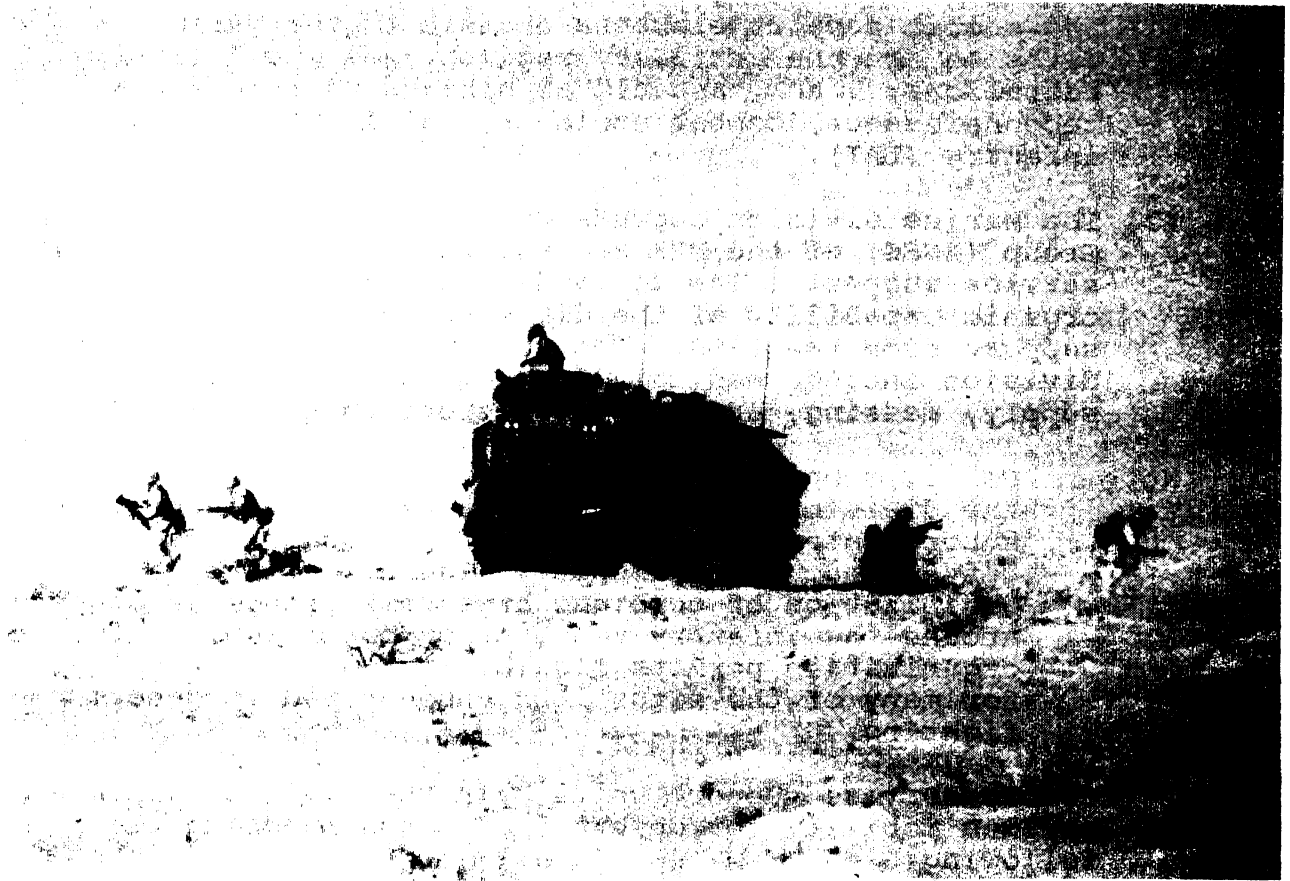


Fig 5-1. Mechanized infantry forces.

- (1) Helicopters are normally used to move, insert, and extract foot-mobile forces. The most important capability of helicopterborne units is the ability to deploy forces rapidly to engage the enemy anywhere within a tactical area of responsibility (TAOR). Always remember that speed, surprise, and the ability to concentrate a sizable number of troops at a specific point are the ingredients of successful desert operations.

Note: Because of the open terrain in the desert, helicopters are particularly vulnerable to enemy air defense weapons and small arms fire. For this reason, we usually conduct helicopter insertions at night or well away from enemy forces.

- (2) Mechanized forces must have the necessary vehicles, firepower, and men to conduct sustained combat operations in the desert. Desert terrain often permits rapid movement, deep penetration, and pursuit of enemy forces. On the defense, mechanized forces are able to disperse over great distances and can mass rapidly to form a counterattack force when necessary. A significant disadvantage of mechanized forces is the large amount of supplies and logistical support they require.

The function of armor in the desert is to conduct highly mobile offensive warfare. Armor forces should be prepared for combined action with mechanized forces to exploit, pursue, and disrupt the enemy's rear and mobile defenses.

As we have already learned, desert operations, because of the size of the battlefield, require highly mobile combat forces. Current Marine Corps doctrine states that infantry and armor units combine their capabilities to support each other. When organized in this way, units may be classified as infantry-heavy, tank-heavy, or balanced.

(a) Infantry-heavy forces are appropriate for attacks against

1. organized defensive positions when man-made or natural obstacles must be breached,
2. built-up areas which must be seized, and
3. terrain not suitable for the employment of a substantial number of armored vehicles.

(b) Tank-heavy forces are appropriate when

1. the enemy is armor-heavy,
2. shock effect and speed are desired,
3. exploiting or pursuing light, disorganized, or discontinuous resistance,
4. enveloping, and
5. conducting a mobile defense.

(c) Balanced units may be organized with an equal number of tanks and infantry elements when the enemy situation is not well known.

CHALLENGE
Time for another test! List the three types of infantry-armor combined forces.
a. _____
b. _____
c. _____

If you answered that the three types of combined infantry-armor forces are a. infantry-heavy, b. tank-heavy, and c. balanced, you are right!

Lesson Summary. In this lesson you learned about the basis for organizing any military force for combat. Then, you learned to identify the three most common Marine Air-Ground Task Force (MAGTF) organizations found in the two Fleet Marine forces. You also learned about the five considerations used to task-organize units for combat. Finally, you learned about the three classes of infantry-armor combined forces. In the next lesson you will learn about conducting offensive operations and how they are modified by desert terrain.

