ADVANCE HANDOUT MATERIAL

ORWAC-WORWAC

5/69-207-2

AUGUST 1969

DEPARTMENT OF TACTICS
AVIATION ARMAMENT DIVISION
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama/Fort Stewart, Georgia

ADVANCE HANDOUT MATERIAL

ORWAC - WORWAC

TABLE OF CONTENTS

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

August 1969
File No. 5/69-207-2
72-207-2
73-207-2

PERFORMANCE OBJECTIVES

PRINCIPLES OF TARGET ATTACK

1. KNOWLEDGES: Without the use of notes or references the student will be able to write, without error:

First Hour

a. The eight principles of attack helicopter attacks.

b. The four factors of METT and give at least two considerations of each factor as to their application toward the attack.

c. The four factors that must be considered during the analysis of enemy weapons prior to the attack.

Second Hour

d. The five considerations in attack pattern selection.

e. At least two of the four advantages of the Clover Leaf; two of the four advantages of the Race Track; two of the four advantages of the 'L' attack pattern.

f. The five specific subjects the door gunner must be briefed on prior to the mission.

g. The two responsibilities of the door gunner.

2. SKILLS: None.

NOTES

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

August 1969
File No. 5/69-207-2
72-207-2
73-207-2

ADVANCE SHEET

PRINCIPLES OF TARGET ATTACK

PURPOSE: This instruction is designed to acquaint you with the principles of target attack common to all targets, the factors of METT and their application toward the attack, attack patterns and the use of door gunners in tactical operations.

STUDY ASSIGNMENT: Study Advance Sheet.

SPECIAL INSTRUCTIONS: Bring advance sheet, student outline, and performance check to class.

DISCUSSION POINTS:

1. Principles of target attack. Extensive planning is necessary from the receipt of the mission until all aircraft have returned to home base. The discussion will be based on the attack only. During the attack the mission commander is responsible for the actions of his unit. All considerations must be based on two or more attack helicopters, gunships are not normally employed individually. During the attack, the mission commander must consider every possible action that will give the friendly forces an advantage and place the enemy in a disadvantage. The principles of target attack are:

a. SURPRISE-implies striking the enemy when, where or in a manner that he is unable to counter effectively.

b. CONTROL-ability of the commander to position or maneuver his elements as he desires to accomplish his mission.

c. FIREPOWER-Efficient use of firepower is achieved by using the appropriate weapons available within the entire combined arms force.

d. TIMING-Precise timing allows maximum support of all attacking elements and reduces the effect of enemy countermeasures.

e. FIRE AND MANEUVER-Allows one element to close with the enemy under the supporting fires of another element.

f. FLEXIBILITY-Allows the attack helicopter commander to adapt to the combat situation and to accept a variety of missions.

g. VIOLENCE-Destruction and demoralization of the enemy.

h. EXPLOITATION-Take advantage of any enemy weakness to enhance success.

2. The factors of METT. The mission commander must first consider each factor separately, then mentally weigh each factor in light of the importance of the other factors pertaining to the specific mission. The commander considers all factors in relation to the unique equipment and mission capabilities of his fire team.

a. MISSION-The mission is the most important factor to consider in formulating the attack plan. There are three types of missions: reconnaissance and security; escort; direct aerial fire support. There are three types of fires used in the direct aerial fire support mission, they are Neutralization Fire and Destruction Fire and Combined Fire. Destruction Fire requires a post strike analysis.

b. ENEMY-The mission commander should obtain all available information from unit, battalion, division intelligence sections. This will provide the commander with accurate and timely information for his continuing estimate of the enemy capabilities. The major items of information are the enemies location and disposition, size, methods of employment and his weapons. When analyzing the enemies weapons the four main factors to consider are; location, type, effectiveness against our aircraft, and their vulnerability to our combat power.

c. TERRAIN AND WEATHER-The terrain and weather are important factors in attack helicopter operations. The mission commander must determine his advantages from the terrain and evaluate the advantages it affords the enemy. Conditions of relatively low visibility and ceiling are ideally suited as cover for helicopter operations.

(1) TERRAIN- The terrain provides cover and concealment. Concealment is protection from observation. Cover is protection from fire. Every advantage afforded by the terrain and conditions of visibility that provide cover and concealment must be exploited by the mission commander. However, concealment and cover should not be sought at the expense of good observation and accurate fire.

