

**UNITED STATES MARINE CORPS**  
FIELD MEDICAL TRAINING BATTALION-EAST  
PSC BOX 20042  
CAMP LEJEUNE, NORTH CAROLINA 28542-0042

MCECST

**RIFLE MARKSMANSHIP**

**TERMINAL LEARNING OBJECTIVE**

1. Given a service rifle, Rifle Combat Optic (RCO), cartridge belt, magazine pouch, sling, (2) magazines, cleaning gear, ammunition, and a target, zero a Rifle Combat Optic (RCO) to a service rifle to ensure Point of Aim (POA) equals Point of Impact (POI) at 100 meters. (2401-RFL-1005)
2. Given a service rifle, cartridge belt, magazine pouch, sling, magazines, ammunition, and a target, engage known distance targets from a firing position with a service rifle by striking the target in accordance with tables in MCO 3574.2. (2401-RFL-1006)
3. Given a service rifle, sling, cartridge belt, magazine pouch, magazines, ammunition, targets and a date book, execute Fundamental Rifle Marksmanship (Table 1) to achieve a qualifying score of 190. (2401-RFL-1007)

!!!! (Event Downgraded) !!!!

**ENABLING LEARNING OBJECTIVES**

1. Given a tactical situation, zero a Rifle Combat Optic (RCO) to a service rifle, to ensure optimal weapon performance within the given mission in accordance with references TM 05538/10012-OR Operator's Manual With Components List For Rifle M16A2, Rifle M16A4, Carbine M4, Carbine M4A1 CQBW (Sep 2012), MCO 3574.2L Marine Corps Combat Marksmanship Program and TM 11064-OI w/ch1 Rifle Combat Optic. (2401-RFL-1005a)
2. Given a tactical situation, demonstrate appropriate weapons safety at all times, to ensure optimal safety within the given mission in accordance with references TM 05538/10012-OR Operator's Manual With Components List For Rifle M16A2, Rifle

M16A4, Carbine M4, Carbine M4A1 CQBW (Sep 2012), MCO 3574.2L Marine Corps Combat Marksmanship Program and TM 11064-OI w/ch1 Rifle Combat Optic. (2401-RFL-1005b)

3. Given a tactical situation, engage known distance targets from a firing position with a service rifle, to ensure optimal weapon performance within the given mission in accordance with references TM 05538/10012-OR Operator's Manual With Components List For Rifle M16A2, Rifle M16A4, Carbine M4, Carbine M4A1 CQBW (Sep 2012), MCO 3574.2L Marine Corps Combat Marksmanship Program and TM 11064-OI w/ch1 Rifle Combat Optic. (2401-RFL-1006a)

4. Given a tactical situation, demonstrate appropriate weapons safety at all times, to ensure optimal safety within the given mission in accordance with references TM 05538/10012-OR Operator's Manual With Components List For Rifle M16A2, Rifle M16A4, Carbine M4, Carbine M4A1 CQBW (Sep 2012), MCO 3574.2L Marine Corps Combat Marksmanship Program and TM 11064-OI w/ch1 Rifle Combat Optic. (2401-RFL-1006b)

5. Given a tactical situation, execute Fundamental Rifle Marksmanship (Table 1), to ensure optimal performance within the given mission in accordance with references TM 05538/10012-OR Operator's Manual With Components List For Rifle M16A2, Rifle M16A4, Carbine M4, Carbine M4A1 CQBW (Sep 2012), MCO 3574.2L Marine Corps Combat Marksmanship Program and TM 11064-OI w/ch1 Rifle Combat Optic. (2401-RFL-1007a) **Downgraded**

6. Given a tactical situation, perform service rifle corrective action, to ensure optimal weapon performance within the given mission in accordance with references TM 05538/10012-OR Operator's Manual With Components List For Rifle M16A2, Rifle M16A4, Carbine M4, Carbine M4A1 CQBW (Sep 2012) and MCO 3574.2L Marine Corps Combat Marksmanship Program. (2401-RFL-1007b) **Downgraded**

1. **ELEMENTS OF ZEROING**: There are five basic elements involved in zeroing a rifle; line of sight, point of aim, centerline of the bore, trajectory, and range. To zero the rifle, these elements must physically and mechanically coincide at a given point. It is your responsibility to get consistent hits on the target with your rifle. This is accomplished by zeroing your rifle--determining and applying the sight settings (windage and elevation) on your rifle to strike the center of the target at a particular range. But to do this, you must understand the elements of zeroing. To accurately engage targets, the strike of the bullet must coincide with the aiming point (Point of aim/point of impact) on the target. This must be done while compensating for the effects of wind/weather and the range to the target.

a. **Point of Aim Point of Impact**. This is accomplished by adjusting the RCO on your rifle to achieve point of aim/point of impact. This process is called zeroing and it is the basic and most critical element of accurate target engagement, along with sound/solid understanding of the marksmanship fundamentals. One cannot work without the other to place a shot or shot group in the center of the target at any given distance.

b. **Elements of Zeroing**. In order to understand the zeroing process there are particular elements that must be accounted for.

(1) **Line of Sight**. Line of sight is a straight line beginning at the center of the eye. It passes through the center of the ocular lens. Then, it continues through the reticle to the exact point of aim on the target.

(2) **Aiming Point**. The aiming point is the precise point where the reticle is placed in relationship to the target.

(3) **Centerline of the Bore**. Centerline of the bore is an imaginary straight line beginning at the chamber end of the barrel. It proceeds out of the muzzle and continues indefinitely.

(4) **Trajectory**. A bullet does not follow a straight line to the target. Instead, a bullet travels in a curved path, or arc, which is called the bullet trajectory.

(a) **Earth's Gravity**. This trajectory occurs because of the earth's gravity, which pulls the bullet down toward the ground as soon as the bullet leaves the rifle's barrel. The rate of this curvature increases as the bullet's speed decreases.

(b) Compensating for Gravity. To compensate for this affect (so that the bullet will impact the target), the muzzle of the rifle must be elevated. This is accomplished by applying elevation to the rifle sights. The greater the distance to the target, the higher the bullet's trajectory must be to impact with the target. Therefore, the greater the distance to the target, the greater the elevation that must be applied to the sights to engage the target from that distance.

(5) Range. Range is the known distance from the rifle to the target.

## 2. TYPES OF ZEROS

a. True Zero for the Rifle Combat Optic (RCO). A zero for the RCO is the elevation and windage settings required to place a single shot or the center of a shot group in a pre-designated location on a target at 100 meters/yards, from a specific firing position, under ideal weather conditions.

b. Zero for the Rifle Combat Optic (RCO). A zero for the RCO is the elevation and windage settings required to place a single shot or the center of a shot group in a pre-designated location on a target at 100 meters/yards, from a specific firing position, under specific weather conditions.

c. Battlesight Zero (BZO). The elevation and windage setting, aiming point, and hold required to place a single shot, or the center of a shot group, in a pre-designated location on a target from 0 to 300 yards/meters, under ideal weather conditions.

## 3. ZEROING THE SERVICE RIFLE

### a. Steps to Zeroing the Rifle.

(1) Fire 3 Round Shot Group. When the target appears your shooters will fire a well-aimed 3 round shot group in a time limit of one minute.

(2) Mark the Target. The target will be lowered to the pits and marked indicating your shooters 3-shot group.

(3) Plot the Group. When the target is raised from the pits, ensure your shooters plot the 3-shot group in their data book.

(4) Triangulate the Shot Group. Triangulate your shooters shot group by drawing a line to form a triangle connecting all 3 shots. Locate the center of the triangle and

make elevation and windage adjustment recommendations to your shooters.

(a) Triangulating the shot groups allows you to find the center of the shot group. The service rifle fires in a cone pattern, and the center of the cone pattern can easily be determined by using the triangulation method.

(b) In order to triangulate a shot group there must be at a minimum of three shots impacted on the target or plotted in the data book. Starting with the furthest impact and continuing on to the outermost impacts, connect them until they form a triangle. The center of the triangle will be the center of the shot group.

(c) Determine windage and elevation adjustments based on the center of the triangle. Now that the center of the shot group has been determined, using the windage and elevation rules, a correct adjustment can be made. The adjustment criteria should begin at the center of the triangle created.

(5) Fire 2<sup>nd</sup> 3 Shot Group. When the target appears fire a well-aimed 3-shot group in a time limit of one minute.

(6) Mark the Target. The target will be lowered to the pits and marked indicating your 3-shot group.

(7) Plot the Group. When the target is raised from the pits, ensure you plot the 3-shot group in the data book.

(8) Triangulate the Shot Group. Triangulate your shot group by drawing a line to form a triangle connecting all 3 shots. Locate the center of the triangle and make HOLD adjustment recommendation.

(9) Fire 4 Shot Group. When the target appears you will fire a well-aimed 4-shot group in a time limit of one minute. This last group is to confirm the sight adjustments that were made.

(10) Final Steps. Once you have confirmed adjustments and gotten sight settings, there needs to be an adjustment determined for the wind (if present) and taken off the sight settings. Remember the standard for a zero is a minimum 5 inch group. This setting becomes the zero setting for the rifle, and must be recorded in your data book.

#### 4. TARGET DIMENSIONS

a. "D" Target. This full-faced (6' wide X 6' long) target

contains a black bull's-eye and is used for rapid fire stages at 200 and 300 yards.

(1) The Bulls-Eye. The black bull's-eye is 19 inches high and 26 inches wide.

(2) The 4-Ring. The 4-ring follows the contours of the head and shoulders of the bull's-eye and is 4 inches from the edge of the aiming black at these points. The 4-ring is 14 inches from the bottom edge of the aiming black.

(3) The 3-Ring. The 3-ring follows the contours of the head and shoulders of the 4-ring and is 8 inches from the outside edge of the 4-ring at these points. The 3-ring is 6 inches from the bottom edge of the 4-ring.

b. **"A" Target**. This full-faced (4' wide X 6' long) target contains a round, black bull's-eye and is used for the slow fire stage at 200 and 300 yards.

(1) The Bulls-Eye. The round, black bull's-eye is 12 inches in diameter.

(2) The 4-Ring. The 4-ring is 24 inches in diameter.

(3) The 3-Ring. The 3-ring is 36 inches in diameter.

## 5. **FACTORS CAUSING A ZERO TO BE RECONFIRMED**

a. **Maintenance**. It is possible for the zero to change if ordnance personnel perform maintenance on the rifle. If maintenance was performed, it is critical that the rifle be re-zeroed as soon as possible.

b. **Temperature**. An extreme change in temperature (i.e., 20 degrees or more) will cause a change in the elevation zero of the weapon. Changes in temperature cause chamber pressure to increase when hot and decrease when cold. This causes shots to impact the target high in hot temperatures and low in cold temperatures.

c. **Climate**. Changing climates can mean changes in air density, moisture content, temperature, or barometric pressure. Any of these elements can affect the rifle's zero.

d. **Ground Elevation**. Drastic changes in ground altitude can create changes in air density, moisture content, temperature, or barometric pressure. Any of these elements can affect the rifle's zero.

e. **Uniform.** If your rifle is zeroed while in utility uniform and then fired in full battle gear, the zero may change. A zero must be established while wearing the uniform and equipment that will be worn while engaging targets.

f. **Factors Affecting the Accuracy of a Zero or Shot Placement.** Anything you change from shot to shot affects the zero on their rifle and or shot placement.

