

# **WARRIOR LEADER COURSE MODIFIED (MOD), OCT 2005**

## **BOOK 2E**

**Instructor Book, Training Support Packages**

**600-WLC (MOD)**



**"NO ONE IS MORE PROFESSIONAL THAN I"**

**The Army Training System (TATS)  
Courseware**

**Prepared by  
The United States Army Sergeants Major Academy  
Fort Bliss, Texas 79918-8002**

**FOR THE ARMY SCHOOL SYSTEM (TASS)  
INSTITUTIONS**

**FIELDING DATE: As Directed**

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## **INSTRUCTOR / STUDENT RECOVERABLE MATERIAL**

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This instruction material is ACCOUNTABLE/RECOVERABLE. Instructors and students MUST TURN IN this material upon course completion or upon reassignment to other duties.

The Army School System (TASS) Institutions are responsible for the issue and control of this material.

To receive additional or replacement material requires that a WRITTEN JUSTIFICATION be forwarded to ATSC through Command Channels.

Instructor book 2 is broken down into six books (Book 2A, 2B, 2C, 2D, 2E, and 2F). This is Instructor Book 2E.

This instructor book contains the following Training Support Packages:  
(NOTE) The order given below is in the same order as the recommended sequence found in the Course Map in the Course Management Plan.

| <b>TSP#</b> | <b>Title</b>     |
|-------------|------------------|
| W221        | Map Reading      |
| W222        | Combat Orders    |
| W223        | Conduct Movement |

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W221

Map Reading

OCT 03

# **U.S. ARMY SERGEANTS MAJOR ACADEMY**

**Primary Leadership Development Course  
(PLDC)**

**The Army Training System**

**TRAINING SUPPORT PACKAGE**



**"NO ONE IS MORE PROFESSIONAL THAN I"**

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## Map Reading

**CHANGE SHEET 3**

1. Synopsis. This change sheet corrects minor administrative errors in the W22, 1 Map Reading Training Support Package.

2. Pen and ink changes: Pages SH-2-1 through SH-2-88, Header Date :

READS AS: "JUL 01"

TO READ: "JAN 05"

3. Page change(s): Remove old pages and insert revised page(s) as indicated.

| <u>Remove Pages</u> | <u>Insert Pages</u> |
|---------------------|---------------------|
| 5 and 6             | 5 and 6             |
| 10                  | 10                  |
| 12                  | 12                  |
| 24 thru 27          | 24 thru 27          |
| C-1 and C-2         | C-1 and C-2         |
| SH-1-2              | SH-1-2              |
| RTP-i               | RTP-i               |
| RTP-1 and RTP-2     | RTP-1 and RTP-2     |
| RTP-8               | RTP-8               |
| RTP-18              | RTP-18              |
| RTP-29              | RTP-29              |
| RTP-37              | RTP-37              |
| RTP-47              | RTP-47              |
| RTP-53              | RTP-53              |
| RTP-55              | RTP-55              |

4. Additional changes that need explaining: none.

5. File this sheet in front of the TSP for reference purposes.

6. Approval of change sheet.

| <b>Name/Signature</b> | <b>Rank</b> | <b>Position</b>     | <b>Date</b> |
|-----------------------|-------------|---------------------|-------------|
| Frank W. Berta        | GS11        | Training Specialist |             |
| Victor A. LeGloahec   | SGM         | Chief, PLDC         |             |
| Marion Lemon          | SGM         | Chief, CDDD         |             |

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**CHANGE SHEET 2**

1. Synopsis. This change sheet corrects minor administrative errors in the W22, 1 Map Reading Training Support Package.

2. Pen and ink changes: none.

3. Page change(s): Remove old pages and insert revised page(s) as indicated.

**Remove Pages**

1 thru 9

**Insert Pages**

1 thru 9

4. Additional changes that need explaining: none.

5. File this sheet in front of the TSP for reference purposes.

6. Approval of change sheet.

| <b>Name/Signature</b> | <b>Rank</b> | <b>Position</b>     | <b>Date</b> |
|-----------------------|-------------|---------------------|-------------|
| Frank W. Berta        | GS11        | Training Specialist |             |
| Victor A. LeGloahec   | SGM         | Chief, PLDC         |             |
| Marion Lemon          | SGM         | Chief, CDDD         |             |

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# U.S. ARMY SERGEANTS MAJOR ACADEMY (PLDC)

W221

2 Aug 04

Map Reading

## CHANGE SHEET 1

1. Synopsis. This change sheet corrects errors in the 600 PLDC, and 600-PLDC Modified Course W221 Map Reading Training Support Package (TSP).

2. Pen and ink changes:

a. Page 4, All Courses Including This Lesson:

AS READS:

"400-PLDC 1 Primary Leadership Development Course.

TO READ:

"600-PLDC 1 Primary Leadership Development Course.  
600-PLDC (MOD) 1 Primary Leadership Development Course Modified"

b. Page 26, para 1d(2) reference--

AS READS: "(See Figure 11-2, SH-2, p SH-2-7)"

TO READ: "(See Figure 11-2, SH-2, p SH-2-76)"

3. Page changes: none

4. Additional changes that need explaining: none.

5. File this sheet in front of the TSP for reference purposes.

6. Approval of change sheet.

| Name/Signature      | Rank  | Title   | Date Signed |
|---------------------|-------|---|-------------|
| Frank W. Berta      | GS-11 | Training Specialist                                 |             |
| Victor A. LeGloahec | SGM   | Chief, NCOES  |             |
| Marion Lemon        | SGM   | Chief, Curriculum, Design, and Development Division |             |

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### TRAINING SUPPORT PACKAGE (TSP)

|  |  |
|--|--|
| <b>TSP Number / Title</b>              | W221 / MAP READING   |
| <b>Effective Date</b>                  | 01 Oct 2003  |
| <b>Supersedes TSP(s) / Lesson(s)</b>   | M207, Map Reading, Nov 99. M207-RC, Map Reading, Jun 01.   |
| <b>TSP Users</b>                       | 600-PLDC, Primary Leadership Development Course<br>600-PLDC (MOD), Primary Leadership Development Course (Modified)  |
| <b>Proponent</b>                       | The proponent for this document is the Sergeants Major Academy.  |
| <b>Improvement Comments</b>            | <p>Users are invited to send comments and suggested improvements on DA Form 2028, <i>Recommended Changes to Publications and Blank Forms</i>. Completed forms, or equivalent response, will be mailed or attached to electronic e-mail and transmitted to:</p> <p style="text-align: center;">COMDT USASMA<br/>ATTN ATSS DCP<br/>BLDG 11291 BIGGS FIELD<br/>FT BLISS TX 79918-8002</p> <p style="text-align: center;">Telephone (Comm) (915) 568-8405<br/>Telephone (DSN) 978-8405</p> |
| <b>Security Clearance / Access</b>     | Unclassified   |
| <b>Foreign Disclosure Restrictions</b> | FD5. This product/publication has been reviewed by the product developers in coordination with the USASMA foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.   |

## PREFACE

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**Purpose**

This Training Support Package provides the instructor with a standardized lesson plan for presenting instruction for:

**Task Number****Task Title****Individual**

071-326-0515

Select a Movement Route Using a Map

071-329-1006

Navigate from One point on the Ground to Another Point While Dismounted.

**This TSP  
Contains**

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**Map Reading  
W221 / Version 1  
01 Oct 2003**

**SECTION I. ADMINISTRATIVE DATA**

|                                   |  |  |  |
|-----------------------------------|--|--|--|
| All Courses Including This Lesson | <u>Course Number</u>   | <u>Version</u>   | <u>Course Title</u>                              |
|                                   | 600-PLDC   | 1  | Primary Leadership Development Course            |
|                                   | 600-PLDC MOD   | 1  | Primary Leadership Development Course (Modified) |
| Task(s) Taught(*) or Supported    | <u>Task Number</u>   | <u>Task Title</u>  |  |
|                                   |  | <u>INDIVIDUAL</u>  |  |
|                                   | 071-326-0515 (*)   | Select a movement route using a map                                      |  |
|                                   | 071-329-1006 (*)   | Navigate from one point on the ground to another point while dismounted. |  |
| Reinforced Task(s)                | <u>Task Number</u>   | <u>Task Title</u>  |  |
|                                   | 071-329-1000   | Identify Topographic Symbols on a Map                                    |  |
|                                   | 071-329-1001   | Identify terrain features on a map                                       |  |
|                                   | 071-329-1002   | Determine Grid Coordinates of a Point on a Military Map                  |  |
|                                   | 071-329-1003   | Determine a magnetic azimuth using a lensatic compass                    |  |
|                                   | 071-329-1004   | Determine the elevation of a point on the ground using a map             |  |
|                                   | 071-329-1008   | Measure Distance on a Map  |  |
|                                   | 071-329-1009   | Convert azimuths   |  |
|                                   | 071-329-1011   | Orient a map using a lensatic compass.                                   |  |
|                                   | 071-329-1012   | Orientate a map to the ground by map terrain association                 |  |
|                                   | 071-329-1014   | Locate an unknown point on a map and the ground by intersection          |  |
|                                   | 071-329-1015   | Locate an unknown point on a map and the ground by resection.            |  |
|                                   | 071-329-1018   | Determine direction without a compass.                                   |  |
| Academic Hours                    | The academic hours required to teach this lesson are as follows: |  |  |
|                                   |  | <u>Resident Hours/Methods</u>  |  |
|                                   |  | 8 hrs 20 mins / Conference / Discussion                                  |  |
|                                   |  | 4 hrs 30 mins / Practical Exercise (Performance)                         |  |
|                                   | Test   | 0 hrs  |  |
|                                   | Test Review  | 0 hrs  |  |
|                                   | Total Hours:   | 13 hrs   |  |
| Test Lesson Number                |  | <u>Hours</u>   | <u>Lesson No.</u>                                |
|                                   | Testing  |  |  |
|                                   | (to include test review)   | 1 hr 30 mins   | WE03 version 1                                   |
|                                   |  | 2 hrs 30 mins  | WE version 2                                     |
| Prerequisite Lesson(s)            | <u>Lesson Number</u>   | <u>Lesson Title</u>  |  |
|                                   | None   |  |  |

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**Clearance Access** Security Level: Unclassified  
Requirements: There are no clearance or access requirements for the lesson.

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**Foreign Disclosure Restrictions** FD5. This product/publication has been reviewed by the product developers in coordination with the USASMA foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.

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**References**

| <u>Number</u>  | <u>Title</u>   | <u>Date</u> | <u>Additional Information</u> |
|----------------|--|-------------|-------------------------------|
| FM 3-25.26     | MAP READING AND LAND NAVIGATION                                  | 18 Jan 2005 |                               |
| FM 21-31       | TOPOGRAPHIC SYMBOLS (REPRINTED W/BASIC INCL C1)                  | 19 Dec 1968 |                               |
| STP 21-1-SMCT  | SOLDIER'S MANUAL OF COMMON TASKS SKILL LEVEL 1                   | 31 Aug 2003 | Appendix C                    |
| STP 21-24-SMCT | SOLDIER'S MANUAL OF COMMON TASKS (SMCT) SKILL LEVELS 2, 3, and 4 | 31 Aug 2003 |                               |

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**Student Study Assignments**

Before class--

- Read Student Handout 1 (Appendix D) for student assignments.
- Complete the reinforcement training package (RTP) (Appendix D)—issued during inprocessing--and perform the practical exercises and complete the quizzes.
- Turn in the quizzes to your SGL NLT three days prior to the start of lesson W221, Map Reading.

During class--

- Participate in classroom discussion.

After class--

- Turn in recoverable references after the examination for this lesson.
- 

**Instructor Requirements**

1:8, SSG, PLDC graduate, ITC and SGITC qualified

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|  |  |                         |                           |                         |                   |                   |
|--|--|-------------------------|---------------------------|-------------------------|-------------------|-------------------|
| <b>Additional Support Personnel Requirements</b> | <b><u>Name</u></b>   | <b><u>Stu Ratio</u></b> | <b><u>Qty</u></b>         | <b><u>Man Hours</u></b> |                   |                   |
|  | None   |                         |                           |                         |                   |                   |
| <b>Equipment Required for Instruction</b>        | <b><u>ID Name</u></b>  | <b><u>Stu Ratio</u></b> | <b><u>Instr Ratio</u></b> | <b><u>Spt</u></b>       | <b><u>Qty</u></b> | <b><u>Exp</u></b> |
|  | 6730-00-577-4813<br>SCREEN, PROJECTION   | 1:16                    | 1:2                       | No                      | 1                 | No                |
|  | 6730-00-P53-8147<br>Projector, Overhead  | 1:16                    | 1:2                       | No                      | 1                 | No                |
|  | 7110-00-132-6651<br>CHALKBOARD   | 1:16                    | 1:2                       | No                      | 1                 | Yes               |
|  | 7510-00-161-6215<br>RULER, NONMETALLIC   | 1:1                     | 1:2                       | No                      | 1                 | Yes               |
|  | 7520-01-424-4867<br>EASEL, DISPLAY AND TRAINING  | 1:16                    | 1:2                       | No                      | 1                 | Yes               |
|  | 7530-00-619-8880<br>PAD, WRITING PAPER   | 1:16                    | 1:2                       | No                      | 1                 | Yes               |
|  | *GTA 5-2-12<br>COORDINATE SCALE AND PROTRACTOR   | 1:1                     | 1:2                       | No                      | 1                 | No                |
|  | *SERIES<br>MAPSHEET, LOCAL TRAINING AREA, 1:50,000   | 1:1                     | 1:2                       | No                      | 1                 | No                |
|  | *SERIES V791<br>TENINO MAPSHEET, 1:50,000  | 1:1                     | 1:2                       | No                      | 1                 | No                |
|  | * Before Id indicates a TADSS  |                         |                           |                         |                   |                   |
| <b>Materials Required</b>                        | <b>Instructor Materials:</b>   |                         |                           |                         |                   |                   |
|  | <ul style="list-style-type: none"> <li>TSP.</li> <li>VGTs: 1 thru 17.</li> </ul>   |                         |                           |                         |                   |                   |
|  | <b>Student Materials:</b>  |                         |                           |                         |                   |                   |
|  | <ul style="list-style-type: none"> <li>SH-1, Advance Sheet in Appendix D.</li> <li>Reinforcement Training Package SH-4 in Appendix D.</li> <li>FM 3-25.26 (SH-2) Map Reading and Land Navigation.</li> <li>STP 21-1-SMCT, Skill Level 1, Appendix C, Aug 03.</li> <li>STP 21-24-SMCT, Skill Level 2-4, Aug 2003.</li> <li>Lensatic compass.</li> <li>GTA 5-2-12 Coordinate Scale/Protractor.</li> <li>1:50,000 Tenino map.</li> <li>1:50,000 scale map of local STX area.</li> </ul> |                         |                           |                         |                   |                   |
|  | <b>NOTE:</b> Issued to students during inprocessing.   |                         |                           |                         |                   |                   |
|  | <ul style="list-style-type: none"> <li>Pencil and writing paper.</li> </ul>  |                         |                           |                         |                   |                   |
|  |  |                         |                           |                         |                   |                   |
|  |  |                         |                           |                         |                   |                   |
|  |  |                         |                           |                         |                   |                   |
|  |  |                         |                           |                         |                   |                   |

**Classroom,  
Training Area,  
and Range  
Requirements**

CLASSROOM (40X40 PER 16 STUDENTS)

**Ammunition  
Requirements**

| <u><b>Id</b></u> | <u><b>Name</b></u> | <u><b>Exp</b></u> | <u><b>Stu<br/>Ratio</b></u> | <u><b>Instr<br/>Ratio</b></u> | <u><b>Spt<br/>Qty</b></u> |
|------------------|--------------------|-------------------|-----------------------------|-------------------------------|---------------------------|
| None             |                    |                   |                             |                               |                           |

**Instructional  
Guidance**

**NOTE:** Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

Before class--

- PE-1 (Appendix C) requires that students complete a Reinforced Training Package (RTP) that is located in Appendix D, (SH-4). NCOAs have specific responsibilities outlined in PE-1 and the RTP that they must accomplish to assist the students in completing the training. Issue the RTP to the students during inprocessing, to include all material that support the RTP. **DO NOT** issue the quiz answer sheets attached at the end of the RTP.
- This TSP has special slide presentations for ELOs F, G, and H. The slide presentation walks the students through the ELOs the same as the TSP, using the same verbiage, problems, and solutions as the TSP. Commandants, whose schools have the capability to electronically project a slide presentation, may use the presentations. NCOAs can download the presentations from the USASMA website.
- This TSP has questions to check learning or generate discussion. You may add any questions you deem necessary to bring a point across to the group or expand on any matter discussed.
- You must know the information in this TSP well enough to teach from it, not read from it.
- This TSP presents references at the beginning of some of the paragraphs. This allows you to inform your students of where they should look in the reference to follow your instruction.
- The total instruction time for this TSP is 13 Hours. Since there are no scheduled breaks in the TSP--due to the numerous practical exercises--SGLs will break the students approximately every 50 minutes.

During class--

- Conduct the class accordance with this TSP.

After class--

- Collect all recoverable materials after the examination for this lesson.

---

**Proponent  
Lesson Plan  
Approvals**

| <u>Name</u>                                | <u>Rank</u> | <u>Position</u>     | <u>Date</u> |
|--|-------------|---------------------|-------------|
| /s/Grace Joralmon<br>/t/Joralmon, Grace    | CIV         | Training Specialist | 16 Jul 03   |
| /s/Brian H. Lawson<br>/t/Barnes, Ronnie G. | MSG         | Course Chief        | 16 Jul 03   |
| /s/Brian H. Lawson<br>/t/Lawson, Brian H.  | SGM         | Chief, NCOES        | 16 Jul 03   |
| /s/Albert J. Mays<br>/t/Mays, Albert J.    | SGM         | Chief, CDDD         | 16 Jul 03   |



**SECTION II. INTRODUCTION**

|   |
|---|
| Method of Instruction: <u>Conference / Discussion</u>       |
| Technique of Delivery: <u>Small Group Instruction (SGI)</u> |
| Instructor to Student Ratio is: <u>1:8</u>                  |
| Time of Instruction: <u>5 mins</u>                          |
| Media: <u>None</u>  |

**Motivator**

You are a warrior and a member of a team serving the people of America.

Warriors live the Army values and always place the mission first and never accept defeat. They will never quit or leave a fallen comrade behind. Warriors have discipline and they keep themselves physically and mentally tough. They train to maintain proficiency in their warrior tasks and drills, and they will always maintain their arms, equipment, and themselves. Warriors are experts and professionals standing ready to deploy, engage, and destroy the enemies of America.

To help prepare and develop your spirit of warrior ethos, you will learn that warrior leaders must have the ability to read a map. Failure could cause the injury or death of their soldiers. The ability to read and use a map is an important qualification for every warrior and a necessary skill of every warrior leader. The topographic maps we use provide us with comprehensive information on the existence, location, and distance between ground features. They also indicate variation in land forms, such as the elevation and relief of natural features that could affect us during a tactical operation. Few factors contribute as much to the survivability of soldiers and their equipment, and to the successful accomplishment of a mission as always knowing where they are and how to get to a designated point.

**Terminal Learning Objective**

**NOTE:** Inform the students of the following Terminal Learning Objective requirements.

At the completion of this lesson, you [the student] will:

|                    |  |
|--------------------|--|
| <b>Action:</b>     | Apply map reading skills.  |
| <b>Conditions:</b> | In a classroom and field environment given a 1:50,000 Tenino map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, and paper, SH-2, SH-3, and SH-4.  |
| <b>Standards:</b>  | <p>Applied map reading skills to--</p> <ul style="list-style-type: none"> <li>• Determine elevation on a map.</li> <li>• Orient a map using a lensatic compass.</li> <li>• Determine direction on a map using a protractor.</li> <li>• Determine polar coordinates.</li> <li>• Convert azimuths using the declination diagram.</li> <li>• Find unknown locations on a map using intersection and resection.</li> </ul> <p>IAW STP 21-1-SMCT, FM 3-25.26 (SH-2), and FM 21-31 (SH-3).</p> |

**Safety Requirements**

None

**Risk Assessment Level**

Low

**Environmental Considerations**

**NOTE:** It is the responsibility of all soldiers and DA civilians to protect the environment from damage.

None

**Evaluation**

Your SGL will evaluate your map reading skills and land navigation skills by evaluating your--

- Work in the RTP.
- A written examination. The examination will contain questions from this lesson. You must correctly answer 70 percent or more of the questions on the examination to receive a GO.
- Map reading and land navigation skills during the land navigation performance examination conducted later in the course.
- Map reading and land navigation skills during the situational training exercise (STX) while you serve in a leadership position.

**Instructional  
Lead-In**

---

This lesson provides you with the map reading skills you need to know to read a map. It also serves as a basis for the lesson you will receive later in the course. You will need the skills taught in this lesson to accomplish the tasks in the land navigation class and perform, not only in the land navigation performance examination, but also in the STX at the end of PLDC.

---

**SECTION III. PRESENTATION**

**NOTE:** Inform the students of the Enabling Learning Objective requirements.

**A. ENABLING LEARNING OBJECTIVE**

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Review reinforcement training package (RTP).  |
| <b>CONDITIONS:</b> | In a classroom and field environment given a 1:50,000 Tenino map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, paper, SH-2, SH-3, and SH-4. |
| <b>STANDARDS:</b>  | Reviewed the reinforcement training package (RTP) IAW STP 21-1-SMCT, FM 3-25.26, and FM 21-31.  |

## 1. Learning Step / Activity 1. Review the RTP.

Method of Instruction: Practical Exercise (Performance)

Technique of Delivery: Small Group Instruction (SGI)

Instructor to Student Ratio: 1:8

Time of Instruction: 4 hrs 30 mins

Media: Reinforcement Training Package (RTP)

**NOTE:** The RTP is in App D as SH-4.

**NOTE:** The SGLs will utilize this time to review and go over the practical exercise/reinforcement training package (RTP) completed and turned in by the students. SGLs should take the results of the quizzes to determine the strengths and weaknesses of each student. Based on the results of the quizzes and his/her assessment, the SGL can prepare any special training for each student and possibly the entire class. The SGL will conduct hands on training to ensure mastery of the map reading skills necessary for the students to successfully complete this lesson. There are no breaks scheduled during this 4.5 hour ELO. The SGL should schedule the breaks at appropriate times.

**CHECK ON LEARNING:** The classroom review of the RTP serves as a check on learning for this ELO.

**B. ENABLING LEARNING OBJECTIVE**

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Determine elevation on a map.   |
| <b>CONDITIONS:</b> | In a classroom and field environment given a 1:50,000 Tenino map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, paper, SH-2, SH-3, and SH-4. |
| <b>STANDARDS:</b>  | Determined elevation on a map IAW FM 3-25.26 and FM 21-31.  |

1. Learning Step / Activity 1. Determine elevation on a map  
Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr 30 mins  
Media: VGT-1 thru VGT-9

Ref: FM 3-25.26 (SH-2), pp SH-2-64 thru SH-2-74, para 10-1 through 10-5

### **Determine Elevation**

Elevation and relief of terrain greatly affect the deployment of units. Elevation and relief limit the routes of travel and the speed of movement. They also determine how easy or difficult it is to attack, defend, or establish a base for support operations. To aid in the selection and use of terrain, mapmakers developed several symbols and methods for identifying and determining elevation and relief on a map. These symbols/methods are spot elevations, bench marks, contour lines, form lines, hachures, shaded relief, and layer tinting. During this class we will discuss spot elevations, bench marks, and contour lines to determine elevation.

### **Spot Elevations and Bench Marks**

Ref: FM 3-25.26 (SH-2), p SH-2-68 , para 10-3i, and FM 21-31 (SH-3), pp SH-3-2 and SH-3-3, Chapter 2, Figures 228 through 230

Mapmakers use bench marks and spot elevations, in addition to contour lines, to indicate points of known elevations on the map.

Maps show spot elevations, by a brown X usually located at road junctions and on hilltops and other prominent terrain features. If the elevation appears in black numerals, it is a checked for accuracy spot; if it is brown, it is an unchecked accuracy spot.

**NOTE:** Refer students to the Tenino map legend for examples of spot elevations. Note the colors: black (checked) and brown (unchecked).

Bench mark symbols are a more accurate way to identify elevation. They represent elevation control points. Your Tenino map depicts how mapmakers refer to bench marks in two ways, monumented or non-monumented. Mapmakers symbolize them by a black X, such as <sup>BM</sup>X<sub>214</sub> (monumented). The 214 indicates that the

center of the X is at an elevation of 214 units of measure (feet, meters, or yards) above mean sea level. To determine the units of measure, refer to the contour interval in the marginal information.

**NOTE:** Refer students to the Tenino map legend for examples of bench marks. Note that the legend identifies two types of bench marks. Monumented **BM** X<sub>246</sub>, and non-monumented X 301.

**NOTE:** Explain to the students the difference between monumented and non monumented bench marks. Direct the students to : FM 21-31(SH-3), pp SH-3-2 and SH-3-3, Chapter 2, Figures 228 through 230.

**NOTE:** Ask the class the following questions and have them work them out on their Tenino map. Select a student to answer the question.

QUESTION: What is the spot elevation indicated at grid EG097863, and is it a checked or unchecked spot elevation?

ANSWER: 74 meters, unchecked.

Ref: Tenino map legend

QUESTION: What is the spot elevation indicated at grid EG186902, and is it a checked or unchecked spot elevation?

ANSWER: 109 meters, checked.

Ref: Tenino map legend

QUESTION: What is the bench mark elevation in grid EG079874, and is it a monumented or non-monumented bench mark?

ANSWER: 83 meters, monumented.

Ref: Tenino map legend

QUESTION: Explain what the following bench mark means: **BM** X<sub>810</sub>

ANSWER: The BM indicates there is a tablet on the ground where surveyors measured the elevation, the X (in the center) is the point of measure of elevation, and the 810 is the measure, in this instance meters. So the bench mark is a monumented bench mark showing the elevation at 810 meters.

Ref: FM 3-25.26 (SH-2), p SH-2-68, para 10-3i(1), and FM 21-31 (SH-3), p SH-3-2, Figures 228

### Horizontal Control Stations

Horizontal control stations, also called survey control points, are another method of determining elevation. The exact elevation and grid coordinates of these

points are in special books called trig lists. Surveyors mainly use these points, and they are of little use to us.

**NOTE:** Refer students to map legend to identify symbols. Then, refer them to grid EG161825 and EG055981 for examples of horizontal control stations.

We are discussing these survey control points because sometimes a horizontal control station and a bench mark represent the same point. In this case, the map uses the symbol for the horizontal control station for the point, but it has the description of a monumented bench mark. Lets look at an example.

**NOTE:** Refer students to grid EG17959825 for an example.

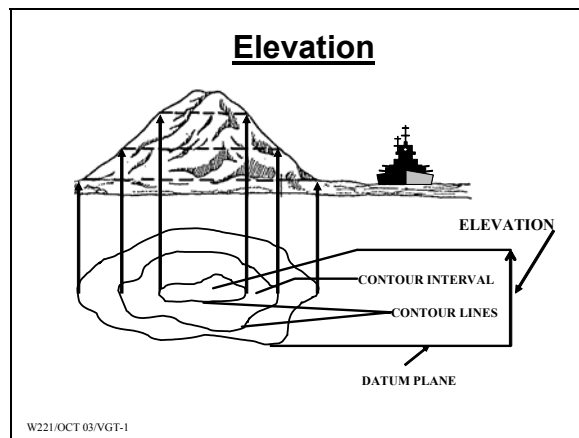
### **Contour Lines**

Ref: FM 3-25.26 (SH-2), p SH-2-64), para 10-2

Military maps primarily show relief and elevation on a map by contour lines. Contour lines show only approximate elevations. You can find the value of contour intervals in the map margin. Standard 1:50,000 military maps use contour intervals of 20 meters. Using the values of contour lines and intervals in conjunction with known elevations, such as the ones we discussed, will enable you to quickly determine the approximate elevation of any point of terrain on the map.

Understanding how to use contour lines enables you to determine the general slope of the ground and visualize terrain features in three-dimensional forms. Let's discuss some terms which will help you visualize how contour lines represent terrain features.

### **SHOW VGT-1, ELEVATION**



**Datum Plane:** There must be a reference from which you make vertical measurements (up and down). This reference or start point for vertical measure of elevation on a standard military map is the datum plane or sea level--the point halfway between high tide and low tide.

**Elevation:** The vertical distance of a point on the earth's surface above or below mean sea level.

**Relief:** The representation (as depicted by the mapmaker) of the shapes of hills, valleys, streams, or terrain features on the earth's surface.

**Contour line:** A line on a map representing an imaginary line on the ground along which all points are of equal elevation.

**Contour interval:** The measurable vertical distance between adjacent contour lines.

## REMOVE VGT-1

Ref: FM 3-25.26 (SH-2), p SH-2-64, para 10-2 e(1-3)

Contour lines are the most common method of showing relief and elevation on a standard topographic map. A contour line represents an imaginary line on the ground, above or below sea level. All points on the contour line are at the same elevation. The elevation represented by contour lines is the vertical distance above or below sea level. The three types of contour lines used on a standard topographic map are index, intermediate, and supplementary.

**NOTE:** Cover the VGT. Call on students to give the definition of each contour line and have them draw an example on the board. After each student explains one of the contour lines and draws an example on the board, uncover the slide showing the correct answer.

## SHOW VGT-2, CONTOUR LINES



## **Contour Lines**

**Index:** A thick printed line indexed to show the elevation above and below mean sea level. Every fifth line will normally be an index contour line.

**Intermediate:** A thin solid line falling between the index contour lines that do not have their elevation given. Normally there are four intermediate lines between index contour lines.

**Supplementary:** Thin broken lines (dashes) representing changes in elevation at least one-half the contour interval. Normally found where there is very little change in elevation.

W221/OCT 03/VGT-2

### **REMOVE VGT-2**

#### **Contour Intervals**

Ref: FM 3-25.26 (SH-2), p SH-2-65, para 10-3

Before determining any point on the map, you must know the contour interval for the map you are using. You can find the contour interval in the marginal information. It is the vertical distance between adjacent contour lines.

**NOTE:** Ask the students to tell you the unit of measure for elevation on the Tenino map, what the contour interval is, and where they found the information on the map.

The Tenino map depicts elevation in meters, and the contour interval is 20 meters with the supplementary contours of 10 meters. The information is under the scale in the center of the lower margin of the map.

#### **Determine Elevation With Contour Lines**

Ref: FM 3-25.26 (SH-2), p SH-2-65), para 10-3

We can use contour lines and contour intervals to determine elevation. To make it easier to understand, we will break the process down into six steps to help you determine elevation.

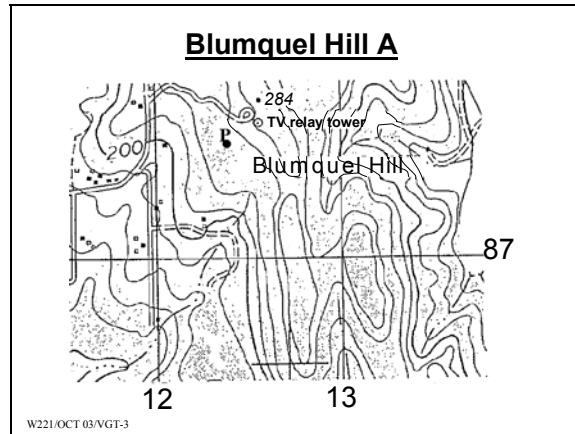
**NOTE:** Instruct the students to take out their Tenino map and their GTA 5-2-12, Coordinate Scale and Protractor. They will need them as you walk them through a six-step process to determine elevation.

**Step 1:** Determine the contour interval and supplementary contour line values of the map by referring to the marginal information. As you determined earlier, the map shows

elevation in meters, the contour interval is 20 meters, and the supplementary interval is 10 meters.

**NOTE:** Show VGT-3, and direct the students to their Tenino map. The area on the VGT is on the Tenino map from which the students will work.

**SHOW VGT-3, BLUMQUEL HILL A**



**Step 2:** Identify and mark a point on the map for which you wish to find the elevation.

The point we will use in this example is at grid EG12358762. It is marked as point "P" on the VGT.

**NOTE:** Write the coordinates on the blackboard and have the students select and mark the point on their Tenino map.

**Step 3:** Find and identify the closest index contour line to your point.

QUESTION: What is the value of the closest index contour line to the point in question?

ANSWER: 200 meters.

**NOTE:** Point out the closest index contour line on the VGT.

**Step 4:** Total the number of intermediate contour lines that you must cross to go from the index line you selected, to the point in question.

**NOTE:** Use the VGT to show how to move from an index contour line across intermediate contour lines to the point to which you need to determine the elevation.

QUESTION: How many intermediate contour lines did you cross to get to the point in question?

ANSWER: Two.

**Step 5:** The value of the contour interval (20 meters) multiplied by the number of lines crossed, equals the difference in elevation between the index contour line and the closest intermediate contour line to the point in question.

QUESTION: What is the difference in elevation between the index contour line and the point in question?

ANSWER: 40 meters.

**Step 6:** The last step is to interpolate, or in other words, "estimate" what the difference in elevation from the closest intermediate contour line is to your point. For example, if the point is half way between two intermediate contour lines, add 1/2 the value of the contour interval to your elevation.

Consider all points less than one-fourth the distance between the contour lines to be the same elevation as the closest contour line. A "rule of thumb" to use in determining the elevation of a hilltop is to take the elevation of the last closed contour line and add to it one-half the contour interval. To determine the elevation of a depression, subtract one-half the contour interval from the last depression contour line. Estimating elevation to one-half contour interval for points between contour lines, tops of hills, and depressions satisfies most military needs.

QUESTION: What is the elevation to your point after you interpolate?

ANSWER: 250 meters.

**NOTE:** Work the following example on the chalkboard to review the process of determining elevation.

Example: Contour interval is 20 meters.

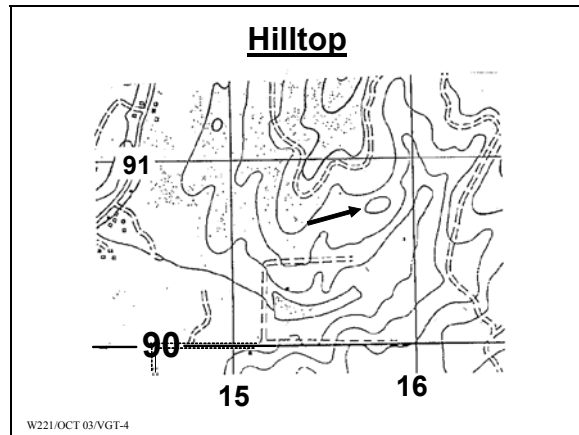
|   |                    |
|---|--------------------|
| Value of index contour line:                | 200 meters         |
| Number of lines crossed meters:             | $2 \times 20 = 40$ |
| Interpolation is 1/2 the contour interval : | <u>10</u> meters   |
| Elevation:                                  | = 250 meters       |

**REMOVE VGT-3**

Let's work another exercise in determining elevation that is a little more difficult. In this example you will see that you can also determine elevation by subtracting from the closest index contour line.

**NOTE:** Tell students to find the hill top at grid EG158907 on their Tenino map.

**SHOW VGT-4, HILLTOP**



By analyzing the terrain and contour lines, you can see that the point of unknown elevation is a hilltop, but at a lower elevation (down slope) than the index contour line.

To determine the elevation of the point, because you cross two intermediate contour lines to get to the hilltop, subtract the 40-meter difference from the 200-meter value of the index contour line. The hilltop lies between the 160 meter and 140 meter intermediate contour line. A contour line indicating a hilltop has the same value as the higher contour line, because you are going up to the small hill top. Remembering the rule of thumb, you must add 1/2 the contour line to arrive at the center of the hilltop.

QUESTION: What is the elevation of the point selected?

ANSWER: 170 meters

**NOTE:** Work the following example on the chalkboard as you review how to determine the elevation.

Example: Contour interval is 20 meters.

Value of index contour line: 200 meters

Number of lines crossed (downhill):  $2 \times 20 = 40$  meters

Hilltop contour line is same elevation as

higher contour line: = 0

Rule of thumb for hilltops adds 1/2 contour line: = +10 meters

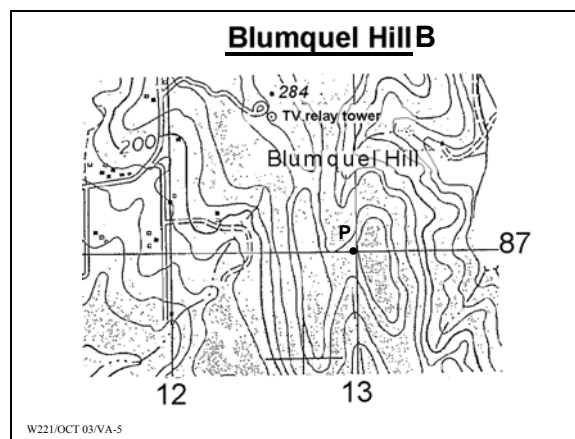
Elevation: = 170 meters

#### REMOVE VGT-4

Let's work one more example for determining elevation. This point is another example where you have to be very careful that you correctly count the number of contour lines that you cross.

**NOTE:** Have students find the point at grid coordinate EG 130870 on their Tenino map.

#### SHOW VGT-5, BLUMQUEL HILL B



By analyzing the terrain, you can see that the point of unknown elevation is in a saddle.

QUESTION: What is the elevation for the point selected?

ANSWER: 280 meters. The point is three-quarters or more towards the next higher contour line; therefore, you consider the elevation of the point to be the same as the elevation of the higher contour line.

Ref: FM 3-25.26 (SH-2), p SH-2-67, para 10-3g(3)

#### REMOVE VGT-5

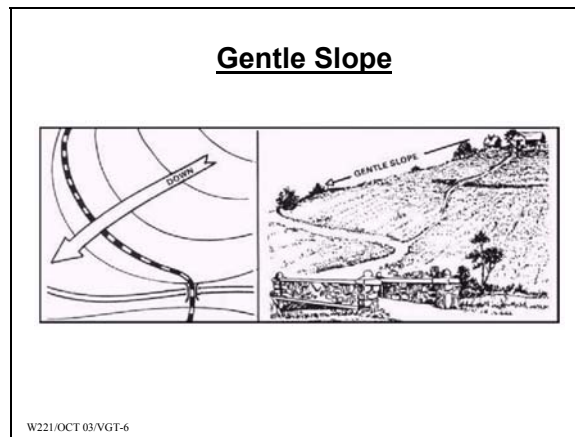
## Determine Types of Slopes and Their Elevation

Ref: FM 3-25.26 SH-2, p SH-2-68, para 10-4,

You can determine types of slopes from the map by studying the contour lines--the closer the contour line, the steeper the slope; the farther apart the contour line, the gentler the slope. There are four types of slopes that concern the military.

**NOTE:** Show VGT-6 and explain the meaning of a gentle slope while the class studies the VGT. Do the same for VGTs 7, 8, and 9.

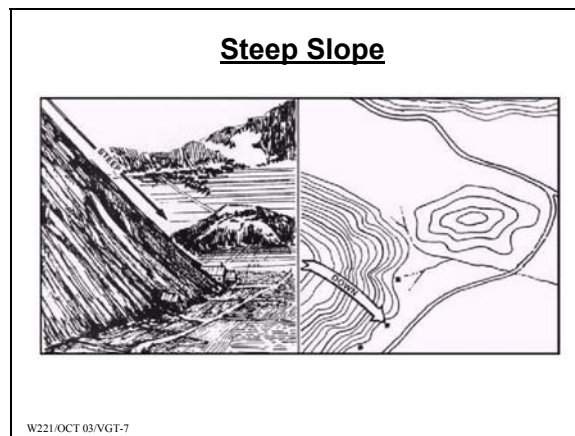
### SHOW VGT-6, GENTLE SLOPE



**1. Gentle slope:** Contour lines show a uniform gentle slope, evenly spaced and wide apart. Considering relief only, a uniform, gentle slope allows the defender to use grazing fire. The attacking force has to climb a slight incline.

### REMOVE VGT-6

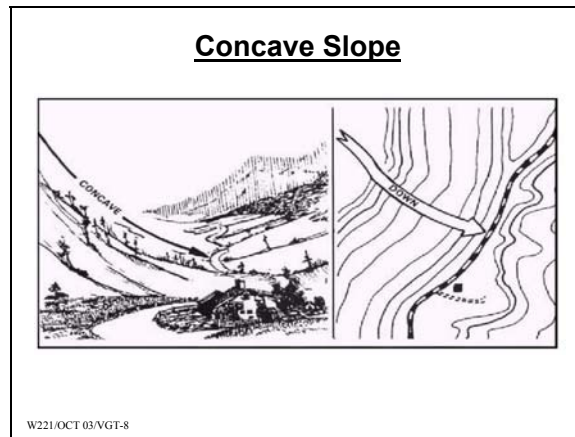
### SHOW VGT-7, STEEP SLOPE



**2. Steep slope:** The map will depict the steep slope with the contour lines uniform and evenly spaced. The closer the contour line the steeper the slope. Considering relief only, a uniform, steep slope allows the defender to use grazing fire, and the attacking force has to negotiate a steep incline.

**REMOVE VGT-7**

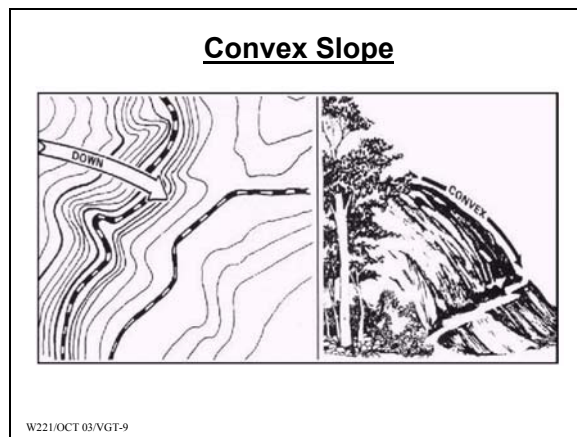
**SHOW VGT-8, CONCAVE SLOPE**



**3. Concave slope:** The map depicts the contour lines closely spaced at the top of the terrain feature and widely spaced at the bottom. Considering relief only, the defender at the top of the slope can observe the entire slope and the terrain at the bottom, but he cannot use grazing fire. The attacker would have no cover from the defender's observation of fire, and his climb would become more difficult as he goes farther up the slope.

**REMOVE VGT-8**

**SHOW VGT-9, CONVEX SLOPE**



**4. Convex slope:** The map shows the contour lines as widely spaced at the top and closely spaced at the bottom. Considering relief only, the defender at the top of the convex slope has a small distance of grazing fire, and he can't observe most of the slope or the terrain at the bottom. The attacker has concealment on most of the slope and an easier climb as he nears the top.

#### **REMOVE VGT-9**

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

**NOTE:** Tell the students to get out their Tenino Maps.

Let's practice what you just learned. Identify the types of slopes at the following grid coordinates on your Tenino map or answer questions.

**QUESTION:** Identify the type of slope that runs from grid EG171844 northeast to Salmon Creek at grid EG175847.

**ANSWER:** Steep slope.

Ref: FM 3-25.26 (SH-2), p SH-2-69, para 10-4b

**QUESTION:** Identify the type of slope that runs from grid EG11708765 to EG11008765.

**ANSWER:** Gentle slope.

Ref: FM 3-25.26 (SH-2), p SH-2-68, para 10-4a

**QUESTION:** How do mapmakers depict a concave slope on a map?

**ANSWER:** They place the contour lines closely spaced at the top of the terrain feature and widely spaced at the bottom.

Ref: FM 3-25.25 (SH-2), p SH-2-69, para 10-4c, figure 10-8



QUESTION: How do mapmakers depict a convex slope on a map?

ANSWER: They draw the contour lines spaced widely at the top and close at the bottom.

Ref: FM 3-25.26 (SH-2), p SH-2-70, para 10-4d, Fig 10-9.

### C. ENABLING LEARNING OBJECTIVE

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Orient a map using a lensatic compass.   |
| <b>CONDITIONS:</b> | In a classroom or field environment given a 1:50,000 map of the local area, GTA 5-2-12 Coordinate Scale and Protractor, pencil, lensatic compass, SH-2, and SH-3.  |
| <b>STANDARDS:</b>  | Oriented a map to the ground using a compass so that the north-seeking arrow on the compass was within 3 degrees of the angle shown on the grid-magnetic (G-M) angle of the declination diagram shown on the local map IAW FM 3-25.26. |

#### 1. Learning Step / Activity 1. Orient a map using a lensatic compass.

Method of Instruction: Conference / Discussion

Technique of Delivery: Small Group Instruction (SGI)

Instructor to Student Ratio: 1:8

Time of Instruction: 1 hr

Media: None

**NOTE:** Give a ten minute break approximately every 50 minutes.

#### **Orient a Map with a Lensatic Compass**

Ref: FM 3-25.26 (SH-2), p SH-2-75, para 11-1a

**NOTE:** Weather allowing, conduct this class outside. Provide the students with a map of the local area so when you cover this material in class they can perform the tasks on their maps. Recommend you mount maps on a board so students can lay the map on the ground making it easier to work their compass.

Your first step as a navigator in the field is to orient your map. You will orient your map when it is in a horizontal position with its north and south corresponding to the north and south on the ground.

You learned during skill level training how to orient your map by terrain association. Now you will learn the two techniques to orienting your map with a lensatic compass. Take out your SH-2, Chapter 11, p SH-2-75.

Since you are orienting your map with a compass, remember that the compass measures magnetic azimuths. Therefore, you must pay special attention to the declination diagram because the magnetic arrow points to magnetic north. As mentioned, there are two techniques to orienting your map with a compass.

**1. First Technique:** Determine the direction of the declination and its value from the declination diagram.

**NOTE:** Call on a student to provide the G-M angle and to identify if it is a western declination or eastern declination.

- a. Place the map in a horizontal position.
- b. Open your compass and place the straight edge of the compass alongside a north-south grid line with the cover of the compass pointing toward the top of the map.

**NOTE:** Check to see if students have lined up their compasses properly.

- c. Keeping the compass aligned as explained, rotate the map and compass together until the magnetic arrow is below the fixed black index line on the compass. You are now close to orienting your map.

**NOTE:** Check to see if the students have their maps and compasses oriented properly to this point.

- d. This is the point where you must know the declination diagram your map.
  - (1) If the magnetic north arrow on the MAP is to the left (west) of the grid north line, rotate the map and compass to the right. When the compass reading is equal to the G-M angle given in the declination diagram, you have oriented your map. (See Figure 11-1, SH-2, p SH-2-76).
  - (2) If the magnetic north arrow on the map is to the right (east) of the grid north line, rotate the map and compass to the left. When the compass reading is equal to 360 degrees minus the G-M angle given in the declination diagram, you oriented your map correctly. (See Figure 11-2, SH-2, p SH-2-76).

**NOTE:** Check to see if the students oriented their maps properly.

**2. Second Technique:** Determine the direction of the declination and its value from the declination diagram.

- a. Using any north-south grid line on the map as a base, draw a magnetic azimuth equal to the G-M angle given in the declination diagram with a protractor.
- b. If the declination is easterly (right) or westerly (left), draw the line in the same direction and on the same G-M angle.
- c. Align the straight edge of the compass--left side--alongside the drawn line on the map.
- d. Rotate the map and compass until the magnetic arrow of the compass is below the fixed black index line. Once done, you have oriented your map. See Figures 11-3 and 11-4, SH-2, p SH-2-77 and SH-2-78.

**NOTE:** Check to ensure the students have their maps properly oriented.

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

**QUESTION:** You do not have a protractor, so you must use the first technique of orienting your map with a compass. You have aligned the straight edge of the compass along a north-south grid line on the map. What is your next step?

**ANSWER:** Rotate the map and compass until the magnetic arrow is below the fixed black index line on the compass.

Ref: FM 3-25.26 (SH-2), p SH-2-75, para 11-1a(1)(b)

**QUESTION:** Once the compass shows that the magnetic arrow is below the fixed back index line on the compass, and the declination diagram shows a westerly magnetic north, what is your next step to orient your map?

**ANSWER:** Rotate the map and compass together to the right until the compass reading is equal to the G-M angle given in the declination diagram.

Ref: FM 3-25.26 (SH-2), p SH-2-75, para 11-1(d)

**QUESTION:** If you must rotate your map to the left because you have an easterly G-M angle, what should the reading on your compass be if you properly oriented your map?

**ANSWER:** 360 degrees minus the declination angle, e.g., a map with 10 degrees easterly G-M angle, the compass should read 350 degrees.

Ref: FM 3-25.26 (SH-2), p SH-2-75, para 11-1a(1)(e)

**D. ENABLING LEARNING OBJECTIVE**

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Determine direction on a map.  |
| <b>CONDITIONS:</b> | In a classroom environment, given a 1:50,000 Tenino Map, GTA 5-2-10 Coordinate Scale and Protractor and SH-2 and SH-3. |
| <b>STANDARDS:</b>  | Determined directions on a map using grid azimuths IAW FM 3-25.26.   |

1. Learning Step / Activity 1. Determine direction on a map  
Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr  
Media: VGT-10 and VGT-11

**NOTE:** Give a 10 minute break where appropriate--approximately every 50 minutes.

### **Determine Direction**

Ref: FM 3-25.26 (SH-2), p SH-2-32, Chapter 6

If asked for the direction to a place far away, your responses would vary. This variation indicates that there is a difference in "accuracy" in the directions. We normally express directions as "right," "left," or "straight ahead." In the military though, we rely on exact directions, and therefore we require a much better method of determining direction.

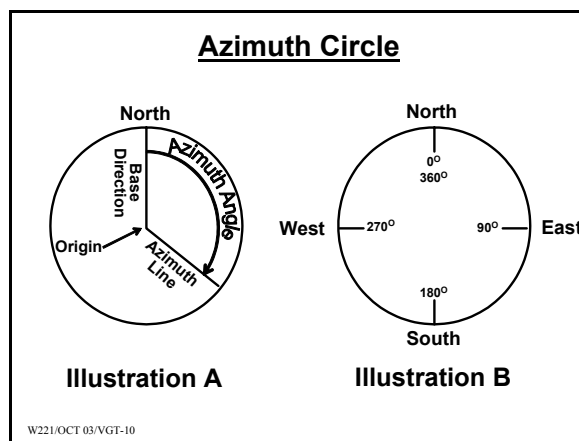
The dictionary defines direction as: "A line or course on which something moves or is aimed to move, or along which something points or faces." In map reading, you express the term "direction" as azimuth.

QUESTION: How would you define azimuth?

ANSWER: An azimuth is a horizontal angle that you measure clockwise from a north base line.

Ref: FM 3-25.26 (SH-2), p SH-2-33, para 6-3

### **SHOW VGT-10, AZIMUTH CIRCLE**



All azimuths originate from the center of an imaginary circle called the azimuth circle.

Illustration "A" shows that the origin of the azimuth line is the center of the circle. You measure the horizontal angle clockwise from the base direction of north to the azimuth line.

When working on a map, you normally measure azimuths in degrees or mils.

Illustration "B" shows the same azimuth circle divided into degrees. Notice that north is zero or 360 degrees, east is 90 degrees, south is 180 degrees, and west is 270 degrees.

QUESTION: What is another (more accurate) measurement that you can use for determining azimuths?

ANSWER: Mils.

FM 3-25.26 (SH-2), p SH-2-32, para 6-1b

Artillery, tank, and mortar gunnery units mainly use the mil. It expresses the size of an angle formed when dividing a circle into 6,400 angles with the vertex of the angles at the center of the circle. You can establish a relationship between degrees and mils. A circle equals 6,400 mils or 360 degrees. Dividing the 6,400 mils by 360 degrees equals 17.78 mils per degree. To convert degrees to mils, multiply degrees by 17.78

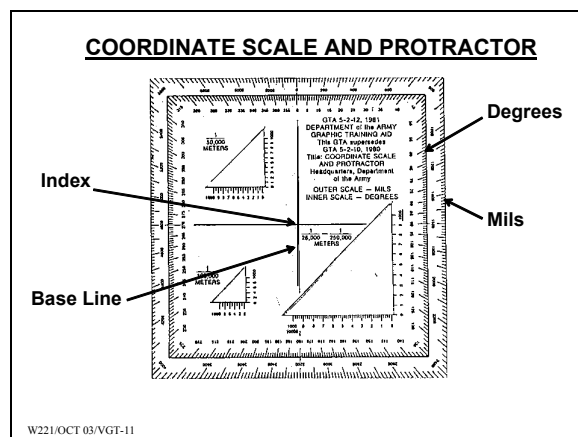
#### REMOVE VGT-10

QUESTION: What instrument do you use in map reading to determine both mils and degree measurements?

ANSWER: Military protractor, GTA 5-2-12.

Ref: FM 3-25.26 (SH-2), p SH-2-36, para 6-5a

#### SHOW VGT-11, COORDINATE SCALE AND PROTRACTOR



The protractor represents the azimuth circle. The outer scale is in mils and the inner scale is in degrees. We will concentrate on the inner scale that is in degrees. It is graduated from zero to 360 degrees. Small tick marks represent one-degree increments and the larger tick marks represent five-degree increments. The line located in the center of the protractor from zero (at the top) to 180 degrees (at the bottom) is the base line. The index or center of the protractor is the point of intersection of the base line and the line extending from 90 degrees to 270 degrees.

When measuring azimuths, be sure you properly align the protractor on the map. Orient the base line of the protractor parallel to a north-south grid line on the map. The zero or 360 degrees end of the protractor must always be pointing north (to the top) of the map.

To correctly determine a grid azimuth, you must:

**Step 1:** Select and mark two separate locations on the map.

**Step 2:** Use a straight edge and a hard, well-sharpened pencil to draw a line from point A to point B.

**Step 3:** Place the protractor index on the drawn line at a point where the drawn line intersects with a north-south or east-west grid line.

**Step 4:** If the point you selected (along the drawn line) intersects with the north-south grid line, simply align the vertical line of the index mark with the north-south gridline. If the point intersects with an east-west grid line, align the horizontal line of the index mark with the east-west grid line.

**Step 5:** Determine the azimuth to your second location by locating the point where the drawn line comes out under the protractor and noting the direction in degrees at this point.

Read the numbers to the nearest degree, and interpolate to a 1/2 degree.

### **REMOVE VGT-11**

**QUESTION:** What is the grid azimuth in degrees from the TV tower in grid square EG1287 to the road junction nearest the pump in grid square EG1688?

**ANSWER:** 80 degrees.

Ensure you use the complete 8-digit grid coordinates in the next exercise. The grid square contains two bridges.

QUESTION: What is the grid azimuth in degrees from the bridge in grid square EG15038389 to the tower in grid square EG1887?

ANSWER: 39 degrees.

After you draw your azimuth line, it is always best to place your index of the protractor on the grid line that forms the larger angle with the azimuth line. This will give you a more exact point of intersection than if you choose the grid line that forms a shallow angle with your azimuth line. Therefore, if an azimuth line runs in an east-west direction, place the index of the protractor on a north-south grid line. If your azimuth line runs in a north-south direction, place the index of the protractor on an east-west grid line.

In the next example, the azimuth is almost straight north; therefore, you must use an east-west grid line to line up the index of the protractor.

QUESTION: What is the grid azimuth in degrees from the water tower in grid EG097827 to the water tower in grid EG093853?

ANSWER: 352.5 degrees

QUESTION: What is the grid azimuth in degrees from the water tower in grid EG097827 to BM 83 in grid EG080874?

ANSWER: 341 degrees

To measure an azimuth in mils, you must follow the same procedure with the exception that you must read the outer scale. The outer scale has graduated short tick marks representing 20 mils and long tick marks representing 100 mils. Every other long tick mark has a number, i.e. 0, 200, 400...6200.

QUESTION: What is the grid azimuth in mils from BM 83 in grid EG080874 to spot elevation 167 in grid square EG0784?

ANSWER: 3520 Mils.

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

Conduct a check on learning by clarifying any questions the students may have on how to determine direction on a map. Repeat any of the exercises above to clear up any questions.

**E. ENABLING LEARNING OBJECTIVE**

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Convert azimuths using the declination diagram.  |
| <b>CONDITIONS:</b> | In a classroom environment given a 1:50,000 Tenino Map, GTA 5-2-12 Coordinate Scale and Protractor, paper, pencil, SH-2, and SH-3. |
| <b>STANDARDS:</b>  | Converted grid azimuths to magnetic azimuths and magnetic azimuths to grid azimuths using the declination diagram IAW FM 3-25.26.  |

1. Learning Step / Activity 1. Convert azimuths using the declination diagram.

Method of Instruction: Conference / Discussion

Technique of Delivery: Small Group Instruction (SGI)

Instructor to Student Ratio: 1:8

Time of Instruction: 1 hr

Media: VGT-12 thru VGT-16

**NOTE:** Give 10 min breaks where appropriate--approximately every 50 min.

**Converting Azimuths**

Ref: FM 3-25.26 (SH-2), p SH-2-33, Chapter 6, para 6-3

Earlier in the lesson you learned how to measure a distance between two points and plot an azimuth to determine polar coordinates. Every time you use a protractor to plot or measure azimuths on a map, you are working with grid azimuths. When in the field, the only instrument that you have available to measure azimuths is a magnetic compass. The azimuth we obtain with a magnetic compass is a magnetic azimuth. In this part of the lesson, you will learn about the different types of azimuths and how to convert a grid azimuth into a magnetic azimuth and vice versa.

As you know, you determine an azimuth by measuring a horizontal angle in a clockwise direction from a base line. There are three different base lines: true north, magnetic north, and grid north.

QUESTION: How does the Army define true north?

ANSWER: 

- It is a line from any position on the earth's surface to the north pole.
- All lines of longitude are true north lines.
- Usually represented by a star.

Ref: FM 3-25.26 (SH-2), p SH-2-32, para 6-2a



QUESTION: How does the Army define magnetic north?

ANSWER: • The direction to the north magnetic pole.  
• The north seeking needle of a lensatic compass points to this location.  
• Used in the field when using a magnetic compass.  
• Usually symbolized by a line ending with half of an arrowhead.