(2) WEATHER-Weather conditions will have an important bearing on any operational decision and should be a primary consideration in mission planning. Weather conditions seldom preclude low-level operations for extended periods of time. High winds, icing and periods in areas of low visibility must be considered by the commander and in turn keep his subordinates informed of likely weather conditions in the target area. High winds will affect helicopter ground speed and the accuracy of rocket firing. Variations in density altitude may limit the amount of ammunition or fuel that the attack helicopter can carry. The attack helicopter mission commander should consider the advantage of attacking out of the early morning or late evening sun. However, an attack into the early morning or late evening sun will greatly decrease the units visibility and place them at a disadvantage.

d. TROOPS AND EQUIPMENT AVAILABLE-Timely logistical support requires detailed planning for resupply, evacuation and maintenance before the operation. Having been assigned a specific tactical mission the attack helicopter commander must consider all fires available and request support from those elements that can most effectively assist in the accomplishment of the mission. When available tactical air support, artillery, naval gun fire and ground combat forces must be considered. The attack helicopter commander's plan depends in part upon the capabilities of his own force and those elements supporting. Economy of combat power is an important consideration in the employment of attack helicopters. Attack helicopter commanders must decide which weapons are required against specific targets. One method of ammunition control is by the use of the aerial fire command.

3. ATTACK PATTERNS.

a. INFLIGHT TARGET ANALYSIS-The inflight target analysis is mandatory on all target attacks based on an examination of the targets environment and physical characteristics related to the factors of METT and based on the principles of target attack. The attack helicopter commander must be capable of correctly analysing the target, formulating his plan of attack, and issuing his order in a matter of seconds. The primary factor to consider is the mission.

b. ATTACK PATTERN CONSIDERATIONS-Attack patterns must be tailored to the specific requirements of the target. Unit SOP's should contain guides for the attack patterns. The factors to consider when developing a pattern are:

The following considerations are mandatory.

(1) CONTROL- All attack patterns should lend themselves to positive control. The elements of the team must be responsive to the commanders orders.

(2) FLEXIBILITY-The unit must be capable of rapidly shifting to meet any new threat or exploit any enemy weakness.

(3) FIREPOWER-The requirement to deliver maximum fire in any direction should result in a pattern tailored for that purpose. Maximum firepower should be maintained from engagement to target disengagement in order to retain the advantages over the enemy.

The following considerations are high priority.

(4) MUTUAL SUPPORT-All elements of the fire team should be within support range of each other during the attack. Mutual support must be continuous within attacking fire teams and platoons whenever possible.

(5) EXPOSURE-Flying over the same ground track by successive elements and flying within the dead man zone should be avoided whenever possible. The use of terrain and marginal weather can be used to reduce exposure.

d. PATTERNS -Specific attack patterns cannot be preplanned. The mission commander must adjust each attack pattern to take advantage of the terrain and weather, exploit enemy weaknesses and employ his element to gain the maximum advantage. Important considerations in the selection of an attack pattern include the number of attacking helicopters, the target characteristics, weapons capabilities, friendly forces and the location of the enemy defenses.

The following constants should be utilized when possible.

(1) Attacks are conducted at optimum speed.

(2) Targets are kept under continuous fire throughout the attack.

(3) All effective fires from each helicopter will continue during disengagement.

(4) A minimum of two (2) helicopters are used in the attack.

(5) Formations are selected that offer maximum mutual support.

(6) Firing runs will use more than one ground track.

(7) Each helicopter will observe other attacks and shift fires to obtain maximum target coverage.

(8) Attack patterns will be oriented so that the firing runs parallel the long axis of the target.

(9) Ammunition expenditure will be restricted to that necessary to accomplish the mission without overkilling the target.

(10) Paralleling terrain features such as roads and ridge lines will be avoided.

CLOVER LEAF PATTERN- The clover leaf pattern may be employed using destruction fires against point or small area targets.

(a) ADVANTAGES.

(1) Good target coverage by attacking from many directions.

(2) Continuous fire on target precluding enemy movement.

(3) No limitation on engagement or disengagement range.

(4) Good mutual support.

(b) DISADVANTAGES.

(1) Requires flying and firing over the heads of friendlies when within the area.

(2) Hostile areas may be over flown.

"L" PATTERN - The "L" pattern may be employed using neutralization fires when large volumes of fire of short duration are desires against linear targets, or targets which are marked on one side by high terrain. "L" patterns are normally used only for initial attacks. Upon disengagement, fragmentary orders are issued for subsequent attacks including attack patterns based on an analysis of the initial attack and the mission.

