DCS Type	Bubble Location	Signs and Symptoms (Clinical Manifestations)
BENDS	Mostly large joints of the body (elbows, shoulders, hip, wrists, knees, ankles)	• Localized deep pain, ranging from mild (a "niggle") to excruciating–sometimes a dull ache, but rarely a sharp pain • Active and passive motion of the joint aggravating the pain • Pain occurring at altitude, during the descent, or many hours later
NEUROLOGIC Manifestations	Brain	• Confusion or memory loss • Headache • Spots in visual field (scotoma), tunnel vision, double vision (diplopia), or blurry vision • Unexplained extreme fatigue or behavior changes • Seizures, dizziness, vertigo, nausea, vomiting, and unconsciousness
	Spinal cord	• Abnormal sensations, such as burning, stinging, and tingling, around the lower chest and back • Symptoms spreading from the feet up and possibly accompanied by ascending weakness or paralysis • Girdling abdominal or chest pain
	Peripheral nerves	• Urinary and rectal incontinence • Abnormal sensations, such as numbness, burning, stinging and tingling (paresthesia) • Muscle weakness or twitching
CHOKES	Lungs	• Burning deep chest pain (under the sternum) • Pain aggravated by breathing • Shortness of breath (dyspnea) • Dry constant cough
SKIN BENDS	Skin	• Itching usually around the ears, face, neck, arms, and upper torso • Sensation of tiny insects crawling over the skin • Mottled or marbled skin usually around the shoulders, upper chest, and abdomen accompanied by itching • Swelling of the skin, accompanied by tiny scar-like skin depressions (pitting edema)

Figure 17-10. *Signs and symptoms of altitude decompression sickness.*

evolved gas can occur during exposure to low altitude and create a serious inflight emergency.

The recommended waiting time before going to flight altitudes of up to 8,000 feet is at least 12 hours after diving that does not require controlled ascent (nondecompression stop diving), and at least 24 hours after diving that does require controlled ascent (decompression stop diving). The waiting time before going to flight altitudes above 8,000 feet should be at least 24 hours after any scuba dive. These recommended altitudes are actual flight altitudes above mean sea level (MSL) and not pressurized cabin altitudes. This takes into consideration the risk of decompression of the aircraft during flight.

Vision in Flight

Of all the senses, vision is the most important for safe flight. Most of the things perceived while flying are visual or heavily supplemented by vision. As remarkable and vital as it is, vision is subject to limitations, such as illusions and blind spots. The more a pilot understands about the eyes and how they function, the easier it is to use vision effectively and compensate for potential problems.

The eye functions much like a camera. Its structure includes an aperture, a lens, a mechanism for focusing, and a surface for registering images. Light enters through the cornea at the front of the eyeball, travels through the lens, and falls on the retina. The retina contains light sensitive cells that convert

Figure 17-11. *To avoid the bends, scuba divers must not fly for specific time periods following dives.*

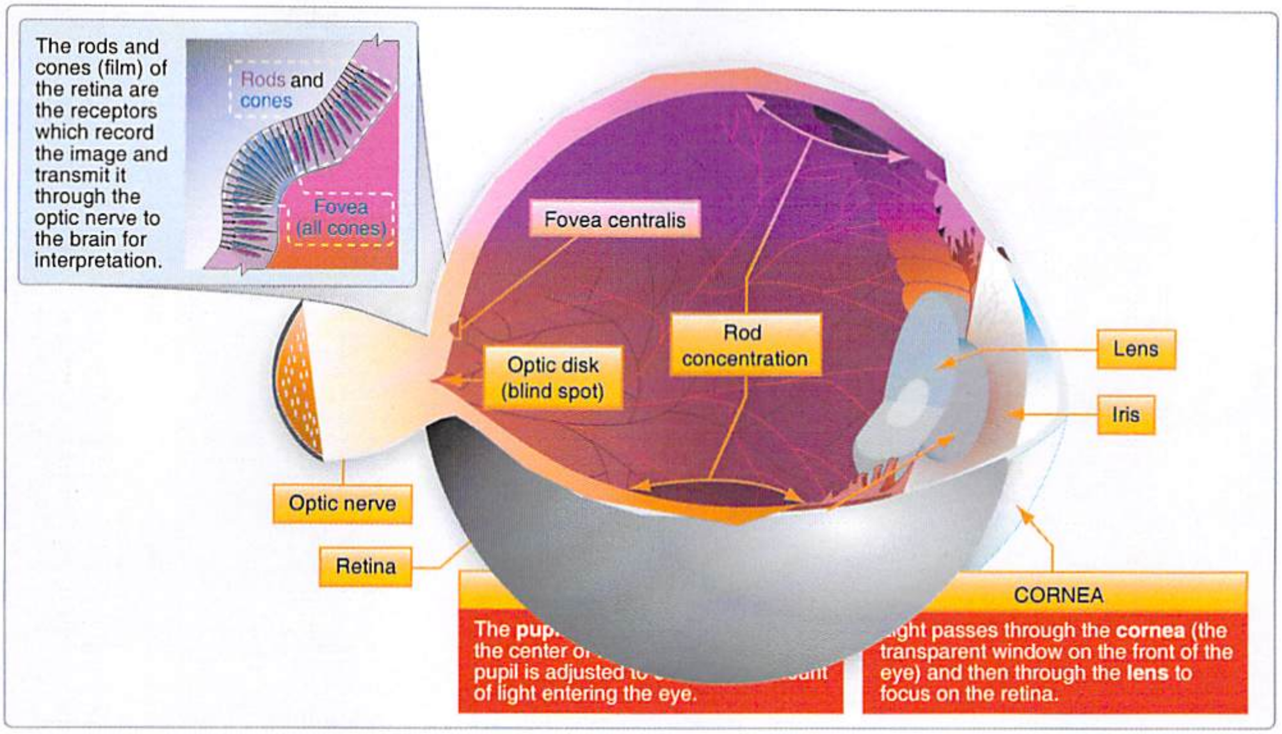

Figure 17-12. *The human eye.*

light energy into electrical impulses that travel through nerves to the brain. The brain interprets the electrical signals to form images. There are two kinds of light-sensitive cells in the eyes: rods and cones. *[Figure 17-12]*

The cones are responsible for all color vision, from appreciating a glorious sunset to discerning the subtle shades in a fine painting. Cones are present throughout the retina, but are concentrated toward the center of the field of vision at the back of the retina. There is a small pit called the fovea where almost all the light sensing cells are cones. This is the area where most "looking" occurs (the center of the visual field where detail, color sensitivity, and resolution are highest).

