LESSON PLAN

PART I
COVER SHEET

LESSON TITLE: : Finding and Plotting Locations on a Map

TRAINING METHOD: Demonstration - Performance

ORGANIZATIONAL PATTERN: Topical

REFERENCES: ***AFPAM 11-216, Air Navigation***
AFI 32-4001, Disaster Preparedness Planning And Operations, (2 Jun 1994)

AIDS AND HANDOUTS: Local Grid Map and Universal Transverse Mercator (UTM) Grid Map
Disaster Preparedness Training Video, 606053DF, I3, Miscellaneous
Attachment 1. Block Grid Map
Attachment 2. Line Grid Map
Attachment 3. Latitude and Longitude Map
Attachment 4. UTM Grid Breakdown
Attachment 5. Grid Map Overlay

LESSON OBJECTIVE: Given an explanation and a demonstration on the use of maps, the student must be able to complete two task steps. The student must also demonstrate mastery of the samples of behavior listed below:

TASK STEPS:

1. Given grid coordinates, plot two separate locations on a local grid or UTM map.

2. Shown two separate locations on any UTM or local grid map, state the grid coordinates.

3. Given a grid map overlay, use it to plot two grid locations.

SAMPLES OF BEHAVIOR:

1. Explain the purpose of grid maps.

2. Explain the difference between latitude and longitude.

3. Define the different scales of universal transverse mercator maps.

4. Describe the use of overlays for grid maps.

SUGGESTED COURSE(S) OF INSTRUCTION: Disaster Preparedness Support Team
Shelter Management Team
Contamination Control Team
Disaster Control Group
Control Center Training

STRATEGY: Explain the purpose of grid maps upon issuing them to students. Students should follow your demonstrations with their map. Ensure each student understands the grid coordinate system. Cover latitude and longitude as necessary to further student's skill in finding locations. The examples explain three ways to read a grid map. Select the one example that applies to your maps. Emphasize the students read on-base and off-base grid maps the same way.

LESSON OUTLINE:

MAIN POINT 1. PURPOSE OF GRID MAPS

MAIN POINT 2. TYPES OF LOCAL GRID MAPS
a. Block Grid System
b. Line Grid System
c. Latitude and Longitude

MAIN POINT 3. UTM GRID SYSTEM
a. Grid Zone Designation
b. Grid Coordinates

MAIN POINT 4. OVERLAYS

This Readiness Training Package was revised and edited by MSgt Leonard B. Howard under the direction and guidance of HQ AFCESA/CEXR.

PART II
TEACHING PLAN
INTRODUCTION

ATTENTION:	We need the M90 Automatic Chemical Agent Alarm placed at grid coordinate 3.3/B.5."
MOTIVATION:	How many of you can determine where that coordinate is located? During contingencies and day-to-day operations, it's important we all speak the same language so we can best complete the mission in the amount of time required. The grid coordinate system is our common language for identifying locations on base and in the field.
OVERVIEW:	A map can be anything from a hand drawn sketch to a multicolored, mass-produced, topographical map. There are many types of maps used in the USAF and other services. Today we'll cover: 1. The purpose of grid maps 2. Types of local grid maps 3. The UTM Grid System 4. Overlays
TRANSITION:	Since there are a variety of maps used to identify locations, let's start by looking at some general rules that apply to all maps.

BODY

MAIN POINT 1. PURPOSE OF GRID MAPS	It is very important that you learn to read and pinpoint map locations quickly and accurately. Intense moments can cause mental confusion and mistakes. Mistakes during emergency situations can cost lives, money and irreparable damage. Equally important is communicating those map coordinates. All base agencies should use the same map, with the same scale. This ensures different agencies respond to the same location! The same set of coordinates will be different locations on maps of different scales. The following are some very important rules that you need to learn:
THE SPOKEN COORDINATE	Always use the phonetic alphabet when relaying alpha-numeric coordinates. For example: "*B5*" is pronounced, "*Bravo-Five*." To do this, you must know the *Air Force* phonetic alphabet, not the *truckers* one!
GET THE POINT	Always pronounce the separating period in a coordinate as "POINT." For example: '*B.5*' is pronounced, "*Bravo* ***POINT*** *Five*."

INSTRUCTOR'S NOTE: Distribute local grid maps to the students.

MAINPOINT 2. TYPES OF LOCAL GRID MAPS

Grid maps provide a rapid and effective means of pinpointing locations such as crash sites, entry control points, and facilities. Bases typically publish large and small grid maps for use in the command posts, control centers and response vehicles.

GENERAL RULES

Reading, plotting or locating coordinates on grid maps will always follow the same basic rules:

THE WRITTEN COORDINATE

Reduce confusion by writing coordinates consistently and correctly. 'Three POINT Three, Bravo POINT Five' is written this way: "3.3/B.5" A series of coordinates can then be separated by spaces without getting mixed up: "3.3/B.5 2.8/C.4 1.2/A.8"

IN THE DOOR AND UP THE STAIRS

Grid coordinates of any given location are determined by reading LEFT to RIGHT and BOTTOM to TOP. *(In the door, and up the stairs.)* In most cases, the location will be inside one of the grid squares. Pin-pointing the location requires one more step.