(1) **Seven Common Factors.** Any changes of the seven common factors (forward hand, grip, right elbow, stock weld, rifle butt in the shoulder, muscular relaxation/tension, and breathing).

(2) **Stability of Hold.** A poor position or anything that does not allow a shooter to hold center mass will affect the accuracy of a zero.

(3) **Sling Tension.** Altering the sling tension can alter a shooters stability of hold.

(4) **Sight Picture.** If a shooter changes aiming point or cannot keep consistent with their aiming point, this will affect the accuracy of a zero.

(5) **Scope Alignment.** Inconsistencies in achieving scope alignment will cause inconsistent shot placement. This will affect the accuracy of a shooters zero because it will continuously alter the zero due to the inconsistent shot placement.

(6) **Trigger Control.** Trigger control can affect the consistencies of sight alignment.

## 6. **EFFECTS OF WEATHER ON THE STUDENTS:**

a. **Mental Attitude:** The accomplishments made on the firing line and in the field stem partly from the ability to mentally adjust to unusual or adverse weather conditions. To engage the target accurately, concentration must be maintained on the fundamentals of marksmanship, and the mental discipline must be developed to overcome the effects of adverse weather conditions.

b. **Physical Effects:** Adverse weather conditions have definite physical effects on every shooter. You must be prepared for the weather so you are comfortable when shooting. Attention must not be diverted from shooting.

7. **EFFECTS OF WIND:** The weather condition that has the greatest

effect on shooting performance is wind. Wind can have a great effect on the shooter as they prepare for their shot and on the bullet once it leaves the rifle. Dry fire practice and knowledge of the measures to compensate for the wind will minimize the effects of wind on shooting performance.

a. The Students: The effect the wind has on the students will depend on the velocity of the wind and the firing position. The stronger the wind, the more difficult it will be to hold the weapon steady. The wind is the one weather condition that affects all students in the same way. However, measures can be taken to counter the effects the wind has on your ability to fire accurately:

(1) If the situation permits, choose a shooting position that is the least susceptible to the effect of the wind. The prone shooting position offers the most stable firing position in windy conditions, while windy conditions make the standing position the least stable.

(2) If the situation permits, counteract the effects of wind by timing your shots. By waiting for a steady wind or a lull in the wind, you can balance properly and deliver a well-aimed shot on the target.

(3) The effects of wind can be partially offset if you train yourself and have a positive mental attitude.

b. The Bullet: The effect the wind has on the round as it travels down range is referred to as deflection. The wind deflects the bullet laterally in its flight path to the target. It is an effect that increases with the distance to the target. The deflection of the bullet can be compared to that of a boat crossing a river with a strong current. The skipper of the boat may aim for a point directly across the river but will end up farther downstream because of the current. There are two factors that affect the amount of deflection of the bullet:

(1) The Velocity of the Wind: The greater the velocity of the wind, the more it will deflect the bullet.

(2) The Range to the Target: Because the initial velocity of the bullet as it leaves the muzzle of the rifle is high, the wind will have little effect on bullets traveling short distances. The velocity of the round decreases as it travels down range, causing the wind to produce a greater deflection. Therefore, the wind deflection increases the farther a round must travel before it strikes the target.

8. **WIND CLASSIFICATION:** As we have learned, the wind has a significant impact on not only the Marine but also the bullet once it leaves the rifle. Winds blowing from different angles have different effects on the bullet. The velocity and direction of the wind in relation to the bullet must be determined to offset the wind's effects. Classifying the wind is a two-step process; first the direction of the wind must be determined and then the value of the wind must be determined.

a. **Wind Direction:** Winds are classified according to the direction from which they are blowing in relation to the direction of fire. For example, if the flag is blowing left, the wind is known as a right wind because it is coming from the right. The direction of the wind can be determined in several different ways. When shooting takes place on the range, the direction of the range flags indicates the direction of the wind. When shooting takes place in the field, any means available should be used to determine the direction of the wind such as observing the direction vegetation is moving or feeling the wind against the body.

b. **Wind Value - The Clock System:** The clock system is used to determine the value of the wind as full, half, or no value. The clock system refers to a sectored circle in which winds blowing from different directions are assigned different values. These values, along with the speed of the wind, are used to calculate the sight adjustments to compensate for the wind. The direction of fire to the target is always considered to be 12 o'clock. The direction from which the wind is blowing determines the relative value of the wind. The relative value of a wind indicates its ability to deflect the bullet in its flight to the target.

(1) **Full Value Wind:** Wind blowing from either right or left directly across your front (3 o'clock or 9 o'clock) is assigned a full value since it will have the greatest effect on bullet deflection.

(2) **No Value Wind:** Winds blowing directly in your face (12 o'clock) or at your back (6 o'clock) are of no value since they will not deflect the bullet.

(3) **Half Value Wind:** Winds blowing from other directions are assigned intermediate values. For example, wind blowing from 1:30 is referred to as a half value wind. A half value wind deflects a bullet half the distance laterally as a full value wind. For example, if a 10 mph wind from 3 o'clock (full value) deflects a bullet 9 inches to the left at 300 yards, the same 10 mph wind from 1:30 (half value) would deflect the bullet only 4.5 inches to the left at 300 yards.

9. **DETERMINING WIND VELOCITY.** Once the direction of the wind is determined and the corresponding value assigned to it, velocity must be determined to make the final adjustments to your rifle sights to compensate for deflection. Velocity is the speed the wind is blowing. There are two field expedient methods for determining wind velocities in mph: the Observation Method and Flag method.

a. **The Observation Method:** The Observation Method is the primary method used to determine wind velocity in a tactical situation and you should practice it on the range.

(1) During KD firing, the flag method is an ideal learning tool to get yourself familiar with observing your surroundings and to determine wind velocity on the range. For example, the range flags may move in different directions making it difficult to gauge the wind. This includes the flags at either end of the firing points in the pits, as well as the flags at each yard line. In these cases, you will have to determine by observing the terrain closest to the target. You can achieve this by associating flags moving with trees moving, or grass near the impact area, or dust created by another shooter's round impacting the berm near the target.

(2) Using the Observation Method, you can observe your surroundings and gauge the wind velocity by objects moving around you and the feel of the wind on your body.

## WIND

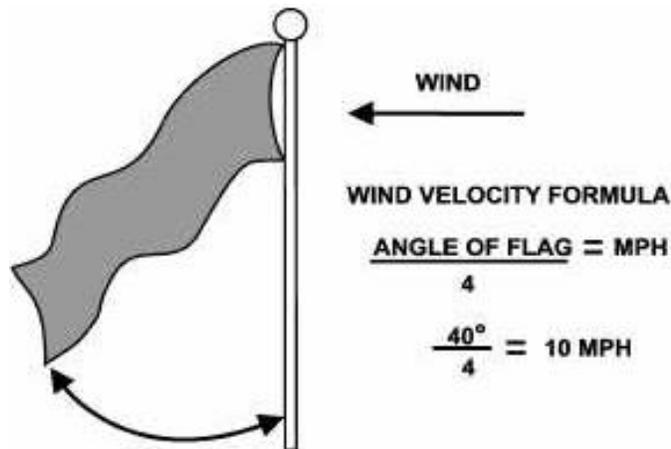
CLASSIFICATION	
<b>DIRECTION</b>	Determine wind direction by observing the direction vegetation is moving, by feeling the wind blow against the body, or by observing the direction of a flag.
<b>VALUE</b>	Winds are classified according to the direction from which they are blowing in relation to the direction of fire. The clock system indicates wind direction and value. The target is always at 12 o'clock.

VELOCITY (OBSERVATION METHOD)	
<b>Under 3 MPH</b>	The wind can hardly be felt on the face, but the presence of a slight wind can be detected by drifting smoke.
<b>3 – 5 MPH</b>	Wind can be felt lightly on the face.
<b>5 – 8 MPH</b>	Wind keeps tree leaves in constant motion.
<b>8 – 12 MPH</b>	Wind will raise dust and loose paper.
<b>12 – 15 MPH</b>	Wind will cause small trees to sway.
<b>15 – 25 MPH</b>	Wind will cause large trees to sway.

b. **The Flag Method:** The flag method of determining wind velocity is the primary method used on the KD range. The flag method is based on the observation of a flag or some other cloth object which is blowing in the wind. It requires you to estimate the angle (in degrees) that the flag is blowing away from its vertical pole. Dividing this angle by 4 will give the wind velocity in mph.

$$(1) \frac{\text{Angle of the flag from the pole}}{4} = \text{Speed in mph}$$

(2) This information is based on a dry flag. A wet flag is heavier and may give a false reading by indicating a lesser velocity than the wind is really blowing.



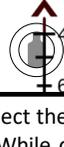
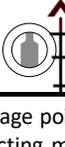
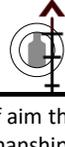
As we have discussed, it is important to understand the effects of wind on marksmanship and accurately estimate the wind's direction, value, and velocity. With this knowledge, you only have to apply this information to a relatively simple mathematical formula or to a windage chart to determine the correct windage adjustment to ensure an accurate shot on the target.

10. **OFFSET AIMING FOR WINDAGE AND ELEVATION:** To engage a target during combat, the Marine may be required to aim his Service rifle at a point on the target other than center mass. This is known as offset aiming. Offset aiming involves adjusting sight picture to compensate for the distance and size of the target to account for wind conditions and range to the target or elevation.

a. **Offset Aiming for Wind:** The strike of the round can be affected by wind. For wind corrections during firing, offset

aiming is used. Unlike the adjustable iron sights on the Service rifle, the RCO should not be adjusted for a wind change. The windage adjusters on the RCO should only be adjusted during zeroing. A hold into the direction of the wind, based on wind speed, will enable accurate engagement of a target. Offset aiming must be used to compensate for the strike of the round when wind is a factor.

A hold for windage should be based on something that can be visually seen and estimated with some uniformity, such as the width of a body. For example, the width of a body is considered approximately 19 inches wide; half a body width is approximately 9.5 inches. Holds will vary based on the wind speed, range to the target, and the weapon system. The RCO reticle pattern centered on the edge of the target into the wind is a hold of approximately 9.5 inches, which is considered a hold of half a body width.

<b>WINDAGE POINTS OF AIM</b>										
Range flags may help determine wind speed.  The angle of the flags will increase with higher wind speeds.										
	5 MPH		10 MPH		15 MPH		20 MPH		25 MPH	
	WIND VALUE		WIND VALUE		WIND VALUE		WIND VALUE		WIND VALUE	
RANGE (yards)	FULL	HALF	FULL	HALF	FULL	HALF	FULL	HALF	FULL	HALF
200	2" 	1" 	5" 	2" 	7" 	3" 	9" 	4" 	11" 	5" 
300	5" 	2" 	11" 	5" 	16" 	8" 	22" 	11" 	27" 	13" 
500	17" 	8" 	35" 	17" 	52" 	26" 	69" 	34" 	87" 	43" 

The values in the above table reflect the windage points of aim that should be used when the surrounding terrain does not reduce the effect wind has on the flight of the bullet. While conducting marksmanship training on known-distance ranges, these values must be adjusted in order to compensate for the wind-reducing effects of the side-berms and/or trees. The figures in the following pages have been adjusted accordingly.

d. **Recording Types of Wind Conditions in the Data Book:**

The types of wind conditions which existed during firing should be recorded in the data book. This information will help determine how different wind conditions affect your battlesight zero, BZO.