While the cones and their associated nerves are well suited to detecting fine detail and color in high light levels, the rods are better able to detect movement and provide vision in dim light. The rods are unable to discern color but are very sensitive at low-light levels. The trouble with rods is that a large amount of light overwhelms them, and they take longer to "reset" and adapt to the dark again. There are so many cones in the fovea that are at the very center of the visual field but virtually has no rods at all. So in low light, the middle of the visual field is not very sensitive, but farther from the fovea, the rods are more numerous and provide the major portion of night vision.

Vision Types

There are three types of vision: photopic, mesopic, and scotopic. Each type functions under different sensory stimuli or ambient light conditions. *[Figure 17-13]*

Photopic Vision

Photopic vision provides the capability for seeing color and resolving fine detail (20/20 or better), but it functions only in good illumination. Photopic vision is experienced during daylight or when a high level of artificial illumination exists.

Types of Vision						
Types of vision used	**Light level**	**Technique of viewing**	**Color perception**	**Receptors used**	**Acuity best**	**Blind spot**
Photopic	High	Central	Good	Cones	20/20	Day
Mesopic	Medium/Low	Both	Some	Cones/Rods	Varies	Day/Night
Scotopic	Low	Scanning	None	Rods	20/200	Day/Night

Figure 17-13. *Types of vision.*

The cones concentrated in the fovea centralis of the eye are primarily responsible for vision in bright light. *[Figure 17-12]* Because of the high light level, rhodopsin, which is a biological pigment of the retina that is responsible for both the formation of the photoreceptor cells and the first events in the perception of light, is bleached out causing the rod cells to become less effective.

Mesopic Vision

Mesopic vision is achieved by a combination of rods and cones and is experienced at dawn, dusk, and during full moonlight. Visual acuity steadily decreases as available light decreases and color perception changes because the cones become less effective. Mesopic viewing period is considered the most dangerous period for viewing. As cone sensitivity decreases, pilots should use off-center vision and proper scanning techniques to detect objects during low-light levels.

Scotopic Vision

Scotopic vision is experienced under low-light levels and the cones become ineffective, resulting in poor resolution of detail. Visual acuity decreases to 20/200 or less and enables a person to see only objects the size of or larger than the big "E" on visual acuity testing charts from 20 feet away. In other words, a person must stand at 20 feet to see what can normally be seen at 200 feet under daylight conditions. When using scotopic vision, color perception is lost and a night blind spot in the central field of view appears at low light levels when the cone-cell sensitivity is lost.

Central Blind Spot

The area where the optic nerve connects to the retina in the back of each eye is known as the optic disk. There is a total absence of cones and rods in this area, and consequently, each eye is completely blind in this spot. *[Figure 17-14]* As a result, it is referred to as the blind spot that everyone

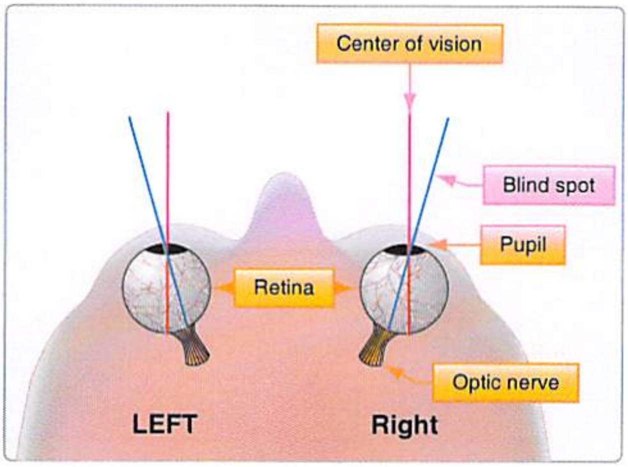

Figure 17-14. *Central blind spot.*

has in each eye. Under normal binocular vision conditions (both eyes are used together), this is not a problem because an object cannot be in the blind spot of both eyes at the same time. On the other hand, where the field of vision of one eye is obstructed by an object (windshield divider or another aircraft), a visual target could fall in the blind spot of the other eye and remain undetected.

Figure 17-15 provides a dramatic example of the eye's blind spot.

1. Hold this page at an arm's length.
2. Completely cover your left eye (without closing or pressing on it) using your hand or other flat object.
3. With your right eye, stare directly at the airplane on the left side of the picture page. In your periphery, you will notice the black X on the right side of the picture.
4. Slowly move the page closer to you while continuing to stare at the airplane.

Figure 17-15. *The eye's blind spot.*

5. When the page is about 16–18 inches from you, the black X should disappear completely because it has been imaged onto the blind spot of your right eye. (Resist the temptation to move your right eye while the black X is gone or else it reappears. Keep staring at the airplane.)
6. As you continue to look at the airplane, keep moving the page closer to you a few more inches, and the black X will come back into view.
7. There is an interval where you are able to move the page a few inches backward and forward, and the black X will be gone. This demonstrates to you the extent of your blind spot.
8. You can try the same thing again, except this time with your right eye covered stare at the black X with your left eye. Move the page in closer and the airplane will disappear.