Lesson 3. OFFENSIVE DESERT OPERATIONS

LEARNING OBJECTIVES

1. Identify six operational reasons for undertaking offensive military action.
2. From a list, select the two offensive means by which a military force can defeat its enemy in the desert.
3. Identify the two-fold purpose of aggressive reconnaissance in the support of offensive operations.
4. Identify the two best ways to reduce the sun's effects during daylight observation.
5. Identify how desert terrain affects offensive maneuver.

5301. Six Reasons for Conducting Offensive Military Action

The **strategic** purpose of offensive military action in the desert (or any other environment for that matter) is to defeat the enemy. That's always the overriding goal. Toward that end, we go on the offensive for the following six **operational** reasons:

- To secure key or decisive terrain
- To deprive the enemy of resources
- To develop intelligence
- To deceive and divert the enemy
- To hold the enemy in position
- To disrupt the enemy attack

Note: For a discussion of the strategic, operational, and tactical levels of warfare, see FMFM 1.

5302. Offensive Means of Defeating the Enemy

In the desert, a force can defeat its enemy by either of the following offensive means:

- By concentrating friendly forces at a weak point(s) in the enemy's defense and destroying the enemy's combat units
- By driving deep into the enemy's rear to destroy his combat service support and cut his lines of communication

5303. Factors That Influence Desert Offensives

Concentrating at weak points and/or driving into the enemy's rear to destroy his support requires consideration of these three factors: imaginative command, the "chess game played" ("played" because of flank vulnerability), and the types of attack possible in the desert.

a. Imaginative command. An imaginative commander is not bound by terrain constraints in seeking and defeating the enemy. Because of the scarcity of key terrain in the desert, the only constraint normally placed upon a maneuvering force is its ability to maintain responsive, protected combat service support.

Note: The longer the lines of communication become, the more susceptible they are to being cut.

b. The chess game. In most deserts, the scarcity of large areas of defensible terrain means that an enemy force has at least one flank open to attack. The offensive force must seek this flank and attempt to maneuver around it into the enemy's rear before the enemy can react and block the envelopment with mobile reserves.

Successful offensive operations depend on rapid, responsive, controlled maneuver that seeks a vulnerable enemy flank while exposing none to the enemy. The enemy, realizing the danger of remaining stationary in this terrain, may choose to conduct spoiling attacks or to counterattack. The resulting meeting engagement between the two attacking forces will often be a "chess game" series of flanking actions and reactions with success going to the force that can find the other's unguarded flank first.

c. Attack types. Attacking forces may conduct or participate in movements to contact, hasty attack, or deliberate attack. Within a division, lead elements of forward units may be conducting deliberate attacks on the enemy's weak point or flank to open a gap. Once a gap has been established, following units will move through and exploit the success. Lead units of the exploiting force will be conducting a movement to contact and hasty attacks to overcome pockets of resistance.

5304. Fundamentals of the Offense

The offensive is the decisive form of war--the commander's ultimate means of imposing his will upon the enemy. In this paragraph we will discuss six of the fundamentals of conducting offensive operations in the desert.

a. Reconnaissance to support the offense. In the offense, the attacker must conduct active and aggressive reconnaissance to the front, flanks, and rear. Of course, any information gathered by reconnaissance must be passed promptly to all affected units. The purpose of reconnaissance in support of the offensive operation is twofold:

- First, to locate and identify enemy obstacles, units, weak points, and flanks, and
- Second, to provide early warning of threats to friendly flanks and combat service support elements

A moving force is at a disadvantage in the desert due to the lack of concealment. For this reason, it may be necessary to push reconnaissance units as far out from the main body as possible to allow early warning and to deny the enemy close-in observation. There is a very real possibility that extensive reconnaissance in one area will alert the enemy to intended operations in that area. Therefore, the need for reconnaissance must be tempered with the need for surprise/cover. On the other hand, reconnaissance may even serve to fool the enemy--to draw the enemy's attention away from the real objective or area of operations.

In featureless desert terrain, the requirement to shock, overwhelm, and defeat the enemy always demands accurate reconnaissance to identify actual from false positions. We reconnoiter to find a gap or assailable flank and concentrate the main body to go through or around it with suppressive fires on the flank(s).

Note: A gap must be wide enough to allow one unit to bypass another unit if either should stall.

Finally, obstacles are likely to be placed so that attempts to go around them will often lead the attacker into a fire sack, so equipment capable of breaching obstacles must be located well forward.

b. Combat power concentration. We must concentrate on overwhelming combat power because we achieve mass in both time and space. Units must be able to concentrate rapidly at a given time and place, and then disperse just as rapidly to avoid offering lucrative targets to the enemy. Concentration does not necessarily mean that vehicles and Marines are massed in a small area but that the units have the ability to place an overwhelming number of fires on the enemy.

c. Movement and deception. When we concentrate our combat power, we may have to move many of our forces from different parts of the battlefield to our point of concentration. This may weaken our forces facing the enemy in another part of our zone. Due to the enemy's observation capabilities, movement should take place at night or in conditions of limited visibility whenever possible. Deception measures play an important part in concentration, either to mislead the enemy as to the strength or true intentions of the opposing forces, or to their avenues of approach. In the desert's vast terrain, concealment and deception cannot be overemphasized.

d. Mutual support. Mutual support is as important in the desert as in temperate climates. Due to the large distances covered by maneuver in the desert, mutual support does not mean that any one unit will always be in position to fire against the enemy threatening another unit. However, units must be capable of maneuvering in support of one another without disrupting the scheme of maneuver.

e. Enemy counter-operations. The enemy's objective is to stop the attacking force by using direct and indirect fires, obstacles, and by conducting counterattacks. The attacker must in turn suppress enemy weapons and surveillance systems to degrade or nullify their effects.

f. Air support for offensive operations. Attack helicopters and high-performance aircraft are extremely useful due to their ability to maneuver and apply firepower over a large battlefield quickly. So, suppression of enemy air defense has a high priority during offensive operations. The destruction of enemy anti-tank capabilities must also have a high priority due to the shock value of armor in the desert. No target that has a long range anti-tank capability should be disregarded. Good gunnery and well-planned fire distribution are preeminent.

5305. Environmental Considerations in Offensive Operations

If you remember, in study unit 3 we examined the general effects of the desert's environment on training and overall operations. Let's take a closer look at how environmental considerations (effects of sun, dust, daylight and night light) play an important part in conducting offensive operations in the desert.

a. Effects of sun. During daylight hours, all efforts must be made to attack when the sun is at our back. This enables us to see the enemy troops clearly, with their shadows behind them. This also means that the enemy troops will have the sun in their eyes when they are looking toward us and that they will be subjected to glare, mirages and haze.

