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Soldier Performance in Continuous Operations

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INTRODUCTION

CONOPS (continuous operations) is combat continuing at the same-high intensity level for extended periods. Soldiers may have opportunities for sleep, but this sleep may be brief or fragmented.

CONOPS is distinguished from SUSOPS (sustained operations). In SUSOPS, the same soldiers and small units engage in continuous operations with no opportunity for the unit to stand down and very little opportunity for soldiers to get more than a few minutes of sleep. Within any CONOPS, there are likely to be periods of SUSOPS.

Continuous land combat is an advanced warfare concept. It is made possible by the almost complete mechanization of land combat forces and by the technology that permits effective movement at night, in poor weather, and in other low-visibility conditions. Continuous combat operations may be fast-paced, around-the-clock, and intense. The reasons that armies have traditionally paused in battle - darkness, resupply, regrouping - have been overcome largely by technological advances. Now that armies have the potential to fight without let up, night operations will become commonplace.

This continuous cycle of day/night operations may cause degradation of perform-

ance in cognitive skills beginning as early as 18 to 24 hours into CONOPS. The ability to think clearly deteriorates even more rapidly than strength and endurance. Mood, morale, initiative, and motivation decline along with mental performance. The soldier increasingly feels the effects of fatigue and stress, especially between 0200 and 0600 hours.

Our force is changing from one that is forward-deployed to one that is CONUS-based and deployment-postured. Therefore, deployments to advanced bases on short notice are becoming routine for all units. Combat support and combat service support units, as well as combat units, are likely to go to the same areas of the world. Deployment starts the process of stress and fatigue which leads to soldier, team, and unit performance degradation.

PREFACE

This manual is designed to help unit leaders identify, counter, and minimize the degrading effects of fatigue and stress on unit operations.

It describes what must be done to prepare for deployment, night operations, and continuous operations (CONOPS). It addresses soldier readiness and unit preparedness during training, deployment, combat, and post-combat operations. It presents methods to sustain soldier, team, and unit effectiveness during CONOPS.

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Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

This publication contains copyrighted material.

ACKNOWLEDGMENT

The Effects of Continuous Operations Upon Military Performance of the Infantryman (Exercise “Early Call II”), Haslam, Diana Dr, UK Army Personnel Research Establishment, 1978.

Chapter 1

The Challenges of Continuous Operations (CONOPS)

SLEEP LOSS

People accumulate a "sleep debt" (cumulative loss of sleep over time) when they perform under limited sleep conditions. The only corrective measure for satisfying this sleep debt is sleep itself.

During continuous operations, soldiers may have opportunities for only limited or fragmented sleep. As a result of these periods of sleep loss, several combat tasks are likely to show degraded performance. These tasks include—

o Orientation to friendly and enemy forces (know the squad's location, maintain concealed disengagement).

o Coordination and information processing (coordinate firing with other vehicles and dismounted elements, report vehicle readiness, communicate with the company).

o Combat activity (fire from bounding vehicle, check the condition of weapons, observe the terrain for enemy presence).

o Force preservation and regrouping (cover disengaging squads, mark the routes between locations, conduct reconnaissance).

o Command and control activity (direct location repositioning, direct mounted defense, assign fire zones and targets).

NIGHT OPERATIONS

In offensive operations, darkness is the time to retain or gain the initiative. In defensive operations, obstacles can be emplaced with greater security. Forces can disengage undetected, and threats to close air support lessen.

At night, the physical environment changes. As the air cools below ground temperature, inversions reduce visibility and hamper radar and radio signals. Wind conditions are optimal for using chemical weapons.

Visual changes also occur. Without the aid of white light, there is no color perception. There is also a decrease in visual clarity, field of view, and depth perception. Targets take longer to engage.

Preparation time increases two- to sixfold. Simple actions such as the departure and return of patrols become more complex and dangerous. Nighttime planning and coordination require greater attention. Navigation,

adjusting fire, and munition/ target matching are more difficult. Precision is essential, but accuracy has a price. Soldiers tend to maintain accuracy at the sacrifice of speed.

CRITICAL ELEMENTS

The adverse conditions associated with or generated by continuous ground combat will degrade the fighting performance of soldiers, teams, and units. A soldier is not a machine and is, therefore, the weak link in the chain. The equipment can operate longer than the soldier can operate it; the soldier must have sleep.

Commanders and leaders must ensure that all soldiers obtain enough rest to counteract the effects of rapidly shifting from day to nighttime duty hours or to extended work schedules. This can be done by implementing countermeasures designed to help soldiers adapt to CONOPS or SUSOPS conditions.

Neither leaders nor soldiers can perform without rest or sleep. The soldier, the unit, the leader, and the battlefield are all affected by continuous operations.

THE SOLDIER

Night affects soldiers. In general, their cognitive and physiological resources are not at

their peak at night, especially after a rapid shift from daytime to nighttime duty hours. Fatigue, fear, feelings of isolation, and loss of confidence increase. One way soldiers try to counter this is by using the radio more often.

The soldier's ability to function is the key to winning battles since, without the soldier, weapons and tactics are useless. Continuous, unrelieved combat degrades performance, eroding mental abilities more rapidly than physical strength and endurance.

Information gained from the Army Unit Resiliency Analysis (AURA) Model shows that even healthy young soldiers who eat and drink properly experience a 25 percent loss in mental performance for each successive 24-hour period without sleep. This includes decision-making, reasoning, memory tasks, and computational tasks. The loss may be greater for soldiers who are older or less physically fit or who do not eat and drink properly.

THE UNIT

CONOPS effects are sometimes hidden and difficult to detect. Units are obviously impaired when soldiers are killed or wounded in action or become noncombatant losses. They are further impaired when soldiers are too tired to perform their tasks. Unlike individual performance, unit performance does not deteriorate gradually. Units fail catastrophically with little warning.

New technologies have significantly increased the range, reduced the time, and changed the conditions over which battles are fought. For example, day/night-capable vehicles can operate for extended periods without resupply, but they are limited by a crew's need to sleep.

THE LEADER

A priority for fighting units is to assure that commanders and leaders are rested and able to think clearly. While this is obvious, it is a most difficult lesson for leaders to learn.

During combat, commanders must focus on the human factor. They must assess and strengthen their units as they plan and fight battles. They must accurately gauge which units must lead, which must be replaced, where the effort must be reinforced, and where tenacity or audacity and resulting success can be exploited.

When leaders begin to fail, control and direction become ineffective, and the organization falls apart. No fighting unit can endure when its primary objectives are no longer being coordinated.

Leaders must also prepare and precondition soldiers to survive. It is particularly important that leaders conscientiously plan and

implement effective sleep plans, because activities most dependent on reasoning, thinking, problem-solving, and decision-making suffer most when sleep and rest are neglected.

THE BATTLEFIELD

In future operations, the battlefield will become increasingly lethal. The threat of nuclear, biological, and chemical (NBC) weapons will maximize confusion, uncertainty, and stress and will impede our ability to move, shoot, communicate, and sustain.

The CANE (Combined Arms in a Nuclear/Chemical Environment) Evaluation Report Phase I purports that in NBC operations, several aspects of the mission are affected:

o Battle is less intense (firing rates decline 20 percent in defense and 40 percent in attack).

o Platoons take almost twice as long to complete an attack.

o Twice as many soldiers are required for a successful attack.

o Numbers of casualties suffered per enemy defender killed increase 75 percent.

o Casualties from friendly fire increase.

o Armored personnel carrier losses double.

o Accurately locating targets is more difficult.

o Radio calls for fire take longer.

o Communications are degraded 50 percent.

o Transmission time during battle increases by 100 percent.

o Leaders have insufficient time to accomplish all their duties because of added duties such as supervision of NBC activities.

o Leaders' ability to direct fire and maneuver severely decreases.

o Concealment actions decrease 39 percent as stress and fatigue overcome tactical procedures.

o Sleep loss compounds an already stressful environment.

The following chapters will further discuss the operational and individual consequences of sleep loss and inadequate rest and of the implementation of adequate work/rest regimens. Specific countermeasures will show how to adapt to the arduous regimens associated with combat and training conditions.

Chapter 2

The Effects of CONOPS on Soldier Performance

OVERVIEW

Continuous combat exhausts soldiers and reduces their ability to perform tasks as quickly or effectively as necessary. Even during the first night of combat, normal sleeping habits and routines are upset. The soldier feels the effects of fatigue and the pressure of stress from noise, disrupted sleep time, and threat to life. Sheer determination, while essential for endurance, cannot offset the mounting effects of adverse conditions. Cognitive degradation involving poor decision-making begins during and after the first 24 hours of sleep deprivation.

Individual and unit military effectiveness depend on the soldiers' ability to think clearly, accurately, and quickly and upon initiative and motivation and physical strength and endurance. The longer a soldier goes without sleep, the more his thinking slows and becomes confused. Lapses in attention occur, and speed is sacrificed to maintain accuracy. Continuous work declines more rapidly than intermittent work.

Tasks like requesting fire, integrating range cards, establishing positions, and coordinating squad tactics become more difficult than

well-practiced routine physical tasks like loading magazines and marching. Without sleep, soldiers can perform the simpler and /or clearer tasks longer than the more complicated or ambiguous tasks. (See Figure 2-1.) They can do simple lifting, digging, and marching longer without sleep than a fine hand-eye coordination sequence as in tracking a target through a scope. (See Figure 2-2, page 2-4.)

Sleep loss affects remembering, choosing, assessing action effectiveness, reasoning, and new problem-solving. While comprehension is accurate, reading speed slows down and memory fails. For example, soldiers may understand but forget orders in documents. Soldiers omit tasks more often than they make errors.

After a period of sustained duty hours in which soldiers are deprived of sleep, the tendency to fall asleep is most pronounced between 0400 and 0700 hours. Consequently, during this time, vigilance, reasoning, and problem-solving are likely to be compromised.

Leaders can expect mood, motivation, initiative, planning, and preventive maintenance to decline. High motivation helps keep soldiers going but at increased risk due to impaired performance.