Ref: FM 3-25.26 (SH-2), p SH-2-32, para 6-2b

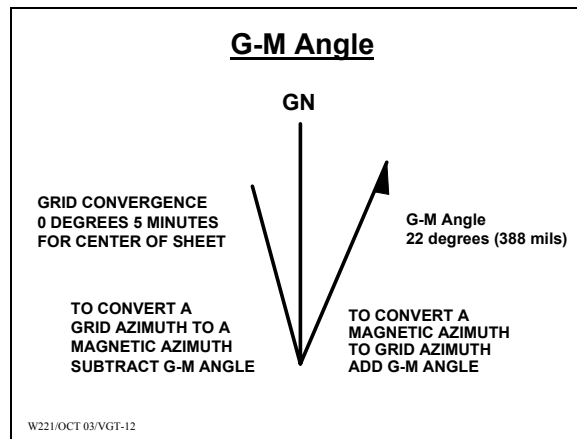
QUESTION: How does the Army define grid north?

ANSWER: • The north established by using the vertical grid lines on a map.  
• The map may symbolize grid north by the letters "GN" or the letter "Y."

Ref: FM 3-25.26 (SH-2), p SH-2-33, para 6-2c

### **SHOW VGT-12, G-M ANGLE**

Ref: FM 3-25.26 (SH-2), p SH-2-38, para 6-6



**NOTE:** The declination diagram shown on VGT-12 is from an older "Tenino" map sheet with an easterly G-M angle of 22 degrees. The student should understand that angles will change periodically. When working with map sheets, you should note the angular relationship between grid, true, and magnetic north.

This is a declination diagram of a Tenino map sheet. The diagram shows the interrelationship of true, grid, and magnetic north. The G-M angle shows the angular difference in direction between grid and magnetic north. We express the value of the angle in degrees to the nearest 1/2-degree; we express mil equivalents to the nearest 10 mils. Because of this angle difference in grid and magnetic north, you must convert one to the other using the G-M angle before you can use the map azimuth on the ground or the compass azimuth on the map.

Newer map sheets normally have notes next to the declination diagram explaining the use of the G-M angle. One note provides instructions for converting a magnetic azimuth to grid azimuth. The other note provides instructions for converting a grid azimuth to a magnetic azimuth. Always follow the instructions of the notes when converting azimuths.

**NOTE:** Point out these notes on VGT.

On older map sheets which do not show the notes telling us how to convert, it is necessary to determine whether to add or subtract the G-M angle to convert grid to magnetic azimuths and vice versa.

### **REMOVE VGT-12**

We differentiate between easterly and westerly G-M angles when converting grid azimuths to magnetic azimuths and vice versa. If the magnetic prong is east of the grid prong, then we have an easterly G-M angle. If the magnetic prong is west of the grid north prong, then we have a westerly G-M angle. However, the principle of how to determine if you have to add or subtract the G-M angle stays the same. It turns out that if you add with an easterly G-M angle, then you subtract with a westerly G-M angle and vice versa. Let's look first at an easterly G-M angle.

**NOTE:** Use the chalkboard to construct an easterly G-M angle of 22 degrees and demonstrate each step as you explain the conversion process.

A rule to remember when solving conversion problems is that: "no matter where the azimuth points, always measure the angle to it clockwise from the base line." With this in mind we may solve the problem in two easy steps.

**Step 1:** From the base of the G-M angle, draw a line to the right; this line represents any azimuth, grid or magnetic, from 0 to 360 degrees.

**NOTE:** Draw a line approximately at a right angle.

**Step 2:** Draw an arc clockwise from grid north to that line and label it "G" for grid arc. Then draw an arc clockwise from magnetic north to that line and label it "M" for magnetic arc.

**NOTE:** Draw in the two arcs.

We can see from the diagram that the grid arc is larger than the magnetic arc by the value of the G-M angle. Therefore, if you want to make the grid azimuth look like the magnetic azimuth (convert a grid azimuth to a magnetic azimuth) you must subtract the G-M angle. If you want to make the shorter magnetic arc look like the Grid Arc (convert a magnetic azimuth to a grid azimuth), then you must add the G-M angle. In our example we have a G-M angle of 22 degrees. If you want to convert a grid azimuth of 110 degrees to a magnetic azimuth, what would you have to do?

Since the grid arc is larger than the magnetic arc, you have to subtract the G-M angle from the grid azimuth.

**NOTE:** Write the following azimuth conversion on the blackboard.

Grid azimuth of 110 degrees  
 G-M angle - 22 degrees  
 Magnetic azimuth 88 degrees

**NOTE:** Students must understand the process before working more exercises. Cover the solutions on VGT-13 before showing it to the students.

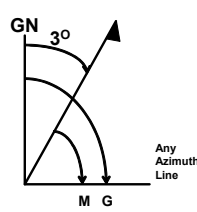
**SHOW VGT-13, EASTERLY**

**Easterly**

**REQUIREMENT:**

Convert these grid azimuths to magnetic azimuths and magnetic azimuths to Grid azimuths.

1. Grid AZ 146°
2. Grid AZ 83°
3. Mag AZ 271°



**SOLUTIONS:**

1. Mag AZ 143°
2. Mag AZ 80°
3. Grid AZ 274°

W221/OCT 03/VGT-13

**QUESTION:** What are the values of the converted azimuths in this VGT?

**ANSWER:** a. Mag AZ 143°  
 b. Mag AZ 80°  
 c. Grid AZ 274°

**REMOVE VGT-13**

Let's construct a westerly G-M angle in the same manner.

**NOTE:** Draw a westerly G-M angle of 22 degrees on the blackboard.

When the magnetic prong is west of the grid prong, then the magnetic arc is larger than the grid arc. Therefore, add the G-M angle to make the grid arc look like the magnetic arc. In other words, you must add the G-M angle if you are converting grid azimuth to magnetic azimuth.

**NOTE:** Write the following azimuth conversion on the blackboard.

Grid azimuth      110 degrees  
G-M angle      + 22 degrees  
Magnetic azimuth 132 degrees

**NOTE:** Ensure students understand the process before working more exercises. Cover the solutions on VGT-14 before showing slide to the students.

**SHOW VGT-14, WESTERLY**

**Westerly**

**REQUIREMENT:**

Convert these grid azimuths to magnetic azimuths and magnetic azimuths to grid azimuths.

1. Mag AZ 54°
2. Grid AZ 183°
3. Mag AZ 216°

**SOLUTIONS:**

1. Grid AZ 44°
2. Mag AZ 193°
3. Grid AZ 206°

W221/OCT 03/VGT-14

QUESTION: What are the values of the converted azimuths in this VGT?

ANSWER: a. Grid AZ 44°  
b. Mag AZ 193°  
c. Grid AZ 206°

**REMOVE VGT-14**

In some cases the G-M angle will be larger than the azimuth you want to convert. When this happens, simply add a full circle (360 degrees) to your azimuth so you will not have negative numbers as shown in the following example.

**SHOW VGT-15, MAGNETIC AZIMUTH SMALLER THAN THE G-M ANGLE**

**Magnetic Azimuth Smaller than G-M Angle**

**REQUIREMENT:**

Determine the Grid Azimuth of this Magnetic Azimuth.

Mag AZ  $17^{\circ}$

**SOLUTION:**

|           |                 |
|-----------|-----------------|
| Mag AZ    | $17^{\circ}$    |
|           | $+ 360^{\circ}$ |
| Total     | $377^{\circ}$   |
| G-M Angle | $- 26^{\circ}$  |
| Grid AZ   | $351^{\circ}$   |

W221/OCT 03/VGT-15

**NOTE:** Work through the problem. Ensure students understand before moving on.

### REMOVE VGT-15

The same thing can happen with the grid azimuth. Again you add a full circle (360 degrees) to the azimuth as shown in this example.

### SHOW VGT-16, GRID AZIMUTH SMALLER THAN G-M ANGLE

**Grid Azimuth Smaller than G-M Angle**

**REQUIREMENT:**

Determine the magnetic azimuth of this grid azimuth:

Grid AZ  $10^{\circ}$

**SOLUTION:**

|                 |                 |
|-----------------|-----------------|
| Grid AZ         | $10^{\circ}$    |
|                 | $+ 360^{\circ}$ |
| Total           | $370^{\circ}$   |
| Minus G-M Angle | $- 14^{\circ}$  |
| Magnetic AZ     | $356^{\circ}$   |

W221/OCT 03/VGT-16

**NOTE:** Work through the problem. Ensure students understand before moving on to more exercises.

### REMOVE VGT-16

Let's now work a few exercises to ensure that you know how to convert azimuths when the G-M angle is greater than the azimuth we are subtracting from.

**QUESTION:** If the G-M angle is 19 degrees easterly and the grid azimuth is 18 degrees, what is the magnetic azimuth?

**ANSWER:** 359 degrees

QUESTION: If the G-M angle is 22 degrees westerly and the magnetic azimuth is 10 degrees, what is the grid azimuth?

ANSWER: 348 degrees

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

Clarifying any questions the students may have on how to  
Convert azimuths. Repeat any of the exercises above to clear up any questions.

**F. ENABLING LEARNING OBJECTIVE**

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Determine polar coordinates.  |
| <b>CONDITIONS:</b> | In a classroom environment, given a 1:50,000 Tenino Map, 1:50,000 map of the local area, GTA 5-2-12 Coordinate Scale and Protractor, paper, pencil, SH-2, and SH-3. |
| <b>STANDARDS:</b>  | Determined the polar coordinates by plotting an azimuth and a distance from a known point on a map IAW FM 3-25.26.  |

1. Learning Step / Activity 1. Determine polar coordinates,  
Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr 10 mins  
Media: VGT-17

**NOTE:** Give 10 min breaks where appropriate--approximately every 50 min.

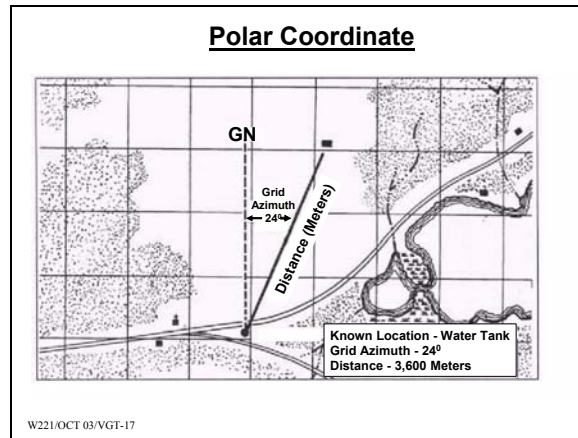
**NOTE:** SGLs may use the ELO F, Polar Coordinate Powerpoint Presentation to conduct this ELO. You need to download the Powerpoint presentation from the USASMA website.

**Determining Polar Coordinates**

Ref: FM 3-25.26 (SH-2), p SH-2-50, Chapter 6, para 6-10

Polar coordinate is a method of locating or plotting an unknown position from a known point by giving a direction and a distance along a direction line.

**SHOW VGT-17, POLAR COORDINATE**



Since you already know how to measure an azimuth and a distance between two points, you will quickly learn how to plot an azimuth and a distance. Let's go through the steps to plot an azimuth from a known point.

**Step 1:** Place the index mark of the protractor at the center of mass on the known point from which you are measuring, ensuring that the base line (0-180 line) is parallel to a north-south grid line. Your known point will seldom fall directly on a grid line; therefore, it is sometimes difficult to keep the base line parallel with a north-south grid line. Since the north-south grid lines on the map are at a right angle (90 degrees) to the east-west grid lines, and all the vertical and horizontal lines on a protractor are at a right angle, you can use any line on the protractor. That is, you can use the edges of the protractor, degree scale, and horizontal line through the index, to assist you in keeping the protractor parallel to a north-south grid line.

**Step 2:** Locate the desired azimuth on the protractor scale and place a dot on the map at this azimuth.

**Step 3:** Remove the protractor and connect the point and dot with a straight line.

The azimuth line you constructed is the direction to your second point. To get the precise location of the point, you must now plot a distance along this azimuth line. Here's how to do that:

**Step 1:** Select the appropriate scale measurement and place a paper straight edge on the scale.

**Step 2:** Determine the desired distance to measure from the scale and mark the paper at this distance using tick marks. Mark the distance to the unknown point, along the azimuth line, with the straight edge tick marks.

**Step 3:** Align the straight edge with the azimuth line. Ensure the first tick mark is center mass on the known point.

**Step 4:** Place a dot on the map at the second tick mark from the straight edge on the map. The position of the second tick mark is the position of the unknown point. Remove the straight edge and determine the grid coordinate to the second point. We call this procedure "Determining Polar Coordinates." Let's work an example of plotting polar coordinates.

QUESTION: What are the polar coordinates plotted from the horizontal control point "Skook" in grid square EG1682 at an azimuth of 272 degrees and a distance of 3100 meters?

ANSWER: EG130826

QUESTION: What are the polar coordinates plotted from the water tower in grid square EG1185 at an azimuth of 46 degrees and a distance of 2000 meters?

ANSWER: EG12958695

QUESTION: What are the polar coordinates plotted from the water tower in grid square EG1185 at an azimuth of 81 degrees and a distance of 3150 meters?

ANSWER: EG14658605

#### **REMOVE VGT-17**

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

Conduct a check on learning by clarifying any questions the students may have on how to Determine polar coordinates.

#### **G. ENABLING LEARNING OBJECTIVE**

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Locate an unknown point on a map and on the ground by intersection.   |
| <b>CONDITIONS:</b> | In a classroom environment, given a 1:50,000 Tenino map, the location of two known points, a straight edge, a GTA 5-2-12 (Coordinate Scale and Protractor), pencil, paper, and an object or terrain feature for which to determine the grid location. |
| <b>STANDARDS:</b>  | Located the unknown location in a 100,000 meter square with its identification letters and six-digit coordinates to within 100 meters of the actual grid coordinate IAW FM 3-25.26.   |



1. Learning Step / Activity 1. Locate an unknown point on a map and on the ground by intersection.

Method of Instruction: Conference / Discussion

Technique of Delivery: Small Group Instruction (SGI)

Instructor to Student Ratio: 1:8

Time of Instruction: 1 hr 10 mins

Media: None (See note below)

**NOTE:** SGLs may use the ELO G, Intersection Powerpoint Presentation to conduct this ELO. They have to download the powerpoint presentation from the USASMA website.

### **Locate Unknown Point on Map by Intersection**

Ref: FM 3-25.26 (SH-2), p SH-2-44, para 6-7

Intersection is a method to determine the location of an unknown point or object by occupying at least two--preferably three--positions and determining the azimuth to the unknown point from these positions. The main purpose of intersection is to determine coordinates to enemy locations. There are two ways to perform an intersection. The primary method is the "map and compass method." The other method is the "map and straight edge method."

The map and straight edge method is much less accurate and you should only use it when a compass is not available. The map and straight edge method requires orientation of the map to the ground.

**NOTE:** Explain to the students that they will only simulate measuring a magnetic azimuth; they can only perform this step in the field.

We will now perform an intersection using the map and compass method.

**NOTE:** Have the students perform the steps of an intersection on their maps as you explain the method step-by-step.

**Step 1.** Orient your map using a compass.

**Step 2.** Sight the enemy position on the ground.

**Step 3.** Locate your position on the ground and mark it on the map.

Example: Road junction at EG13508009.

**Step 4.** Determine the magnetic azimuth from the road junction to the enemy position and convert the magnetic azimuth to a grid azimuth.

Example:   Magnetic azimuth       59 degrees

|                    |                    |
|--------------------|--------------------|
| Easterly G-M angle | <u>+21 degrees</u> |
| Grid azimuth       | 80 degrees         |

**Step 5.** Draw a line from the road junction along that grid azimuth.

**NOTE:** Explain that it is much better to have a second team positioned at an observation point that can radio the azimuth from its position to the enemy to you. Then you don't have to move to a second location.

**Step 6.** Move to or call a second known position where you or they can see the enemy and mark that position on the map.

Example: Road junction located at EG13318108.

**Step 7.** Repeat steps 4 and 5.

Example: Magnetic azimuth       79 degrees

|                      |                    |
|----------------------|--------------------|
| Easterly G - M angle | <u>+21 degrees</u> |
| Grid azimuth         | 100 degrees        |

**Step 8.** Where the lines cross is the location of the enemy.

Example: Grid EG16218055

**Step 9.** It is desirable to repeat the procedure from a third point to increase the accuracy.

Example: Road junction at EG15478180.

Magnetic azimuth       128 degrees

|                    |                    |
|--------------------|--------------------|
| Easterly G-M angle | <u>+21 degrees</u> |
| Grid azimuth       | 149 degrees        |

Notice that the lines from the first and second point form a very shallow angle where they intersect. This decreases the accuracy of an intersection. Whenever possible, choose locations that will give you a large angle where the lines intersect. The third location in our example is such a point. Notice the line from that point intersects both of the other lines at a larger angle. This greatly increases the accuracy of the intersection.

Let's work some exercises of intersections and see what accuracy you can achieve. Remember, it is important that you perform the work precisely and that your pencil is sharp.

Your squad occupies two observation posts. The team at the water tower in grid square EG0985 sees the enemy at a magnetic azimuth of 351 degrees. The second team located at the water tower in grid square EG1185 sees the enemy at a magnetic azimuth of 300 degrees.

QUESTION: What is the grid location of the enemy?

ANSWER: Grid coordinate EG09798765.

Your squad is operating as an observation team and you see six enemy helicopters land and then disappear from your sight. Prior to the helicopters disappearing from your sight, you shot a magnetic azimuth to the location where you saw them land. This magnetic azimuth is 316 1/2 degrees. Your location is the bridge in grid square EH1000. You contact your other team located in the Zion Chapel Tower at grid square EH1102. They have a sighting of six enemy helicopters at a magnetic azimuth of 229 1/2 degrees. Both your teams perform an intersection.

QUESTION: What are the grid location and the type of terrain where the six enemy helicopters landed?

ANSWER: Grid EH093022, depression.

The second method of intersection requires orienting the map to the ground and aligning a straight edge with both the known point on the map and the unknown point on the ground. Although this method is not as accurate as the map and compass method, you may use it as an alternate method of intersection when a compass is not available. To use this method you must:

**Step 1.** Orient the map properly to the ground.

**Step 2.** Locate your position on the ground and mark your position on the map.

**Step 3.** Lay a straight edge (e.g., protractor) with one end at your position as a pivot point, then rotate the straight edge until you sight the unknown point (Your selected piece of equipment or soldier) along the edge.

**Step 4.** Draw a line along the straight edge.

**Step 5.** Repeat procedures 1 thru 4 at an alternate known position.

**Step 6.** The intersection of lines is the location of the unknown point.

**Step 7.** Again, for a check of accuracy, you may use a third position.

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

Conduct a check on learning by clarifying any questions the students may have on how to locate unknown points on a map by intersection. Repeat any of the steps above to clear up any questions.

**H. ENABLING LEARNING OBJECTIVE**

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Locate an unknown point on a map and on the ground by resection.  |
| <b>CONDITIONS:</b> | In a classroom environment, given a 1:50,000 Tenino map, the location of two known and identifiable points on the map, a straight edge, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, paper, SH-2 and SH-3. |
| <b>STANDARDS:</b>  | Located the unknown point in a 100,000 meter square with its identification letters and six-digit coordinates to within 100 meters of the actual grid coordinate IAW FM 3-25.26.                                    |

1. Learning Step / Activity 1. Locate an unknown point on a map and on the ground by resection.  
Method of Instruction: Conference / Discussion  
Technique of delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr 10 mins  
Media: None (See note below).

**NOTE:** SGLs may use the ELO H, Resection Powerpoint Presentation to conduct this ELO. They have to download it from the USASMA webpage.

**NOTE:** Give 10 min breaks where appropriate--approximately every 50 min.

**Locate Unknown Point on Map by Resection**

Ref: FM 3-25.26 (SH-2), p SH-2-46 thru SH-2-48, para 6-8

Resection is a method to determine the location of an unknown point (your position) by sighting on at least two--preferably three known positions--and determining the azimuth to the unknown point (your location) from these well-defined locations. The main purpose of resection is to determine coordinates to your location. As in "intersection," there are two ways to perform a resection. The primary method is the "map and compass method." The other method is the "map and straight edge method." The map and straight edge method is much less accurate, and you should only use it when a compass is not available. This method requires that you orient the map to the ground.

Resection is very similar to intersection. The main difference is that instead of plotting an azimuth to an unknown point from two or three known locations that you have to occupy, you now plot back azimuths from known positions that you don't have to occupy. Intersection allows you to determine grid coordinates to the enemy without occupying the enemy's position. Resection allows you to determine grid coordinates to your location from known points even if the enemy controls them. In order to do that, you need to understand the term back azimuth.

Ref: FM 3-25.26 (SH-2), p SH-2-34, para 6-3a

Suppose your mission requires you to move along an azimuth of 81 degrees to an alternate position and then return to your present location.

QUESTION: What direction would you follow during your return trip?

ANSWER: You would move along an azimuth of 261 degrees. A back azimuth is simply the opposite of an azimuth and it always differs by exactly 180 degrees. There are two rules you must remember when determining the back azimuth.

**Rule 1.** If the azimuth is more than 180 degrees, then subtract 180 degrees.

**NOTE:** Work the example on the blackboard.

|                  |                     |
|------------------|---------------------|
| Example: Azimuth | 215 degrees         |
|                  | <u>-180 degrees</u> |
| Back azimuth     | 35 degrees          |

**Rule 2.** If the azimuth is 180 degrees or less, then add 180 degrees.

**NOTE:** Work the example on the blackboard.

|                  |                      |
|------------------|----------------------|
| Example: Azimuth | 180 degrees          |
|                  | <u>+ 180 degrees</u> |
| Back azimuth     | 360 degrees          |

QUESTION: What are the back azimuths of these azimuths? 45, 340, 210, 125, and 15 degrees.

ANSWER: 225, 160, 30, 305, and 195.

Now that you understand what a back azimuth is and how to calculate it, let's return to resection and see how to use the back azimuth.

Ref: FM 3-25.26 (SH-2), p SH-2-46, para 6-8

To use the map and compass method of resection, you must follow these steps:

**Step 1.** Orient the map using the compass.

**Step 2.** Locate a feature or object that is identifiable on both the ground and the map and mark the map location.

Example: Tower located at EG18048759

**Step 3.** Measure the magnetic azimuth to the known position and convert the magnetic azimuth to a grid azimuth.

|                 |                    |
|-----------------|--------------------|
| Example: Mag AZ | 29 degrees         |
| G-M angle       | <u>+21 degrees</u> |
| Grid azimuth    | 50 degrees         |

**Step 4.** Change the grid azimuth to a back azimuth and draw a line from the known position backward toward your unknown position.

|                       |                     |
|-----------------------|---------------------|
| Example: Grid azimuth | 50 degrees          |
| Add                   | <u>+180 degrees</u> |
| Grid back AZ          | 230 degrees         |

**Step 5.** Locate a second feature or object that is identifiable on both the ground and the map and mark the map location.

Example: Bridge located at EG15008389.

**Step 6.** Repeat step 3.

|                           |                     |
|---------------------------|---------------------|
| Example: Magnetic azimuth | 151 degrees         |
| Add G-M angle             | <u>+ 21 degrees</u> |
| Grid azimuth              | 172 degrees         |

**Step 7.** Repeat step 4.

|                       |                     |
|-----------------------|---------------------|
| Example: Grid azimuth | 172 degrees         |
| Add                   | <u>+180 degrees</u> |
| Grid back AZ          | 352 degrees         |

**Step 8.** The point where the two lines intersect is your location.

Example: EG14858494

**Step 9.** For a check on accuracy, you should construct a third line following the steps as outlined.

Whenever possible, choose locations which will give you a large angle where the lines intersect. This will increase the accuracy of your resection.

Work some resection exercises and check your accuracy. Remember, it's important to perform the work precisely and that your pencil is sharp.

While on a reconnaissance mission, an enemy scout platoon detects your squad. You take up a defensive position and decide to request indirect fire support. You're not sure of your location. From your location, you can see a lookout tower in grid EG1887 at a magnetic azimuth of 110 degrees and a TV relay tower in grid EG1287 at a magnetic azimuth of 215 degrees.

QUESTION: What is your location?

ANSWER: EG155897.

You determine a distance of 800 meters to the enemy with your laser range finder and a magnetic azimuth of 290 degrees.

QUESTION: What is the grid location of the enemy scout platoon?

ANSWER: EG149902.

You had to remember how to use the polar plot method to find the location of the enemy. Since the enemy pinned you down, it would have been impossible to move to another location and perform an intersection. As you can see, you have to use all the map reading skills in conjunction with each other. Let's work a couple of more resection problems to improve our accuracy.

QUESTION: You determined that the magnetic azimuth from your position to the TV relay tower in grid square EG1287 is 3 degrees and the magnetic azimuth to the spot elevation 199 in grid square EG1385 is 77 degrees. What is the six-digit grid coordinate of your location?

ANSWER: EG116856.

QUESTION: The magnetic azimuth from your location to the water tower at EG093853 is 63 degrees and the magnetic azimuth to the water tower at EG097827 is 104 degrees. What is the six-digit coordinate to your location?

ANSWER: EG063849.

Whenever you do not have a compass available you can use the straight edge method to perform a resection. This requires that you orient the map to the ground and use a straight edge to sight at the known locations. The method remains basically the same. The main difference is that you do not shoot a magnetic azimuth

to the known points. You simply line up a straight edge, just like a rifle sight, to your points. This saves you from converting magnetic azimuth to grid azimuth and also azimuth to back azimuth. Use this method only when a compass is not available since it is not nearly as accurate as the compass method.

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

Conduct a check on learning by clarifying any questions the students may have on how to locate unknown points on a map by resection. Repeat any of the steps above to clear up any questions.



#### SECTION IV. SUMMARY

|   |
|---|
| Method of Instruction: <u>Conference / Discussion</u>       |
| Technique of Delivery: <u>Small Group Instruction (SGI)</u> |
| Instructor to Student Ratio is: <u>1:8</u>                  |
| Time of Instruction: <u>5 mins</u>                          |
| Media: <u>None</u>  |

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#### Check on Learning

Ask the students if there are any questions pertaining to what they covered during the last 13 hours of class and practical exercises. The PEs completed during the lesson and the questions asked serve as the check on learning.

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#### Review / Summarize Lesson

During the last 13 hours you received reinforcement training in the following tasks through self study and practical exercises. These skills include:

- Identify topographic symbols on a military map.
- Identify terrain features on a map.
- Orient a map to the ground by map terrain association.
- Determine the grid coordinate of a point on a military map.
- Determine a location on the ground by terrain association.
- Determine a magnetic azimuth using a lensatic compass.
- Determine direction using field-expedient methods.
- Measure distance on a map.

The above navigation tasks are absolutely essential, along with the tasks--listed below--in order for you to successfully complete the land navigation performance examination, and to lead a section/squad during the STX later in this course.

- Determine the elevation of a point on the ground using a map.
- Convert azimuths.
- Orient a map using a lensatic compass.
- Locate an unknown point on a map and the ground by intersection.
- Locate an unknown point on a map and the ground by resection.
- Determine an azimuth using a protractor.
- Compute back azimuths.

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#### Transition to Next Lesson

You will now begin using the skills you just reinforced and learned in support of the next lesson, W226, Land Navigation.

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## SECTION V. STUDENT EVALUATION

### Testing Requirements

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**NOTE:** Describe how the student must demonstrate accomplishment of the TLO. Refer student to the Student Evaluation Plan.

- You will take a written examination. The examination will contain questions from this lesson. You must correctly answer 70 percent or more of the questions on the examination to receive a GO. Failure to achieve a GO on the examination will result in a retest. Failure of the retest could result in your dismissal from the course.
- You will take a performance evaluated examination later in the course following W226, Land Navigation, utilizing the skills presented in this lesson. You must navigate a course covering approximately 3200 meters. You must find three of four points to receive a GO. Failure to achieve a GO on the examination will result in a retest. Failure of the retest could result in your dismissal from the course
- Your SGL will also evaluate your ability to read a map and navigate during the end of course STX while you are filling a leadership position.

### Feedback Requirements

---

**NOTE:** Feedback is essential to effective learning. Schedule and provide feedback on the evaluation and any information to help answer students' questions about the test. Provide remedial training as needed.

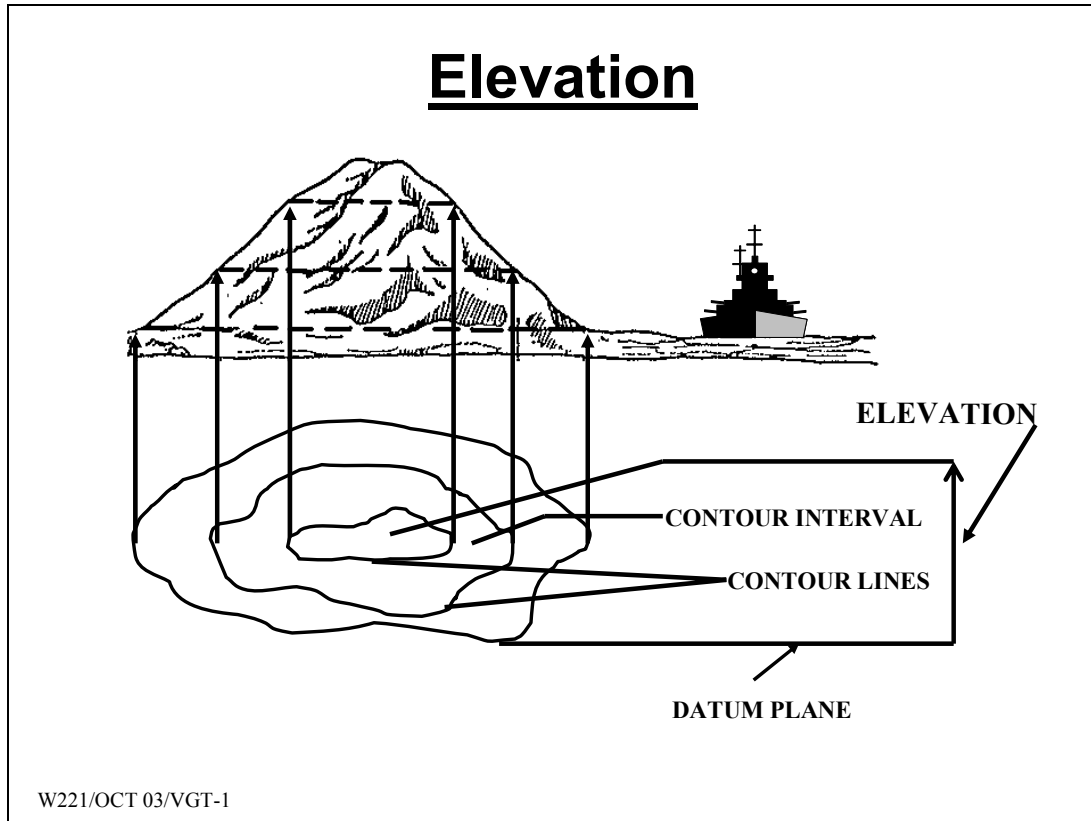
Inform the students where their examination will take place, as posted on the training schedule, and when they will receive feedback on the test. Include any retest information.

---

Enabling Learning Objective B

Learning Step 1

VGT-1, ELEVATION



## **Contour Lines**

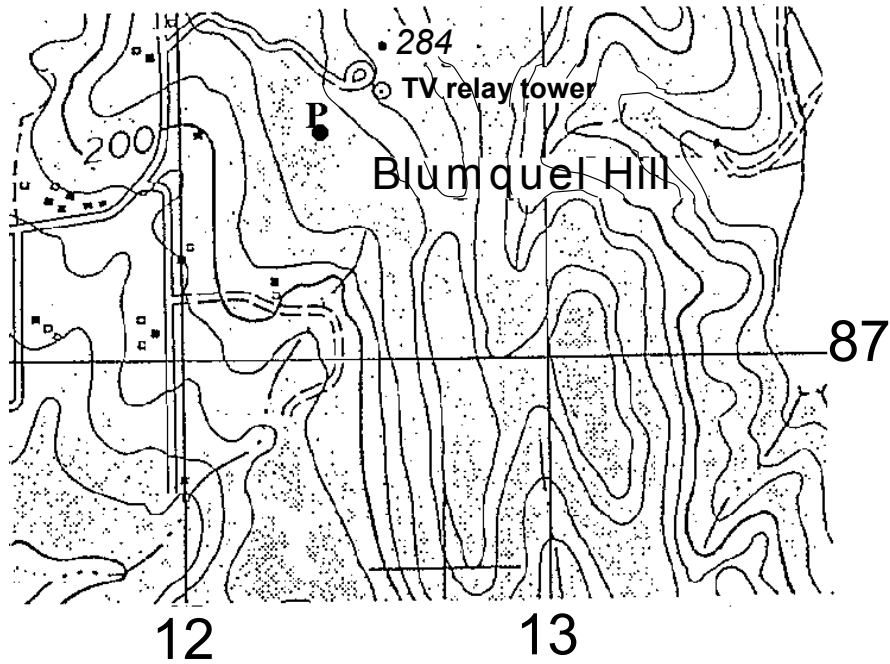
**Index:** A thick printed line indexed to show the elevation above and below mean sea level. Every fifth line will normally be an index contour line.

**Intermediate:** A thin solid line falling between the index contour lines that do not have their elevation given. Normally there are four intermediate lines between index contour lines.

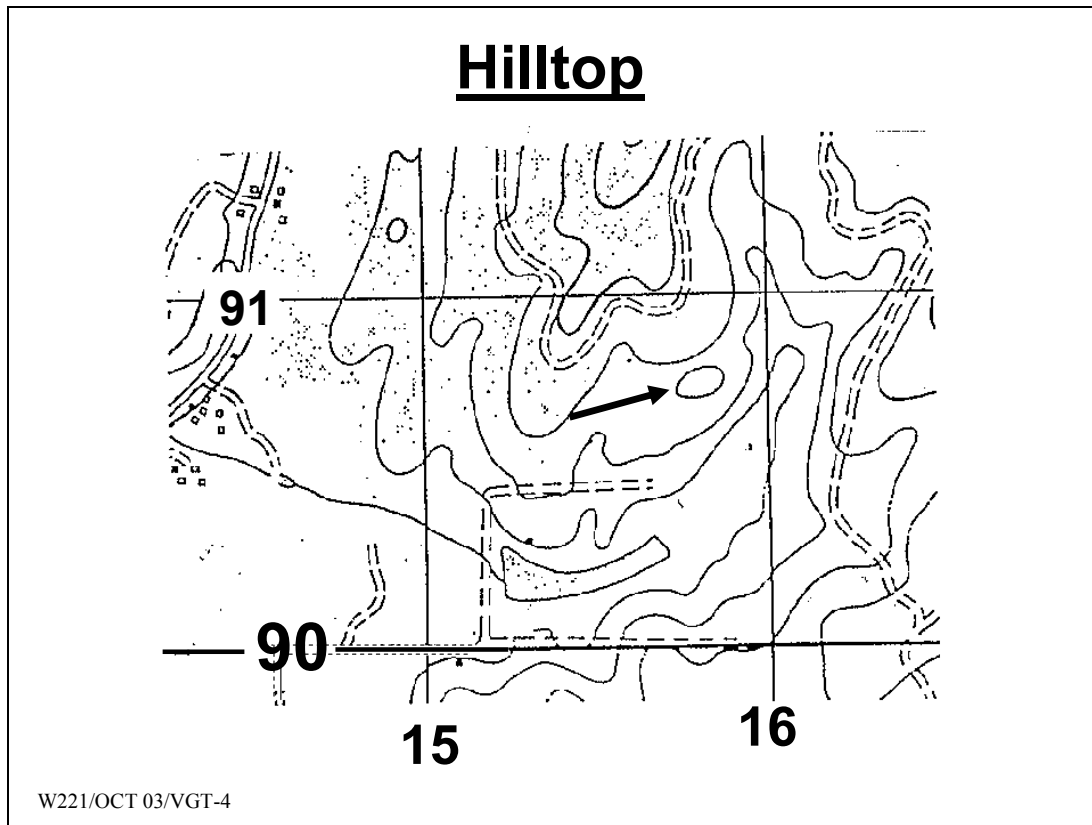
**Supplementary:** Thin broken lines (dashes) representing changes in elevation at least one-half the contour interval. Normally found where there is very little change in elevation.

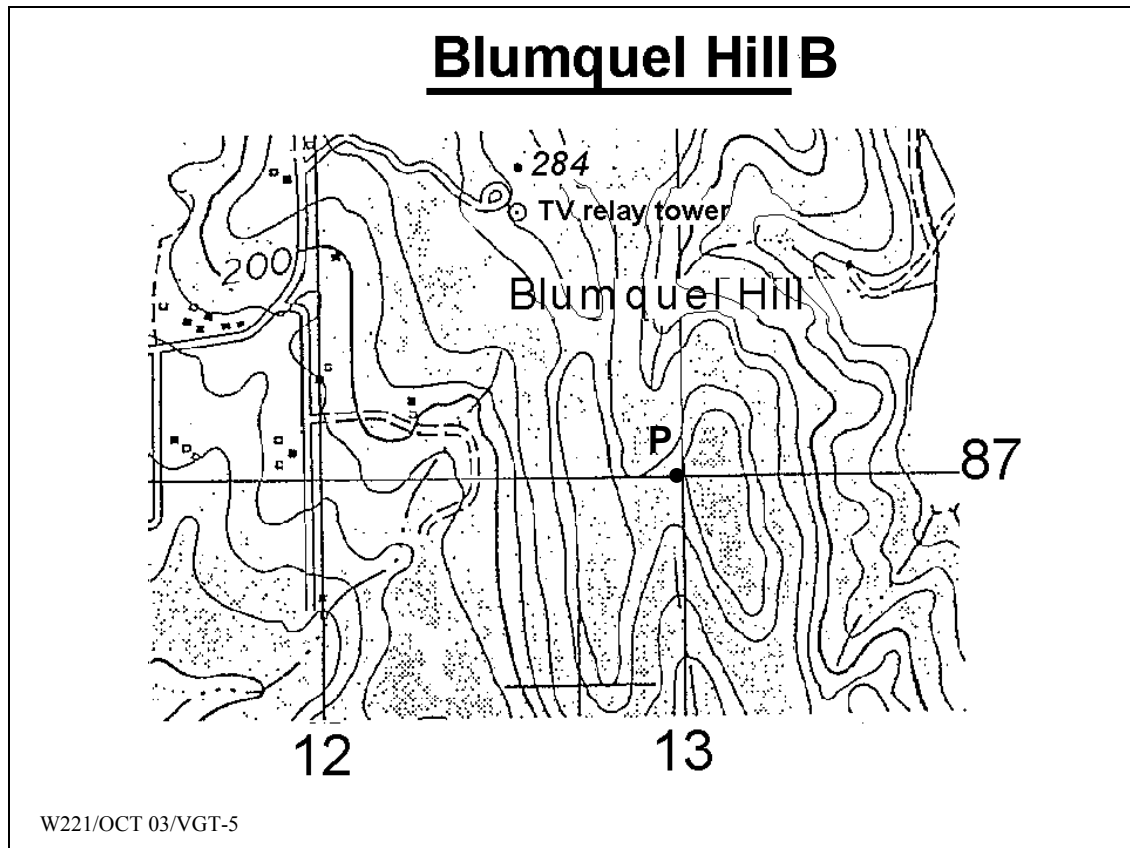
W221/OCT 03/VGT-2

## Blumquel Hill A

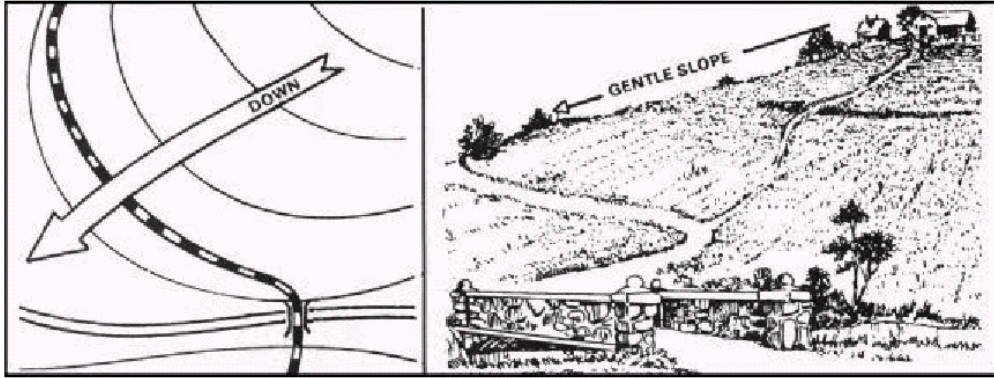


W221/OCT 03/VGT-3





## Gentle Slope



W221/OCT 03/VGT-6

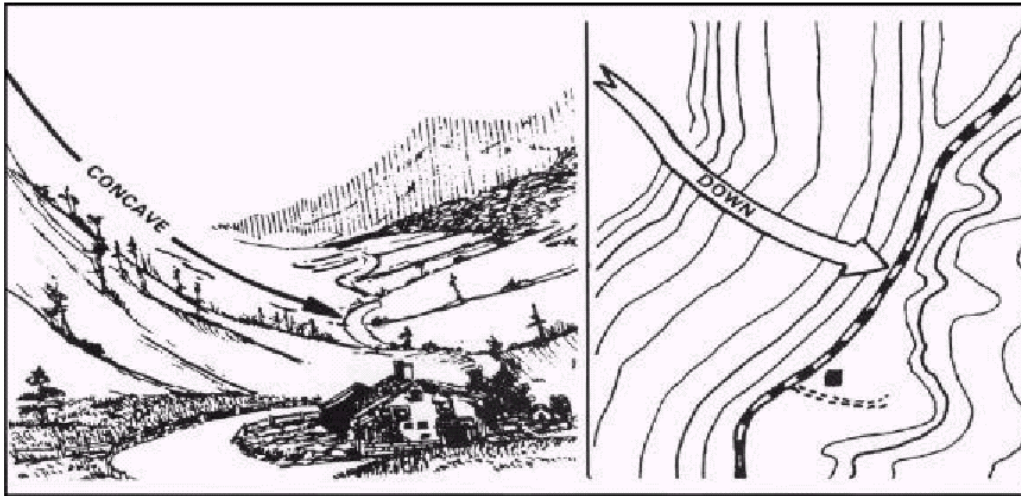


## Steep Slope



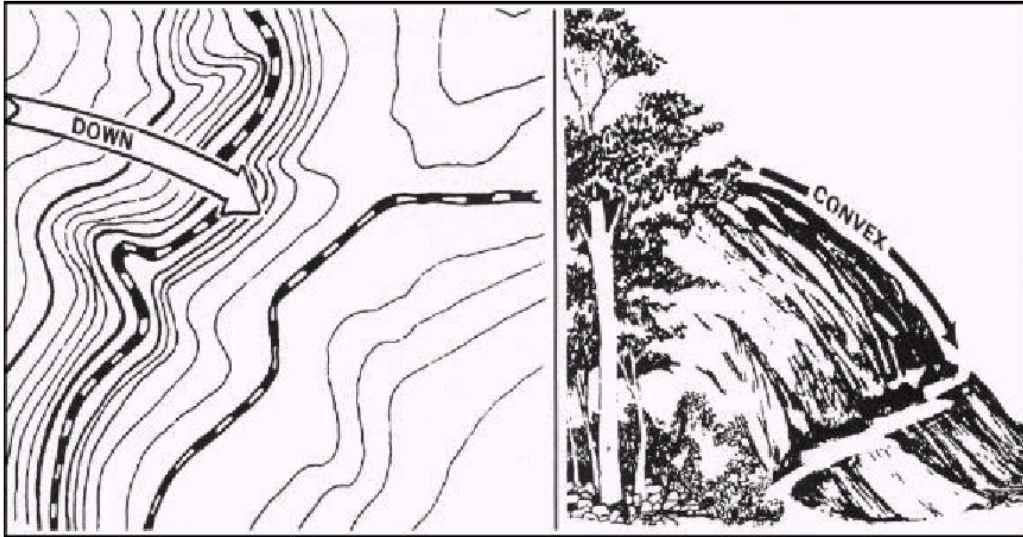
W221/OCT 03/VGT-7

## Concave Slope



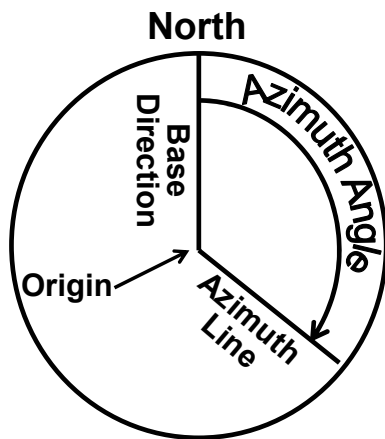
W221/OCT 03/VGT-8

## Convex Slope

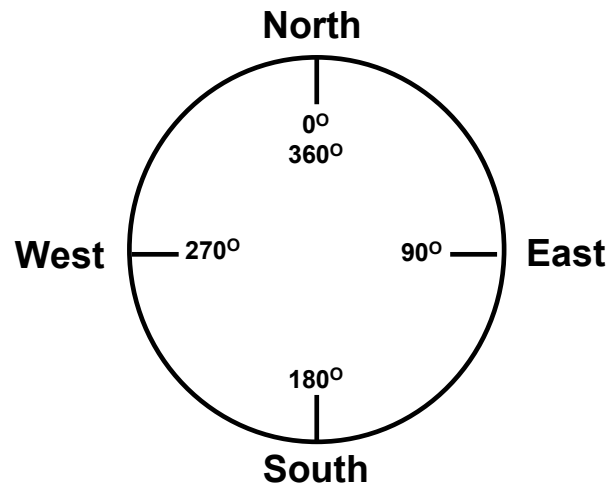


W221/OCT 03/VGT-9

## Azimuth Circle



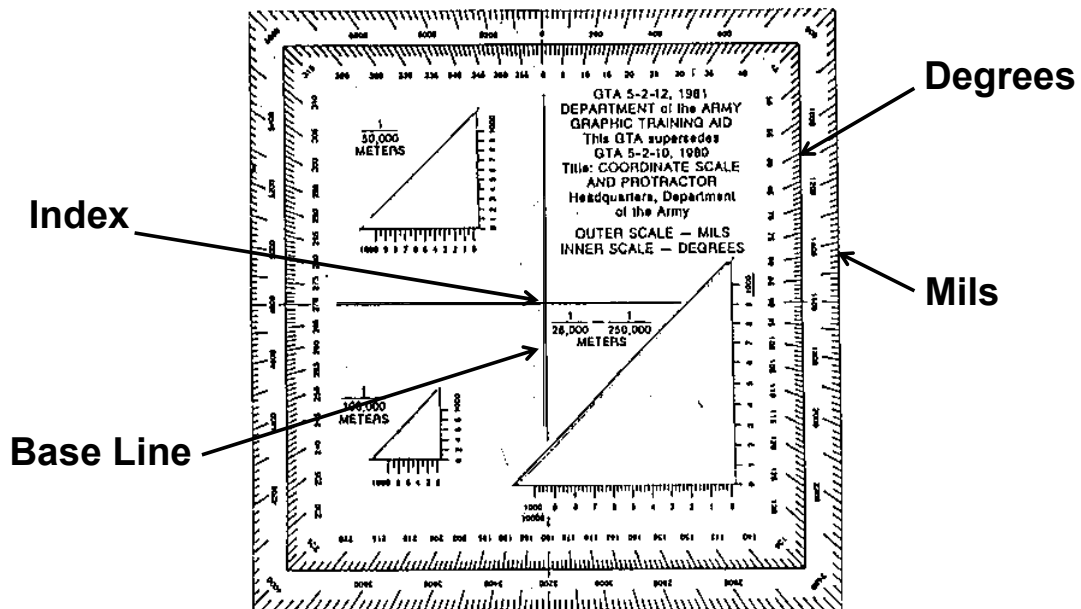
**Illustration A**



**Illustration B**

W221/OCT 03/VGT-10

## COORDINATE SCALE AND PROTRACTOR



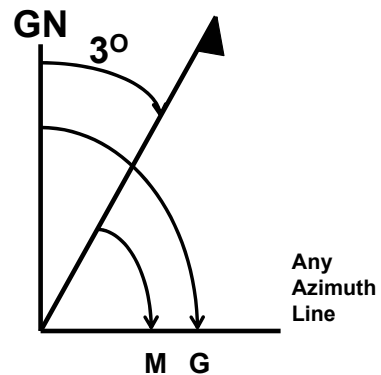
W221/OCT 03/VGT-11

## Easterly

### REQUIREMENT:

Convert these grid azimuths to magnetic azimuths and magnetic azimuths to Grid azimuths.

1. Grid AZ  $146^{\circ}$
2. Grid AZ  $83^{\circ}$
3. Mag AZ  $271^{\circ}$



### SOLUTIONS:

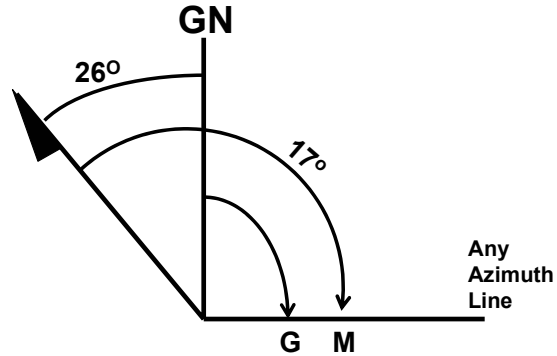
1. Mag AZ  $143^{\circ}$
2. Mag AZ  $80^{\circ}$
3. Grid AZ  $274^{\circ}$

## Magnetic Azimuth Smaller than G-M Angle

### REQUIREMENT:

Determine the Grid Azimuth of this Magnetic Azimuth.

Mag AZ  $17^{\circ}$



**SOLUTION:**

|           |                 |
|-----------|-----------------|
| Mag AZ    | $17^{\circ}$    |
|           | $+ 360^{\circ}$ |
|           | <hr/>           |
| Total     | $377^{\circ}$   |
| G-M Angle | $- 26^{\circ}$  |
|           | <hr/>           |
| Grid AZ   | $351^{\circ}$   |

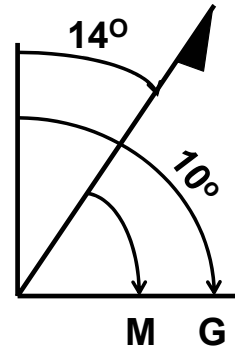
W221/OCT 03/VGT-13

## Grid Azimuth Smaller than G-M Angle

### REQUIREMENT:

Determine the magnetic azimuth of this grid azimuth:

Grid AZ  $10^{\circ}$



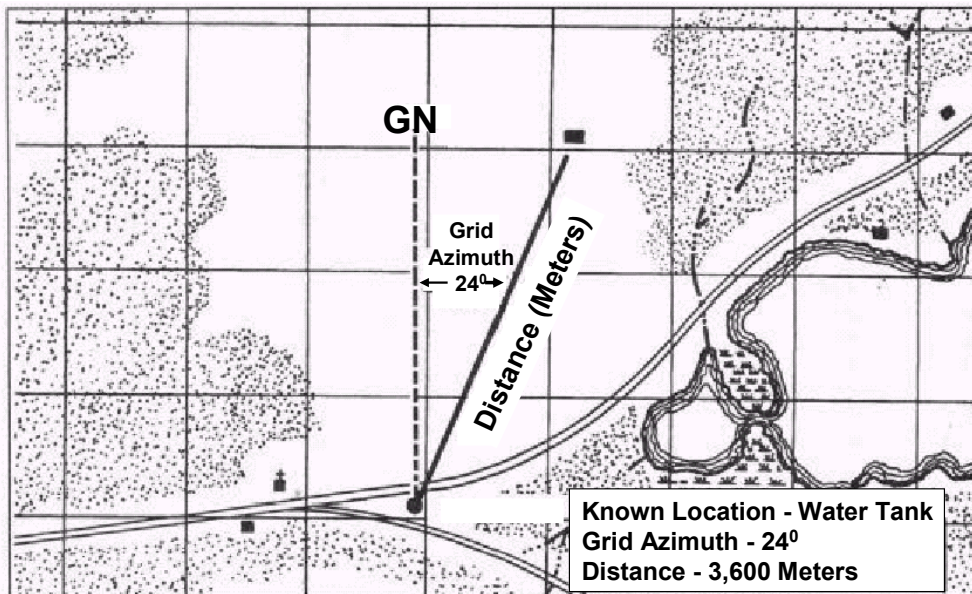
SOLUTION:

|                 |                 |
|-----------------|-----------------|
| Grid AZ         | $10^{\circ}$    |
|                 | $+ 360^{\circ}$ |
| Total           | $370^{\circ}$   |
| Minus G-M Angle | $14^{\circ}$    |
| Magnetic AZ     | $356^{\circ}$   |

W221/OCT 03/VGT-14



## Polar Coordinate



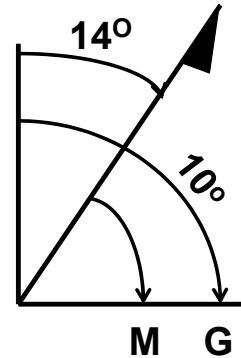
W221/OCT 03/VGT-15

## Grid Azimuth Smaller than G-M Angle

### REQUIREMENT:

Determine the magnetic azimuth of this grid azimuth:

Grid AZ  $10^{\circ}$



SOLUTION:

|                 |                 |
|-----------------|-----------------|
| Grid AZ         | $10^{\circ}$    |
|                 | $+ 360^{\circ}$ |
| Total           | $370^{\circ}$   |
| Minus G-M Angle | $14^{\circ}$    |
| Magnetic AZ     | $356^{\circ}$   |

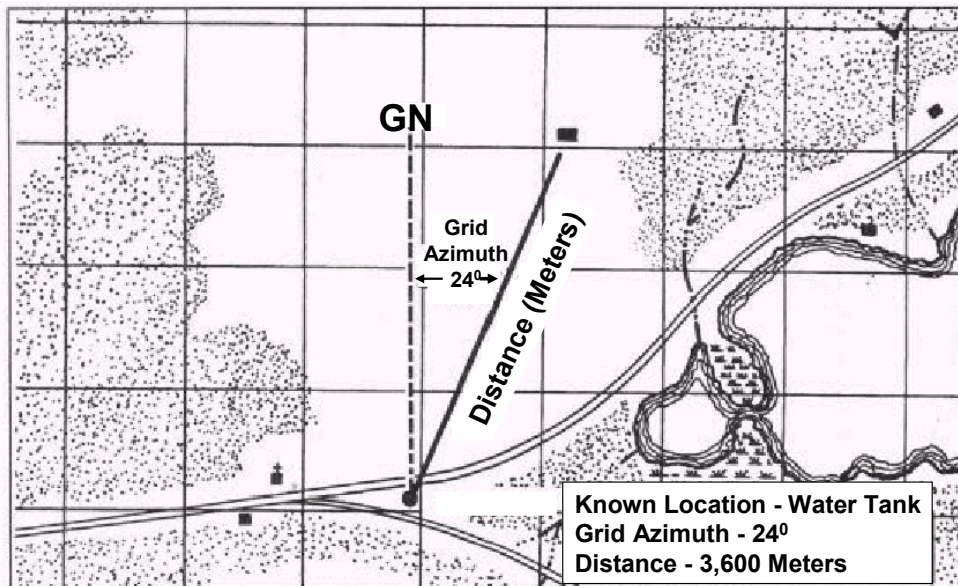
W221/OCT 03/VGT-16

Enabling Learning Objective F

Learning Step 1

VGT-17, POLAR COORDINATES

## Polar Coordinate



W221/OCT 03/VGT-17

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**Appendix B Test(s) and Test Solution(s) (N/A)**

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## Appendix C Practical Exercises and Solutions

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This appendix contains the items listed in this table:

| Item/Title  | Pages           |
|---|-----------------|
| PE-1, Map Reading/Land Navigation Reinforcement Training  | C-1 through C-3 |
| SPE-1, Map Reading/Land Navigation Reinforcement Training | C-4             |

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### PRACTICAL EXERCISE SHEET PE-1 (RTP)

|                                     |   |                |                           |                    |   |                   |  |
|-------------------------------------|---|----------------|---------------------------|--------------------|---|-------------------|--|
| <b>Title</b>                        | Map Reading/Land Navigation Reinforcement Training  |                |                           |                    |   |                   |  |
| <b>Lesson Number/Title</b>          | W221 version 1 / Map Reading  |                |                           |                    |   |                   |  |
| <b>Introduction</b>                 | <p>This practical exercise is for PLDC students to use from inprocessing to the day the NCOA teaches W221 (Map Reading), to help prepare them for the map reading and land navigation training they will receive. This PE reinforces training students received during basic training or in their units.</p> <p><b>NOTE:</b> The RTP is in Appendix D as SH-4.</p>  |                |                           |                    |   |                   |  |
| <b>Motivator</b>                    | <p>In order for you to successfully complete the graduation requirements of PLDC, you must be able to perform the skill level one tasks listed below. You will use these tasks in conjunction with the map reading and land navigation skills you will learn in this course. You will use these skills during the land navigation performance examination and when you lead a mission during the situational training exercise (STX), while filling a leadership position.</p>  |                |                           |                    |   |                   |  |
| <b>Terminal Learning Objective</b>  | <p><b>NOTE:</b> The instructor should inform the students of the following Terminal Learning Objective covered by this practical exercise.</p> <p>At the completion of this lesson, you [the student] will:</p> <table border="1"> <tr> <td><b>Action:</b></td><td>Apply map reading skills.</td></tr> <tr> <td><b>Conditions:</b></td><td>In a classroom and field environment given a 1:50,000 Tenino map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, and paper, SH-2, SH-3, and SH-4.</td></tr> <tr> <td><b>Standards:</b></td><td> <p>Applied map reading skills to--</p> <ul style="list-style-type: none"> <li>• Determine elevation on a map.</li> <li>• Orient a map using a lensatic compass.</li> <li>• Determine direction on a map using a protractor.</li> <li>• Determine polar coordinates.</li> <li>• Convert azimuths using the declination diagram.</li> <li>• Find unknown locations on a map using intersection and resection.</li> </ul> <p>IAW STP 21-1-SMCT, FM 3-25.26 (SH-2), and FM 21-31 (SH-3).</p> </td></tr> </table> | <b>Action:</b> | Apply map reading skills. | <b>Conditions:</b> | In a classroom and field environment given a 1:50,000 Tenino map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, and paper, SH-2, SH-3, and SH-4. | <b>Standards:</b> | <p>Applied map reading skills to--</p> <ul style="list-style-type: none"> <li>• Determine elevation on a map.</li> <li>• Orient a map using a lensatic compass.</li> <li>• Determine direction on a map using a protractor.</li> <li>• Determine polar coordinates.</li> <li>• Convert azimuths using the declination diagram.</li> <li>• Find unknown locations on a map using intersection and resection.</li> </ul> <p>IAW STP 21-1-SMCT, FM 3-25.26 (SH-2), and FM 21-31 (SH-3).</p> |
| <b>Action:</b>                      | Apply map reading skills.   |                |                           |                    |   |                   |  |
| <b>Conditions:</b>                  | In a classroom and field environment given a 1:50,000 Tenino map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12 (Coordinate Scale and Protractor), pencil, and paper, SH-2, SH-3, and SH-4.   |                |                           |                    |   |                   |  |
| <b>Standards:</b>                   | <p>Applied map reading skills to--</p> <ul style="list-style-type: none"> <li>• Determine elevation on a map.</li> <li>• Orient a map using a lensatic compass.</li> <li>• Determine direction on a map using a protractor.</li> <li>• Determine polar coordinates.</li> <li>• Convert azimuths using the declination diagram.</li> <li>• Find unknown locations on a map using intersection and resection.</li> </ul> <p>IAW STP 21-1-SMCT, FM 3-25.26 (SH-2), and FM 21-31 (SH-3).</p>  |                |                           |                    |   |                   |  |
| <b>Safety Requirements</b>          | IAW NCOAs SOP.  |                |                           |                    |   |                   |  |
| <b>Risk Assessment Level</b>        | Low   |                |                           |                    |   |                   |  |
| <b>Environmental Considerations</b> | None  |                |                           |                    |   |                   |  |
| <b>Evaluation</b>                   | Not graded. The SGL will use the information gained from this exercise to enhance your map reading capabilities and skills.   |                |                           |                    |   |                   |  |

**Instructional  
Lead-In**

- Students will study on their own and take the quizzes in the attached Refresher Training Package (RTP) as out of class homework covering the following tasks found in appendix C of STP 21-1-SMCT, Aug 03:
  - Task 2 Identify topographic symbols on a military map.
  - Task 4 Determine the grid coordinates of a point on a military map.
  - Task 3 Identify terrain features on a map
  - Task 5 Determine a magnetic azimuth using a lensatic compass.
  - Task 8 Measure distance on a map.
  - Task 14 Determine direction without a compass.
  - Task 11 Orient a map to the ground by map terrain association.
  - Task 7 Determine a location on the ground by terrain association.
- Students will use the first 4.5 hours of the map reading lesson to review their work on the RTP and conduct any remedial training.