It is not always possible, however, for us to have the sun at our backs when we are attacking. Relying on this might lead to a stereotyped method of attack which could become evident to our enemy.

Our maneuver force commanders should attempt to keep the sun somewhere on a 3,200-mil arc to our flanks or rear, giving us a wide choice of angle of attack.

b. Effects of dust. Dust is an observation hazard to a maneuvering force, especially when there is little or no wind. When there is dust, units should move in echelon with overwatch elements on the upwind side, and observers and attack helicopters should operate well to the flank to avoid it. Since it is impossible to disguise movement during daylight, the assault should be as rapid as possible.

The decision to move through a sandstorm will depend on the unit's distance from the enemy, mobility, the presence of minefields, and the direction and density of the storm.

If the advancing unit is caught in a storm blowing from the enemy's direction, the safest alternative is to halt until it abates (although this may not always be possible). When the storm is blowing toward the enemy, it is possible (and extremely effective) to conduct an attack immediately behind the storm.

c. Day observation. In certain circumstances equipment or positions that are camouflaged and are less than one meter from the ground are invisible to an observer at the same height out to approximately 2,000 meters. At the same time, mirages allow observation of objects below the horizon, although these may be distorted or fuzzy to the point of being unrecognizable. These effects often depend entirely on the angle of the sun to the observer. The two most effective ways to reduce the sun's effects during daylight observation are to

- (1) Maintain observers as high above the desert floor as possible (even if only in hull-down positions behind sand dunes).
- (2) Maintain interlocking fields of vision by continually scanning and providing threat warnings to adjacent positions.

d. Night observation. Many offensive operations take place at night. Observation in these conditions varies according to the amount of ambient light. During nights when the moon is full or almost full, the clear desert sky and ample ambient light allow for good observation, both with the naked eye and with night observation devices. Maneuvering units using night-vision devices must continually scan the surrounding terrain to pick up enemy activity that normally would be acquired by peripheral vision in daylight.

The desert night is extremely dark when there is little or no moon. Under these conditions, passive-vision devices (with the exception of thermal imagery) are of little value unless artificial light is used. Active light sources will have to be relied upon.

Employment of artificial light must be strictly controlled by the attacking force to maintain surprise. As a general rule, direct-fire weapons should not illuminate their targets themselves, as their vision will be obscured by debris from muzzle blast. Following contact (when some targets may be on fire) passive devices can be used.

5306. Effects of Terrain on Maneuver

If you are operating in terrain that permits masking of our maneuvering units and if mobility is good, use normal fundamentals of fire and maneuver.

You may be in areas of rocky terrain that may restrict mobility, or the ground may be so flat that your enemy has total observation of the area in which you are trying to maneuver. Movement under these circumstances requires that we use speed of maneuver, deception, and considerable suppression to degrade our enemy's observation and fires.

Avoid frontal attacks in the desert, especially in conditions of restricted mobility. Instead, maintain pressure on enemy units in unfavorable terrain while our other forces find enemy weaknesses in terrain that is more favorable for attacking.

The lack of clearly defined terrain features complicates navigation and phased operations. A unit conducting an enveloping attack is apt to lose direction unless it has carefully reconnoitered its routes.

Lesson Summary. Now you've learned how the desert affects offensive operations, the operational reasons for undertaking offensive military action in the desert, the two offensive means by which a military force can defeat its enemy there, the two-fold purpose of aggressive reconnaissance to support offensive operations, the two best ways to reduce the sun's effects during daylight observation, and finally, the ways desert terrain affects offensive maneuver. Now, let's move on and see how the desert modifies defensive operations as well.

Lesson 4. DEFENSIVE DESERT OPERATIONS

LEARNING OBJECTIVES

1. Identify the five operational reasons for assuming the defense.
2. Identify the eight fundamentals of defensive desert operations.
3. Identify the three types of defenses normally used in defensive desert operations.

4. Identify the three main environmental considerations that affect the conduct of defensive operations in the desert.

5401. Five Operational Reasons for Assuming the Defense

It is unlikely that a U.S. Force will be fully deployed in a desert country before an attack. Recently, Operation Desert Shield demonstrated the most probable situation. Assuming that a secure lodgement area (friendly port and/or air facility) were readily available, an initial landing force would position itself to support the allied force while the remainder of the larger force moved in by air and sea. Tactically, the allied force would be outnumbered, so the initial mission would be to gain time until the entire force was present in the operational area. This would require a defensive posture initially. But a defense, when undertaken aggressively, would convince the enemy that his offensive action would be far too costly in personnel and equipment to be worth maintaining.

Ultimately, the strategic purpose of any defense is to defeat the enemy. There are, however, more limited reasons for assuming a defensive posture. These reasons are not unique to the desert. We normally go on the defensive for the following five operational reasons:

- To gain time
- To concentrate forces elsewhere
- To control key or decisive terrain

Note: Key or decisive terrain is not necessarily a major natural or man-made feature, but terrain whose loss would inhibit the force in some manner. For example, the loss of terrain relatively close to a lodgement area may hinder the planned rate of buildup.

- To attrit enemy forces as a prelude to offensive operations
- To retain strategic, operational, or tactical objectives

5402. Fundamentals of the Defense

The fundamentals of defensive operations in the desert are much the same as in other environments and are applied along with normal combat principles. These fundamentals of defensive operations include:

- a. Using terrain properly. The military aspects of terrain must be understood and used more wisely in the desert than anywhere else. There are two ways the desert can modify how you use terrain.

- (1) In the desert, we don't always select commanding terrain as the best tactical position. Low ground may be used to the commander's tactical advantage. Regardless of the position selected, it is best not to occupy that position until after dark because of the observation capability of the enemy.
- (2) In the desert, emphasize bringing the enemy under long-range fires. Open terrain combined with good observation permits maximum use of direct and indirect fire weapons. Although desert terrain will offer good fields of fire for direct fire weapons, washes or dry river beds will limit grazing fire. Therefore, artillery and mortars should have preplanned fires to support the direct fire weapons.

b. Providing for security. The almost complete freedom of movement in the desert demands all-around security measures along with aggressive, continuous reconnaissance. Our forces will need to use security patrols, radar, sensors, and surveillance devices (aerial and ground) to furnish additional means of security at night and during periods of reduced visibility. Below are some more specific security measures:

- (1) Stress the use of passive as well as active air defense measures.
- (2) Ensure vehicles travel in pairs when conducting patrols.
- (3) Support daylight patrols with anti-aircraft and anti-tank weapons.
- (4) Use motorized infantry or reconnaissance units for night patrols.
- (5) Ensure night patrols approach the objective in vehicles, dismount at a designated point, and proceed to the objective on foot.

c. Providing mutual support. In a large scale defensive plan, gaps between defending forces may form due to the vast area that we must cover. Control these gaps through mutual support. We accomplish this mutual support through the following:

- (1) Surveillance
- (2) Natural or artificial obstacles
- (3) Prearranged fires
- (4) Patrols
- (5) Reaction forces to occupy gaps the enemy intends to exploit.

d. Organizing defenses in depth. There are several ways to organize in depth and make maximum use of offensive action.