Another way to check your blind spot is to do a similar test outside at night when there is a full moon. Cover your left eye, looking at the full moon with your right eye. Gradually move your right eye to the left (and maybe slightly up or down). Before long, all you will be able to see is the large halo around the full moon; the entire moon itself will seem to have disappeared.

Empty-Field Myopia

Empty-field myopia is a condition that usually occurs when flying above the clouds or in a haze layer that provides nothing specific to focus on outside the aircraft. This causes the eyes to relax and seek a comfortable focal distance that may range from 10 to 30 feet. For the pilot, this means looking without seeing, which is dangerous. Searching out and focusing on distant light sources, no matter how dim, helps prevent the onset of empty-field myopia.

Night Vision

There are many good reasons to fly at night, but pilots must keep in mind that the risks of night flying are different than during the day and often times higher. *[Figure 17-16]* Pilots who are cautious and educated on night-flying techniques can mitigate those risks and become very comfortable and proficient in the task.

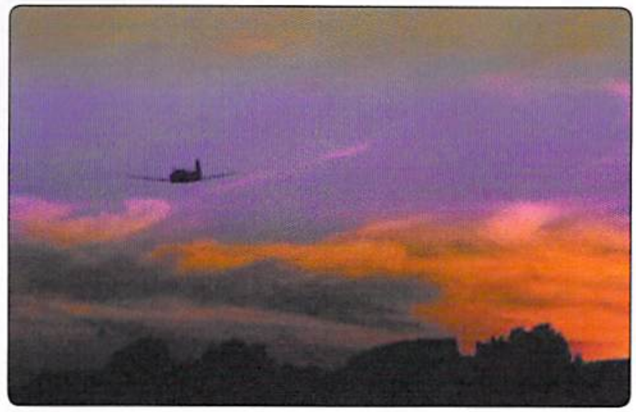

Figure 17-16. *Night vision.*

Night Blind Spot

It is estimated that once fully adapted to darkness, the rods are 10,000 times more sensitive to light than the cones, making them the primary receptors for night vision. Since the cones are concentrated near the fovea, the rods are also responsible for much of the peripheral vision. The concentration of cones in the fovea can make a night blind spot in the center of the field of vision. To see an object clearly at night, the pilot must expose the rods to the image. This can be done by looking 5° to 10° off center of the object to be seen. This can be tried in a dim light in a darkened room. When looking directly at the light, it dims or disappears altogether. When looking slightly off center, it becomes clearer and brighter.

When looking directly at an object, the image is focused mainly on the fovea, where detail is best seen. At night, the ability to see an object in the center of the visual field is reduced as the cones lose much of their sensitivity and the rods become more sensitive. Looking off center can help compensate for this night blind spot. Along with the loss of

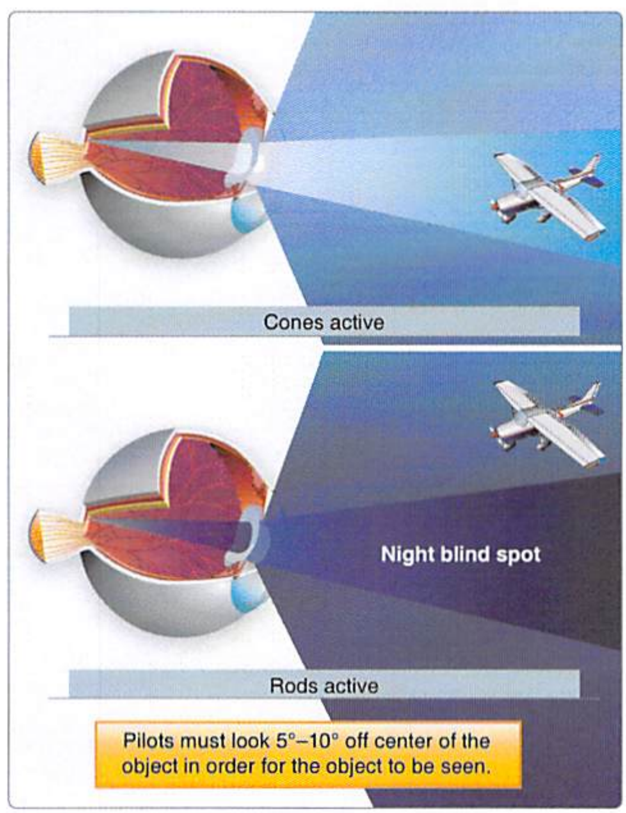

Figure 17-17. *Night blind spot.*

sharpness (acuity) and color at night, depth perception and judgment of size may be lost. *[Figure 17-17]*

Dark Adaptation

Dark adaptation is the adjustment of the human eye to a dark environment. That adjustment takes longer depending on the amount of light in the environment that a person has just left. Moving from a bright room into a dark one takes longer than moving from a dim room and going into a dark one.

While the cones adapt rapidly to changes in light intensities, the rods take much longer. Walking from bright sunlight into a dark movie theater is an example of this dark adaptation period experience. The rods can take approximately 30 minutes to fully adapt to darkness. A bright light, however, can completely destroy night adaptation, leaving night vision severely compromised while the adaptation process is repeated.

Scanning Techniques

Scanning techniques are very important in identifying objects at night. To scan effectively, pilots must look from right to left or left to right. They should begin scanning at the greatest distance an object can be perceived (top) and move inward toward the position of the aircraft (bottom). For each stop, an area approximately 30° wide should be scanned. The duration of each stop is based on the degree of detail that is required, but no stop should last longer than 2 to 3 seconds. When moving from one viewing point to the next, pilots should overlap the previous field of view by 10°. *[Figure 17-18]*

Off-center viewing is another type of scan that pilots can use during night flying. It is a technique that requires an object be viewed by looking 10° above, below, or to either side of the object. *[Figure 17-19]* In this manner, the peripheral vision can maintain contact with an object.