Leaders must recognize erratic or unreliable task performance in subordinates and

themselves. Alertness and performance decline gradually with partial sleep deprivation when sleep is limited to four to five hours each night. After five to seven days of partial sleep deprivation, alertness and performance decline to the same low levels as those seen following two days of total sleep deprivation. (See Figure 2-3, page 2-5.) After 48 to 72 hours without sleep, soldiers become militarily ineffective.

TYPE OF TASK AFFECTED

TASK	EFFECT
High Work Loads	Are more affected than low ones due to increasing attentional lapses.
Routine Tasks	Routine but critical subsidiary tasks tend to be skipped; this is part of a general unwillingness to act or respond.
Physical Tasks	Will only be affected in the presence of severe physical fatigue.

Figure 2 - 1

Note: The type of task is affected by sleep loss.

Source: UK Army Personnel Research Establishment.

ABILITY TO CARRY OUT VARIOUS TASKS

EFFECT	TASK
Likely to take longer	All tasks.
Most Affected	Complex, uninteresting long tasks requiring sustained attention; newly or poorly learned tasks.
Least Affected	Short, simple, well-learned, self-paced, interesting tasks.

Figure 2 - 2

Note: The ability to carry out various tasks is affected by sleep loss.

Source: UK Army Personnel Research Establishment.

EFFICIENCY OF UNDERTAKING TASK (100 is nominal "norm")

Sleep Deprivation in Hours	Snap Shooting	Target Detection
24	71	82
36	64	71
72	56	41
Sleep Deprivation in Hours	**Encode Grid Refs**	**Decode Grid Refs**
24	90	80
36	57	47
72	50	40

Figure 2 - 3

Note: The efficiency with which an individual performs a particular task will vary according to the length of time that he has been deprived of sleep and the task that is being undertaken. The above is a table showing the efficiency with which a task might be undertaken based upon a "norm" or 100 when there is no sleep deprivation.

Source: UK Army Personnel Research Establishment.

CONDITIONS CONTRIBUTING TO DEGRADATION

Continuous combat forces soldiers to perform under adverse conditions that cause a degradation in performance. These adverse conditions include--

o **Low light level.** The amount of light available for seeing landmarks, targets, and maps is greatly reduced at twilight and night.

o **Limited visibility.** Smoke, fog, rain, snow, ice, and glare make seeing difficult.

o **Disrupted sleep routines.** Every person is used to being awake or asleep during certain hours of the day/night. Disruption of the normal sleeping schedule causes performance to degrade.

o **Physical fatigue.** Working the muscles faster than they can be supplied with oxygen and fuel creates a "debt" which may eventually make them unable to function until the deficits are made up during brief rests.

o **Sleep loss.** The muscles can continue to function adequately without sleep, but the brain cannot. Increasing sleep debt leads to subtle but potentially critical performance failures.

EFFECTS OF SLEEP LOSS

TIME WITHOUT SLEEP	EFFECT
After 24 hrs	A deterioration in performance of tasks that are inadequately or newly learned, or are monotonous, or that require vigilance.
After 36 hrs	A marked deterioration in ability to register and understand information.
After 72 hrs	Performance on most tasks will be about 50 percent of normal.
3 to 4 days	Is the limit for intensive work including mental and physical elements. Visual illusions are likely at this stage, or earlier, especially in NBC.
0300 to 0600 hrs	Performance is at its lowest ebb.

Figure 2 - 4

Note: The effect of lack of sleep varies with the length of time an individual has been deprived of sleep.

Source: UK Army Personnel Research Establishment.

MENTAL AND PHYSICAL FACTORS AFFECTED BY SLEEP LOSS

Mental Factors	Attention	Lapses of attention increase in frequency and duration; information is often not registered.
	Initiative	The ability to initiate work decreases; tasks imposed by others are less likely to be affected.
	Insight	Insight is reduced; performance and abilities are overestimated.
	Motivation	Motivation is reduced; a "mental lift" or high morale can counter this.
	Moods	Most often reported are feelings of fatigue, irritability, persecution, inability to concentrate, periods of misinterpretation and disorientation, loss of interest in surroundings and events, and dominating desire to sleep. These

Figure 2 - 5

MENTAL AND PHYSICAL FACTORS AFFECTED BY SLEEP LOSS (cont.)

	Moods (cont.)	often appear after one night of total sleep loss and are present in most individuals after two nights without sleep.
Physical Factors	Personal Hygiene	Self-care deteriorates.
	Hunger	There is an increase in hunger disproportionate to time spent awake.
	Age	Young men (aver. 22 yrs) demonstrate poorer "continual mental efficiency" than middle-aged men (aver.40 yrs); older men pace themselves better.
	Eyestrain	Close work such as reading, viewing monitors, and using keyboards is likely to cause eyestrain.

Figure 2 - 5 (cont.)

Source: UK Army Personnel Research Establishment.

o **Fear.** Fear is a normal reaction to a threatening situation. It depletes the soldier's physical and mental energy.

INDICATIONS OF SLEEP LOSS AND DEGRADED PERFORMANCE

Sleep loss symptoms become more prevalent as sleep debt builds up. (See Figure 2-4, page 2-7.) Performance is affected by the hours of wakefulness, tolerance to sleep loss, and the kinds of mental or physical work. Both mental and physical changes occur, with symptoms varying among individuals. (See Figure 2-5, page 2-8.) Leaders must watch soldiers for the following indications of sleep loss and degraded performance.

PHYSICAL CHANGES

Changes in appearance include vacant stares, bloodshot eyes, pale skin, and poor personal hygiene. Other physical signs of sleep loss include the body swaying when standing, sudden dropping of the chin when sitting, occasional loss of hand grip strength, walking into obstacles and ditches, low body temperature, slowed heart rate, and slurred speech.

MOOD AND MOTIVATIONAL CHANGES

Mood changes, decreased willingness to work, and diminished performance go hand in hand. Soldiers may feel less energetic, alert, and cheerful and less interested in their sur-

roundings while, at the same time, they are more irritable and increasingly negative and sleepy. Some become depressed and apathetic. Sleepiness and mood changes are not signs of weakness. After long periods of sleep loss, soldiers go from being irritable and negative to dull and weary.

EARLY MORNING DOLDRUMS

Soldiers may feel that it takes more effort to do a physical task in the morning than it takes to do the same task in the afternoon. They may feel like stopping work due to exaggerated feelings of physical exertion. This is especially true between 0400 and 0700. During this time, the tendency to fall asleep is considerably more noticeable than at other times of the nighttime work period.

COMMUNICATION PROBLEMS

Soldiers may have difficulty deciding what needs to be said and how to say it or what someone else has said. They may not be able to carry on a conversation. They may forget what is being discussed, their minds may wander, or they may repeat themselves. Asking questions and cross-checking to avoid misunderstandings is helpful.

BICKERING

Bickering is caused by irritability. Both bickering and irritability increase with sleep

loss. When soldiers are bickering, it shows that they are still talking to each other and exchanging orders and messages. When bickering decreases, especially after a period of increased bickering, soldiers may be in a state of mental exhaustion.

DIFFICULTY IN PROCESSING INFORMATION

Comprehension and perception slow down. Soldiers take longer and longer to understand oral, written, or coded information. They may take a long time to find a location on a map and may make mistakes with map/chart coordinates. They are slow to interpret changes in enemy fire patterns. They may take longer to make sense of things seen or heard, especially patterns. They may have difficulty with spot, status, or damage reports and may not be able to assess simple tactical situations.

CHANGED RESPONSE TIME

Sleep loss also causes uneven response time. Some responses remain fast, while others become slow. The dangers are in the slowing down of appropriate responses and the delay in translating a simple order into action.

INADEQUATE RESPONSES

Soldiers may miss incoming signals. The Naval Health Research Center Report No. 86-22

entitled “Sleep Management in Sustained Operator's User's Guide" found that after 36 hours, soldiers may be able to perform message coding/decoding at only 50 percent of normal speed or detect only 70 percent of incoming signals. (Immediate correction improves the soldier’s attention.)

IMPAIRED ATTENTION SPAN

Sleep deprivation causes the attention span to shorten. There is a loss of concentration on the job as dream-like thoughts cause lapses in attention. Leaders should watch for—

o **Decreased vigilance.** Soldiers are less alert. They fail to detect the appearance of targets especially in monotonous environments.

o **Reduced attention.** soldiers are slow to notice changes like hand signals or moving “bushes.”

o **Inability to concentrate.** Soldiers cannot keep their minds on what they are doing. They cannot follow multiple directions or perform numerical calculations. They are confused.

o **Failure to complete routines.** Sleep loss interferes with completing routines like drying the feet, changing socks, or filling canteens when water is available. Soldiers may skip tasks like performing weapons checks.

MEMORY LOSS FOR RECENT EVENTS

When a soldier cannot recall what someone has just told him or what he just saw, heard, or read, he is exhibiting a common sign of sleep loss. His memory loss is limited to recent events. For example, a sleep-deprived soldier may forget recent target data elements or recall them incorrectly. It becomes difficult for him to learn new information.

MISPERCEPTIONS

The soldier's tired brain may see (and hear) things that aren't there. For example, he may mistake a bush for an enemy soldier. The danger is that a tired soldier may think it's real and act incorrectly for the tactical situation.

POTENTIAL FOR ACCIDENTS

There are situations such as fatigue, confusion, inadequate training, and improperly maintained equipment that increase the potential for accidents. Good leaders recognize these situations and prepare their subordinates through such means as training and awareness, sleep plans, and additional supervision to reduce the possibility of accident and injury.

Chapter 3
The Need for Sleep in Combat and How to Get It

SLEEP ROUTINES

Sleep management is a combat multiplier. Planned sleep routines are important for keeping the unit and individual soldiers performing and for reducing sleepiness during continuous combat. They prevent degradation in performance, moods, and work motivation. Since leaders are responsible for planning sleep routines, they need a basic understanding of the physiological and behavioral aspects of sleep and their impact on performance. The following paragraphs provide this information.