200 YARD SLOW-FIRE SITTING			BEFORE FIRING					EXAMPLE
SIGHT PICTURE			+ WIND =					ZERO
WEATHER DATA			PLOT					AFTER FIRING
LIGHT <input type="checkbox"/> OVERCAST <input checked="" type="checkbox"/> PARTLY CLOUDY <input type="checkbox"/> CLEAR								SIGHT PICTURE ADJUSTMENT (WITHOUT WIND)
PRECIP <input checked="" type="checkbox"/> DRY <input type="checkbox"/> LT RAIN <input type="checkbox"/> MIST <input type="checkbox"/> HVY RAIN								
DURING FIRING			REMARKS					
1 CALL HOLD	2 CALL HOLD	3 CALL HOLD	Some clouds, sun out of 200 low in the sky, temp cool. Anticipated shot 4. For NPA on shot 5.					

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11. **EFFECTS OF DIFFERENT LIGHT CONDITIONS.** While windy conditions can affect the path of the bullet as well as your mental state, light conditions affect marksmanship in a different way. The effects of different light conditions do not affect the trajectory of the bullet, but the way that the target is perceived. The effects of light and how they can affect your shooting must be understood before you can learn how to overcome them. Many inexperienced shooters do not recognize that light conditions can affect their shooting accuracy and affect a weapon's BZO. A change in light condition, which may not be noticed, can cause you to aim at what you think are the correct aiming points, but really are not. What appears to be center mass on the target may in fact be several inches higher or lower, left or right. Maintaining a center mass hold, regardless of how indistinct the target appears, ensures the best chances for an effective shot. Common light conditions include:

a. **Bright Light:** Bright light conditions exist under a clear blue sky with no fog or haze present to filter the sunlight.

(1) Bright light can make a target appear smaller and farther away. As a result, it is easy to overestimate range.

(2) Bright light shining from above makes the front sight post appear shorter and bright light from the side makes the front sight post appear narrower. This affects aiming

because you will aim at center mass using the perceived tip of the front sight post, which is altered due to the effects of light.

b. **Haze**: Haze exists when smog, fog, dust, or humidity is present. Haze is not bright, but it can be uncomfortable to the eyes. Haze can make a target appear indistinct, making it difficult to establish sight picture.

c. **Overcast**: Overcast conditions exist when a solid layer of clouds blocks the sun. The amount of light changes as the cloud cover thickens. Overcast conditions make a target appear larger and closer. As a result, it is easy to underestimate range.

(1) **Light Overcast**: Light overcast conditions exist when no blue sky is visible and a thin layer of clouds is present. In light overcast, both the target and the rifle sights appear very distinct. Light overcast is comfortable on the eyes with no glare present, making probably the best light condition for shooting.

(2) **Dark Heavy Overcast**: Dark heavy overcast conditions exist when the sky is completely overcast with most of the light blotted out by the clouds. As the overcast thickens, it becomes difficult to identify the target from the surroundings.

d. **Scattered Clouds**: Scattered cloud conditions exist when the clouds are broken up into small patches with the sun appearing at times between the clouds. Your eyes may have problems adjusting between a target which is brightly lit and one that is shadowed.

e. **Moving Clouds**: Moving clouds exist when scattered clouds move across the sky rapidly, making the sun appear periodically. Rapidly moving clouds can fatigue the eyes due to the rapid changes from bright light to shadows. This condition is probably the most difficult to contend with because the light changes rapidly. If the situation permits, this condition can be compensated for by selecting one of the two light conditions (bright light or shadow) in which to fire. Best results will be obtained if each shot is fired under the same light condition.

f. **Record Light Condition in the Data Book**: A significant change in light condition should be recorded in the REMARKS block of the data book. This information will help determine how the type of light condition or change in condition affects your BZO.

12. **EFFECTS OF TEMPERATURE**. In addition to the effects that wind and light conditions have on a shooter, excessive heat and cold can also affect the Marine's performance and in some cases the trajectory of the round. It is essential to learn how to compensate for extremes in temperature to engage a target effectively.

a. **Extreme Heat:**

(1) Effects of Extreme Heat on the Marine: Hot temperatures can lead to rapid fatigue and cause distractions that can result in inaccurate shooting. This can cause blurred vision and reduce concentration levels. Excessive heat can cause muscle cramps, heat exhaustion, or heat stroke. Increased fluid intake, good physical condition, and periodic rest breaks (if possible) will help offset these effects.

(2) Target: At high temperatures, ground mirage can cause a target to appear indistinct and drift from side to side. Heat waves or mirage may distort the target shape or the appearance of the front sight post. Mirage created by the heat of the rifle barrel can cause difficulty in seeing the sights clearly. Maintaining a center of mass hold and focusing on the front sight post not the target will ensure the best chance for accurate target engagement.

(3) The Rifle and Bullet: In hot weather, rifle chamber pressure increases, causing the bullet to exit the muzzle at a higher velocity and impact the target above the point of aim. Hot air is less dense than cooler air and provides the bullet with less resistance allowing it to travel faster, causing the bullet to experience less deflection when there is wind.

b. **Extreme Cold:**

(1) The Students: Extreme cold can cause you to shiver, feel uncomfortable, have lapses in memory, and difficulty holding a frigid rifle with numb hands. Shivering can make aiming very difficult, if not impossible. Trigger control is also difficult to execute properly if the fingers are numb. Additionally, the potential for frostbite is a concern. Proper dress in cold climates is paramount.

(2) The Rifle and the Bullet: Extreme cold will affect the rifle and the bullet. In cold weather, rifle chamber pressure decreases, causing the bullet to exit the muzzle at a lower velocity and impact the target below the point of aim. The air is denser at lower temperatures and tends to slow the

speed of the bullet, causing the bullet to experience a greater deflection when there is wind.

c. **Record Temperature in the Data Book:** A substantial temperature change (20 degrees or more) should be recorded in the REMARKS block of the data book. A substantial change requires that students re-zero their rifle.

13. **EFFECTS OF PRECIPITATION.** Precipitation in the form of rain, snow, hail, and sleet, like temperature, can affect shooting performance. The temperature and wind that accompany precipitation affect the bullet. However, if a shooter is distracted by precipitation, they may shoot poorly regardless of any corrections they may have made to compensate for the effects of temperature and wind.

a. **The Students:** Precipitation can affect concentration and comfort. Depending on the amount of precipitation, the target may be obscured or not visible at all making it difficult to establish sight picture. A positive mental attitude will provide the best performance.

b. **The Rifle and Bullet:** Freezing rain and other types of precipitation can make the weapon difficult to handle or may foul the weapon and cause stoppages. Water buildup in the barrel or compensator can cause erratic shots. Care should be taken to keep the weapon covered and dry until ready to shoot. The rifle should be carried Weak Side Sling Arms (Muzzle Down), unless on the rifle range, to keep moisture out of the bore.

14. **SHOOTING POSITIONS AND USE OF THE SLING:**

a. **Loop Sling Purpose:** When the loop sling is adjusted properly, it will provide maximum stability for the weapon and help stabilize the front sight and reduce the effects of the rifle's recoil. A loop sling takes longer to don and remove than any other sling. Therefore, it has limited combat application; it is best used where stability of hold is needed for a precision or long-range shot.

b. **Donning the Loop Sling:** To form the loop sling, perform the following steps:

(1) Place the rifle butt on your strong side hip and cradle the rifle with your strong arm.

(2) Disconnect the J-hook from the lower sling swivel.

(3) With the M-buckle near the hook, feed the sling

through the top of the M-buckle to form a loop large enough to slip over the arm.

(4) Give the loop a quarter turn clockwise for a right handed shooter and a quarter turn counter clockwise for a left handed students and then insert the support arm through the loop, positioning the loop high above the bicep. The loop must be high and above the bicep so that the sling pulls on the rifle straight back and into the pocket of the shoulder. If the sling were lower on the arm the sling would pull down and at an angle causing you to try and fight for elevation.

(5) Position the M-buckle and the J-hook on the outside of the support arm.

(6) Tighten the loop on the support arm, ensuring the M-buckle moves toward the center of the arm as the loop tightens. The sling must pull from the center of the arm to be properly positioned. In this way, as tension is applied to the sling in the firing position, the loop will tighten.

(7) To adjust the sling for the proper length, loosen the sling keeper and pull the feed end down toward the loop. This adjustment varies with every individual and every firing position:

(a) The loop should not be tightened excessively on the arm. If blood flow is restricted a stable hold at the desired aiming point is impossible to achieve.

(b) Tension on the rifle sling is correct when it causes the rifle butt to be forced rearward into the pocket of the shoulder. This serves to keep the buttplate in the shoulder pocket during recoil. To increase the amount of tension on the rifle sling, the sling must be shortened. To lessen the tension, the sling must be lengthened.

(8) Move the sling keeper toward the support arm and secure it. The sling keeper should be positioned near the feed end of the sling so that it is away from your support hand and arm preventing any distracting discomfort. This also allows the loose end of the sling to be secured and not allow it to act as a "back up" range flag in windy conditions causing the rifle to be unsteady.

(9) Place the support hand over the sling from the support side and under the rifle. The rail cover/heat shield should rest in the "V" formed between the thumb and forefinger and across the meaty portion of the palm of the hand. If the

rail cover/heat shield rests further out toward the fingers of the hand you will need to use muscular tension in those fingers to support the rifle preventing complete muscular relaxation.

(10) Move the support hand forward and back on the rail cover/heat shield to adjust for elevation when acquiring natural point of aim. If the support hand is as far forward or backward as it will go, and you still need more elevation. You can then adjust the butt stock up and down in the pocket of the shoulder to achieve the desired elevation. Adjust the length of the sling for proper sling tension and support.

(11) Placement of the support elbow and forearm are also critical in allowing the sling to function properly. The elbow should be as close to center line of the weapon as possible which then allows the forearm to do the same. A good measure is to try and allow the forearm to come in contact with the magazine. This ensures that the sling is pulling straight back and into the pocket of the shoulder and not at an angle causing the rifle to pull in that direction.

c. **Sling Adjustment**: The loop sling should be above the biceps and pull straight from the upper arm, not from the side, so it does not transmit a pulse beat to the rifle. To adjust the sling, grasp the buckle and pull it around to the center of the arm above the biceps. To adjust the sling for the proper length, loosen the sling keeper and pull the feed end down toward the loop. This adjustment varies with every individual and every firing position.

d. **Sling Tension**: Ensure the loop is not tightened excessively on the arm. If blood flow is restricted, excessive pulse beat is transmitted through the rifle sling to the rifle and causes a noticeable, rhythmic movement of the rifle sights. When this occurs, a stable hold at the desired aiming point is impossible to achieve. To check this, look at the front sight to see if you can see an excessive pulse beat (The front sight will move up and down with the beat of the heart.)

15. **THREE ELEMENTS OF A GOOD SHOOTING POSITION WHEN FIRING WITH A LOOP SLING.** Rifle firing positions are designed as foundations for the rifle. A rifle firing position may be adjusted to conform to your body configuration as long as the position provides balance, control, and stability. There are three elements essential to every rifle firing position when firing with the loop sling: bone support, muscular relaxation, and natural point of aim.

a. **Bone Support:** The body's skeletal structure provides a stable foundation to support the rifle's weight. A weak shooting position will not withstand the repeated recoil of a rifle when firing at the sustained rate or buffeting from wind. To attain a correct shooting position, the bones of the body must support as much of the rifle's weight as possible. Proper use of the sling provides additional support.