(a) ADVANTAGES.

(1) The enemy is forced to defend in more than one direction at the same time.

(2) Surprise and firepower are attained on the initial assault.

(3) Good target coverage is obtained from two (2) directions simultaneously.

(4) Mutual support can be attained from within the two attacking elements.

(b) DISADVANTAGES.

(1) Control, timing and ground track are critical.

(2) The beaten zone of one fire team is not on long axis of the target.

(3) Required flying and firing over the heads of friendlies when within the area.

RACETRACK- The racetrack pattern is used most effectively when the terrain is restrictive and is the most commonly used pattern to support troops in contact.

(a) ADVANTAGES.

(1) Used when terrain is restrictive.

(2) The long axis of the beaten zone is on the long axis of the target.

(3) Best use of the weather, such as the wind and the sun.

(4) Control is easier than when employing the other two patterns.

(b) DISADVANTAGES.

(1) Enemy can easily concentrate fires in attack direction unless ground track is changed often.

(2) High Exposure rate as a result of the above.

d. CONTROL

(1) RADIO. The control of attack helicopters during the attack as well as all other operations is done solely by the use of radio. Attack helicopters generally make use of all radios they have available.

The UHF is used for the company or higher net. The FM radio is used for communications with the ground forces and the VHF the gunship command net.

(2) AERIAL FIRE COMMAND. The aerial fire command is the most expeditious and organized manner for the fire team commander to issue an attack order to his elements. The elements of the fire command are given in order to eliminate confusion. The first five elements are given in the initial order, the adjustment and coordination are given as necessary. The last element is given once the fire team commander has determined the mission has been accomplished or elects to disengage that target. The use of the radio for control will decrease as the proficiency and team work increase. The elements of the aerial fire command are:

(a) The alert.

(b) Target description and location.

(c) Attack pattern.

(d) Direction of the break.

(e) The ordnance to be expended.

(f) Adjustment and coordination.

(g) End of mission.

4. DOOR GUNNERS.

a. GENERAL. Attack helicopter operations evolve around the team effort. The team begins within the individual helicopter crew itself. To be effective the door gunner must be well oriented on the mission. The door gunner is a very valuable member of the crew when properly trained. Door gunners play a very important role in the security of your helicopter, mutual support of the fire team, and the accomplishment of the mission.

b. ORIENTATION - Prior to the mission, the aircraft commander must brief his crew on the enemy situation, friendly situation, the mission, the rules of engagement and the unit SOP that apply on the mission. During the mission the aircraft commander is responsible for the actions of his crew to include every bullet that leaves his helicopter. The aircraft commander may give the door gunner an open gun which allows him to fire at targets based on his own judgement, or, fire only

at designated targets. This must be understood prior to takeoff. Keep the door gunners abreast of the current situation to preclude accidental firing into friendly forces.

c. FIRST AID - The aircraft commander must insure that his crew knows and is able to administer correct and timely first aid. The door gunners are the only ones available to administer first aid to the pilot or copilot while enroute to an aid station. When the aircraft commander draws a packet of morphine prior to the mission, he should insure that each member of the crew knows where it is physically kept within the helicopter. Door gunners have saved many pilots lives because they knew their first aid.

d. MARKING TARGETS - Door gunners are very effective at marking targets when properly trained. Targets are generally marked in one of two ways. One is to have the door gunners fire all tracer ammunition at designated targets thus identifying the target to the wing man. Attack helicopters normally carry a large supply of smoke grenades of various colors for marking targets and landing zones. The unit SOP may state that any time a helicopter receives fire the door gunners throw smoke. This alerts the other helicopters within the area which would result in immediate neutralization fire from the attack helicopters. The smoke does not have to land directly on the target, but can be used as a reference point.

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

Aug 1969
File No. 5/69-207-2
72-207-2
73-207-2

STUDENT OUTLINE

PRINCIPLES OF TARGET ATTACK

1. Principles of attack helicopter attacks.

   a. Firepower. all weapons

   b. Surprise.

   c. Violence. volume of firepower

   d. Timing. necessary for good firepower

   e. Control.

   f. Exploitation. take advantage

   g. Fire and Maneuver. tactics of fighting

   h. Flexibility.

2. METT.

a. Mission. 1. escort
2. reconnic + security
3. direct fire support.

b. Enemy.

c. Terrain and weather.

d. Troops and equipment available.

3. Attack Patterns

a. Target analysis.

b. Attack pattern considerations.