CIRCADIAN RHYTHM

There are rhythmic variations in individual performance based on a predictable physiological and behavioral cycle that is about one day or 24 hours. The 24-hour, day-night/work-rest cycle is called the "circadian rhythm."

Moving across a half-dozen time zones disrupts the usual relationship in the day-night/ work-rest cycle. So, for a few days, soldiers are not sleepiest at their usual sleep period of 2400 to 0600, new-locale time. Letting them sleep when they are sleepiest, which will

be at 1200 to 1800, new-locale time, will only delay their adaptation to their new locale. Leaders must tell soldiers to go to bed between 2400 and 0600 new-locale time. This establishes a new circadian rhythm.

Another example of circadian rhythm is body temperature. Although one's "normal" temperature is 98.6 degrees, this is really an average or midpoint of a daily swing from 96.8 to 100.8 degrees. For a person who is accustomed to working days and sleeping nights, body temperature would fluctuate approximately as indicated in Figure 3-1.

CIRCADIAN RHYTHM
Body Temperature

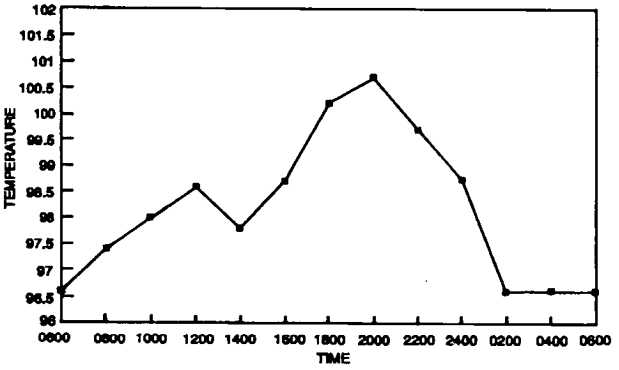


Figure 3-1

IMPACT ON PERFORMANCE

A change in day-night/work-rest cycles also disrupts the usual relationship between body temperature and time of day (jet lag). There is a well-established link between body temperature and sleepiness and/or performance slumps. Performance parallels body temperature. The higher the temperature, the better is the performance. As temperature decreases, there is a decline in mood and motivation and an increase in sleepiness and fatigue. Performance (particularly cognitive) declines somewhat coincidentally with lower body temperature.

Performance impact is most pronounced during the "circadian lull" which is roughly 0200 to 0600 hours. During this time, performance declines about 10 to 15 percent. In sleep-deprived soldiers, this decline may reach 35 to 40 percent.

If the day-night/work-rest cycle is disrupted, performance suffers, because the soldier is sleepy during the new work period and awake during the new sleep period. The body needs several days to adjust to the new schedule.

Critical hours for sleep are between 0200 and 0600 when anchor sleep (the most beneficial sleep) is taken. The body is at its lowest temperature during this period. This is the best time for sleep but not for naps. To prevent

sleep inertia, naps should always be taken at times other than the lowest point in body temperature.

Leaders will need day- and night-fighting teams. Soldiers used to working nights and sleeping days should be scheduled to work days and sleep nights. Their performance slump / optimal time to sleep would be 2400 to 0600, new-locale time.

Deployment, pre-combat, and combat are not usual circumstances. If certain soldiers must have an offset circadian timing from the rest of the unit, a special effort must be made to establish a sleeping time for them.

Obviously, soldiers must sleep whenever possible if a planned sleep schedule cannot be followed. However, performance is enhanced if sleep coincides with the low point in body temperature.

Leaders need to calculate the difference in time zones and make the necessary schedule changes. A twelve-hour difference is shown in Figure 3-2.

New - Locale Time					
2400	0200	0400	0600	0800	1000
1200	1400	1600	1800	2000	2200
Home - Base Time					

Figure 3-2

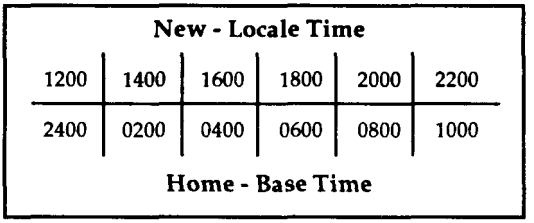


Figure 3 - 2 (cont.)

WORK AND SLEEP/REST SCHEDULES

Adjusting to new circadian rhythms is a slow process. It may take from three to six days to come "in phase" with a new schedule. Leaders will seldom know if CONOPS will be over in three to six days so, from the beginning, the prudent commander will choose shifts of 4 hours on/4 hours off, 6 hours on/6 hours off, or 12 hours on/12 hours off.

Leaders should devise a sleep schedule that makes every effort to provide for sleep at the same time of day or night every 24 hours. Sleep schedules that provide for sleep at different times of day or night are much less valuable and are detrimental to quality sleep and optimal performance.

Figure 3-3, page 3-6, shows work schedules for two shifts working 4 on/4 off, 6 on/6 off, and 12 on/12 off. (Shift 1 = S1, Shift 2 = S2.) Work schedules are stated in hours (i.e., 4 on/4 off means 4 hours of work followed by 4 hours of "rest" - meaning sleep or, at least, an absence of duties).

2 - Shift Work/Sleep Schedule for 4 on/4 off, 6 on/6 off, 12 on/12 off

S1	S1	S2	S2	S1	S1	4 4
S1	S1	S1	S2	S2	S2	6 6
S1	S1	S1	S1	S1	S1	12 12
2400	0200	0400	0600	0800	1000	

2 - Shift Work/Sleep Schedule for 4 on/4 off, 6 on/6 off, 12 on/12 off (cont.)

S2	S2	S1	S1	S2	S2	4 4
S1	S1	S1	S2	S2	S2	6 6
S2	S2	S2	S2	S2	S2	12 12
1200	1400	1600	1800	2000	2200	

Figure 3 - 3

NOTE: Figure 3-3 is an example of a 4 on/4 off, 6 on/6 off, 12 on/12 off schedule. Soldiers on the 4 on/4 off shift 1 (S1) get to sleep from 2400 to 0400, 0800 to 1200, 1600 to 2000 every day. The second shift (S2) sleeps from 0400 to 0800, 1200 to 1600, 2000 to 2400. Likewise, the 6 on/6 off schedule provides for shift 1 to sleep from 2400 to 0600 and 1200 to 1800 and for shift 2 to sleep from 0600 to 1200 and 1800 to 2400. The 12 on/12 off provides for shift 1 to sleep from 2400 to 1200 and shift 2 from 1200 to 2400. The next day, each shift follows the same schedule. It is better to maintain regular shift schedules than ones that continually change.

WORK SCHEDULES

Usual work schedules are 8 hours on, 16 hours off. People develop a routine of working 8 hours and sleeping 6 to 8 hours at about the same time during every 24-hour period. Since CONOPS requires working around-the-clock, leaders may divide soldiers into teams with supervision, skill mix, and numbers necessary to accomplish the task. Figure 3-4 is a standard one-team, 8-hour-shift schedule.

Usual One Team Working One 8 - Hour Shift

Hours	2400	0400	0800	1200	1600	2000
One Shift			Work Period 8 hrs			

Figure 3 - 4

With two teams, 12-hour shifts are needed. Some soldiers may be accustomed to working nights. As they cross a half - dozen time zones, they will be right at home in the new location if they now work days. In fact, if the unit is working 12-hour shifts in CONUS, switching day workers to night and vice versa in the new time zone, may be all the adjusting the unit needs to do to match body rhythms to the local time.

Another option is noon to midnight and midnight to noon. This provides each shift with an opportunity to see sunlight.

The plan must balance the work with the fatigue build up. When a 12-hour shift is too demanding mentally or physically, then shifts of 6 hours on, 6 hours off may be used. It is critical that soldiers sleep during the same hours during each 24-hour period. Figure 3-5 is a midnight-to-noon and noon-to-midnight option.

Two Teams Working 12 - Hour Shifts

Two Shifts	2400	0400	0800	1200	1600	2000
First	— Work Period —					
Second				— Work Period —		

Figure 3 - 5

With three teams, the 24-hour period is covered with three 8-hour shifts, as shown in Figure 3-6. Shifting duty hours from daytime to nighttime requires sleep to occur in part or completely during daytime hours.

Three Teams Working 8 - Hour Shifts

Three Shifts	2400	0400	0800	1200	1600	2000
First	Work Period					
Second			Work Period			
Third					Work Period	

Figure 3-6

Consider that in extended work days, personnel may begin work at 1200 hours and continue until 0400. This schedule would provide a ratio of about 16 hours of work (1200 to 0400) to 8 hours of rest (0400 to 1200 hours).

Research shows that delaying sleep onset from 2400 hours to a later time during the night, such as 0400, does not result in cognitive impairment upon awakening. On the other hand, scheduling sleep earlier than usual, for instance beginning at 2100 hours, results in cognitive impairment. Thus, scheduling sleep to begin a few hours later than the usual bed-time is always a better choice.

SLEEP/REST SCHEDULE

Soldiers in CONOPS can expect to be deprived of extended regular sleep, possibly any sleep, for as long as three to five days. Performing around-the-clock disrupts their normal day and night rhythms. The effects of this disruption diminish, but the cumulative effects of sleep loss increase.

Loss of sleep for 36 to 48 hours significantly reduces mental abilities. The "tired brain" may create illusions or hallucinations. A soldier may mistake what he sees for something else, for example, mistake a tree for an enemy soldier. The cumulative effect of sleep loss taxes and depletes the body.

Leaders must be aware of several facts in scheduling sleep. First, if soldiers are required to work from sunset to about 0400 hours, sleep should begin before sunrise and extend to about 1100 to 1200 hours. This is because there is a tendency to fall asleep between 0400 and 0700 hours.

Second, leaders should avoid shifts which set the period of sleep at different times each day such as 8 on/8 off or 4 on/2 off. A combination that does not allow for sleep during the same period during consecutive 24-hour periods, leads to "desynchronization" or getting "out of phase" with a schedule. In days follow-

ing schedules of this type, soldier performance will be severely degraded, and leaders should expect a high incidence of sleep disorders.