With off-center vision, the images of an object viewed longer than 2 to 3 seconds will disappear. This occurs because the rods reach a photochemical equilibrium that prevents any further response until the scene changes. This produces a potentially unsafe operating condition. To overcome this night vision limitation, pilots must be aware of the phenomenon and avoid viewing an object for longer than 2 or 3 seconds. The peripheral field of vision will continue to pick up the object when the eyes are shifted from one off-center point to another.

Night Vision Protection

Several things can be done to help with the dark adaptation process and to keep the eyes adapted to darkness. Some of the steps pilots and flight crews can take to protect their night vision are described in the following paragraphs.

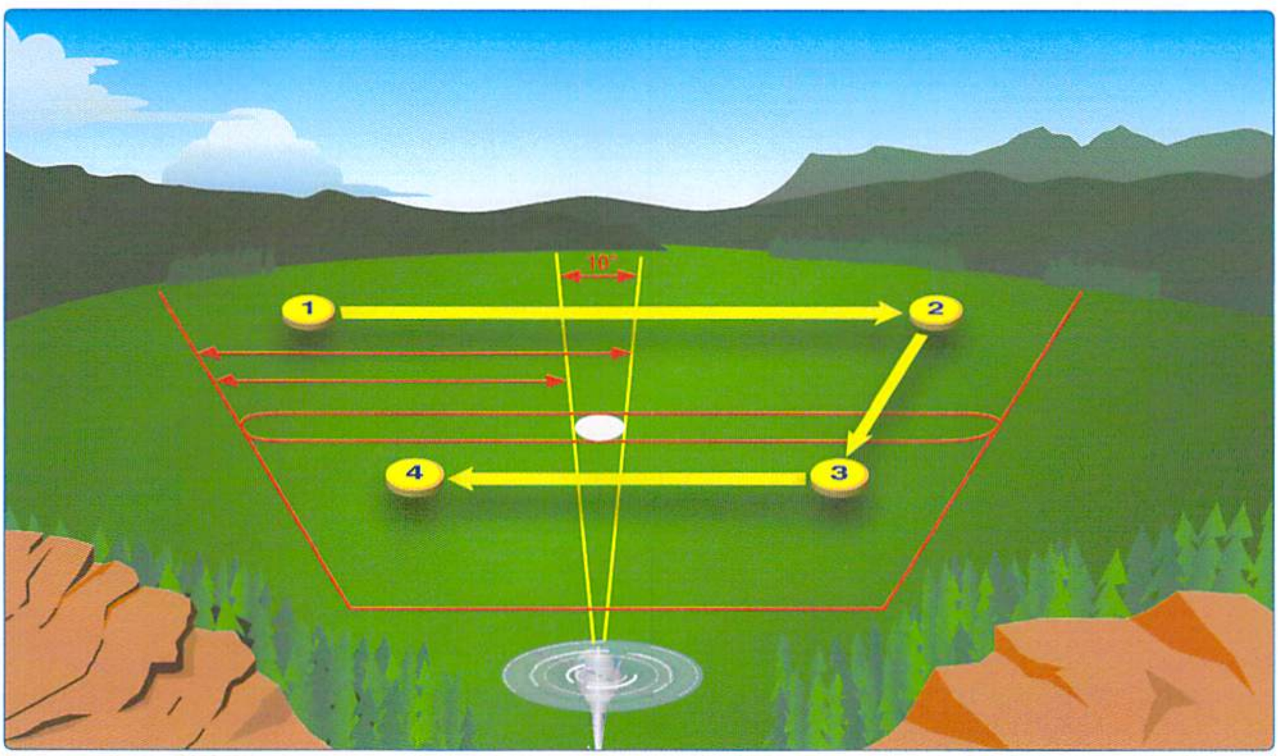

Figure 17-18. *Scanning techniques.*

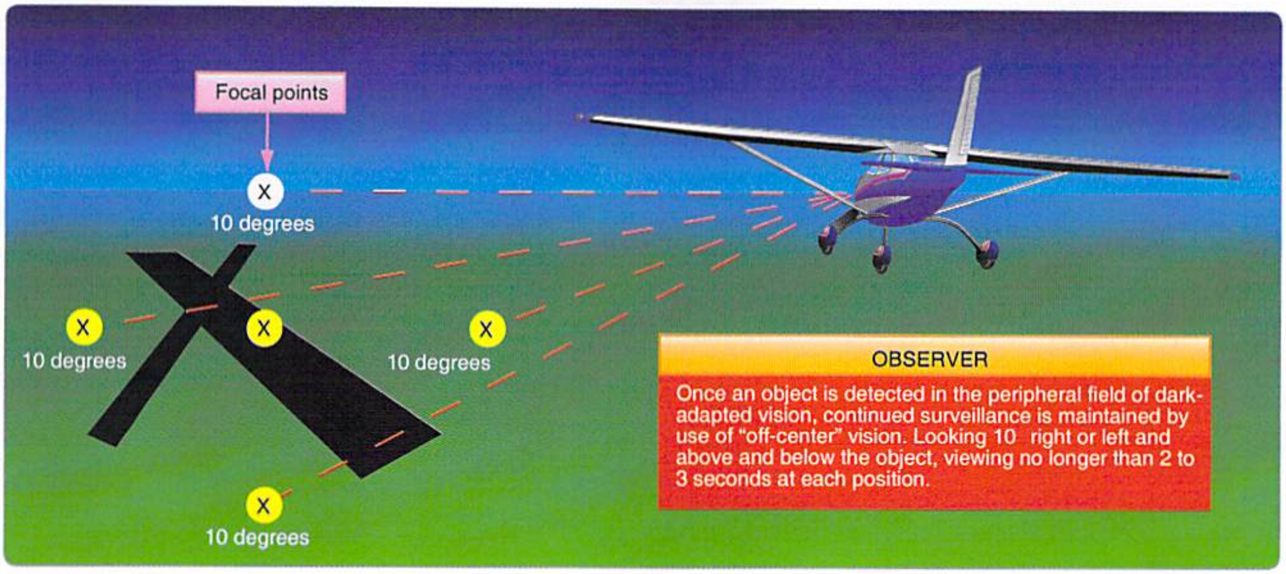

Figure 17-19. *Off-center viewing.*

Sunglasses

If a night flight is scheduled, pilots and crew members should wear neutral density (N-15) sunglasses or equivalent filter lenses when exposed to bright sunlight. This precaution increases the rate of dark adaptation at night and improves night visual sensitivity.