**Resource  
Requirements****Instructor Materials:**

- TSP
- VGTs (17)

NCOAs will provide the students the following during inprocessing:

- Map Reading/Land Navigation Reinforcement Training Package, SH 4.
- FM 3-25.26, Map Reading and Land Navigation, **or** SH-2, Appendix D.
- STP 21-1-SMCT, Soldier's Manual of Common Tasks, Skill Level One, Aug 03.
- GTA 5-2-12, Coordinate Scale and Protractor.
- 1:50,000 Tenino map.
- 1:50,000 map of the STX Training Area.
- Lensatic compass.
- NCOA developed Quiz Sheets Two, Five, and Six. (See NCOA Responsibilities on p RTP-i, para 2)

**Student Materials:**

- SH-1, Advance Sheet in Appendix D.
- Reinforcement Training Package in Appendix D.
- FM 3-25.26 Map Reading and Land Navigation, Jun 01 or SH 2 in appendix D.
- STP 21-1-SMCT, Skill Level 1, Appendix C, Aug 03.
- STP 21-24-SMCT, Skill Level 2-4, Aug 03.
- Lensatic compass.
- GTA 5-2-12 Coordinate Scale/Protractor.
- 1:50,000 Tenino map.
- 1:50,000 scale map of local STX area.

**NOTE:** Issued to students during inprocessing.

- Pencil and writing paper.

**Special  
Instructions**

See NCOA responsibilities on the attached Map Reading/Land Navigation Reinforcement Training Package (SH-4), on p RTP-i, para 2.

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**Procedures**

**NOTE:** The RTP and the overview and instructions are found in SH-4. The placement of the RTP as a handout is because the file was too large to fit in the

PE (App C) area.

- See Attached reinforcement training package.
- Students will turn in their RTP quizzes to their SGL NLT 3 days prior to the start of Lesson W221 (Map Reading). SGLs will identify weaknesses and provide feedback to the students.
- The first 4 hours and 30 minutes of W221 is to allow the students to review their RTPs, and work on any weaknesses they may have.
- SGLs should know--by the results of the RTP quizzes--the strengths and weaknesses of each soldier and the group's over all knowledge of the Skill Level 1 Tasks. SGLs may modify the conduct of the PE by focusing on the specific weaknesses of each soldier and the group as a whole.
- NCOAs will use the entire four hours and 30 minutes for the students to study and conduct hands on training of the skill level one map reading/land navigation skills listed above.

---

**Feedback  
Requirements**

This is a nongraded PE. However--as stated above--students will perform all tasks in the reinforcement training package (RTP) and turn in their work to their SGL. SGLs will assist soldiers in identifying any weaknesses and provide any needed remedial training. SGLs will also place the students' RTPs in their individual folders.

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**SOLUTION FOR  
PRACTICAL EXERCISE PE-1 (RTP)**

You will find the solutions to the student quizzes in SH-4, pp RTPQAS-1 thru RTPQAS-6.

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**Appendix D, HANDOUTS FOR LESSON 1: W221 version 1**

---

This appendix contains the items listed in this table—

| <b>Title/Synopsis</b>                | <b>Pages</b>      |
|--------------------------------------|-------------------|
| SH-1, Advance Sheet                  | SH-1-1 to SH-1-3  |
| SH-2, FM 3-25.26 extract             | SH-2-1 to SH-2-88 |
| SH-3, FM 21-31 extract               | SH-3-1 to SH-3-3  |
| SH-4, Reinforcement Training Package | SH-4-1            |

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## **Student Handout 1**

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This student handout contains the Advance Sheet.

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## Student Handout 1

### Advance Sheet

**Lesson Hours** This lesson consists of 8.5 hours of small group instruction and a 4.5 hour practical exercise reinforcement training package (RTP) overview

**Overview** During this lesson you will receive reinforcement training for the skill level one and two map reading skills necessary to read a map. You should have received initial training on these tasks in basic training or in your unit. This lesson will also serve as a foundation for future lesson on land navigation. Successful completion of the Primary leadership Development Course (PLDC) depends on your ability to apply map reading skills.

**Learning Objective** Terminal Learning Objective (TLO).

|                    |  |
|--------------------|--|
| <b>Action:</b>     | Apply map reading skills.  |
| <b>Conditions:</b> | In a classroom and field environment given a 1:50,000 TENINO map, 1:50,000 map of local training area, lensatic compass, GTA 5-2-12, (Coordinate Scale and Protractor), pencil, paper, and SH-2 and SH-3.  |
| <b>Standards:</b>  | Applied map reading skills to-- <ul style="list-style-type: none"> <li>• Determine elevation on a map.</li> <li>• Orient a map using a lensatic compass.</li> <li>• Determine direction on a map using a protractor.</li> <li>• Determine polar coordinates.</li> <li>• Convert azimuths using the declination diagram.</li> <li>• Find unknown locations on a map using intersection and resection.</li> </ul> IAW STP 21-1-SMCT, FM 3-25.26, and FM 21-31. |

**ELO A:** Review reinforcement training package.

**ELO B:** Determine elevation on a map.

**ELO C:** Orient a map using a lensatic compass.

**ELO D:** Determine direction on a map.

**ELO E:** Convert azimuths using the declination diagram.

**ELO F:** Determine polar coordinates.

**ELO G:** Locate an unknown point on a map and on the ground by intersection.

**ELO H:** Locate an unknown point on a map and on the ground by resection.

### Assignment

The student assignments for this lesson are:

- Read SH-2, SH-3.
- Study and complete the Reinforced Training Package (RTP) provided to you at inprocessing and answer all quizzes. Turn in your quiz answer sheets to your SGL NLT three days prior to the start of Lesson W221, Map Reading.

---

**Additional  
Subject Area  
Resources**

None

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**Bring to Class**

You must bring the following materials to class:

- All reference material received for this lesson.
  - Pencil and writing paper.
- 

**Note to Students**

It is your responsibility to do the homework prior to class. We expect you to come to class prepared. You will participate in small group discussion. We expect you to participate in the discussion by providing information you learned from your study, and also your personal and observed experiences. Failure to study and read the assignments above will result in your inability to participate with the rest of the group. Not having your input affects the group's ability to fully discuss the information.

---

## Student Handout 2

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This student handout contains 87 pages of extracted material from FM 3-25.26:

| Page                 | (Reading/Study) Requirement             |
|----------------------|---|
| SH-2-2 thru SH-2-7   | Chapter 3, pages 3-1 thru 3-6, read     |
| SH-2-8 thru SH-2-21  | Chapter 4, pages 4-12 thru 4-25, read   |
| SH-2-22 thru SH-2-31 | Chapter 5, pages 5-1 thru 5-10, read    |
| SH-2-32 thru SH-2-50 | Chapter 6, page 6-1 thru 6-19, read     |
| SH-2-51 thru SH-2-63 | Chapter 9, pages 9-1 thru 9-13, read    |
| SH-2-64 thru SH-2-74 | Chapter 10, pages 10-1 thru 10-11, read |
| SH-2-75 thru SH-2-88 | Chapter 11, pages 11-1 thru 11-14, read |

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Disclaimer: The training developer downloaded this extract from the General Dennis J. Reimer training and Doctrine Library. The text may contain passive voice, misspelled words, grammatical errors, etc., and may not be in compliance with the Army Writing Style Program.

### RECOVERABLE PUBLICATIONS

YOU RECEIVED THIS DOCUMENT IN A DAMAGE-FREE CONDITION. DAMAGE IN ANY WAY, TO INCLUDE HIGHLIGHTING, PENCIL MARKS, OR MISSING PAGES, WILL SUBJECT YOU TO PECUNIARY LIABILITY (STATEMENT OF CHARGES, CASH COLLECTION ETC.) TO RECOVER PRINTING COSTS.

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## CHAPTER 3

# MARGINAL INFORMATION AND SYMBOLS

*A map could be compared to any piece of equipment, in that before it is placed into operation the user must read the instructions. It is important that you, as a soldier, know how to read these instructions. The most logical place to begin is the marginal information and symbols, where useful information telling about the map is located and explained. All maps are not the same, so it becomes necessary every time a different map is used to examine the marginal information carefully.*

### 3-1. MARGINAL INFORMATION ON A MILITARY MAP

Figure 3-1 shows a reduced version of a large-scale topographic map. The circled numbers indicate the items of marginal information that the map user needs to know. These circled numbers correspond to the following listed items.

a. **Sheet Name (1).** The sheet name is found in bold print at the center of the top and in the lower left area of the map margin. A map is generally named for the settlement contained within the area covered by the sheet, or for the largest natural feature located within the area at the time the map was drawn.

b. **Sheet Number (2).** The sheet number is found in bold print in both the upper right and lower left areas of the margin, and in the center box of the adjoining sheets diagram, which is found in the lower right margin. It is used as a reference number to link specific maps to overlays, operations orders, and plans. For maps at 1:100,000 scale and larger, sheet numbers are based on an arbitrary system that makes possible the ready orientation of maps at scales of 1:100,000, 1:50,000, and 1:25,000.

c. **Series Name (3).** The map series name is found in the same bold print as the sheet number in the upper left corner of the margin. The name given to the series is generally that of a major political subdivision, such as a state within the United States or a European nation. A map series usually includes a group of similar maps at the same scale and on the same sheet lines or format designed to cover a particular geographic area. It may also be a group of maps that serve a common purpose, such as the military city maps.

d. **Scale (4).** The scale is found both in the upper left margin after the series name, and in the center of the lower margin. The scale note is a representative fraction that gives the ratio of a map distance to the corresponding distance on the earth's surface. For example, the scale note 1:50,000 indicates that one unit of measure on the map equals 50,000 units of the same measure on the ground.

e. **Series Number (5).** The series number is found in both the upper right margin and the lower left margin. It is a sequence reference expressed either as a four-digit numeral (1125) or as a letter, followed by a three- or four-digit numeral (M661; T7110).

f. **Edition Number (6).** The edition number is found in bold print in the upper right area of the top margin and the lower left area of the bottom margin. Editions are numbered consecutively; therefore, if you have more than one edition, the highest numbered sheet is the most recent. Most military maps are now published by the DMA, but older editions of maps may have been produced by the US Army Map Service. Still others may have been drawn, at

least in part, by the US Army Corps of Engineers, the US Geological Survey, or other agencies affiliated or not with the United States or allied governments. The credit line, telling who produced the map, is just above the legend. The map information date is found immediately below the word "LEGEND" in the lower left margin of the map. This date is important when determining how accurately the map data might be expected to match what you will encounter on the ground.

g. **Index to Boundaries (7).** The index to boundaries diagram appears in the lower or right margin of all sheets. This diagram, which is a miniature of the map, shows the boundaries that occur within the map area, such as county lines and state boundaries.

h. **Adjoining Sheets Diagram (8).** Maps at all standard scales contain a diagram that illustrates the adjoining sheets. On maps at 1:100,000 and larger scales and at 1:1,000,000 scale, the diagram is called the index to adjoining sheets. It consists of as many rectangles representing adjoining sheets as are necessary to surround the rectangle that represents the sheet under consideration. The diagram usually contains nine rectangles, but the number may vary depending on the locations of the adjoining sheets. All represented sheets are identified by their sheet numbers. Sheets of an adjoining series, whether published or planned, that are at the same scale are represented by dashed lines. The series number of the adjoining series is indicated along the appropriate side of the division line between the series.

i. **Elevation Guide (9).** This is normally found in the lower right margin. It is a miniature characterization of the terrain shown. The terrain is represented by bands of elevation, spot elevations, and major drainage features. The elevation guide provides the map reader with a means of rapid recognition of major landforms.

j. **Declination Diagram (10).** This is located in the lower margin of large-scale maps and indicates the angular relationships of true north, grid north, and magnetic north. On maps at 1:250,000 scale, this information is expressed as a note in the lower margin. In recent edition maps, there is a note indicating the conversion of azimuths from grid to magnetic and from magnetic to grid next to the declination diagram.

k. **Bar Scales (11).** These are located in the center of the lower margin. They are rulers used to convert map distance to ground distance. Maps have three or more bar scales, each in a different unit of measure. Care should be exercised when using the scales, especially in the selection of the unit of measure that is needed.

l. **Contour Interval Note (12).** This note is found in the center of the lower margin normally below the bar scales. It states the vertical distance between adjacent contour lines of the map. When supplementary contours are used, the interval is indicated. In recent edition maps, the contour interval is given in meters instead of feet.

m. **Spheroid Note (13).** This note is located in the center of the lower margin. Spheroids (ellipsoids) have specific parameters that define the X Y Z axis of the earth. The spheroid is an integral part of the datum.

n. **Grid Note (14).** This note is located in the center of the lower margin. It gives information pertaining to the grid system used and the interval between grid lines, and it identifies the UTM grid zone number.

o. **Projection Note (15).** The projection system is the framework of the map. For military maps, this framework is of the conformal type; that is, small areas of the surface of the earth retain their true shapes on the projection; measured angles closely approximate true values; and



the scale factor is the same in all directions from a point. The projection note is located in the center of the lower margin. Refer to DMA for the development characteristics of the conformal-type projection systems.

(1) Between 80° south and 84° north, maps at scales larger than 1:500,000 are based on the transverse Mercator projection. The note reads TRANSVERSE MERCATOR PROJECTION.

(2) Between 80° south and 84° north, maps at 1:1,000,000 scale and smaller are based on standard parallels of the Lambert conformal conic projection. The note reads, for example, LAMBERT CONFORMAL CONIC PROJECTIONS 36° 40' N AND 39° 20' N.

(3) Maps of the polar regions (south of 80° south and north of 84° north) at 1:1,000,000 and larger scales are based on the polar stereographic projection. The note reads POLAR STEREOGRAPHIC PROJECTION.

p. **Vertical Datum Note (16).** This note is located in the center of the lower margin. The vertical datum or vertical-control datum is defined as any level surface (for example, mean sea level) taken as a surface of reference from which to determine elevations. In the United States, Canada, and Europe, the vertical datum refers to the mean sea level surface. However, in parts of Asia and Africa, the vertical-control datum may vary locally and is based on an assumed elevation that has no connection to any sea level surface. Map readers should habitually check the vertical datum note on maps, particularly if the map is used for low-level aircraft navigation, naval gunfire support, or missile target acquisition.

q. **Horizontal Datum Note (17).** This note is located in the center of the lower margin. The horizontal datum or horizontal-control datum is defined as a geodetic reference point (of which five quantities are known: latitude, longitude, azimuth of a line from this point, and two constants, which are the parameters of reference ellipsoid). These are the basis for horizontal-control surveys. The horizontal-control datum may extend over a continent or be limited to a small local area. Maps and charts produced by DMA are produced on 32 different horizontal-control data. Map readers should habitually check the horizontal datum note on every map or chart, especially adjacent map sheets. This is to ensure the products are based on the same horizontal datum. If products are based on different horizontal-control data, coordinate transformations to a common datum must be performed. UTM coordinates from the same point computed on different data may differ as much as 900 meters.

r. **Control Note (18).** This note is located in the center of the lower margin. It indicates the special agencies involved in the control of the technical aspects of all the information that is disseminated on the map.

s. **Preparation Note (19).** This note is located in the center of the lower margin. It indicates the agency responsible for preparing the map.

t. **Printing Note (20).** This note is also located in the center of the lower margin. It indicates the agency responsible for printing the map and the date the map was printed. The printing data should not be used to determine when the map information was obtained.

u. **Grid Reference Box (21).** This box is normally located in the center of the lower margin. It contains instructions for composing a grid reference.

v. **Unit imprint and Symbol (22).** The unit imprint and symbol is on the left side of the lower margin. It identifies the agency that prepared and printed the map with its respective symbol. This information is important to the map user in evaluating the reliability of the map.

w. **Legend (23).** The legend is located in the lower left margin. It illustrates and identifies the topographic symbols used to depict some of the more prominent features on the map. The symbols are not always the same on every map. Always refer to the legend to avoid errors when reading a map.

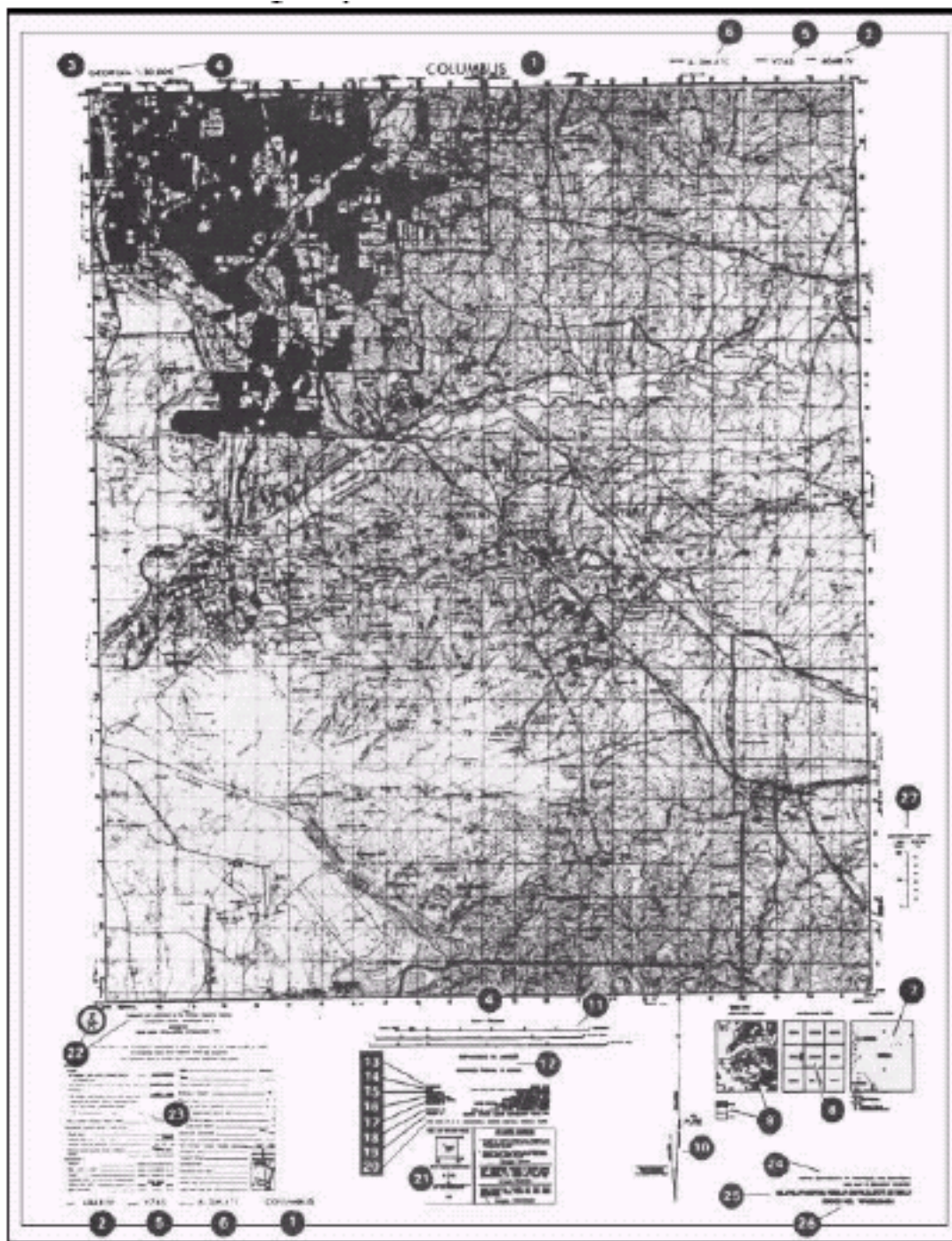


Figure 3-1. Topographical Map

### 3-2. ADDITIONAL NOTES

Not all maps contain the same items of marginal information. Under certain conditions, special notes and scales may be added to aid the map user. The following are examples:

a. **Glossary.** This is an explanation of technical terms or a translation of terms on maps of foreign areas where the native language is other than English.

b. **Classification.** Certain maps require a note indicating the security classification. This is shown in the upper and lower margins.

c. **Protractor Scale.** This scale may appear in the upper margin on some maps. It is used to lay out the magnetic-grid declination for the map, which, in turn, is used to orient the map sheet with the aid of the lensatic compass.

d. **Coverage Diagram.** On maps at scales of 1:100,000 and larger, a coverage diagram may be used. It is normally in the lower or right margin and indicates the methods by which the map was made, dates of photography, and reliability of the sources. On maps at 1:250,000 scale, the coverage diagram is replaced by a reliability diagram.

e. **Special Notes (24).** A special note is any statement of general information that relates to the mapped area. It is normally found in the lower right margin. For example: This map is red-light readable.

f. **User's Note (25).** This note is normally located in the lower right-hand margin. It requests cooperation in correcting errors or omissions on the map. Errors should be marked and the map forwarded to the agency identified in the note.

g. **Stock Number Identification (26).** All maps published by the DMA that are in the Department of the Army map supply system contain stock number identifications that are used in requisitioning map supplies. The identification consists of the words "STOCK NO" followed by a unique designation that is composed of the series number, the sheet number of the individual map and, on recently printed sheets, the edition number. The designation is limited to 15 units (letters and numbers). The first 5 units are allotted to the series number; when the series number is less than 5 units, the letter "X" is substituted as the fifth unit. The sheet number is the next component; however, Roman numerals, which are part of the sheet number, are converted to Arabic numerals in the stock number. The last 2 units are the edition number; the first digit of the edition number is a zero if the number is less than 10. If the current edition number is unknown, the number 01 is used. The latest available edition will be furnished. Asterisks are placed between the sheet number and the edition number when necessary to ensure there are at least 11 units in the stock number.

h. **Conversion Graph (27).** Normally found in the right margin, this graph indicates the conversion of different units of measure used on the map.

### 3-3. TOPOGRAPHIC MAP SYMBOLS

The purpose of a map is to permit one to visualize an area of the earth's surface with pertinent features properly positioned. The map's legend contains the symbols most commonly used in a particular series or on that specific topographic map sheet. Therefore, the legend should be referred to each time a new map is used. Every effort is made to design standard symbols that resemble the features they represent. If this is not possible, symbols are selected that logically imply the features they portray. For example, an open-pit mining operation is represented by a small black drawing of a crossed hammer and pickax.

a. Ideally, all the features within an area would appear on a map in their true proportion, position, and shape. This, however, is not practical because many of the features would be unimportant and others would be unrecognizable because of their reduction in size.

b. The mapmaker has been forced to use symbols to represent the natural and man-made features of the earth's surface. These symbols resemble, as closely as possible, the actual features themselves as viewed from above. They are positioned in such a manner that the center of the symbol remains in its true location. An exception to this would be the position of a feature adjacent to a major road. If the width of the road has been exaggerated, then the feature is moved from its true position to preserve its relation to the road. FM 21-31 gives a description of topographic features and abbreviations authorized for use on our military maps.

### 3-4. MILITARY SYMBOLS

In addition to the topographic symbols used to represent the natural and man-made features of the earth, military personnel require some method for showing identity, size, location, or movement of soldiers; and military activities and installations. The symbols used to represent these military features are known as military symbols. These symbols are not normally printed on maps because the features and units that they represent are constantly moving or changing; military security is also a consideration. They do appear in special maps and overlays (Chapter 7) The map user draws them in, in accordance with proper security precautions. Refer to FM 101-5-1 for complete information on military symbols.

### 3-5. COLORS USED ON A MILITARY MAP

By the fifteenth century, most European maps were carefully colored. Profile drawings of mountains and hills were shown in brown, rivers and lakes in blue, vegetation in green, roads in yellow, and special information in red. A look at the legend of a modern map confirms that the use of colors has not changed much over the past several hundred years. To facilitate the identification of features on a map, the topographical and cultural information is usually printed in different colors. These colors may vary from map to map. On a standard large-scale topographic map, the colors used and the features each represent are:

- a. **Black.** Indicates cultural (man-made) features such as buildings and roads, surveyed spot elevations, and all labels.
- b. **Red-Brown.** The colors red and brown are combined to identify cultural features, all relief features, non-surveyed spot elevations, and elevation, such as contour lines on red-light readable maps.
- c. **Blue.** Identifies hydrography or water features such as lakes, swamps, rivers, and drainage.
- d. **Green.** Identifies vegetation with military significance, such as woods, orchards, and vineyards.
- e. **Brown.** Identifies all relief features and elevation, such as contours on older edition maps, and cultivated land on red-light readable maps.
- f. **Red.** Classifies cultural features, such as populated areas, main roads, and boundaries, on older maps.
- g. **Other.** Occasionally other colors may be used to show special information. These are indicated in the marginal information as a rule.

## CHAPTER 4

### GRIDS

*This chapter covers how to determine and report positions on the ground in terms of their location on a map. Knowing where you are (position fixing) and being able to communicate that knowledge is crucial to successful navigation as well as to the effective employment of direct and indirect fire, tactical air support, and medical evacuation. It is essential for valid target acquisition; accurate reporting of NBC contamination and various danger areas; and obtaining emergency resupply. Few factors contribute as much to the survivability of troops and equipment and to the successful accomplishment of a mission as always knowing where you are. The chapter includes explanation of geographical coordinates, Universal Transverse Mercator grids, the military grid reference system, and the use of grid coordinates.*

#### 4-4. UNITED STATES ARMY MILITARY GRID REFERENCE SYSTEM

This grid reference system is designated for use with the UTM and UPS grids. The coordinate value of points in these grids could contain as many as 15 digits if numerals alone were used. The US military grid reference system reduces the length of written coordinates by substituting single letters for several numbers. Using the UTM and the UPS grids, it is possible for the location of a point (identified by numbers alone) to be in many different places on the surface of the earth. With the use of the military grid reference system, there is no possibility of this happening.

a. **Grid Zone Designation.** The world is divided into 60 grid zones, which are large, regularly shaped geographic areas, each of which is given a unique identification called the grid zone designation.

(1) **UTM Grid.** The first major breakdown is the division of each zone into areas 6° wide by 80 high and 6° wide by 120 high. Remember, for the transverse Mercator projection, the earth's surface between 80°S and 84°N is divided into 60 N-S zones, each 6° wide. These zones are numbered from west to east, 1 through 60, starting at the 180° meridian. This surface is divided into 20 east-west rows in which 19 are 8° high and 1 row at the extreme north is 12° high. These rows are then lettered, from south to north, C through X (I and O were omitted). Any 6° by 8° zone or 6° by 12° zone is identified by giving the number and letter of the grid zone and row in which it lies. These are read "RIGHT" and "UP" so the number is always written before the letter. This combination of zone number and row letter constitutes the grid zone designation. Columbus lies in zone 16 and row S, or in grid zone designation 16S.

(2) **UPS Grid.** The remaining letters of the alphabet, A, B, Y, and Z, are used for the UPS grids. Each polar area is divided into two zones separated by the 0-180° meridian. In the south polar area, the letter A is the grid zone designation for the area west of the 0-180° meridian, and B for the area to the east. In the north polar area, Y is the grid zone designation for the western area and Z for the eastern area (Figure 4-10)

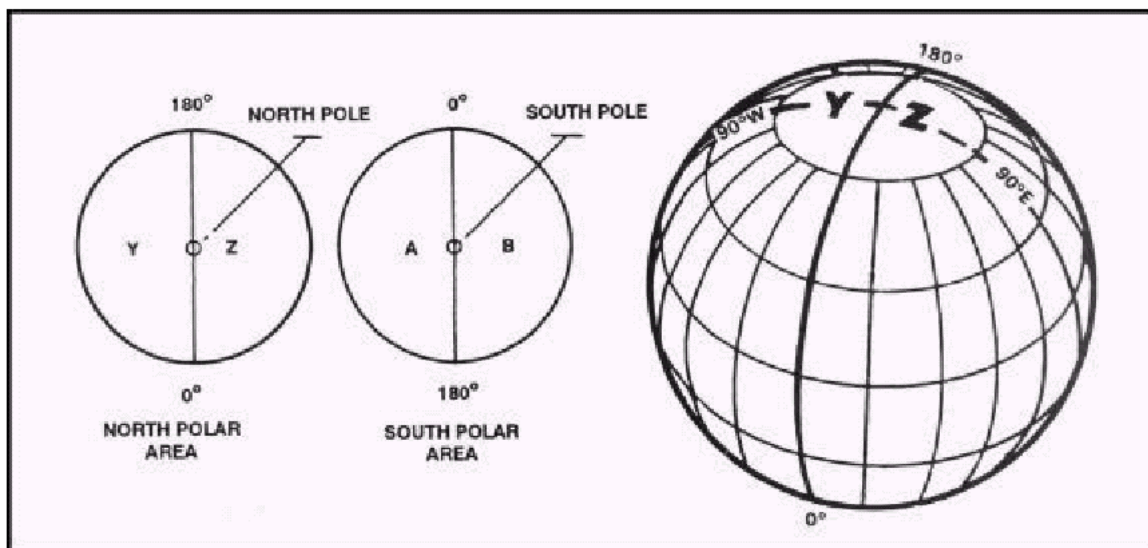


Figure 4-10. Grid zone designation for UPS grid.

b. **100,000-Meter Square.** Between 84°N and 80°S, each 6° by 8° or 6° by 12° zone is covered by 100,000-meter squares that are identified by the combination of two alphabetical letters. This identification is unique within the area covered by the grid zone designation. The first letter is the column designation; the second letter is the row designation (Figure 4-11, page 4-14). The north and south polar areas are also divided into 100,000-meter squares by columns and rows. A detailed discussion of the polar system can be found in Technical Report 8358.1. The 100,000-meter square identification letters are located in the grid reference box in the lower margin of the map.



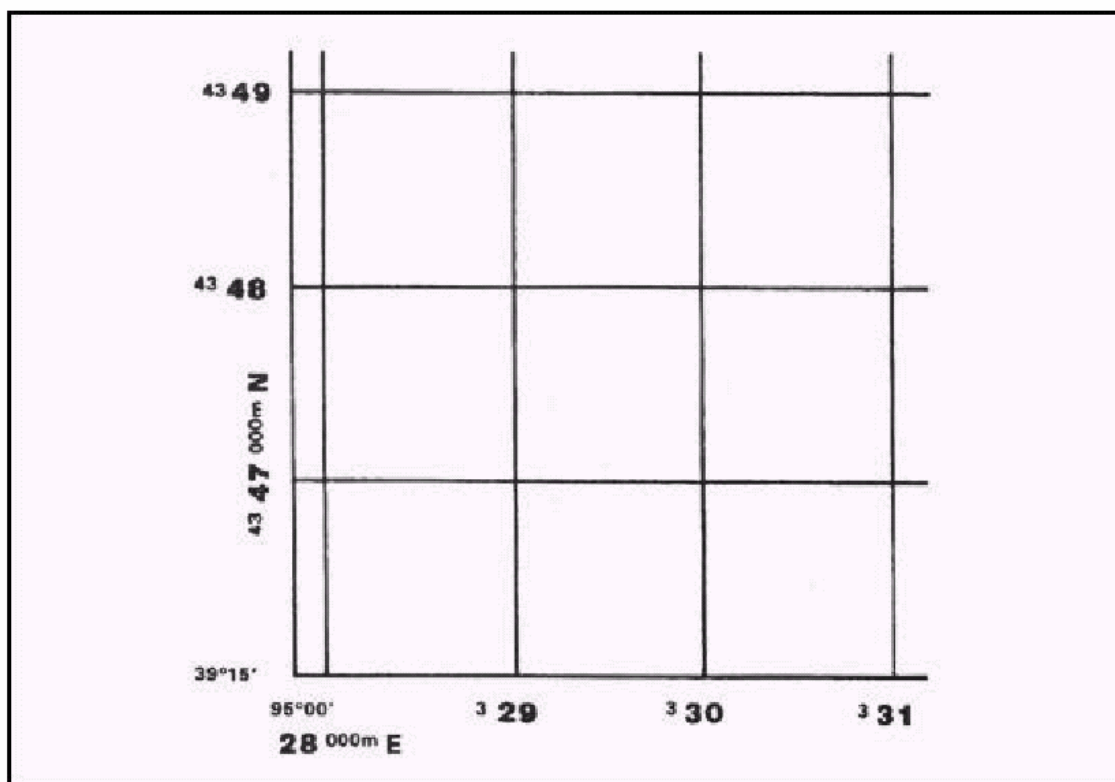
**PLATE 12**

| 96° |    | 580,000m |    |    |    |    | 90° |    | 500,000m |    |    |    |    | 84° |  |
|-----|----|----------|----|----|----|----|-----|----|----------|----|----|----|----|-----|--|
| QV  | TQ | UQ       | VQ | WQ | XQ | YQ | BV  | CV | DV       | EV | FV | GV | KQ |     |  |
| QU  | TP | UP       | VP | WP | XP | YP | BU  | CU | DU       | EU | FU | GU | KP |     |  |
| QT  | TN | UN       | VN | WN | XN | YN | BT  | CT | DT       | ET | FT | GT | KN |     |  |
| QS  | TM | UM       | VM | WM | XM | YM | BS  | CS | DS       | ES | FS | GS | KI |     |  |
| QR  | TL | UL       | VL | WL | XL | YL | BR  | CR | DR       | ER | FR | GR | K  |     |  |
| QQ  | TK | UK       | VK | WK | XK | YK | BQ  | CQ | DQ       | EQ | FQ | GQ | K  |     |  |
| QP  | TJ | UJ       | VJ | WJ | XJ | YJ | BP  | CP | DP       | EP | FP | GP | K  |     |  |
| QN  | TH | UH       | VH | WH | XH | YH | BN  | CN | DN       | EN | FN | GN | K  |     |  |
| QM  | TG | UG       | VG | WG | XG | YG | BM  | CM | DM       | EM | FM | GM | K  |     |  |
| QL  | TF | UF       | VF | WF | XF | YF | BL  | CL | DL       | EL | FL | GL | K  |     |  |

**Figure 4-11. Grid zone designation and 100,000-meter square identification.**

c. **Grid Coordinates.** We have now divided the earth's surface into 6° by 8° quadrangles, and covered these with 100,000-meter squares. The military grid reference of a point consists of the numbers and letters indicating in which of these areas the point lies, plus the coordinates locating the point to the desired position within the 100,000-meter square. The next step is to tie in the coordinates of the point with the larger areas. To do this, you must understand the following.

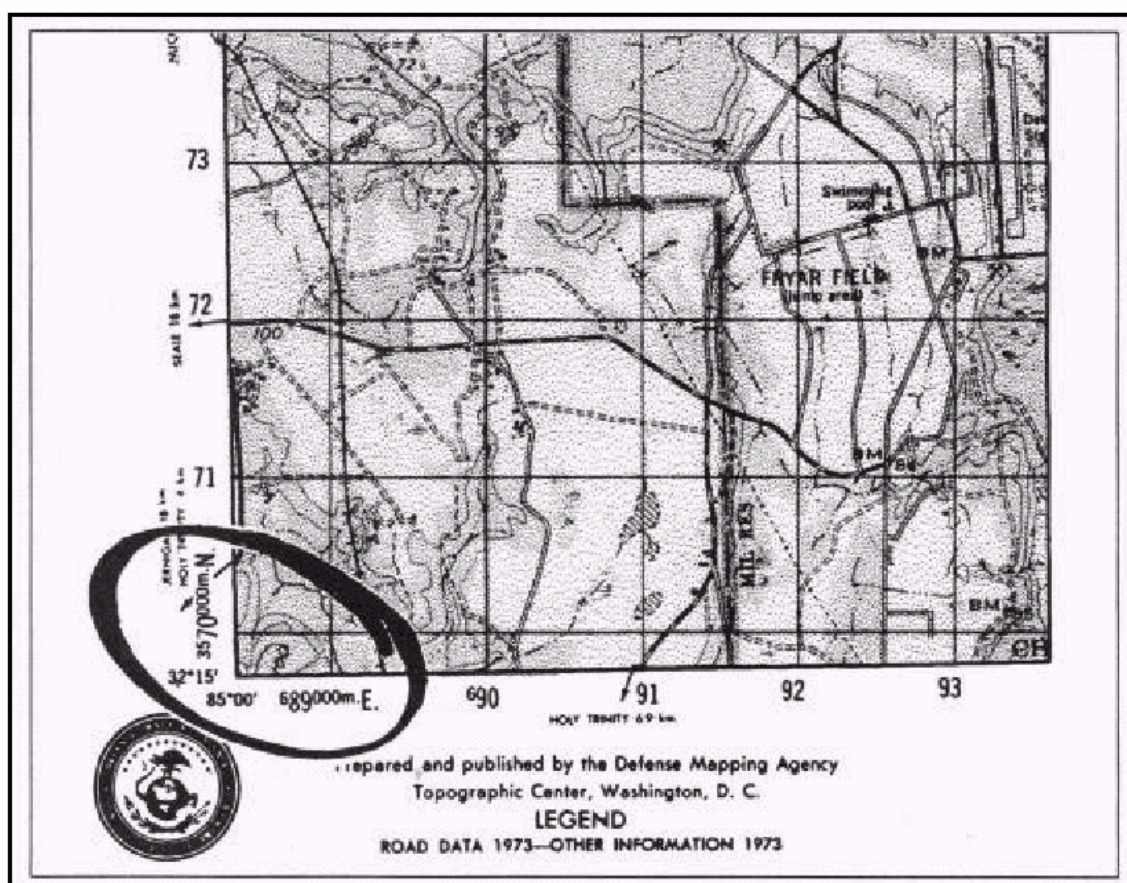
(1) **Grid Lines.** The regularly spaced lines that make the UTM and the UPS grid on any large-scale maps are divisions of the 100,000-meter square; the lines are spaced at 10,000- or 1,000-meter intervals (Figure 4-12). Each of these lines is labeled at both ends of the map with its false easting or false northing value, showing its relation to the origin of the zone. Two digits of the values are printed in large type, and these same two digits appear at intervals along the grid lines on the face of the map. These are called the principal digits, and represent the 10,000 and 1,000 digits of the grid value. They are of major importance to the map reader because they are the numbers he will use most often for referencing points. The smaller digits complete the UTM grid designation.



**Figure 4-12. Grid lines.**

**EXAMPLE:** The first grid line north of the south-west corner of the Columbus map is labeled 3570000m N. This means its false northing (distance north of the equator) is 3,570,000 meters. The principal digits, 70, identify the line for referencing points in the northerly direction. The smaller digits, 35, are part of the false coordinates and are rarely used. The last three digits, 000, of the value are omitted. Therefore, the first grid line east of the south-west corner is labeled 689000m E. The principal digits, 89, identify the line for referencing points in the easterly direction (Figure 4-13, page 4-16).

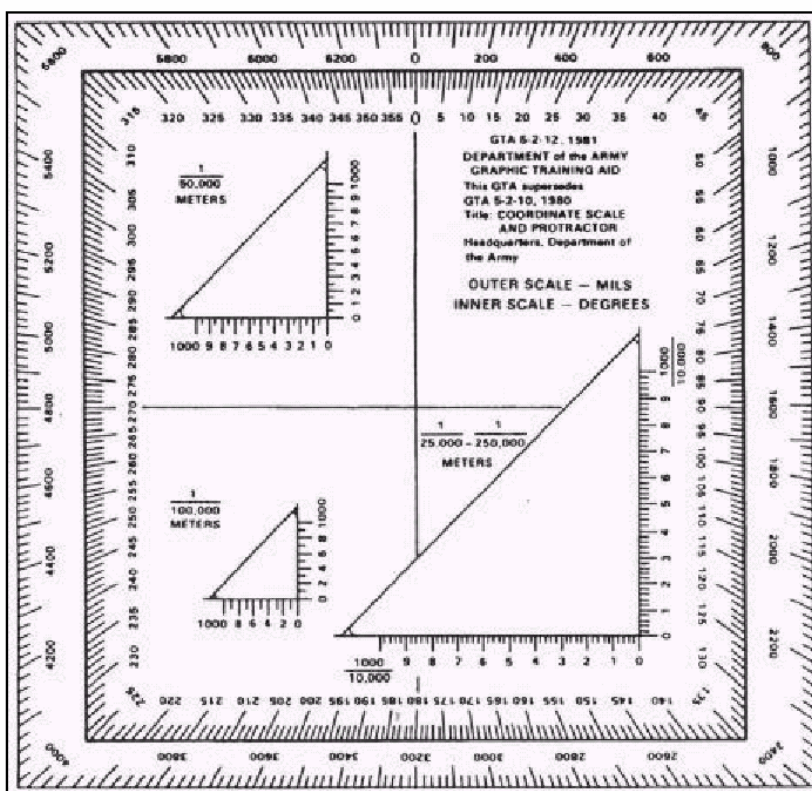




**Figure 4-13. Columbus map, southwest corner.**

(2) **Grid Squares.** The north-south and east-west grid lines intersect at 90°, forming grid squares. Normally, the size of one of these grid squares on large-scale maps is 1,000 meters (1 kilometer).

(3) **Grid Coordinate Scales.** The primary tool for plotting grid coordinates is the grid coordinate scale. The grid coordinate scale divides the grid square more accurately than can be done by estimation, and the results are more consistent. When used correctly, it presents less chance for making errors. GTA 5-2-12, 1981, contains four types of coordinate scales (Figure 4-14).



**Figure 4-14. Coordinate scales.**

(a) The 1:25,000/1:250,000 (lower right in figure) can be used in two different scale maps, 1:25,000 or 1:250,000. The 1:25,000 scale subdivides the 1,000-meter grid block into 10 major subdivisions, each equal to 100 meters. Each 100-meter block has five graduations, each equal to 20 meters. Points falling between the two graduations can be read accurately by the use of estimation. These values are the fourth and eighth digits of the coordinates. Likewise, the 1:250,000 scale is subdivided in 10 major subdivisions, each equal to 1,000 meters. Each 1,000-meter block has five graduations, each equal to 200 meters. Points falling between two graduations can be read approximately by the use of estimation.

(b) The 1:50,000 scale (upper left in Figure 4-14) subdivides the 1,000-meter block into 10 major subdivisions, each equal to 100 meters. Each 100-meter block is then divided in half. Points falling between the graduations must be estimated to the nearest 10 meters for the fourth and eighth digits of the coordinates.

(c) The 1:100,000 scale (lower left in Figure 4-14) subdivides the 1,000-meter grid block into five major subdivisions of 200 meters each. Each 200-meter block is then divided in half at 100-meter intervals.

#### 4-5. LOCATE A POINT USING GRID COORDINATES

Based on the military principle for reading maps (RIGHT and UP), locations on the map can be determined by grid coordinates. The number of digits represents the degree of precision to

to which a point has been located and measured on a map—the more digits the more precise the measurement.

a. **Without a Coordinate Scale.** Determine grids without a coordinate scale by referring to the north-south grid lines numbered at the bottom margin of any map. Then read RIGHT to the north-south grid line that precedes the desired point (this first set of two digits is the RIGHT reading). Then by referring to the east-west grid lines numbered at either side of the map, move UP to the east-west grid line that precedes the desired point (these two digits are the UP reading). Coordinate 1484 locate the 1,000-meter grid square in which point X is located; the next square to the right would be 1584; the next square up would be 1485, and so forth (Figure 4-15). Locate the point to the nearest 100 meters using estimation. Mentally divide the grid square in tenths, estimate the distance from the grid line to the point in the same order (RIGHT and UP). Give complete coordinate RIGHT, then complete coordinate UP. Point X is about two-tenths or 200 meters to the RIGHT into the grid square and about seven-tenths or 700 meters UP.

RESULTS: The coordinates to the nearest 100 meters are 142847.

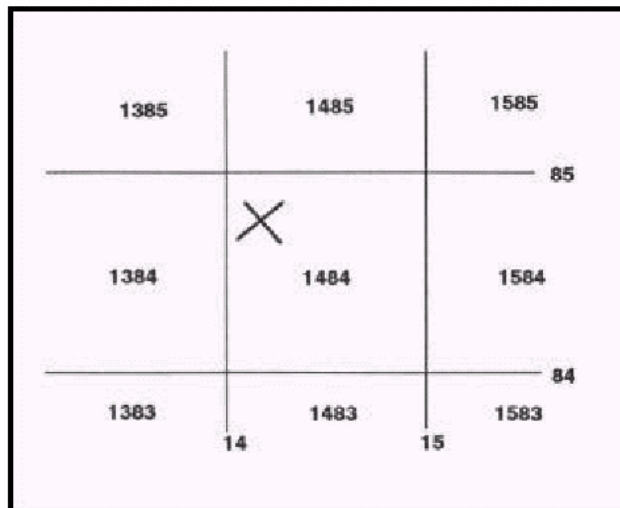


Figure 4-15. Determining grids without coordinate point.

b. **With a Coordinate Scale (1:25,000).** In order to use the coordinate scale for determining grid coordinates, ensure that the appropriate scale is being used on the corresponding map, and that the scale is right side up. To ensure the scale is correctly aligned, place it with the zero-zero point at the lower left corner of the grid square. Keeping the horizontal line of the scale directly on top of the east-west grid line, slide it to the right until the vertical line of the scale touches the point for which the coordinates are desired (Figure 4-16). When reading coordinates, examine the two sides of the coordinate scale to ensure that the horizontal line of the scale is aligned with the east-west grid line, and the vertical line of the scale is parallel with the north-south grid line. Use the scale when precision of more than 100 meters is required. To locate the point to the nearest 10 meters, measure the hundredths of a grid square RIGHT and UP from the grid lines to the point.

Point X is about 17 hundredths or 170 meters RIGHT and 84 hundredths or 840 meters UP.  
The coordinates to the nearest 10 meters are 14178484.

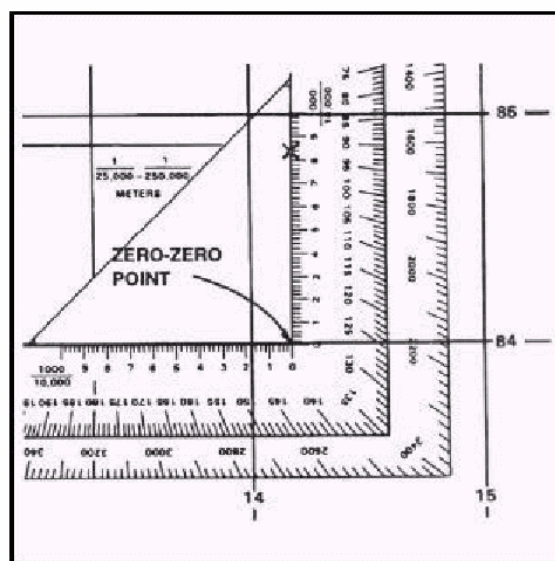


Figure 4-16. Placing a coordinate scale on a grid.

**NOTE:** Care should be exercised by the map reader using the coordinate scale when the desired point is located within the zero-zero point and the number 1 on the scale. Always prefix a zero if the hundredths reading is less than 10. In Figure 4-17, the desired point is reported as 14818407.

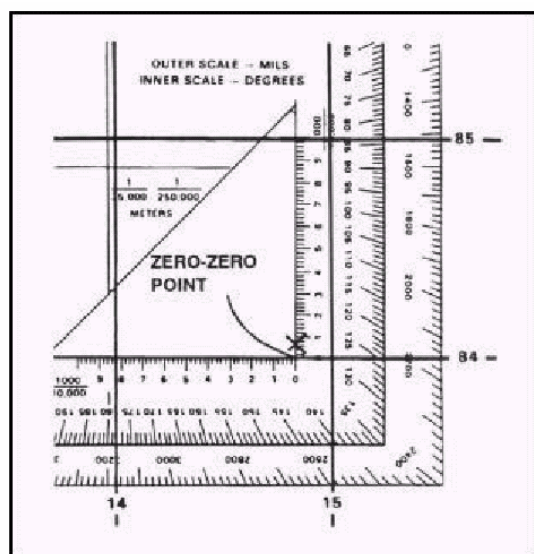


Figure 4-17. Zero-zero point.



c. **1:50,000 Coordinating Scale.** On the 1:50,000 coordinate scale, there are two sides: vertical and horizontal. These sides are 1,000 meters in length. The point at which the sides meet is the zero-zero point. Each side is divided into 10 equal 100-meter segments by a long tick mark and number. Each 100-meter segment is subdivided into 50-meter segments by a short tick mark (Figure 4-18). By using interpolation, mentally divide each 50-meter segment into tenths. For example, a point that lies after a whole number but before a short tick mark is identified as 10, 20, 30, or 40 meters and any point that lies after the short tick mark but before the whole number is identified as 60, 70, 80, or 90 meters.

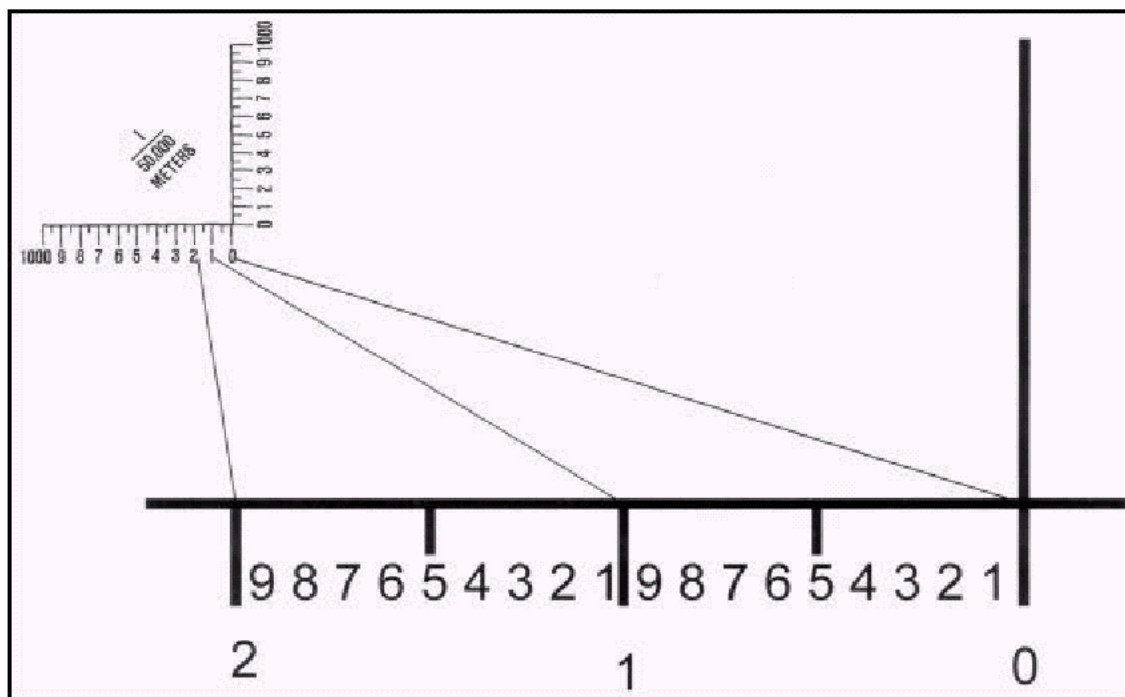
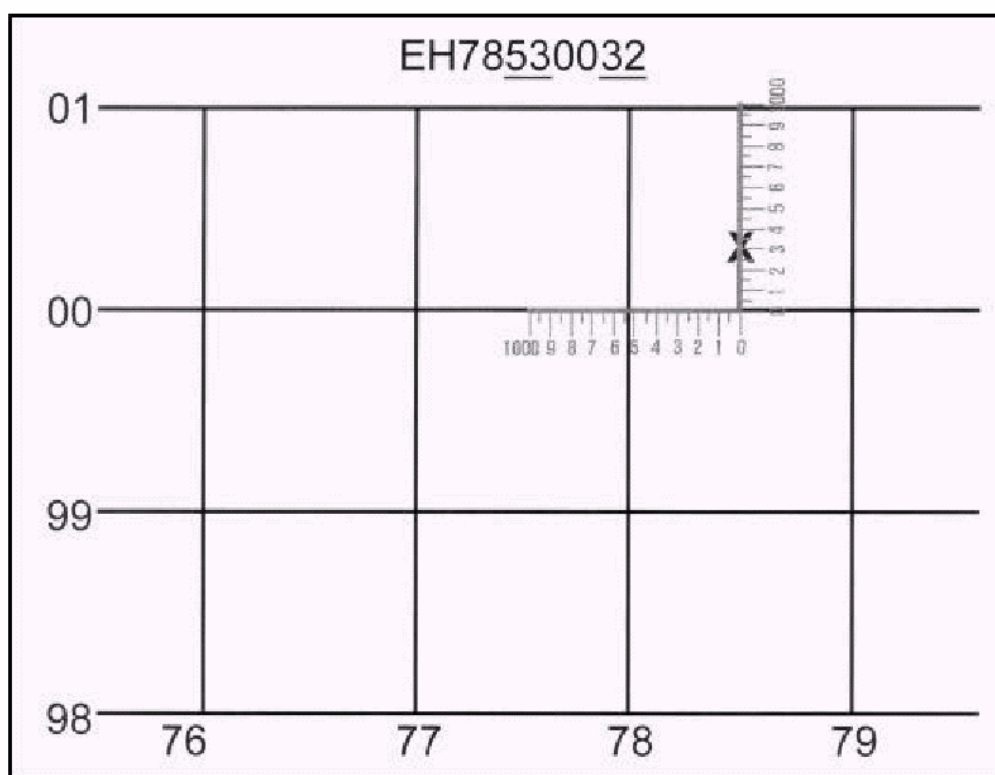


Figure 4-18. 1:50,000 coordinating scale.

d. **Example of Obtaining an Eight-Digit Coordinate Using 1:50,000 Scale.** To ensure the scale is correctly aligned, place it with the zero-zero point at the lower left corner of the grid square. Keeping the horizontal line of the scale directly on top of the east-west grid line, slide the scale to the right until the vertical line of the scale touches the point for which the coordinates are desired (Figure 4-19, page 4-21). Reading **right**, you can see that the point lies **530** meters to the right into the grid square, which gives a right reading of **7853**. Reading **up**, you can see that the point lies **320** meters up into the grid square, giving an up reading of **0032**.



**Figure 4-19. Example of obtaining an eight-digit coordinate using 1:50,000 scale.**

e. **Recording and Reporting Grid Coordinates.** Coordinates are written as one continuous number without spaces, parentheses, dashes, or decimal points; they must always contain an even number of digits. Therefore, whoever is to use the written coordinates must know where to make the split between the RIGHT and UP readings. It is a military requirement that the 100,000-meter square identification letters be included in any point designation. Normally, grid coordinates are determined to the nearest 100 meters (six digits) for reporting locations. With practice, this can be done without using plotting scales. The location of targets and other point locations for fire support are determined to the nearest 10 meters (eight digits).

**NOTE:** Special care should be exercised when recording and reporting coordinates.

Transposing numbers or making errors could be detrimental to military operations.

#### **4-6. LOCATE A POINT USING THE US ARMY MILITARY GRID REFERENCE SYSTEM**

There is only one rule to remember when reading or reporting grid coordinates—always read to the RIGHT and then UP. The first half of the reported set of coordinate digits represents the left-to-right (easting) grid label, and the second half represents the label as read from the

bottom to top (northing). The grid coordinates may represent the location to the nearest 10-, 100-, or 1,000-meter increment.

a. **Grid Zone.** The number 16 locates a point within zone 16, which is an area 6° wide and extends between 80°S latitude and 84°N latitude (Figure 4-8, page 4-11).

b. **Grid Zone Designation.** The number and letter combination, 16S, further locates a point within the grid zone designation 16S, which is a quadrangle 6° wide by 8° high. There are 19 of these quads in zone 16. Quad X, which is located between 72°N and 84°N latitude, is 12° high (Figure 4-8, page 4-11).

c. **100,000-Meter Square Identification.** The addition of two more letters locates a point within the 100,000-meter grid square. Thus 16SGL (Figure 4-11, page 4-14) locates the point within the 100,000-meter square GL in the grid zone designation 16S. For information on the lettering system of 100,000-meter squares, see TM 5-241-1.

d. **10,000-Meter Square.** The breakdown of the US Army military grid reference system continues as each side of the 100,000-meter square is divided into 10 equal parts. This division produces lines that are 10,000 meters apart. Thus the coordinates 16SGL08 would locate a point as shown in Figure 4-20. The 10,000-meter grid lines appear as index (heavier) grid lines on maps at 1:100,000 and larger.