If shifts are not possible, all soldiers should be allowed at least four hours' sleep per 24 hours (five hours if sleep is interrupted). They should not go with four hours' sleep per 24-hour periods for longer than one to two weeks before paying back sleep debt.

Third, leaders should give priority to soldiers who have more critical and vulnerable tasks or who are showing signs of excessive fatigue.

No one should try to go without sleep. If possible, leaders should allow for four uninterrupted hours of sleep or multiple periods of three to four hours' duration if sleep is interrupted. Consistent timing of sleep and wake-up times will contribute to the successful physiological adaptation to arduous regimens during combat or training exercises. This is true even when the total sleep time is less than eight hours.

It is better to work 20 hours with brief rest periods and have 4 hours of uninterrupted sleep from 0200 to 0600 than to have schedule variations. For example, an 8-hour on/8-hour off schedule totally disrupts circadian rhythms and is of less value than the 20-hour on/4-hour off schedule.

SLEEP/REST GUIDELINES

Leaders should use the sleep/rest guidelines in this section to enhance leader, soldier, and unit performance in continuous operations. The guidelines are the following

o Know your own tolerance for sleep loss and that of others under your command. Be prepared to deal with some individuals who are unable to sleep during pre-deployment and deployment stages. For those who can't sleep, suggest a relaxation exercise. For example, tell soldiers to breathe shallowly and slowly, counting each breath. See Appendix A for additional relaxation techniques.

o Ensure that soldiers know how to make the most of their breaks and other opportunities for rest. Encourage them to waste no time in getting to sleep. Undisturbed, prolonged sleep is the most desirable use of rest opportunities. When extended sleep is not possible, even the briefest catnap (power nap) can be useful. When naps are impractical, soldiers should use relaxation techniques. When there has been sleep loss but little physical exertion (e.g., manning communications, operating a radio), mild physical exercise such as walking around can help maintain alertness.

o Encourage soldiers to sleep, not just rest, by creating the most conducive environment possible for sleep.

o Do not allow soldiers to sleep in unsafe conditions. Enforce strict rules designating sleep areas and requiring perimeter guards. Require guides for all vehicles, day and night, to prevent soldiers from being accidentally run over.

o Make sure that soldiers follow sleep schedules or routines. The field commander who doesn't enforce a sleep schedule or routine leads his soldiers into hazards in continuous combat. Taking naps isn't a sign of low fighting spirit or weakness; it is a sign of foresight.

o Learn how to measure sleep loss. You can do this in the following ways:

oo Keep a sleep /activity log. From pre-deployment to post-deployment, make an effort to log sleep and nap periods. Soldiers need four to five hours per 24-hour period. If they get less, the first chance for a long rest period must be used for sleep.

oo Observe performance, and ask questions. Look for the indications of sleep loss: increase in errors, inability to understand information, increase in irritability, lapses in attention, decrease in initiative, loss of short-term memory, and deterioration of personal hygiene. Confirm sleep loss by asking the obvious question: "When did you sleep last, and how long did you sleep?"

o Devise ways to overcome performance degradation. For example—

oo When signs of diminished performance appear, find time for soldiers to nap, change routines, or rotate jobs if they are cross-trained.

oo Let the soldiers most affected by sleep loss do a task which can be done at a self-paced rate.

oo Have soldiers team up to do a job, or create a buddy system.

o Do not allow soldiers to be awakened for meals while in flight to a new location.

o Insist that soldiers empty their bladder before going to bed. Awakening to urinate interrupts sleep, and getting in and out of bed may disturb others and interrupt their sleep.

o Allocate sleep by priority. Leaders, on whose decisions mission success and unit survival depend, must get the highest priority and largest allocation of sleep. This may seem contrary to military tradition, but tradition must change to meet modern-day challenges. Plan and schedule your own sleep. Give second priority to soldiers who have guard duty and to those whose jobs require them to perform calculations, make judgments, sustain attention, and evaluate information.

o Learn the sleep facts at the end of this chapter in order to dispel myths.

STAGES OF BATTLE

Sleep/rest guidelines for leaders to follow are presented in the following paragraphs. They apply to the predeployment, deployment, pre-combat, combat, and post-combat stages of battle.

PRE-DEPLOYMENT STAGE

Using mission-scenario operation guidelines, determine periods available for sleep and the total number of sleep hours possible. CONOPS requirements may change, so plan several sleep routines.

Become familiar with the area where the combat unit will sleep. For example, some may have to sleep in MOPP IV, which is unfamiliar and is not restful. If sleeping in MOPP IV is anticipated in combat, practice it during the pre-deployment stage. Prior experience reduces stress, so try out anticipated sleep routines before CONOPS. Soldiers should be rested before deployment.

DEPLOYMENT STAGE

Since sleep will be reduced during deployment, follow preplanned sleep routines. The prudent commander will choose a 4-hour

on/4-hour off, 6 on/6 off, or 12 on/12 off shift from the start. Make plans for sleep gear, adequate clothing padding, cots, darkened rest areas, and noise-free environment.

Take into account that soldiers on night duty will need to sleep during the daytime. Provide night shift personnel with separate sleeping quarters to avoid disruption of their sleep period.

Keep in mind that transcontinental rapid movement of personnel and equipment for immediate deployment into the battlefield, without rest, will result in casualties and an ineffective cohesive fighting force.

PRE-COMBAT STAGE

In general, people are most effective during the afternoon and are least effective just before dawn. When there is a delay of a week or more between arrival in a combat zone and actual combat, adjust the sleep routine to the destination time zone. If there is not time to adjust to the local time zone, or if you are likely to be sleeping during the day and working at night, stay with the home-base routine.

Without prior adjustment to the new time zone, which takes three to six days if left to nature, leaders can expect daytime performance to be degraded. The reason is that 0200 to 0600

hours home-base time is the low point in performance efficiency. Consider this when planning work loads.

COMBAT STAGE

Attempt to avoid a situation where all soldiers are physically and mentally exhausted at the same time. Make the most of any lull during the combat phase by sleeping briefly. Complete recovery from sleep loss may not be possible during intense combat, but limited sleep is helpful. Uninterrupted short sleep of 15 minutes or longer is beneficial in partially recovering alertness.

Taking sleep in the combat stage may be risky, however, because a soldier may wake up feeling groggy, confused, sluggish, and uncoordinated. It may take his brain from 5 to 15 minutes to "warm up." This condition is called "sleep inertia." Soldiers should practice performing a job after sleep to balance the lost man-hours and sleep inertia normally experienced after awakening.

POST-COMBAT STAGE

It is important to makeup sleep debt, but experts disagree about the amount of recovery time needed. Some say the hours of sleep needed for recovery after sleep deprivation are less than the amount lost. It is known that lost sleep is not made up hour-for-hour.

Most experts agree that immediately following continuous combat, soldiers should be allowed to sleep up to ten hours. Longer sleep periods are not desirable because they cause "sleep drunkenness" and delay in getting back to a normal schedule. After the first sleep period of up to ten hours, soldiers should return to the regular sleep routine.

Sleep inertia lasting longer than 5 to 15 minutes and increased sleepiness may occur for as long as a week following continuous combat.

Some experts recommend that four of the first eight hours of recovery sleep should be at the 0200 to 0600 sleep time, and they suggest the following guidelines for complete recovery from the effects of sleep loss:

o 12 hours for sleep and rest after 36 to 48 hours of complete sleep loss with light to moderate work load (fatigue may linger for 3 days).

o 24 hours for sleep and rest after 36 to 48 hours of sleep loss with high work load (12 to 16 hours per day).

o 2 to 3 days' time off after 72 hours or more of acute sleep loss.

o As much as 5 days for sleep and rest following 96 hours or more of complete sleep loss.

o 3 to 5 days to get back into a normal day/night schedule.

o 3 to 4 weeks to adapt fully to routine.

Other experts believe the above guidelines are too generous and suggest the guidance shown in Figure 3-7. This chart shows that after 24 hours of CONOPS, a soldier needs a minimum of 4 hours' sleep. After 48 hours he needs 8 hours' sleep; after 72 hours, 12 hours' sleep/rest. Most experts agree that 10 hours of sleep is the maximum needed, with the additional two hours used for rest. This will prevent grogginess and sleep drunkenness. It is doubtful a soldier could continue past 72 hours of wakefulness. Should this occur, a couple of nights with 10 hours of sleep are more beneficial than an excess of 10 hours during one sleep period.

Cumulative Hours of Sleep Loss	Usual Sleep/Rest	Minimum Restorative Sleep/Rest Requirement
Day 1 - 24 hrs	8 hrs	4 hrs
Day 2 - 48 hrs	16 hrs	8 hrs
Day 3 - 72 hrs	24 hrs	12 hrs (10 sleep, 2 rest)

Figure 3-7

If soldiers haven't slept for 36 to 48 hours or more, they should avoid sleep of less than two hours, especially if it falls between 0400 and 0600. A too-short sleep period at the wrong time may cause a long period of sleep inertia.

Four hours of sleep after 96 hours of total wakefulness may provide substantial recovery for the simpler, less-vulnerable tasks. Recovery continues with additional days of four hours' sleep per 24 hours. Complex leadership tasks may require longer recovery sleep, but sleep until fully satisfied is not necessary.

SLEEP FACTS

Sleep loss alone does not cause permanent health problems or cause mentally healthy people to become mentally ill. Reduced sleep (from eight to four hours) does not produce physical harm. Hallucinations may occur, but they disappear after recovery sleep.

Clinical laboratory tests show that total sleep loss of over a week does not pose serious health problems. It is doubtful that soldiers could stay awake for such an extended period, and it is not suggested that soldiers try to endure long periods without rest. The tests are cited only to assure leaders that lack of sleep will not necessarily cause permanent physio-

logical damage or health problems. However, the effects of sleep loss, such as inattentiveness and poor judgment, may be harmful. For example, falling asleep at the wheel of a vehicle could be fatal.