Oxygen Supply

Unaided night vision depends on optimum function and sensitivity of the rods of the retina. Lack of oxygen to the rods (hypoxia) significantly reduces their sensitivity. Sharp clear vision (with the best being equal to 20–20 vision) requires significant oxygen especially at night. Without supplemental oxygen, an individual's night vision declines measurably at pressure altitudes above 4,000 feet. As altitude increases, the available oxygen decreases, degrading night vision. Compounding the problem is fatigue, which minimizes physiological well being. Adding fatigue to high altitude exposure is a recipe for disaster. In fact, if flying at night at an altitude of 12,000 feet, the pilot may actually see elements of his or her normal vision missing or not in focus. Missing visual elements resemble the missing pixels in a digital image while unfocused vision is dim and washed out.

For the pilot suffering the effects of hypoxic hypoxia, a simple descent to a lower altitude may not be sufficient to reestablish vision. For example, a climb from 8,000 feet to 12,000 feet for 30 minutes does not mean a descent to 8,000 feet will rectify the problem. Visual acuity may not be regained for over an hour. Thus, it is important to remember, altitude and fatigue have a profound effect on a pilot's ability to see.

High Intensity Lighting

If, during the flight, any high intensity lighting areas are encountered, attempt to turn the aircraft away and fly in the periphery of the lighted area. This will not expose the eyes to such a large amount of light all at once. If possible, plan your route to avoid direct over flight of built-up, brightly lit areas.

Flightdeck Lighting

Flightdeck lighting should be kept as low as possible so that the light does not monopolize night vision. After reaching the desired flight altitude, pilots should allow time to adjust to the flight conditions. This includes readjustment of instrument lights and orientation to outside references. During the adjustment period, night vision should continue to improve until optimum night adaptation is achieved. When it is necessary to read maps, charts, and checklists, use a dim white light flashlight and avoid shining it in your or any other crewmember's eyes.

Airfield Precautions

Often time, pilots have no say in how airfield operations are handled, but listed below are some precautions that can be taken to make night flying safer and help protect night vision.

- Airfield lighting should be reduced to the lowest usable intensity.
- Maintenance personnel should practice light discipline with headlights and flashlights.
- Position the aircraft at a part of the airfield where the least amount of lighting exists.

- Select approach and departure routes that avoid highways and residential areas where illumination can impair night vision.

Self-Imposed Stress

Night flight can be more fatiguing and stressful than day flight, and many self- imposed stressors can limit night vision. Pilots can control this type of stress by knowing the factors that can cause self-imposed stressors. Some of these factors are listed in the following paragraphs. *[Figure 17-20]*

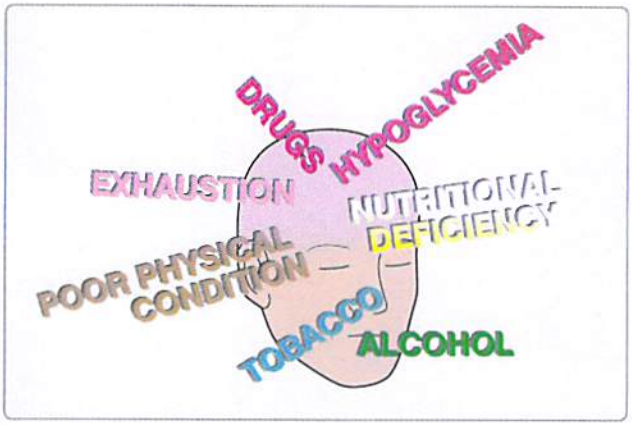

Figure 17-20. *Self-imposed stress.*

Drugs

Drugs can seriously degrade visual acuity during the day and especially at night. Pilots who become ill should consult an aviation medical examiner (AME) or flight surgeon as to which drugs are appropriate to take while flying.

Exhaustion

Pilots who become fatigued during a night flight will not be mentally alert and will respond more slowly to situations requiring immediate action. Exhausted pilots tend to concentrate on one aspect of a situation without considering the total requirement. Their performance may become a safety hazard depending on the degree of fatigue and instead of using proper scanning techniques may get fixated on the instruments or stare off rather than multitask.

Poor Physical Conditioning

To overcome poor physical conditioning, pilots should participate in regular exercise programs. People who are physically fit become less fatigued during flight and have better night scanning efficiency. However, too much exercise in a given day may leave crew members too fatigued for night flying.

Alcohol

Alcohol is a sedative and its use impairs both coordination and judgment. As a result, pilots who are impaired by alcohol fail to apply the proper techniques of night vision. They are likely to stare at objects and to neglect scanning techniques. The amount of alcohol consumed determines the degree to which night vision is affected. The effects of alcohol are long lasting and the residual effects of alcohol can also impair visual scanning efficiency.

Tobacco

Of all the self-imposed stressors, cigarette smoking most decreases visual sensitivity at night. Smoking significantly increases the amount of carbon monoxide carried by the hemoglobin in red blood cells. This reduces the blood's capacity to combine with oxygen, so less oxygen is carried in the blood. Hypoxia caused by carbon monoxide poisoning affects peripheral vision and dark adaptation. The results are the same as those for hypoxia caused by high altitude. Smoking 3 cigarettes in rapid succession or 20 to 30 cigarettes within a 24-hour period may saturate from 8 to 10 percent of the capacity of hemoglobin. Smokers lose 20 percent of their night vision capability at sea level, which is equal to a physiological altitude of 5,000 feet.