(1) The weight of the weapon should be supported by bones rather than muscles because muscles can fatigue whereas bones do not.

(2) Establish a strong foundation for the rifle by utilizing bone support. This will enable the shooter to relax as much as possible while minimizing the movement of the weapon due to muscle tension.

b. **Muscular Relaxation:** Once bone support is achieved, muscles are relaxed. Muscular relaxation helps to hold steady and increase the accuracy of your aim. Muscular relaxation also permits the use of maximum bone support to create a minimum arc of movement and consistency in resistance to recoil.

(1) There is no way to achieve muscular relaxation without bone support. During the shooting process, the muscles of the body must be relaxed as much as possible. Muscles that are tense will cause excessive movement of the rifle, disturbing the aim. When proper bone support and muscular relaxation are achieved, the rifle will settle onto your aiming point, making it possible to apply trigger control and deliver a well-aimed shot.

(2) Only through practice and achieving a natural point of aim will proper muscular relaxation be achieved.

c. **Natural Point of Aim:** The point at which the rifle sights settle when bone support and muscular relaxation are achieved is called the natural point of aim.

(1) Since the rifle becomes an extension of your body, it may be necessary to adjust the position of your body until the rifle sights settle naturally on the desired aiming point on the target.

(2) When in a shooting position with proper sight alignment, the position of the tip of the front sight post will indicate the natural point of aim. When completely relaxed, the tip of the front sight post should rest on the desired aiming point.

(3) One method of checking for natural point of aim is to aim in on your target, close your eyes, take a couple of breaths, and relax as much as possible. When you open your eyes, the tip of the front sight post should be positioned on the desired aiming point while maintaining sight alignment.

(4) For each shooting position, specific adjustments will cause your rifle sights to settle center mass, achieving a natural point of aim. These adjustments will be covered in each of the position lessons.

16. **THE SEVEN FACTORS COMMON TO ALL SHOOTING POSITIONS AS THEY APPLY TO THE LOOP SLING.** In addition to the three elements of a good shooting position, there are seven factors common to all shooting positions. The seven factors affect your ability to hold the rifle steady, maintain sight alignment, and control the trigger. The way these factors are applied differs slightly for each position, but the principles of each factor remain the same.

a. The seven common factors affect your ability to hold the rifle steady, maintain sight alignment, and control the trigger. The seven common factors are as follows:

- (1) Forward hand
- (2) Rifle butt in the pocket of the shoulder
- (3) Firing Grip
- (4) Firing elbow
- (5) Stock weld
- (6) Breathing
- (7) Muscular tension

b. **Forward Hand:** The placement of the forward hand affects sling tension, and overall stability of the rifle in a given position. (Example: with the prone position the further forward the support hand is on the rail cover/heat shield the more stable the rifle will be, because you will have more leverage and control over the muzzle versus the hand being closer to the slip ring which would give you less leverage and control over the muzzle.

(1) **Forward Hand and Wrist Straight and Locked:** To stabilize the front sight of the rifle, the forward hand, wrist,

and forearm should be straight with the wrist locked in place. The sling lies flat against the back or side of the wrist or on the arm near the wrist.

(a) When the forward hand's wrist is straight and locked, it creates resistance on the sling close to the muzzle because the sling is in contact with the back or side of the wrist or on the arm near the wrist. This resistance allows the front sight to be stabilized.

(2) In all positions it is desirable that the rail cover/heat shield of the rifle rest in the "V" formed by the thumb and index finger of the left hand. The left wrist is straight with the rifle resting across the heel of the hand. The left elbow should be positioned directly under the weapon to create bone support and a consistent resistance to recoil. The fingers can curl against the rail cover/heat shield, but should apply only the minimum amount of pressure to prevent the hand from slipping on the hand guard.

c. **Rifle Butt in the Pocket of the Shoulder:** The rifle butt placed firmly in the pocket formed in the firing shoulder provides resistance to recoil, helps steady the rifle, and prevents the rifle butt from slipping in the shoulder during firing. Consistent placement of the rifle butt in the shoulder pocket is essential to maintaining a BZO and firing tight shot groups.

d. **Grip of the Firing Hand:** The pistol grip is grasped with the firing hand and the forefinger is placed on the trigger, with the thumb and remaining fingers wrapped around the pistol grip.

(1) Ensure the firing hand grasps the grip high on the pistol grip. This enables the trigger to be moved straight to the rear without disturbing sight alignment. If the hand is lower on the grip, the trigger finger will pull the trigger down and at an angle. This will completely throw off sight alignment and sight picture contradicting the definition of proper trigger control and causing an erratic shot.

(2) The trigger finger should be placed naturally on the trigger. Ensure the finger is not angled on the trigger because it will cause pressure to be applied at a slight angle rather than straight to the rear. Side pressure, no matter how slight, will tend to pull the sights off the aiming point disrupting sight alignment and sight picture.

(3) Ensure your trigger finger placement is consistent from shot to shot.

(a) There should be enough of your finger on the trigger to allow it to be moved straight to the rear in one continuous motion without disturbing sight alignment.

(b) Your finger should manipulate the trigger independent of the grip.

e. **Firing Elbow:** The firing elbow should be positioned naturally to provide balance to the position and create a pocket in the shoulder for the rifle butt. If the elbow is correctly positioned, it helps to form the pocket in the firing shoulder where the rifle butt rests. The placement of the elbow should remain consistent from shot to shot, ensuring the resistance to recoil remains constant.

f. **Stock Weld:** The placement of your cheek against the stock should remain firm and consistent from shot to shot. The stock should be placed so it is anchored under your cheek bone. Consistency of stock weld is achieved through proper placement of the rifle butt in the pocket of the shoulder and by having a point of reference such as the tip of the nose touching the tip of the charging handle. Your head should remain erect to allow the aiming eye to look straight through the rear sight aperture. A firm contact between your cheek and the stock enables:

- (1) Consistent eye relief
- (2) The aiming eye to be aligned with the rear sight aperture
- (3) The head and rifle to recoil as a single unit

g. **Breathing:** Breathing causes movement of the chest and a corresponding movement in the rifle and its sights. To minimize this movement and the effect it has on aiming, ensure to apply proper breath control.

h. **Muscular Tension:** With the sling donned, you may apply an amount of controlled muscular tension in the support arm to keep the sling taut and stabilize the weapon's sights. Resistance against the sling controls the point at which the rifle sights will settle. However, muscular tension should not be excessive, when it is excessive it is no longer controlled, causing you to shake, tremble, or fatigue.

#### 17. **REQUIREMENTS FOR THE RIFLE KNEELING POSITION:**

a. The weak side foot, strong side knee and foot will support the body's weight.

b. The buttocks will be clear of the ground, but may rest on the strong side foot.

c. Both hands, the sling, and one shoulder will support the rifle.

d. The arm supporting the rifle will rest on the knee or just inside the knee.

e. The strong side elbow will not be supported.

f. The magazine will be allowed to touch the clothing or the arm supporting the rifle, and may be gripped along the sides but the bottom of the magazine may not be used to support the weapon.

18. **VARIATIONS OF AND ASSUMING THE KNEELING POSITION:**

a. **Considerations For Assuming The Kneeling Position:**

Although there are three variations of the position, they all have some common considerations when getting into them. You can assume the kneeling position by either moving forward or Dropping back into position, depending on the situation. For example, it may be necessary to drop back into position to avoid crowding cover or moving onto unclear terrain.

(1) Moving Forward into Position: To move forward into the kneeling position, step forward toward the target with the support foot and kneel down on the firing knee.

(2) Dropping Back into Position: To drop back into the kneeling position, leave the support foot in place, step back with the firing foot, and kneel down on the firing knee.

b. **Assuming a Variation Of the Kneeling Position:** The kneeling position has three variations, the high kneeling, medium (or bootlace) kneeling, and the low kneeling. You should try each variation and choose a position that is natural and provides balance, stability, and control during firing. When getting into any variation of the position the steps are essentially the same.

(1) First you should create body alignment by covering on your target.

(2) Then you face to your firing side approximately 45 degrees.

(3) Next you position your feet. The non-firing foot should point at the target and the firing foot and knee (once in position) should be perpendicular to the target (this creates a tripod for maximum stability).

(4) The non-firing hand should be in position on the rail cover/heat shield (for Table 1 firing, the farther forward the hand is the more stable the position will be) to create maximum bone support and stability.

(5) Then you kneel down into position, and place your forward arm (not the elbow) on your knee or the inside of your knee.

(6) Next place the palm of your firing hand on the butt plate of the rifle and move the butt into the firing shoulder high and close to your neck. This will help establish stock weld and eye relief.

(7) Then form the pocket in the firing shoulder and obtain your grip with the firing hand. Reach out with your firing hand 90 degrees from the weapon, then bend your arm at the elbow and grasp the pistol grip high and firm.

(8) Slightly lower the head and place the cheek firmly against the stock. Your head should be as erect as possible to allow the aiming eye to look through the optic.

(9) Lastly, you should adjust your natural point of aim. All of the variations, the three elements and seven factors are the key to a stable position (with emphasis on the three elements).

c. **The Three Kneeling Positions:**

(1) High Kneeling Position: This variation provides a fairly stable platform to fire the weapon. Assume the high kneeling position with the loop sling, as described previously except for the firing side foot. Keep the firing ankle straight with the toe of the boot in contact with the ground and curled under by the weight of the body. The firing portion of the buttocks rests on or over the firing heel. Contact with the heel provides more stability to the position. Place the support foot forward to a point that allows the shin to be vertically straight. The heel should be directly under the knee for the shin to be vertical. The support foot must be flat on the ground since it supports the majority of the weight.

(2) Medium Kneeling Position: This position is also

referred to as the bootlace kneeling position. Assume the medium kneeling position in the same way as previously described with the exception of the firing foot. The firing ankle is straight and the foot is stretched out with the bootlaces in contact with the ground. The buttocks are in contact with the heel of the firing foot.

(3) Low Kneeling Position: The low kneeling position is most commonly used when firing from a forward slope. Assume the low kneeling position in the same way as previously described with the exception of the placement of the firing foot. Turn the firing ankle so the outside of the foot is in contact with the ground and the buttocks are in contact with the inside of the foot.

#### 19. DETAILED POSITION ANALYSIS:

a. Forward Hand: You need to find a forward hand placement that controls tension on the sling and maximizes bone support for the rifle. Ensure the forward hand and forearm is straight with the wrist locked in place. The hand is rotated up so the rifle rests naturally on the non-firing hand. The fingers naturally curl around the rail cover/heat shield, and the hand should be relaxed. During combat, the hand should grip the rail cover/heat shield slightly to keep the hand from slipping on the rail cover/heat shield during recoil.

(1) If you are forcing your sights onto the target, you do not have natural point of aim and must adjust your position to establish it.

(a) To ensure you establish consistent forward hand placement, you can note the number of rings on the rail cover/heat shield where your hand is placed when your position is established.

b. Support Elbow: The placement of the forward hand dictates elbow placement.

(1) Ensure your lower triceps near your elbow is in firm contact on your support knee or against the inside of your knee. (You may have to widen your stance to place your arm on the inside of your knee.)

(2) Ensure the upper portion of the triceps or the armpit does not rest on the knee.

(3) Ensure you properly adjust sling tension. When you widen your stance by moving your support foot and knee outboard,

the sling tightens.