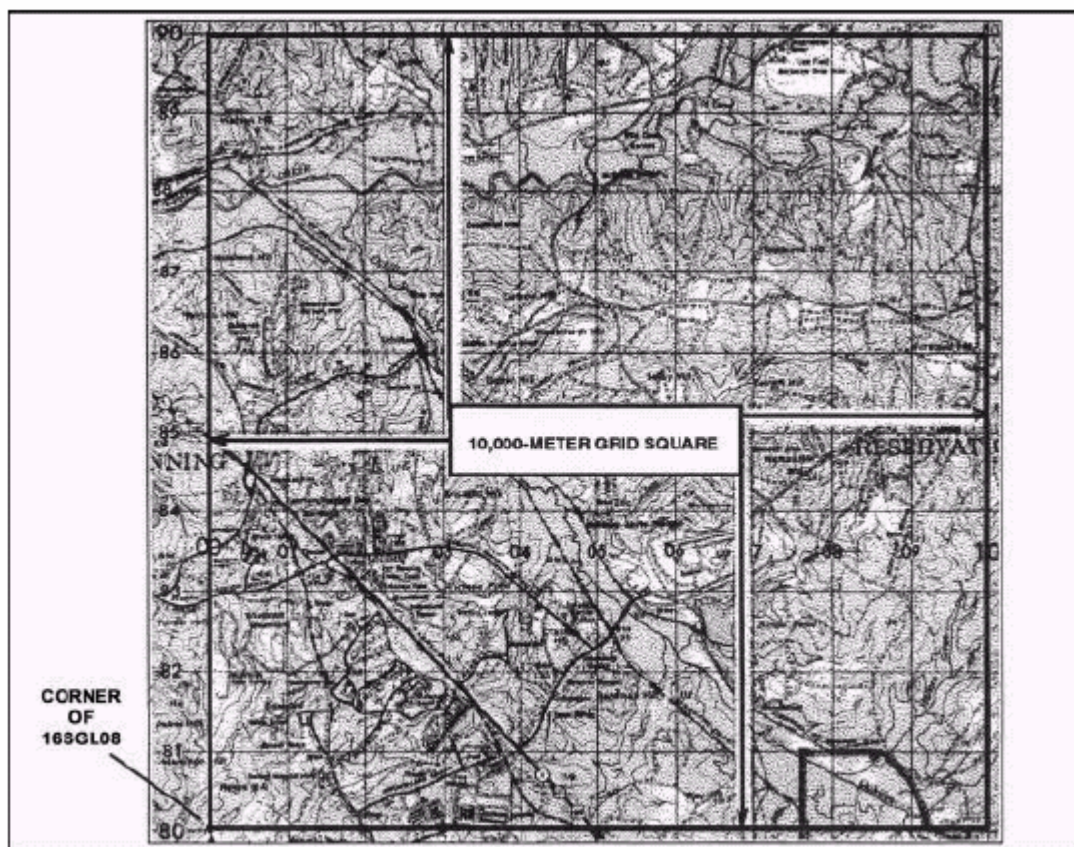


Figure 4-20. The 10,000-meter grid square.



e. **1,000-Meter Square.** To obtain 1,000-meter squares, each side of the 10,000-meter square is divided into 10 equal parts. This division appears on large-scale maps as the actual grid lines; they are 1,000 meters apart. On the Columbus map, using coordinates 16SGL0182, the easting 01 and the northing 82 gives the location of the southwest corner of grid square 0182 or to the nearest 1,000 meters of a point on the map (Figure 4-21).

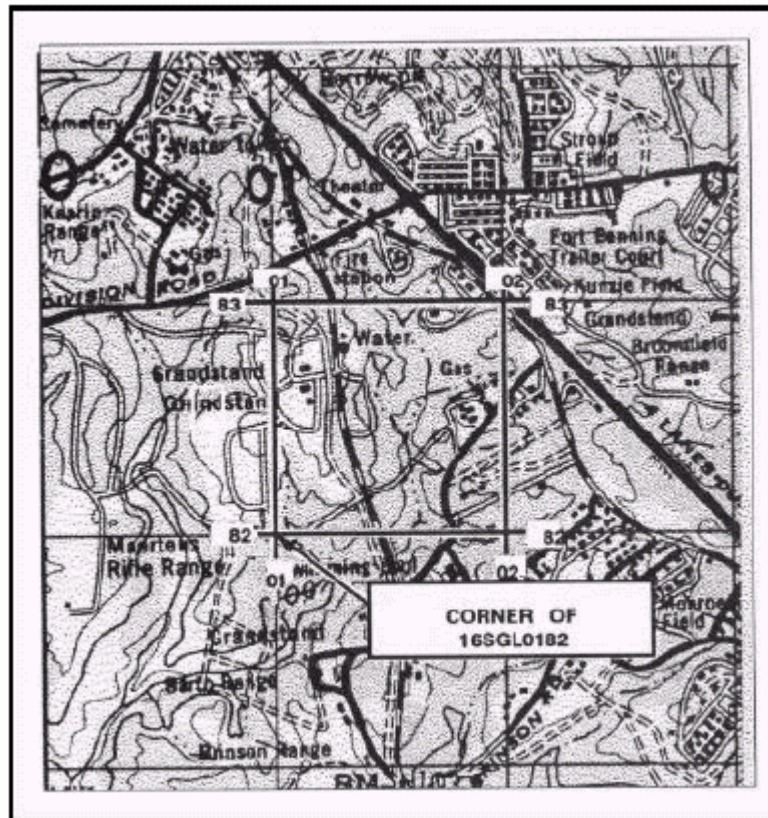


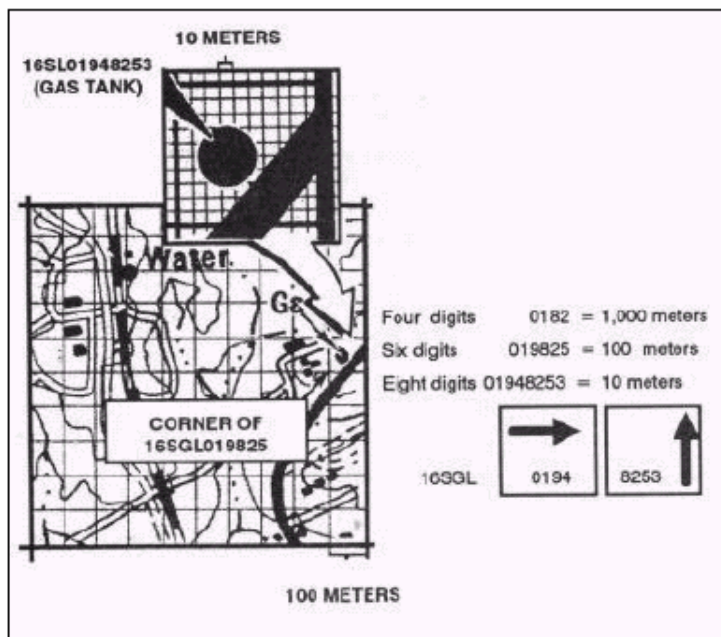
Figure 4-21. The 1,000-meter grid square.

f. **100-Meter Identification.** To locate to the nearest 100 meters, the grid coordinate scale can be used to divide the 1,000-meter grid squares into 10 equal parts (Figure 4-22, page 4-24).

g. **10-Meter Identification.** The grid coordinate scale has divisions every 50 meters on the 1:50,000 scale and every 20 meters on the 1:25,000 scale. These can be used to estimate to the nearest 10 meters and give the location of one point on the earth's surface to the nearest 10 meters.



**EXAMPLE:** 16SGL01948253 (gas tank) (Figure 4-22).



**Figure 4-22. The 100-meter and 10-meter grid squares.**

h. **Precision.** The precision of a point's location is shown by the number of digits in the coordinates; the more digits, the more precise the location (Figure 4-22, insert).

#### 4-7. GRID REFERENCE BOX

A grid reference box (Figure 4-23) appears in the marginal information of each map sheet. It contains step-by-step instructions for using the grid and the US Army military grid reference system. The grid reference box is divided into two parts.

a. The left portion identifies the grid zone designation and the 100,000-meter square. If the sheet falls in more than one 100,000-meter square, the grid lines that separate the squares are shown in the diagram and the letters identifying the 100,000-meter squares are given.

**EXAMPLE:** On the Columbus map sheet, the vertical line labeled 00 is the grid line that separates the two 100,000-meter squares, FL and GL. The left portion also shows a sample for the 1,000-meter square with its respective labeled grid coordinate numbers and a sample point within the 1,000-meter square.

b. The right portion of the grid reference box explains how to use the grid and is keyed on the sample 1,000-meter square of the left side. The following is an example of the military grid reference:

**EXAMPLE:** 16S locates the 6° by 8° area (grid zone designation).

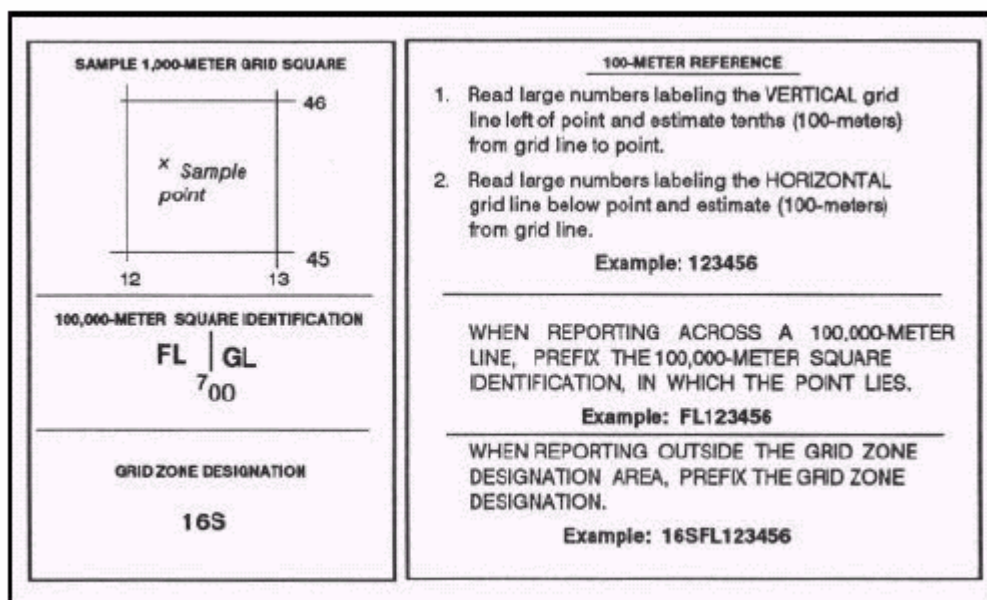


Figure 4-23. Grid reference box.

#### 4-8. OTHER GRID SYSTEMS

The military grid reference system is not universally used. Soldiers must be prepared to interpret and use other grid systems, depending on the area of operations or the personnel the soldiers are operating with.

a. **British Grids.** In a few areas of the world, British grids are still shown on military maps. However, the British grid systems are being phased out. Eventually all military mapping will be converted to the UTM grid.

b. **World Geographic Reference System (GEOREF).** This system is a worldwide position reference system used primarily by the US Air Force. It may be used with any map or chart that has latitude and longitude printed on it. Instructions for using GEOREF data are printed in blue and are found in the margin of aeronautical charts (Figure 4-24, page 4-26). This system is based upon a division of the earth's surface into quadrangles of latitude and longitude having a systematic identification code. It is a method of expressing latitude and longitude in a form suitable for rapid reporting and plotting. Figure 4-24 illustrates a sample grid reference box using GEOREF. The GEOREF system uses an identification code that has three main divisions.

## CHAPTER 5

# SCALE AND DISTANCE

*A map is a scaled graphic representation of a portion of the earth's surface. The scale of the map permits the user to convert distance on the map to distance on the ground or vice versa. The ability to determine distance on a map, as well as on the earth's surface, is an important factor in planning and executing military missions.*

### 5-1. REPRESENTATIVE FRACTION

The numerical scale of a map indicates the relationship of distance measured on a map and the corresponding distance on the ground. This scale is usually written as a fraction and is called the representative fraction. The RF is always written with the map distance as 1 and is independent of any unit of measure. (It could be yards, meters, inches, and so forth.) An RF of 1/50,000 or 1:50,000 means that one unit of measure on the map is equal to 50,000 units of the same measure on the ground.

a. The ground distance between two points is determined by measuring between the same two points on the map and then multiplying the map measurement by the denominator of the RF or scale (Figure 5-1, page 5-2).

#### EXAMPLE:

The map scale is 1:50,000

RF = 1/50,000

The map distance from point A to point B is 5 units

5 x 50,000 = 250,000 units of ground distance

b. Since the distance on most maps is marked in meters and the RF is expressed in this unit of measurement in most cases, a brief description of the metric system is needed. In the metric system, the standard unit of measurement is the meter.

1 meter contains 100 centimeters (cm).

100 meters is a regular football field plus 10 meters.

1,000 meters is 1 kilometer (km).

10 kilometers is 10,000 meters.

Appendix C contains the conversion tables.

c. The situation may arise when a map or sketch has no RF or scale. To be able to determine ground distance on such a map, the RF must be determined. There are two ways to do this:

(1) **Comparison with Ground Distance.**

(a) Measure the distance between two points on the map—map distance (MD).

(b) Determine the horizontal distance between these same two points on the ground—ground distance (GD).

(c) Use the RF formula and remember that RF must be in the general form:

$$\text{RF} = \frac{1}{X} = \frac{\text{MD}}{\text{GD}}$$

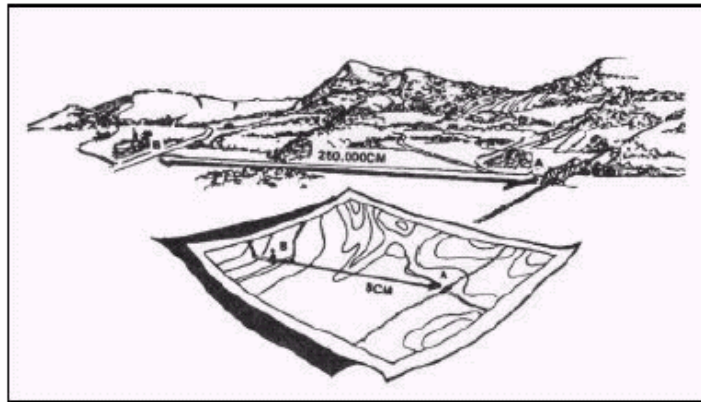


Figure 5-1. Converting map distance to ground distance.

(d) Both the MD and the GD must be in the same unit of measure and the MD must be reduced to 1.

**EXAMPLE:**

*MD = 4.32 centimeters*  
*GD = 2.16 kilometers*  
*(216,000 centimeters)*

$$RF = \frac{1}{X} = \frac{4.32}{216,000}$$

*or*

$$\frac{216,000}{4.32} = 50,000$$

*therefore*

$$RF = \frac{1}{50,000} \text{ or } 1:50,000$$

**(2) Comparison With Another Map of the Same Area that Has an RF.**

(a) Select two points on the map with the unknown RF. Measure the distance (MD) between them.

(b) Locate those same two points on the map that have the known RF. Measure the distance (MD) between them. Using the RF for this map, determine GD, which is the same for both maps.

(c) Using the GD and the MD from the first map, determine the RF using the formula:

$$RF = \frac{1}{X} = \frac{MD}{GD}$$

d. Occasionally it may be necessary to determine map distance from a known ground distance and the RF:

$$MD = \frac{GD}{\text{Denominator or RF}}$$

*Ground Distance = 2,200 meters*

*RF = 1:50,000*

$$MD = \frac{2,200 \text{ meters}}{50,000}$$

*MD = 0.044 meters x 100 (centimeters per meter)*

*MD = 4.4 centimeters*

e. When determining ground distance from a map, the scale of the map affects the accuracy. As the scale becomes smaller, the accuracy of measurement decreases because some of the features on the map must be exaggerated so that they may be readily identified.

## 5-2. GRAPHIC (BAR) SCALES

A graphic scale is a ruler printed on the map and is used to convert distances on the map to actual ground distances. The graphic scale is divided into two parts. To the right of the zero, the scale is marked in full units of measure and is called the primary scale. To the left of the zero, the scale is divided into tenths and is called the extension scale. Most maps have three or more graphic scales, each using a different unit of measure (Figure 5-2). When using the graphic scale, be sure to use the correct scale for the unit of measure desired.

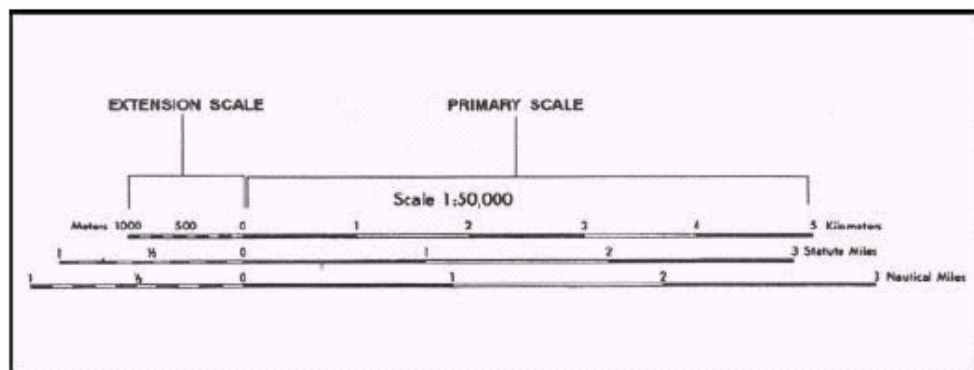
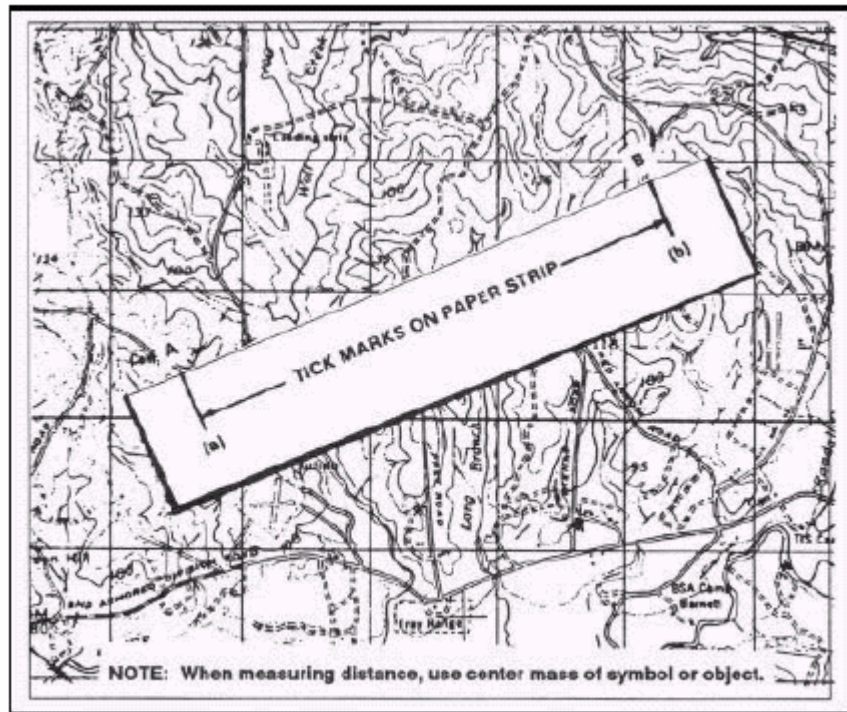


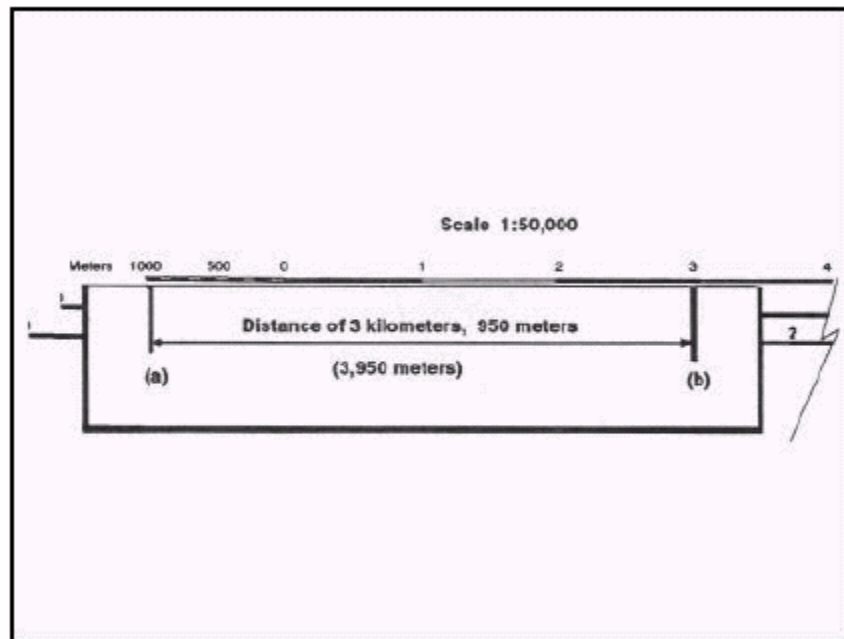
Figure 5-2. Using a graphic (bar) scale.

a. To determine straight-line distance between two points on a map, lay a straight-edged piece of paper on the map so that the edge of the paper touches both points and extends past them. Make a tick mark on the edge of the paper at each point (Figure 5-3).



**Figure 5-3. Transferring map distance to paper strip.**

b. To convert the map distance to ground distance, move the paper down to the graphic bar scale, and align the right tick mark (b) with a printed number in the primary scale so that the left tick mark (a) is in the extension scale (Figure 5-4).



**Figure 5-4. Measuring straight-line map distance.**

c. The right tick mark (b) is aligned with the 3,000-meter mark in the primary scale, thus the distance is at least 3,000 meters. To determine the distance between the two points to the nearest 10 meters, look at the extension scale. The extension scale is numbered with zero at the right and increases to the left. When using the extension scale, always read right to left (Figure 5-4). From the zero left to the beginning of the first shaded area is 100 meters. From the beginning of the shaded square to the end of the shaded square is 100 to 200 meters. From the end of the first shaded square to the beginning of the second shaded square is 200 to 300 meters. Remember, the distance in the extension scale increases from right to left.

d. To determine the distance from the zero to tick mark (a), divide the distance inside the squares into tenths (Figure 5-4). As you break down the distance between the squares in the extension scale into tenths, you will see that tick mark (a) is aligned with the 950-meter mark. Adding the distance of 3,000 meters determined in the primary scale to the 950 meters you determined by using the extension scale, we find that the total distance between points (a) and (b) is 3,950 meters.

e. To measure distance along a road, stream, or other curved line, the straight edge of a piece of paper is used. In order to avoid confusion concerning the point to begin measuring from and the ending point, an eight-digit coordinate should be given for both the starting and ending points. Place a tick mark on the paper and map at the beginning point from which the curved line is to be measured. Align the edge of the paper along a straight portion and make a tick mark on both map and paper when the edge of the paper leaves the straight portion of the line being measured (Figure 5-5A, page 5-7).



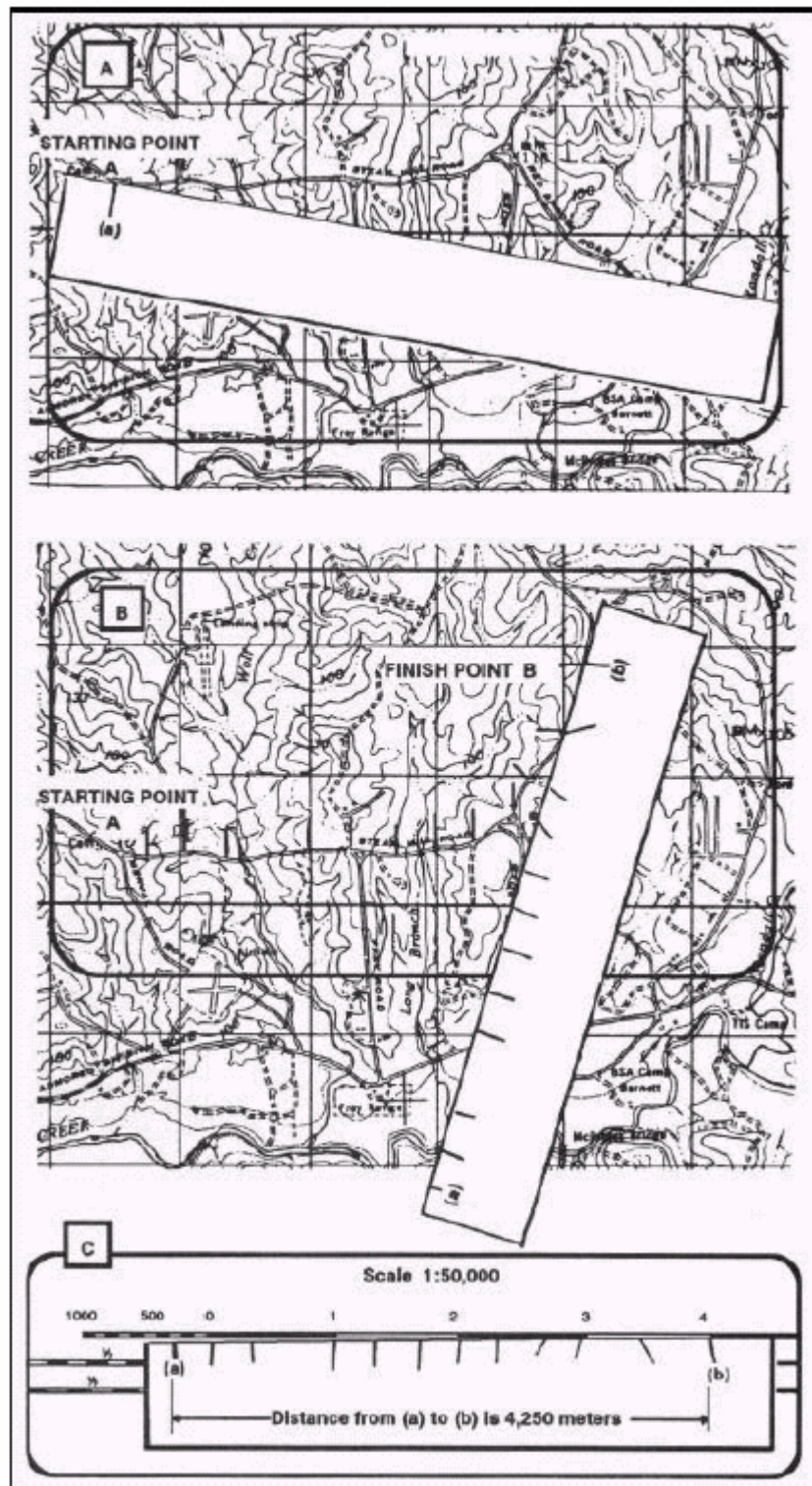
f. Keeping both tick marks together (on paper and map), place the point of the pencil close to the edge of the paper on the tick mark to hold it in place and pivot the paper until another straight portion of the curved line is aligned with the edge of the paper. Continue in this manner until the measurement is completed (Figure 5-5B, page 5-7).

g. When you have completed measuring the distance, move the paper to the graphic scale to determine the ground distance. The only tick marks you will be measuring the distance between are tick marks (a) and (b). The tick marks in between are not used (Figure 5-5C, page 5-7).

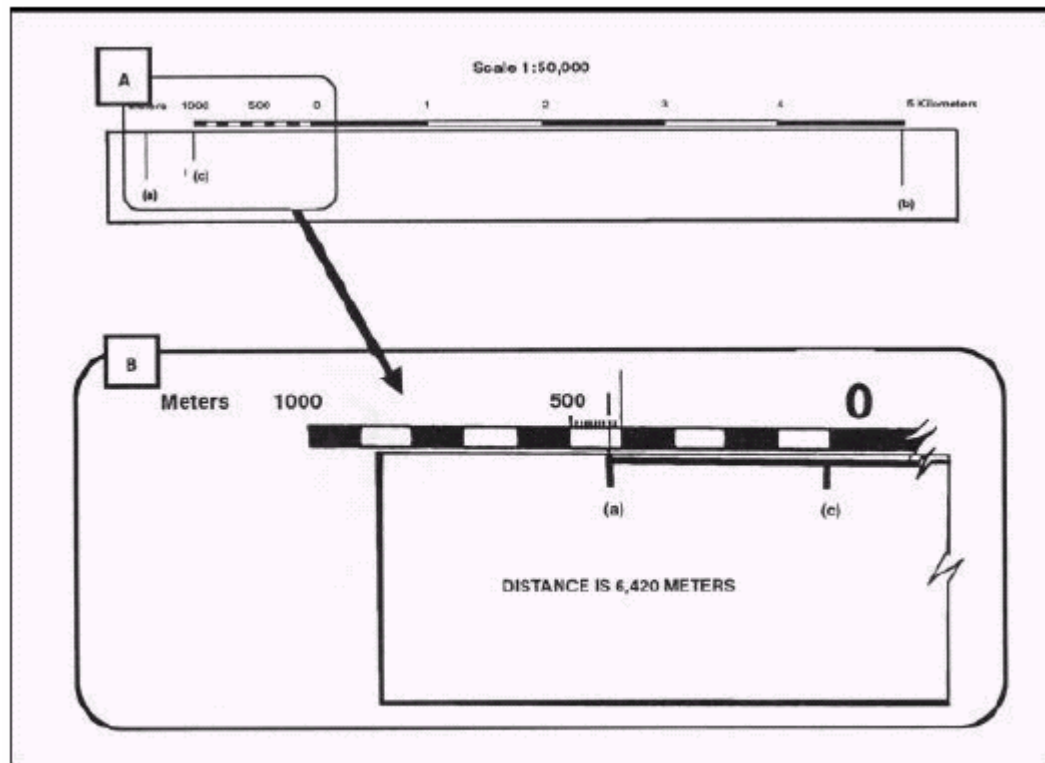
h. There may be times when the distance you measure on the edge of the paper exceeds the graphic scale. In this case, there are different techniques you can use to determine the distance.

(1) One technique is to align the right tick mark (b) with a printed number in the primary scale, in this case the 5. You can see that from point (a) to point (b) is more than 6,000 meters when you add the 1,000 meters in the extension scale. To determine the exact distance to the nearest 10 meters, place a tick mark (c) on the edge of the paper at the end of the extension scale (Figure 5-6A, page 5-8). You know that from point (b) to point (c) is 6,000 meters. With the tick mark (c) placed on the edge of the paper at the end of the extension scale, slide the paper to the right. Remember the distance in the extension is always read from right to left. Align tick mark (c) with zero and then measure the distance between tick marks (a) and (c). The distance between tick marks (a) and (c) is 420 meters. The total ground distance between start and finish points is 6,420 meters (Figure 5-6B, page 5-8).





**Figure 5-5. Measuring a curved line.**



**Figure 5-6. Determining the exact distance.**

(2) Another technique that may be used to determine exact distance between two points when the edge of the paper exceeds the bar scale is to slide the edge of the paper to the right until tick mark (a) is aligned with the edge of the extension scale. Make a tick mark on the paper, in line with the 2,000-meter mark (c) (Figure 5-7A). Then slide the edge of the paper to the left until tick mark (b) is aligned with the zero. Estimate the 100-meter increments into 10-meter increments to determine how many meters tick mark (c) is from the zero line (Figure 5-7B). The total distance would be 3,030 meters.

(3) At times you may want to know the distance from a point on the map to a point off the map. In order to do this, measure the distance from the start point to the edge of the map. The marginal notes give the road distance from the edge of the map to some towns, highways, or junctions off the map. To determine the total distance, add the distance measured on the map to the distance given in the marginal notes. Be sure the unit of measure is the same.

(4) When measuring distance in statute or nautical miles, round it off to the nearest one tenth of a mile and make sure the appropriate bar scale is used.

(5) Distance measured on a map does not take into consideration the rise and fall of the land. All distances measured by using the map and graphic scales are flat distances. Therefore, the distance measured on a map will increase when actually measured on the ground. This must be taken into consideration when navigating across country.

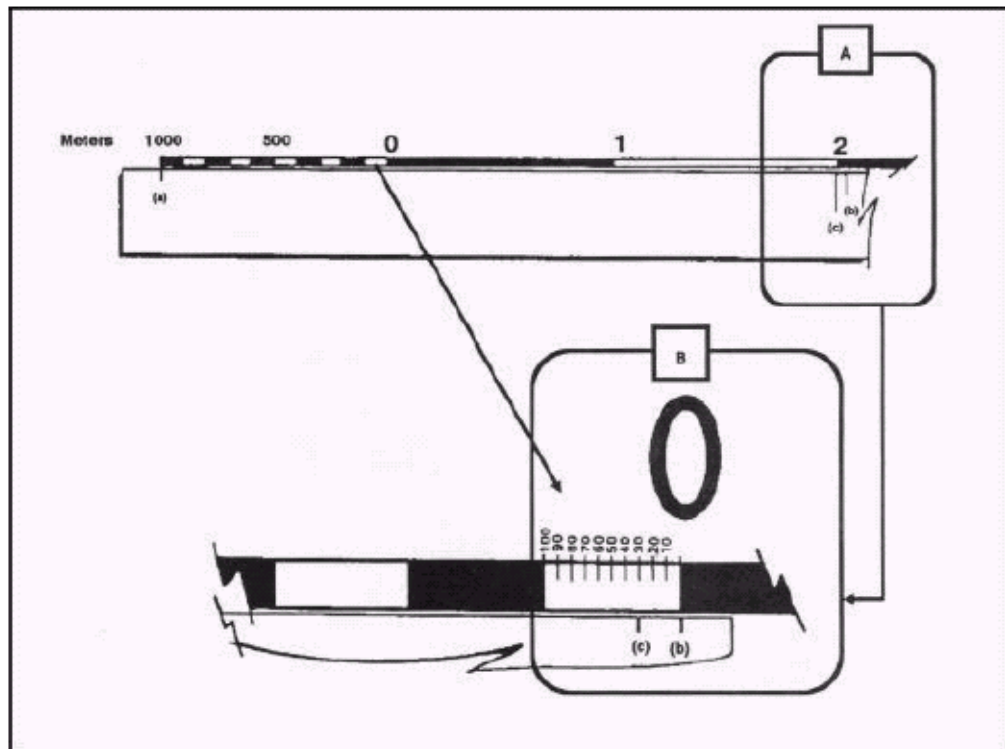


Figure 5-7. Reading the extension scale.

i. The amount of time required to travel a certain distance on the ground is an important factor in most military operations. This can be determined if a map of the area is available and a graphic time-distance scale is constructed for use with the map as follows:

***R = Rate of travel (speed)***

***T = Time***

***D = Distance (ground distance)***

$$T = \frac{D}{R}$$

For example, if an infantry unit is marching at an average rate (R) of 4 kilometers per hour, it will take about 3 hours (T) to travel 12 kilometers.

$$\frac{12 (D)}{4 (R)} = 3 (T)$$

j. To construct a time-distance scale (Figure 5-8A), knowing your length of march, rate of speed, and map scale, that is, 12 kilometers at 3 kilometers per hour on a 1:50,000-scale map, use the following process:

(1) Mark off the total distance on a line by referring to the graphic scale of the map or, if this is impracticable, compute the length of the line as follows:

(a) Convert the ground distance to centimeters: 12 kilometers x 100,000 (centimeters per kilometer) = 1,200,000 centimeters.

(b) Find the length of the line to represent the distance at map scale—

$$MD = \frac{1}{50,000} = \frac{1,200,000}{50,000} = 24 \text{ centimeters}$$

(c) Construct a line 24 centimeters in length (Figure 5-8A).

(2) Divide the line by the rate of march into three parts (Figure 5-8B), each part representing the distance traveled in one hour, and label.

(3) Divide the scale extension (left portion) into the desired number of lesser time divisions—

**1-minute divisions — 60**

**5-minute divisions — 12**

**10-minute divisions — 6**

(4) Figure 5-8C shows a 5-minute interval scale. Make these divisions in the same manner as for a graphic scale. The completed scale makes it possible to determine where the unit will be at any given time. However, it must be remembered that this scale is for one specific rate of march only, 4 kilometers per hour.

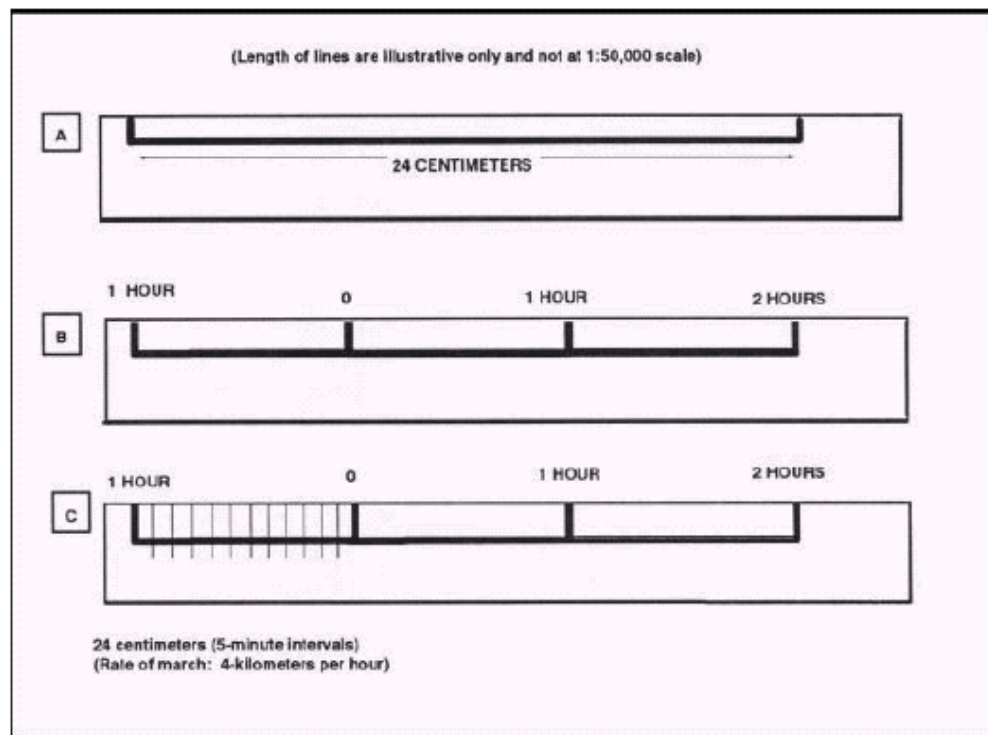


Figure 5-8. Constructing a time-distance scale.

## CHAPTER 6

# DIRECTION

*Being in the right place at the prescribed time is necessary to successfully accomplish military missions. Direction plays an important role in a soldier's everyday life. It can be expressed as right, left, straight ahead, and so forth; but then the question arises, "To the right of what?" This chapter defines the word azimuth and the three different norths. It explains in detail how to determine the grid and the magnetic azimuths with the use of the protractor and the compass. It explains the use of some field-expedient methods to find directions, the declination diagram, and the conversion of azimuths from grid to magnetic and vice versa. It also includes some advanced aspects of map reading, such as intersection, resection, modified resection, and polar plots.*

### 6-1. METHODS OF EXPRESSING DIRECTION

Military personnel need a way of expressing direction that is accurate, is adaptable to any part of the world, and has a common unit of measure. Directions are expressed as units of angular measure.

a. **Degree.** The most common unit of measure is the degree (°) with its subdivisions of minutes (') and seconds (").

**1 degree = 60 minutes.**

**1 minute = 60 seconds.**

b. **Mil.** Another unit of measure, the mil (abbreviated m/ ), is used mainly in artillery, tank, and mortar gunnery. The mil expresses the size of an angle formed when a circle is divided into 6,400 angles, with the vertex of the angles at the center of the circle. A relationship can be established between degrees and mils. A circle equals 6400 mils divided by 360 degrees, or 17.78 mils per degree. To convert degrees to mils, multiply degrees by 17.78.

c. **Grad.** The grad is a metric unit of measure found on some foreign maps. There are 400 grads in a circle (a 90-degree right angle equals 100 grads). The grad is divided into 100 centesimal minutes (centigrads) and the minute into 100 centesimal seconds (milligrads).

### 6-2. BASE LINES

In order to measure something, there must always be a starting point or zero measurement. To express direction as a unit of angular measure, there must be a starting point or zero measure and a point of reference. These two points designate the base or reference line. There are three base lines—true north, magnetic north, and grid north. The most commonly used are magnetic and grid.

a. **True North.** A line from any point on the earth's surface to the north pole. All lines of longitude are true north lines. True north is usually represented by a star (Figure 6-1, page 6-2).

b. **Magnetic North.** The direction to the north magnetic pole, as indicated by the northseeking needle of a magnetic instrument. The magnetic north is usually symbolized by

a line ending with half of an arrowhead (Figure 6-1). Magnetic readings are obtained with magnetic instruments, such as lensatic and M2 compasses.

c. **Grid North.** The north that is established by using the vertical grid lines on the map. Grid north may be symbolized by the letters GN or the letter “y” (Figure 6-1).

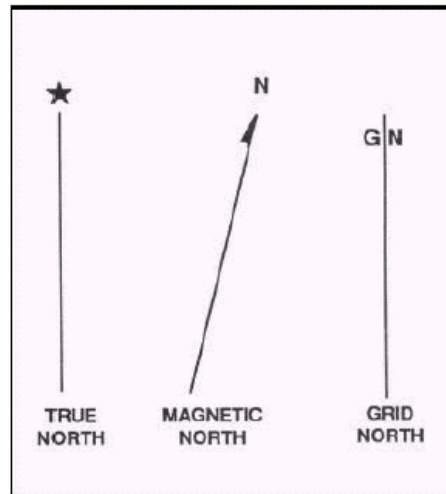


Figure 6-1. Three norths.

### 6-3. AZIMUTHS

An azimuth is defined as a horizontal angle measured clockwise from a north base line. This north base line could be true north, magnetic north, or grid north. The azimuth is the most common military method to express direction. When using an azimuth, the point from which the azimuth originates is the center of an imaginary circle (Figure 6-2). This circle is divided into 360 degrees or 6400 mils (Appendix G).

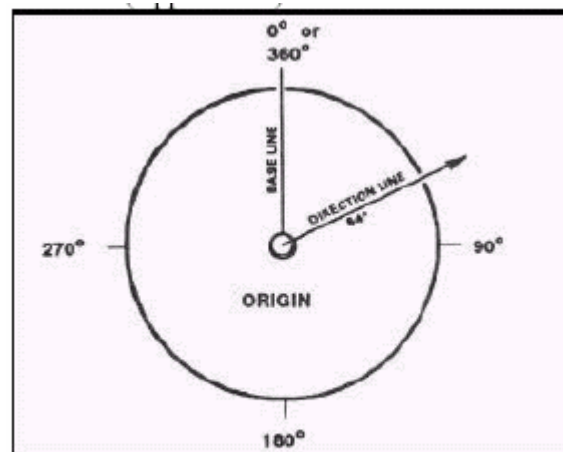


Figure 6-2. Origin of azimuth circle.



a. **Back Azimuth.** A back azimuth is the opposite direction of an azimuth. It is comparable to doing “about face.” To obtain a back azimuth from an azimuth, add 180 degrees if the azimuth is 180 degrees or less, or subtract 180 degrees if the azimuth is 180 degrees or more (Figure 6-3). The back azimuth of 180 degrees may be stated as 0 degrees or 360 degrees. For mils, if the azimuth is less than 3200 mils, add 3200 mils, if the azimuth is more than 3200 mils, subtract 3200 mils.

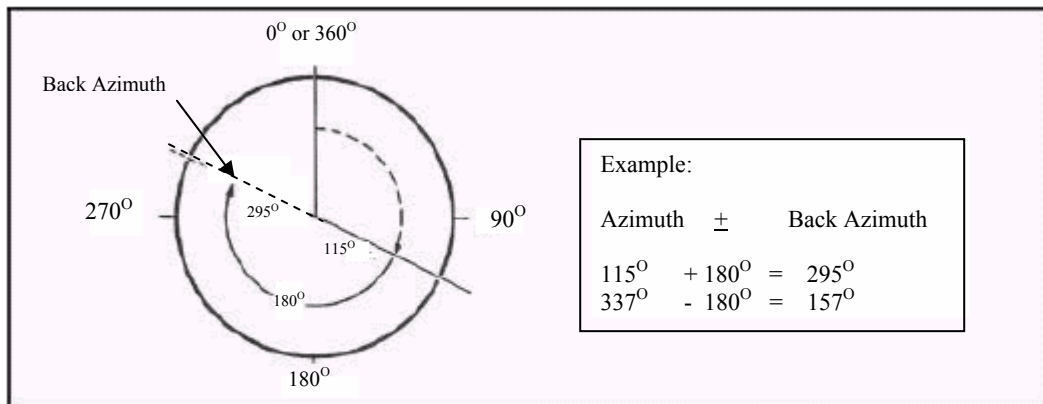


Figure 6-3. Back azimuth.

#### WARNING

When converting azimuths into back azimuths, extreme care should be exercised when adding or subtracting the 180 degrees. A simple mathematical mistake could cause disastrous consequences.

b. **Magnetic Azimuth.** The magnetic azimuth is determined by using magnetic instruments, such as lensatic and M2 compasses. Refer to Chapter 9, paragraph 4, for details.

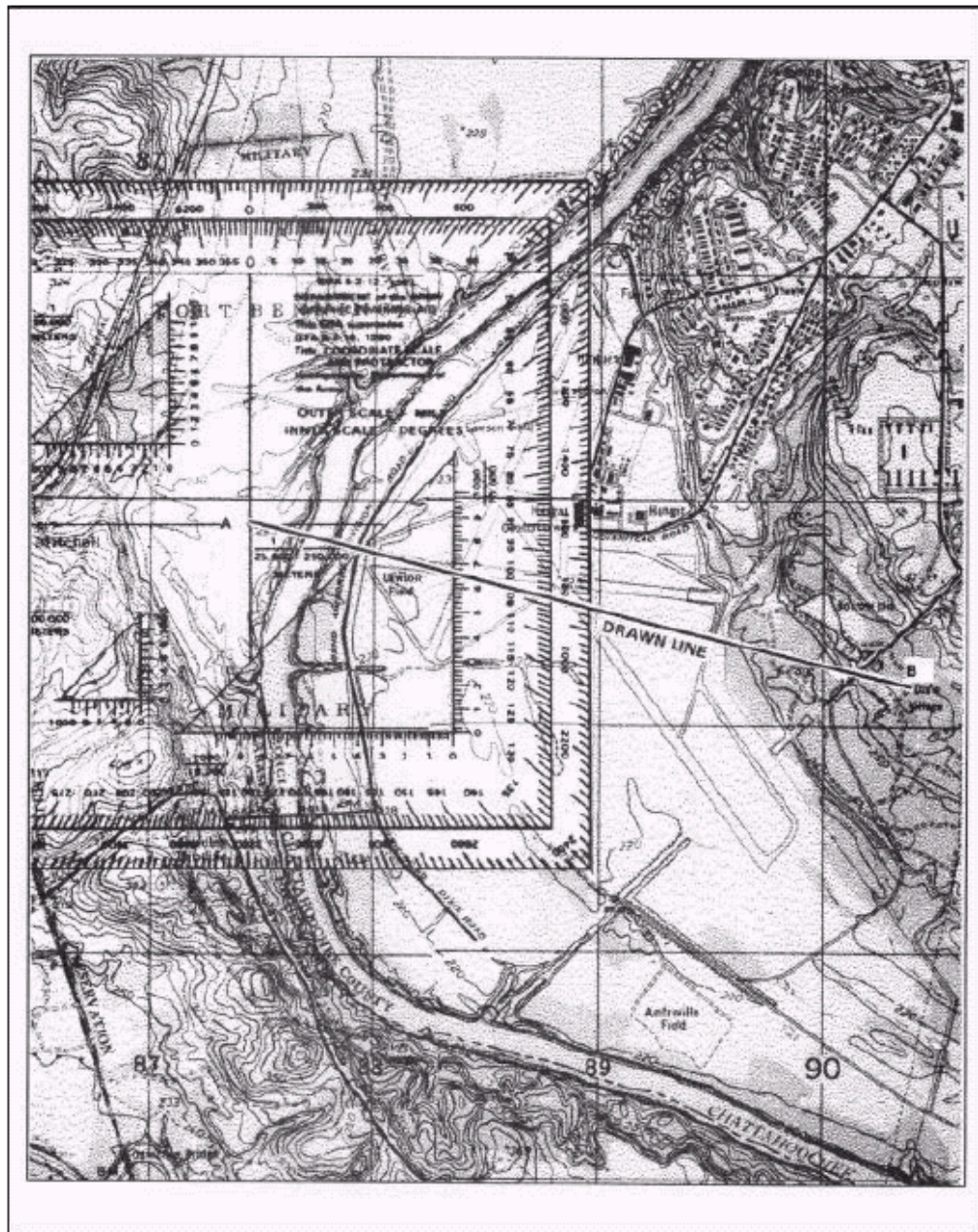
c. **Field-Expedient Methods.** Several field-expedient methods to determine direction are discussed in Chapter 9, paragraph 5.

#### 6-4. GRID AZIMUTHS

When an azimuth is plotted on a map between point A (starting point) and point B (ending point), the points are joined together by a straight line. A protractor is used to measure the angle between grid north and the drawn line, and this measured azimuth is the grid azimuth (Figure 6-4).

#### WARNING

When measuring azimuths on a map, remember that you are measuring from a starting point to an ending point. If a mistake is made and the reading is taken from then ending point, the grid azimuth will be opposite, thus causing the used to go in the wrong direction

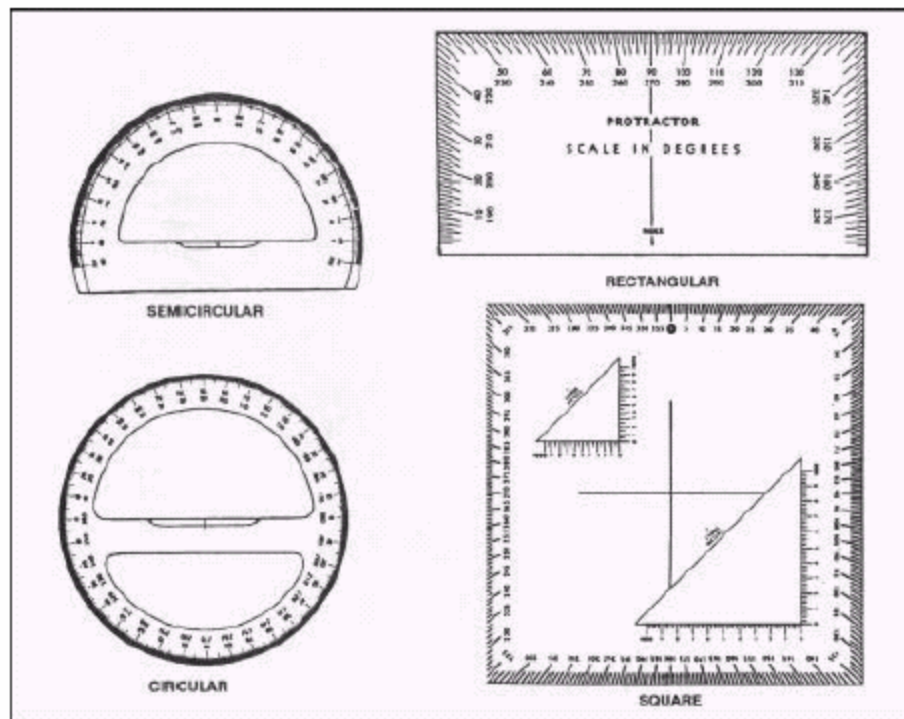


**Figure 6-4. Measure an azimuth**

### **6-5. PROTRACTOR**

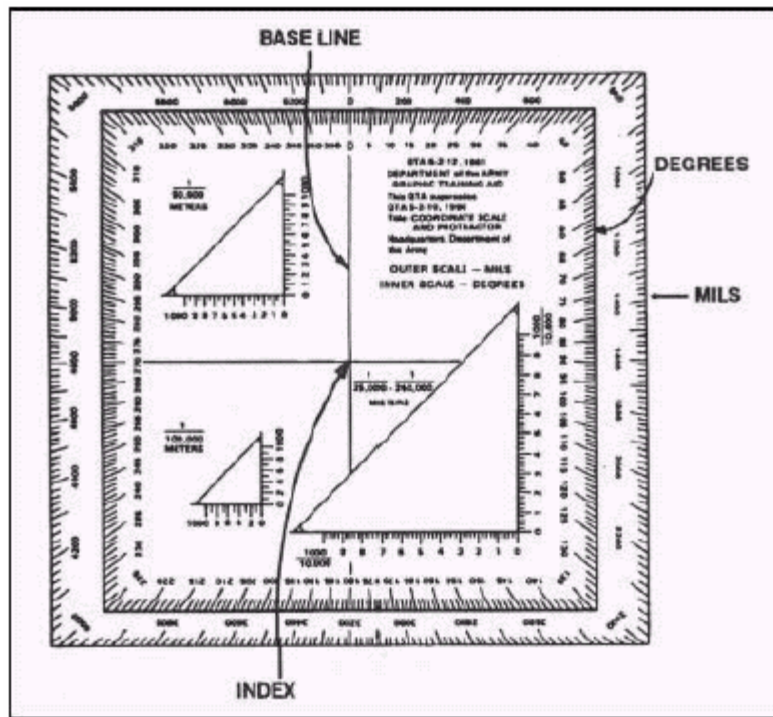
There are several types of protractors—full circle, half circle, square, and rectangular (Figure 6-5). All of them divide the circle into units of angular measure, and each has a scale around the outer edge and an index mark. The index mark is the center of the protractor circle from which all directions are measured.





**Figure 6-5. Types of protractors.**

a. The military protractor, GTA 5-2-12, contains two scales: one in degrees (inner scale) and one in mils (outer scale). This protractor represents the azimuth circle. The degree scale is graduated from 0 to 360 degrees; each tick mark on the degree scale represents one degree. A line from 0 to 180 degrees is called the base line of the protractor. Where the base line intersects the horizontal line, between 90 and 270 degrees, is the index or center of the protractor (Figure 6-6).



**Figure 6-6. Military protractor**

b. When using the protractor, the base line is always oriented parallel to a north-south grid line. The 0- or 360-degree mark is always toward the top or north on the map and the 90° mark is to the right.

(1) To determine the grid azimuth—

(a) Draw a line connecting the two points (A and B).

(b) Place the index of the protractor at the point where the drawn line crosses a vertical (north-south) grid line.

(c) Keeping the index at this point, align the 0- to 180-degree line of the protractor on the vertical grid line.

(d) Read the value of the angle from the scale; this is the grid azimuth from point A to point B (Figure 6-4).

(2) To plot an azimuth from a known point on a map (Figure 6-7)—

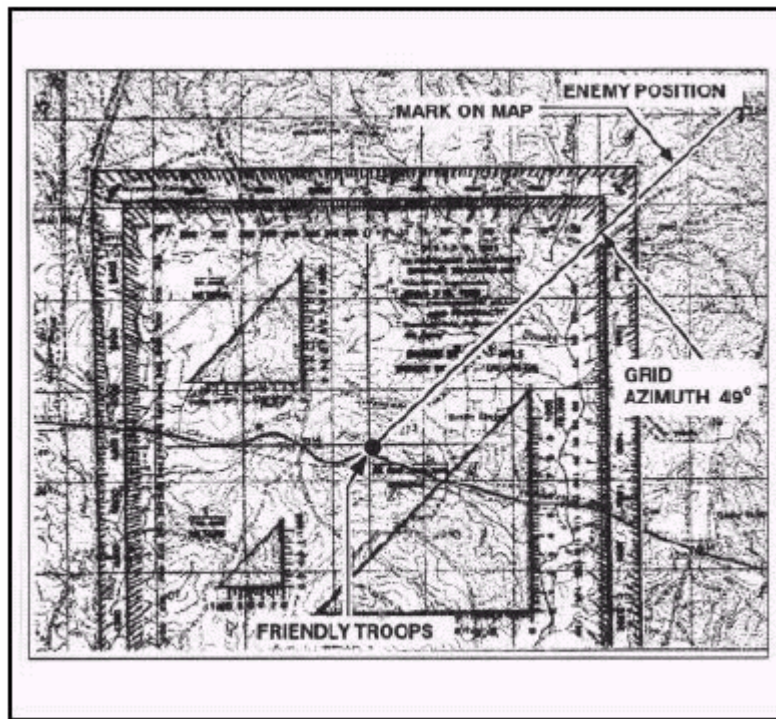
(a) Convert the azimuth from magnetic to grid, if necessary. (See paragraph 6-6.)

(b) Place the protractor on the map with the index mark at the center of mass of the known point and the base line parallel to a north-south grid line.

(c) Make a mark on the map at the desired azimuth.

(d) Remove the protractor and draw a line connecting the known point and the mark on the map. This is the grid direction line (azimuth).

**NOTE:** When measuring an azimuth, the reading is always to the nearest degree or 10 mils. Distance does not change an accurately measured azimuth.



**Figure 6-7. Plotting an azimuth on the map.**

c. To obtain an accurate reading with the protractor (to the nearest degree or 10 mils), there are two techniques to check that the base line of the protractor is parallel to a northsouth grid line.

(1) Place the protractor index where the azimuth line cuts a north-south grid line, aligning the base line of the protractor directly over the intersection of the azimuth line with the north-south grid line. The user should be able to determine whether the initial azimuth reading was correct.

(2) The user should re-read the azimuth between the azimuth and north-south grid line to check the initial azimuth.

(3) Note that the protractor is cut at both the top and bottom by the same north-south grid line. Count the number of degrees from the 0-degree mark at the top of the protractor to this north-south grid line and then count the number of degrees from the 180-degree mark at the bottom of the protractor to this same grid line. If the two counts are equal, the protractor is properly aligned.