Hypoglycemia and Nutritional Deficiency

Missing or postponing meals can cause low blood sugar, which impairs night flight performance. Low blood sugar levels may result in stomach contractions, distraction, breakdown in habit pattern, and a shortened attention span. Likewise, an insufficient consumption of vitamin A may also impair night vision. Foods high in vitamin A include eggs, butter, cheese, liver, apricots, peaches, carrots, squash, spinach, peas, and most types of greens. High quantities of vitamin A do not increase night vision but a lack of vitamin A certainly impairs it.

Distance Estimation and Depth Perception

Knowledge of the mechanisms and cues affecting distance estimation and depth perception assist pilots in judging distances at night. These cues may be monocular or binocular. The monocular cues that aid in distance estimation and depth perception include motion parallax, geometric perspective, retinal image size, and aerial perspective.

Motion Parallax

Motion parallax refers to the apparent motion of stationary objects as viewed by an observer moving across the landscape. When the pilot or crewmember looks outside the aircraft perpendicular to the direction of travel, near objects appear to move backward, past, or opposite the path of motion; far objects seem to move in the direction of motion or remain fixed. The rate of apparent movement depends on the distance the observer is from the object.

Geometric Perspective

An object may appear to have a different shape when viewed at varying distances and from different angles. Geometric perspective cues include linear perspective, apparent foreshortening, and vertical position in the field.

- Linear perspective—parallel lines, such as runway lights, power lines and railroad tracks, tend to converge as distance from the observer increases. *[Figure 17-21A]*
- Apparent foreshortening—the true shape of an object or a terrain feature appears elliptical when viewed from a distance. *[Figure 17-21B]*
- Vertical position in the field—objects or terrain features farther away from the observer appear higher on the horizon than those closer to the observer. *[Figure 17-21C]*

Aerial Perspective

The clarity of an object and the shadow cast by it are perceived by the brain and are cues for estimating distance. Subtle variations in color or shade are clearer the closer the observer is to an object. However, as distance increases, these distinctions may become blurry. The same applies to an object detail or texture. As a person gets farther from an object, its discrete details become less apparent. Another important fact to remember while flying at night is that every object casts a shadow from a light source. The direction in which the shadow is cast depends on the position of the light source. If the shadow of an object is cast toward the observer, the object is closer than the light source is to the observer.

Binocular Cues

Binocular cues of an object are dependent upon the slightly different viewing angle of each eye of an object. Binocular perception is useful only when the object is close enough to make an obvious difference in the viewing angle of both eyes. In the flight environment, most distances outside the cockpit are so great that binocular cues are of little, if any, value. In addition, binocular cues operate on a more subconscious level than monocular cues and are performed automatically.

Night Vision Illusions

There are many different types of visual illusions that commonly occur at night. Anticipating and maintaining awareness of them is usually the best way to avoid them.

Autokinesis

Autokinesis is caused by staring at a single point of light against a dark background for more than a few seconds. After a few moments, the light appears to move on its own. Apparent movement of the light source will begin in about 8 to 10 seconds. To prevent this illusion, focus the eyes on objects at varying distances and avoid fixating on one source of light. This illusion can be eliminated or reduced by visual scanning, by increasing the number of lights, or by varying the light intensity. The most important of the three solutions is visual scanning. A light or lights should not be stared at for more than 10 seconds.

False Horizon

A false horizon can occur when the natural horizon is obscured or not readily apparent. It can be generated by confusing bright stars and city lights. It can also occur while flying toward the shore of an ocean or a large lake. Because of the relative darkness of the water, the lights along the shoreline can be mistaken for stars in the sky. *[Figure 17-22]*

Reversible Perspective Illusion

At night, an aircraft may appear to be moving away from a second aircraft when it is, in fact, approaching a second aircraft. This illusion often occurs when an aircraft is flying