SUBDIVISIONS OF TEN

Each grid has ten subdivisions. You must mentally estimate locations and coordinates when the subdivisions are not actually marked on the map.

MARKING A LOCATION ON THE MAP

Maps should be laminated or covered with Plexiglas so a grease pencil or transparency marker can be used to place a mark (i.e. dot, circle, or "X") on the location. Write the actual coordinate somewhere near the mark, or place a sequential number next to the mark and begin a legend in a margin of the map. This eliminates having to re-plot a location to ascertain the coordinate. It also helps reduce confusion when reviewing coordinates, especially on smaller scale maps that are crowded or cramped.

a. TWO TYPES OF GRID MAPS

Superimposing vertical and horizontal lines on the map makes the 'grid'. The horizontal lines are numbered LEFT to RIGHT, on the top and bottom of the map. Vertical lines are alphabetized from BOTTOM to TOP, along the right and left edges of the map. The two types of grid maps are *block* and *line*. Let's start with a block grid map.

INSTRUCTOR'S NOTE: Use Attachment 1 as an overhead or a handout.

a. BLOCK GRIDS

Block grids are the simplest of grid maps. It's also the least accurate. Reading LEFT to RIGHT and BOTTOM to TOP, the block where a column and a row intersect is the single alphanumeric grid coordinate. Let's locate block '3.3-B.5'.

1) COLUMNS AND ROWS	The third column ACROSS the map is '3' and the SECOND row UP the map is 'B.' This location is referred to as 'Three-Bravo'. There is no '*point*' at this first level of the coordinate. You are simply identifying a block on the map.
2) DIVIDE COLUMN	Mentally divide column '3' into 10 even increments. Locate where the third increment would be. This is approximately '3.3'. Hold a finger on this location.
3) DIVIDE ROW	Mentally divide row 'B' into ten even increments. Locate the halfway point. This is approximately 'B.5'.
4) "X" MARKS THE SPOT	Now, move your 'B' finger straight across to the right as you move your '3' finger straight up. Where the two imaginary lines intersect is grid coordinate "Three POINT Three, Bravo POINT Five".
	INSTRUCTOR'S NOTE: Give one or two more examples until students are proficient.
b. LINE GRIDS	This type of grid map intersects on the lines versus the blocks. Again, the blocks are subdivided into 10 increments. The point where the lines intersect is the double alpha-numeric grid coordinate. Always express line grids in double alpha-numeric coordinates. For example, '3-B' on this map is not a block, it is the first line of each new section and is expressed '3.0/B.0'.

INSTRUCTOR'S NOTE: Use Attachment 2 as an overhead or a handout.

1) IN THE DOOR	Using our previous coordinate '3.3/B.5' start from the bottom left corner and locate the third line across. This is '3.0'.
2) FIND '3.3'	Locate the third increment line to the right of line three. This is '3.3'. Hold a finger on this location.
3) UP THE STAIRS	Using your other hand, locate the second line up. This is 'B.0'.
4) FIND 'B.5'	Locate the fifth increment line above line 'B'. This is 'B.5'. Place your finger here.
5) "X" MARKS THE SPOT	Now, move your 'B' finger straight across to the right as you move your '3' finger straight up. Mark where the two lines intersect.

INSTRUCTOR'S NOTE: Tell students that placing a mark on each spot, and using a ruler to mark the intersection increases accuracy. This is recommended when a template is not available.

6) REPORT LOCATION	Where '3.3' and 'B.5' intersect is known as grid coordinate '3.3/B.5'. Report this as "Three POINT Three, Bravo POINT Five."

7) FURTHER SUBDIVIDE GRID	Greater accuracy can be attained by mentally dividing the smaller lines into ten equal increments. The same rules apply and the coordinate would be, for example: '3.32/B.58', or spoken: "Three POINT Three Two, Bravo POINT Five Eight."
	INSTRUCTOR'S NOTE: Give one or two more examples until students are proficient.
c. LONGITUDE AND LATITUDE	Navigation maps have horizontal and vertical lines called "Latitude" and "Longitude". Latitude lines READ North and South. Longitude lines READ East and West.
1) PARALLELS OF LATITUDE	Parallels of latitude run around the earth like the equator. You measure the angular distances on these meridians north or south of the equator to determine the latitude. Accordingly, latitude is expressed in degrees up to 90 degrees north or south of the equator.
2) LONGITUDE AND LATITUDE EXPRESSED IN DEGREES	Both latitude and longitude are expressed in degrees. Example: Place a dot on 36°N, 127°E (say "thirty-six degrees North, one Hundred twenty seven degrees East).