## 6-6. DECLINATION DIAGRAM

Declination is the angular difference between any two norths. If you have a map and a compass, the one of most interest to you will be between magnetic and grid north. The declination diagram (Figure 6-8) shows the angular relationship, represented by prongs, among grid, magnetic, and true norths. While the relative positions of the prongs are correct, they are seldom plotted to scale. Do not use the diagram to measure a numerical value. This

value will be written in the map margin (in both degrees and mils) beside the diagram.

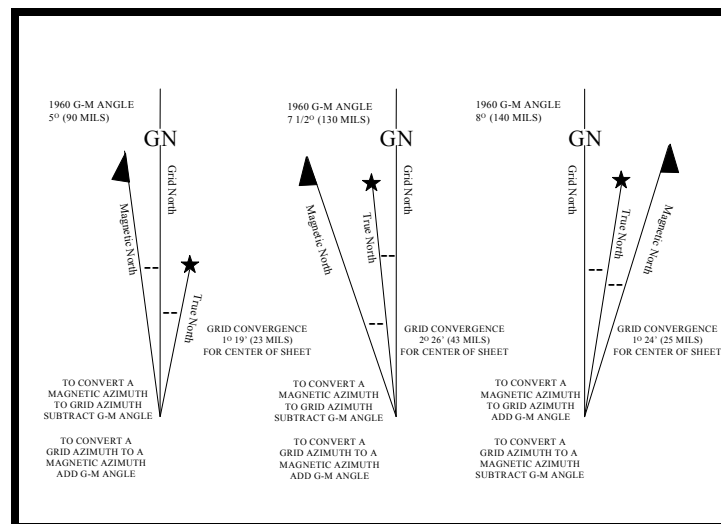
a. **Location.** A declination diagram is a part of the information in the lower margin on most larger maps. On medium-scale maps, the declination information is shown by a note in the map margin.

b. **Grid-Magnetic Angle.** The G-M angle value is the angular size that exists between grid north and magnetic north. It is an arc, indicated by a dashed line, that connects the gridnorth and magnetic-north prongs. This value is expressed to the nearest 1/2 degree, with mil equivalents shown to the nearest 10 mils. The G-M angle is important to the map reader/land navigator because azimuths translated between map and ground will be in error by the size of the declination angle if not adjusted for it.

c. **Grid Convergence.** An arc indicated by a dashed line connects the prongs for true north and grid north. The value of the angle for the center of the sheet is given to the nearest full minute with its equivalent to the nearest mil. These data are shown in the form of a gridconvergence note.

d. **Conversion.** There is an angular difference between the grid north and the magnetic north. Since the location of magnetic north does not correspond exactly with the grid-north lines on the maps, a conversion from magnetic to grid or vice versa is needed.

(1) **With Notes.** Simply refer to the conversion notes that appear in conjunction with the diagram explaining the use of the G-M angle (Figure 6-8). One note provides instructions for converting magnetic azimuth to grid azimuth; the other, for converting grid azimuth to magnetic azimuth. The conversion (add or subtract) is governed by the direction of the magnetic-north prong relative to that of the north-grid prong.



**Figure 6-8. Declination diagrams.**

(2) **Without Notes.** In some cases, there are no declination conversion notes on the margin of the map; it is necessary to convert from one type of declination to another. A magnetic compass gives a magnetic azimuth; but in order to plot this line on a gridded map, the magnetic azimuth value must be changed to grid azimuth. The declination diagram is used for these conversions. A rule to remember when solving such problems is this:

**No matter where the azimuth line points, the angle to it is always measured clockwise from the reference direction (base line). With this in mind, the problem is solved by the following steps:**

(a) Draw a vertical or grid-north line (prong). Always align this line with the vertical lines on a map (Figure 6-9).

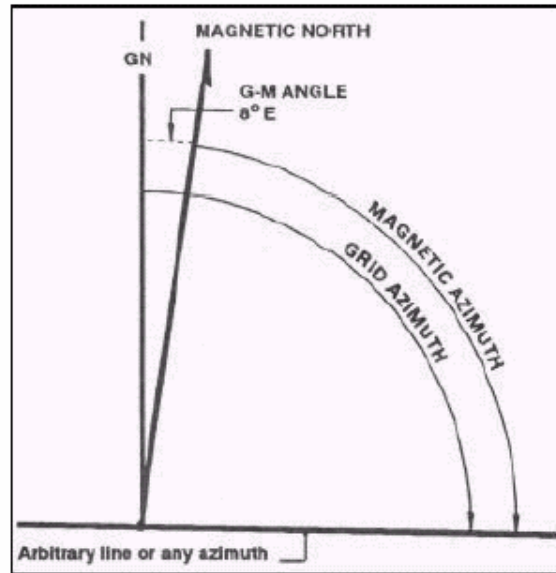


Figure 6-9. Declination diagram with arbitrary line.

(b) From the base of the grid-north line (prong), draw an arbitrary line (or any azimuth line) at a roughly right angle to north, regardless of the actual value of the azimuth in degrees (Figure 6-9).

(c) Examine the declination diagram on the map and determine the direction of the magnetic north (right-left or east-west) relative to that of the grid-north prong. Draw a magnetic prong from the apex of the grid-north line in the desired direction (Figure 6-9).

(d) Determine the value of the G-M angle. Draw an arc from the grid prong to the magnetic prong and place the value of the G-M angle (Figure 6-9).

(e) Complete the diagram by drawing an arc from each reference line to the arbitrary line. A glance at the completed diagram shows whether the given azimuth or the desired azimuth is greater, and thus whether the known difference between the two must be added or subtracted.

(f) The inclusion of the true-north prong in relationship to the conversion is of little importance.

e. **Applications.** Remember, there are no negative azimuths on the azimuth circle. Since 0 degree is the same as 360 degrees, then 2 degrees is the same as 362 degrees. This is because 2 degrees and 362 degrees are located at the same point on the azimuth circle. The grid azimuth can now be converted into a magnetic azimuth because the grid azimuth is now larger than the G-M angle.

(1) When working with a map having an east G-M angle:

- (a) To plot a magnetic azimuth on a map, first change it to a grid azimuth (Figure 6-10).

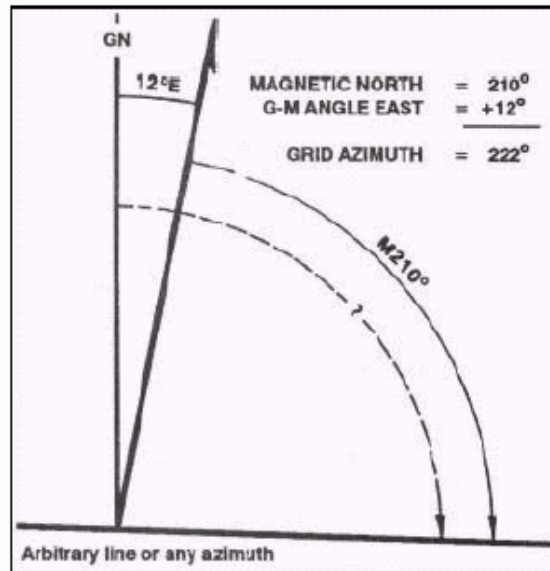


Figure 6-10. Converting to grid azimuth.

- (b) To use a magnetic azimuth in the field with a compass, first change the grid azimuth plotted on a map to a magnetic azimuth (Figure 6-11).

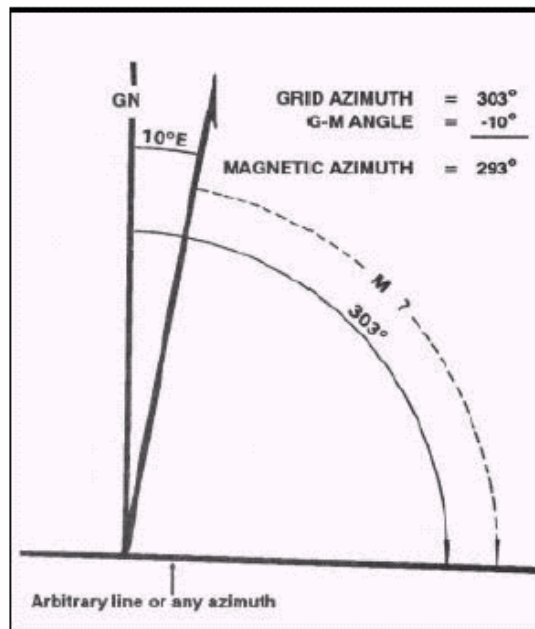


Figure 6-11. Converting to magnetic azimuth.



(c) Convert a grid azimuth to a magnetic azimuth when the G-M angle is greater than a grid azimuth (Figure 6-12).

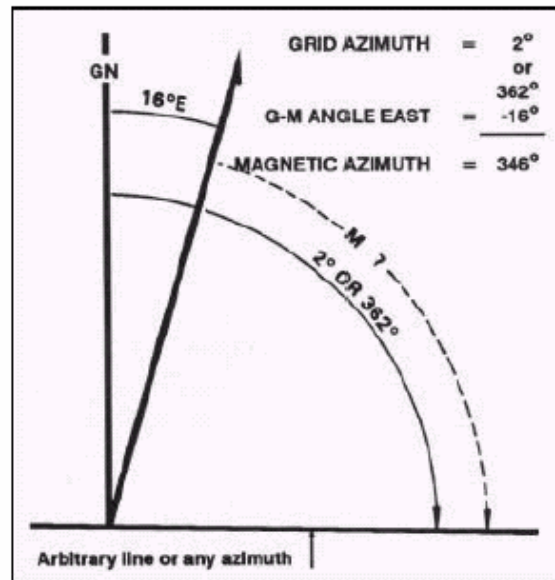


Figure 6-12. Converting to a magnetic azimuth when the G-M angle is greater.

(2) When working with a map having a west G-M angle:

(a) To plot a magnetic azimuth on a map, first convert it to a grid azimuth (Figure 6-13).

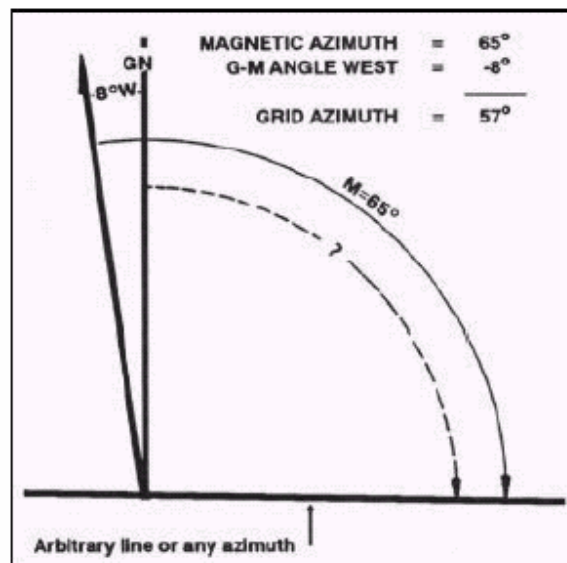


Figure 6-13. Converting to a grid azimuth on a map.

(b) To use a magnetic azimuth in the field with a compass, change the grid azimuth plotted on a map to a magnetic azimuth (Figure 6-14).

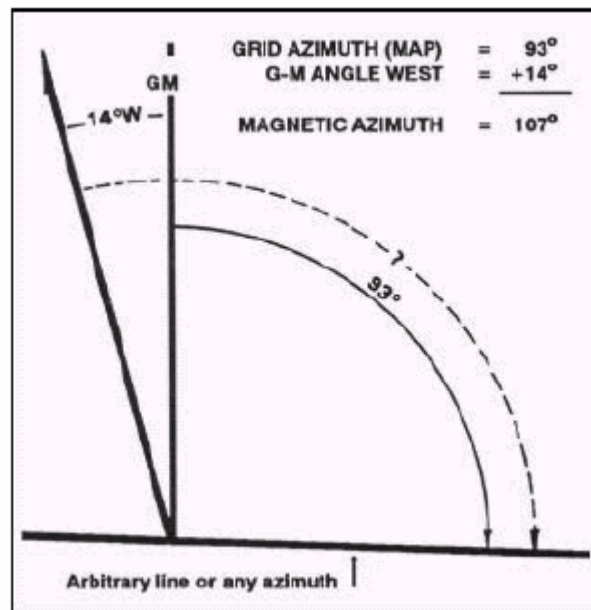


Figure 6-14. Converting to a magnetic azimuth on a map.

(c) Convert a magnetic azimuth when the G-M angle is greater than the magnetic azimuth (Figure 6-15).

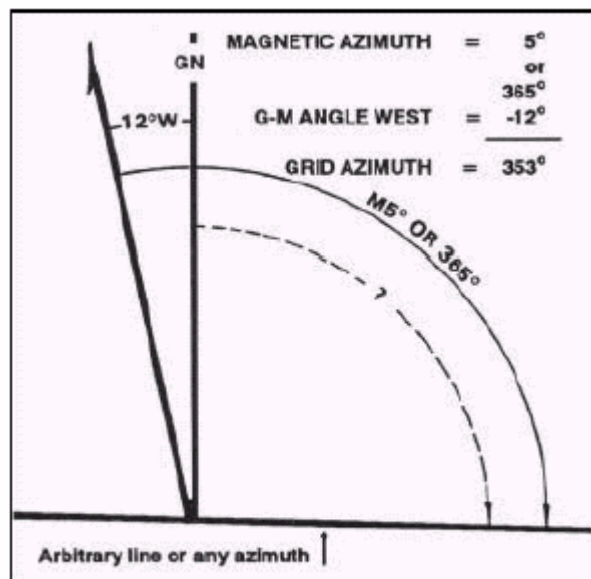


Figure 6-15. Converting to a grid azimuth when the G-M angle is greater.



(3) The G-M angle diagram should be constructed and used each time the conversion of azimuth is required. Such procedure is important when working with a map for the first time. It also may be convenient to construct a G-M angle conversion table on the margin of the map.

**NOTE:** When converting azimuths, exercise extreme care when adding and subtracting the G-M angle. A simple mistake of 1° could be significant in the field.

## **6-7. INTERSECTION**

Intersection is the location of an unknown point by successively occupying at least two (preferably three) known positions on the ground and then map sighting on the unknown location. It is used to locate distant or inaccessible points or objects such as enemy targets and danger areas. There are two methods of intersection: the map and compass method and the straightedge method (Figures 6-16 and 6-17 on pages 6-14 and 6-15).

a. When using the map and compass method—

(1) Orient the map using the compass.

(2) Locate and mark your position on the map,

(3) Determine the magnetic azimuth to the unknown position using the compass.

(4) Convert the magnetic azimuth to grid azimuth.

(5) Draw a line on the map from your position on this grid azimuth.

(6) Move to a second known point and repeat steps 1, 2, 3, 4, and 5.

(7) The location of the unknown position is where the lines cross on the map. Determine the grid coordinates to the desired accuracy.

b. The straight edge method is used when a compass is not available. When using it—

(1) Orient the map on a flat surface by the terrain association method.

(2) Locate and mark your position on the map.

(3) Lay a straight edge on the map with one end at the user's position (A) as a pivot point; then, rotate the straightedge until the unknown point is sighted along the edge.

(4) Draw a line along the straight edge

(5) Repeat the above steps at position (B) and check for accuracy.

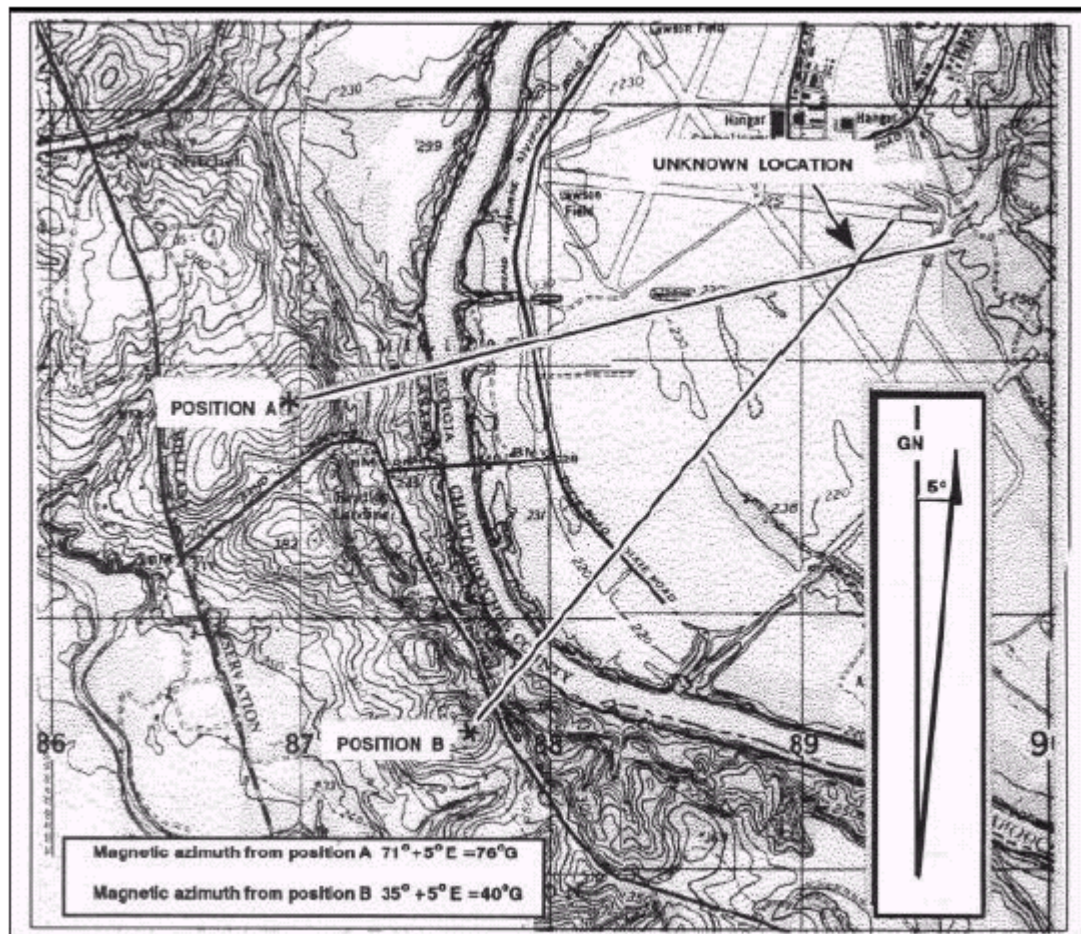


Figure 6-16. Intersection, using map and compass.

(6) The intersection of the lines on the map is the location of the unknown point (C). Determine the grid coordinates to the desired accuracy (Figure 6-17).

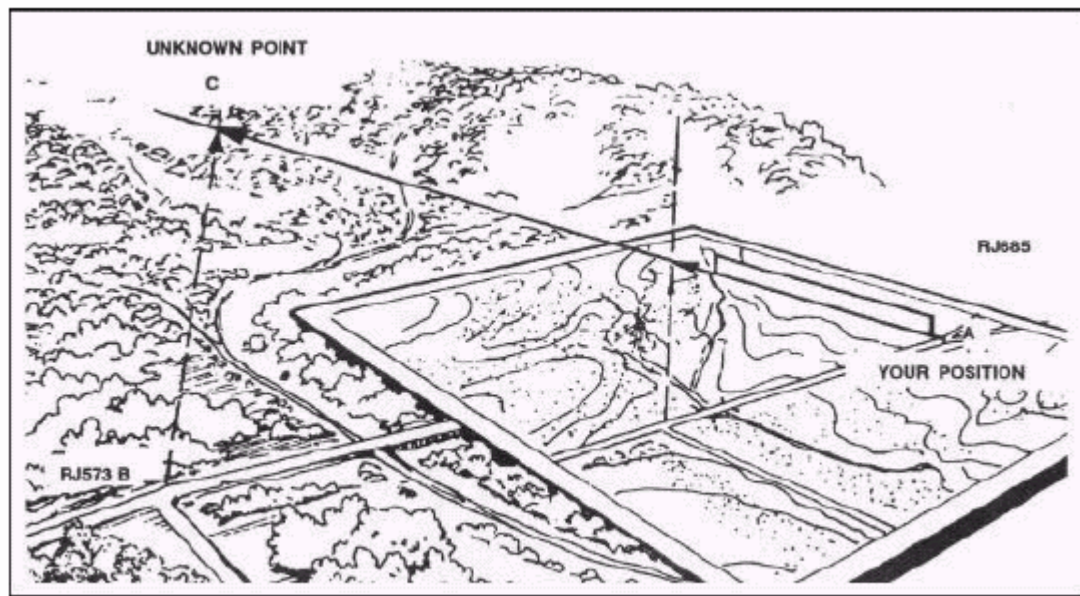


Figure 6-17. Intersection, using a straightedge.

### 6-8. RESECTION

Resection is the method of locating one's position on a map by determining the grid azimuth to at least two well-defined locations that can be pinpointed on the map. For greater accuracy, the desired method of resection would be to use three or more well-defined locations.

- a. When using the map and compass method (Figure 6-18)—
  - (1) Orient the map using the compass.
  - (2) Identify two or three known distant locations on the ground and mark them on the map.
  - (3) Measure the magnetic azimuth to one of the known positions from your location using a compass.
  - (4) Convert the magnetic azimuth to a grid azimuth.
  - (5) Convert the grid azimuth to a back azimuth. Using a protractor, draw a line for the back azimuth on the map from the known position back toward your unknown position.
  - (6) Repeat 3, 4, and 5 for a second position and a third position, if desired.



(7) The intersection of the lines is your location. Determine the grid coordinates to the desired accuracy.

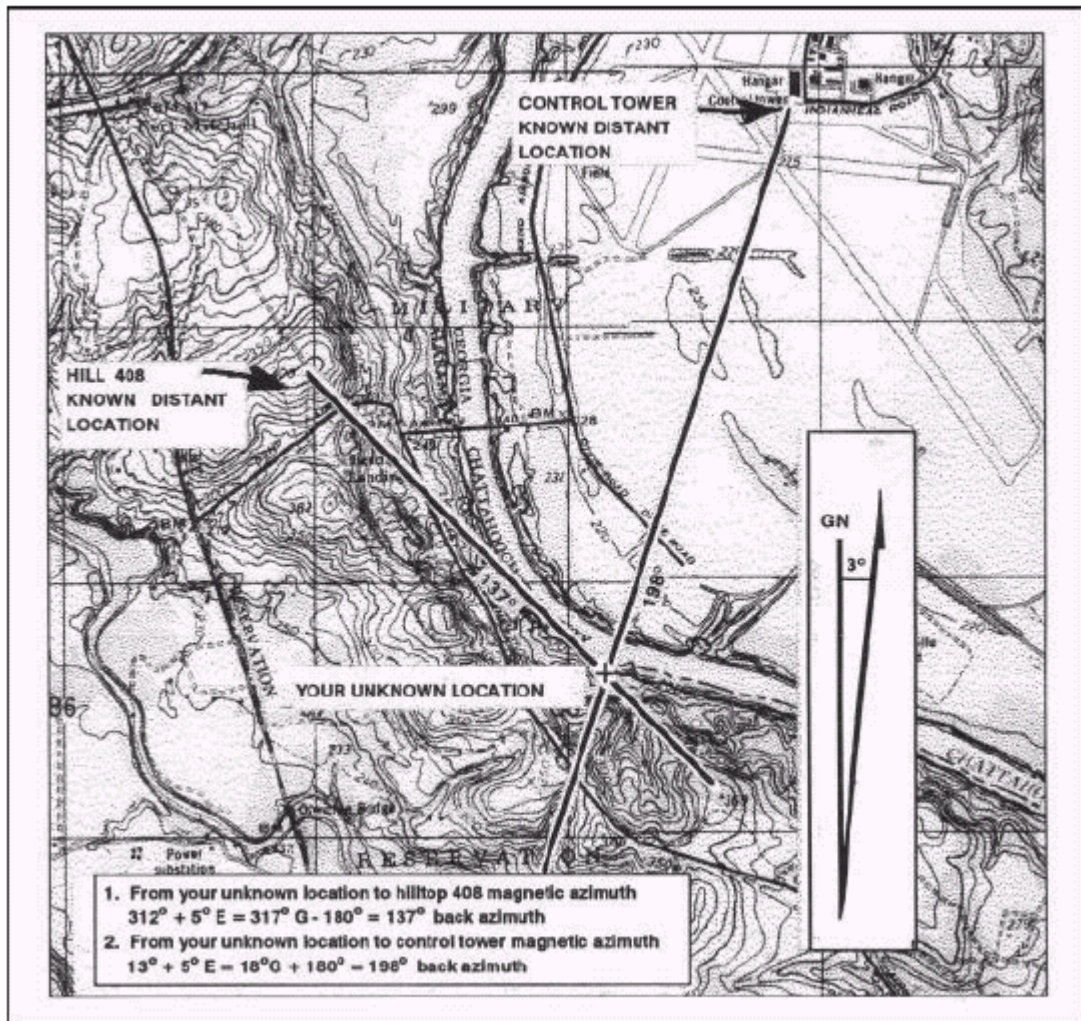


Figure 6-18. Resection with map and compass.

- a. When using the straightedge method (Figure 6-19)—
- (1) Orient the map on a flat surface by the terrain association method.
  - (2) Locate at least two known distant locations or prominent features on the ground and mark them on the map.
  - (3) Lay a straightedge on the map using a known position as a pivot point. Rotate the straightedge until the known position on the map is aligned with the known position on the ground.
  - (4) Draw a line along the straightedge away from the known position on the ground toward your position.
  - (5) Repeat 3 and 4 using a second known position.
  - (6) The intersection of the lines on the map is your location. Determine the grid coordinates to the desired accuracy.

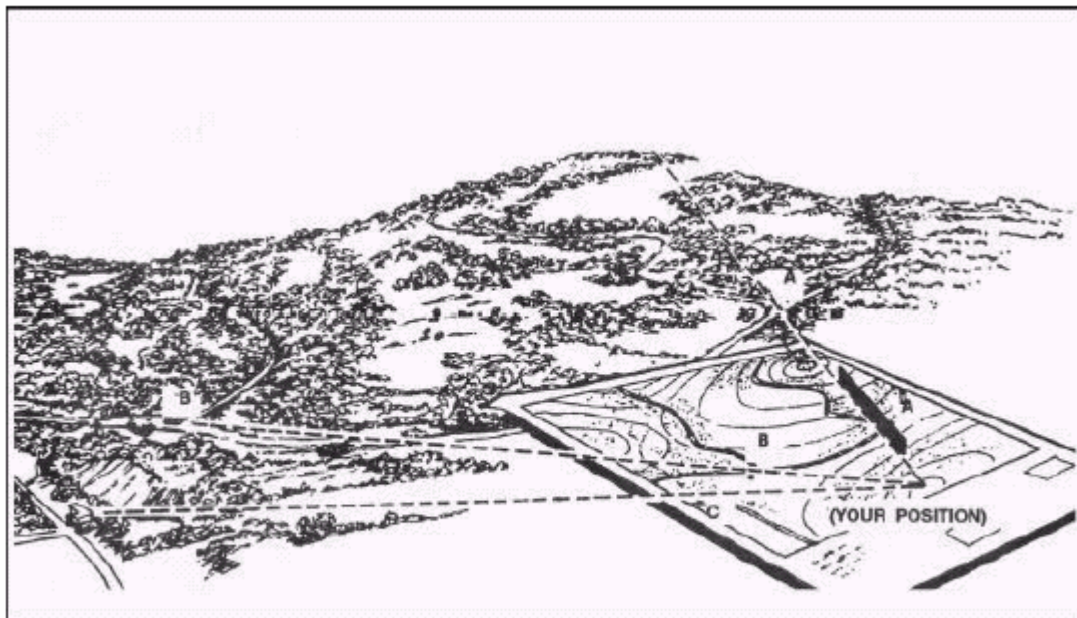


Figure 6-19. Resection with straightedge.

### 6-9. MODIFIED RESECTION

Modified resection is the method of locating one's position on the map when the person is located on a linear feature on the ground, such as a road, canal, or stream (Figure 6-20).

Proceed as follows:

- Orient the map using a compass or by terrain association.
- Find a distant point that can be identified on the ground and on the map.
- Determine the magnetic azimuth from your location to the distant known point.
- Convert the magnetic azimuth to a grid azimuth.
- Convert the grid azimuth to a back azimuth. Using a protractor, draw a line for the back azimuth on the map from the known position back toward your unknown position.
- The location of the user is where the line crosses the linear feature. Determine the grid coordinates to the desired accuracy.

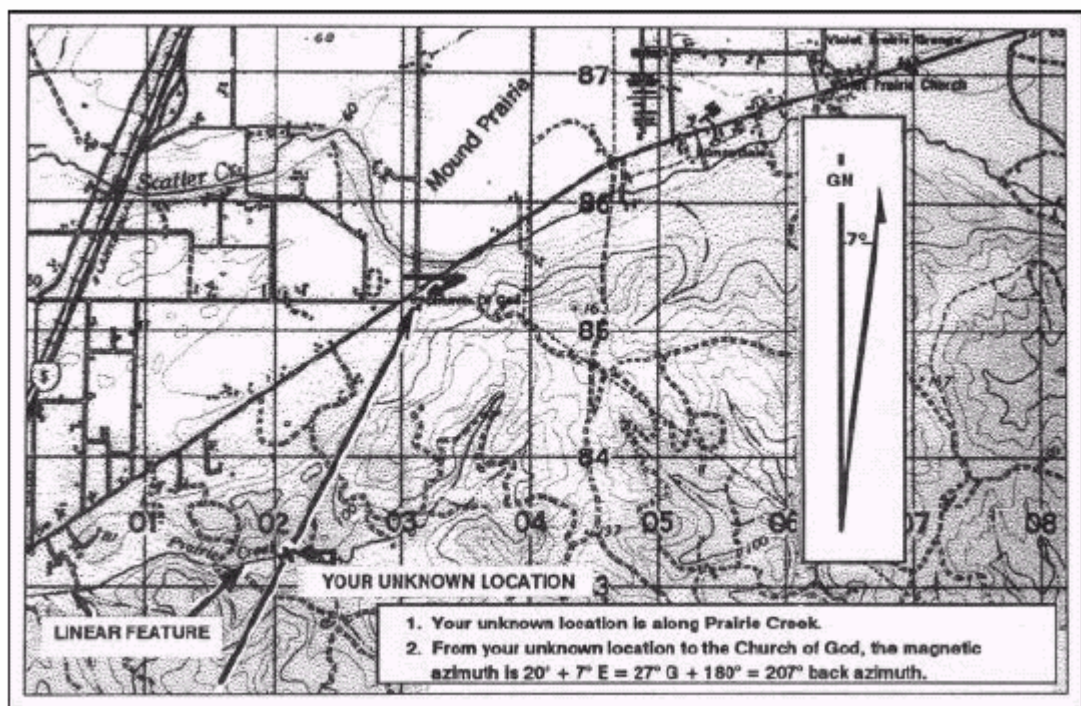


Figure 6-20. Modified resection.



### 6-10. POLAR COORDINATES

A method of locating or plotting an unknown position from a known point by giving a direction and a distance along that direction line is called polar coordinates. The following elements must be present when using polar coordinates (Figure 6-21).

- Present known location on the map.
- Azimuth (grid or magnetic).
- Distance (in meters).

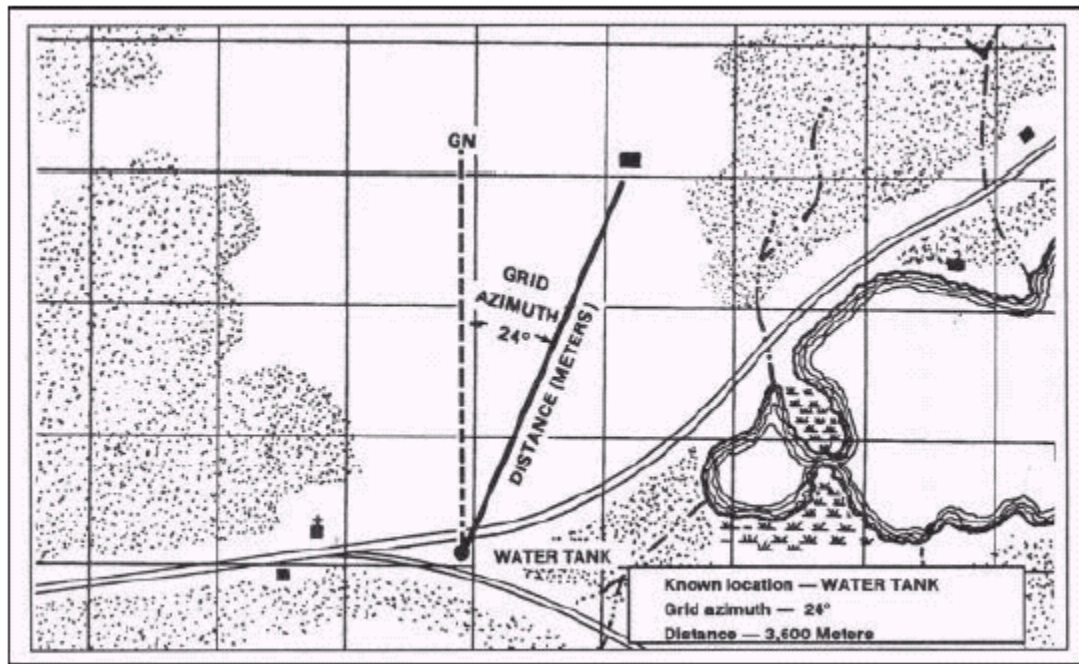


Figure 6-21. Polar plot.

Using the laser range finder to determine the range enhances your accuracy in determining the unknown position's location.

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## PART TWO LAND NAVIGATION

### CHAPTER 9 NAVIGATION EQUIPMENT AND METHODS

*Compasses are the primary navigation tools to use when moving in an outdoor world where there is no other way to find directions. Soldiers should be thoroughly familiar with the compass and its uses. Part One of this manual discussed the techniques of map reading. To complement these techniques, a mastery of field movement techniques is essential. This chapter describes the lensatic compass and its uses, and some of the field expedient methods used to find directions when compasses are not available.*

#### 9-1. TYPES OF COMPASSES

The **lensatic compass** is the most common and simplest instrument for measuring direction. It is discussed in detail in paragraph 9-2. The **artillery M2 compass** is a special-purpose instrument designed for accuracy; it will be discussed in Appendix G. The **wrist/pocket compass** is a small magnetic compass that can be attached to a wristwatch band. It contains a north-seeking arrow and a dial in degrees. A **protractor** can be used to determine azimuths when a compass is not available. However, it should be noted that when using the protractor on a map, only grid azimuths are obtained.

#### 9-2. LENSATIC COMPASS

The lensatic compass (Figure 9-1) consists of three major parts: the cover, the base, and the lens.

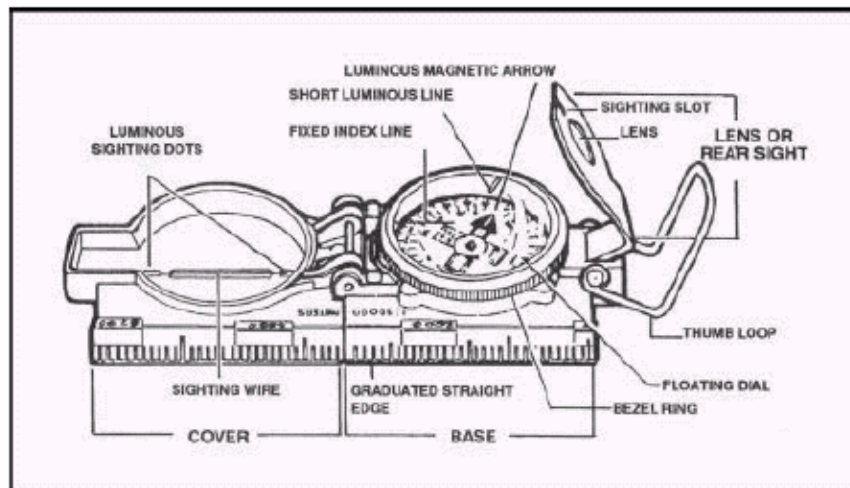


Figure 9-1. Lensatic compass.

a. **Cover.** The compass cover protects the floating dial. It contains the sighting wire (front sight) and two luminous sighting slots or dots used for night navigation.

b. **Base.** The body of the compass contains the following movable parts:

(1) The floating dial is mounted on a pivot so it can rotate freely when the compass is held level. Printed on the dial in luminous figures are an arrow and the letters E and W. The arrow always points to magnetic north and the letters fall at east (E) 90° and west (W) 270° on the dial. There are two scales; the outer scale denotes mils and the inner scale (normally in red) denotes degrees.

(2) Encasing the floating dial is a glass containing a fixed black index line.

(3) The bezel ring is a ratchet device that clicks when turned. It contains 120 clicks when rotated fully; each click is equal to 3°. A short luminous line that is used in conjunction with the north-seeking arrow during navigation is contained in the glass face of the bezel ring.

(4) The thumb loop is attached to the base of the compass.

c. **Lens.** The lens is used to read the dial, and it contains the rear-sight slot used in conjunction with the front for sighting on objects. The rear sight also serves as a lock and clamps the dial when closed for its protection. The rear sight must be opened more than 45° to allow the dial to float freely.

**NOTE:** When opened, the straightedge on the left side of the compass has a coordinate scale; the scale is 1:50,000 in newer compasses.

#### **WARNING**

Some older compasses will have a 1:25,000 scale. This scale can be used with a 1:50,000-scale map, but the values read must be halved. Check the scale.

### **9-3. COMPASS HANDLING**

Compasses are delicate instruments and should be cared for accordingly.

a. **Inspection.** A detailed inspection is required when first obtaining and using a compass. One of the most important parts to check is the floating dial, which contains the magnetic needle. The user must also make sure the sighting wire is straight, the glass and crystal parts are not broken, the numbers on the dial are readable, and most important, that the dial does not stick.

b. **Effects of Metal and Electricity.** Metal objects and electrical sources can affect the performance of a compass. However, nonmagnetic metals and alloys do not affect compass readings. The following separation distances are suggested to ensure proper functioning of a compass:

|   |            |
|---|------------|
| High-tension power lines .....                    | 55 meters. |
| Field gun, truck, or tank.....                    | 18 meters. |
| Telegraph or telephone wires and barbed wire..... | 10 meters. |
| Machine gun.....                                  | 2 meters.  |
| Steel helmet or rifle.....                        | 1/2 meter. |

c. **Accuracy.** A compass in good working condition is very accurate. However, a compass has to be checked periodically on a known line of direction, such as a surveyed azimuth using a declination station. Compasses with more than  $3^{\circ}$  + variation should not be used.

d. **Protection.** If traveling with the compass unfolded, make sure the rear sight is fully folded down onto the bezel ring. This will lock the floating dial and prevent vibration, as well as protect the crystal and rear sight from damage.

#### 9-4. USING A COMPASS

Magnetic azimuths are determined with the use of magnetic instruments, such as lensatic and M2 compasses. The techniques employed when using the lensatic compass are as follows:

a. **Using the Centerhold Technique.** First, open the compass to its fullest so that the cover forms a straightedge with the base. Move the lens (rear sight) to the rearmost position, allowing the dial to float freely. Next, place your thumb through the thumb loop, form a steady base with your third and fourth fingers, and extend your index finger along the side of the compass. Place the thumb of the other hand between the lens (rear sight) and the bezel ring; extend the index finger along the remaining side of the compass, and the remaining fingers around the fingers of the other hand. Pull your elbows firmly into your sides; this will place the compass between your chin and your belt. To measure an azimuth, simply turn your entire body toward the object, pointing the compass cover directly at the object. Once you are pointing at the object, look down and read the azimuth from beneath the fixed black index line (Figure 9-2). This preferred method offers the following advantages over the sighting technique:

- (1) It is faster and easier to use.
- (2) It can be used under all conditions of visibility.
- (3) It can be used when navigating over any type of terrain.
- (4) It can be used without putting down the rifle; however, the rifle must be slung well back over either shoulder.
- (5) It can be used without removing eyeglasses.

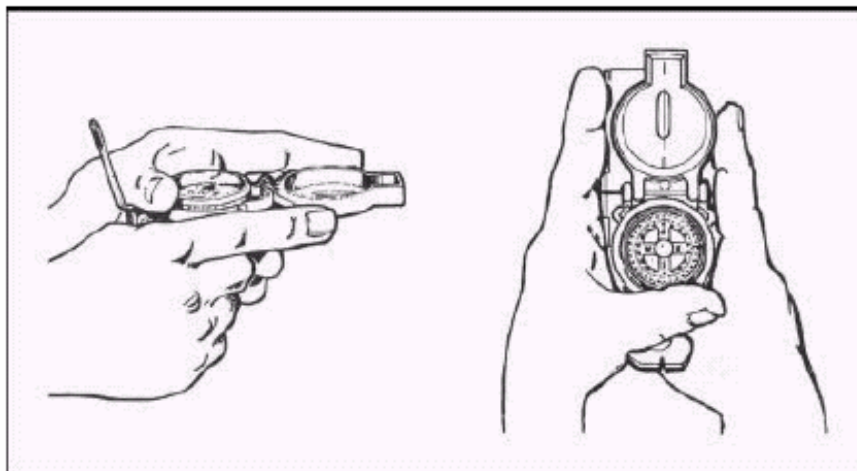
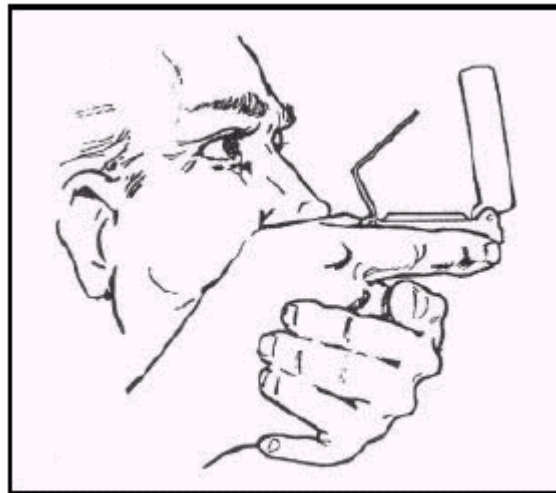


Figure 9-2. Centerhold technique.

b. **Using the Compass-to-Cheek Technique.** Fold the cover of the compass containing the sighting wire to a vertical position; then fold the rear sight slightly forward. Look through the rear-sight slot and align the front-sight hairline with the desired object in the distance. Then glance down at the dial through the eye lens to read the azimuth (Figure 9-3).

**NOTE:** The compass-to-cheek technique is used almost exclusively for sighting, and it is the best technique for this purpose.



**Figure 9-3. Compass-to-cheek technique.**

c. **Presetting a Compass and Following an Azimuth.** Although different models of the lensatic compass vary somewhat in the details of their use, the principles are the same.

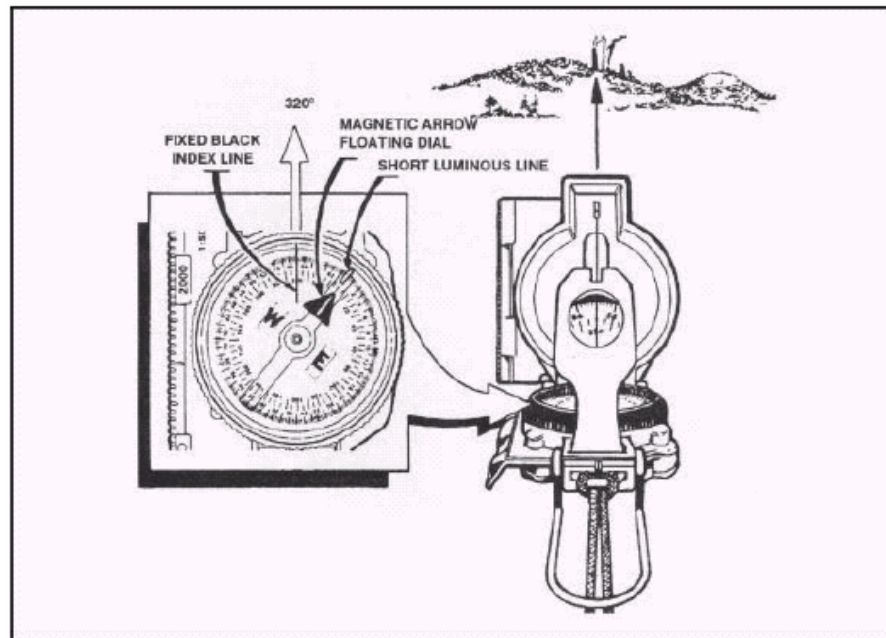
(1) During daylight hours or with a light source:

(a) Hold the compass level in the palm of the hand.

(b) Rotate it until the desired azimuth falls under the fixed black index line (for example, 320°), maintaining the azimuth as prescribed (Figure 9-4).

(c) Turn the bezel ring until the luminous line is aligned with the north-seeking arrow. Once the alignment is obtained, the compass is preset.

(d) To follow an azimuth, assume the centerhold technique and turn your body until the north-seeking arrow is aligned with the luminous line. Then proceed forward in the direction of the front cover's sighting wire, which is aligned with the fixed black index line that contains the desired azimuth.



**Figure 9-4. Compass preset at 320 degrees**

(2) During limited visibility, an azimuth may be set on the compass by the click method. Remember that the bezel ring contains 3° intervals (clicks).

(a) Rotate the bezel ring until the luminous line is over the fixed black index line.

(b) Find the desired azimuth and divide it by three. The result is the number of clicks that you have to rotate the bezel ring.

(c) Count the desired number of clicks. If the desired azimuth is smaller than 180°, the number of clicks on the bezel ring should be counted in a counterclockwise direction. For example, the desired azimuth is 51°. Desired azimuth is  $51^\circ \div 3 = 17$  clicks counterclockwise. If the desired azimuth is larger than 180°, subtract the number of degrees from 360° and divide by 3 to obtain the number of clicks. Count them in a clockwise direction. For example, the desired azimuth is 330°;  $360^\circ - 330^\circ = 30 \div 3 = 10$  clicks clockwise.

(d) With the compass preset as described above, assume a centerhold technique and rotate your body until the north-seeking arrow is aligned with the luminous line on the bezel. Then proceed forward in the direction of the front cover's luminous dots, which are aligned with the fixed black index line containing the azimuth.

(e) When the compass is to be used in darkness, an initial azimuth should be set while light is still available, if possible. With the initial azimuth as a base, any other azimuth that is a multiple of three can be established through the use of the clicking feature of the bezel ring.

**NOTE:** Sometimes the desired azimuth is not exactly divisible by three, causing an option of rounding up or rounding down. If the azimuth is rounded up, this causes an

increase in the value of the azimuth, and the object is to be found on the left. If the azimuth is rounded down, this causes a decrease in the value of the azimuth, and the object is to be found on the right.

d. **Bypassing an Obstacle.** To bypass enemy positions or obstacles and still stay oriented, detour around the obstacle by moving at right angles for specified distances.

(1) For example, while moving on an azimuth of  $90^\circ$  change your azimuth to  $180^\circ$  and travel for 100 meters. Change your azimuth to  $90^\circ$  and travel for 150 meters. Change your azimuth to  $360^\circ$  and travel for 100 meters. Then, change your azimuth to  $90^\circ$  and you are back on your original azimuth line (Figure 9-5).

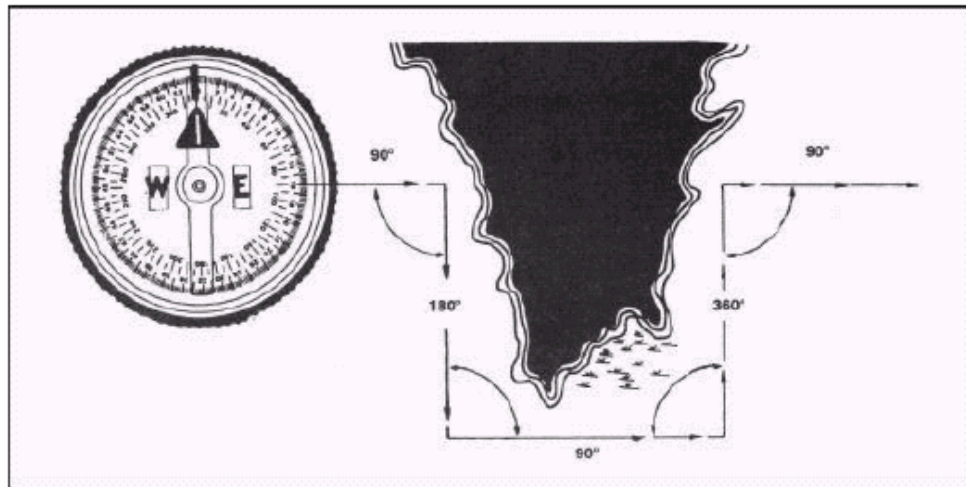


Figure 9-5. Bypassing an obstacle.

(2) Bypassing an unexpected obstacle at night is a fairly simple matter. To make a  $90^\circ$  turn to the right, hold the compass in the centerhold technique; turn until the center of the luminous letter E is under the luminous line (*do not* move the bezel ring). To make a  $90^\circ$  turn to the left, turn until the center of the luminous letter W is under the luminous line. This does not require changing the compass setting (bezel ring), and it ensures accurate  $90^\circ$  turns.

e. **Offset.** A deliberate offset is a planned magnetic deviation to the right or left of an azimuth to an objective. Use it when the objective is located along or in the vicinity of a linear feature such as a road or stream. Because of errors in the compass or in map reading, the linear feature may be reached without knowing whether the objective lies to the right or left. A deliberate offset by a known number of degrees in a known direction compensates for possible errors and ensures that upon reaching the linear feature, the user knows whether to go right or left to reach the objective. Ten degrees is an adequate offset for most tactical uses. Each degree offset moves the course about 18 meters to the right or left for each 1,000 meters traveled. For example, in Figure 9-6, the number of degrees offset is 10. If the distance traveled to "x" in 1,000 meters, then "x" is located about 180 meters to the right of the objective.



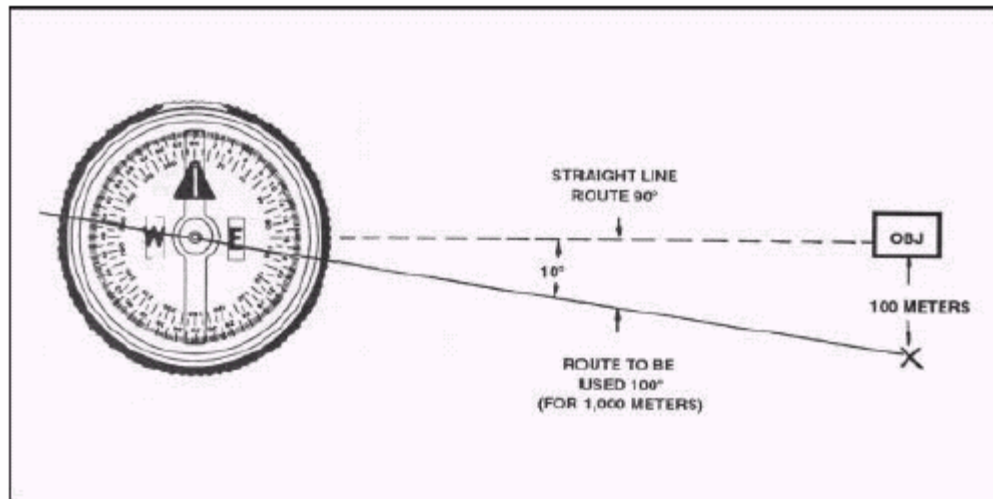


Figure 9-6. Deliberate offset to the objective.

### 9-5. FIELD-EXPEDIENT METHODS

When a compass is not available, different techniques should be used to determine the four cardinal directions.

#### a. Shadow-Tip Method.

(1) This simple and accurate method of finding direction by the sun consists of four basic steps (Figure 9-7).

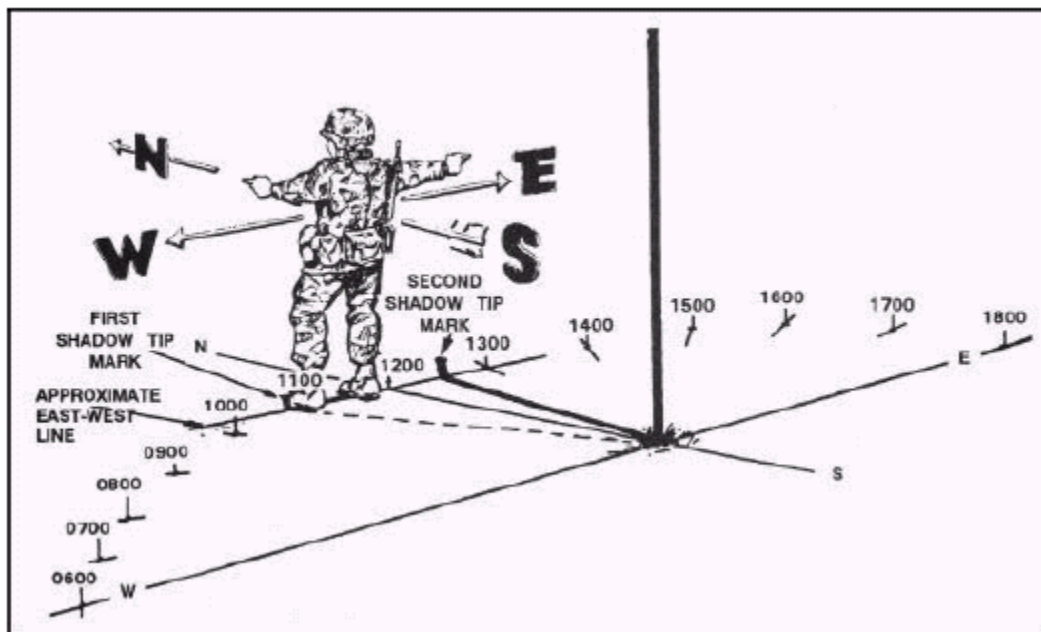


Figure 9-7. Determining directions and time by shadow

**Step 1.** Place a stick or branch into the ground at a level spot where a distinctive shadow will be cast. Mark the shadow tip with a stone, twig, or other means. This first shadow mark is always the west direction.

**Step 2.** Wait 10 to 15 minutes until the shadow tip moves a few inches. Mark the new position of the shadow tip in the same way as the first.

**Step 3.** Draw a straight line through the two marks to obtain an approximate east-west line.

**Step 4.** Standing with the first mark (west) to your left, the other directions are simple; north is to the front, east is to the right, and south is behind you.

(2) A line drawn perpendicular to the east-west line at any point is the approximate north-south line. If you are uncertain which direction is east and which is west, observe this simple rule--the first shadow-tip mark is always in the west direction, everywhere on earth.

(3) The shadow-tip method can also be used as a shadow clock to find the approximate time of day (Figure 9-7 on page 9-7).

(a) To find the time of day, move the stick to the intersection of the east-west line and the north-south line, and set it vertically in the ground. The west part of the east-west line indicates 0600 hours, and the east part is 1800 hours, anywhere on earth, because the basic rule always applies.

(b) The north-south line now becomes the noon line. The shadow of the stick is an hour hand in the shadow clock, and with it you can estimate the time using the noon line and the 6 o'clock line as your guides. Depending on your location and the season, the shadow may move either clockwise or counterclockwise, but this does not alter your manner of reading the shadow clock.

(c) The shadow clock is not a timepiece in the ordinary sense. It makes every day 12 unequal hours long, and always reads 0600 hours at sunrise and 1800 hours at sunset. The shadow clock time is closest to conventional clock time at midday, but the spacing of the other hours compared to conventional time varies somewhat with the locality and the date. However, it does provide a satisfactory means of telling time in the absence of properly set watches.

(d) The shadow-tip system is not intended for use in polar regions, which the Department of Defense defines as being above 60° latitude in either hemisphere. Distressed persons in these areas are advised to stay in one place so that search/rescue teams may easily find them. The presence and location of all aircraft and ground parties in polar regions are reported to and checked regularly by governmental or other agencies, and any need for help becomes quickly known.

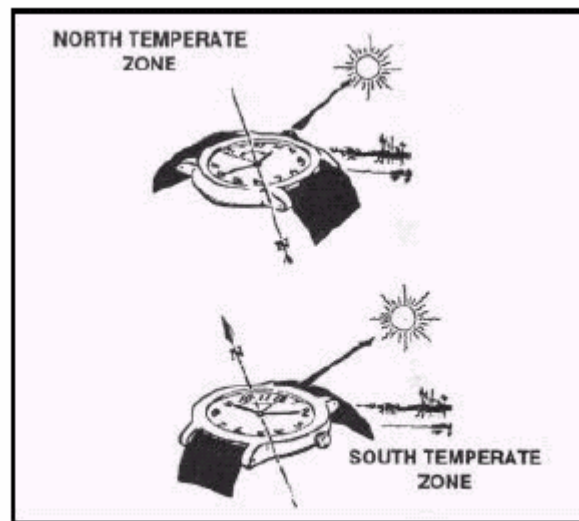
**b. Watch Method.**

(1) A watch can be used to determine the approximate true north and true south. In the north temperate zone only, the hour hand is pointed toward the sun. A south line can be found midway between the hour hand and 1200 hours, standard time. If on daylight saving time, the north-south line is found between the hour hand and 1300 hours. If there is any doubt as to which end of the line is north, remember that the sun is in the east before noon and in the west after noon.

(2) The watch may also be used to determine direction in the south temperate zone; however, the method is different. The 1200-hour dial is pointed toward the sun, and halfway



between 1200 hours and the hour hand will be a north line. If on daylight saving time, the north line lies midway between the hour hand and 1300 hours (Figure 9-8).