(1) Mandatory. control
flexibility
fire power

(2) High priority. mutual support
exposure

c. Patterns.

(1) Clover leaf. - contains target coverage, from all sides.

(2) "L" attack pattern, gives 2 sides of attack + continuous coverage.

(3) Racetrack (Daisy chain). most important or used pattern.

d. Control.

4. Door gunner.

a. Orientation.

b. First aid.

c. Survival Kit.

d. Marking targets.

5. Situations.

a. Situation #1.

b. Situation #2.

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

Aug 1969
File No. 5/69-207-2
73-207-2
72-207-2

PERFORMANCE CHECK

PRINCIPLES OF TARGET ATTACK

1. Write the eight (8) principles of attack helicopter attacks.

2. Write the factors of METT and give at least two (2) considerations of each as to their application toward the attack.

3. Write the four factors that must be considered during the analysis of enemy weapons prior to the attack.

4. Write each of the five (5) considerations in attack pattern selection and describe how each factor is applied.

5. Write at least two (2) of the four (4) advantages of each of the following:

   a. Clover leaf pattern.

   b. "L" attack pattern.

   c. Racetrack (Daisy chain).

6. Write each of the five (5) specific subjects the door gunner must be briefed on prior to the mission.

7. Write each of the two (2) responsibilities of the door gunner.

NOTES

August 1969
File No. 5/69-317-1

PERFORMANCE OBJECTIVES

ATTACK HELICOPTER SEMINAR

This is a nongraded 1-hour seminar. As such, there are no specific parameters for KNOWLEDGES or SKILLS attained. It is desired that the students become acquainted with the equipment and tactics with which they will be operating for the next 1 to 2 years.

NOTES

August 1969
File No. 5/69-317-1

STUDENT OUTLINE

ATTACK HELICOPTER SEMINAR

1. INFANT

2. COBRA (AH-16)

   a. TAT 102.

   b. TAT 141 (XM-28).

   c. Ammo Bay.

   d. Gunner Sight.

   e. Pilot Sight.

   f. External Stores.

   g. Passive Defense.

3. Ammunition Developments

   a. 40mm proximity fuze.

   b. 2.75 inch FFAR proximity fuze.

   c. 17 pound warhead.

   d. Flechette warhead.

4. Cheyenne

NOTES

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

August 1969
File No. 5/69-250-1
72-250-1
73-250-1

PERFORMANCE OBJECTIVES

PRINCIPLES OF AERIAL GUNNERY

1. KNOWLEDGES: Without the aid of notes or references, the student will be able to:

   a. List the three basic problems of aerial weapons subsystems.

   b. List the appropriate techniques to utilize to insure the maximum effectiveness of the beaten zone on a type target.

   c. Compute the range within 50 meters when given the mil value of a sight, the size of a target, and a portion of the reticle covered by the target.

   d. When given conditions under which fire is to be delivered, and a list of sight corrections, be able to select the correct sight corrections to insure the highest probability of a first burst hit.

2. SKILLS: None.

NOTES

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

August 1969
File No. 5/69-250-1
72-205-1
73-205-1

ADVANCE SHEET

PRINCIPLES OF AERIAL GUNNERY

PURPOSE: This instruction is designed to acquaint the student with the fire control problems associated with aerial gunnery from a helicopter, to include fire control subsystems and techniques for using these subsystems. Knowledge of this subject will enable the student to make immediate and accurate compensations to overcome these problems, and insure maximum utilization of the firepower available.

STUDY ASSIGNMENT: Scan Advance Sheet.

SPECIAL INSTRUCTIONS: Bring Advance Sheet, Student Outline, and Performance Check to class.

DISCUSSION POINTS:

1. Problems of aerial gunnery:

    a. Problems caused by aircraft movement:

        (1) When firing in the direction of flight the aircraft speed is added to the projectile velocity, to give the total velocity of the projectile.

        (2) Trajectory shift: Trajectory shift is when the aircrafts speed causes an angular displacement between the gun bore line and the actual line of effective fire.

    b. Change in range:

        (1) Aerial weapons subsystems are employed against targets that are constantly changing in range. This is due to the closure rate of the aircraft on the target. The range to a target is usually decreasing.

        (2) Altitude error.

(a) Slant range: Slant range is the distance from the aircraft to the target. Slant range is normally greater than the ground distance.

(b) Range increases: The altitude increases the maximum range of the system. A projectile fired from a high altitude will travel farther than the same round fired at lower altitudes.

c. The effects of relative winds on rocket trajectory.