3) MEASURING DEGREES LATITUDE	A degree may be subdivided into smaller units by dividing each degree into 60 minutes. Each minute may be further subdivided into 60 seconds. For example, you can show the latitude of one point as 20 degrees, 20 minutes and 20 seconds north and another point as 20 degrees, 0 minutes, 5 seconds south of the equator.
a) DETERMINING INTERVALS	Between Latitude (36°N, 37°N) and Longitude (127°E, 128°E) lines there are 60 dash lines each which represent one minute for each dash. Different dash lengths make the map easier and faster to read. The small dashes identify the single minute intervals. The longer dashes (on one side of the line) represent five minute intervals. The longest dashes (on both sides of the line) represent ten minute intervals.
b) SCALE DETERMINES SECONDS	The scale of the navigational map used will determine if "seconds" can be plotted. Normally the base will use maps requiring only degrees and minutes.
c) READ SOUTH TO NORTH, WEST TO EAST	READ Latitude from BOTTOM to TOP (*Equator to North Pole* in the Northern Hemisphere). READ Longitude from West to East in Asia (Greenwich, England to International Date Line).

d) EXAMPLE FOR PLOTTING

Place “Dot (2)” at 36°15’ N; 127°47’ E:

- First find 36°. Move up (go North) the dashes to 15’.
- Next, find 127°. Move right (East) along the dashes to 47’.

Mentally, connect the lines and where they intersect is the location for “Dot (2)”.

4) SELECTING LONGITUDE COORDINATES

Longitude measures east-west angles. Latitude has a natural starting point, the equator, but longitude does not. Someone had to select an arbitrary starting point for these lines that run up and down between the poles. This arbitrary starting point is **Greenwich, England**.

a) THE ZERO MERIDIAN

This point is known as the Greenwich, Prime, or First Meridian. It is actually the Zero Meridian. *Longitude is counted east and west from this meridian through 180 degrees.*

b) THE 180TH MERIDIAN

Keep in mind that the Greenwich meridian is 0 degree longitude on one side of the Earth. After crossing the poles, it becomes the 180th meridian (180 degrees east or west of the 0 degree meridian).

5) MEASURING DEGREES LONGITUDE

Longitude is expressed in degrees up to 180 and is subdivided into minutes and seconds just like latitude.

MAIN POINT 3. UTM GRID SYSTEM	The universal transverse mercator (UTM) grid system uses geographical reference (Georef) grids, and is primarily used for NBC (nuclear, biological, chemical) plotting. Even if you are not required to perform NBC plotting, you should still be able to read a UTM Map.
	INSTRUCTOR'S NOTE: Pass out UTM grid maps and Attachment 3 to the students and have them find two locations using grid coordinates.
GENERAL RULES	Reading, plotting or locating coordinates on grid maps will always follow the same basic rules:
MAP SCALES	The size of the grid square on a map varies with the scale of the map. The map scale determines the size of the coordinate. For example, a 1:50,000 scale will have more or less digits than the 1:250,000, or the 1:1,000,000 scale.
1:50,000 IS USED FOR CHEMICAL PLOTTING	A 1:50,000 scale map (read as "1 to 50,000") is typically used to plot chemical attacks. It's extremely detailed. Two centimeters on this map equals one kilometer.
1:250,000 IS USED FOR NUCLEAR PLOTTING	Nuclear plotting is typically done on a 1:250,000 scale map. It covers a large area and is easier to work with. When necessary, estimate more detailed coordinates within the grid square.

THE WRITTEN COORDINATE	Reduce confusion by writing coordinates consistently and correctly. 'Three, Two, Tango; November, Lima; Seven, Four, Three, Four, Two; Three, Eight, Five, Six, Five' is written all together, with no spaces or dividers, in this way: "32TNL7434238565" The interpreter or plotter must divide the number.
THE SPOKEN COORDINATE	Depending on the size of the coordinate, use pronounced pauses between the map section and the sets of numbers. For example, "32T NL 74342 38565" is verbally relayed "THREE, TWO, TANGO (*pause*) NOVEMBER, LIMA (*pause*) SEVEN, FOUR, THREE, FOUR, TWO (*pause*) THREE, EIGHT, FIVE, SIX, FIVE".
IN THE DOOR AND UP THE STAIRS	Grid coordinates of any given location are determined by reading LEFT to RIGHT and BOTTOM to TOP. *(In the door, and up the stairs.)* In most cases, the location will be inside one of the grid squares. Pin-pointing the location requires one more step.
IN THE DOOR	The number in the first set of three numerals is used from LEFT to RIGHT (West to East) to establish part of the coordinate.

UP THE STAIRS	The first number in the second of numerals is used from BOTTOM to TOP (South to North) to establish the other part of the coordinate.
APPROXIMATE INTERSECTION	Mentally connect the lines and approximate where they will intersect.
MIDDLE DIGIT	The second and fifth numbers represent the next subdivision in the metric system in the smaller square.
THIRD DIGIT IN EACH SET	The third and sixth numbers are only used when the scale of the map extends to this detail.
a. GRID ZONES	The earth's surface between 80 degrees South and 84 degrees North is divided into 60 North-South zones. These areas are called grid zones. Each grid zone has a zone number and a letter for identification, for example; 32T.
1) ZONE NUMBERS	Zone numbers start at the 180 degree meridian and are numbered to the RIGHT (east) from 1 through 60. This 180 degree meridian or line is on the opposite side of the globe from Greenwich, England located on the 0 degree meridian.