People become sleepy at least twice a day - once in the afternoon at about 1400 hours and once just before their habitual sleep time.

Sleep cannot be stored in our bodies for emergency use. Sleep of more than seven to eight hours before deployment does not store up excess sleep, but sleep taken immediately before a deployment can prolong activity. Therefore, it is important to start CONOPS rested.

During daytime or early morning naps, many soldiers experience vivid dreams as they fall asleep and often wake up frightened. Leaders should tell their soldiers that this is common and normal during daytime sleep.

If a single, unbroken period of four to five hours is not available for sleep, power naps of 15 to 30 minutes, although less recuperative, can be taken. Leaders must capitalize on every opportunity for a power nap.

Merely resting by lying flat does not take the place of sleep. Only sleep can satisfy the need for sleep.

Chapter 4

Ways to Counter Degradation

CONOPS CAPABILITY

Every soldier, team, and unit must learn to effectively sustain performance in continuous operations. This requirement applies especially to leaders. While it is an important ingredient, the determination to endure does not ensure effectiveness.

Gaining the required capability goes beyond a high level of proficiency in combat skills and technical specialties. It means learning to identify the adverse conditions of CONOPS, to cope with them, and to overcome their effect. It means learning how to slow the rate of performance degradation. Units, leaders, and soldiers must prepare and execute plans and train to sustain performance.

Doctrinal products that describe how operations are affected by CONOPS include FM 100-5, FM 22-100, and FM 90-22.

DEGRADATION REMEDIES

Adverse conditions progressively degrade soldier effectiveness. Fortunately, long-

term remedies exist for slowing the rate of performance decline. These remedies must be introduced prior to combat. Factors to consider are safety, food intake, soldier load, weapon system manning, and stimulant drugs.

SAFETY

Safety, which encompasses such factors as using proper lifting techniques, is influenced by fatigue. Overtired soldiers are more vulnerable to injury than those who are rested. After 72 hours of continuous combat, the tendency to seek shortcuts is very strong, and accident rates increase 50 percent. Fatigue affects all military systems, but it is especially hazardous when weapon systems are involved. Catastrophic accidents can occur when weapon systems are manned by fatigued (and under-experienced) crews. Ways to safeguard soldiers include developing and using safety SOPs and increasing supervision during extended operations.

FOOD INTAKE

If soldiers are too busy, too stressed, or too tired to eat adequate rations during CONOPS, their caloric intake will be reduced. This may lead to both physical and mental fatigue and degraded performance. For example, in accidents judged to involve aviator fatigue, there is some indication that before the accidents occurred the pilots had irregular eating schedules or missed one or more meals.

In field tests done by the U.S. Army Natick Labs, some personnel subsisting solely on meals ready to eat (MREs) lost weight over just a few weeks. In various other field tests approximating CONOPS, it was discovered that meals are frequently delivered very late or missed altogether. This prompted soldiers to allege that their leaders show little concern for their welfare.

The relationship between performance and diet, nutrition, and regular meals is not clear. However, it appears that eating regularly is important in CONOPS, and providing hot meals at assigned times or when the work load has been sustained is a real morale booster.

NOTE: Information on food values, types of meals, number of meals per day, quantities and composition of meals, and nutritional requirements under various operational conditions is available from U.S. Army Natick Research, Development and Engineering Center, Natick, MA 01760.

SOLDIER LOAD

In combat, soldier load significantly exceeds optimum recommended weights. In the case of a light infantry soldier, the soldier load is as much as double the recommended load. Physical conditioning cannot compensate for this degree of excess. Soldiers tire faster and, in continuous combat, recovery from fatigue becomes more time-consuming.

When the soldier must carry excessive amounts of equipment, the effects of stress and lack of rest are magnified. To ease the strain on soldiers, use of a load echelonment concept must be considered. In this concept, the complete unit separates and the approach march load is dropped as the soldier continues forward with the assault pack.

MANNING WEAPON SYSTEMS

Manning key weapon systems with single crews does not make the best use of equipment. Soldiers should be cross-trained so the system can be manned 24-hours-a-day, if needed.

STIMULANT DRUGS

Stimulant drugs can restore alertness and motivation. However, the currently available drugs impair judgment, which can result in serious accident or injury to the soldiers. No drug can replace sleep.

SOLDIER RESOURCES

Performance degradation can be countered by beefing up soldier resources. This involves preparing soldiers through training, physical conditioning inoculation, balanced

nutrition, and increased fluid intake. Leaders must design a program that achieves maximum resource build up.

TRAINING

In 1933, General Douglas MacArthur observed in a report to the U.S. Army Chief of Staff that"...in no other profession are the penalties for employing untrained personnel so appalling or so irrevocable as in the military." Training offers the opportunity to correct problems and reinforce skills. Soldiers who perform duties that require a high degree of mental skill should overlearn the skills and be cross-trained. Overlearning provides higher reliability and rapid skill performance. Cross-training permits duties to be shared and computations to be cross-checked.

PHYSICAL CONDITIONING

Good physical conditioning delays fatigue, builds confidence, and shortens recovery times from sleep deprivation, illness, and injury. It also prepares one to better cope with the physiological demands of stress. Soldiers in top physical condition can better control their internal physiological functions. This improves their performance in all areas.

INOCULATIONS

Inoculations are required for building the body's resistance to disease. The commander

must ensure that all soldiers have received the required inoculations and proper medical preparation for combat tours.

NUTRITION

Good nutrition is important. An inadequate diet degrades performance, reduces resistance to disease, and prolongs recuperation from illness and injury. Reduced caloric input may result in the onset of exhaustion from certain types of physical activity.

When food and water become available in CONOPS, leaders must provide and maintain a supply of food that has the nutritional value commensurate with the physical activity and stress of battle. They must remind and encourage soldiers to eat and drink properly.

FLUID INTAKE

The excitement, stress, and rapid pace of events associated with field preparations can cause soldiers to forget to drink liquids. Thus, they enter the early part of the field scenario inadequately hydrated. Dehydration may result, especially if the early scenario calls for assault of a position or rapid air/land deployment. Contributing to the developing dehydration is the relative lack of moisture in MREs and other packets. In addition, soldiers experiencing dehydration lose their appetite and reduce their food intake. This, in combination with dehydration, leads to degraded performance.

Leaders must reemphasize drinking regimens to ensure that soldiers are properly hydrated going into battle. They must remind soldiers to drink liquids in both hot and cold climates and must monitor fluid intake. If soldiers are allowed to drink only when thirsty, they will become dehydrated.

PERFORMANCE SUPPORTS

Performance supports help soldiers accomplish their tasks. For example, a tired soldier may need a lever to shift heavy equipment. The lever is a mechanical support. Soldiers also need various kinds of motivational supports.

MECHANICAL SUPPORTS

Many kinds of mechanical performance supports are in common use, ranging from basic supplies to high-technology equipment. Binoculars support distance vision, while telephones and radiotelephones support distance communication. Many types of night vision devices and ground surveillance radars aid surveillance in the dark. Laser target designators and range finders support soldiers' judgments in accurate range estimation. Computers and hand-held calculators support numerical operations and decision-making (the most degraded and vulnerable performance in CONOPS).

Common items such as note pads, charts, acetate overlays, and grease pencils are also performance supports. Other types, for example, cassette or micro-cassette recorders and optical filters for enhancing contrast or shifting colors, require only a moderate level of technology.

Leaders must ensure that performance supports are developed and used to help soldiers accomplish tasks successfully. They must remember that performance supports require their own precautions and double-checks. For example, the computer will do the calculations if the right entry keys are pushed and the result is correctly read off the readout device.

MOTIVATIONAL SUPPORTS

Supports may be schemes or procedures rather than physical objects. Motivational performance support factors that leaders should be aware of include support of critical abilities, pacing, motivation, trust, confidence, communication, and leading by example.

Support of Critical Abilities

Before the need arises, leaders must be prepared to support critical abilities. These are skills a soldier must be able to perform regardless of fatigue so that he and his comrades can

survive. The means for supports must be familiar, practiced, and comfortable.

For example, the fire support team (FIST) chief's ability to quickly call for fire on an enemy position is a critical ability. It may be difficult for a fatigued soldier to determine accurately a set of six-digit grid coordinates to the position. A support would be to preestablish on the map the target reference points from which the FIST chief could quickly shift up or down, left or right. When fatigued, it is easier to shift than to determine precise locations.

Pacing

Leaders must carefully monitor soldiers' endurance in order to keep their units fighting at a rate they can sustain. Leaders who fail to plan will lead their soldiers into exhaustion. Tactical options depend on advance preparation, planning, and extensive practice.

Motivation

Soldiers must have a motive to act, and they must have faith that the leader will provide their best opportunity for success and survival. Soldiers will willingly follow those in whom they have confidence and trust. A leader is responsible for providing exemplary tactical proficiency, personal ethics, soldier team development, supervision, decision-making,

planning, communications, teaching, and counseling.

Trust

Trust in leadership, training, and equipment is required to develop a cohesive fighting unit. Soldiers must trust themselves and others in their unit. Trust is necessary both up and down the chain of command and laterally with sister units. Trust is developed through training.

Confidence

Confident, cohesive units believe they can and will accomplish their combat mission. Confidence cannot be ordered; it is built on desire, know how, and success. It is attained through appropriate experiences that lead soldiers to become optimistic about themselves, their equipment, their unit, and their leaders.

Leaders must show not only technical and tactical ability, but also a true interest in the welfare of their soldiers. Soldiers must believe that the leader will do everything possible, within the limits of the mission, for their safety and welfare. Such confidence in leaders is built in training. The leader must earn the confidence of his soldiers with fair and concerned treatment if he expects his soldiers to believe in him in war. Confidence in leadership is a key factor in withstanding stress.

Communication

Leaders must practice good communication. They must inform soldiers about the mission and objectives, how and when the objectives must be reached, how well they are doing, and what they must do to improve the unit's effectiveness. When leaders keep soldiers informed about the tactical situation, they minimize the debilitating stress of ambiguity and uncertainty. Passing information is vital. Soldiers need facts.