(4) Sometimes when you move your support elbow, you create a cant in the rifle. To adjust for a minor cant in the rifle, ensure that you rotate the rail cover/heat shield left or right in the support hand formed by the thumb and forefinger by rotating the pistol grip left or right.

c. **Muzzle Elevation:** If the rifles optic is above or below the desired aiming point, vary the placement of the support hand in relation to the rail cover/heat shield. Moving the support hand forward on the rail cover/heat shield lowers the muzzle of the weapon, causing the BDC to settle lower on the target. Moving the support hand back on the rail cover/heat shield raises the muzzle of the weapon, causing the BDC to settle higher on the target.

d. **Rifle Butt in the Pocket of the Shoulder:** Consistency of stock weld is achieved through proper placement of the rifle butt in the shoulder. Your firing shoulder must be relaxed to ensure consistency. The rifle butt should be placed firmly in the pocket formed in the firing shoulder. This reduces the effect of recoil, helps steady the rifle, and prevents the rifle butt from slipping in the shoulder during recoil.

(1) Check the placement by physically feeling the rifle's butt stock to ensure the heel sets tightly in the shoulder.

(2) Ensure the rifle's butt stock is not too high or low in the shoulder. This is indicated by your head position. If your head is not erect or is creeping up on the optic, you may have improper butt stock placement. The placement is correct when the aiming eye can look straight through the optic.

(3) Adjust placement of the butt stock by Physically moving it in the shoulder.

e. **Grip of the Firing Hand:**

(1) You should maintain a high firm grip consistently throughout the duration of the shot. However, ensure you are not attempting to control the optic or overcome a cant by muscling the weapon with your grip. Enough rearward pressure should exist on the grip to stabilize the weapon, and hold it into the pocket of the shoulder. Muscling the rifle with the grip produces excessive muscular tension.

(2) Dry fire a couple of shots to check finger placement on the trigger. You should position enough of your finger on the trigger to allow straight, rearward trigger movement without disturbing scope alignment. Your finger should manipulate the trigger independent of the grip.

f. **Firing Elbow:** Check the placement of the firing elbow to ensure it falls naturally. The rifle's butt stock should come in contact with the shoulder pocket as much as possible.

g. **Stock Weld:** You should place your cheek naturally, but firmly on the stock to enable the head and rifle to recoil together. Your head should come straight down on the stock in a position where the aiming eye can look straight through the optic to obtain stock weld.

(1) **Eye Relief:** You should establish a stock weld that creates eye relief. It should also allow a shooter to achieve scope alignment and sight picture. If the aiming eye is too close to the optic, it can make establishing scope alignment difficult.

(2) An adequate distance between the aiming eye and the optic ensures the rear lens assembly does not hit your eyebrow during recoil. This is particularly true for students who wear eyeglasses. It is important to check eye relief before you ever fire a shot. Getting hit may cause you to flinch or to break stock weld on following shots.

(3) You should check your eye relief periodically to ensure you maintain a consistent stock weld and eye relief. You must ensure consistent head placement and pressure on the stock.

h. **Breathing:** Ensure you stop breathing at your natural respiratory pause and shoot during the same point in your breathing cycle.

i. **Muscular Tension:** You must ensure that muscular tension is not excessive to causing you to shake, tremble, or fatigue. The proper placement of the support elbow helps to reduce some of the muscular tension it takes to stabilize the front sight.

## 20. **ASSUMING THE PRONE POSITION:**

a. **Description:** The prone position provides a very steady foundation for shooting, is easy to assume, and presents a low profile. In this position, the weight is evenly distributed on the elbows, providing maximum support and good stability for the rifle. The loop sling is used when firing from either of the

two variations of the prone position, straight leg or cocked leg, on the known distance (KD) range.

b. **Straight Leg Position:**

(1) Attach the loop sling. Position the loop of the sling on the left arm above the biceps muscle to provide the best support for the rifle with the least amount of physical effort on the part of the shooter. The loop should not be tightened excessively on the arm. If blood flow is restricted, excessive pulse beat is transmitted through the rifle sling to the rifle and causes a noticeable, rhythmic movement of the rifle sights. When this occurs, a stable hold at the desired aiming point is impossible to achieve.

(2) Stand erect, face the target, and spread your feet a comfortable distance.

(3) Place your left hand forward under the rail cover. Your right hand should be on the pistol grip, but may be removed to break your fall as you drop into position.

(4) Lower yourself into position by dropping to both knees. Then shift your weight forward to lower your upper body to the ground using your right hand to break the forward motion.

(5) Roll your body to the left side as you extend and invert your left elbow on the ground. Stretch your legs out behind you. Spread your feet a comfortable distance apart with your toes pointing outboard and the inner portion of your feet in contact with the ground.

(a) As much of your body mass should be aligned directly behind the rifle as possible.

(b) If body alignment is correct, the weapon's recoil is absorbed by the whole body and not just the shoulder.

(6) Grasp the rifle butt with your right hand and place the rifle butt into your right shoulder pocket so the sights are level with your eyes.

(7) Grasp the pistol grip with your right hand.

(8) Rotate your body to the right while your elbow is lowered to the ground so your shoulders are level and your right wrist is as straight as possible.

(9) Lower your head and place your cheek firmly against

the stock in the same place for every shot to ensure you maintain consistent eye relief and stock weld.

(10) Move your left hand to a location under the lower rail cover to provide maximum bone support and stability for the weapon. This may require that you remove the rifle from your shoulder to reposition your left hand.

(11) Tension on the rifle sling is correct when it causes the rifle butt to be forced rearward into the pocket of the shoulder. This serves to keep the butt plate in the shoulder pocket during recoil. To increase the amount of tension on the rifle sling, the sling must be shortened. To lessen the tension, the rifle sling must be lengthened.

**c. Cocked Leg Position:**

(1) Attach the loop sling and drop to the ground in the same manner as for the straight leg position.

(2) Once on the ground, roll your body to the left side and extend and invert your left elbow on the ground. Then stretch your left leg out behind you, almost in a straight line. This allows the mass of the body to be placed behind the rifle to aid in absorbing recoil.

(3) Turn the toe of your left foot inboard so the outside of your left leg and foot are in contact with the ground. Then bend your right leg and draw it up toward your body to a comfortable position. Turn your right leg and foot outboard so the inside of your right boot is in contact with the ground. Cocking the leg will raise the diaphragm, making breathing easier.

(4) Grasp the rifle butt with your right hand and place the rifle butt into your right shoulder pocket so the sights are level with your eyes.

(5) Grasp the pistol grip with your right hand.

(6) Roll your body to the right while your right elbow is lowered to the ground and your right wrist is as straight as possible. The right shoulder is higher than the left shoulder in the cocked leg position.

(7) Lower your head and place your cheek firmly against the stock in the same place for every shot to ensure you maintain consistent eye relief and stock weld.

(8) Move your left hand to a location under the lower rail cover which provides maximum bone support and stability for the weapon.

(9) Adjust the tension on the sling in the same manner as described in the straight leg position.

d. **Adjusting Natural Point of Aim:** Natural point of aim can be achieved in the prone position by making minor body adjustments.

(1) If the natural point of aim is above or below the desired aiming point:

(a) Move your body slightly forward or back using your left elbow as a pivot and by digging your toes in.

1 Pushing your body forward causes the sights to settle lower on the target.

2 Pulling your body backward causes the sights to settle higher on the target.

(2) Vary the placement of the left hand in relation to the rail covers.

(a) Moving the left hand forward on the rail covers lowers the muzzle of the weapon, causing the sights to settle lower on the target.

(b) Moving the left hand back on the rail cover raises the muzzle of the weapon, causing the sights to settle higher on the target.

(3) Vary the placement of the stock in the shoulder.

(a) Moving the stock higher in the shoulder lowers the muzzle of the weapon, causing the sights to settle lower on the target.

(b) Moving the stock lower in the shoulder raises the muzzle of the weapon, causing the sights to settle higher on the target.

(4) The natural point of aim can be adjusted right or left in the prone position by adjusting body alignment in relation to the target. When adjusting body alignment, keep the left elbow in place.

21. **REQUIREMENTS FOR THE RIFLE SITTING POSITION.**

a. The buttocks and feet or ankles will support the body's weight. No other portion of the body will touch the ground.

b. Both hands, the sling, and one shoulder will support rifle.

c. The arms may rest on the legs at any point above the ankles.

d. The magazine will be allowed to touch the clothing or the arm supporting the rifle, and may be gripped along the sides but the bottom of the magazine may not be used to support the weapon.

22. **ASSUMING THE SITTING POSITION.**

a. **Description.** The sitting position provides an extremely stable base and provides good bone support. The sitting position provides better observation than the prone position while still maintaining a fairly low profile.

b. **Variations.** There are three variations of the sitting position that can be adapted to the individual: crossed ankle, crossed leg, and open leg. The student should experiment with all the variations and select the position that is easiest to assume and provides the most stability for firing.

(1) **Crossed Ankle Sitting Position with the Loop Sling.**  
Apply the three elements and seven factors to this position. To assume crossed ankle sitting position with the loop sling:

(a) Position your body at approximately a 30-degree angle to the target.

(b) Place your support hand under the lower rail.

(c) Bend at knees and break the fall with your firing hand.

(d) Push backward with the feet to extend the legs and place your buttocks on the ground.

(e) Cross the support ankle over the firing ankle.

(f) Bend forward at your waist and place your support elbow on the support leg below the knee.

(g) Grasp the rifle butt with your firing hand and place the rifle butt into your firing shoulder pocket.

(h) Grasp the pistol grip with your firing hand.

(i) Lower firing elbow to the inside of the firing knee.

(j) Lower your head and place the cheek firmly against the stock to allow the aiming eye to look through the RCO.

(k) Move your support hand to a location under the lower rail, which provides maximum bone support and stability of the weapon.

(2) Crossed Leg Sitting Position with the Loop Sling.  
Apply the three elements and seven factors to this position. To assume crossed leg sitting position with loop sling:

(a) Position body at a 45 to 60-degree angle to the target.

(b) Place the support hand under the lower rail.

(c) Cross the support leg over the firing leg.

(d) Bend at your knees while breaking the fall with the firing hand.

(e) Place your buttocks on the ground as close to the crossed legs as you comfortably can.

(f) Bend forward at your waist while placing the support elbow on the support leg into the bend of the knee.

(g) Grasp the rifle butt with your firing hand and place the rifle butt into the firing shoulder pocket.

(h) Grasp the pistol grip with your firing hand.

(i) Lower firing elbow to the inside of the firing knee.

(j) Lower your head and place the cheek firmly against the stock to allow your aiming eye to look through the RCO.

(k) Move your support hand to a location under the lower rail that provides maximum bone support and stability of

the weapon.

(3) Open Leg Sitting Position with the Loop Sling.  
Apply the three elements and seven factors to this position.  
To assume the open leg sitting position with the loop sling:

(a) Position the body at approximately a 30-degree angle to the target.

(b) Place your feet approximately shoulder width apart.

(c) Place your support hand under the lower rail.

(d) Bend at your knees while breaking the fall with the firing hand.

(e) Push backward with the feet to extend the legs and place your buttocks on the ground.

(f) Place the support elbow on the inside of the support knee.

(g) Grasp the rifle butt with your firing hand and place the rifle butt into the firing shoulder pocket.

(h) Lower firing elbow to the inside of the firing knee.