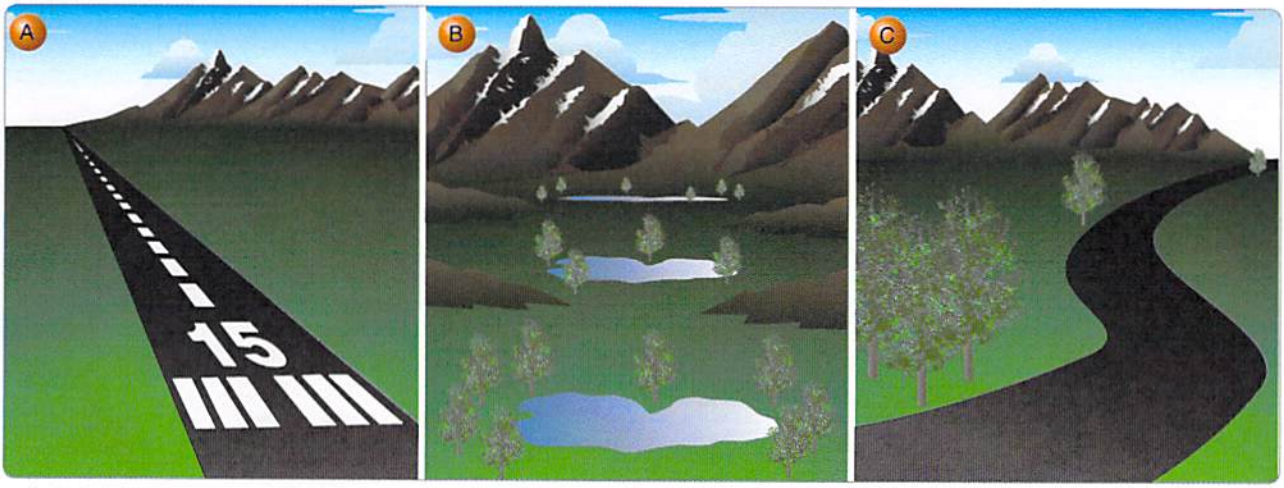

Figure 17-21. *Geometric perspective.*

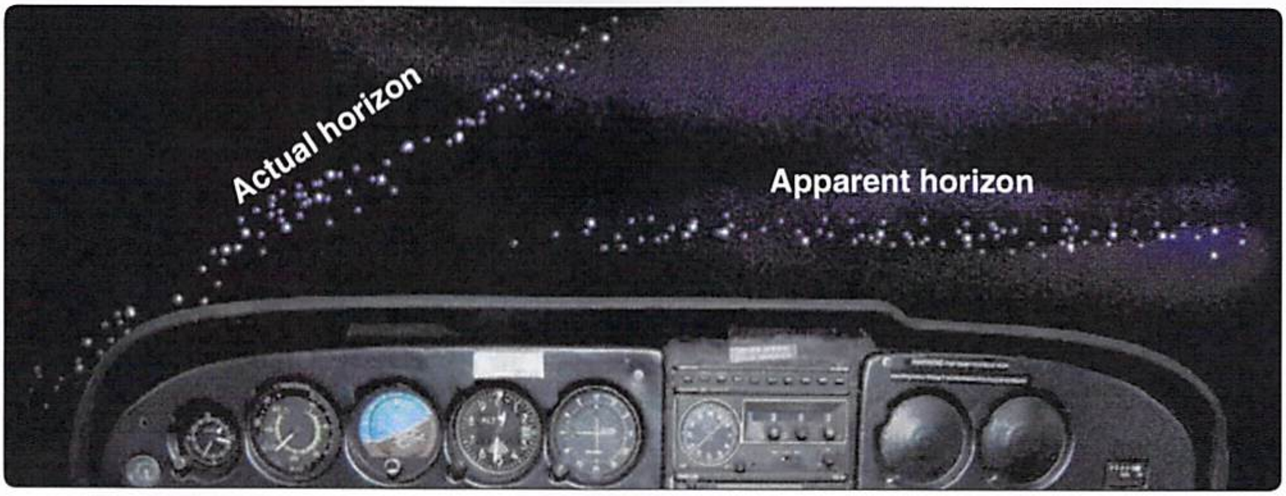

Figure 17-22. *At night, the horizon may be hard to discern due to dark terrain and misleading light patterns on the ground.*

parallel to another's course. To determine the direction of flight, pilots should observe aircraft lights and their relative position to the horizon. If the intensity of the lights increases, the aircraft is approaching; if the lights dim, the aircraft is moving away.

Size-Distance Illusion

This illusion results from viewing a source of light that is increasing or decreasing in luminance (brightness). Pilots may interpret the light as approaching or retreating.

Fascination (Fixation)

This illusion occurs when pilots ignore orientation cues and fix their attention on a goal or an object. Student pilots tend to have this happen when they are concentrating on the aircraft instruments or attempting to land. They become fixated on one task and forget to look at what is going on around them. At night, this can be especially dangerous because aircraft ground-closure rates are difficult to determine, and there may be minimal time to correct the situation.

Flicker Vertigo

A light flickering at a rate between 4 and 20 cycles per second can produce unpleasant and dangerous reactions. Such conditions as nausea, vomiting, and vertigo may occur. On rare occasions, convulsions and unconsciousness may also occur. Proper scanning techniques at night can prevent pilots from getting flicker vertigo.

Night Landing Illusions

Landing illusions occur in many forms. Above featureless terrain at night, there is a natural tendency to fly a lower-than-normal approach. Elements that cause any type of visual obscurities, such as rain, haze, or a dark runway environment, can also cause low approaches. Bright lights, steep surrounding terrain, and a wide runway can produce the illusion of being too low with a tendency to fly a higher-than-normal approach. A set of regularly spaced lights along a road or highway can appear to be runway lights. Pilots have even mistaken the lights on moving trains as runway or approach lights. Bright runway or approach lighting systems can create the illusion that the aircraft is closer to the runway, especially where few lights illuminate the surrounding terrain.

Prior to flying at night, it is best to learn and know the challenges of the area in which you are flying in. Study the area and know how to navigate your way through areas that may pose a problem at night. For example, many areas near water may be obscured by low lying clouds or fog. To help deal with this type of situation, it is important to have a plan before you leave the ground. In the daytime, fly the routes and passes that you will be flying at night and determine the minimum altitude you are willing to use at night. If weather prevents you from maintaining the altitude that you planned, make a decision early to turn 180° and land at an alternate airport with better weather conditions. Always consider safer alternatives rather than hope things will work out by taking a chance.

Pilots who fly at night should strongly consider oxygen supplementation at altitudes and times not required by the FAA, especially at night when critical judgment and hand-eye coordination is necessary (e.g., IFR) or if he/she is a smoker or not perfectly healthy.

Enhanced Night Vision Systems

Synthetic Vision Systems (SVS) and Enhanced Flight Vision Systems (EFVS) are two systems that can improve the safety of flight at night. The technology of both is evolving rapidly and being used more and more. *[Figure 17-23]*