Leading by Example

Leader behavior sets the example for adhering to principles and maintaining standards. Such things as self-control, coping with stress, overcoming fear, and doing what is necessary although it is unpleasant cannot be explained adequately in words. Behavior requires a model from which soldiers can learn. Good behavior carries over into combat.

LEADERSHIP ACTIONS

As soldiers become increasingly worn out, leaders must recognize the problem areas and take action. Countermeasures to sleep loss for leaders to follow are presented in Figure 4-1, pages 4-16 through 4-18. Leaders should also take the following actions.

GIVE SIMPLE DIRECTIONS

Make all directions simple. Degraded soldiers have difficulty understanding complicated directions and paying attention. If the directions consist of several parts, some are likely to be forgotten.

GIVE PRECISE ORDERS

Be sure that all orders are complete, clear, and precise leaving no room for misinterpretation. Degraded soldiers have great difficulty reasoning. They cannot "fill in" anything that has not been said explicitly. They cannot interpret the intent of an order when that intent has not been stated clearly and completely.

REPEAT AND GET FEEDBACK

Repeat and get feedback on all orders and directions. Have degraded soldiers repeat the orders given to them, since memory for new information will be faulty. Soldiers are likely to forget orders or parts of orders almost as soon as they are given; therefore, they should write them down. When that is impractical, they should repeat the order several times.

DOUBLE-CHECK

Double-check yourself and others constantly to find out if orders have been executed

as intended. Orders given and acknowledged may not be carried out correctly or completely. Leaders also suffer degradation. Arrange a way to double-check your own activities.

GIVE REASSURANCE

Soldiers whose performance has lost its initial effectiveness need reassurance rather than pressure. Soldiers often recognize that their performance has deteriorated, and they are angry or frustrated because of it. They need firm but patient prompting, not pressure. Give them reassurance that they can make it, that they can keep going, and that they can do what is being asked of them.

INCREASE COMMUNICATION

Degraded soldiers in combat gain reassurance from frequent contacts with leaders and fellow soldiers. Make contact with as many subordinates as possible and as often as possible. When personal contact is impractical, replace it with voice contact over communication channels. On these occasions, give as much information as possible, and encourage and praise the soldiers as individuals.

APPEAL TO COMMITMENT

Reassure soldiers that they, their unit, and their country will make it. Remind them of their commitment. That commitment can help them make the extra push that is needed to

accomplish the mission. A friendly, supportive environment helps.

PHYSICAL FITNESS

Physical fitness, including aerobic fitness and muscular strength and endurance, must be developed in all soldiers to strengthen their ability to bounce back from exhaustion.

Aerobic fitness increases work capacity and the ability to withstand stress. While feelings of depression and moodiness accompany tiredness, aerobically fit soldiers are affected less than unfit ones. Soldiers can achieve aerobic fitness by walking, jogging, running, bicycling, swimming, skipping rope, bench stepping, stair running, and road marching

Muscular strength and endurance are built through weight lifting calisthenics (push-ups, sit-ups, chin-ups), and other types of resistance training such as partner-resisted exercises.

Physical fitness lets the body withstand extraordinary demands without harm. Muscles, joints, and bones are likely to suffer overuse injuries if subjected to heavy or prolonged work greater than they are used to. Overused muscles become sore and may swell and be weak for days. Tennis elbow, stress fractures, back strain, and ruptured discs can result from improper training and overuse

when unfit individuals try to meet new physical demands for which they are not prepared.

Fit soldiers can perform strenuous activity like moving heavy weapons, carrying large loads, and digging in for extended periods and bounce back to normal effectiveness after a brief rest. These reserves are maintained daily and weekly through smart physical training.

Soldiers lose top physical conditioning quickly after only a few nights of total sleep loss. However, less fitness is lost by soldiers who are well- or highly conditioned.

Soldiers may use energy faster than their bodies can furnish it. Leaders must train them to pace themselves to work at their maximum rate but without degradation. With proper pacing, sleep loss up to 60 hours doesn't impair the capability for physical work.

To extend limits, soldiers should practice and achieve working at the upper limits over extended periods. Determination can extend upper limits; the body can, when needed, draw on emergency reserves. By training soldiers to expand their limits, they learn that they can make seemingly impossible accomplishments with a brief extra effort.

COUNTERMEASURES TO SLEEP LOSS

BEFORE OPERATIONS	Training	The higher the state of training prior to sleep loss, the less the deterioration in performance. Training under conditions of CONOPS enables com manders and soldiers to know the effects of sleep loss.
	Preparatory Sleep	Although sleep cannot be stored in advance, it is obviously sensible to get as much as possible before operations.
DURING OPERATIONS	Communicating Orders	Because memory lapses follow sleep loss, extra care must be taken to make messages and orders clear and simple, and they should be written when possible.
	Duty Rotation	Where possible, duties should be rotated between visual, mental, and physical tasks. This relieves some effects of fatigue and visual strain

Figure 4-1

COUNTERMEASURES TO SLEEP LOSS (cont.)

DURING OPERATIONS

	and increases alertness. It implies cross-training.
Task Rate	More time should be allowed for the execution of tasks because performance will be slower.
Surveillance & Command	Special consideration should be given to personnel responsible for tasks most adversely affected by sleep loss, e. g. those undertaking surveillance and command
Cross-checking	After 36 hours without sleep, decisions, calculations, etc., must be cross-checked.
Mental Stimulation	Increased incentive, interest, or morale can often raise the level of mental alertness and improve performance.
Physical Stimulation	Exercise, noise, and cold will often give temporary help; however, they will increase the physical cost and lead eventually to greater fatigue.

Figure 4-1 (cont.)

COUNTERMEASURES TO SLEEP LOSS (cont.)

SLEEP SCHEDULING

Catnaps Power Naps 10 - 30 min.	The only really effective remedy for sleep loss is sleep, but catnaps are beneficial and should be taken as frequently as possible.
Sleep Wakefulness	A small amount of sleep relative to that lost is very beneficial. For example, 4 hours' sleep after 90 hours' wakefulness markedly improves performance and mood. For full recovery, 12 hours' uninterrupted sleep should be allowed after 48 to 72 hours without sleep.
Adequate	In every 24 hours, 4 hours' sleep (continuous or broken) is likely to maintain adequate performance over several weeks.

Figure 4-1 (cont.)

Source: UK Army Personnel Research Establishment

Chapter 5

Stress in CONOPS

DEFINITION

The nature of CONOPS, with the resulting fragmentation of sleep, produces stress, a state of bodily or mental tension resulting from continuous periods of pressure and strain. It is a reaction of the mind and body to extreme demands, impending threat, or other difficult situations. The demands may be physical or mental and may be caused by combinations of—

o Threat to personal safety, such as pain, wounds, and death.

o Fear of personal injury, such as loss of limbs, sight, and hearing.

o Fear of failure, such as letting down comrades.

o Horrible sights and experiences.

o Intense grief, rage, hate, and guilt.

o Cumulative physical fatigue, sleep loss, and discomfort.

o Complex demands of command and control.

o Frustration, defeat, isolation, and being lost.

o Heat, cold, wetness, noise, fumes, vibration, light, and other environmental conditions.

o Overwork.

Expressions such as "paralyzed by fear," "sick with disgust," and "trembling with anger" define the feelings associated with mental stress. Fear arises and persists when soldiers find themselves in threatening situations over which they feel they have little or no control. An integral part of leadership is ensuring that soldiers are physically and mentally prepared to cope with any situation - to feel that they do have some control.

CHALLENGES TO SUCCESS IN BATTLE - THE HUMAN FACTOR

War will remain fundamentally a contest of wills fought by men. On future battlefields, the essential qualities of professional competence, tenacity, innovation, and courage may well be the deciding factors. Combat will strain physical and mental endurance to unprecedented levels.

The battlefield environment will impose new challenges and stress on a continuous basis

which, if unchecked by the mental and physical conditioning of soldiers, could result in the catastrophic failure of entire units. Several human-factor challenges must be met. They include the challenges of preparing mentally for isolation and high casualty rates.

ISOLATION

During CONOPS, units will experience long periods of combat where forces are intermixed, lines of communication are broken, and unpredictable strikes by long-range weapons are a constant threat. Soldiers fighting under such conditions must be able to overcome feelings of uncertainty and helplessness and the fear of isolation and exposure. They must continue to fight as separate battles are tied together into a cohesive force by a higher headquarters.

CASUALTY RATES

Another challenge will be coping with a high casualty rate resulting from chemical and nuclear as well as conventional weapons. The increased destructive capability of potential future weaponry will cause serious physical and morale problems. Seeing the rapid and horrible death of forty to sixty percent of an entire unit will be a stressor that may cause soldiers to become emotionally unable to perform their duties and may jeopardize unit stability.

Leaders can anticipate about a quarter of the soldiers becoming stress casualties. To meet this challenge, leaders must ensure that soldiers are conditioned to mentally overcome the devastation accompanying mass human destruction. They must make sure that soldiers are trained to take over from those who are lost and to reform units that can continue to fight.

STRESS PREVENTION

Strong leadership, unit identification, and motivation are factors that significantly reduce stress casualties. Survival increases when soldiers have developed and practiced coping skills which give them a sense of control in their lives. One way to maintain a sense of control is to practice stress management techniques. These are not easily learned once soldiers are involved in continuous combat operations. The time to learn them is during training. Training and practicing the techniques require leadership example.

Both leaders and soldiers should practice relaxation and stress management techniques several times a week as part of regular training to help them gain the needed skill in using them. Relaxation techniques calm the mind and body, provide a systematic method for full relaxation, and reduce stress levels. They restore a sense of self-control. Some techniques are described in Appendix A.