(i) Lower your head and place the cheek firmly against the stock to allow your aiming eye to look through the RCO.

(j) Move your support hand to a location under the lower rail, which provides maximum bone support and stability of the weapon.

## 23. INITIAL ASSESSMENT OF THE SITTING POSITION.

a. Initial Assessment. Before beginning a detailed analysis of the position, you should make a quick assessment to ensure a reasonable sitting position is assumed. You are primarily looking for proper wearing of gear and body position.

(1) Proper Wearing of Gear. You should ensure your clothing and gear (e.g., cartridge belt) do not restrict your movement or breathing.

(2) Body Position and Alignment to the Target. You should establish one of the three accepted variations of the

sitting position and have as much of your body behind the weapon as possible to absorb recoil.

(a) Your torso should be bent slightly forward from the hips with the head oriented toward the target. The degree of bend depends on the position and the individual. If pulse beat is transmitted to the rifle or if you are having difficulty breathing, open your position up.

(b) Your body is not behind the weapon to absorb recoil, your body will rock backward during recoil and it will take longer to recover on target. In the crossed leg position, your firing shoulder will absorb most of the rifle's recoil. In the open leg and crossed ankle positions, your body will absorb recoil.

(c) Smaller students may need more of their bodies behind the rifle to absorb recoil than larger students.

b. **Selecting A Variation.** If you are having difficulty assuming a position, or incorporating the seven factors into the position, select a variation that is stable and maximizes the seven factors. Your body should be behind the weapon to absorb recoil without too much rocking and the elbows should be firmly placed so they do not slip.

(1) Crossed Leg Sitting. The crossed leg variation can be easily assumed and provides good bone support but does not place as much of your body behind the weapon.

(2) Crossed Ankle Sitting. In the crossed ankle variation, the body absorbs recoil. This variation provides a larger base of support on the ground, which can increase stability. This variation may require a great deal of dry fire to limber the body up to get into a stable position.

(3) Open Leg Sitting. In the open leg position, the heels of both feet should be in contact with the ground to provide bone support. Controlled muscle tension may be required to keep the knees up. Your feet should be positioned to provide stability and create muscle tension. This variation provides a wide base of support on the ground that can provide stability. The elbows should not be so far forward on the legs that your knees are in your armpits. This will throw the center of balance off and reduce stability because the muzzle is far from the bulk of your body.

#### 24. **DETAILED POSITION ANALYSIS.**

a. **Forward Hand.** You need to find a forward hand placement that controls tension on the sling and maximizes support for the rifle.

(1) Forward Hand Placement.

(a) Ensure the forward hand and forearm are straight with the wrist locked in place.

(b) Ensure the hand is rotated up so the rifle rests naturally on the support hand. The fingers naturally curl around the rail cover/heat shield. The support hand should grip the lower rail slightly to keep the hand from slipping on the lower rail during recoil.

(c) To ensure you establish consistent forward hand placement, you can note the number of rings on the rail cover/heat shield where your hand is placed once your position is established.

(2) Support Elbow. The placement of your forward hand dictates elbow placement. Your elbow should be under the rifle as much as possible to maximize bone support and to create a consistent resistance to recoil.

(a) In the crossed leg position, your elbow rests in the pocket of the support knee or the triceps rest against the shin or lower leg.

(b) In the open leg and crossed ankle positions, your elbow is extended forward of the knee and the triceps rest against the inside of the shin. In these positions, the knee acts as a brace for the elbow ensuring it does not slide out during recoil.

(c) Look at the magazine well in relation to the elbow. If the magazine well is directly over the elbow, you will not be able to insert the magazine.

(3) Muzzle Elevation. If the RCO is above or below the desired aiming point:

(a) Vary the placement of the support hand in relation to the rail cover/heat shield.

1 Moving the support hand forward on the lower rail lowers the muzzle of the weapon, causing the bullet drop compensator to settle lower on the target.

2 Moving the support hand back on the lower rail raises the muzzle of the weapon, causing the bullet drop compensator to settle higher on the target.

b. **Rifle Butt In The Pocket Of The Shoulder.** Consistency of stock weld is achieved through proper placement of the rifle butt in the shoulder. To ensure consistency, your shoulder must be relaxed. The rifle butt should be placed firmly in the pocket formed in the firing shoulder. This lessens the effect of recoil, helps steady the rifle, and prevents the rifle butt from slipping in the shoulder during recoil.

(1) Check the placement by physically feeling the butt stock to ensure the heel is in your shoulder tightly.

(2) Ensure the rifle butt is not too high or too low in your shoulder. This can be indicated by head position. If your head is not erect or you are creeping up on the rear sight, you may have improper butt stock placement. The placement is correct when the aiming eye can look straight through the optic.

(3) Adjust placement of the butt stock by physically moving it in your shoulder.

c. **Grip Of The Firing Hand.**

(1) A high firm grip should be maintained consistently throughout the duration of the shot. However, you want to make sure you are not attempting to control natural point of aim by "muscling" the weapon with your grip. There should be enough rearward pressure on the grip to stabilize the weapon and pull it into the pocket of the shoulder. Muscling the rifle with the grip will produce excessive muscular tension.

(2) To check finger placement on the trigger, you should dry fire a couple of shots. There should be enough of your finger on the trigger to allow the trigger to be moved straight to the rear without disturbing sight alignment. The finger should manipulate the trigger independent of the grip.

d. **Firing Elbow.** In the crossed leg position, the firing elbow should rest in the pocket of the firing knee or the triceps may rest against the shin or lower leg. In the open leg and crossed ankle positions, the firing elbow extends over the knee and the triceps rest firmly against the shin. Placement of the elbow must ensure support is behind it to brace it and keep it from slipping during recoil.

e. **Stock Weld.** Your head may be further back on the stock

in the sitting position as compared to the prone. Your cheek should be placed naturally but firmly on the stock to enable the head and rifle to recoil as a single unit. If your head is not firmly on the stock, the stock will hit your cheek during recoil. To obtain stock weld, your head should come straight down on the stock to a position where the aiming eye can look straight through the RCO.

(1) Eye Relief. A stock weld should be established that creates eye relief that allows scope alignment and sight picture to be achieved. If the aiming eye is too close to the optic, it can make establishing scope alignment difficult because it is harder to center the reticle in the sight. Moving the butt stock closer to the neck can extend eye relief.

(a) The distance between the aiming eye and the rear of the optic should be enough to ensure the rear housing assembly does not hit your eyebrow during recoil. This is particularly true for those who wear eyeglasses. In the sitting position students have the tendency to keep binding over, and this means they will creep up on the optic. Getting hit may cause you to flinch or to break stock weld on following shots.

f. Breathing. Observe your breathing to ensure you stop your breathing at your natural respiratory pause and shoot during the same point in your breathing cycle for every shot.

g. Muscular Tension. Muscular tension will cause you to shake, tremble, or become fatigued. The proper placement of the support elbow will help to reduce some of the muscular tension it takes to stabilize the optic.

## 25. REQUIREMENTS FOR THE RIFLE STANDING POSITION:

a. Standing erect on both feet will support the body's weight.

b. No other portion of the body will touch the ground.

c. Both hands and one shoulder will support the rifle.

d. The rifle sling will be adjusted to the parade configuration for web slings.

e. The forward arm may rest against the body or on the cartridge belt and any attached equipment.

f. The magazine will be allowed to touch the clothing or the arm supporting the rifle, and may be gripped along the sides but

the bottom of the magazine may not be used to support the weapon.

26. **INITIAL ASSESSMENT OF THE STANDING POSITION:**

a. **Description:** The standing position is the quickest position to assume and allows greater mobility and observation than any other position. It is often used for immediate combat engagement. The position is supported by your legs and feet and provides a small area of contact with the ground. Your center of gravity is high above the ground; therefore, maintaining balance is critical in this position.

b. **Initial Assessment:** You must make a quick assessment to ensure a fairly reasonable position is assumed. You are primarily looking for proper wearing of gear and body position.

(1) **Proper Wearing of Gear:** You must ensure that all clothing and individual field equipment (e.g., cartridge belt) does not restrict movement or breathing. The sling must be used properly.

(2) **Body Position and Alignment to the Target:** When you are using the parade sling, look for the following:

a. It is recommended that your body be bladed to the target during basic shooting.

b. You should be facing to your strong side.

c. Your feet are shoulder width apart and parallel to one another.

27. **DETAILED POSITION ANALYSIS:**

a. **Standing Position with the Parade Sling:** During Table 1, you should focus on the seven factors common to all shooting positions. Your analysis should be systematic and begin from one end of the position and work to the other end. Develop your own system so that you can quickly spot anything that needs correction.

(1) Stand straight and erect. The hips should not be flared out in any way nor should the back be arched.

(2) The feet are approximately shoulder width apart distributing weight evenly between both feet (ideally, you will stand as naturally as possible). Your toes point straight, not

pointed inboard or outboard, this will cause you to become unbalanced and will create muscular tension in the legs.

(3) Do not twist at the waist in an effort to square your body to the target. Check your body position by looking at the angle of your body in reference to the target. You should face approximately 45-90 degrees towards your strong side. With the parade sling the closer you can get to 90 degrees the more stable the position will be.

(4) The butt or toe (the end with the lower sling swivel) of the stock should be in pocket of the firing shoulder. Corrections in muzzle elevation are made by raising or lowering the stock in the firing shoulder. The placement of the stock may vary based on your body. For example: if you have short arms you may need to move the stock of the weapon out a little farther between their bicep and deltoid (keep in mind that this is a technique and not a hard fast rule).

(5) Your firing side elbow should be relaxed and lowered naturally (note that if you force your elbow down then it will create muscular tension).

(6) Your grip of your firing hand should be high on the pistol grip and firm enough to provide some stability and positioned so you can apply trigger control.

(7) Your head should be as erect as possible so that you are looking through the center of the optic. In addition, your cheek is firmly placed against the stock to maintain stock weld and proper eye relief (eye relief should remain 2-4 inches from the rear reticle).

(8) Your non-firing hand is under and around the rail cover/heat shield close to the receiver (when firing with the parade sling, the non-firing hand should support the weapon at its center of gravity, the slip ring). The forearm and wrist are straight providing additional bone support. The support hand is rotated so the rifle rests naturally between the thumb and index finger. The fingers should form a naturally curl, but kept away from the ejection port.

(9) The non-firing elbow is placed so that it rests across your rib cage to provide some bone support for the weapon.

**28. FUNDAMENTALS OF MARKSMANSHIP. (140 MIN)**

The fundamentals of marksmanship are aiming, breathing, and trigger control. These techniques provide the foundation for

all marksmanship principles and skills. For rifle fire to be effective, it must be accurate. A rifleman who merely sprays shots in the vicinity of the enemy produces little effect. The fundamentals of marksmanship, when applied correctly, form the basis for delivering accurate fire on enemy targets. These skills must be developed so that they are applied instinctively.

29. **THE AIMING PROCESS**. Aiming is the process of aligning the weapon on the target. Aiming consists of two components; scope alignment and sight picture as well as a number of factors that affect the aiming process. As a coach you must understand, apply, analyze and correct the process.

a. **Sight Systems**. With the introduction of the RCO, all Marines need to understand the optical sight system. The fundamentals of marksmanship apply when using the optical sight system.

b. **Rifle Combat Optic**. The RCO is an optical sight that magnifies the image (4x32). The RCO is optically centered with a reticle pattern that uses a Bullet Drop Compensator (BDC) topped with an illuminated chevron and graduated horizontal stadia lines. Once zeroed the bullet drop compensator allows targets to be engaged at different ranges without making any sight adjustments. The following RCO terms are interchangeable with those for iron sights when describing aiming principles.