(1) An out of trim condition to right causes the rocket to weather vane into the relative wind; this in turn cuases the rocket to strike to the left of the target.

(2) An out of trim condition to the left causes the rocket to strike right of the target, for reasons explained in (1) above. 4 mils upward for every 10K after 10K

(3) A power addition from an in trim condition results in the relative wind being off the top of the rocket causing the rocket to land long.

(4) A power reduction from an in trim condition results in the relative wind being off the bottom of the rocket causing the rocket to land short of the target.

2. Optical sight.

a. This type sight is not affected by head movement and offers a constant field of view for range estimation and provides:

(1) An aiming point or sighting line which can be harmonized with the trajectory of the bullet.

(2) A method for quick estimation of range and deflection allowance.

(3) A clearly focused picture of the reticle image and target.

b. The only error which is encountered in this type sight is parallax. Parallax is:

(1) Present whenever the reticle image of the sight moves away from a distant target as the gunner's head moves.

(2) The result of a misalignment between the lens and reticle plate of the sight.

3. Weapons system employment techniques.

a. Range estimation.

(1) To estimate the range using the optical sight, the following must be known:

(a) Mil value of the sight.

(b) Actual, or an accurate, estimation of the size of the target.

(2) The mil value of the infinity sight used with the machine-guns is 70 mils. The field of view through this size reticle increases 7 meters for every 100 meters of range.

(3) Knowing these factors, range is estimated by the relationship of the target to the reticle. (Example: A truck 7 meters long would fill the reticle at 100 meters, one-half the reticle at 200 meters, one-third at 300 meters, etc.).

b. Firing situations.

(1) When firing at ranges beyond harmonization, place the pipper of the sight over the target and under the target for shorter ranges.

(2) When the boreline axis of the guns differs from the flight-path of the aircraft, a shift in the trajectory will curve away from the gunbore axis toward the flight-path of the aircraft. The amount of this shift is predicted on three factors.

(a) Speed of the aircraft.

(b) Amount of angular displacement.

(c) Range to the target.

(3) When the aircraft is in a turning movement, the bank causes the bullets to strike the ground low and in the direction of the turn. To compensate, the corrections are up and right in left bank and up and left in a right bank.

c. Summary of trajectory errors requiring sight-picture corrections.

(1) Trajectory shift corrections are made by aiming behind the target based on the speed of the aircraft, amount of angular displacement, and range to the target.

(2) Bullet-jump corrections are made in the opposite direction to the jump; down when firing a left deflection shot and up when firing a right deflection shot.

(3) Firing while in a banking turn requires a sight-picture correction high and to the opposite direction of the turn commensurate to the degree of bank.

(4) Firing at ranges longer or shorter than the bore-sight range will require holding the pipper above or below the target to compensate for bullet drop (gravitational force and air resistance).

d. To adjust for the second burst of fire, a gunner may apply "burst-on-target" method of adjustment.

e. To get the maximum effect on a target, the attack should be made so that the long axis of the beaten zone is placed parallel to the long axis of the target (or enfilade fire).

DEPARTMENT OF TACTICS
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA/FORT STEWART, GEORGIA

August 1969
File No. 5/69-250-1
72-250-1
73-250-1

STUDENT OUTLINE

PRINCIPLES OF AERIAL GUNNERY

1. Problems in firing aerial weapon systems:

   a. Movement

      (1)

      (2)

   b. Change in range

      (1)

      (2)

      (3)

(4)

c. Wind effects

(1)

(2)

d. Aircraft bank:

2. Optical sights

a. Flexible ordnance

(1)

(2)

b. Stowed ordnance

(1)

(2)

c. Advantages of optical sights.

(1)

(2)

(3)

d. Parallax

3. Weapons subsystem employment

a. Range estimation

(1) Use of 100 meter fields:

(2) 70 mil sight:

b. Burst on target method of adjustment.

c. Firing corrections

(1) Firing at different ranges:

(2) Firing beyond tracer burnout:

(3) Firing flexible guns at different angles to the flightpath:

(a) Trajectory shift:

(b) Bullet jump:

(c) Gunners corrections:

(4) Firing in turns

(5) Relative wind effect on rockets

d. Firing situations

(1)

(2)

(3)

e. Fire effect on target

(1) Dispersion

(2) Cone of fire.

(3) Beaten zone.

(4) Size and shape of the beaten zone.

(5) Effect on target.

(6) Enfilade fire.

NOTES