- (1) Position forces well forward of key terrain and establish blocking positions and strongpoints on the main avenues of enemy approach.
- (2) Use highly mobile, mechanized infantry forces with a large proportion of anti-tank weapons to conduct a mobile defense, with the armored forces held in the rear for use in offensive actions. Aggressive offensive action should accomplish the following:
 - (a) Keeping the enemy off balance
 - (b) Causing the enemy to commit a unit for security
 - (c) Spoiling attacks
 - (d) Shocking the enemy with pure tank or tank-heavy forces

e. Achieving responsiveness. A defender must always retain the ability to influence the conduct of the defense. Ideally, the defender must not only be able to stop the enemy attack but, at the same time, be able to take advantage of any error made by the enemy. In the desert, a mobile defense will allow the defender to respond quickly to changes in the flow of battle.

f. Maintaining dispersion. In the desert, unit leaders must ensure their units are dispersed to present the least lucrative target to the enemy.

g. Using available time. The speed at which enemy offensive forces can move will determine the time available to make detailed plans and establish elaborate positions in the desert. Therefore, when preparing the defense, first devote any available time to determining the employment of forces, preparing obstacles, and coordinating fires.

h. Integrating and coordinating defensive measures. These include preparing fires (especially long range fires), barriers, and armor and air defenses.

- (1) Fires are prepared to support and complement the plans for security, defense in depth, and offensive actions. Long-range fires will provide for mutual support for the defense and add flexibility to the conduct of the defense.
- (2) Barrier operations are a series of coordinated natural or man-made obstacles designed to channelize, restrict, delay, or impose heavy losses on the enemy and his equipment. All efforts must be made to coordinate barrier plans at all unit levels along with the entire defensive plan.

(3) Defense against armor is the mission of combined arms forces and includes tanks, antitank weapons, field artillery, and aerial-mounted antitank weapons. Employ the weapons in depth and along likely avenues of approach. Specific defenses include mines and antitank ditches.

(a) Mines covered by observation and fire serve as obstacles for both tanks and wheeled vehicles.

(b) Antitank ditches tied in with natural obstacles and covered by observation and fire serve as a highly effective defense against armor.

(4) Stress air defense measures, both active and passive, to avoid aerial observation and attack against defensive positions.

(a) Active air defense measures include the following:

1. Establishing warning systems
2. Assigning areas of responsibility to organic air defense weapons
3. Coordinating air defense employment
4. Developing SOP's concerning rules of engagement for enemy aircraft

(b) Passive air defense measures include:

1. Enforcing camouflage discipline
2. Maintaining dispersion
3. Controlling anti-air fires if position disclosure would be detrimental to mission accomplishment
4. Enforcing communication and electronic security
5. Using deceptive measures

CHALLENGE	
List the eight fundamentals of defensive desert operations.	
a. _____	b. _____
c. _____	d. _____
e. _____	f. _____
g. _____	h. _____

When you're ready, check your answers against those below.

If you answered that the eight fundamentals of desert defensive operations are a. to use terrain properly, b. provide security, c. provide mutual support, d. maintain dispersion, e. organize defenses in depth, f. achieve responsiveness, g. use time available, and h. integrate and coordinate defensive measures, you are absolutely correct. Let's move on and discuss the conduct of these operations.

5403. Conducting Three Types of Desert Defenses

As we just learned, defensive operations in the desert follow the same basic principles of warfare as defensive operations anywhere else but require special consideration of the unique characteristics of the desert that make maneuvering so important. Before any commander makes his defensive plan, he must consider the enemy's intent. To better understand the enemy's intent, the commander will rely on his reconnaissance and security units and force surveillance systems. These units and systems must focus on the following:

- What is the enemy's short-term objective?
- What are the enemy's avenues of approach, and what forces is he dedicating to each of them?
- Are the enemy's apparent movements real or feints?
- What are the enemy's long-term objectives?

Until these questions are answered and confirmed, the commander can do nothing more than react to the enemy's initiatives. Reacting is dangerous in any circumstance and more so in the desert as the side with the greatest potential for maneuver is more likely to emerge victorious. Once these questions are answered, we will be able to maneuver to defeat the enemy. The commander has many types of doctrinal defensive plans at his disposal, but here are three of the more common types of defenses that he may use in the desert.

a. Mobile defense. If at all possible, a desert force engages the enemy and defeats him before he reaches friendly positions. A mobile defense in the desert can accomplish this by channelizing the enemy into planned kill zones. Once in the kill zone, the enemy will be defeated by overwhelming fire power and aggressive offensive action.

b. Strongpoint defense. A strongpoint defense protects key or decisive terrain which is essential to the enemy's scheme of maneuver. Strongpoint effectiveness depends on our range of fires, the level of our fortifications, and the decision of the opponent to attack.

It is better to initiate the strongpoint defense well forward of the key terrain we are protecting. Then, we can conduct the defense in depth and destroy the enemy or force him to break off the attack before he reaches the critical terrain.

Strongpoints need to be well prepared. They are dug deeply and are usually surrounded by minefields. Although any strongpoints may be neutralized by air or artillery fire or may be bypassed totally, eventually they will have to be assaulted. If the strongpoint is carefully sited and is well defended, it can be quite effective. Figure 5-2 illustrates defenses around a strongpoint.