**Figure 9-8. Determining direction by using a watch.**

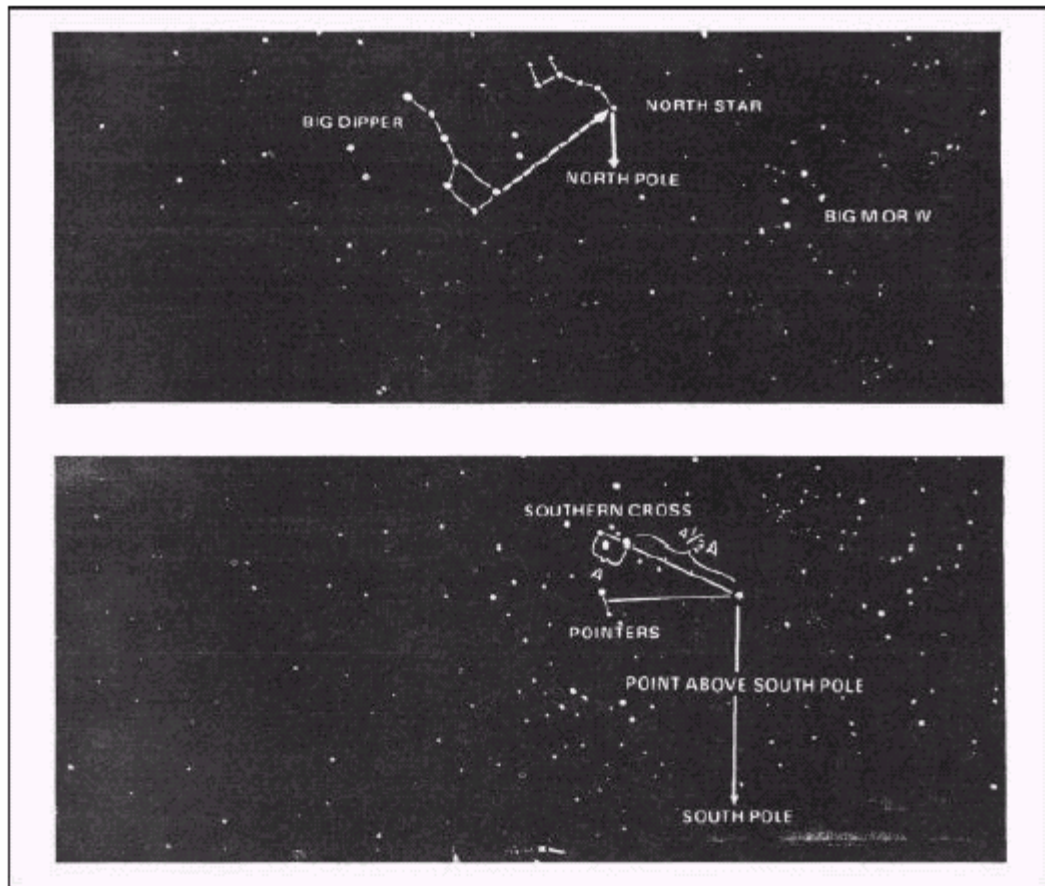
(3) The watch method can be in error, especially in the lower latitudes, and may cause *circling*. To avoid this, make a shadow clock and set your watch to the time indicated. After traveling for an hour, take another shadow-clock reading. Reset your watch if necessary.

**c. Star Method.**

(1) Less than 60 of approximately 5,000 stars visible to the eye are used by navigators. The stars seen as we look up at the sky at night are not evenly scattered across the whole sky. Instead they are in groups called constellations.

(2) The constellations that we see depends partly on where we are located on the earth, the time of the year, and the time of the night. The night changes with the seasons because of the journey of the earth around the sun, and it also changes from hour to hour because the turning of the earth makes some constellations seem to travel in a circle. But there is one star that is in almost exactly the same place in the sky all night long every night. It is the North Star, also known as the Polar Star or Polaris.

(3) The North Star is less than  $1^\circ$  off true north and does not move from its place because the axis of the earth is pointed toward it. The North Star is in the group of stars called the Little Dipper. It is the last star in the handle of the dipper. There are two stars in the Big Dipper, which are a big help when trying to find the North Star. They are called the Pointers, and an imaginary line drawn through them five times their distance points to the North Star. There are many stars brighter than the North Star, but none is more important because of its location. However, the North Star can only be seen in the northern hemisphere so it cannot serve as a guide south of the equator. The farther one goes north, the higher the North Star is in the sky, and above latitude  $70^\circ$ , it is too high in the sky to be useful (Figure 9-9).



**Figure 9-9. Determining direction by the North Star and Southern Cross.**

(4) Depending on the star selected for navigation, azimuth checks are necessary. A star near the north horizon serves for about half an hour. When moving south, azimuth checks should be made every 15 minutes. When traveling east or west, the difficulty of staying on azimuth is caused more by the likelihood of the star climbing too high in the sky or losing itself behind the western horizon than it is by the star changing direction angle. When this happens, it is necessary to change to another guide star. The Southern Cross is the main constellation used as a guide south of the equator, and the above general directions for using north and south stars are reversed. When navigating using the stars as guides, the user must know the different constellation shapes and their locations throughout the world (Figure 9-10 and Figure 9-11 on page 9-12).

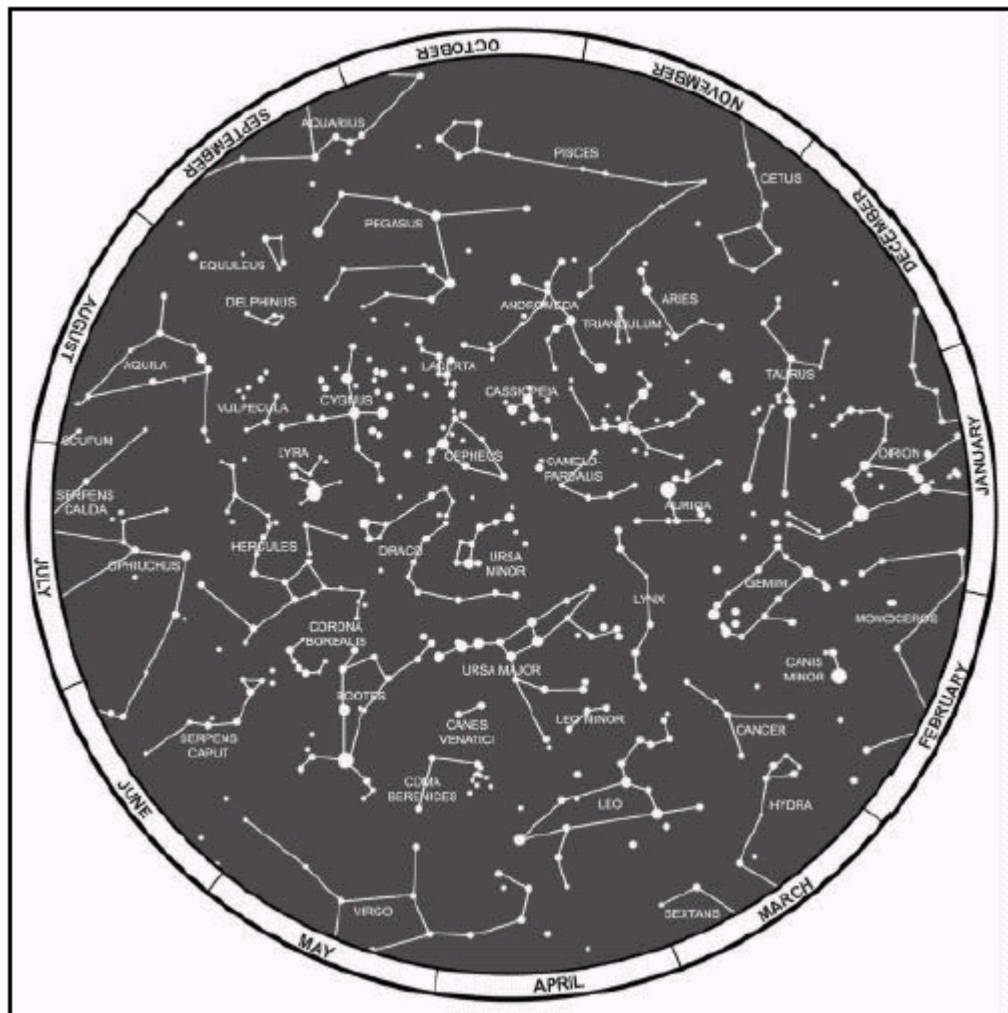
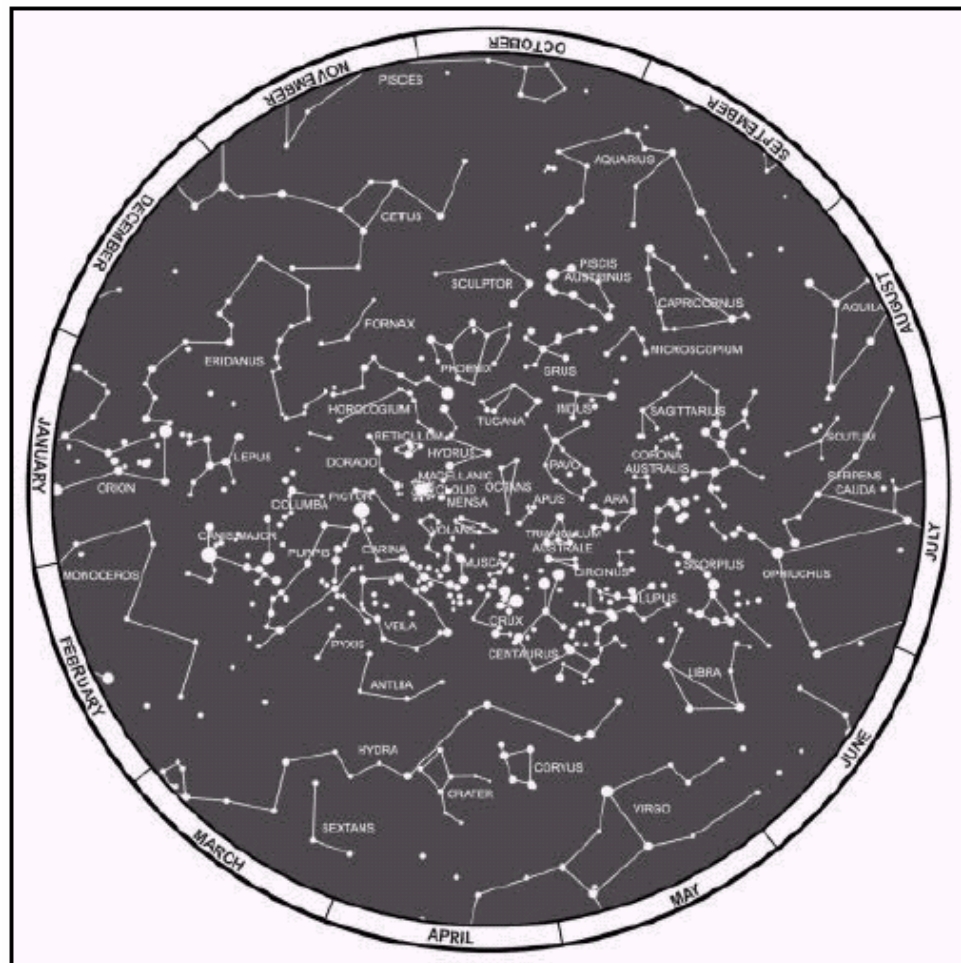


Figure 9-10. Constellations, northern hemisphere



**Figure 9-11. Constellations, southern hemisphere**

## 9-6. GLOBAL POSITIONING SYSTEM

The GPS is a space-based, global, all-weather, continuously available, radio positioning navigation system. It is highly accurate in determining position location derived from signal triangulation from a satellite constellation system. It is capable of determining latitude, longitude, and altitude of the individual user. It is being fielded in hand-held, manpack, vehicular, aircraft, and watercraft configurations. The GPS receives and processes data from satellites on either a simultaneous or sequential basis. It measures the velocity and range with respect to each satellite, processes the data in terms of an earth-centered, earth-fixed coordinate system, and displays the information to the user in geographic or military grid coordinates.

- a. The GPS can provide precise steering information, as well as position location. The receiver can accept many checkpoints entered in any coordinate system by the user and convert them to the desired coordinate system. The user then calls up the desired checkpoint and the receiver will display direction and distance to the checkpoint. The GPS does not have

inherent drift, an improvement over the Inertial Navigation System, and the receiver will automatically update its position. The receiver can also compute time to the next checkpoint.

b. Specific uses for the GPS are position location; navigation; weapon location; target and sensor location; coordination of firepower; scout and screening operations; combat resupply; location of obstacles, barriers, and gaps; and communication support. The GPS also has the potential to allow units to train their soldiers and provide the following:

- Performance feedback.
- Knowledge of routes taken by the soldier.
- Knowledge of errors committed by the soldier.
- Comparison of planned versus executed routes.
- Safety and control of lost and injured soldiers.

(See Appendix J for more information of the GPS.)

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## CHAPTER 10

# ELEVATION AND RELIEF

*The elevation of points on the ground and the relief of an area affect the movement, positioning, and, in some cases, effectiveness of military units. Soldiers must know how to determine locations of points on a map, measure distances and azimuths, and identify symbols on a map. They must also be able to determine the elevation and relief of areas on standard military maps. To do this, they must first understand how the mapmaker indicated the elevation and relief on the map.*

### 10-1. DEFINITIONS

The reference or start point for vertical measurement of elevation on a standard military map are the **datum plane** or **mean sea level**, the point halfway between high tide and low tide. **Elevation** of a point on the earth's surface is the vertical distance it is above or below mean sea level. **Relief** is the representation (as depicted by the mapmaker) of the shapes of hills, valleys, streams, or terrain features on the earth's surface.

### 10-2. METHODS OF DEPICTING RELIEF

Mapmakers use several methods to depict relief of the terrain.

a. **Layer Tinting.** Layer tinting is a method of showing relief by color. A different color is used for each band of elevation. Each shade of color, or band, represents a definite elevation range. A legend is printed on the map margin to indicate the elevation range represented by each color. However, this method does not allow the map user to determine the exact elevation of a specific point—only the range.

b. **Form Lines.** Form lines are not measured from any datum plane. Form lines have no standard elevation and give only a general idea of relief. Form lines are represented on a map as dashed lines and are never labeled with representative elevations.

c. **Shaded Relief.** Relief shading indicates relief by a shadow effect achieved by tone and color that results in the darkening of one side of terrain features, such as hills and ridges. The darker the shading, the steeper the slope. Shaded relief is sometimes used in conjunction with contour lines to emphasize these features.

d. **Hachures.** Hachures are short, broken lines used to show relief. Hachures are sometimes used with contour lines. They do not represent exact elevations, but are mainly used to show large, rocky outcrop areas. Hachures are used extensively on small-scale maps to show mountain ranges, plateaus, and mountain peaks.

e. **Contour Lines.** Contour lines are the most common method of showing relief and elevation on a standard topographic map. A contour line represents an imaginary line on the ground, above or below sea level. All points on the contour line are at the same elevation. The elevation represented by contour lines is the vertical distance above or below sea level. The three types of contour lines (Figure 10-1, page 10-2) used on a standard topographic map are as follows:



(1) **Index.** Starting at zero elevation or mean sea level, every fifth contour line is a heavier line. These are known as index contour lines. Normally, each index contour line is numbered at some point. This number is the elevation of that line.

(2) **Intermediate.** The contour lines falling between the index contour lines are called intermediate contour lines. These lines are finer and do not have their elevations given. There are normally four intermediate contour lines between index contour lines.

(3) **Supplementary.** These contour lines resemble dashes. They show changes in elevation of at least one-half the contour interval. These lines are normally found where there is very little change in elevation, such as on fairly level terrain.

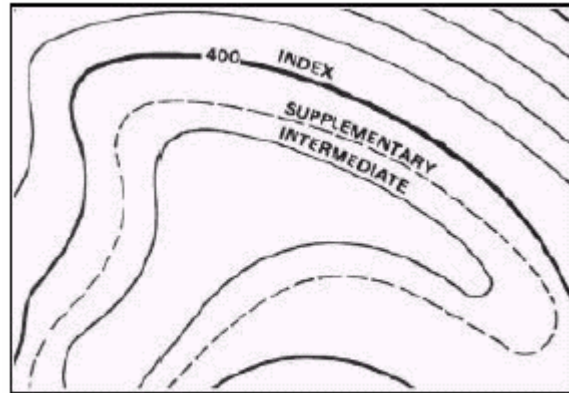


Figure 10-1. Contour lines.

### 10-3. CONTOUR INTERVALS

Before the elevation of any point on the map can be determined, the user must know the contour interval for the map he is using. The contour interval measurement given in the marginal information is the vertical distance between adjacent contour lines. To determine the elevation of a point on the map—

a. Determine the contour interval and the unit of measure used, for example, feet, meters, or yards (Figure 10-2).

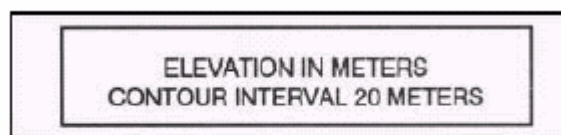
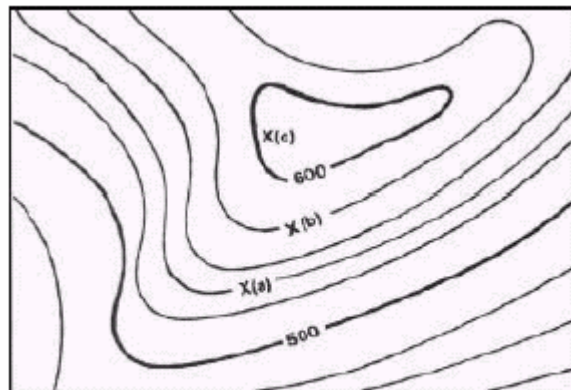


Figure 10-2. Contour interval note.



b. Find the numbered index contour line nearest the point of which you are trying to determine the elevation (Figure 10-3).



**Figure 10-3. Points on contour lines.**

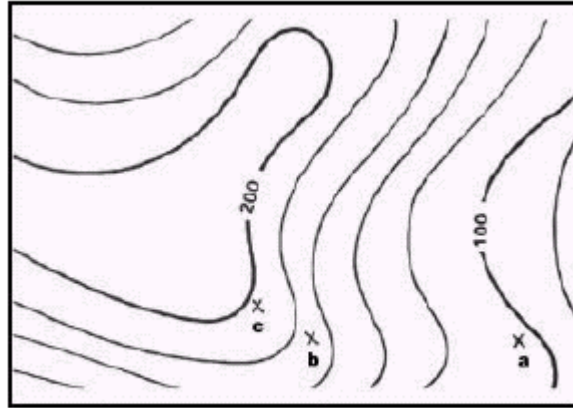
c. Determine if you are going from lower elevation to higher, or vice versa. In Figure 10-3, point (a) is between the index contour lines. The lower index contour line is numbered 500, which means any point on that line is at an elevation of 500 meters above mean sea level. The upper index contour line is numbered 600, or 600 meters. Going from the lower to the upper index contour line shows an increase in elevation.

d. Determine the exact elevation of point (a), start at the index contour line numbered 500 and count the number of intermediate contour lines to point (a). Locate point (a) on the second intermediate contour line above the 500-meter index contour line. The contour interval is 20 meters (Figure 10-2), thus each one of the intermediate contour lines crossed to get to point (a) adds 20 meters to the 500-meter index contour line. The elevation of point (a) is 540 meters; the elevation has increased.

e. Determine the elevation of point (b). Go to the nearest index contour line. In this case, it is the upper index contour line numbered 600. Locate point (b) on the intermediate contour line immediately below the 600-meter index contour line. Below means downhill or a lower elevation. Therefore, point (b) is located at an elevation of 580 meters. Remember, if you are increasing elevation, add the contour interval to the nearest index contour line. If you are decreasing elevation, subtract the contour interval from the nearest index contour line.

f. Determine the elevation to a hilltop point (c). Add one-half the contour interval to the elevation of the last contour line. In this example, the last contour line before the hilltop is an index contour line numbered 600. Add one-half the contour interval, 10 meters, to the index contour line. The elevation of the hilltop would be 610 meters.

g. There may be times when you need to determine the elevation of points to a greater accuracy. To do this, you must determine how far between the two contour lines the point lies. However, most military needs are satisfied by estimating the elevation of points between contour lines (Figure 10-4).



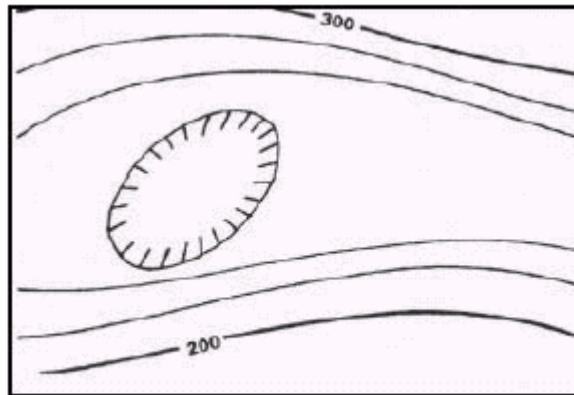
**Figure 10-4. Points between contour lines.**

(1) If the point is less than one-fourth the distance between contour lines, the elevation will be the same as the last contour line. In Figure 10-4, the elevation of *point a* will be 100 meters. To estimate the elevation of a point between one-fourth and three-fourths of the distance between contour lines, add one-half the contour interval to the last contour line.

(2) *Point b* is one-half the distance between contour lines. The contour line immediately below *point b* is at an elevation of 160 meters. The contour interval is 20 meters; thus one-half the contour interval is 10 meters. In this case, add 10 meters to the last contour line of 160 meters. The elevation of *point b* would be about 170 meters.

(3) A point located more than three-fourths of the distance between contour lines is considered to be at the same elevation as the next contour line. *Point c* is located three-fourths of the distance between contour lines. In Figure 10-4, *point c* would be considered to be at an elevation of 180 meters.

h. To estimate the elevation to the bottom of a depression, subtract one-half the contour interval from the value of the lowest contour line before the depression. In Figure 10-5, the lowest contour line before the depression is 240 meters in elevation. Thus, the elevation at the edge of the depression is 240 meters. To determine the elevation at the bottom of the depression, subtract one-half the contour interval. The contour interval for this example is 20 meters. Subtract 10 meters from the lowest contour line immediately before the depression. The result is that the elevation at the bottom of the depression is 230 meters. The tick marks on the contour line forming a depression always point to lower elevations.



**Figure 10-5. Depression.**

i. In addition to the contour lines, bench marks and spot elevations are used to indicate points of known elevations on the map.

(1) Bench marks, the more accurate of the two, are symbolized by a black X, such as X BM 214. The 214 indicates that the center of the X is at an elevation of 214 units of measure (feet, meters, or yards) above mean sea level. To determine the units of measure, refer to the contour interval in the marginal information.

(2) Spot elevations are shown by a brown X and are usually located at road junctions and on hilltops and other prominent terrain features. If the elevation is shown in black numerals, it has been checked for accuracy; if it is in brown, it has not been checked.

**NOTE:** New maps are being printed using a dot instead of brown Xs.

#### **10-4. TYPES OF SLOPES**

Depending on the military mission, soldiers may need to determine not only the height of a hill, but the degree of the hill's slope as well. The rate of rise or fall of a terrain feature is known as its slope. The speed at which equipment or personnel can move is affected by the slope of the ground or terrain feature. This slope can be determined from the map by studying the contour lines—the closer the contour lines, the steeper the slope; the farther apart the contour lines, the gentler the slope. Four types of slopes that concern the military are as follows:

a. **Gentle.** Contour lines showing a uniform, gentle slope will be evenly spaced and wide apart (Figure 10-6, page 10-6). Considering relief only, a uniform, gentle slope allows the defender to use grazing fire. The attacking force has to climb a slight incline.

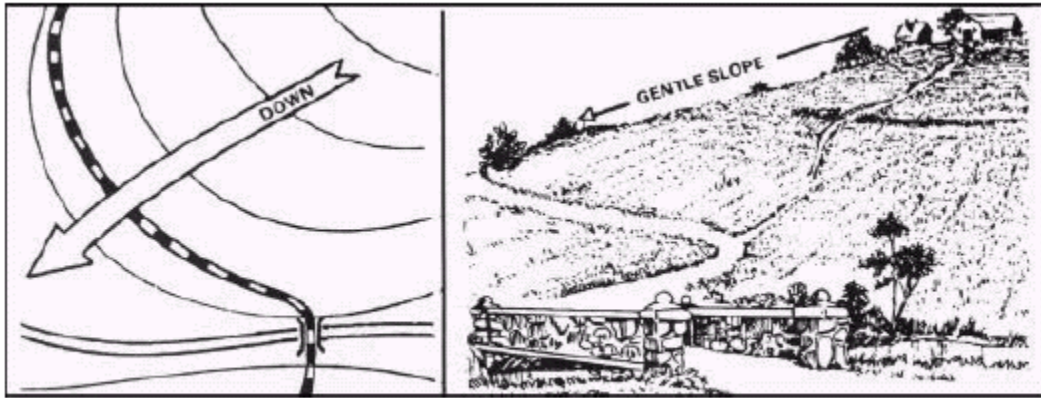


Figure 10-6. Uniform, gentle slope.

b. **Steep.** Contour lines showing a uniform, steep slope on a map will be evenly spaced, but close together. Remember, the closer the contour lines, the steeper the slope (Figure 10-7). Considering relief only, a uniform, steep slope allows the defender to use grazing fire, and the attacking force has to negotiate a steep incline.



Figure 10-7. Uniform, steep slope.

c. **Concave.** Contour lines showing a concave slope on a map will be closely spaced at the top of the terrain feature and widely spaced at the bottom (Figure 10-8, page 10-7). Considering relief only, the defender at the top of the slope can observe the entire slope and the terrain at the bottom, but he cannot use grazing fire. The attacker would have no cover from the defender's observation of fire, and his climb would become more difficult as he got farther up the slope.



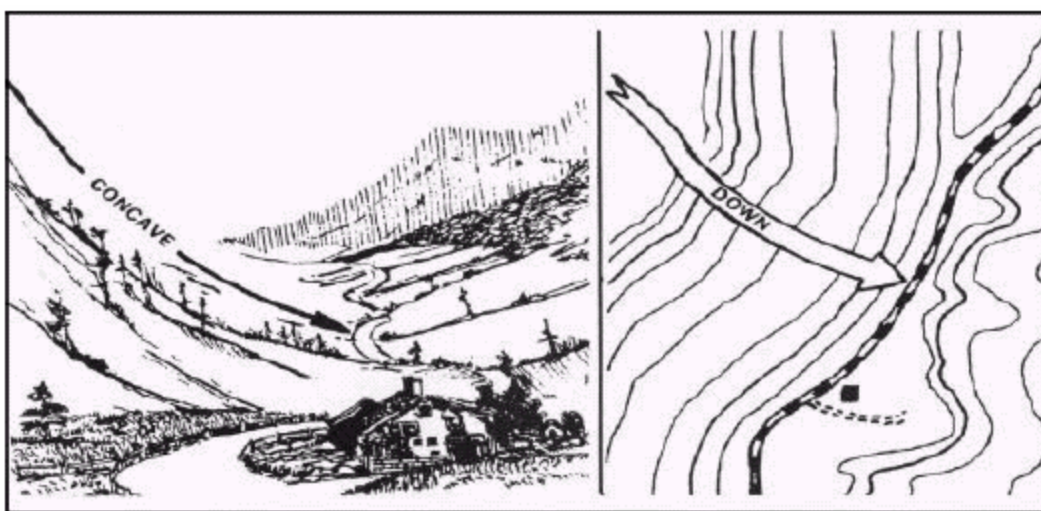


Figure 10-8. Concave slope.

d. **Convex.** Contour lines showing a convex slope on a map will be widely spaced at the top and closely spaced at the bottom (Figure 10-9). Considering relief only, the defender at the top of the convex slope can obtain a small distance of grazing fire, but he cannot observe most of the slope or the terrain at the bottom. The attacker will have concealment on most of the slope and an easier climb as he nears the top.

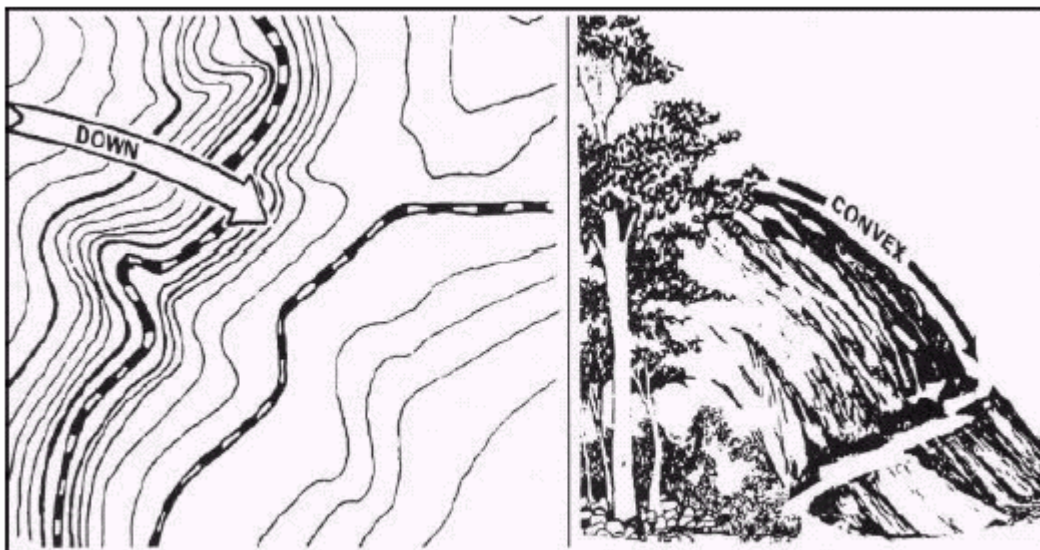


Figure 10-9. Convex slope.

### 10-5. PERCENTAGE OF SLOPE

The speed at which personnel and equipment can move up or down a hill is affected by the slope of the ground and the limitations of the equipment. Because of this, a more exact way of describing a slope is necessary.

a. Slope may be expressed in several ways, but all depend upon the comparison of vertical distance (VD) to horizontal distance (HD) (Figure 10-10). Before we can determine the percentage of a slope, we must know the VD of the slope. The VD is determined by subtracting the lowest point of the slope from the highest point. Use the contour lines to determine the highest and lowest point of the slope (Figure 10-11).

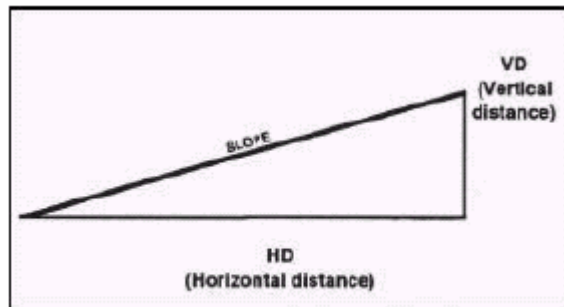


Figure 10-10. Slope diagram.

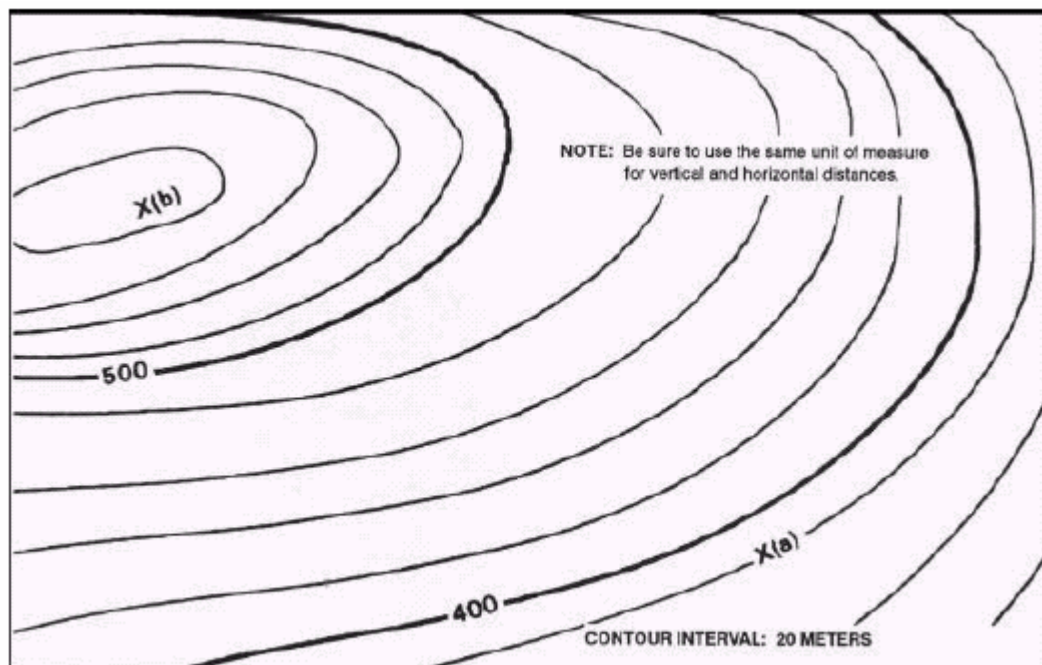


Figure 10-11. Contour line around a slope.

b. To determine the percentage of the slope between points (a) and (b) in Figure 10-11, determine the elevation of point (b) (590 meters). Then determine the elevation of point (a)

(380 meters). Determine the vertical distance between the two points by subtracting the elevation of point (a) from the elevation of point (b). The difference (210 meters) is the VD between points (a) and (b). Then measure the HD between the two points on the map in Figure 10-12. After the horizontal distance has been determined, compute the percentage of the slope by using the formula shown in Figure 10-13.

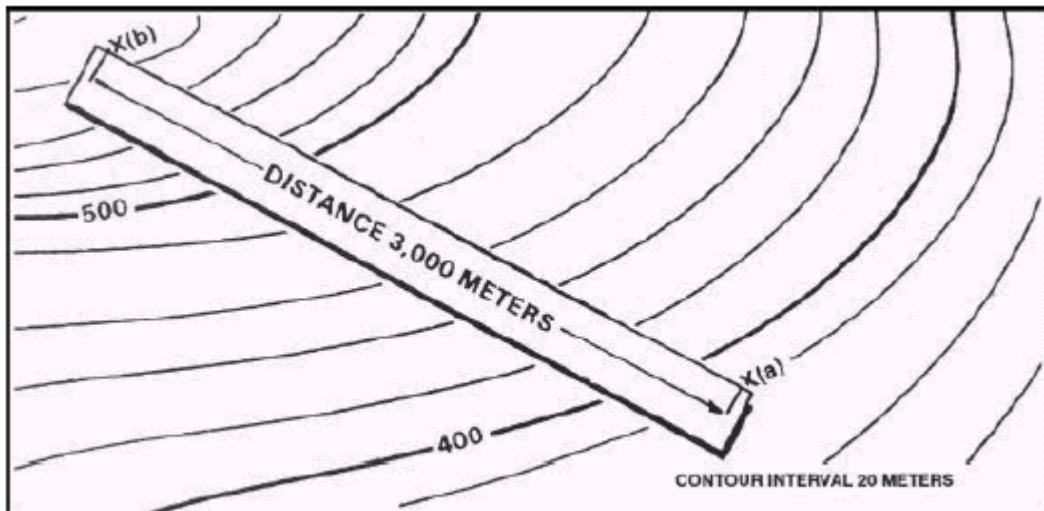


Figure 10-12. Measuring horizontal distance.

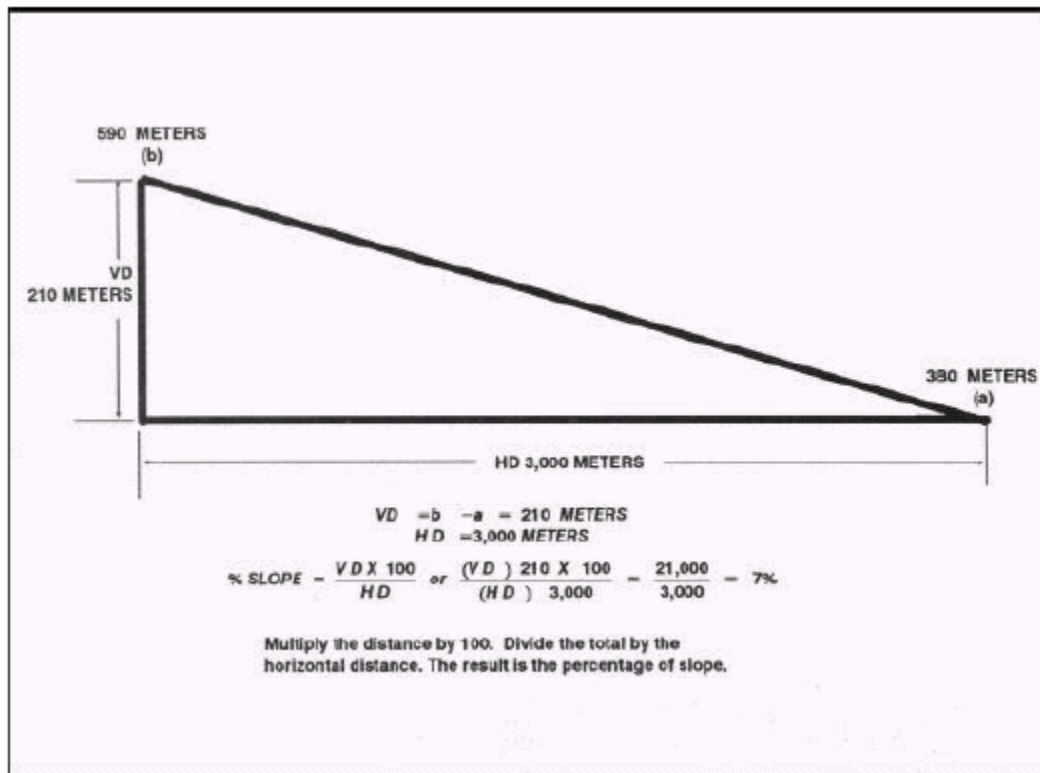


Fig 10-13. Percentabe of slope in meters.

c. The slope angle can also be expressed in degrees. To do this, determine the VD and HD of the slope. Multiply the VD by 57.3 and then divide the total by the HD (Figure 10-14). This method determines the approximate degree of slope and is reasonably accurate for slope angles less than 20°.

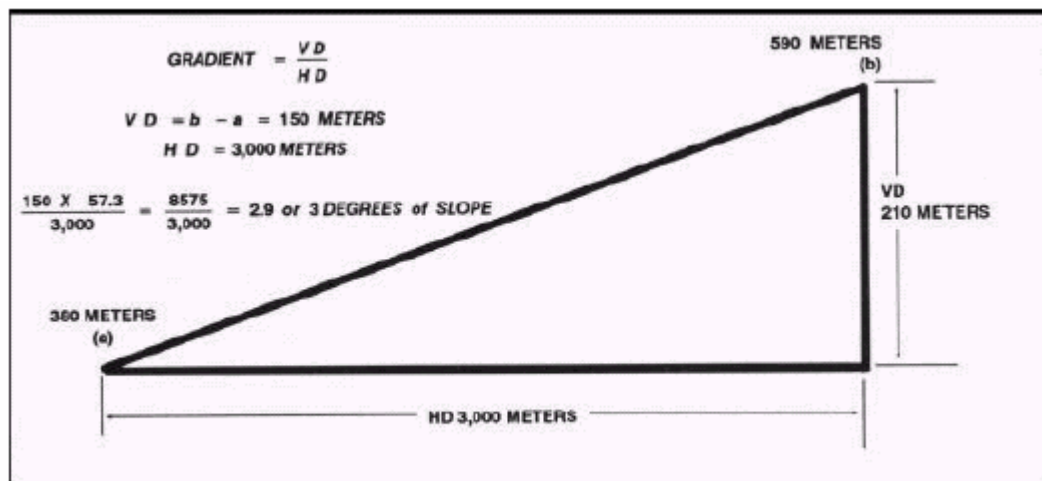
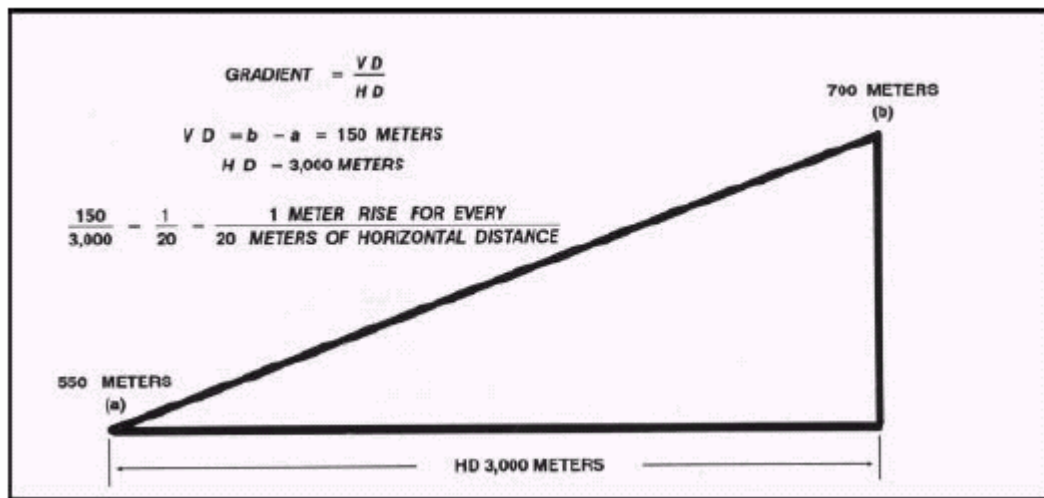


Figure 10-14. Degree of slope.



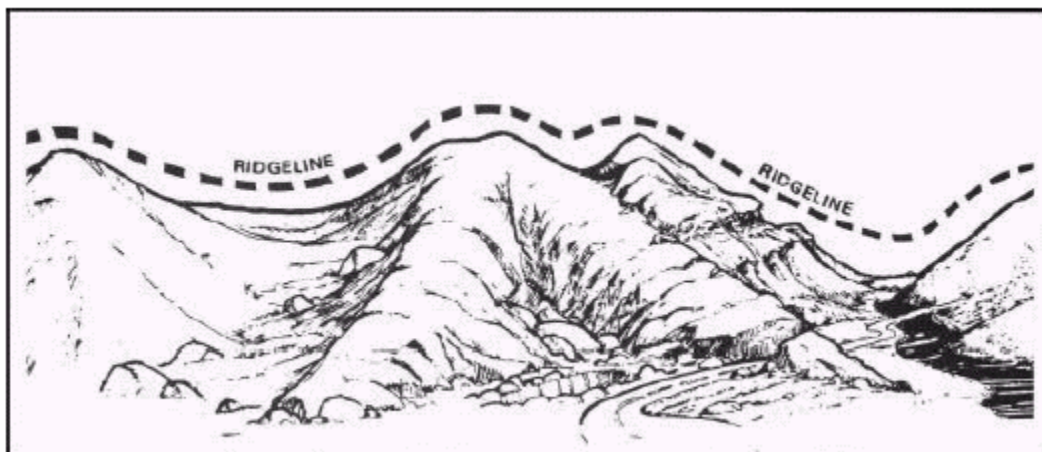
d. The slope angle can also be expressed as a gradient. The relationship of horizontal and vertical distance is expressed as a fraction with a numerator of one (Figure 10-15).



**Figure 10-15. Gradient.**

## 10-6. TERRAIN FEATURES

All terrain features are derived from a complex landmass known as a mountain or ridgeline (Figure 10-16). The term ridgeline is not interchangeable with the term ridge. A ridgeline is a line of high ground, usually with changes in elevation along its top and low ground on all sides from which a total of 10 natural or man-made terrain features are classified.



**Figure 10-16. Ridgeline.**

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## CHAPTER 11

# TERRAIN ASSOCIATION

*Failure to make use of the vast amounts of information presented by the map and available to the eye on the ground reduces the chances for success in land navigation. The soldier who has repeatedly practiced the skills of identifying and discriminating among the many types of terrain and other features knows how these features are mapped. He can begin to visualize the shape of the land by studying the map, estimate distances, and perform quick resection from the many landmarks he sees is the one who will be at the right place to help defeat the enemy on the battlefield. This chapter tells how to orient a map with and without a compass, how to find locations on a map as well as on the ground, how to study the terrain, and how to move on the ground using terrain association and dead reckoning.*

### 11-1. ORIENTING THE MAP

The first step for a navigator in the field is orienting the map. A map is oriented when it is in a horizontal position with its north and south corresponding to the north and south on the ground. Some orienting techniques follow:

a. **Using a Compass.** When orienting a map with a compass, remember that the compass measures magnetic azimuths. Since the magnetic arrow points to magnetic north, pay special attention to the declination diagram. There are two techniques used.

(1) **First Technique.** Determine the direction of the declination and its value from the declination diagram.

(a) With the map in a horizontal position, take the straightedge on the left side of the compass and place it alongside the north-south grid line with the cover of the compass pointing toward the top of the map. This procedure places the fixed black index line of the compass parallel to north-south grid lines of the map.

(b) Keeping the compass aligned as directed above, rotate the map and compass together until the magnetic arrow is below the fixed black index line on the compass. At this time, the map is close to being oriented.

(c) Rotate the map and compass in the direction of the declination diagram.

(d) If the magnetic north arrow on the map is to the left of the grid north, check the compass reading to see if it equals the G-M angle given in the declination diagram. The map is then oriented (Figure 11-1, page 11-2).

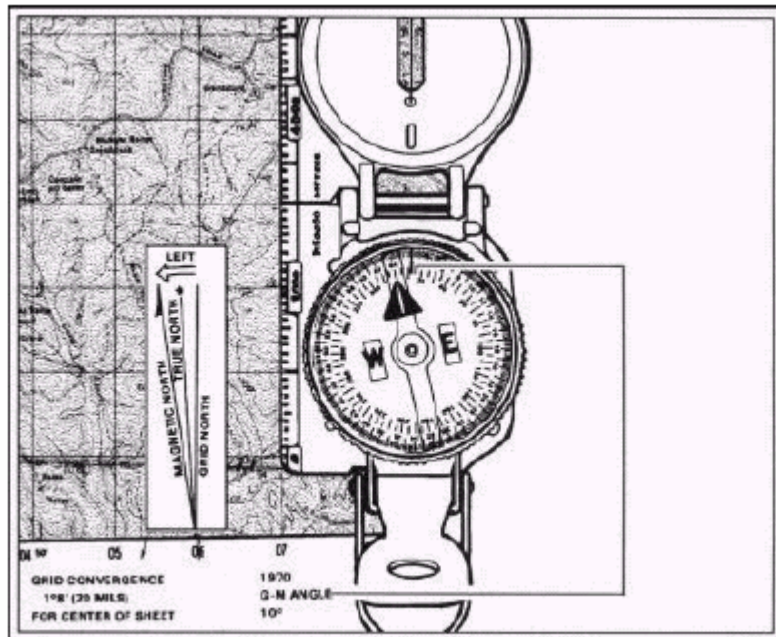


Figure 11-1. Map oriented with 11 degrees west declination.

(e) If the magnetic north is to the right of grid north, check the compass reading to see if it equals 360 degrees minus the G-M angle (Figure 11-2).

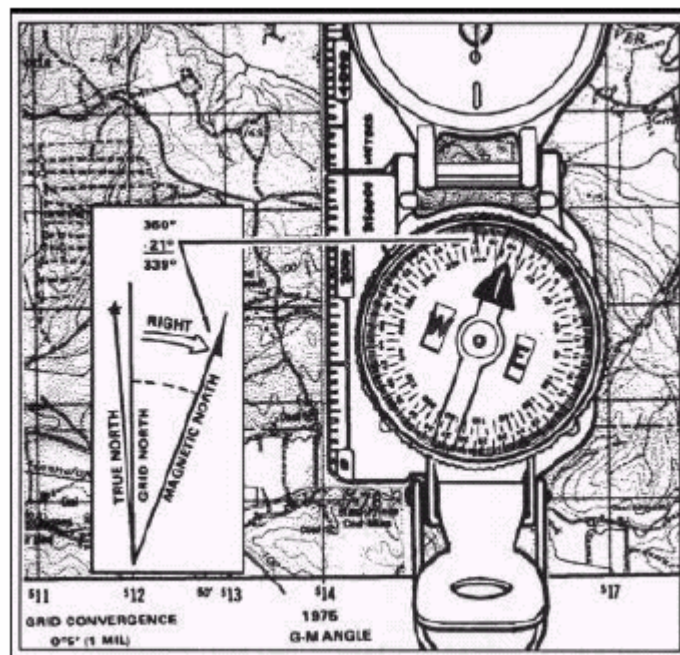


Figure 11-2. Map oriented with 21 degrees east declination.

(2) **Second Technique.** Determine the direction of the declination and its value from the declination diagram.

(a) Using any north-south grid line on the map as a base, draw a magnetic azimuth equal to the G-M angle given in the declination diagram with the protractor.

(b) If the declination is easterly (right), the drawn line is equal to the value of the G-M angle. Then align the straightedge, which is on the left side of the compass, alongside the drawn line on the map. Rotate the map and compass until the magnetic arrow of the compass is below the fixed black index line. The map is now oriented (Figure 11-3).

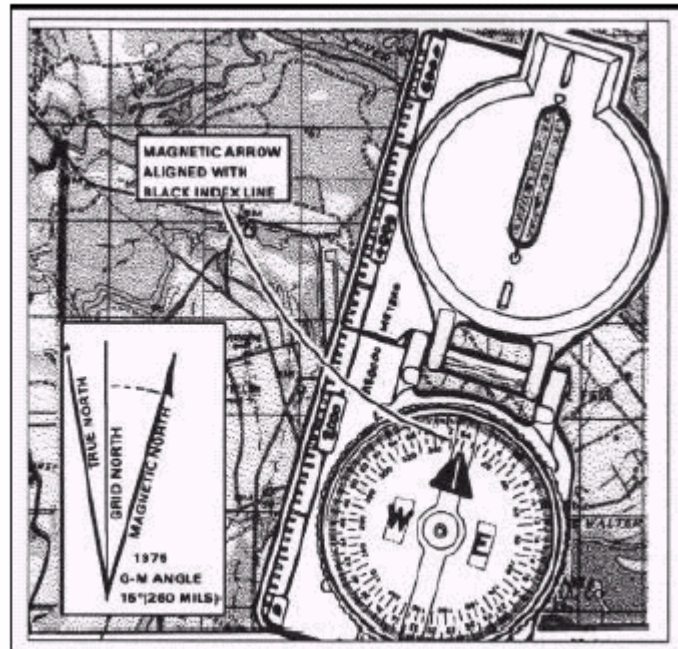


Figure 11-3. Map oriented with 15 degrees east declination.

(c) If the declination is westerly (left), the drawn line will equal 360 degrees minus the value of the G-M angle. Then align the straightedge, which is on the left side of the compass, alongside the drawn line on the map. Rotate the map and compass until the magnetic arrow of the compass is below the fixed black index line. The map is now oriented (Figure 11-4, page 11-4).

#### NOTES:

1. Once the map is oriented, magnetic azimuths are determined using the compass. Do not move the map from its oriented position since any change in its position moves it out of line with the magnetic north. [See paragraph 11-6b(1).]
2. Special care should be taken whenever orienting your map with a compass. A small mistake can cause you to navigate in the wrong direction.



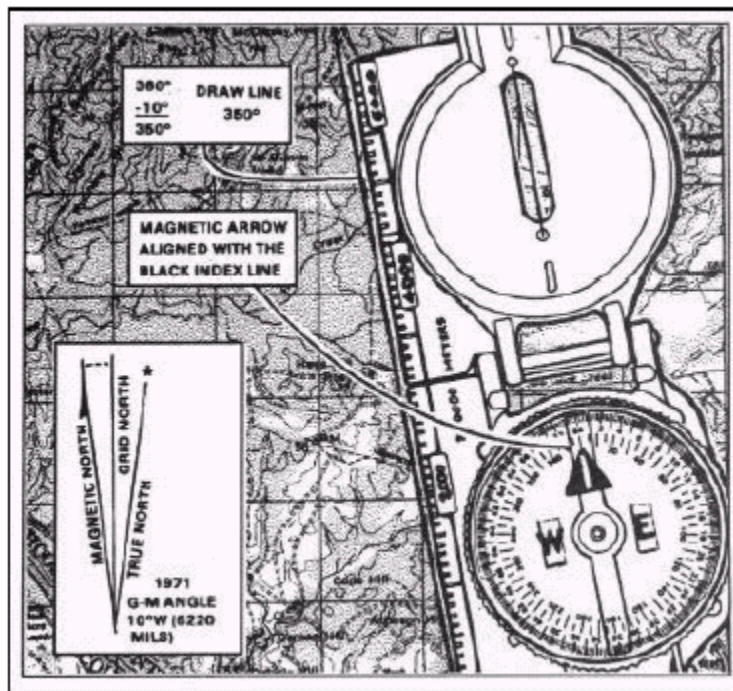


Figure 11-4. Map oriented with 10 degrees west declination.

**b. Using Terrain Association.** A map can be oriented by terrain association when a compass is not available or when the user has to make many quick references as he moves across country. Using this method requires careful examination of the map and the ground, and the user must know his approximate location (Figure 11-5). Orienting by this method is discussed in detail in paragraph 11-3.

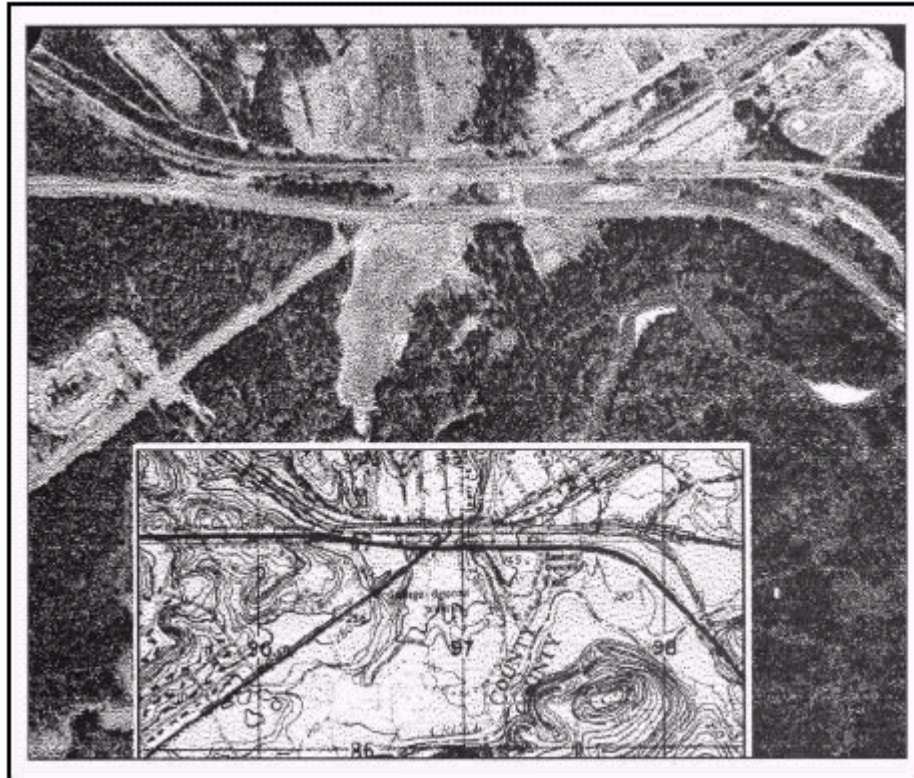


Figure 11-5. Terrain association.

c. **Using Field-Expedient Methods.** When a compass is not available and there are no recognizable terrain features, a map may be oriented by any of the field-expedient methods described in paragraph 9-5. Also see Figure 11-6.

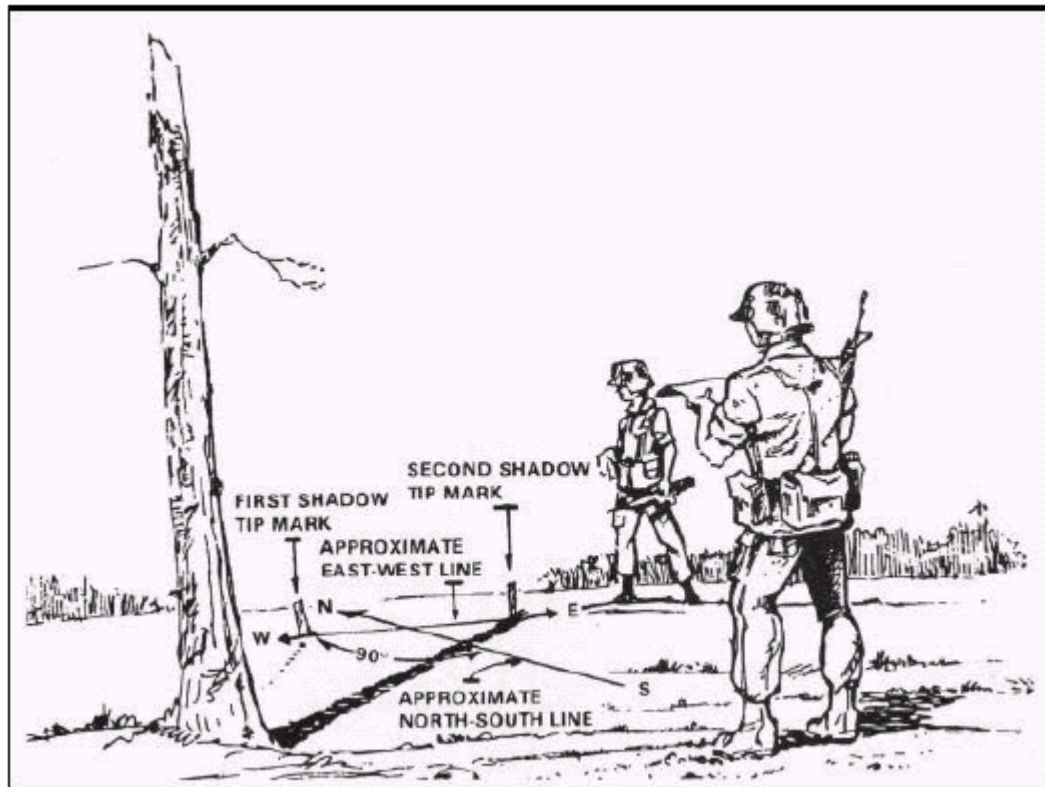


Figure 11-6. Field-expedient method.