Leaders must also control and reduce stressors that increase battle fatigue and misconduct. Leaders must be sure that—

o Soldiers' home front business is in order (e.g., wills, power of attorney, child care plans).

o Pre-deployment training has been completed.

o Sleep plans have been developed.

o Soldiers are in good physical condition and are eating and drinking properly.

o Soldiers are prepared for hot, cold, dry, and wet weathers.

o Soldiers are being provided information.

o All members of the unit share a sense of purpose and goal.

STRESS REACTIONS

High continued stress uses up physical and mental resources faster than the soldier's body and mind can maintain them. There are stages in the reaction to stress. Initially when a soldier is stressed, tasks requiring strength may be done well, but fine motor coordination and

judgment may be impaired. The soldier may become anxious but remain calm in the face of danger. His behavior may become erratic, and he may become excitable and aggressive. His psychological defenses may control his fear. In later stages, exhaustion sets in. He may feel weak and too tired to move. At this point, the body may shut down.

NORMAL REACTIONS

Normal reactions to stress include muscle tension, shaking and tremors, excessive perspiration, breathlessness, diarrhea, nausea, and vomiting. There may be panic, fear, sensitivity to noise, sleep difficulties, irritability, resentment, a "don't care" attitude, and extremely lethargic or euphoric post-combat moods. As the mind and body wear down, more incidents of mild illness occur. With rest, food, encouragement, suggestion, and persuasion, soldiers with normal stress reactions will continue to be combat fit.

When normal stress reactions interfere with duty performance, the soldier in combat becomes a battle fatigue case. Battle fatigue is a defense and escape mechanism which provides respite from intolerable situations.

As battle fatigue sets in, soldiers experience anxiety, sleep disturbance, depression, and fear. They may cry easily, become irritable, and use excessive profanity. They may have nightmares or insomnia and may have an exaggerated response to noise and movement.

Battle fatigue can be brought on by sudden exposure to horrible sights, fear, and facing the life and death consequences of battle. Battle fatigue can also be caused by cumulative exposure to danger, heavy responsibilities, close calls with death and disaster, and repeated grief and guilt over lost comrades. Many soldiers feel their luck, skill, and courage are used up.

REACTIONS IN COMBAT

When a soldier cannot deal with stress, his efforts to cope become extreme. He may think he is safely at home when actually he is under heavy fire. In the middle of an artillery barrage, the soldier may curl up into a blind, unhearing, unfeeling, inactive ball. Some soldiers, just before attack, may pick arguments, fight with others, or become quiet; they may sulk or withdraw. Some may become immobilized when tasked to bury the dead.

First exposure to combat may cause severe tremors and shaking, hallucinations, uncontrollable panic, stupor, hysterical muteness, blindness, or paralysis (without real injury). After extended exposure to combat, soldiers may become apathetic, unconcerned about their survival, dependent on others, hypersensitive to sounds and movement, openly fearful and confused, noticeably reclusive, and slow in thinking, responding, or moving. They may suffer from mild tremors, sleep disturbances, depression, diarrhea, and vomiting. Some may smoke excessively and fail to eat.

Still other soldiers may react to the stress of combat (or extended duty in a combat zone, even without combat) with misconduct or stress reactions like insubordination, disobedience, desertion, and maltreatment of enemy prisoners or civilians. The proper response to these behaviors is disciplinary and/or legal action.

FRONT-LINE TREATMENT

Leaders and forward medical personnel must identify battle fatigue and combat stress signs early and begin immediate corrective action. Battle fatigue yields readily to some simple corrective actions. Leaders should base treatment on the concepts in the acronym PIES.

Proximity - Treat as near to the soldier's unit and battle zone as possible; prevent over-evacuation.

Immediacy - Treat as soon as possible after identification.

Expectancy - Treat with the explicitly stated expectation that the soldier will return to his unit and resume his former duties.

Simplicity - Treat using simple, brief, nonmysterious methods to restore physical well-being and self-confidence; use nonmedical terms and techniques.

Corrective intervention usually lasts up to 48 hours. During this time the soldier makes up for food, drink, and sleep deficiencies. He is given the opportunity to ventilate feelings and given meaningful work to do. History has proven that this front-line approach yields an impressive rate of return to duty and significantly decreases the incidence of post-traumatic stress disorders.

Front-line treatment principles include the following. There are additional guidelines in Appendix B. Leaders will—

o Give soldiers brief and immediate attention based on mission, enemy, terrain, troops and time (METT-T).

o Reassure the soldier that this is just battle fatigue - a temporary condition that will improve quickly.

o Provide rest, food and water, good hygiene, and relative relief from danger.

o Restore confidence with structured military work details.

o Avoid using sedatives and tranquilizers.

o Avoid evacuation unless absolutely necessary; it delays recovery.

o Remove the soldier one echelon at a time if removal is necessary.

o Send the soldier back to his unit as soon as possible.

o Refer the soldier to the unit ministry team.

Rest, organized work details, recreation, and individual and group debriefing are all part of treatment. Debriefing focuses on the immediate past battle and the immediate future return to battle. Minimum attention is given to the soldier's family and to his distant past and future. The object is to verbalize the horror and terror of battle and come to grips with normal, powerful emotions of grief, guilt, and remorse.

RETURN TO DUTY

Harsh and heartless as it may sound, return to duty serves both the individual and the Army. Failure to return to duty leads to post-combat mental problems and perhaps a permanent disability.

Commanders will accept combat stress-reaction casualties back to active service in their units soon after having seen them in a state of incapacity. Commanders must show a great deal of trust and cooperation as well as tolerance and acceptance. This is essential to the successful reintegration of the soldier into both

military and civilian life following front-line care.

Many combat stress casualties are hesitant to return to a setting in which they have so obviously failed to function. The encouragement of the commander and the example he sets for the other men in the unit may help the returnee overcome his fear and tip the balance between his being able or unable to resume his fighting role.

Finally, to minimize the incidence of post-traumatic stress disorder in all soldiers, commanders should, as soon as possible after combat, conduct debriefings that deal with the sights and feelings experienced. This will also help bind the unit together as a cohesive fighting force. When appropriate, a brief memorial service for those lost will serve as closure on the traumatic incident.

Most combat survivors don't become anxious or depressed. As a result of training, they are more apt to have inner confidence, a fighting spirit, a positive mental attitude, and a deep faith. They can create a sense of inner calm from the thoughts and pressures of the day. They can use relaxation techniques as a tool to calm the mind and break the cycle of anxiety. They can cope with stress by achieving control over the stress process. They have the inner resources, developed through training, for the mental toughness that is essential for individual and unit success.

APPENDIX A

RELAXATION AND STRESS MANAGEMENT TECHNIQUES

The following relaxation and stress management techniques are easy to learn and practice in nearly any environment. Leaders must ensure that soldiers learn the techniques and use them on a regular basis.

TECHNIQUE No.1 - STRETCH RELAXATION

This technique may be used at any time, but it is especially good after prolonged sitting or being cramped in one position over a period of time. It stretches and relaxes the major muscle groups.

Step 1. Stand straight with your knees slightly bent. Raise your arms straight out to your sides. Bend your elbows so your hands are at chest level. Twist at the waist to the right and the left several times. Then stretch your hands over your head, and bend your elbows so your hands fall behind your head. Take your right hand by the left hand and gently pull downward. Then reverse, taking your left hand by the right hand and gently pulling downward.

Step 2. Stand straight with your knees slightly bent. Drop your head and shoulders, and bend over until your hands are either touching the

ground or are as close to the ground as you can reach without straining. Relax in this position, and hold for several seconds. Turn your trunk to the right and hold for several seconds, then to the left for several seconds. Return to the center position, and slowly stand up straight. Slowly roll your head from right to left, then left to right and back to center.

Step 3. Stand straight with your knees slightly bent. Raise your arms straight out to your sides. Then bend forward, crossing your arms in front of you and reaching toward the ground. Straighten up, uncross your arms, and extend them out to the sides at shoulder level so you are standing in a "T" position. Bend your elbows so your hands are at chest level. Then pull your elbows toward your back. Repeat several times.

Step 4. Stand straight with your knees slightly bent. Stretch your arms up over your head. Bend over, and reach with your hands in front of your body as far from your feet as possible. Straighten up. Repeat several times.

Step 5. Lie on your back on the ground with your arms stretched over your head and your legs stretched out in front of you. Lift your legs slightly off the ground, and spread and close them.

TECHNIQUE No.2 - MUSCLE RELAXATION

This five-minute technique relaxes the body and clears the mind; it may be combined with imagery or other techniques.

Step 1. Remove all distractions to include smoking noise, and talking close by. Loosen tight-fitting clothing to include belt, boots, and backpack. Sit or lie down in a comfortable position.

Step 2. Concentrate on slowly stretching your arms and legs and making yourself comfortable. Shut your eyes, and consciously remove all thoughts from your mind for about 15 seconds.

Step 3. Next, you will tense and relax various muscles in your body, tightening for two or three seconds, then relaxing, and repeating the exercise once. Start with the feet, then move to the calves, thighs, buttocks, abdomen, hands, forearms, upperarms, neck, and face. While doing this, deeply breathe in through your nose and out through your mouth.

Step 4. After completing the muscle groups, shake your arms and legs to remove tension while concentrating on relaxing your body. Continue deep breathing for several minutes before opening your eyes.

TECHNIQUE No.3 - IMAGERY

You may either move from the muscle relaxation technique into imagery or start with the imagery technique.

Step 1. Search your memory for a familiar place where you can relax.

Step 2. Shut your eyes and visualize the place. Recall the feelings of relaxation that accompanied that place.

Step 3. After relaxing for a few moments, slowly open your eyes.

This technique can be practiced any time or place. The only requirement is that you are in a safe location when you practice it.

TECHNIQUE No.4 - MEDITATION

Meditation is an old technique that was once associated with non-Judeo-Christian religions. In recent years, the essence has been used in a non-religious setting to teach the mind to focus and concentrate and the body to relax.

Step 1. Shake the tension from your arms and legs. Roll your head a few times to the right, then the left. Stretch your arms above your head, and arch your back. Now, sit or lie down in a comfortable position.