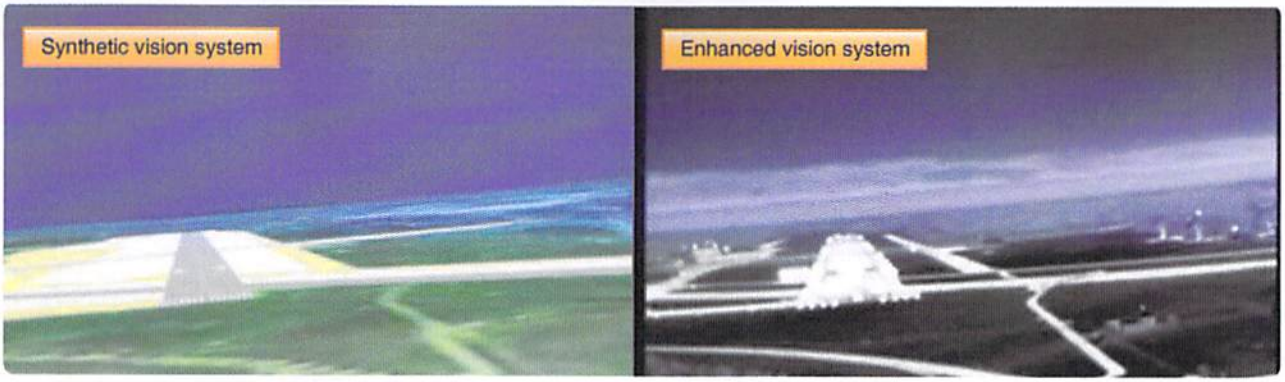

Figure 17-23. *Synthetic and enhanced vision systems.*

Synthetic Vision System

A Synthetic Vision System (SVS) is an electronic means to display a synthetic vision image of the external scene topography to the flight crew. *[Figure 17-24]* It is not a real-time image like that produced by an EFVS. Unlike EFVS, SVS requires a terrain and obstacle database, a precise navigation solution, and a display. The terrain image is based on the use of data from a Digital Elevation Model (DEM) that is stored within the SVS. With SVS, the synthetic terrain/vision image is intended to enhance pilot awareness of spatial position relative to important features in all visibility conditions. This is particularly useful during critical phases of flight, such as takeoff, approach, and landing, where important features, such as terrain, obstacles, runways, and landmarks, may be depicted on the SVS display. *[Figure 17-25]* During approach operations, the obvious advantages of SVS are that the digital terrain image remains on the pilot's display regardless of how poor the visibility is outside.

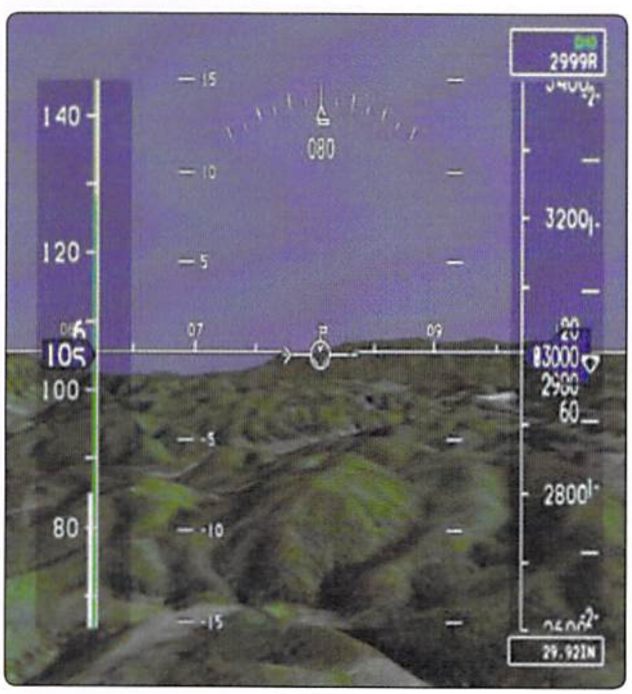

Figure 17-24. *SVS system.*

An SVS image can be displayed on either a head-down display or head-up display (HUD); however, to date, SVS has only been certified on head-down displays. Development efforts to display a synthetic image on a HUD are currently underway as are efforts that would combine SVS with a real-time sensor image produced by an EFVS. These systems are known as Combined Vision Systems. While SVS is currently certified as an aid to situation awareness only, the FAA and aviation industry are working on defining operational concepts and airworthiness criteria that would enable SVS to be used for operational credit in certain low visibility conditions. Other future enhancements to SVS displays could include integrating ADS-B to display traffic information.

Enhanced Flight Vision System

Enhanced Vision (EV) or Enhanced Flight Vision System (EFVS) is an electronic means to provide a display of

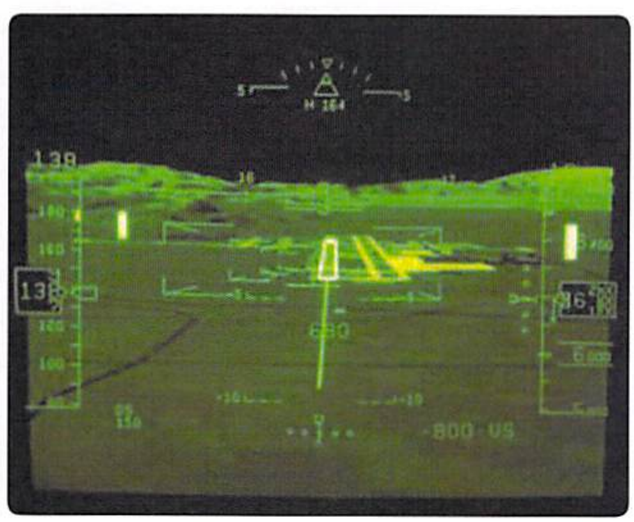

Figure 17-25. *Night time SVS system.*

the external scene by use of an imaging sensor, such as a Forward-Looking InfraRed (FLIR) or millimeter wave radar (MMWR). In 2004, 14 CFR part 91, section 91.175 was amended to reflect that operators conducting straight-in instrument approach procedures (in other than Category II or Category III operations) may now operate below the published decision height (DH) or minimum descent altitude (MDA) when using an approved EFVS shown on the pilot's HUD. This rule change provides "operational credit" for EV equipage. No such credit exists for SV.

Chapter Summary

This chapter provides an introduction to aeromedical factors relating to flight activities. More detailed information on the subjects discussed in this chapter is available in the Aeronautical Information Manual (AIM) and online at www.faa.gov.