## 11-2. LOCATIONS

The key to success in land navigation is to know your location at all times. With this basic knowledge, you can decide what direction and what distance to travel.

a. **Known Position.** Most important of all is the initial location of the user before starting any movement in the field. If movement takes place without establishing the initial location, everything that is done in the field from there on is a gamble. Determine the initial location by referring to the last known position, by grid coordinates and terrain association, or by locating and orienting your position on the map and ground.

b. **Known Point/Known Distance (Polar Plot).** This location can be determined by knowing the starting point, the azimuth to the desired objective, and the distance to it.

c. **Resection.** See Chapter 6.

d. **Modified Resection.** See Chapter 6.

e. **Intersection.** See Chapter 6.

f. **Indirect Fire.** Finding a location by indirect fire is done with smoke. Use the point of impact of the round as a reference point from which distances and azimuth can be obtained.



### 11-3. TERRAIN ASSOCIATION USAGE

The technique of moving by terrain association is more forgiving of mistakes and far less time-consuming than dead reckoning. It best suits those situations that call for movement from one area to another. Errors made using terrain association are easily corrected because you are comparing what you expected to see from the map to what you do see on the ground. Errors are anticipated and will not go unchecked. You can easily make adjustments based upon what you encounter. Periodic position-fixing through either plotted or estimated resection will also make it possible to correct your movements, call for fire, or call in the locations of enemy targets or any other information of tactical or logistical importance.

a. **Matching the Terrain to the Map by Examining Terrain Features.** By observing the contour lines in detail, the five major terrain features (hilltop, valley, ridge, depression, and saddle) should be determined. This is a simple task in an area where the observer has ample view of the terrain in all directions. One-by-one, match the terrain features depicted on the map with the same features on the ground. In restricted terrain, this procedure becomes harder; however, constantly check the map as you move since it is the determining factor (Figure 11-5).

b. **Comparing the Vegetation Depicted on the Map.** When comparing the vegetation, a topographic map should be used to make a comparison of the clearings that appear on the map with the ones on the ground. The user must be familiar with the different symbols, such as vineyards, plantations, and orchards that appear on the legend. The age of the map is an important factor when comparing vegetation. Some important vegetation features were likely to be different when the map was made. Another important factor about vegetation is that it can change overnight by natural accidents or by man (forest fires, clearing of land for new developments, farming, and so forth).

c. **Masking by the Vegetation.** Camouflage the important landforms using vegetation. Use of camouflage makes it harder for the navigator to use terrain association.

d. **Using the Hydrography.** Inland bodies of water can help during terrain association. The shape and size of lakes in conjunction with the size and direction of flow of the rivers and streams are valuable help.

e. **Using Man-made Features.** Man-made features are an important factor during terrain association. The user must be familiar with the symbols shown in the legend representing those features. The direction of buildings, roads, bridges, high-tension lines, and so forth make the terrain inspection a lot easier; however, the age of the map must be considered because man-made features appear and disappear constantly.

f. **Examining the Same Piece of Terrain During the Different Seasons of the Year.** In those areas of the world where the seasons are distinctive, a detailed examination of the terrain should be made during each of the seasons. The same piece of land does not present the same characteristics during both spring and winter.

(1) During winter, the snow packs the vegetation, delineating the land, making the terrain features appear as clear as they are shown by the contour lines on the map. Ridges, valleys, and saddles are very distinctive.

(2) During spring, the vegetation begins to reappear and grow. New vegetation causes a gradual change of the land to the point that the foliage conceals the terrain features and makes the terrain hard to recognize.

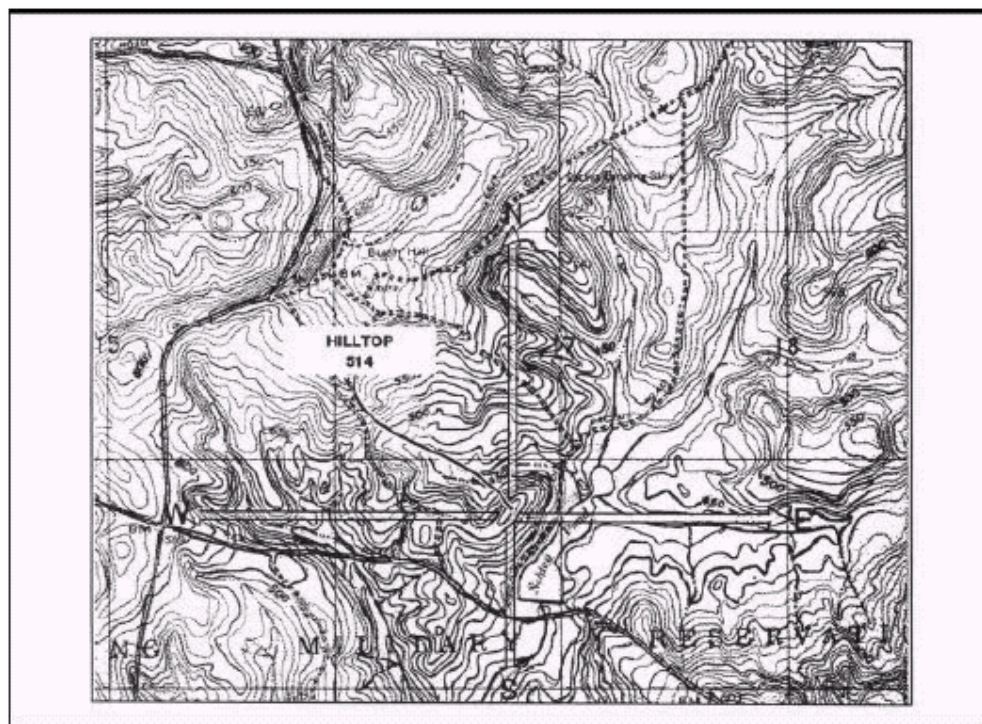
(3) During summer months, the effects are similar to those in the spring.

(4) Fall makes the land appear different with its change of color and gradual loss of vegetation.

(5) During the rainy season, the vegetation is green and thick, and the streams and ponds look like small rivers and lakes. In scarcely vegetated areas, the erosion changes the shape of the land.

(6) During a period of drought, the vegetation dries out and becomes vulnerable to forest fires that change the terrain whenever they occur. Also during this season, the water levels of streams and lakes drop, adding new dimensions and shape to the existing mapped areas.

g. **Following an Example of Terrain Association.** Your location is hilltop 514 in the lower center of the map in Figure 11-7.



**Figure 11-7. Example of terrain association.**

(1) **To The North.** The contour lines indicate that the hill slopes down for about 190 meters, and that it leads into a small valley containing an intermittent stream. On the other side of the stream as you continue with your northerly inspection, the terrain starts a gradual ascent, indicating a hilltop partially covered with vegetation, until an unimproved road is reached. This road runs along a gradual ridgeline with north-west direction. Then the contour line spacings become narrow, indicating a steeper grade that leads to a narrow valley containing a small intermittent stream. As you continue up, you find a small but prominent ridge with a clearing. The contour lines once again show a steeper grade leading to a moderate valley containing an intermittent stream running in a south-east direction.

(2) **To The East.** There is a clearing of the terrain as it slopes down to Schley Pond. An ample valley is clearly seen on the right side of the pond, as indicated by the "U" and "V" shape of the contour lines. This valley contains some swamp areas and there is a long ridgeline on the north portion of the valley.

(3) **To The South.** The terrain gently slopes downward until a clear area is reached. It continues in a downward direction to an intermittent stream running south-east in a small valley. There is also an improved road running in the same direction as the valley. At the intersection of the roads as you face south, there is a clearing of about 120 meters on the ridge. At the bottom of it, a stream runs from Schley Pond in a south-west direction through an ample valley fed by two intermittent streams. As you continue, a steep, vegetated hill is found with a clearing on its top, followed by a small saddle and another hilltop.

(4) **To The West.** First, you see a small, clear valley. It is followed by a general ridgeline running north-west in which an unimproved road is located just before a hilltop. Continuing on a westerly direction, you will find a series of alternate valleys and ridges.

#### 11-4. TACTICAL CONSIDERATIONS

Military cross-country navigation is intellectually demanding because it is imperative that the unit, crew, or vehicle survive and successfully complete the move in order to accomplish its mission. However, the unnecessary use of a difficult route makes navigation too complicated, creates more noise when proceeding over it, causes wear and tear on equipment and personnel, increases the need for and needlessly complicate recovery operations, and wastes scarce time. On receipt of a tactical mission, the leader begins his troop-leading procedures and makes a tentative plan. He bases the tentative plan on a good terrain analysis. He analyzes the considerations covered in the following mnemonics—OCOKA and METT-T.

a. **OCOKA.** The terrain should be analyzed for observation and fields of fire, cover and concealment, obstacles, key terrain, and avenues of approach.

(1) **Observation and Fields of Fire.** The purpose of observation is to see the enemy (or various landmarks) but not be seen by him. Anything that can be seen can be hit. Therefore, a field of fire is an area that a weapon or a group of weapons can cover effectively with fire from a given position.

(2) **Cover and Concealment.** Cover is shelter or protection (from enemy fire) either natural or artificial. Always try to use covered routes and seek cover for each halt, no matter how brief it is planned to be. Unfortunately, two factors interfere with obtaining constant cover. One is time and the other is terrain. Concealment is protection from observation or surveillance, including concealment from enemy air observation. Before, trees provided good concealment, but with modern thermal and infrared imaging equipment, trees are not always effective. When you are moving, concealment is generally secondary; therefore, select routes and positions that do not allow covered or concealed enemy near you.

(3) **Obstacles.** Obstacles are any obstructions that stop, delay, or divert movement. Obstacles can be natural (rivers, swamps, cliffs, or mountains) or they may be artificial (barbed wire entanglements, pits, concrete or metal anti-mechanized traps). They can be readymade or constructed in the field. Always consider any possible obstacles along your movement route and, if possible, try to keep obstacles between the enemy and yourself.

(4) **Key Terrain.** Key terrain is any locality or area that the seizure or retention of affords a marked advantage to either combatant. Urban areas that are often seen by higher headquarters as being key terrain because they are used to control routes. On the other hand, an urban area that is destroyed may be an obstacle instead. High ground can be key because it dominates an area with good observation and fields of fire. In an open area, a draw or wadi (dry streambed located in an arid area) may provide the only cover for many kilometers, thereby becoming key. You should always attempt to locate any area near you that could be even remotely considered as key terrain.

(5) **Avenues of Approach.** These are access routes. They may be the routes you can use to get to the enemy or the routes they can use to get to you. Basically, an identifiable route that approaches a position or location is an avenue of approach to that location. They are often terrain corridors such as valleys or wide, open areas.

b. **METT-T.** Tactical factors other than the military aspects of terrain must also be considered in conjunction with terrain during movement planning and execution as well. These additional considerations are mission, enemy, terrain and weather, troops, and time available.

(1) **Mission.** This refers to the specific task assigned to a unit or individual. It is the duty or task together with the purpose that clearly indicates the action to be taken and the reason for it—but not how to do it. Training exercises should stress the importance of a thorough map reconnaissance to evaluate the terrain. This allows the leader to confirm his tentative plan, basing his decision on the terrain's effect on his mission.

(a) Marches by foot or vehicle are used to move troops from one location to another. Soldiers must get to the right place, at the right time, and in good fighting condition. The normal rate for an 8-hour foot march is 4 kmph. However, the rate of march may vary, depending on the following factors:

- Distance.
- Time allowed.
- Likelihood of enemy contact.
- Terrain.
- Weather.
- Physical condition of soldiers.
- Equipment/weight to be carried.
- A motor march requires little or no walking by the soldiers, but the factors affecting the rate of march still apply.

(b) Patrol missions are used to conduct combat or reconnaissance operations. Without detailed planning and a thorough map reconnaissance, any patrol mission may not succeed. During the map reconnaissance, the mission leader determines a primary and alternate route to and from the objectives.

(c) Movement to contact is conducted whenever an element is moving toward the enemy but is not in contact with the enemy. The lead element must orient its movement on the objective by conducting a map reconnaissance, determining the location of the objective on both the map and the ground, and selecting the route to be taken.

(d) Delays and withdrawals are conducted to slow the enemy down without becoming decisively engaged, or to assume another mission. To be effective, the element leader must know where he is to move and the route to be taken.

(2) **Enemy.** This refers to the strength, status of training, disposition (locations), doctrine, capabilities, equipment (including night vision devices), and probable courses of action that impact upon both the planning and execution of the mission, including a movement.

(3) **Terrain and Weather.** Observation and fields of fire influence the placement of positions and crew-served weapons. The leader conducts a map reconnaissance to determine key terrain, obstacles, cover and concealment, and likely avenues of approach.

(a) Key terrain is any area whose control affords a marked advantage to the force holding it. Some types of key terrain are high ground, bridges, towns, and road junctions.

(b) Obstacles are natural or man-made terrain features that stop, slow down, or divert movement. Consideration of obstacles is influenced by the unit's mission. An obstacle may be an advantage or disadvantage, depending upon the direction of attack or defense. Obstacles can be found by conducting a thorough map reconnaissance and study of recent aerial photographs.

(c) Cover and concealment are determined for both friendly and enemy forces. Concealment is protection from observation; cover is protection from the effects of fire. Most terrain features that offer cover also provide concealment from ground observation. There are areas that provide no concealment from enemy observation. These danger areas may be large or small open fields, roads, or streams. During the leader's map reconnaissance, he determines any obvious danger areas and, if possible, adjusts his route.

(d) Avenues of approach are routes by which a unit may reach an objective or key terrain. To be considered an AA, a route must provide enough width for the deployment of the size force for which it is being considered. The AAs are also considered for the subordinate enemy force. For example, a company determines likely AAs for an enemy platoon; a platoon determines likely AAs for an enemy squad. Likely AAs may be either ridges, valleys, or by air. By examining the terrain, the leader determines the likely enemy AAs based on the tactical situation.

(e) Weather has little effect on dismounted land navigation. Rain and snow could possibly slow down the rate of march, that is all. But during mounted land navigation, the navigator must know the effect of weather on his vehicle. (See Chapter 12 for mounted land navigation.)

(4) **Troops.** Consideration of your own troops is equally important. The size and type of the unit to be moved and its capabilities, physical condition, status of training, and types of equipment assigned all affect the selection of routes, positions, fire plans, and the various decisions to be made during movement. On ideal terrain such as relatively level ground with little or no woods, a platoon can defend a front of up to 400 meters. The leader must conduct a thorough map reconnaissance and terrain analysis of the area his unit is to defend. Heavily wooded areas or very hilly areas may reduce the front a platoon can defend. The size of the unit must also be taken into consideration when planning a movement to contact. During movement, the unit must retain its ability to maneuver. A small draw or stream may reduce the unit's maneuverability but provide excellent concealment. All of these factors must be considered.

(a) Types of equipment that may be needed by the unit can be determined by a map reconnaissance. For example, if the unit must cross a large stream during its movement to the objective, ropes may be needed for safety lines.

(b) Physical capabilities of the soldiers must be considered when selecting a route. Crossing a large swampy area may present no problem to a physically fit unit, but to a unit that has not been physically conditioned, the swampy area may slow or completely stop its movement.

(5) **Time Available.** At times, the unit may have little time to reach an objective or to move from one point to another. The leader must conduct a map reconnaissance to determine the quickest route to the objective; this is not always a straight route. From point A to point B on the map may appear to be 1,000 meters, but if the route is across a large ridge, the distance will be greater. Another route from point A to B may be 1,500 meters—but on flat terrain. In this case, the quickest route would be across the flat terrain; however, concealment and cover may be lost.

## 11-5. MOVEMENT AND ROUTE SELECTION

One key to success in tactical missions is the ability to move undetected to the objective. There are four steps to land navigation. Being given an objective and the requirement to move there, you must know where you are, plan the route, stay on the route, and recognize the objective.

a. **Know Where You Are (Step 1).** You must know where you are on the map and on the ground at all times and in every possible way. This includes knowing where you are relative to—

- Your directional orientation.
- The direction and distances to your objective.
- Other landmarks and features.
- Any impassable terrain, the enemy, and danger areas.
- Both the advantages and disadvantages presented by the terrain between you and your objective.

This step is accomplished by knowing how to read a map, recognize and identify specific terrain and other features; determine and estimate direction; pace, measure, and estimate distances, and both plot and estimate a position by resection.

b. **Plan the Route (Step 2).** Depending upon the size of the unit and the length and type of movement to be conducted, several factors should be considered in selecting a good route or routes to be followed. These include—

- Travel time.
- Travel distance.
- Maneuver room needed.
- Trafficability.
- Load-bearing capacities of the soil.
- Energy expenditure by troops.
- The factors of METT-T.
- Tactical aspects of terrain (OCOKA).
- Ease of logistical support.
- Potential for surprising the enemy.
- Availability of control and coordination features.
- Availability of good checkpoints and steering marks.

In other words, the route must be the result of careful map study and should address the requirements of the mission, tactical situation, and time available. It must also provide for ease of movement and navigation.

(1) Three route-selection criteria that are important for small-unit movements are cover, concealment, and the availability of reliable checkpoint features. The latter is weighted even more heavily when selecting the route for a night operation. The degree of visibility and ease of recognition (visual effect) are the key to the proper selection of these features.

(2) The best checkpoints are linear features that cross the route. Examples include perennial streams, hard-top roads, ridges, valleys, railroads, and power transmission lines. Next, it is best to select features that represent elevation changes of at least two contour intervals such as hills, depressions, spurs, and draws. Primary reliance upon cultural features and vegetation is cautioned against because they are most likely to have changed since the map was last revised.

(3) Checkpoints located at places where changes in direction are made mark your **decision points**. Be especially alert to see and recognize these features during movement. During preparation and planning, it is especially important to review the route and anticipate where mistakes are most likely to be made so they can be avoided.

(4) Following a valley floor or proceeding near (not on) the crest of a ridgeline generally offers easy movement, good navigation checkpoints, and sufficient cover and concealment. It is best to follow terrain features whenever you can—not to fight them.

(5) A lost or a late arriving unit, or a tired unit that is tasked with an unnecessarily difficult move, does not contribute to the accomplishment of a mission. On the other hand, the unit that moves too quickly and carelessly into a destructive ambush or leaves itself open to air strikes also have little effect. Careful planning and study are required each time a movement route is to be selected.

c. **Stay on the Route (Step 3).** In order to know that you are still on the correct route, you must be able to compare the evidence you encounter as you move according to the plan you developed on the map when you selected your route. This may include watching your compass reading (dead reckoning) or recognizing various checkpoints or landmarks from the map in their anticipated positions and sequences as you pass them (terrain association). A better way is to use a combination of both.

d. **Recognize the Objective (Step 4).** The destination is rarely a highly recognizable feature such as a dominant hilltop or road junction. Such locations as this are seldom missed by the most inexperienced navigators and are often dangerous places for soldiers to occupy. The relatively small, obscure places are most likely to be the destinations.

(1) Just how does a soldier travel over unfamiliar terrain for moderate to great distances and know when he reaches the destination? One minor error, when many are possible, can cause the target to be missed.

(2) The answer is simple. Select a checkpoint (reasonably close to the destination) that is not so difficult to find or recognize. Then plan a short, fine-tuned last leg from the new *expanded objective* to the final destination. For example, you may be able to plan and execute the move as a series of sequenced movements from one checkpoint or landmark to another using both the terrain and a compass to keep you on the correct course. Finally, after

arriving at the last checkpoint, you might follow a specific compass azimuth and pace off the relatively short, known distance to the final, pinpoint destination. This procedure is called *point navigation*. A short movement out from a unit position to an observation post or to a coordination point may also be accomplished in the same manner.



### **Student Handout 3**

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This student handout contains 2 pages of extracted material from pages 79 thru 81, para 22 of FM 21-31.

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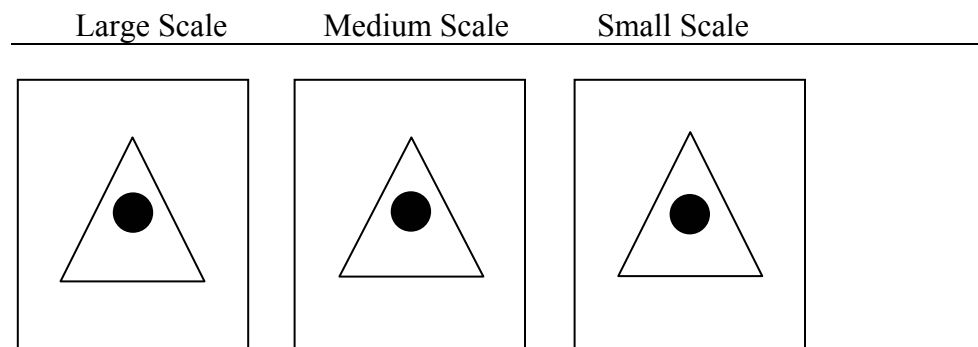
## 22. Control Points and Elevations

a. Applications of Definitions. The definitions of horizontal and vertical control stations which follow are generally applicable only to the United States.

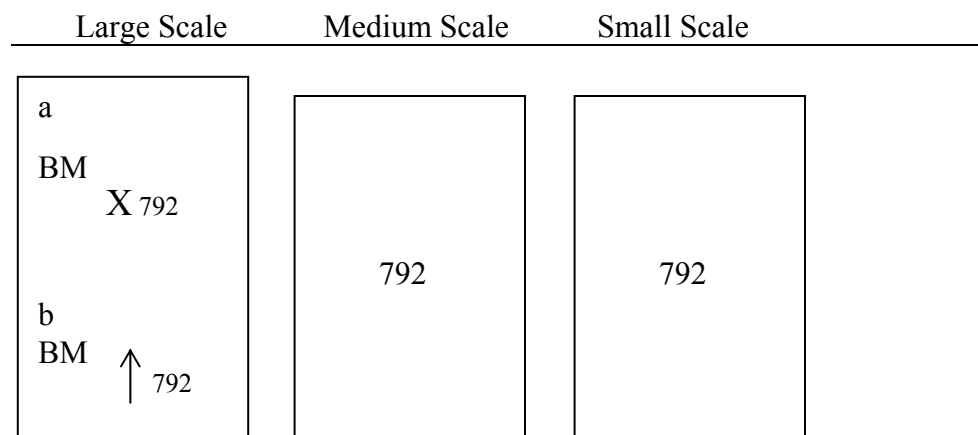
b. Exceptions. In foreign areas, horizontal stations may not be monumented and in some cases, may be less than third order accuracy. Whenever information is available, exceptions are noted in the marginal legend of the map.

c. Symbols. The following pages contain the approved symbols for control points and elevations.

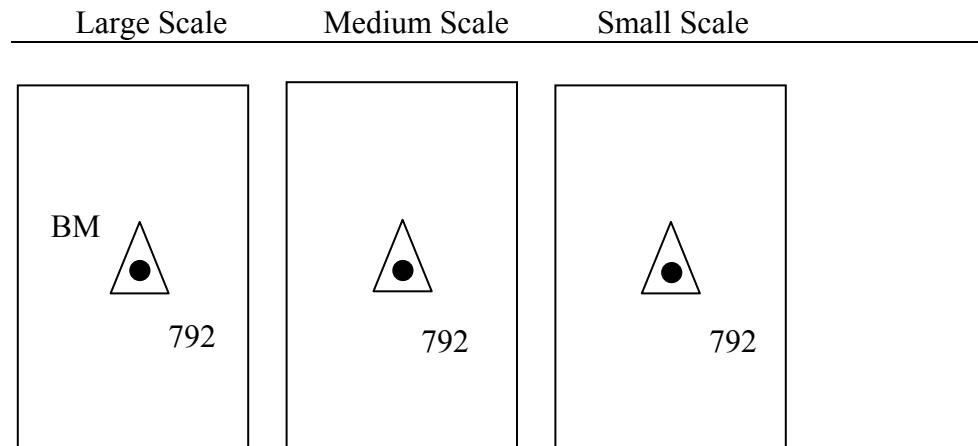
**Figure 227. Horizontal Control Point.** The symbol represents a described horizontal control point which is marked on the ground and which was established by triangulation or traverse of third or higher order accuracy.



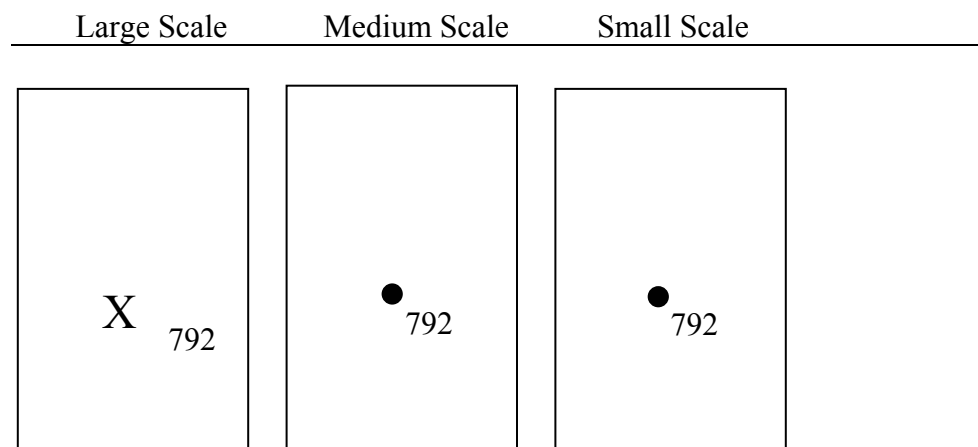
**Figure 228. Monumented Bench Mark.** The symbol represents a described vertical control point which is marked by a tablet on the ground and which was established by survey methods of third or higher order accuracy. On medium and small-scale maps Bench Marks are not specially symbolized. Their elevations are shown as spot elevations. (a) and (b) are alternate symbols.



**Figure 229. Monumented Bench Mark At Horizontal Control Point.** The symbol represents a described control point which is marked on the ground and whose horizontal and vertical positions were established by survey methods of third or higher order accuracy.



**Figure 230. Non-monumented Bench Mark** (Sometimes called temporary, supplemental, or intermediate). The symbol represents a described control point which is marked on the ground and whose horizontal and vertical positions were established by survey methods of third or higher order accuracy.



## **Student Handout 4**

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This student handout contains the Reinforcement Training Package (RTP) and the overview and instructions for completing the RTP.

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## Map Reading/Land Navigation Reinforcement Training Package (RTP).

**Overview:** This reinforcement-training package (RTP) is for PLDC students to refresh some of their map reading and land navigation skills to prepare them for the map reading and land navigation training they will receive following this RTP.

Passing the quizzes in this RTP is not a graduation requirement. The quizzes are for the students and small group leaders (SGLs) to determine how well the students understand the tasks, and to improve upon their weak areas. However, **completion of this RTP is a graduation requirement.** SGLs will file the students' RTPs in their individual records.

USASMA used the references listed on this page and RTP-ii of this package. This RTP provides the information needed to complete all the tasks for practical exercise 1.

### 1. Student Responsibilities:

a. Study the material in this RTP and answer or perform all questions or tasks in the quiz answer sheets found in this package or given by the NCOA. **Note: Do not use the answer sheets in this RTP. Use a separate piece of paper. This is a recoverable document, damage in any way, to include highlighting, pencil marks, or missing pages, will subject you to pecuniary liability (statement of charges, cash collection, etc.) to recover printing costs.** The NCOA will determine if you may write on the answer sheets they provide you for quizzes two, five and six.

b. Turn in all quiz answer sheets to your SGL NLT three days prior to the start of TSP W221, Map Reading.

### 2. NCOA Responsibilities:

a. Issue the following to the students when they inprocess:

- (1) Map Reading/Land Navigation Reinforced Training Package (Appendix D, SH-4).  
**NOTE: DO NOT ISSUE** the Quiz Answer Sheets to the students. You can find the quiz answer sheets attached at the end of the RTP, pages RTPQAS-1 thru RTPQAS-6.
- (2) FM 3-25.26 (SH-2), Map Reading and Land Navigation (SH-2) in Appendix D.
- (3) FM 21-31, Topographical Symbols (SH-3) in Appendix D.
- (4) STP 21-1-SMCT, Soldier Manual of Common Tasks, Skill Level One, Appendix C, Aug 03.
- (5) GTA 5-2-12, Coordinate Scale and Protractor.
- (6) 1:50,000 Tenino map.
- (7) 1:50,000 map of the local STX area.
- (8) Lensatic compass.
- (9) Quiz sheets 2, 5, and 6.

## Map Reading/Land Navigation RTP, cont

b. Set up a sufficient number of points in the NCOA Garrison, or other areas close to the NCOA, where students can accomplish the following tasks:

- (1) App C, Task 5, Determine a Magnetic Azimuth Using a Lensatic Compass.
- (2) App C, Task 7, Determine a Location on the Ground by Terrain Association.
- (3) App C, Task 11, Orient a Map to the Ground by Map-Terrain Association.

c. Design Quiz sheets for quizzes two, five, and six. See the Standards Statements of the above three tasks in STP 21-1-SMCT when making up the quizzes and for setting up your points. Also, see the bold printed instructions on pages RTP-36, RTP-54 and RTP-56.

d. SGLs will collect and review the student quiz sheets NLT three days prior to the start of W221, Map Reading, to ensure completeness and provide assistance to students who ask for help, and to those students who may have had difficulty--based on their quizzes--performing the tasks. SGLs will also file the quizzes in the students' records.

e. SGLs should take the results of the Quizzes to determine the strengths and weaknesses of each student and the group as a whole. Based on the SGL's analysis of the quizzes, he can use the first 4.5 hours of W221, Map Reading, and prepare any special training for each student and possibly the entire class. The SGL will use the entire first 4.5 hours of W221 for students to review the RTP and conduct hands on training to insure mastery of the skill level one tasks listed above.

e. Ensure SGLs are available to assist students.

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### 3. Recommendation to the NCOA Commandants.

Contact the CSMs that send their soldiers to your NCOA and recommend to them that their soldiers--at a minimum--read and study the following prior to arriving at PLDC.

a. STP 21-1-SMCT, Draft, Soldier's Manual of Common Tasks(Draft), Appendix C, the following tasks:

- (1) Task 2, Identify topographic symbols on a military map.
- (2) Task 3, Identify terrain features on a map.
- (3) Task 4, Determine the grid coordinates of a point on a military map.
- (4) Task 5, Determine a magnetic azimuth using a lensatic compass.
- (5) Task 7, Determine a location on the ground by terrain association.
- (6) Task 8, Measure distance on a map.
- (7) Task 11, Orient a map to the ground by map terrain association.
- (8) Task 14, Determine direction without a compass.

b. FM 3-25.26 (SH-2), Map Reading and Land Navigation:

- (1) Chapter 3, para 3-1, 3-3, and 3-5.
- (2) Chapter 4, para 4-4 thru 4-7.
- (3) Chapter 5, para 5-1 and 5-2.
- (4) Chapter 9, para 9-2 thru 9-3c, and 9-5
- (5) Chapter 10, para 10-6
- (6) Chapter 11, para 11-1b thru 11-3.



**NOTE:** The NCOA will not formally teach skill level one tasks; however, the students will receive reinforcement training for the purpose of refreshing themselves in these skills.

**NOTE:** The NCOA can make this RTP available to the CSMs to design their own refresher package. The CSMs will have to replace and design their own exercises with a map of their local area wherever this RTP references the Tenino map.

**NOTE:** Recommend that NCOAs place this RTP on their homepage.

## Map Reading/Land Navigation Student RTP

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**Purpose**

This RTP provides students with a standardized plan for reinforcement training of the skill level one tasks listed below:

STP 21-1-SMCT, Appendix C, Aug 03.

**This RTP  
Contains:**

| <b>Table of Contents</b> |  |             |
|--------------------------|--|-------------|
| <b>Task Number</b>       | <b>Task Title</b>  | <b>Page</b> |
| App C, Task 2            | Identify Topographic Symbols on a Military Map.              | RTP-2       |
| App C, Task 4            | Determine the Grid Coordinates of a Point on a Military Map. | RTP-8       |
| App C, Task 3            | Identify Terrain Features on a Map.                          | RTP-18      |
|                          | Quiz One   | RTP-25      |
| App C, Task 5            | Determine a Magnetic Azimuth using a Lensatic Compass        | RTP-29      |
|                          | Quiz Two (Answers provided by SGL)                           | RTP-36      |
| App C, Task 8            | Measure Distance on a Map                                    | RTP-37      |
|                          | Quiz Three   | RTP-46      |
| App C, Task 14           | Determine Direction Without a Compass                        | RTP-47      |
|                          | Quiz Four  | RTP-51      |
| App C, Task 11           | Orient a Map to the Ground by Map-Terrain Association.       | RTP-53      |
|                          | Quiz Five (Answers provided by SGL)                          | RTP-54      |
| App C, Task 7            | Determine a Location on the Ground by Terrain Association.   | RTP-55      |
|                          | Quiz Six (Answers provided by SGL)                           | RTP-56      |
|                          | Answers to Quiz One  | RTPQAS-1    |
|                          | Answers to Quiz Three  | RTPQAS-4    |
|                          | Answers to Quiz Four   | RTPQAS-5    |

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# Identify Topographic Symbols on a Military Map

**Task** This section of the RTP teaches--

|                     |  |
|---------------------|--|
| <b>Task Number:</b> | App C, Task 2, STP 21-1-SMCT   |
| <b>Task Title:</b>  | Identify topographic symbols on a military map.  |
| <b>Conditions:</b>  | Given a standard 1:50,000-scale military map.  |
| <b>Standards:</b>   | Identified the topographic symbols, colors, and marginal information on a military map with 100 percent accuracy IAW FM 3-25.26 (SH-2), Chapter 3 (RTP-2 thru RTP-7); STP 21-1-SMCT, App C, p C-4 and C-5. |

Colors on a Military Map

The ideal situation would be that every mapmaker could show every map feature in its true shape and size; however, it's impossible. The amount of detail the map shows will increase or decrease dependent on the scale of the map.

Topographic symbols show details on the map and these symbols use six basic colors, Figure 1.

| COLORS    | SYMBOLS   |
|-----------|---|
| Black     | Cultural (man-made) features other than roads.  |
| Blue      | Water.  |
| Brown     | All relief features--contour lines on old maps--cultivated land on red-light readable maps. |
| Green     | Vegetation.   |
| Red       | Major roads, built-up areas, special features on old maps.                                  |
| Red-brown | All relief features and main roads on red-light readable maps.                              |

Figure 1

Symbols on a Military Map

Mapmakers use symbols on a map to represent physical features, such as physical surroundings or objects, as shown in Figure 2.

The shape of an object on the map will usually tell what it is, e.g., a black solid square is a building or a house, and a round or irregular blue item--a lake or pond.

Logic and what the colors mean must work together to determine a map feature, e.g., blue represents water. If you see a symbol that is blue and has clumps of grass, this would be a swamp.

Symbols on a  
Military Map,  
continued

The size of the symbol shows the approximate size of that object. Most symbols are six to ten times larger so that you can see them under dim light.

You should use the legend--located in the lower left margin of a map--to find an explanation of the symbols and features used on the map.

| FEATURES   | COLORS                      | DESCRIPTION   |
|------------|-----------------------------|---|
| Drainage   | Blue                        | These symbols include lakes, streams, rivers, marshes, swamps, and coastal waters.  |
| Relief     | Brown                       | These features are normally shown by contour lines, intermediate contour lines, and form lines. In addition to contour lines, there are relief symbols to show cuts, levees, sand, sand dunes, ice fields, strip mines, and glaciers.                         |
| Vegetation | Green                       | These symbols include woods, scrub, orchards, vineyards, tropical grass, mangrove and marshy areas, or tundra.  |
| Roads      | Red, Black, or Red-brown    | These symbols show hard-surface, heavy-duty roads; hard surface, medium-duty roads; improved light-duty roads; unimproved dirt roads; and trails. On foreign road maps, symbols may differ slightly; check the map legend for proper identification of roads. |
| Railroads  | Black                       | These symbols show single-track railroads in operation; single-track railroads not in operation; double or multiple-track railroads.  |
| Buildings  | Black, yellow, Red, or Pink | These symbols show built-up areas, schools, churches, ruins, lighthouses, windmills, and cemeteries.  |

Figure 2

Marginal  
Information

Marginal information explains useful information about a map. All maps do not have the same marginal information. Examine all marginal information each time you use a different map.

**NOTE:** Each of the items listed below has a reference, e.g., (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1a(**1**)), or (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1f(**6**)). The numbers in bold parenthesis (**1**) will match the number in Figure 3 on page 4 of this RTP to provide you the location of the item. You can then look at the item on your Tenino map in order to see the item clearer.

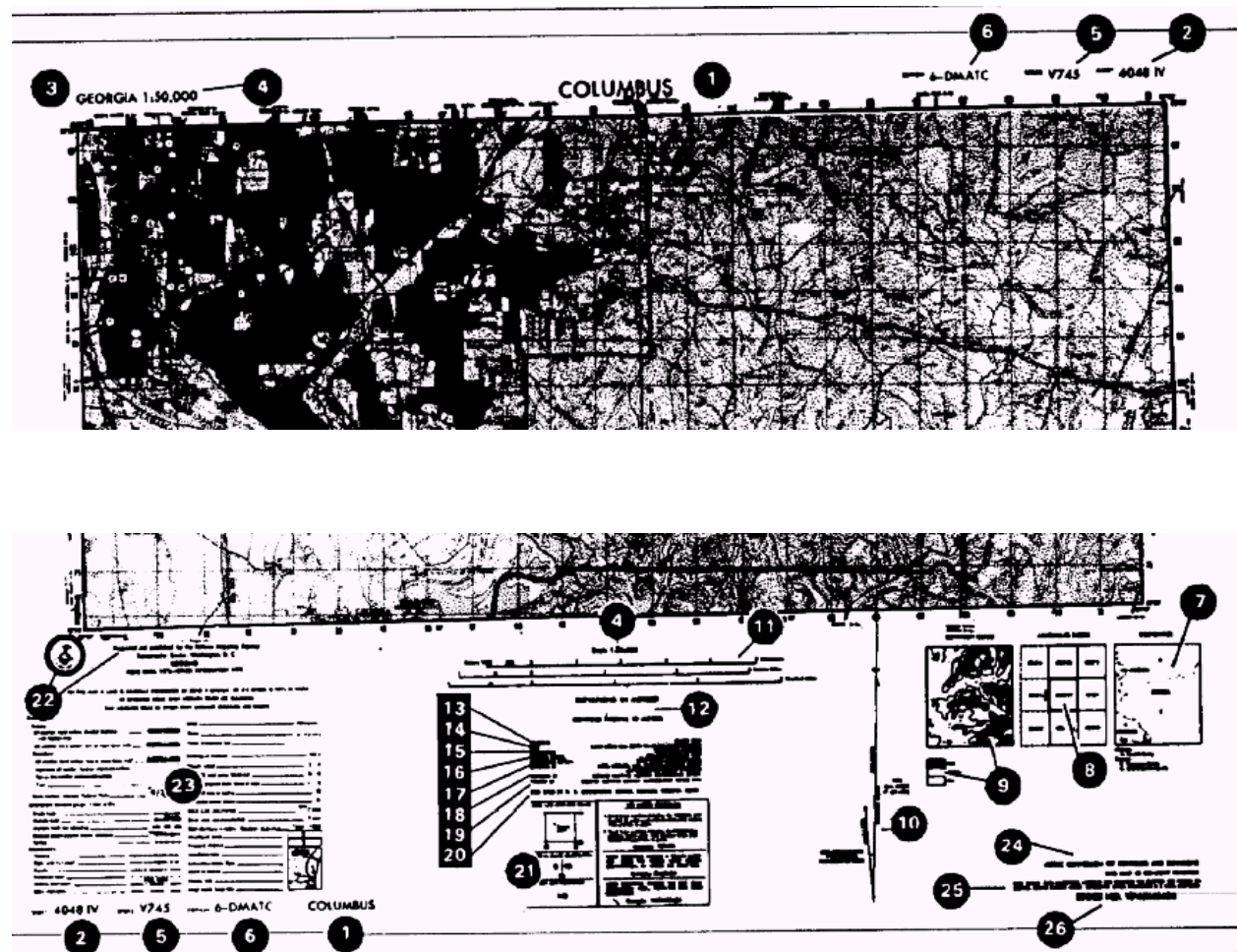


Figure 3

Sheet Name (1) (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1a(1))

The sheet name, located at the center of the top and in the lower left area of the map margin, is in bold print. The map name on your Tenino map is just that "Tenino." Mapmakers generally name the map after the largest settlement or natural feature located entirely within the area of the map sheet.

---

Sheet Number (2) (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1b(2))

The location of the sheet number--in bold print--is in both the upper right and lower left areas of the margin, and in the center box of the adjoining sheets diagram, found in the lower right margin. You use it as a reference number to link specific maps to overlays, operations orders, and plans. On the Tenino Map, the sheet number is **1477 IV**.

---

Series Name (3) (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1c(3))

You will find the map series name in bold print in the upper left corner of the margin. The name given to the series is generally that of a major political subdivision, such as a state within the United States, or a European nation. On your Tenino map, the Series Name is **Washington**.

---

Scale (4) (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1d(4))

The scale of the map appears in both the upper left margin after the series name and in the lower center of the bottom margin. The scale is a representative fraction that gives the ratio of a map distance to the corresponding distance on the earth's surface. For example, the scale 1:50,000 indicates that one unit of measure on the map equals 50,000 units of the same measure on the ground. One inch on the map represents 50,000 inches on the ground. On your Tenino map, the scale is **1:50,000**.

---

Series Number (5) (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1e(5))

You will find the series number in both the upper right margin and the lower left margin. It is a sequence reference expressed either as a four-digit number or as a letter, followed by a three- or four-digit number. The Series Number on your Tenino map is **V791**.

---

Edition Number (6) (Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1f(6))

You will find the edition number in bold print in the upper right area of the top margin and lower left area of the bottom margin. Mapmakers number the editions consecutively; therefore, if you have more than one edition, the highest numbered sheet is the most recent (newest). On your Tenino map, the edition number is **7-DMATC**.

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Index to  
Boundaries (7)

(Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1g(7))

The index to boundaries diagram appears on the lower or right margin of all map sheets. This diagram, which is a miniature of the map, shows the boundaries that occur within the map area, such as county lines and state boundaries. Note on your Tenino map in the lower right corner, that the **Boundaries Index** depicts a line that separates Thurston County from Lewis County. Look at the Tenino map between latitudes 78 and 79, the dashed line that goes across the entire map just like the one in the **Boundaries Index**.

---

Adjoining Sheets  
Diagram (8)

(Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1h(8))

The adjoining sheet diagram--lower right margin--contains a diagram that illustrates the adjoining sheets to your map sheet. On maps at 1:100,000 and larger scales and at 1:1,000,000 scale, the diagram is called the index to adjoining sheets. The diagram usually contains nine rectangles, but the number may vary depending on the locations of the adjoining sheets. Your Tenino has a total of nine sheets. Note that Tenino Map Sheet Number--1477 IV--is in the center. Should your operations extend out from your Map Sheet, then you will know which map sheet--based on the direction your operation will take you--to use.

---

Elevation Guide  
(9)

(Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1i(9))

The elevation guide normally appears in the lower right margin. It is a miniature characterization of the terrain shown. This map represents the terrain by bands of elevation, spot elevation, and major drainage features. The elevation guide provides the map reader with a means of rapid recognition of major landforms. Note that the **Elevation Guide** is right next to the adjoining sheets diagram.

---

Declination  
Diagram (10)

(Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1j(10))

You will find the declination diagram in the lower margin of large-scale maps. The scale indicates the angular relationships of true north, grid north, and magnetic north. In recent edition maps, there is a note indicating the conversion of azimuths from grid to magnetic and from magnetic to grid next to the declination diagram. These are very important--as you will see later on--in conducting land navigation when you have to convert grid azimuths to magnetic azimuths and magnetic to grid.

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Bar Scales (11)

(Ref: FM 3-25.26 (SH-2), Chapter 3, page 3-1, para 3-1k(11))

You will find the bar scale located in the center of the lower margin. The bar scales are rulers that you use to convert map distance to ground distance. Maps have three or more bar scales, each in a different unit of measure. Take care when using the scales, especially in the selection of the unit of measure that you need. On your Tenino map, there are four scales, meters, yards, statute miles, and nautical miles.

---



## Determine the Grid Coordinates of a Point on a Military Map

### Task

This section of the RTP teaches--

|                     |  |
|---------------------|--|
| <b>Task Number:</b> | App C, Task 4, STP 21-1-SMCT.  |
| <b>Task Title:</b>  | Determine the grid coordinates of a point on a military map.   |
| <b>Conditions:</b>  | Given a standard 1:50,000-scale military map in a field location, a 1:50,000 grid coordinate scale, a pencil, paper, and determine coordinates for a point on the map.   |
| <b>Standards:</b>   | Determined the six-digit grid coordinates for the point on the map with a 100-meter tolerance. Record the grid coordinates with the correct two-letter 100,000-meter-square identifier IAW FM 3-25.26 (SH-2), Chapter 4, p SH-2-8; STP 21-1-SMCT, Aug 03, App C, p C-15. |

### Notes

To keep from getting lost, you have to know how to find out where you are. There are no street addresses in a combat area, but a military map can spot your location accurately. The map has **Vertical Lines** (top to bottom), and **Horizontal Lines** (left to right). These lines form small squares 1,000 meters on each side called **Grid Squares**.

The lines that form grid squares have numbers along the outside edge of the map picture. No two grid squares will have the same number.

We use digits to locate a point on a map. The more digits there are in a coordinate, the more precise the location. You will refresh your memory by covering the four, six, and eight-digit coordinates.

## Four-Digit Coordinate

Look at Figure 4 below. Someone tells you that your location is somewhere in grid square 1181. Your first question may be, how do I know where I am?

Begin by reading LEFT to RIGHT (easterly) on your map until you reach **number 11**. You have found the first half of your grid square. Next you read UP (northerly) the map until you reach **number 81**. Now you have the second half of the grid square and your location in a 1000-meter grid square. So, your location is somewhere in grid square 1181.

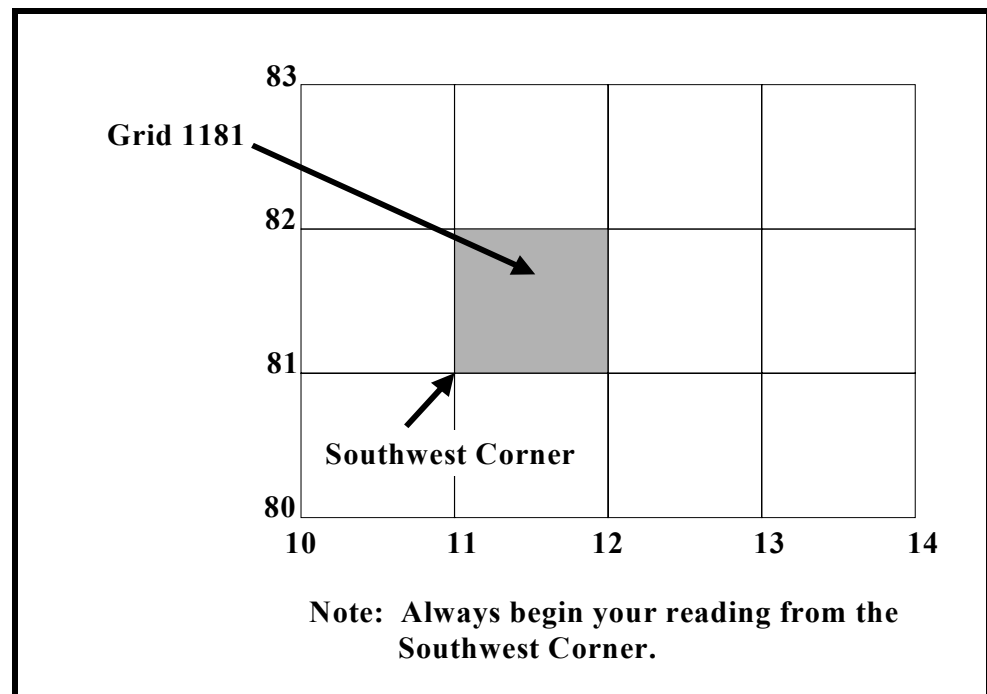


Figure 4

## Six-Digit Grid Coordinates

Now that you know you are in grid square 1181, you may want a more precise idea of where you are in this 1000-meter grid square. In other words, you are in the general neighborhood, but it would be nice to determine where your location is within 100 meters. To do this, you just need to add two more numbers, one to the first half (easterly reading 11) and the other number to the second half (northerly reading 81).

To get those extra numbers, imagine that each grid square has ten lines inside spaced evenly running east and west, and another ten lines spaced evenly running north and south. This breaks down the grid square into 100 smaller squares. Now you can estimate where these imaginary lines are and determine where your location is within 100 meters.

Six-Digit Grid  
Coordinates,  
continued

Take a look at Figure 5. As you can see, grid zone 1181 breaks down into 100-meter squares.

Suppose you are halfway--about 500 meters--between grid line 11 and grid line 12. Starting at the southwest corner (Ref: Figure 4) of grid square 11, you count from left to right (easterly) (Ref: Figure 5). Since the location is **five**, then you add 5 to the first half of the coordinate (easterly) 11, and it becomes 115.

Now suppose you are approximately 3/10ths--300 meters--of the way between grid line 81 and grid line 82. Starting from grid line 81, you count UP, (northerly) until you reach the 3/10ths--300-meter point (Ref: Figure 5). Since the location is **three**, then you add 3 to the second half of the coordinate (northerly) 81, and it becomes 813. So, your six-digit grid is 115813 as shown in Figure 5.

In another example, if you are exactly on line 11, then the first half coordinate (easterly) would be 110, and if you are exactly on line 81, then the second half of the coordinate (northerly) would be 810. Then the six-digit grid is 110810.

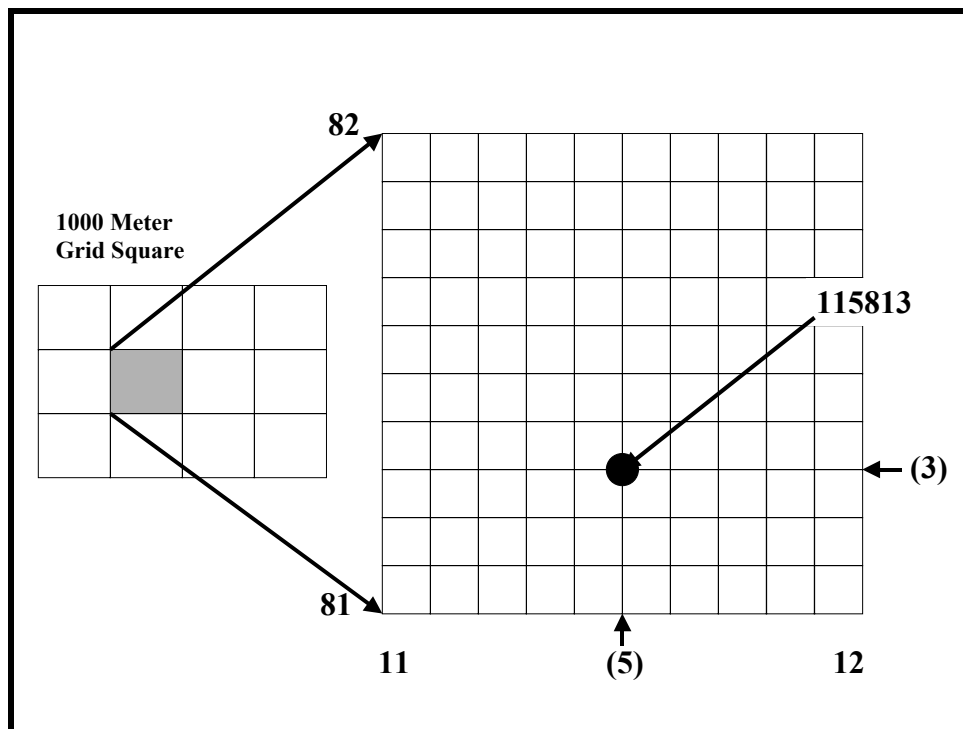


Figure 5

## Coordinate Scale

The most accurate way to determine the coordinate of a point on a map is to use a coordinate scale. With the coordinate scale, you don't have to use imaginary lines because the coordinate scale will give you the exact coordinates. This scale is on the Coordinate Scale and Protractor--GTA 5-2-12--see Figure 6 below.

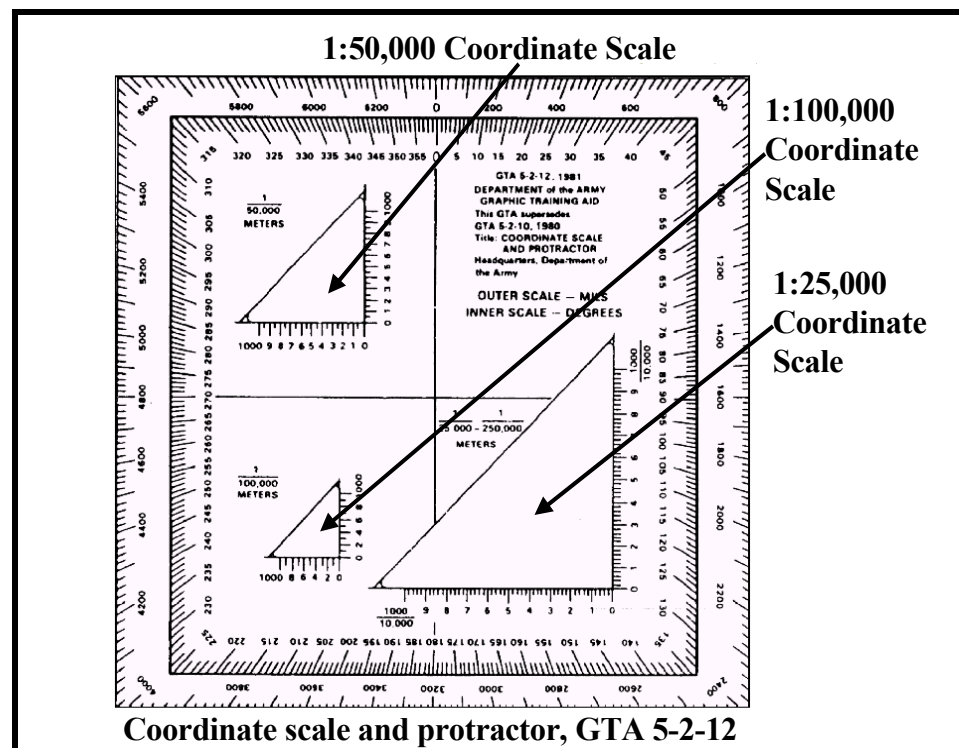


Figure 6

## Six-Digit Grid Coordinates Using Coordinate Scale

As you can see, the protractor has three coordinate scales: 1:25,000, 1:50,000 and 1:100,000. Make sure that when you use the coordinate scale that you use the proper one based on the scale of your map. For the PLDC course, you will be using 1:50,000 scale maps.

Let's locate a point on a grid square using the coordinate scale, Figure 7, page RTP-12.

1. Locate the four-digit grid square of Point A.
2. Read RIGHT and UP, you should have a four-digit grid of 1181.
3. Place the coordinate scale on the bottom horizontal grid line (81) of the grid square containing Point A to determine the third and sixth digits of the coordinate.

Point A

83

82

81

Southwest Corner  
Grid Square 1181

09 10 11 12

5800 5600 5400 5200 5000

6000 6200 0 200 400

318 320 325 330 335 340 345 350 355 0 5 10 15 20 25 30 35

1  
50,000  
METERS

1000 9 8 7 6 5 4 3 2 1 0

0 1 2 3 4 5 6 7 8 9 1000

GTA 5-2-12, 1981  
DEPARTMENT of the ARMY  
GRAPHIC TRAINING AID  
This GTA supersedes  
GTA 5-2-10, 1980  
Title: COORDINATE SCALE  
AND PROTRACTOR  
U.S. Army, Department of  
A SCALE - MILS  
INNER SCALE - DEGREE

SLIDE  
To The  
Right

Figure 7

4. Place the coordinate scale so that the **ZEROS** of the coordinate scale are in the lower left-hand (**southwest corner**) of grid square 1181, the grid square containing Point A, Figure 7.

Six-Digit Grid  
Coordinates  
Using Coordinate  
Scale, continued

5. Slide the scale to the right, keeping the bottom of the scale on the bottom grid line (81), until Point A is under the vertical (right-hand) scale, Figure 8.