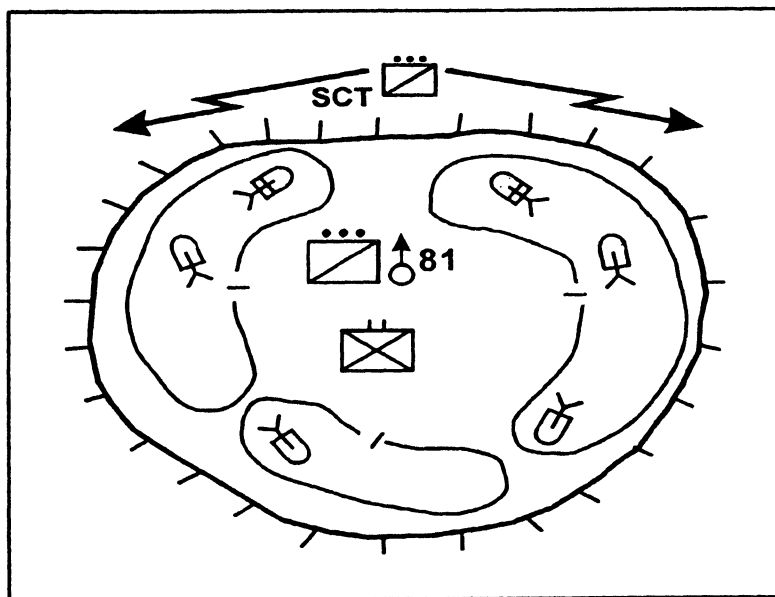


Fig 5-2. Strongpoint defense.

Combat service support units use variations of the strongpoint defense in perimeter-type or base cluster defenses in rear area operations.

c. Reverse slope defense. In parts of the desert where the terrain is made up of large, sweeping dunes or hilly terrain, a reverse slope defense can prove to be highly effective. The reverse slope defense is designed to cause the enemy maximum casualties forward of the defensive position, to have maximum surprise fires as the enemy crosses the skyline, and to deny the enemy the topographical crest of the hill on which the reverse slope defense is positioned (fig 5-3).

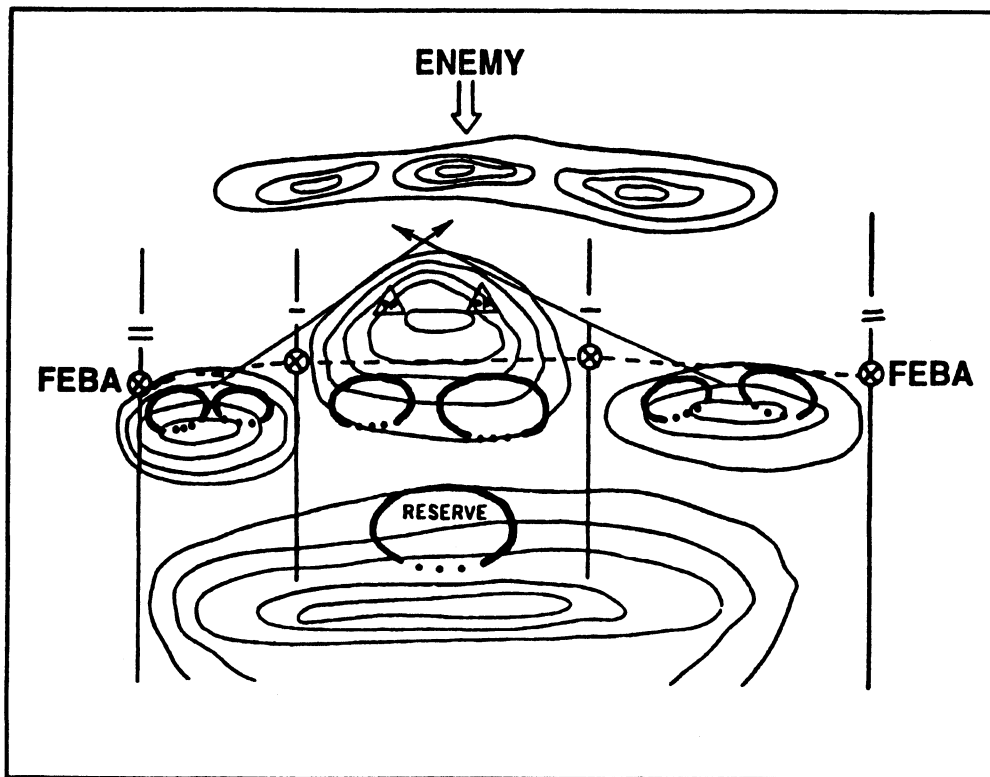


Fig 5-3. Company in reverse slope defensive position.

- (1) The reverse slope defense must have good fields of fire up to the topographical crest, and the forward edge of the battle area (FEBA) must be within effective range of small arms. At the same time, the FEBA must be far enough away from the topographical crest so that the defenders will have time to place well-aimed fire on the enemy before they reach the defensive positions.
- (2) If the situation permits, flanking fires on the forward slope will make a reverse slope defense particularly effective. To provide this, observation posts (OP's) and local security must be placed on or forward of the topographical crest. These OP's and security provide observation across the entire front of the defensive position and may be reinforced with machine guns, antitank weapons, and tanks.
- (3) Reserve forces, which should include armor, should be located on the military crest of the next high ground to the rear or flank of the defensive positions. For the reserve to be effective, the FEBA must be within effective range of their weapons.

- (4) In a reverse slope defense, every attempt is made to defeat the enemy in front of the FEBA and especially to keep him from gaining control of the topographical crest. Normally the final protective fires (FPF) begin when the enemy crosses the crest. If the enemy gains control of the crest, a counterattack (by the reserve) is launched to regain control of the crest.

CHALLENGE	
What are the three most common types of defenses used in the desert?	
a. _____	b. _____
c. _____	

If you answered that the three most common types of defenses used in the desert are the mobile, strongpoint, and reverse slope defenses, you are correct once again! Let's move on and examine the environmental considerations of defensive desert operations.

5404. Three Environmental Considerations Affecting Defensive Operations

The time of day and how daylight and night light affect observation, the problems associated with sandstorms, and the details about the particular terrain are three factors that need to be taken into consideration when planning a desert defense.

a. Characteristics of day and night observation. If you recall from our discussion of offensive operations, the enemy will try some of these same tactics against us. He will probably attack when the sun is low and behind him so as to surprise us, the defenders. Our observers must be positioned as high as possible to see the advancing enemy as soon as possible.

Active light sources can be detected from great distances, especially during nights with low ambient light. Positive control of active light sources (light discipline) must be maintained until the battle is joined. Even then, the force equipped with passive (heat detecting) devices will have an advantage.

If the enemy is using thermal imagery devices, heat from combat vehicles can give the enemy a complete picture of the defensive scheme. For this reason, as a rule, combat vehicles avoid prematurely occupying battle positions at night.

b. Sandstorms. Sandstorms may be used by the enemy to hide an offensive operation, especially if the storm is blowing from the enemy's direction. If this is the case, units immediately occupy battle positions before the storm arrives.