2) ZONE LETTERS	Zone letters, which start at 80 degrees south, are lettered UP (north) from C through X. The letters "I" and "O" are not used to avoid confusion with numbers. The letters A, B, Y, and Z identify the North and South polar areas on UTM maps.
3) ZONE SUARES	Each grid zone is subdivided into squares of 100,000 meters. Each square within a grid zone is assigned a two-letter identifier, for example; NL. Each column of squares within a grid zone is lettered alphabetically A through Z (with I and O omitted) to the right. Each row of grids is also lettered the same way up to the North.
4) SUBDIVISIONS OF TEN	Subdivisions within UTM grids are based on the metric system (10 divisions).
NOT METRIC	Latitude and Longitude are NOT based on the metric system. They are measured in degrees, minutes, and seconds.
SYSTEM ACCURACY	The UTM system allows position referencing within 1 square meter of accuracy, if needed.
Army Use Of UTM Maps	The U.S. Army uses UTM coordinates for directing artillery fire missions and for pinpointing objectives, unit defensive sector boundaries, etc.

AIR FORCE USE OF UTM MAPS

NBC reports are forwarded using UTM coordinates for identifying attacked and contaminated locations and areas.

INSTRUCTOR'S NOTE: Using the example listed, substitute necessary letters and numbers to match the particular UTM sector map available to you. Follow the instructions for your students.

EXAMPLE FOR PLOTTING

Let's locate "32TNL7434238565" on our map. We start by breaking the number down (attachment 4)

DETERMINE SECTOR

The example identifies the 100,000-meter square (NL) within the (32T) grid zone. Find the large square identified by the 2-digit Alpha designation.

INSTRUCTOR'S NOTE: Use Attachment 4 to show a breakdown of the UTM grid system.

b. GRID COORDINATES

Additional numeric references are added to identify a position to the desired accuracy. The additional references are identified by a grid square. The first half of the grid square designator indicates a specific column read left to right; the second half of the number indicates a specific row read from bottom to top.

For example:
32TNL locates a 100,000 meter grid square.
32TNL73 locates a 10,000 meter grid square.
32TNL7438 locates a 1,000 meter grid square.
32TNL743385 locates a 100 meter grid square.
32TNL74343856 locates a 10 meter grid square.

INTERIM SUMMARY:

Let's review the UTM elements we've already covered before going further.

MAINPOINT 4. OVERLAYS

The purpose of a map overlay is to increase your accuracy and save time when plotting locations on a grid map.

OVERLAYS REFLECT THE SAME SCALE

A grid map overlay is normally constructed of clear plastic sheeting and is made to reflect the same scale of the map to be used with.

OPTIMAL INFORMATION ON THE OVERLAY

Sometimes compass headings and local perimeter distances are added to help the user plot a specific location or area of concern.

INSTRUCTOR'S NOTE: Show the students a sample base grid map overlay using Attachment 3 or your local overlay.

USING THE OVERLAY

Place the overlay over the desired location. The overlay divides an area into increments that are read in the same manner as a line grid map.

CONCLUSION

SUMMARY:	We've just covered the purpose of grid maps, the types of grid maps, the UTM Grid System, and map Overlays.
REMOTIVATION:	Using maps and the grid coordinate system helps us identify locations. If all agencies correctly plot using the same map, we can quickly and easily find locations. Thus, minimizing our time and efforts in responding to contingency situations.
CLOSURE:	This concludes this lesson on finding locations on a map.
TRANSITION:	(Develop locally to transition to the next topic.)

PART III
EVALUATION
STUDENT PERFORMANCE STANDARDS

TEST ITEMS

---

1. LESSON OBJECTIVE: Explain the purpose of grid maps.

QUESTION: (True and False)

All maps use alphanumeric symbols to accurately locate positions and areas of concern.

a. True
b. False

KEY: b

REFERENCE: Main Point 1

---

2. LESSON OBJECTIVE: Explain the difference between latitude and longitude.

QUESTION: (Multiple Choice)

Which of the following statements is correct?

a. Parallels of longitude run around the earth like the equator.
b. The natural starting point for parallels of longitude is the equator.
c. Longitude is expressed in degrees up to 90 degrees north or south of the equator.
d. Longitude is counted east and west from the Prime Meridian through 180 degrees.

KEY: d

REFERENCE: Main Point 2

---

3. LESSON OBJECTIVE: Define the different scales of universal transverse mercator maps.

QUESTION: (Multiple choice)

Which map scales are normally used for nuclear and chemical plotting, respectively?

a. 1:200,000 and 1:50,000
b. 1:100,000 and 1:50,000
c. 1:250,000 and 1:50,000
d. 1:50,000 and 1:250,000

KEY: c

REFERENCE: Main Point 3

4. LESSON OBJECTIVE: Define the different scales of UTM maps.

QUESTION: (Multiple Choice)

Determine which statement is not true for the UTM grid system.

a. Read the UTM grid map coordinates up and to the right.
b. UTM grid is made up of two alpha characters followed by 6 numerals.
c. UTM coordinates use vertical and horizontal lines forming grid squares.
d. UTM system allows position reference within 1 square meter of accuracy.

