STUDENT HANDOUT

PRINCIPLES OF AERIAL FIRE BALLISTICS

F-39-292-I
41-292-I
43-292-I
67-292-I
71-292-I

(CONFERENCE)

JANUARY 1970

UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

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(CONFERENCE)

1-56-361-1
1-56-361-2
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1-56-361-4
1-56-361-5

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STUDENT HANDOUT

DEPARTMENT OF TACTICS
United States Army Aviation School
Fort Rucker, Alabama 36360

January 1970
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PERFORMANCE OBJECTIVES

PRINCIPLES OF AERIAL FIRE BALLISTICS

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

   a. List the three phases of ballistics.

   b. List four of the seven ballistic factors common to all weapons systems.

   c. List the two ballistic factors unique to flexible weapons.

   d. List the two methods used for stabilizing projectiles.

   e. List four of the six major ballistic factors affecting rockets.

2. SKILLS: None.

NOTES

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ADVANCE SHEET

PRINCIPLES OF AERIAL FIRE BALLISTICS

PURPOSE: This conference is designed to provide you with a background knowledge of the ballistic factors that affect projectiles fired from a moving platform so that you will be better able to instruct in ordnance delivery techniques.

SUMMARY: The conference begins with a discussion of the three phases of ballistics. The discussion then moves to a detailed discussion of the external phase with particular emphasis on the ballistic factors affecting flexible-mode firing. These ballistic factors affect all flexible weapons but have more effect on the lower muzzle velocity systems such as the M-5. Of course, there is a direct relationship between ballistic factors and aircraft speed/deflection angle. The last portion of this block of instruction is devoted to stowed-weapon ballistics with primary emphasis going to the 2.75" folding fin aerial rocket. The discussion will cover all the major ballistic factors as well as minor, unpredictable factors which affect accuracy.

NOTES

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STUDENT OUTLINE

PRINCIPLES OF AERIAL FIRE BALLISTICS

1. Three phases of ballistics.
   a. Internal - inside barrel spiral to right
   b. External - leaves barrel
   c. Terminal - impact
2. Ballistic factors common to all weapons systems.
   a. Propellant Force
   b. Air Resistance
   c. Gravitational Force
   d. Projectile drift - (Gyroscopic Precession)
   e. Coriolis Effect - (compensation of Earth's rotation)
   f. Yaw (wobble of round) until it finds its center of G.
   g. Gross Wind Effect
3. Ballistic factors for flexible weapons systems.
   a. Aircraft movement
   b. Trajectory shift
      Projectile jump or

4. Methods for stabilizing projectiles.

a. Low Left Spinning Effect

b. High Right and Fins

5. Ballistic factors for stowed weapon systems.

a. Propellant force

b. Drag

c. Gravity

d. Cross wind 0-10 kt disregard
10-20 kt/mil for every kt

e. Relative wind Effect

f.

(1)

(2)

g. Miscellaneous factors:

(1) Unequal burning

(2) Salvo Effect

(3)

(4)

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PERFORMANCE CHECK

PRINCIPLES OF AERIAL FIRE BALLISTICS

1. List the three phases of ballistics.

   a. Internal

   b. External

   c. Terminal

2. List four of the seven ballistic factors common to all weapons systems.

   a.

   b.

   c.

   d.

3. List the two ballistic factors unique to flexible weapons.

   a.

   b.

4. List the two methods used for stabilizing projectiles.

   a.

   b.

5. List four of the seven major ballistic factors affecting rockets.

a.

b.

c.

d.