(1) With the RCO your "front sight post" is your Bullet Drop Compensator.

(2) Your "rear sight aperture" would be the rear ocular lens of the scope when utilizing the RCO. With the RCO the term scope alignment is used instead of sight alignment.

### 30. **RIFLE COMBAT OPTIC**

a. **Scope Alignment - RCO**. The RCO is an optical sight with a reticle pattern. The RCO provides the ability to engage targets using precision marksmanship techniques. Shooting with the RCO uses a center post topped with an illuminated chevron and graduated horizontal stadia lines to adjust for changes in range, this is the bullet drop compensator. Scope alignment consists of the following:

(1) Scope alignment is the relationship between the reticle pattern and a full field of view as seen by the shooter. Scope alignment for the RCO consists of ensuring that there is a full field of view with the shooter focusing on the chevron and center post with horizontal stadia lines.

(2) Improper eye relief, or improper field of view, known as scope shadow will result in improper shot placement. For scope shadow, the shooter must place his head so that a full field of view fills the tube, with no dark shadows or crescents to cause inaccurate shots. You must adjust the position of your eye in relation to the ocular lens until there is no shadow and a full field of view is achieved.

b. **Sight Picture - RCO.** Sight picture is the placement of the reticle with the proper hold in relation to your target while maintaining a full field of view, proper scope alignment, focus remains on the bullet drop compensator and the target is out of focus.

(1) Bullet Drop Compensator. The reticle pattern is a bullet drop compensator with designated aiming points to compensate for trajectory of the 5.56mm round at ranges of 100 - 800 meters. Point of aim for sight picture changes based on the range to the target, and the possibility of the wind being compensated.

(a) Hold the tip of the chevron center mass on a target at 100 meters and less.

(b) Hold the bottom of the chevron center mass on a target at 200 meters.

(c) Hold the tip of the red post center mass on a target at 300 meters.

(d) Hold the appropriate horizontal stadia line center mass on a target at each of the ranges indicated outside 300 meters.

(2) When zeroed properly the POA/POI at the designated distance will be center mass of the target. Because the BDC is calibrated for the correct trajectory, your POA is your POI at each distance.

(3) Using the identified reference points will assist in adjusting holds based on range to the target but does not compensate for the effects of weather. That will be discussed during another lesson.

(4) Due to differences in recoil resistance, the jump angle of the rifle, and an overall perception of full field of view and reticle placement, a Shooter may have differences in aiming points from position to position. This difference must be compensated for by adjusting ones hold on the target, or

aiming point, whether it's for the difference in elevation, windage, or both.

c. **Relationship Between the Eye and the RCO.** The human eye can focus clearly on only one object at a time. For accurate shooting, it is important to focus on the reticle of the BDC throughout the aiming process.

(1) While exhaling and bringing the reticle to the target, your primary focus should be on the reticle while maintaining a full field of view.

(2) During firing, your peripheral vision will include the rear ocular lens and the target.

(3) An inexperienced shooter may have difficulty accepting that the final focus must be on the reticle with the target appearing slightly indistinct.

d. **Scope Parallax.** Parallax is when the image of the target, and the reticle, are not in exactly the same plane, and by moving the eye up and down, or side to side, either the target or the reticle appears to move in relation to the other. Parallax effects proper sight picture. Several points to remember about scope parallax:

(1) Parallax will not have a noticeable affect except at longer ranges.

(2) To confirm that you have parallax move your head up and down and side to side. If you notice a change in all directions your problem is parallax. If it only occurs in one or two directions then you have other problems, either you are moving the rifle, or you have eye problems.

(3) The RCO cannot be adjusted to compensate for parallax. To minimize its affect consistent stock weld and proper eye relief must be maintained at for every shot.

31. **FACTORS AFFECTING THE AIMING PROCESS.** There are several factors that will affect the aiming process. It is important to you as a Coach to understand these factors and their relationship to the aiming process.

a. **Stock Weld.** Stock weld is the point of firm contact between your cheek and the stock of the rifle. Stock weld is very important as it helps establish eye relief, provides more contact surface area with the weapon, and is a great place for controlled muscular tension creating more stability and better

recoil management. Correct stock weld will allow a shooter's head to be as erect as possible to enable the aiming eye to look straight through the rear sight aperture or the ocular lens.

(1) Establish Stock Weld. To properly establish stock weld a shooter should lower the bottom portion of the jaw to the meaty portion of the cheek onto the stock of the weapon until a full field of view is established through optic. This may not be a familiar placement of the cheek, but must be maintained in order to ensure accurate and consistent shot placement.

(2) Eye Strain. If the position of the shooter's head causes him to look across the bridge of his nose or out from under his eyebrow, the eye will be strained. The position of a shooter's head, if incorrect, can cause the shooter to strain the eye by not allowing it to rest at its natural position. Eyestrains can also produce involuntary eye movements, which reduce the reliability of vision. Fatigue of the eye and improper perception of the sight will follow causing poor shooter performance.

(3) Movement of Stock Weld. Changing the placement of your cheek up or down on the stock from shot to shot may affect shot placement and the zero on the rifle, due to your perception of the rear ocular lens. Always explain to your shooters that consistency breeds accuracy.

(4) RCO Specific. Depending on the type of mounting system used for the RCO, a shooter may not be able to place as much contact of the cheek on the stock.

b. Eye Relief. Eye relief is the distance between the ocular lens and the aiming eye.

(1) RCO. Optimal eye relief is 1.5 inches from the rear ocular lens, every shooter is different. The distance between the aiming eye and the rear ocular lens will ultimately depend on how long the shooter's neck is and the position of the rifle stock in his shoulder. Every effort should be made to accommodate the 1.5 inches of relief. The ability to move the RCO on the rail system can help accommodate the optimal eye relief of 1.5 inches. The shooter should annotate where he mounts the RCO on the rail and be consistent with its placement as well as the torque applied to the mounting screws.

(a) If your eye is too close to the ocular lens the shooter may be struck by the RCO during recoil and the field of view may blacken. Moving your eye back from the ocular lens

will allow sufficient light to enter the ocular and make acquiring the full field of view easier.

(b) However, if your eye is too far from the ocular lens, it will be difficult to acquire full field of view of the target and to maintain a precise aiming point.

(c) A rough eye relief adjustment can be acquired when mounting the RCO to the M16A4 or M4 by changing the placement of the RCO on the top mounted rail of these weapon systems. This adjustment is best made from the sitting position.

c. **Wearing of Glasses.** Wearing glasses can alter the perception of scope alignment and sight picture. When wearing glasses, it is critical to look through the optical center of the lens. The following are specific considerations for each type of sighting system.

(1) **Optical Center of the Lens.** The lenses of the glasses are curved not flat, and looking through the upper or lower part of the lens where the curve is at its most extreme will distort your vision. The optical center of the lens is the center of the curve and is the only position of the lens that offers optimal viewing of scope alignment and sight picture.

(2) **Proper Wear.** Shooters who wear glasses should ensure they are clean and worn properly. The use of an elastic band on the glasses helps keep the glasses in place. Additional support under the bridge of the glasses such as a foam earplug will help keep the glasses stable.

d. **RCO.** Wearing glasses can alter the perception of the reticle and the image of the target. If wearing glasses, it is critical to look through the optic center of the lens and to be consistent with the wear of the glasses or contact lenses. Avoid switching from one corrective system to the other, i.e. glasses to contacts. The RCO is designed with a 4 power magnification.

(1) The amount of movement seen through a magnified scope will appear to be dramatically more than when firing with iron sights from similar positions and ranges to the target. This must be compensated by focusing on the reticle and assuming correct natural point of aim.

(2) The level of concentration on the reticle and full field of view can be considerably compromised due to the clarity of the appearance of the target. Discipline must be maintained

throughout the firing process by focusing on the maintaining the full field of view and primary focus on the reticle.

(3) Common errors in firing with optics are slapping the trigger, staring at the target, muscling the reticle to the target, and an overall absence of the fundamentals of marksmanship. These can all be alleviated by keeping primary focus on the reticle while maintaining a full field of view in coordination with proper trigger control.

e. **Other Considerations.** The wear of shooting glasses, ballistic eyewear, or sun/wind/dust goggles can have a similar impact on the RCO as prescription eyewear.

d. **Body Alignment.** The direction that the body/rifle combination is oriented while in a stable firing position. Requires correct scope alignment and sight picture. Requires proper muscular control and works with all types of slings in all positions.

32. **APPLICATION OF THE AIMING PROCESS.** Acquiring and maintaining the two components of the aiming process requires mastering a series of steps. This process varies depending on the size and distance to the target as well as the type of sighting system being used.

a. **Rifle Combat Optics.** The RCO can also be used as a reflex sight at close ranges.

(1) **Target Acquisition with the RCO.** The AN/PVQ-31 is designed for shooting with both eyes open for quick target acquisition and engagement. This allows the AN/PVQ-31 to be utilized as a reflex sight when speed is critical at these distances. This is because of a process called the Bindon Aiming Concept (BAC).

(2) **Bindon Aiming Concept (BAC).** A scope with an illuminated aiming point and magnification employs what is called the Bindon Aiming Concept.

(a) Human vision is based upon a binocular presentation of visual information to the brain - this means that the brain processes what is seen through both eyes. The RCO is designed to present a binocular view of the target. Therefore, the RCO is designed to shoot with both eyes open. A traditional scope presents a monocular view - that is why one eye is closed to shoot.

(b) With both eyes open, when the weapon is moved,

the brain picks up the chevron in the dominant eye through the optic. The brain picks up the target and background via the non-dominant eye. During dynamic movement, the scene through the telescope blurs because the image moves more rapidly due to magnification. The dominant eye sees the bright chevron against the blurred target scene, so the brain picks the scene from the unaided eye. The brain actually merges the two images. As soon as the weapon begins to become steady in the target area, the brain switches to the magnified view of the target.

(3) Procedures for Determining Dominant Eye. To use the RCO to its maximum potential, you should shoot with both eyes open and use your dominate eye to look through the optic. To determine dominant eye, perform the following steps:

(a) Have another Marine stand in front of you approximately 5-7 feet away. With both eyes open, look at the Marine and extend your hands at eye level out to the sides of your body.

(b) While keeping the hands extended, slowly bring your two hands together, forming a small triangle out in front of your face.

(c) The Marine standing in front of you will determine which eye is dominant. If he sees your right eye in the small triangle, you are right-eye dominant. You can confirm this by closing your left eye - you should be able to see the Marine through the triangle with your right eye.

(4) Shooting Adjustment. Marines who are cross-eye dominant, meaning they use their non-dominant eye behind the optic, will experience a shift in point of impact when shooting using both eyes open. The amount of shift will be based on the disparity between the dominant and non-dominant eye. If you cannot shoot using the dominant eye behind the optic, keep your dominant eye closed. The downside to this approach is a loss of peripheral vision.

(5) Short Range Engagements. At close ranges (e.g., 0 - 100 yards), keeping both eyes open increases situational awareness. In addition, at close ranges there is a natural tendency to look at the target and, therefore, shoot with both eyes open. To acquire a target, keep both eyes open, focus on the target, bring the weapon/optic up into the line of sight (do not switch the focus to the reticle), and engage the target.