KEY: a

REFERENCE: Main Point 3

5. LESSON OBJECTIVE: Describe the use of overlays for grid maps.

QUESTION: (Multiple Choice)

Describe the characteristics of grid overlays.

a. Can be constructed of clear plastic sheeting.
b. Increase accuracy and save time in plotting locations of concern.
c. UTM system allows position reference within 1 square meter of accuracy.
d. All the above.

KEY: d

REFERENCE: Main Point 4

PART IV
RELATED MATERIALS

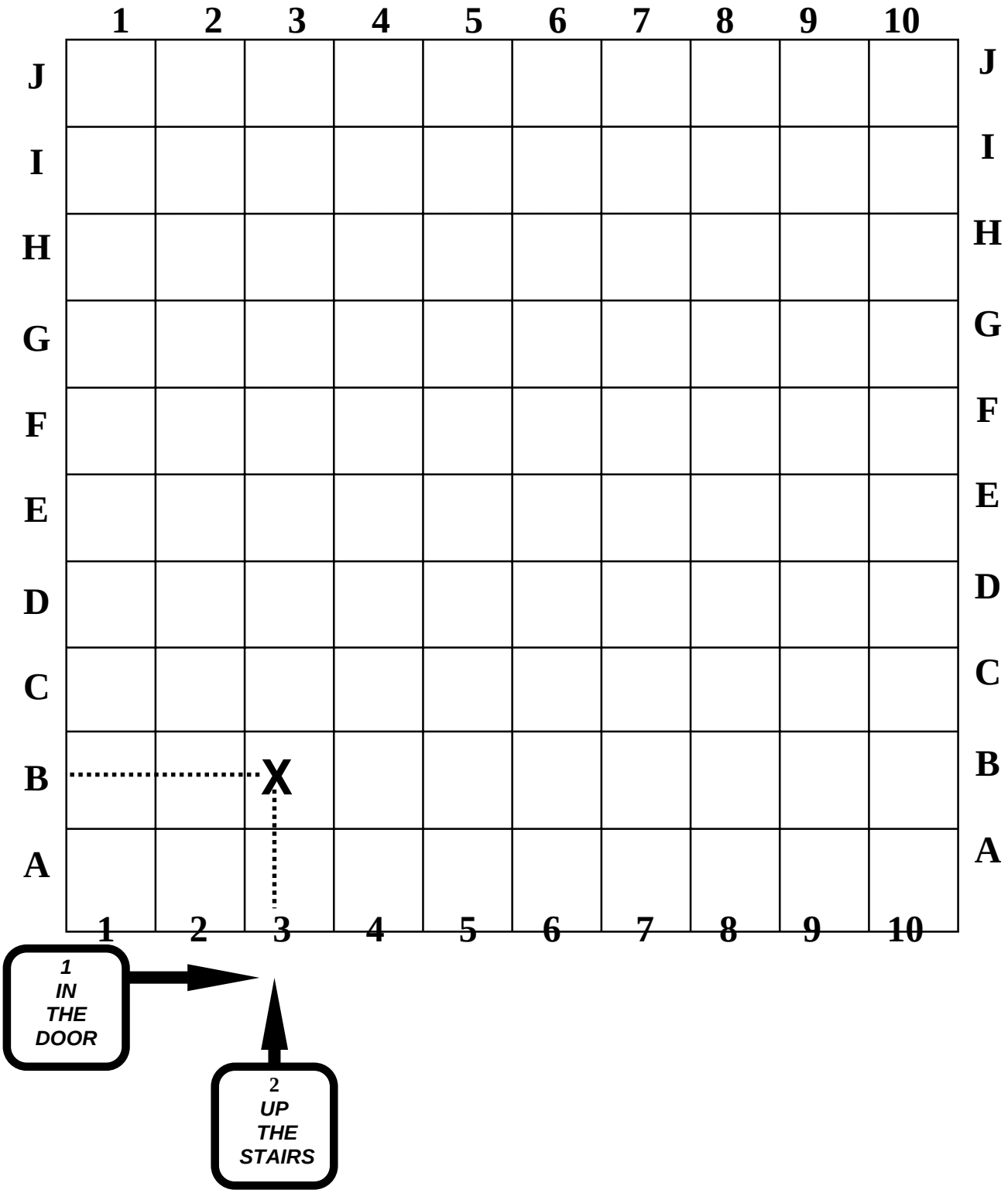
ATTACHMENT 1: Block Grid Map

ATTACHMENT 2: Line Grid Map

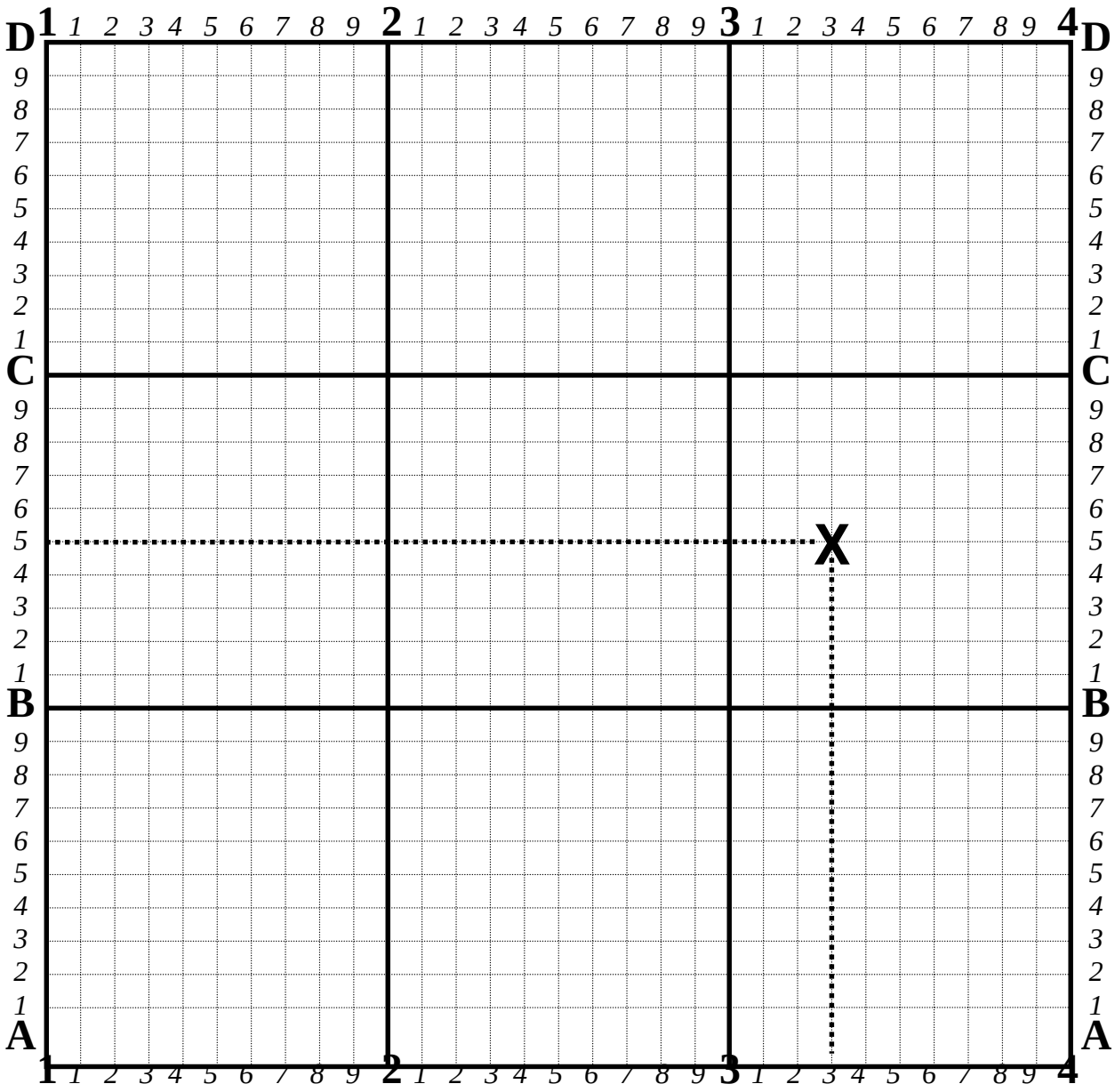
ATTACHMENT 3: Latitude and Longitude Map