The units remain in position until the storm ends at which time they are ready to fire and maneuver against the enemy. If vehicle patrols are possible, scout platoons or similar units, preferably moving in pairs, cover all gaps.

c. Terrain. From the point of view of the larger defending forces (brigade or battalion), avenues of approach will seem unlimited. Long-range observation must be maximized and scouts employed well forward to offset this problem. Use electronic surveillance means extensively to provide early warning. It is essential to identify the enemy's main effort early to move and concentrate.

Lack of concealment, especially from aerial observation, prohibits units from occupying firing positions until just before engaging the enemy. Combat vehicles displace immediately after engagement or risk destruction. When possible (because of frequent displacement) reconnoiter and mark routes between battle positions without revealing the scheme of the defense. Use smoke to conceal movement.

Note: The fundamentals of conducting defensive operations are further described in FM 100-5 and FMFM 6-1.

Lesson Summary. In this lesson, you learned the operational reasons for assuming the defensive strategy in the desert, the fundamentals of defensive desert operations, the types of defenses normally used, and, finally, the main environmental considerations which can always affect the conduct of defensive operations in the desert.

Unit Exercise: Complete items 1 through 18 by performing the action required. Check your responses against those listed at the end of this study unit.

1. List the seven fundamentals of desert warfare.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____

2. Which statement most applies to desert combat? It is _____.
- a. mobile
 - b. positional
 - c. defensive
 - d. static
3. A military force should be task-organized for combat based on its
- a. primary armament.
 - b. mode of transportation.
 - c. combat mission or task.
 - d. host nation support.
4. The three most common MAGTF organizations found in the FMF are the MEF, MEB, and
- a. MAB.
 - b. MEU.
 - c. MAO.
 - d. MAS.
5. Five considerations used when task-organizing units for combat are to analyze the mission, enemy situation, status of supporting units, control capabilities, and
- a. naval support liaison requirements.
 - b. weather and topographic data.
 - c. NATO force responsibilities.
 - d. area of operation characteristics.
6. The Marine division consists of combat, combat support, and
- a. aviation combat elements.
 - b. combat service support elements.
 - c. interdiction and harassment elements.
 - d. coordinating support elements.
7. The three types of infantry-armor combined forces are classified as balanced, infantry-heavy, and
- a. infantry-pure.
 - b. mobility-heavy.
 - c. mobility-light.
 - d. tank-heavy.
8. Infantry-heavy units are appropriate for which areas of the desert?
- a. Hills and mountains
 - b. Salt marshes
 - c. Dune areas
 - d. Built-up areas

9. The six main reasons for undertaking offensive operations to defeat the enemy are to deprive the enemy of resources, hold the enemy in position, disrupt the enemy attack, secure key or decisive terrain, deceive and divert the enemy, and to
 - a. confuse the enemy as to your true mission.
 - b. alter the flow of battle.
 - c. develop intelligence.
 - d. probe for enemy strengths.

10. The two general means by which an offensive force in the desert can defeat its enemy are by
 - (1) concentrating friendly forces at weak points in the enemy's defense and destroying the enemy's combat units.
 - (2) attacking the enemy's armored forces through the use of an advance to contact across a broad front.
 - (3) destroying the enemy's reconnaissance forces with aggressive fires and bold maneuver.
 - (4) driving deep into the enemy's rear to destroy his combat service support and cut his lines of communication.
 - a. 1 and 3
 - b. 1 and 4
 - c. 2 and 4
 - d. 3 and 4

11. The two-fold purpose of conducting aggressive reconnaissance in support of offensive operations is to locate and identify enemy obstacles, units, weak points, and flanks, and to
 - a. provide early warning of threats to friendly flanks and CSS elements.
 - b. initiate the offensive on command.
 - c. probe the enemy defensive positions.
 - d. act as a maneuver element in support of the offensive.

12. The two best ways to reduce the sun's effects on observation during daylight are to maintain interlocking fields of vision (meaning to continually scan and provide threat warnings to adjacent positions) and to
 - a. disperse at greater intervals to cover more terrain.
 - b. maintain observers as high above the desert floor as possible.
 - c. fix on predetermined observation points.
 - d. use glare reduction devices.

13. When rocky terrain restricts mobility or when the ground is so flat that the enemy has total observation are two terrain effects on maneuver that you will have to overcome. Doing so requires considerable suppression to degrade enemy observation and fires and
- an increase in tracked vehicle assets to support the infantry.
 - a possible change to the overall scheme maneuver.
 - an increase in helicopter support for the larger insertion need.
 - an increase in speed of maneuver and deception.
14. The five operational reasons for assuming the defensive are to concentrate forces; control key terrain; attrit enemy forces; retain strategic, operational, or tactical objectives; and to
- gain time.
 - delay the enemy.
 - resupply.
 - re-form and re-attack.
15. Listed below are seven of the eight fundamentals of desert defensive operations. Which one is missing?
- Provide for security
 - Organize defenses in depth
 - Use available time
 - Integrate and coordinate defensive measures
 - Provide mutual support
 - Maintain dispersion
 - Use terrain properly
- Mass forces
 - Achieve responsiveness
 - Generate intelligence
 - Employ resources
16. The three types of defenses normally used in desert defensive operations are mobile, reverse slope, and
- highpoint.
 - strongpoint.
 - lowpoint.
 - areapoint.
17. Which type of defense should be used in large sweeping dunes or hilly terrain?
- Reverse slope
 - Hasty
 - Barrier
 - Coordinated

18. Which of the following are environmental considerations of defensive operations in the desert?
- (1) Because the terrain is so open in the desert, it may appear to us that the enemy has only one avenue of approach when we are in the defense.
 - (2) Because of the lack of humidity in the desert, we should use mirages to conceal our fighting positions.
 - (3) Because the sun is so bright in the desert, the enemy will try to attack us when the sun is low and at his back.
 - (4) A force equipped with passive (heat detecting) observation devices will have an advantage over a force not equipped with these devices.
 - (5) The enemy may use sandstorms to hide an offensive operation.
 - (6) Because of the lack of concealment in the desert, our fighting vehicles (especially our armor assets) should occupy fighting positions long before the enemy approaches.
- a. 1, 2, and 3 c. 3, 4, and 5
b. 2, 3, and 4 d. 4, 5, and 6

UNIT SUMMARY

This study unit provided you with a basic understanding of operations and operations support in a desert environment.