(6) Longer Range Engagements. At longer ranges, 300 yards and out, shoot with one eye closed to focus on the reticle

of the RCO. At these ranges, accurate sight picture is more critical to accurate shooting. Past 300 yards, the horizontal stadia lines are used as the aiming point. These lines are black and not illuminated, so they must be focused on to establish sight picture.

(a) The RCO is a 4-power scope. When using it to engage targets at longer distances, the magnification shows movement of the sight more (stability of hold), which can slow down reaction time. Size and distance to the target will affect how quickly stability of hold can be achieved.

(b) At 300 yards, the tip of the red post in the RCO is held center mass on a target. At this range, it may be difficult to acquire the target because the red chevron tends to mask the target. There is a tendency to shoot lower at 300 yards because there is a smaller portion of the target visible. Therefore, ensure the red post is placed correctly on the target at this distance.

(7) Intermediate Range Engagements. At ranges between 100 and 300 yards the shooter can use either the precision marksmanship aiming process or the RCO close range procedures to engage targets. This will depend on the size of the target and the tactical situation. For example if using the RCO for Table 1A live fire then long range procedures associated with precision marksmanship should be used.

33. **STABILITY OF HOLD**. The ability to hold the rifle sight(s) still on a designated area of a target is considered stability of hold. Size and distance to the target dictates how critical stability of hold must be. The smaller the target or the longer range to the target requires more stability of hold. Likewise, the larger the target or the shorter range requires less stability of hold, however, the sight(s) must still be stabilized on the target. Firing positions, sling adjustment, and use of support affect stability of hold and the ability to achieve it. We will cover this element of marksmanship in more detail in another lesson: Analyzing Rifle Firing Positions. The final element of stability of hold is breath control.

a. **Analyzing Breath Control**. Good breath control will interrupt the breathing cycle long enough to fire a well-aimed shot. Proper breath control is critical to the aiming process. Breathing causes the body to move. This movement transfers to the rifle making it impossible to maintain proper sight picture. Breath control allows you to fire the rifle at the moment of least movement thus achieving stability of hold.

b. **Natural Respiratory Pause.** A respiratory cycle (inhaling and exhaling) lasts about four or five seconds. Between respiratory cycles there is a natural pause of two to three seconds. This is the natural respiratory pause, where the breath naturally stops exhaling without forcing any air out. During this respiratory pause, breathing muscles are relaxed and the rifle sights settle at their natural point of aim. The shooter should fire at this point.

(1) Extending Natural Respiratory Pause. Some shooters can extend this natural pause up to ten seconds to fire a shot. The pause should last as long as the shooter feels comfortable with it. It really depends on physical condition and lung capacity. A shooter that holds their breath longer than is comfortable will result in a lack of oxygen. This causes the vision to deteriorate and affects the ability to focus on the sights.

(2) Not Firing During the Natural Respiratory Pause. If the shooter does not fire during their respiratory pause, their shot groups will have a tendency to be in a vertical pattern. When they fire during an inhale the shot will be low, at respiratory pause the shot will be center, and at a forcible exhale the shot will be high; all which will create that vertical pattern.

b. **Techniques for Breath Control**

(1) Slow Fire Techniques

(a) Assume a Firing Position.

(b) Stop Breathing. Stop breathing at your natural respiratory pause and make final adjustments to your natural point of aim.

(c) Breathe Naturally. Breathe naturally until your sight picture begins to settle.

(d) Take a Slightly Deeper Breath.

(e) Exhale. Exhale and stop breathing at the natural respiratory pause.

(f) Fire the Shot. Fire the shot during the natural respiratory pause.

(g) If the sight picture does not sufficiently settle to allow the shot to be fired, resume normal breathing and repeat the process.

(2) Rapid Fire Techniques. There are two techniques for breath control during rapid fire. First is breathing between shots, and the second is holding the breath.

(a) Breathing Between Shots Technique

1. Assume a Firing Position.
2. Stop Breathing. Stop breathing at your natural respiratory pause.
3. Fire the Shot. Fire the shot during the natural respiratory pause.
4. Repeat Steps. Repeat steps 1-3 until all ten shots have been fired.

(b) Holding the Breath Technique

1. Assume a Firing Position.
2. Take a Deep Breath. Take a deep breath allowing a large amount of oxygen to cycle through the body.
3. Exhale. Exhale until you hit your respiratory pause.
4. Fire the Shot. Fire as many shots as comfortable while holding your respiratory pause.
5. Take Another Breath. Once the shooter needs to take another breath all they have to do is repeat steps 2-4.
6. Repeat Steps. Repeat Steps 2-5 until all shots have been fired.

34. **ANALYZING TRIGGER CONTROL**

a. Definition. Trigger control is the skillful manipulation of the trigger that causes the rifle to fire, while maintaining scope alignment and sight picture. Controlling the trigger is a mental process, while pulling the trigger is a physical process.

(1) Timing of Trigger Control. Controlling the trigger is a mental process. Everyone has probably heard or read that trigger control is such a subconscious process that a surprise shot is fired. This is a good way to develop trigger control. You must develop trigger control, to ensure that at the moment you fire the shot the reticle settles on the aiming point. It should be a subconscious effort not to disturb the aiming point or scope alignment.

(2) Manipulating the Trigger. The skilled shooter knows when the weapon will fire and manipulates the trigger so that the shot is fired when they are at their aiming point.

b. Grip and Placement of Trigger Finger. A high firm pistol grip is essential for good trigger control. With a high grip the trigger finger is very close to being parallel with the deck, and the shooter is able to pull the trigger straight to the rear. If the firing grip was lower on the pistol grip your trigger finger would pull downward on the weapon as the trigger was manipulated. This will disrupt sight alignment. You want a firm grip so you can isolate the muscles in your trigger finger from the rest of the hand. This allows only the trigger finger to move and the rest of the fingers will not move as the trigger is pulled to the rear. If the whole hand squeezes the pistol grip then your sight alignment will be disrupted. Establish a grip before starting the application of trigger control and maintain it through the shot's duration.

c. Establishing a Proper Grip

(1) Proper Hand Placement. Place the "V" of the thumb and index finger on the pistol grip directly behind the trigger.

(2) Proper Grip. The grip should be firm and high enough to allow manipulation of the trigger, without disturbing the sights.

(3) Proper Finger Placement. Place the fingers and thumb around the pistol grip in a location that allows the trigger finger to rest naturally on the trigger.

d. Establishing Proper Trigger Finger Placement. You must understand correct trigger finger placement before you can master trigger control.

(1) Natural Placement. Your trigger finger should contact the trigger naturally. You should not make any special effort to place a certain portion of the finger on the trigger.

(2) Shooter Variations. Trigger finger placement depends greatly on the size of your hand and the manner in which you grip the pistol grip. Placement is correct, when it allows trigger movement straight to the rear, without disturbing sight alignment.

e. Techniques of Trigger Control. There are two techniques of proper trigger control. First is uninterrupted, and the second is interrupted.

(1) Uninterrupted Trigger Control. Uninterrupted trigger control is applying smooth and continuous pressure to the rear until the shot is fired. This is the preferred method of trigger control.

(2) Interrupted Trigger Control. Interrupted trigger control is applying smooth and continuous pressure to the rear until an error is detected in the aiming process. When this occurs rearward pressure is stopped until sight picture is achieved. When the sight picture settles the rearward pressure is continued until the shot is fired.

(a) This method of trigger control is used in extremely windy conditions when the weapon will not settle. It forces the Marine to pause until the sights return to their aiming point.

(b) A shooter should not force the rifle by steering it into an aiming point. Let the rifle move naturally toward and away from the aiming point on the target. If the rifle is moving toward the target, continuously apply trigger pressure. If the rifle is moving away from the target or aiming point, hold trigger pressure until the rifle starts drifting back toward the aiming point. Then, apply pressure to the trigger. If the shot breaks as the sights are moving toward the aiming point, the shot will normally be inside a shooter's call.

h. Improper Trigger Control. Jerking the trigger, bucking, and flinching are usually associated with improper trigger control. These errors are usually caused by a lack of stability of hold. In turn, this can make a shooter hesitate, jerk the trigger, and anticipate the shot, etc.

(1) Jerking. A shooter acquiring a sight picture only causes jerking of the trigger. As soon as they see the sight picture in the sights, the shooter abruptly moves the trigger rearward, quickly causing it to disturb scope alignment and sight picture. The trigger should be moved in one continuous,

even motion to the rear.

(2) Bucking. Bucking is caused by a shooter forcing their firing shoulder forward into the rifle as they fire the shot. Bucking is due to the shooter forcing the rifle to fire, instead of letting the shot break as sight picture is acquired.

(3) Flinching. Flinching occurs when you anticipate the shot, recoil, or report of the shot firing. With flinching, a shooter involuntarily tenses the muscles in the entire body causing the shooter to jump as the shot is fired. Blinking as the shot is fired often accompanies flinching.

i. **Techniques for Correcting Improper Trigger Control**

(1) Accept Movement of the Muzzle. Accept the movement of the rifle. When in position and maintaining perfect scope alignment, you will notice your own breathing and natural body movement. This moves the muzzle of the weapon. Although the sights remain aligned, you see them moving within an area on the target. That movement is natural.

(a) Recognize that a certain amount of movement always exists. The goal is to refine or minimize this movement.

(b) Work on stability of hold to minimize this arc of movement to an acceptable aiming area.

(2) Remove Hesitation. The shooter should not second-guess their self. Take the shot once sight picture is acquired. This can be achieved through dry fire working on trigger control applied in a steady, smooth motion straight to the rear the moment sight picture is acquired.

(3) Do Not Anticipate the Shot. As you move the trigger rearward in one steady, continuous motion, concentrate on the reticle on the target's center mass. You should not think about trigger control. Then, you are not conscious of an effort to move the trigger rearward and the shot breaks. You must let the shot happen rather than anticipate the shot.

(4) Relax and Slow Down. Correct improper trigger control during dry fire by calming down and working on moving the trigger straight to the rear in one steady, continuous, even motion. Once you can apply trigger control slowly and evenly, gradually speed up until you get the feel of proper trigger control.

35. **FOLLOW-THROUGH.** Trigger control enables you to maintain sight alignment and an aiming point when taking a shot. It is a difficult skill to acquire and must be achieved to avoid errors such as flinching, bucking, and jerking. Mastering the three fundamentals of aiming, breath control, and trigger control is critical to becoming a proficient marksman. The consistent application of the fundamentals of marksmanship depends on follow-through.

a. **Definition.** Follow-through is the continued application of the fundamentals, until the round has exited the rifle barrel.

(1) **Limit Movement.** Ensure you do not shift your position, move your head, or let the muzzle of the rifle drop until the bullet has left the barrel. This is often observed when a shooter raises their head off the stock before the bullet has exited the muzzle.

(2) **Importance of Follow-through.** Follow-through is important so the direction of your shot will not be disturbed. Proper follow-through reduces the likelihood of errors. Follow-through also allows for faster follow on shots if necessary.

b. **Recovery.** It is important to get the rifle sights back on the target for another shot. This is known as recovery. Shot recovery starts immediately after the round leaves the barrel. To recover quickly, apply a consistent amount of muscular tension within the position throughout the shot process to allow recovery of the sights back on target as quickly as possible.

#### REFERENCES

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