Step 2. Shut your eyes and concentrate on relaxing each muscle group of your body starting from your head and moving downward or from your feet and moving upward.

Step 3. Select a one-syllable word such as "sky," "grass," or "lake," that recalls to your conscious mind a quiet, peaceful scene.

Step 4. Concentrate on slowly breathing in through your nose and out through your mouth while repeating the word.

Step 5. Repeat this process every day for 15 to 20 minutes.

Ignore interruptions. If distracting thoughts or pictures enter your mind, ignore them, and concentrate on breathing and repeating your one-syllable word.

Experts agree that this technique increases the ability to focus the thoughts. By practicing daily for several months, you will be able to call on this technique when you need to concentrate and focus and to relax quickly.

TECHNIQUE No.5 - SELF-MASSAGE

You can use the following self-massage techniques whenever it is convenient -in a transport plane or truck, in a foxhole or tent,

and so on. The first technique releases neck tension often associated with headaches. The second is a foot massage that relaxes tired, aching feet. Soaking the feet in warm water with Epsom salts for about 10 minutes will also relax them.

NECK TENSION RELEASE

Step 1. Place your fingers on the back of your neck at the base of your head.

Step 2. Massage with a circular motion applying light pressure.

Step 3. Stop massaging, and apply pressure for 10 to 15 seconds, then release. Repeat several times.

Step 4. Continue the circular motions with your fingers on the back and sides of your neck.

FOOT MASSAGE

Step 1. Sit in a comfortable position that allows you to reach your foot easily.

Step 2. Using your thumbs, massage the entire sole of your foot from toes to heel, applying moderate pressure from the center of your foot outward to the sides. Repeat several times on each foot.

Step 3. Gently pull and twist each toe.

APPENDIX B

STRESS IN BATTLE :A COMMANDER'S GUIDE

This guide describes soldiers' reactions to combat stress and ways to deal with these reactions. There are three sections:

I. Combat Stress and Treatment
II. Maximizing Morale
III. NBC Operations

Keep the following points in mind:

o Some reactions to stress must be expected. They are not a sign of illness.

o The effects of stress can be reduced by immediate action.

o Look for stress reactions in yourself and in others.

o Help others as a soldier and a friend.

o Call for your section leader or a medic only if reactions persist or become very severe.

Remember the stress management principles. They are as easy as PIES.

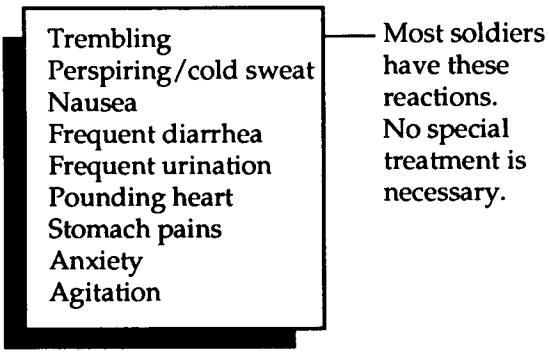
Proximity - Treat as close to the unit as the situation permits.

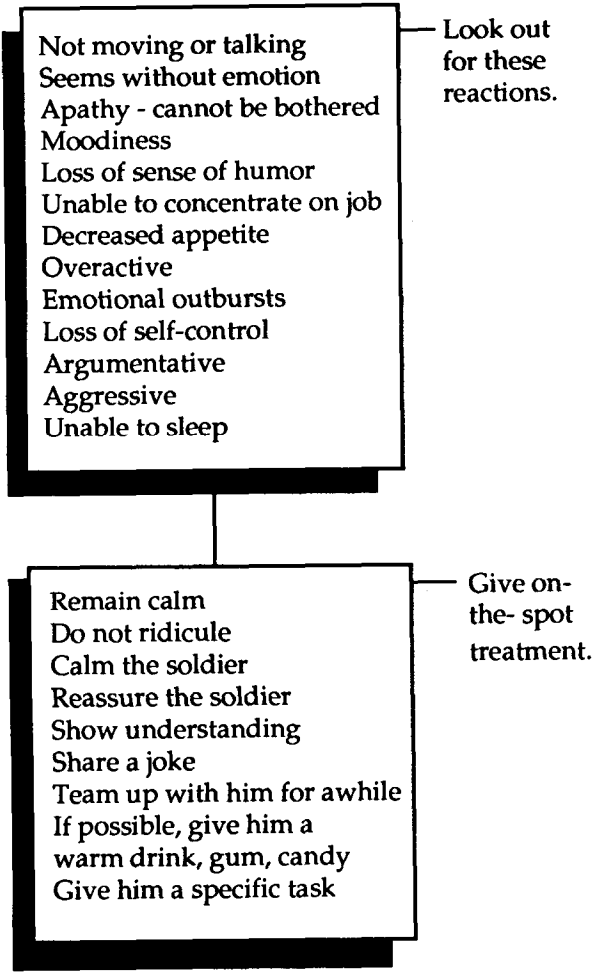
Immediacy - Treat quickly and briefly.

Expectancy - Express a positive expectation for recovery and rapid return to unit and former duties.

Simplicity - Use simple, brief, nonmysterious methods to restore physical well-being and self-confidence; use nonmedical terms and techniques.

I. COMBAT STRESS AND TREATMENT




Not moving or talking
Seems without emotion
Apathy - cannot be bothered
Moodiness
Loss of sense of humor
Unable to concentrate on job
Decreased appetite
Overactive
Emotional outbursts
Loss of self-control
Argumentative
Aggressive
Unable to sleep
Look out for these reactions.
Remain calm
Do not ridicule
Calm the soldier
Reassure the soldier
Show understanding
Share a joke
Team up with him for awhile
If possible, give him a warm drink, gum, candy
Give him a specific task
Give on-the- spot treatment.

Report to your superior.

Repeated nausea and vomiting
Inability to use some parts of the body
Unable to perform job
Feelings of guilt
Excessive use of alcohol/tobacco

— Severe reactions.

Unit treatment is necessary.

Keep soldier with unit but away from battle
Allow him to sleep
Treat him as a soldier, not as a patient
Have someone stay near him - supervise
Have members of his unit interested in his welfare
Have him help on small jobs
Return him to unit after about two days

If reactions still persist or are very severe,
CALL A MEDIC.

II. MAXIMIZING MORALE

Look after the needs of the soldiers.

- o Know your soldiers:

  Be friendly and approachable.
  how a few personal details - spouse's name, home town, etc.
  Show concern for their welfare - food, rest, etc.
  Share hardships.
  Show confidence in the soldier.
  Reward good performance.
  Do not criticize a soldier in front of others.
  Pair inexperienced with experienced soldiers.

- o Look out for:

  The young, inexperienced recruit.
  Soldiers with financial, marital/personal problems.
  Soldier who overindulges in alcohol/drugs.
  The loner who is uncommunicative.
  The restless soldier.
  The pessimist who believes he is doomed.
  The soldier who is ill-prepared for his assignment.

Encourage team spirit.

o Know your unit:

Praise individuals and teams for good performance.
Point out the importance of the unit's role.
Emphasize the importance of unit effort.
Express confidence in the unit.
Involve the unit in making future plans.
Make plans realistic for the unit's/soldiers' abilities.
Disseminate information whenever possible.
Allocate tasks fairly.

o Look out for:

Lack of team spirit.
Low productivity.
Bickering.
Dissatisfaction about everything and anything.
Reporting sick for minor illnesses.
Oversensitivity to criticism.
Ignoring orders or taking shortcuts.
Dumb insolence.
AWOL.

Match the soldiers' abilities to the jobs.

o Think:

WHAT must be done.
HOW to do it.
WHO can do it.
HOW LONG must he do it.

o Know the job demands:

Match the job requirements to the soldier's abilities.
When possible, assign two soldiers per job.
Ensure the soldier knows exactly what he has to do.
Ensure he knows how to do the job.
Make sure orders are clear and understood.
Make sure radio communications are clearly understood.
Repeat communications if necessary.
Rotate jobs when possible.

o Look out for:

Inaccurate communications.
Messages over-simplified - loss of detail.
Confusion - soldier not sure what to do..
Forgetfulness - procedures not followed properly.

Vital bits of information
are missed.
Lack of awareness - absorbed in
minor problems.
Lack of confidence - soldier slow
and cautious.

III. NBC OPERATIONS

In NBC operations, commanders should be aware of the following factors:

o Combat stress reactions may occur earlier than in conventional combat.

o Increased feelings of isolation can lead to loss of individual and group morale and decline in military performance.

o Soldiers may panic and attempt to remove their respirator or ignore drills.

o Soldiers may accidentally give themselves overdoses of prophylactic drugs.

o The use of prophylactic drugs could cause behavioral changes such as slowing of actions and reactions.

o Maintain morale by keeping in regular contact with the soldiers and keeping them informed of the situation.

o Command and control are more difficult because of communication and soldier identification problems.

Source: UK Army Personnel Research Establishment

GLOSSARY

Circadian Rhythm - rhythmic variations in individuals; predictable physiological and behavioral cycle of about 24 hours

CONOPS - continuous operations. Continuous land combat with some opportunity for sleep although it maybe brief or fragmented

CONUS - continental United States

DA - Department of the Army

e.g. - for example

etc. - et cetera (and so forth)

FIST - fire support team

FM - field manual

hrs - hours

i.e. - that is

min - minute

MRE - meal ready to eat. Dehydrated food to which water must be added

NBC - nuclear, biological, chemical

No. - number

PIES - Proximity, Immediacy, Expectancy, Simplicity. Reminder acronym used in association with treatment of battle fatigue casualties

refs - references

sleep debt - cumulative loss of sleep over a period of days

sleep fragmentations - repeated arousals or full awakenings from sleep

sleep inertia - period of grogginess upon awakening from sleep lasting from 5 to 15 minutes

SOP - standing operating procedure

stress - tension or pressure caused by change such as accident or injury or by impending threat or other difficult situations

SUSOPS - sustained operations. Continuous land combat with no opportunity for sleep

UK - United Kingdom

U.S. - United States

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