Study Unit 5 Exercise Solutions

Reference

1.	a.	Mobility is critical in the desert.	5101
	b.	The air element dominates the battlefield.	
	c.	Lines of communication are extremely vulnerable.	
	d.	Forces are usually deployed over a broad front.	
	e.	Night operations are necessary.	
	f.	Logistical support will require imaginative concepts.	
	g.	The threat of air, artillery, and NBC attack makes dispersion essential.	
2.	a.		5101a
3.	c.		5201
4.	b.		5201a
5.	d.		5201b
6.	b.		5202a
7.	d.		5202b
8.	d.		5202b
9.	c.		5301
10.	b.		5302
11.	a.		5304a
12.	b.		5305
13.	d.		5306
14.	a.		5401
15.	b.		5402
16.	b.		5403
17.	a.		5403c
18.	c.		5404

DESERT OPERATIONS
REVIEW LESSON EXAMINATION

INSTRUCTIONS: The purpose of the review lesson examination is to prepare you for your final examination. We recommend that you try to complete your review lesson examination without referring to the text, but for those items (questions) you are unsure of, restudy the text. When you finish your review lesson and are satisfied with your responses, check your responses against the answers provided at the end of this review lesson examination.

Select the ONE answer that BEST completes the statement or that answers the item. For multiple choice items, circle your response. For matching items, place the letter of your response in the space provided.

1. The nine major desert regions of the world include the Great Basin of North America, Atacama, Kalahari, Iranian, and the Patagonia. Which choice below contains the remaining four desert regions?
 - a. Great Barren Dunes, Salton, Mojave, and Arabian
 - b. Gobi, Great Australian, Sahara, and Arabian
 - c. Upper Sonoran, Pismo, Outback, and Sahara
 - d. Lower Sonoran, Outer Mongolian, Big Sur, and Gobi

2. Politically and militarily, the most important deserts of the world are the
 - a. Gobi, Sahara, Great Basin of the United States, and Atacama.
 - b. Sahara, Great Sandy, Arabian, and Iranian.
 - c. Sahara, Arabian, and Iranian.
 - d. Kalahari, Great Victoria, Patagonia, and Atacama.

3. The reason that some deserts are considered more important politically and militarily than others is that some
 - a. have a larger land mass than others,
 - b. have greater population centers.
 - c. are near routes of international commerce and have precious natural resources.
 - d. Have greater agricultural development.

4. Natural characteristics of the desert include rain and water resources, soil, weather and climate, insects and animals, vegetation, and
 - a. forests.
 - b. farming.
 - c. geographic relief.
 - d. inland seas.

5. Man-made characteristics of the desert include roadways, structures, industry, and
- a. oil tankers.
 - b. populations.
 - c. cars and trucks.
 - d. agriculture.
6. If your body cannot balance heat gain with heat loss, you will
- a. acclimatize more quickly than you normally would.
 - b. never be susceptible to heat injury.
 - c. need to eat and drink more frequently.
 - d. suffer brain damage and/or die.
7. The process of adjusting the cooling system of the body to the heat of the desert is known as
- a. physical conditioning.
 - b. acclimatization.
 - c. body heat balance.
 - d. the effects of temperature.
8. At equal temperatures, the body requires _____ times as much water to maintain water balance in the desert than it does in a high humidity environment.
- a. 2 to 3
 - b. $2\frac{1}{2}$ to $3\frac{1}{2}$
 - c. 3 to 4
 - d. 4 to 5
9. The purpose of salt in the human body is to
- a. aid digestion.
 - b. increase sweat.
 - c. retain liquids.
 - d. enhance food flavor.
10. Which one of the following is an individual protective measure to prevent heat related injuries?
- a. Drinking water only when you're thirsty
 - b. Resting in the exposed sun sitting up, not lying down
 - c. Engaging in vigorous physical activity immediately on arrival in the desert
 - d. Removing clothing to prevent overheating
11. The three major types of heat injuries are heat exhaustion, heat stroke, and
- a. heat cramps.
 - b. heat flashes.
 - c. fainting spells.
 - d. swollen joints.

Matching: For items 12 through 14, match each type of heat injury in column 1 with its symptoms in column 2.

Column 1	Column 2
<u>Heat Injury</u>	<u>Symptoms</u>
12. Heat cramps	a. Weakness or faintness; dizziness; cool, pale, moist skin; headaches; and appetite loss
13. Heat exhaustion	b. Flushed, hot and dry skin; dizziness, confusion, headaches, seizures, and nausea; rapid respiration and weak pulse
14. Heat stroke	c. Muscle cramps in arms, legs, and/or stomach

Matching: For items 15 through 17, match each heat injury in column 1 with its correct treatment in column 2.

Column 1	Column 2
<u>Heat Injury</u>	<u>Treatment</u>
15. Heat cramps	a. Move casualty to a shaded area, remove clothing, pour water on the casualty and fan, massage skin, elevate legs, have casualty drink water slowly, seek medical aid, and transport to a medical facility as soon as possible.
16. Heat exhaustion	b. Move casualty to a shaded area, loosen or remove clothing, elevate legs, have casualty drink one full canteen slowly, ensure the casualty remains inactive for the rest of the day, and monitor.
17. Heat stroke	c. Move casualty to a shaded area, loosen clothing, have casualty drink one full canteen slowly, and seek medical aid if symptoms persist.

18. The purpose of practicing good health and hygiene habits in the desert is to
- reduce the need for bathing and related water use.
 - reduce the need for resupply of health and comfort items.
 - prevent the spread of disease and maintain combat efficiency.
 - increase the need for personnel inspections.
19. Which of the following insects are specific to desert regions?
- Poisonous cicadae
 - Various scorpions
 - Common brown roaches
 - Banana spiders
20. The field treatment for insect bites and stings is to calm the victim, clean the wound, remove the stinger, remove jewelry at or near the bite, and
- apply a tourniquet.
 - apply pressure.
 - scrub the wound.
 - observe and treat reactions.
21. Some snakes commonly found in desert regions are the saw-scaled viper, Egyptian cobra, desert horned viper, puff adder, blunt-nosed viper, and the
- garter snake.
 - carpet viper.
 - water moccasin.
 - green coral.
22. Listed below are six of the seven steps for the field treatment of snake bites. Which one is missing?
- Apply a tourniquet
 - Remove jewelry
 - Clean the wound
 - Apply ice
 - Seek medical help
 - Calm the victim
- Suck out the venom
 - Induce vomiting
 - Immobilize
 - Bleed the wound
23. The initial objective of desert training must include instruction in acclimatization procedures, other related medical information, and
- desert familiarization.
 - capabilities of equipment in the desert.
 - tactics employed in desert warfare.
 - the reason for specialized desert training.