ATTACHMENT 4: Universal Transverse Mercator (UTM) Grid Breakdown

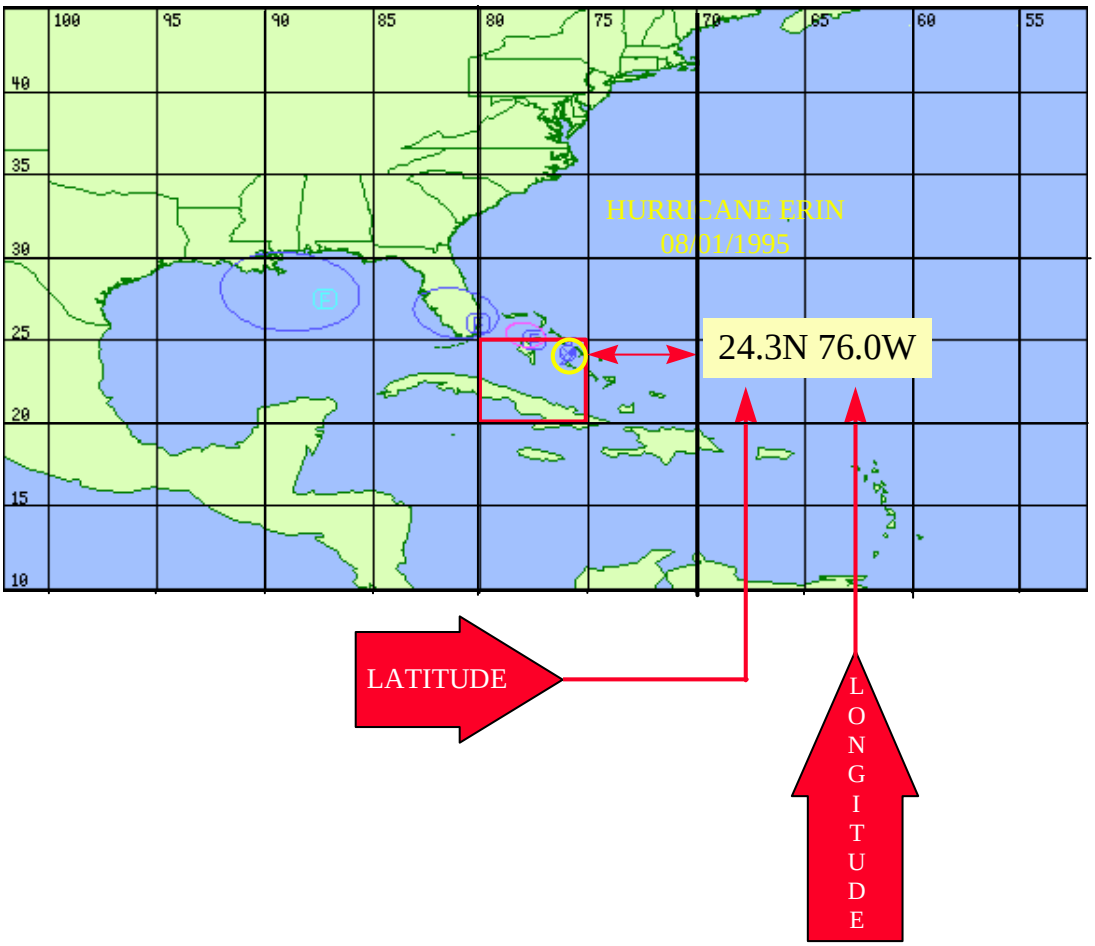
ATTACHMENT 5: Grid Map Overlay



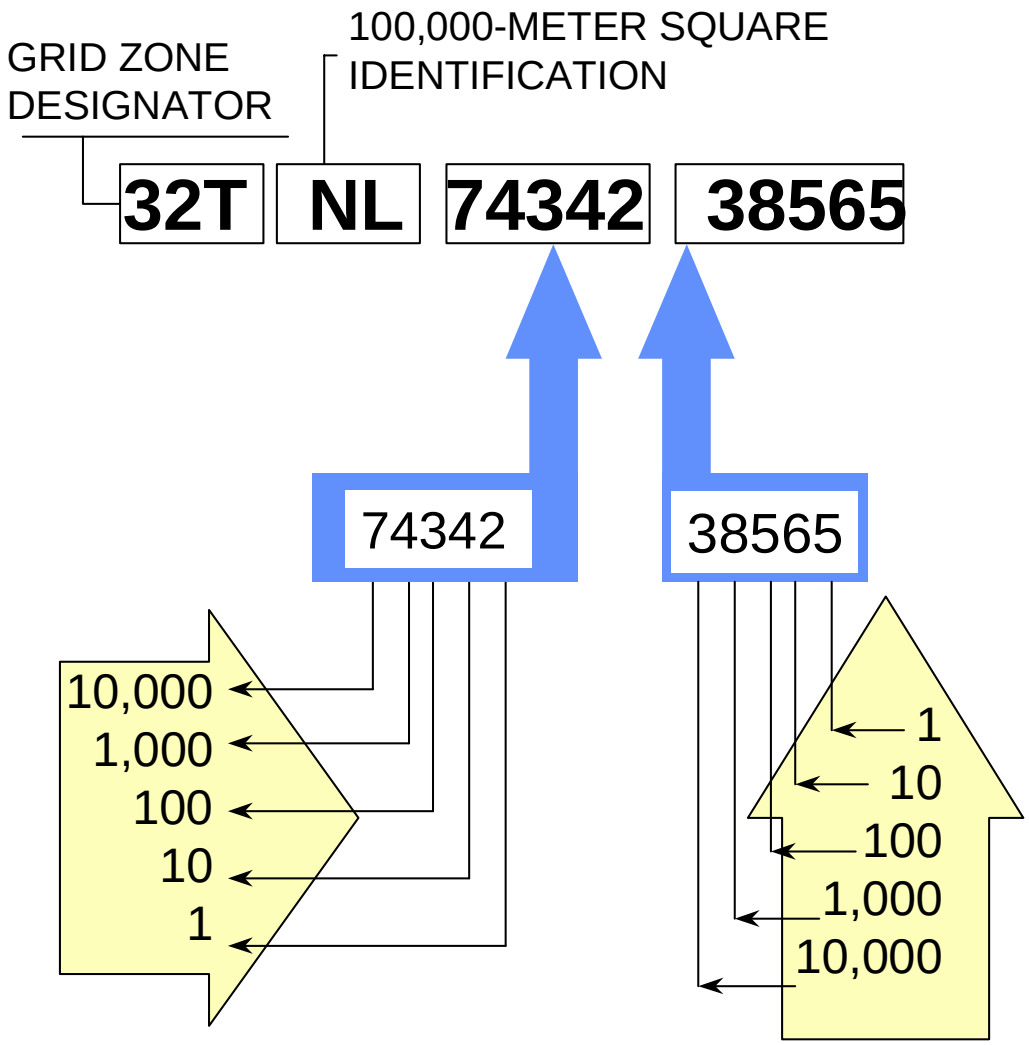
ATTACHMENT 1: BLOCK GRID COORDINATES
THREE-POINT-THREE, BRAVO-POINT-FIVE



ATTACHMENT 2: LINE GRID MAP COORDINATES
THREE-POINT-THREE, BRAVO-POINT-FIVE



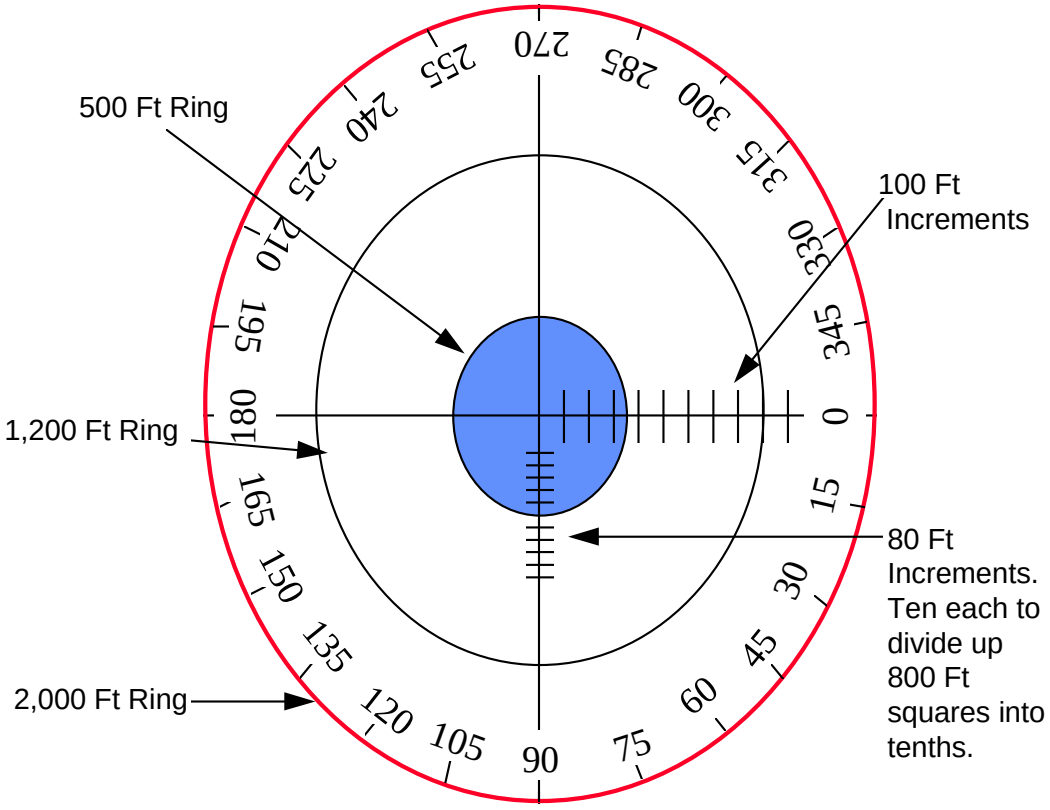
ATTACHMENT 3: READING LONGITUDE AND LATITUDE



GRID COORDINATES 32TNL7434238565
IDENTIFY A 1-METER SQUARE

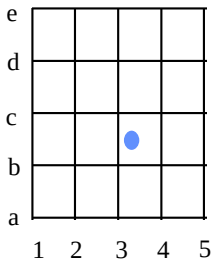
ATTACHMENT 4: UTM MAP BREAKDOWN

COMPASS HEADING ON OUTSIDE RING



NOT TO SCALE

EXAMPLE: DOT IS LOCATED AT 3.3/B.5



ATTACHMENT 5: GRID MAP OVERLAY

TRAINING PACKAGE COMMENT REPORT

RTP # _____ **RTP DATE: _____**

For an *immediate response* to your questions concerning subject matter in this Readiness Training Package (RTP), contact the Office of Primary Responsibility (OPR) TSgt Ron Childs of the Contingency Training Section at DSN 523-6458 between 0700-1600 (CT), Monday through Friday. Otherwise, write, fax, or E-mail the OPR to make comments, suggestions, or point out technical errors in the areas of: references, body information, performance standards, test questions, and attachments.

NOTE: Do not use the Suggestion Program to submit corrections for printing or typographical errors.

Comments:_____
_____
_____
_____
_____

HQ AFCESA/CEX FAX #: DSN 523-6383
E-mail address: childsr@afcesa.af.mil

---------- FOLD HERE ----------

OFFICIAL BUSINESS

HQ AFCESA/CEXX
ATTN: TSGT CHILDS
139 BARNES DRIVE SUITE 1
TYNDALL AFB FL 32403-5319