24. Land navigation is difficult in the desert due to
- the rugged terrain.
 - the vastness of the desert itself.
 - the lack of well-defined landmarks.
 - erratic compass readings caused by the extreme heat.
25. The simplest and most reliable method of land navigation in the desert is
- dead reckoning.
 - doglegging.
 - contouring.
 - resection.
26. Four factors that can adversely affect compass readings in the desert are the following: condensation fogging the lens, scratches on the compass lens if left unprotected, the metal mass of vehicles, and
- electrical interference from high tension wires.
 - iron ore deposits found in the desert.
 - heat expansion of the compass' metal components.
 - reading difficulty caused by glare.
27. The basic principle of camouflage in the desert is to
- achieve total concealment.
 - duplicate only the color of surroundings.
 - use only natural foliage.
 - blend into the existing ground pattern.
28. The availability of natural camouflage materials and concealment opportunities are key considerations when determining
- approach lanes.
 - range.
 - lateral limits.
 - position selections.
29. The two main factors that govern dispersion are
- vision and area to be covered.
 - ground cover and terrain.
 - security and mutual support.
 - noise and light discipline.
30. The environmental factors that effect visibility, observation, and range estimation during desert operations are the sun, dust, mirages, moonlight, and
- rain.
 - twilight.
 - cloud cover.
 - windblown sand.

31. The proper amount of lubrication applied to a personal weapon in a desert environment is
- a. a liberal coating of all metal surfaces.
 - b. a very thin coat to internal moving parts only.
 - c. a heavy coat to internal moving parts only.
 - d. up to your discretion.
32. The correct forward slope placement of field fortifications in the desert is
- a. at an oblique angle to the ground.
 - b. slightly below ground level.
 - c. at ground level.
 - d. well above ground level.
33. The three most important elements contributing to vehicular mobility in the desert are clean lubricants, clean fuel, and clean
- a. air.
 - b. preventives.
 - c. additives.
 - d. detergents.
34. Three additional vehicle systems affected by the desert's harsh environment are the cooling, electrical, and _____ systems.
- a. power steering
 - b. suspension
 - c. brake
 - d. pneumatic
35. For landing forces to efficiently conduct desert operations, what is the desired mobility percentage?
- a. 50%
 - b. 75%
 - c. 90%
 - d. 100%
36. The purpose of route reconnaissance, as it pertains to motor transport operations, is to gather information concerning possible enemy activity, route conditions, critical terrain features, and _____ along a specific route.
- a. weather conditions
 - b. navigation aids
 - c. obstacles
 - d. possible bivouac sites
37. What are the three types of basic convoy column formations used in desert operations?
- a. Skirmishers, echelon, and wedge
 - b. Staggered, diamond, and inverted
 - c. Open, close, and infiltration
 - d. Herringbone, "V," and coil

38. Four additional considerations that you should be aware of during desert convoy operations are the importance of conducting night operations, communications, messing and quarters needs, and
- a. load requirements.
 - b. disabled vehicle recovery.
 - c. hand and arm signals.
 - d. convoy march order.
39. Your vision is obscured by dust while driving in convoy formation. You should
- a. increase vehicle interval to allow for clear vision.
 - b. speed up so you can see the vehicle in front of you.
 - c. apply your brakes and come to a full stop.
 - d. drive your vehicle on the shoulder of the road.
40. While driving, you encounter a slow moving vehicle that you must pass. Conditions are dusty and vision is limited. What precaution should you take before attempting to pass?
- a. Sound your horn repeatedly and force the slower vehicle to move over.
 - b. Stay behind but as close as possible to the slower vehicle.
 - c. Drive your vehicle over the shoulder and pass on the right.
 - d. If the tactical situation permits, turn on your headlights to increase your visibility and pass with extreme caution.
41. Three types of desert terrain that should be avoided as possible navigation hazards are salt marshes, deep soft sand, and
- a. sand dunes.
 - b. gullies.
 - c. corrugated roads.
 - d. reverse slopes.
42. Four tips to minimize the effects when driving over desert terrain are taking special precautions when driving over boulders and large rocks, travelling with or across the direction of the prevailing wind, ensuring tools and cargo are secured to prevent shifting during movement, and
- a. crossing sand dunes diagonally when possible.
 - b. pumping the brake pedal when descending steep hills.
 - c. using first gear only if the vehicle becomes mired in soft sand or marshy terrain.
 - d. decreasing tire pressure for maximum support on soft sand.

43. Of the following, which is a general rule or lesson learned from desert warfare?
- a. Tanks always dominate the desert battlefield.
 - b. Forces are usually deployed over a concentrated front.
 - c. Tactical deception plans are the responsibility of the low level commander.
 - d. The threat of air, artillery, and NBC attack makes dispersion essential.
44. A military force should be task-organized to support its
- a. primary armament.
 - b. mode of transportation.
 - c. combat mission or task.
 - d. host nation support.
45. The three most common MAGTF organizations found in the FMF are the MEF, MEB, and
- a. MAB.
 - b. MEU.
 - c. MAO.
 - d. MAS.
46. Five considerations to analyze when task-organizing units for combat are the mission, enemy situation, status of supporting units, control capabilities, and
- a. naval support liaison requirements.
 - b. weather and topographic data.
 - c. NATO force responsibilities.
 - d. characteristics of the area of operation.
47. Infantry-armor combined forces are classified as balanced, infantry-heavy, and
- a. infantry-pure.
 - b. mobility-heavy.
 - c. mobility-light.
 - d. tank-heavy.
48. The six operational reasons for going on the offensive to defeat the enemy are to deprive the enemy of resources, hold the enemy in position, disrupt the enemy attack, secure key or decisive terrain, deceive and divert the enemy, and
- a. confuse the enemy as to your true mission.
 - b. alter the flow of battle.
 - c. develop intelligence.
 - d. probe for enemy strengths.

56. The three types of defenses normally used in desert defensive operations are mobile, strongpoint, and
- a. highpoint.
 - b. lowpoint.
 - c. reverse slope.
 - d. areapoint.

LAST PAGE OF REVIEW LESSON

Review Lesson Solutions

Answers

1. B
2. C
3. C
4. C
5. D
6. D
7. B
8. A
9. C
10. B
11. A
12. C
13. A
14. B
15. C
16. B
17. A
18. C
19. B
20. D
21. B
22. C
23. A
24. C
25. A
26. B
27. D
28. D
29. C
30. D
31. B
32. C
33. A
34. B
35. D
36. C
37. C
38. B
39. A
40. D
41. A
42. D

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Review Lesson Solutions (continued)

Answer

Reference

- 43. D
- 44. C
- 45. B
- 46. D
- 47. D
- 48. C
- 49. B
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- 52. D
- 53. B
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- 55. B
- 56. C

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