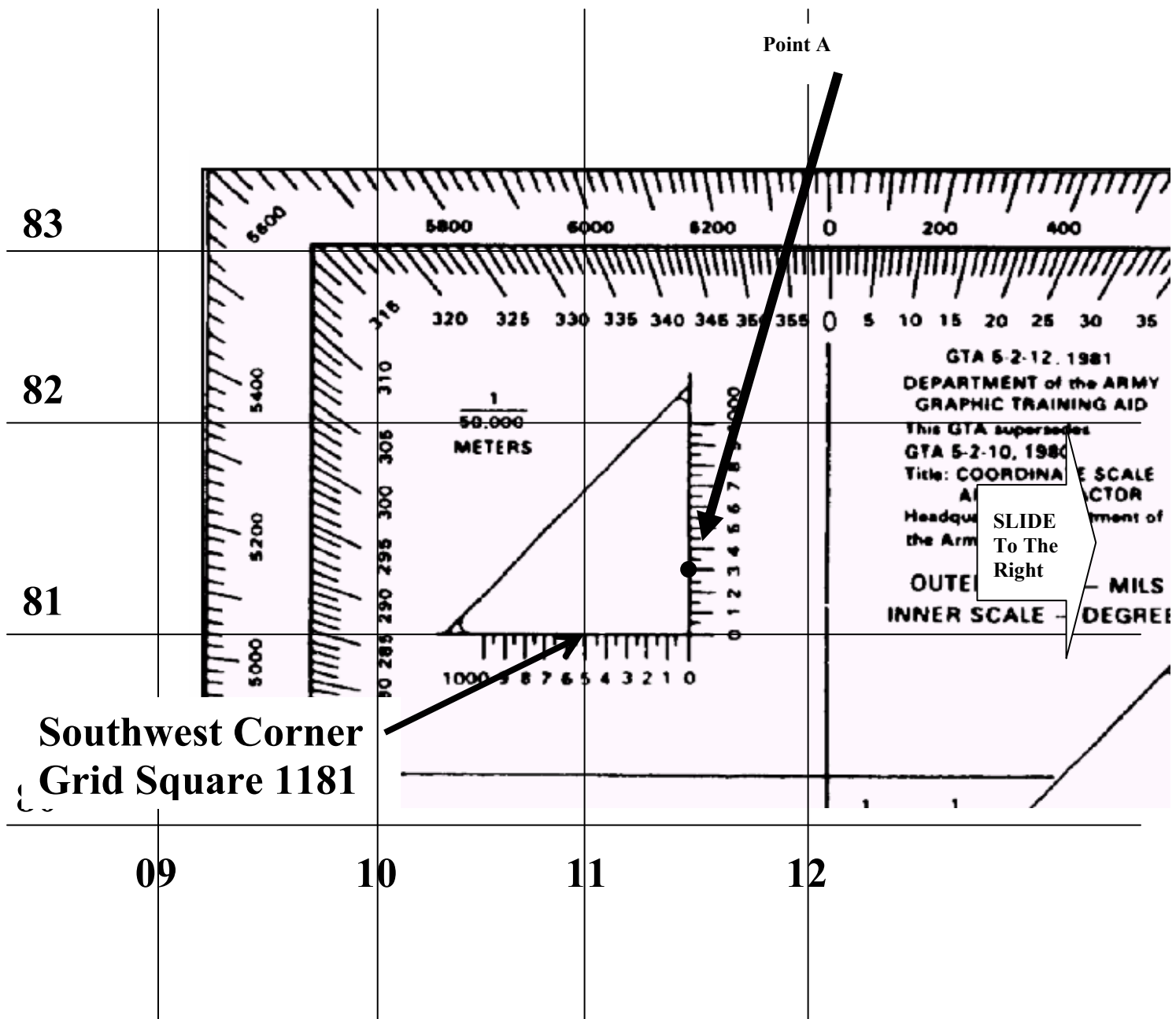


Figure 8

Six-Digit Grid  
Coordinates  
Using Coordinate  
Scale, continued

6. To find the third-digit for the first half (easterly) grid coordinate, go to grid line 11. There, as you see in Figure 8, grid line 11 runs through the number five on the bottom line of the coordinate scale. Five becomes your third number for grid 11 (easterly), so the first half of the grid coordinate is 115.

7. To find the third-digit for the second half (northerly) grid coordinate, go to grid line 81. As you can see in Figure 8, Point A on the map is right under the number 3 (vertical scale) on the coordinate scale. The 3 becomes your third number for grid 81 (northerly), so the second half of the grid coordinate is 813.

8. You have now determined your location on the map to within 100 meters as 115813.

Eight-Digit Grid  
Coordinates  
Using Coordinate  
Scale

To determine an eight-digit coordinate, which will locate a point on the ground to within 10 meters, you must keep in mind that there are 100 meters between each 100-meter mark (number) on the coordinate scale. As you may have already noticed, the coordinate scale has short tickmarks to indicate 50 meters between each 100-meter mark. See Figure 9.

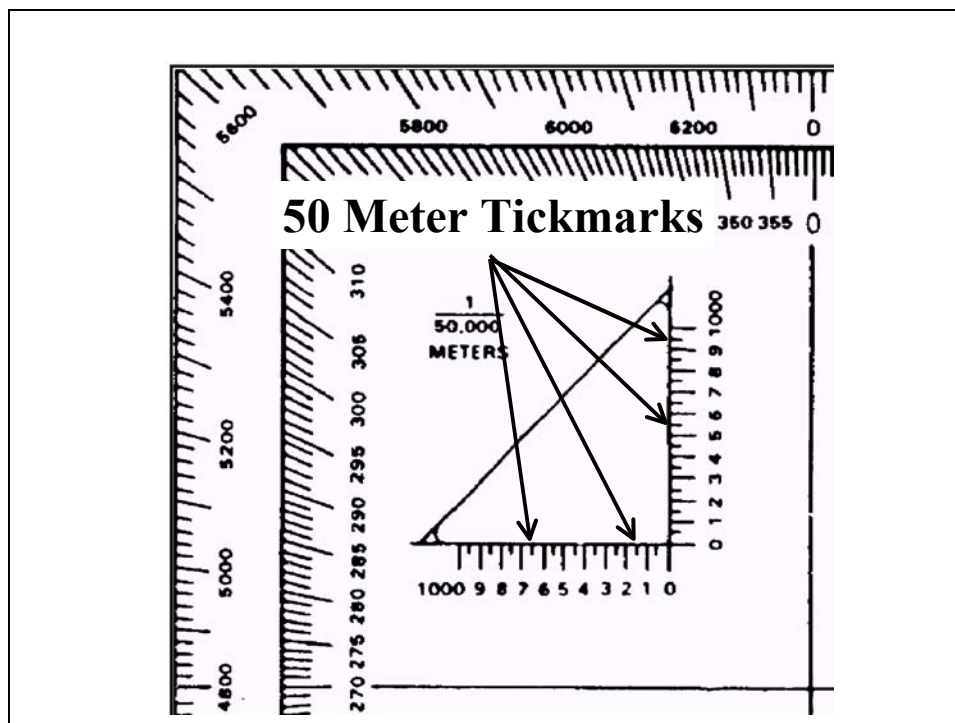


Figure 9

Determine an  
Eight-Digit Grid  
Coordinates  
Using Coordinate  
Scale

---

To find the eight-digit coordinate, you use the same procedures as those used to find the six-digit coordinate using the coordinate scale. If the point on the map lies at a spot where the vertical grid line falls between two 100-meter marks on the horizontal scale of the coordinate scale, and between two 100-meter marks on the vertical scale of the coordinate scale, then you interpolate (estimate) the distance, Figure 10, p RTP 16.

To determine the four digits of the first half of the grid coordinate, you can see where grid line 11 runs through the number 5 (500-meter mark) on the horizontal scale of the coordinate scale. Since the line runs right through the 5, then the third number is 5, and the fourth number is 0. So, the first half of the grid coordinate is 1150.

To determine the four digits of the second half of the grid coordinate, you can see where Point A lies between the number 5 (500-meter mark) and the 50 meter tickmark that lies between numbers 5 and 4 (400-meter mark) on the vertical scale of the coordinate scale. The third number of the second half of the grid coordinate will be 4. To determine the fourth number of the second half, you must interpolate (estimate) the distance between the 50 meter tickmark and the number 5 in 10 meter increments. In this case the estimate is 30 meters from the 50 meter tickmark. So, the second half of the grid coordinate is 8148.

The eight-digit grid coordinate for Point A on Figure 10 then reads as **11508148**.

---

100,000-Meter  
Square Identifier

The last thing in determining a grid coordinate is to place the correct 100,000-meter square identifier in front of your four, six, or eight-digit grid coordinate. You can find the 100,000-meter square identifier, made up of two letters, in the lower center margin of your map in the grid reference box, Figure 11, page 17.

As you can see in the grid reference box, the 100,000 meter square identification is in the left column center, identified as:

**EH**  
**EG**     <sup>52</sup>00

Take out your Tenino map, and find the grid reference box. Notice that the 100,000-meter square identification is the same as above, and that the grid reference box is the same as Figure 11, page RTP-17.

---



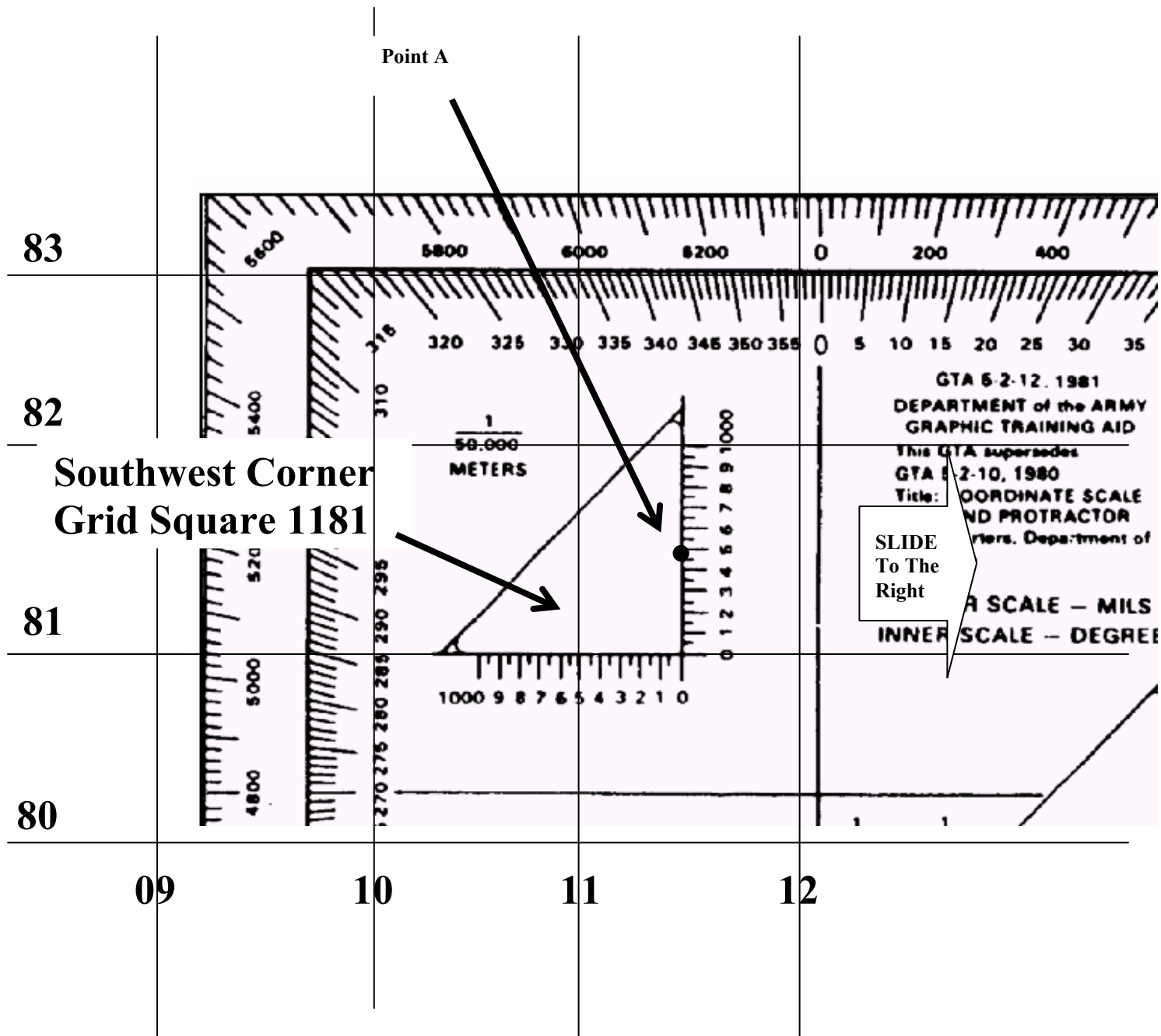


Figure 10

100,000-Meter  
Square Identifier,  
continued

Don't let the EH over the EG confuse you. What this indicates is that the Tenino map happens to fall within two different 100,000-meter map squares. The numbers to the right (<sup>52</sup>00) tell you where on your map the division between the two 100,000-meter map squares are. Since the EH is over the EG--as shown below--separated by a horizontal line, the division is on grid line 00 that runs east and west. If the grid reference was shown with the **EH** and **EG** beside each other with a vertical line between them, then the division would have been on Grid Line 00 running north and south.

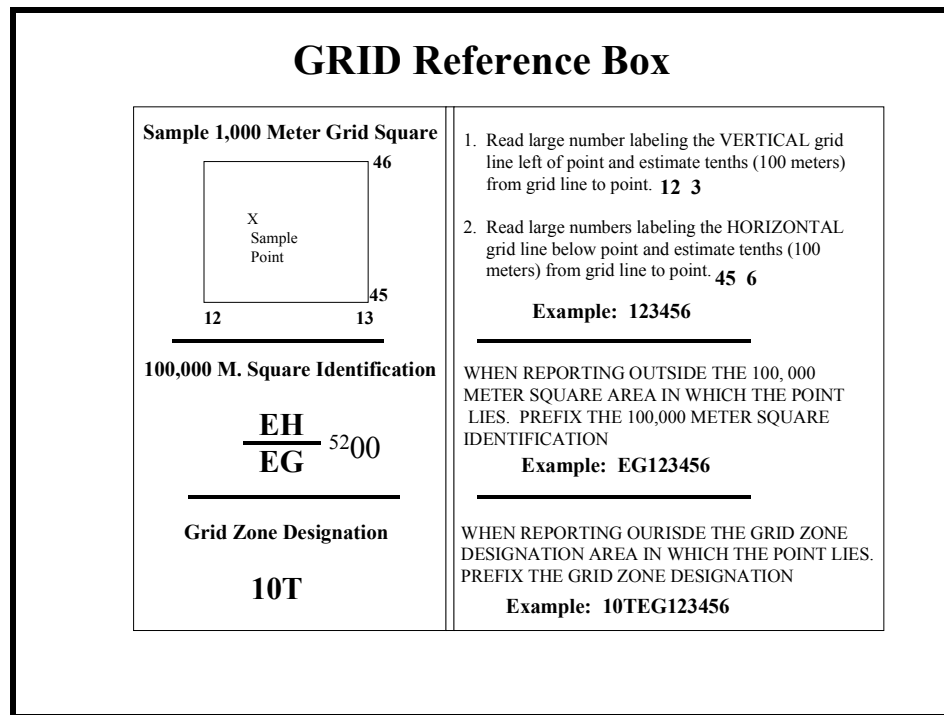


Figure 11

The significance of this is that all coordinates above the 00 grid line running east and west will begin with the letters EH and all coordinates below the 00 grid line running east and west will begin with the letters EG. For Example: On your Tenino Map:

EH0401, See the two ponds?  
EH053045, See the lake?  
EG0493, See Maytown?  
EG086958, See Pitman Lake?

Without the EH or EG, when you report locations, the people who receive your report would not know which 100,000-meter map square you are reporting about.

## Identify Terrain Features on a Map

### Task

This section of RTP teaches--

|                     |  |
|---------------------|--|
| <b>Task Number:</b> | App C, Task 3, STP 21-1-SMCT   |
| <b>Task Title:</b>  | Identify terrain features on a map.  |
| <b>Conditions:</b>  | Given a standard 1:50,000-scale military map.  |
| <b>Standards:</b>   | Identified the five major and three minor features on the map IAW FM 3-25.26 (SH-2), Chapter 10, p SH-2-64; STP 21-1-SMCT, Aug 03, App C, p C-8. |

### Identify Terrain Features

You identify terrain features in the same manner on all maps, regardless of the contour interval, but you must realize that a hill in the Rocky Mountains will be much bigger than the one in south Florida. You must be able to recognize all the terrain features to locate a point on the ground or to navigate from one point to another.

### Terrain Features

Mapmakers derived all terrain features from a complex landmass known as a mountain or ridgeline (Figure 12). The term ridgeline is not interchangeable with the term ridge. A ridgeline is a line of high ground, usually with changes in elevation along its top and low ground on all sides. It is from the ridgeline that mapmakers have classified a total of 10 natural or man-made terrain features. These features break down into five major, three minor, and two supplementary features.

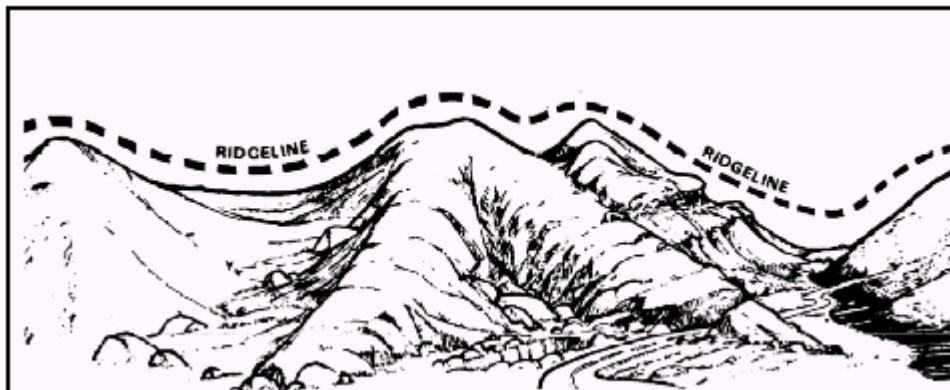


Figure 12

Five Major  
Terrain Features

**1. Hill.** A hill is an area of high ground. From a hilltop, the ground slopes down in all directions. A map depicts a hill by showing contour lines forming concentric circles (circles having a common center). The inside of the smallest closed circle is the hilltop, Figure 13.

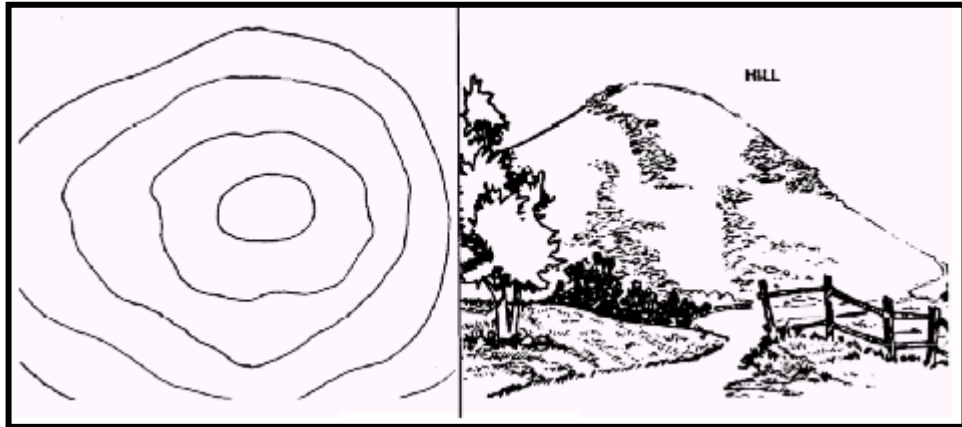


Figure 13, Hill

**2. Saddle:** A saddle is a dip or low point between two areas of high ground. A saddle is not necessarily the lower ground between two hilltops; it may be simply a dip or break along a level ridgecrest. If you are in a saddle, there is high ground in two opposite directions and lower ground in the other two directions. An hourglass normally represents a saddle. Figure 14.

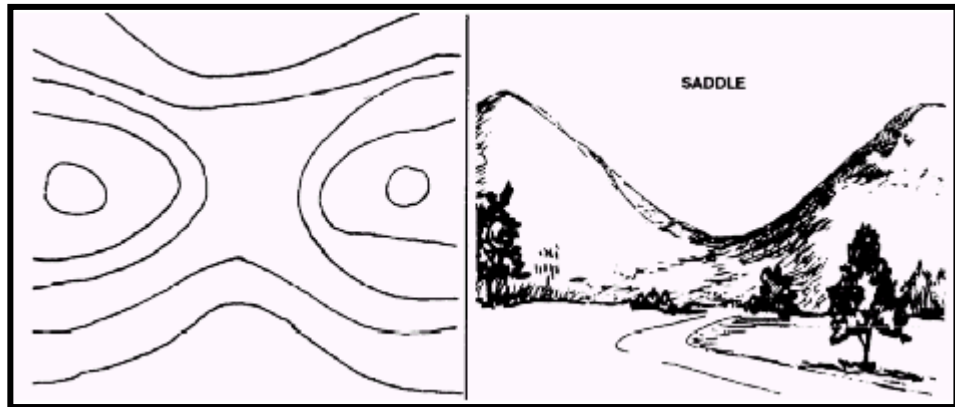


Figure 14, Saddle

**3. Valley.** A valley is a stretched-out groove in the land, usually formed by streams or rivers. A valley begins with high ground on three sides, and usually has a course of running water through it. If standing in a valley, there is high ground in two opposite directions and there is a decline from the third direction to the fourth. Depending on its size and where a

person is standing, it may not be obvious that there is high ground in the third direction, but water flows from higher to lower ground. Contour lines forming a valley are either U shaped or V shaped. To determine the direction water is flowing, look at the contour lines. The closed end of the contour line (U or V) always points upstream or toward high ground, Figure 15.



Figure 15, Valley

**4. Ridge.** A ridge is a sloping line of high ground. If you are standing on the centerline of a ridge, you will normally have low ground in three directions and high ground in one direction with varying degrees of slope. If you cross a ridge at right angles, you will climb steeply to the crest and then descend steeply to the base. When you move along the path of the ridge, depending on the geographic location, there may be either an almost unnoticeable slope or a very obvious incline. Contour lines forming a ridge tend to be U-shaped or V-shaped. The closed end of the contour line points away from high ground, Figure 16.

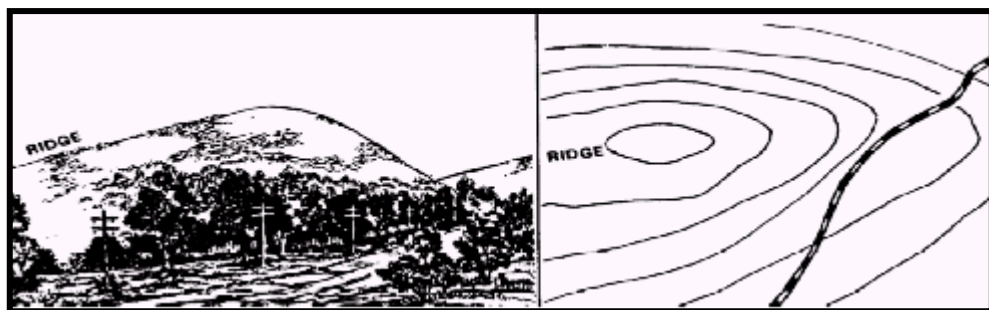


Figure 16, Ridge

**5. Depression.** A depression is a low point in the ground or a sinkhole. One could describe it as an area of low ground surrounded by higher ground in all directions, or simply a hole in the ground. Usually mapmakers only show depressions that are equal to or greater than the contour interval. Maps show depressions by closed contour lines that have tickmarks pointing toward low ground, Figure 17.

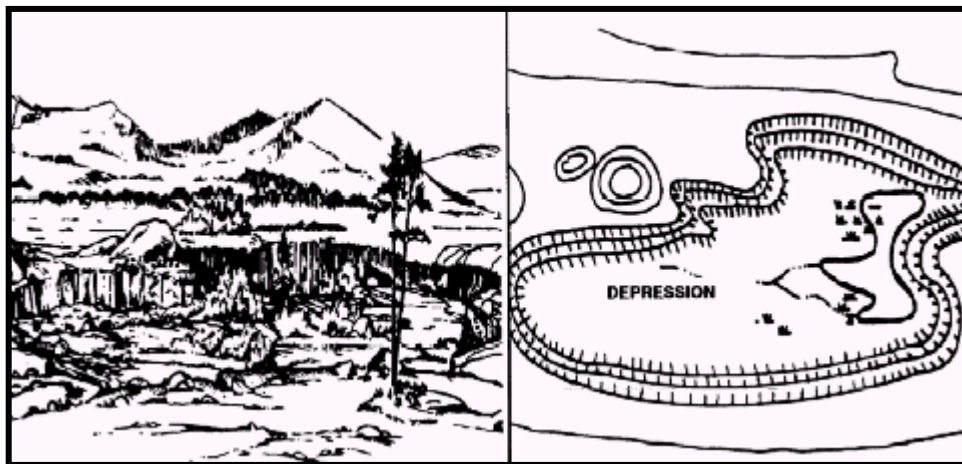


Figure 17, Depression

**1. Draw.** A draw is a less developed stream course than a valley. In a draw, there is essentially no level ground and, therefore, little or no maneuver room within its confines. If you are standing in a draw, the ground slopes upward in three directions and downward in the other direction. You can consider a draw as the initial formation of a valley. The contour lines depicting draws are U-shaped or V-shaped, pointing toward high ground, Figure 18.



Figure 18, Draw



Three Minor  
Terrain Features,  
continued

**2. Spur.** A spur is a short, continuous sloping line of higher ground, normally jutting out from the side of a ridge. A spur often forms when two roughly parallel streams cut draws down the side of a ridge. The ground will slope down in three directions and up in one. Contour lines on a map depict a spur with the U or V pointing away from high ground, Figure 19.

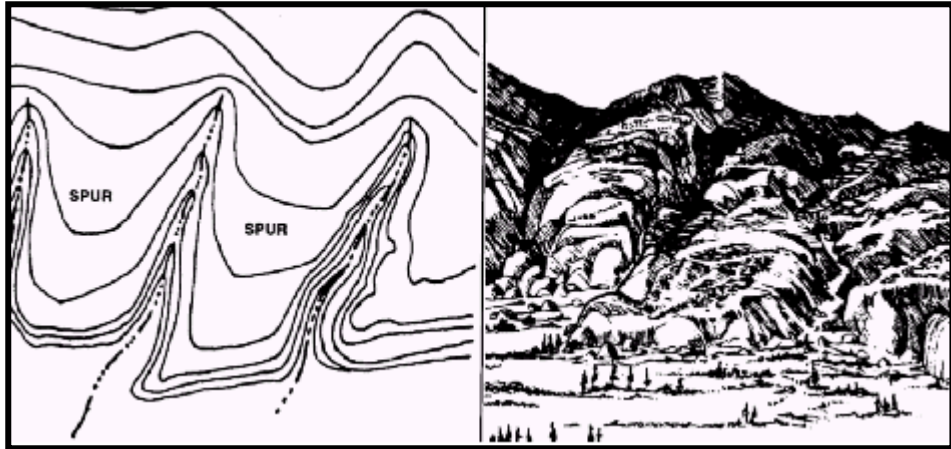


Figure 19, Spur

**3. Cliff.** A cliff is a vertical or near vertical feature; an abrupt change of the land. When a slope is so steep that the contour lines converge into one "carrying" contour of contours, this last contour line has tick marks pointing toward low ground, Figure 20.

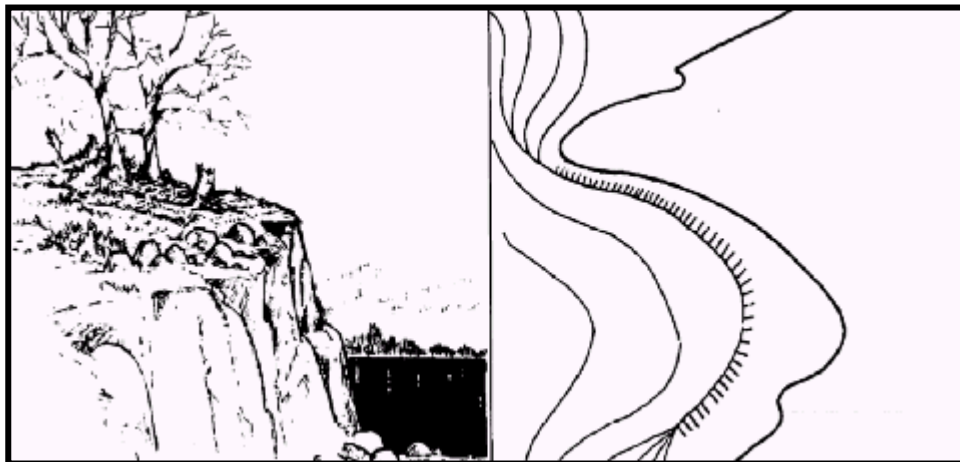


Figure 20, Cliff (With Tick Marks)

Three Minor  
Terrain Features,  
continued

Maps also depict cliffs by showing contour lines very close together and, in some instances, touching each other, Figure 21.

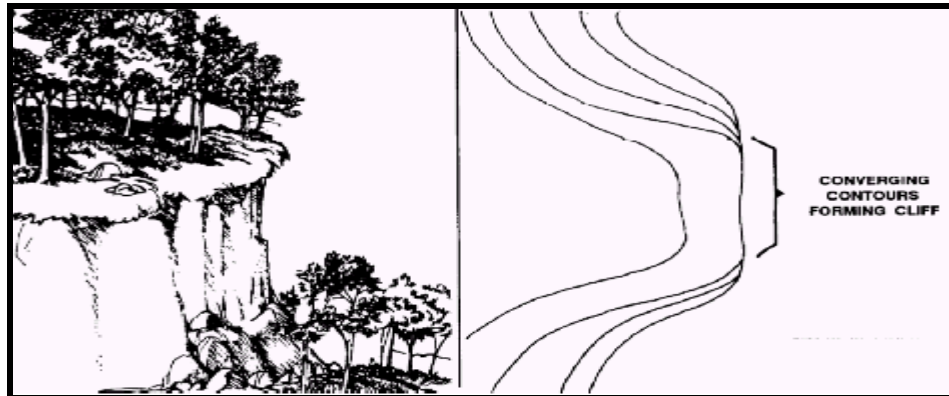


Figure 21, Cliff with Converging Contours

Two  
Supplementary  
Terrain Features.

**1. Cut.** A cut is a man-made feature resulting from cutting through raised ground, usually to form a level bed for a road or railroad track. Maps identify cuts when they are at least 10 feet high, and they appear with a contour line along the cut line. This contour line extends the length of the cut and has tick marks that extend from the cut line to the roadbed, if the map scale permits this level of detail, Figure 22.

**2. Fill.** A fill is a man-made feature resulting from filling a low area, usually to form a level bed for a road or railroad track. Maps depict fills when they are at least 10 feet high; they appear with a contour line along the fill line. This contour line extends the length of the filled area and has tick marks that point toward lower ground. If the map scale permits, the length of the fill tickmarks--drawn to scale--extend from the base line of the fill symbol, Figure 22.

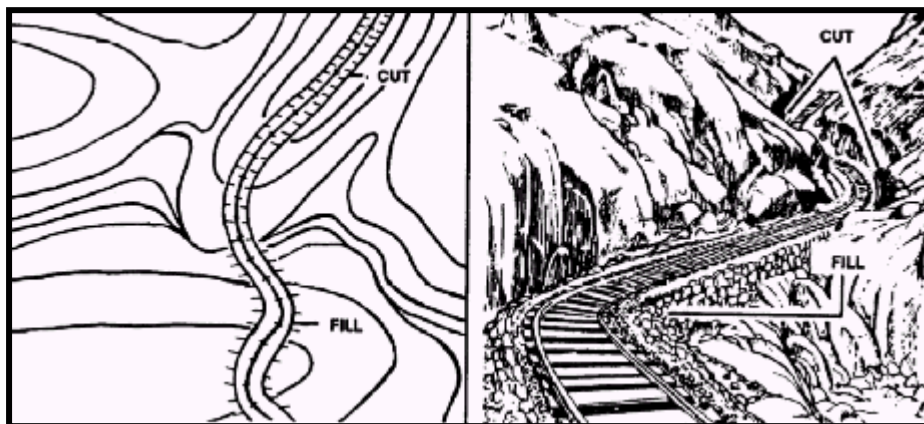


Figure 22, Cut and Fill



## Terrain Features

Figure 23 provides you with a map with all the terrain features you just covered.

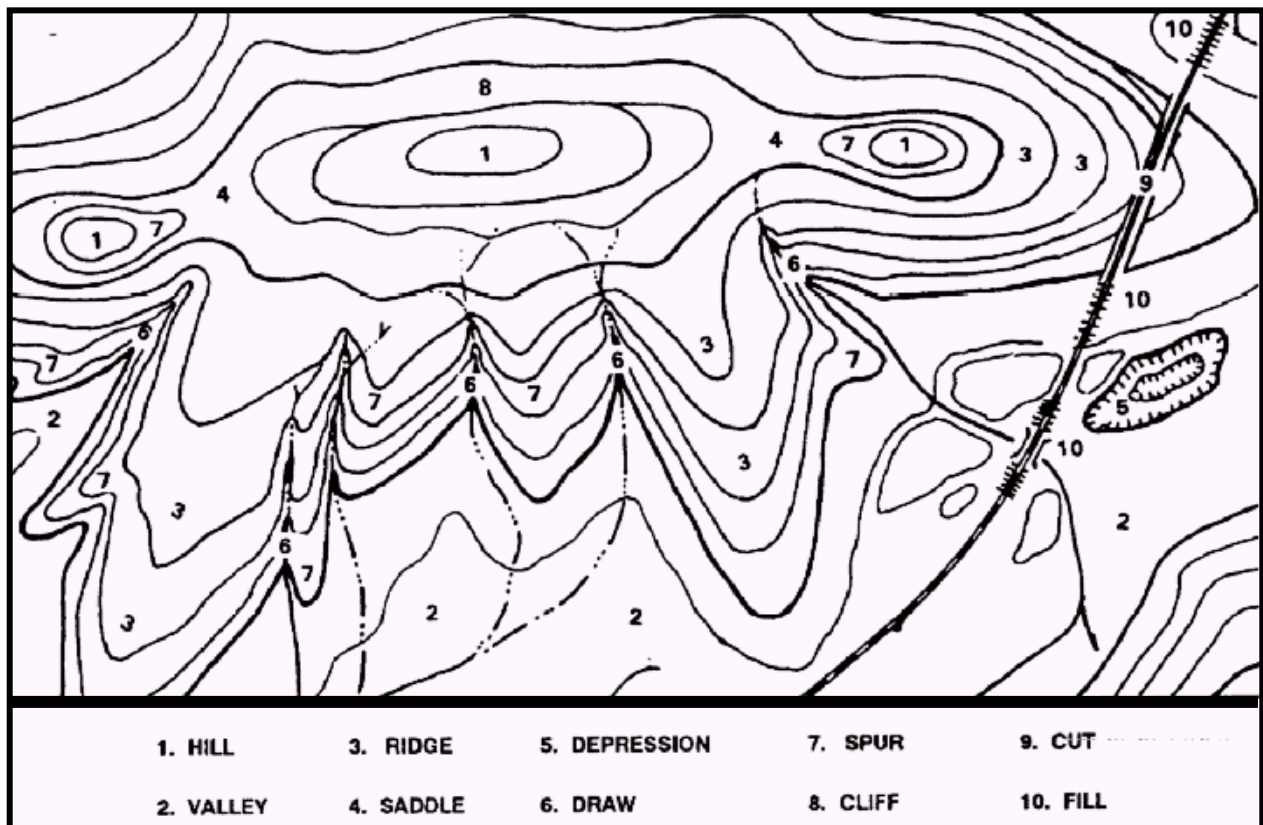


Figure 23

## Quiz 1

---

### Quiz 1

Take a few moments now to review tasks 2, Identify Topographic Symbols on a Military Map; task 4, Determine the Grid Coordinates of a Point on a Military Map; and task 5, Identify Terrain Features on a Map. Answer the questions below by circling the correct response, filling in the blank, or writing in the space provided. After you finish, check your answers with the answers on pages RTPQAS-1 thru RTPQAS-3.

You will need your Tenino Map and your GTA 5-2-12 Coordinate Scale and Protractor. If you need additional help, begin by reviewing this RTP and then ask your SGL for assistance.

**NOTE:** Do not use the answer sheet below unless directed by the SGL. Write the questions on a separate sheet of paper and then answer them.

---

### Question 1

What are the six colors used on a military map?

1. \_\_\_\_\_, 2. \_\_\_\_\_, 3. \_\_\_\_\_, 4. \_\_\_\_\_  
5. \_\_\_\_\_, 6. \_\_\_\_\_.
- 

### Question 2

What do the six colors on a military map represent?

1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_  
4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_
-

## Quiz 1, cont

- 
- Question 3**      What portion of a map explains the symbols and features used, and where can you find it? \_\_\_\_\_
- 
- Question 4**      What is the "map series name," "scale," and "series number" of your Tenino map?
1. Map Series Name: \_\_\_\_\_
2. Scale: \_\_\_\_\_
3. Series Number: \_\_\_\_\_
- 
- Question 5**      What is the adjoining sheet number directly south of the Tenino Map sheet? \_\_\_\_\_
- 
- Question 6**      What information is on the map that will tell you the angular relationships of true north, grid north, and magnetic north? \_\_\_\_\_
- 
- Question 7**      Where on the map will you find the declination diagram? \_\_\_\_\_
- 
- Question 8**      The more digits in a coordinate, the \_\_\_\_\_ the location.
- 
- Question 9**      Regardless of the scale of a military map, how many meters are in a grid square? \_\_\_\_\_
- 
- Question 10**      How do you read a map to find a grid coordinate? \_\_\_\_\_
- 
- Question 11**      How many digits must there be in the grid coordinate of a target that would place that target to within 100 meters in a 1,000-meter grid square? \_\_\_\_\_
-

## Quiz 1, cont

---

### Question 12

Without the use of a coordinate scale, identify on the Tenino map the topographic symbols at the following six-digit grid coordinates within 100 meters. (Don't forget to use the "legend" and common sense.)

- a. EG065824 \_\_\_\_\_
  - b. EG127841 \_\_\_\_\_
  - c. EG032913 \_\_\_\_\_
  - d. EH064028 \_\_\_\_\_
  - e. EG180903 \_\_\_\_\_
  - f. EG177951 \_\_\_\_\_
- 

### Question 13

Using a coordinate scale, identify on the Tenino map the topographic symbols at the following grid coordinates:

- a. EG099821 \_\_\_\_\_
  - b. EH021005 \_\_\_\_\_
  - c. EG086958 \_\_\_\_\_
  - d. EG037994 \_\_\_\_\_
  - e. EG094847 \_\_\_\_\_
  - f. EH123045 \_\_\_\_\_
- 

### Question 14

With the use of a coordinate scale, and the Tenino map, determine the eight-digit grid coordinate of the items named in the following four-digit grid squares, to within 10 meters.

- a. Church of God, EG0385. \_\_\_\_\_
  - b. Water tower, EG1088. \_\_\_\_\_
  - c. Open pit mine or quarry (active), EG1095. \_\_\_\_\_
  - d. Oil tank, EG0893. \_\_\_\_\_
  - e. Road intersection, EH0404. \_\_\_\_\_
  - f. Zion Chapel, EH1102. \_\_\_\_\_
- 

### Question 15.

What terrain feature is along the unimproved road from the tower at grid coordinate EG180875 to grid coordinate EG184862 on the Tenino map?

- a. Depression.
  - b. Cliff.
  - c. Ridge.
  - d. Valley.
-

## Quiz 1, cont

---

**Question 16** What terrain feature runs from grid coordinate EG153841 along the intermittent stream to grid coordinate EG158847 on the Tenino map?

- a. Cliff.
  - b. Draw.
  - c. Ridge.
  - d. Saddle.
- 

**Question 17** What major terrain feature is in grid coordinate EG1297?

- a. Valley.
  - b. Ridgeline.
  - c. Hill
  - d. Saddle.
- 

**Question 18** What minor terrain features are in grid squares EG1786 and EG1785?

\_\_\_\_\_ and \_\_\_\_\_.

---

**Question 19** What major terrain feature on the Tenino map is at grid coordinate EG16458470?

- a. Hill top.
  - b. Valley.
  - c. Depression.
  - d. Saddle.
- 

**Question 20** On what major terrain feature does the city of Tenino sit?

- a. Ridgeline.
  - b. Saddle.
  - c. Valley.
  - d. Hill.
-

## Determine a Magnetic Azimuth using a Lensatic Compass

### Task

This section of the RTP teaches--

|                     |   |
|---------------------|---|
| <b>Task Number:</b> | App C, Task 5, STP 21-1-SMCT  |
| <b>Task Title:</b>  | Determine a magnetic azimuth using a lensatic compass.  |
| <b>Conditions:</b>  | Given a compass and a designated point on the ground.   |
| <b>Standards:</b>   | Determined the correct magnetic azimuth to the designated point within 3 degrees using the compass-to-cheek method, and within 10 degrees using the center-hold method IAW FM 3-25.26 (SH-2), Chapter 9, p SH-2-51; STP 21-1-SMCT, Aug 03, App C, p C-23. |

### The Lensatic Compass

The lensatic compass, Figure 24, consists of three major parts: the cover, the base, and the lens or rear sight.

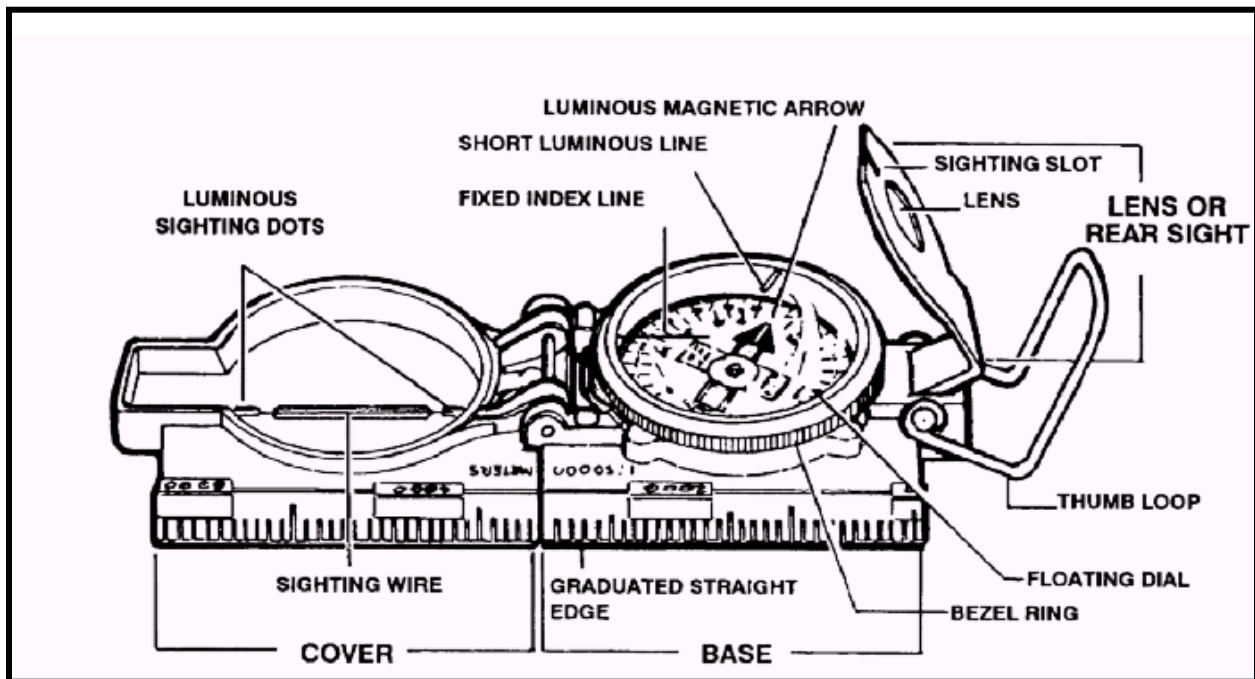


Figure 24

**A. Cover:** The compass cover protects the floating dial. It contains the sighting wire (front sight) and two luminous sighting slots or dots used for night navigation.

**B. Base:** The body of the compass contains the following movable parts:

1. Floating Dial, Figure 25. Used to determine the direction in which you point your compass. The dial, mounted on a pivot, rotates freely when you hold the compass level. Printed on the dial in luminous figures are an arrow and the letters E and W. The arrow always points to magnetic north and the letters (E) east  $90^{\circ}$  and (W) west  $270^{\circ}$  are on the dial.

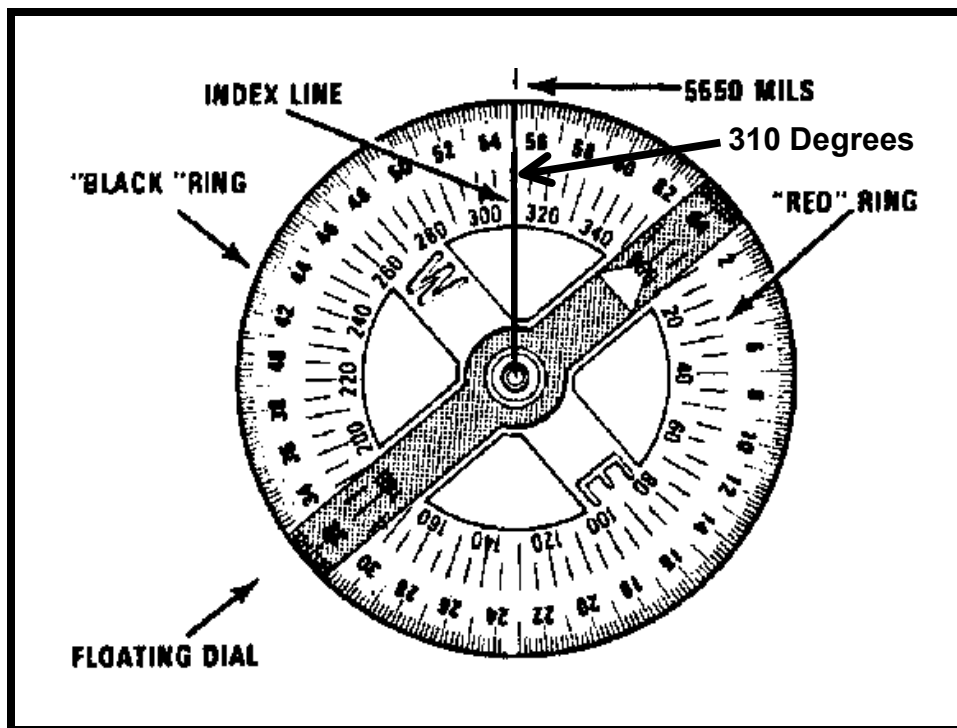


Figure 25

There are two scales; the outer in black numbers denotes mils and the inner numbers (normally in red) denotes degrees.

2. Encasing the floating dial is a glass containing a fixed black index line, Figures 24 and 25.

3. The bezel ring is a ratchet device that clicks when turned. It contains 120 clicks when rotated fully; each click is equal to  $3^{\circ}$ . The glass face of the bezel ring contains a short luminous line that you use in conjunction with the north-seeking arrow during navigation, Figure 24.

4. The thumb loop is attached to the base of the compass, Figure 24.

The Lensatic  
Compass,  
continued

---

**C. Lens or Rear Sight:** You use the lens to read the dial. Above the lens is the rear-sight slot used in conjunction with the front for sighting on objects. The rear sight also serves as a lock and clamps the dial when closed for its protection. You must open the rear sight more than 45° to allow the dial to float freely, Figure 24.

---

Care of the  
Compass

As soon as you get your compass, inspect it in detail. One of the most important parts is the floating dial that contains the magnetic needle. Make sure that the dial floats freely and DOES NOT STICK. Also, make sure the sighting wire is straight, the glass and crystal parts are not broken, and you can read all the numbers on the dial.

Metal objects and electrical sources have an effect on the performance of a compass. However, nonmagnetic metals and alloys do not affect compass readings. Maintain the following separation distances when using a compass:

|   |            |
|---|------------|
| High-tension power line.....                        | 55 meters. |
| Field gun, truck, or tank.....                      | 18 meters. |
| Telegraph or telephone wire and<br>barbed wire..... | 10 meters. |
| Machine gun.....                                    | 2 meters.  |
| Steel helmet or rifle                               | 1/2 meter. |

Your compass, if in good working condition, is very accurate. However, you must check your compass periodically to ensure it works properly. Check it by using it on a known line of direction, such as a surveyed azimuth using a declination station. Do not use a compass with more than a 3° + variation.

**Note:** The NCOA should have some locations in the NCOA area where you can test the accuracy of your compass. Check with your SGL.

When you travel with the compass unfolded, make sure you fold down the rear sight all the way to the bezel ring. This will lock the floating dial and prevent vibration, as well as protect the crystal and rear sight from damage.

---

Shooting an  
Azimuth

1. Use the floating dial to determine the direction in which you are pointing your compass.
  2. Use the outer black ring of numbers and tick marks for finding directions in mils, Figure 25.
-



## Shooting an Azimuth

---

3. Use the inner red ring of numbers and tick marks for finding direction in degrees, Figure 25.

a. There are 360 degrees (inner red ring) and 6,400 mils (outer black ring) in a circle. The compass depicts the degrees at 5 degree intervals and depicts the mils at 20 mil intervals. For the lines in degrees and mils that do not have a number, you will have to determine the line's number using the numbers given on the dial.

**Note:** In Figure 25, the dial is resting with the **index line** over 5,550 mils and 310 degrees.

**Note:** You will use the degree ring (inner red ring) for this course.

b. To read direction, point the compass in the direction you want to go or want to determine.

c. Look beneath the index line on the outer glass cover and estimate to the nearest degree or 10 mils the position of the index line over the Red (degree) or black (mils) scale.

d. Be careful to hold the compass still so that the dial remains stationary while you read the scale.

**Note:** If you understand these readings and can apply either of the holding and sighting techniques of shooting an azimuth, you will be proficient in performing this task.

4. Use the compass to determine or follow an azimuth. The arrow on the compass points toward magnetic north. The arrow is also attracted by any mass of metal; for example, a truck, your rifle, and even electrical power lines. Thus, be sure you use your compass away from metal objects so it will not give a wrong reading.

5. Always hold the compass level and firm when sighting on an object and reading an azimuth.

---

## Compass Holding Methods

There are two methods to holding and reading a compass.

**NOTE:** At this time you will need your compass that the NCOA issued to you.

### A. Compass-to-Cheek Method: (Figure 26)

1. Open the cover to a 90-degree angle to the base. Position the eyepiece at a 45-degree angle to the base.

---



Figure 26, Compass-to-Cheek Method

Compass  
Holding  
Methods,  
continued

2. Place your thumb through the thumb loop, form a steady base with your third and fourth fingers, and extend your index finger along the side of the compass base.

3. Place the hand holding the compass into the palm of the other hand.

4. Bring both hands up to your face and position the thumb that is through the loop against your cheekbone.

5. Look through the lens of the eyepiece. If the dial is not in focus, move the eyepiece up or down until the dial is in focus. Don't forget that the lens/rear sight must be at a  $45^{\circ}$  angle to ensure the dial floats freely.

6. Align the sighting slot of the eyepiece with the sighting wire in the cover on the point for which you are trying to determine the azimuth, Figure 27.

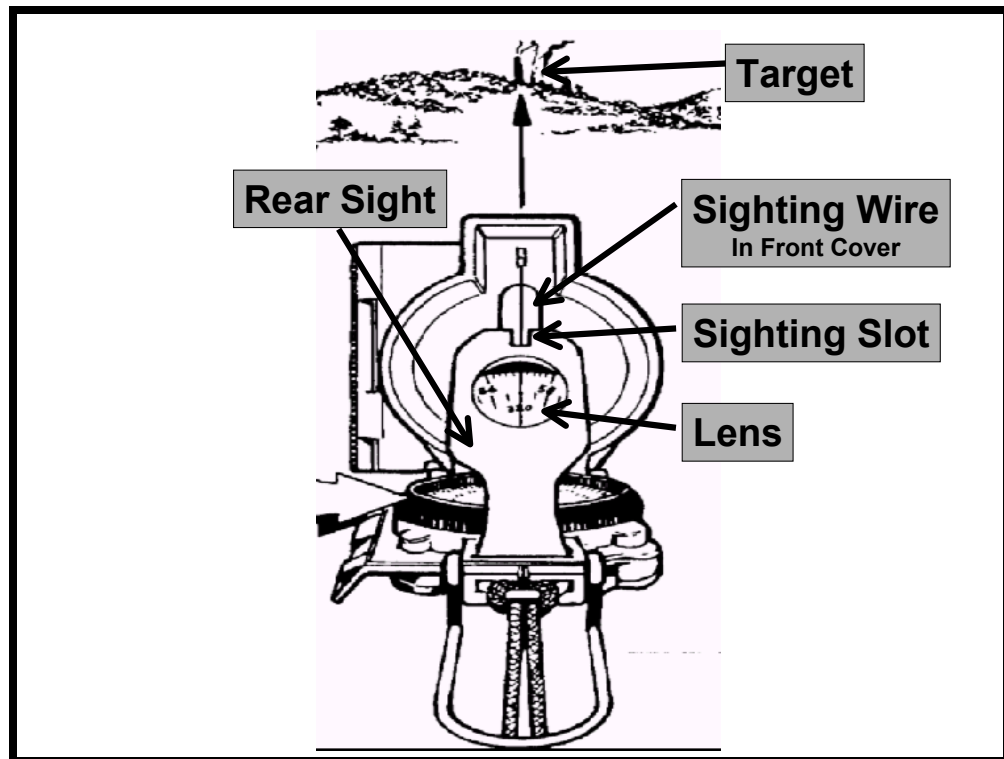


Figure 27

### B. Centerhold Method (Figure 28)

**Note:** Use this method only when you don't need a precise direction.

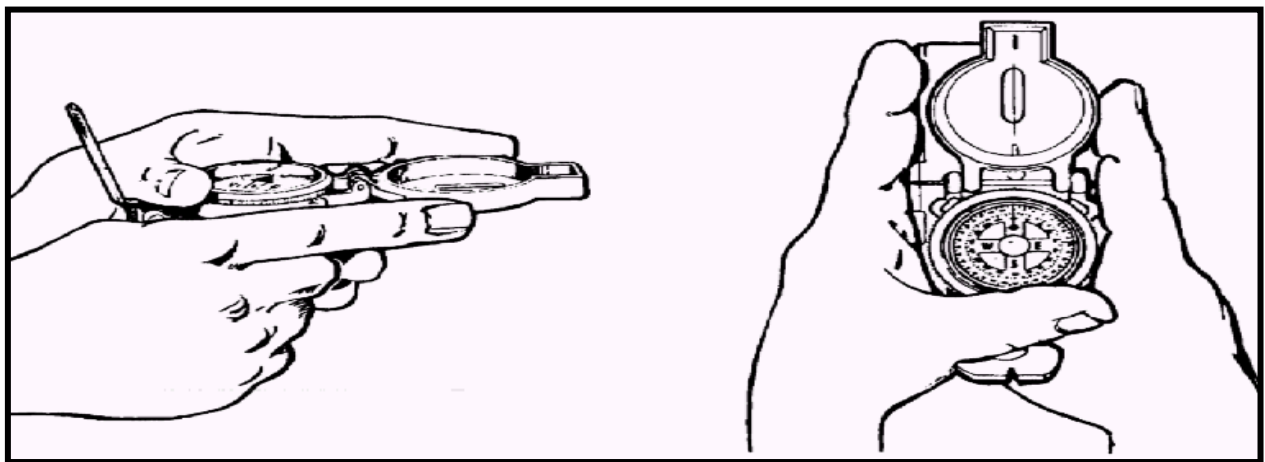


Figure 28, Centerhold Method

1. Open the compass so that the cover forms a straight edge with the base. Move the lens/rear sight to the rear as far as it will move.

---

2. Next, place your thumb through the thumb loop, form a steady base with your third and fourth fingers, and extend your index finger along the side of the compass.

3. Place the thumb of the other hand between the eyepiece and the lens, extend the index finger along the remaining side of the compass, wrap the remaining fingers around the fingers of the other hand, and pull your elbows firmly into your sides. This will place the compass between your chin and your belt.

4. To measure an azimuth, you must turn your entire body toward the object and point the compass cover directly at the object. Look down and read the azimuth from beneath the fixed black index line. You may use this method at night.

5. To keep from going in circles when you are land navigating, stop occasionally to check the azimuth along which you are moving. Also, you can move from object to object along your path by shooting an azimuth to each object and then moving to that object. Repeating this process while you navigate should keep you straight.

---

## Quiz 2

---

### Quiz 2

The NCOA will provide you with the locations of some compass points, and Quiz Sheet 2.

Take your compass out to the NCOA's known compass points. Shoot an azimuth from those points using the Compass-to-Cheek and Centerhold methods.

You azimuth should be within 3 degrees of the azimuth using the Compass-to-Cheek method and 10 degrees using the Centerhold method.

**NOTE:** Check with your classmates to see if you are shooting the same azimuth as they are. If you are experiencing difficulties, make sure your compass is working properly. If the compass is working properly, contact your SGL for assistance.

**NOTE TO NCOA:** Set up points throughout the NCOA, or points in close proximity, where students can check the accuracy of their compasses, and to test themselves to the standards given above. Provide the students with Quiz Sheet 2 where they must shoot three Compass-to-Cheek shots, and three Centerhold shots. Provide them three to four choices of azimuths for each shot.

---

## Measure Distance on a Map

### Task

This section of the RTP teaches--

|                     |   |
|---------------------|---|
| <b>Task Number:</b> | App C, Task 8, STP 21-1-SMCT  |
| <b>Task Title:</b>  | Measure distance on a map.  |
| <b>Conditions:</b>  | Given a standard 1:50,000-scale military map, a strip of paper with a straight edge, and a pencil.  |
| <b>Standards:</b>   | <ol style="list-style-type: none"> <li>1. Determined the straight-line distance, in meters, between two points, with no more than 5 percent error.</li> <li>2. Determined the road (curved line) distance, in meters, between two points, with no more than 10 percent error IAW FM 3-25.26 (SH-2), Chapter 5, p SH-2-22; STP 21-1-SMCT, Aug 03, App C, p C-34</li> </ol> |

### Determining Distance on a Map

If you were to plot the coordinates to two points, one inch apart on your 1:50,000-scale map, your first thought might be--this isn't very far. However, once you convert the one-inch of map distance to actual distance you must travel on the ground, you will discover that your trip, at a minimum, would be 1,270 meters long!

A definite relationship exists between the distance of points on the map and the distance between the same points on the ground. Normally, we express this relationship in one of two ways: by a representative fraction or by a graphic scale.

A representative fraction (RF) is the numerical scale of a map (on your Tenino map it is 1:50,000). Keep in mind, RF expresses the ratio of horizontal distance on the map to the corresponding horizontal distance on the ground. You always write the RF with the map distance as one (1) and in either linear form (1:50,000) or fraction form  $1/50,000$ .

An RF written in either form simply means that one unit of measure on the map is equal to (on your Tenino map) 50,000 of the same units on the ground. For example, one-inch (1") map distance (MD) measured on a map scaled at 1:50,000 is equal to 50,000 inches of ground distance (GD).

---

Determining  
Distance on a  
Map

If you don't like working with inches, you can convert to other units of measure by dividing the 50,000 by the appropriate divisor. The following are examples to convert to feet and meters.

Feet: 50,000 inches **divided** by 12 inches (1 Ft) = 4,166.7 Ft.

Meters: 50,000 inches **divided** by 39.37 inches (1 Meter) = 1270 Meters

A bar scale is a graphic representation of ground distance drawn to the scale of the map. These scales appear on most military maps in the bottom center margin. Look at your Tenino map, you will see that your map has a bar scale. The unit of measure for an individual scale appears to the right or above the scale, Figure 29.

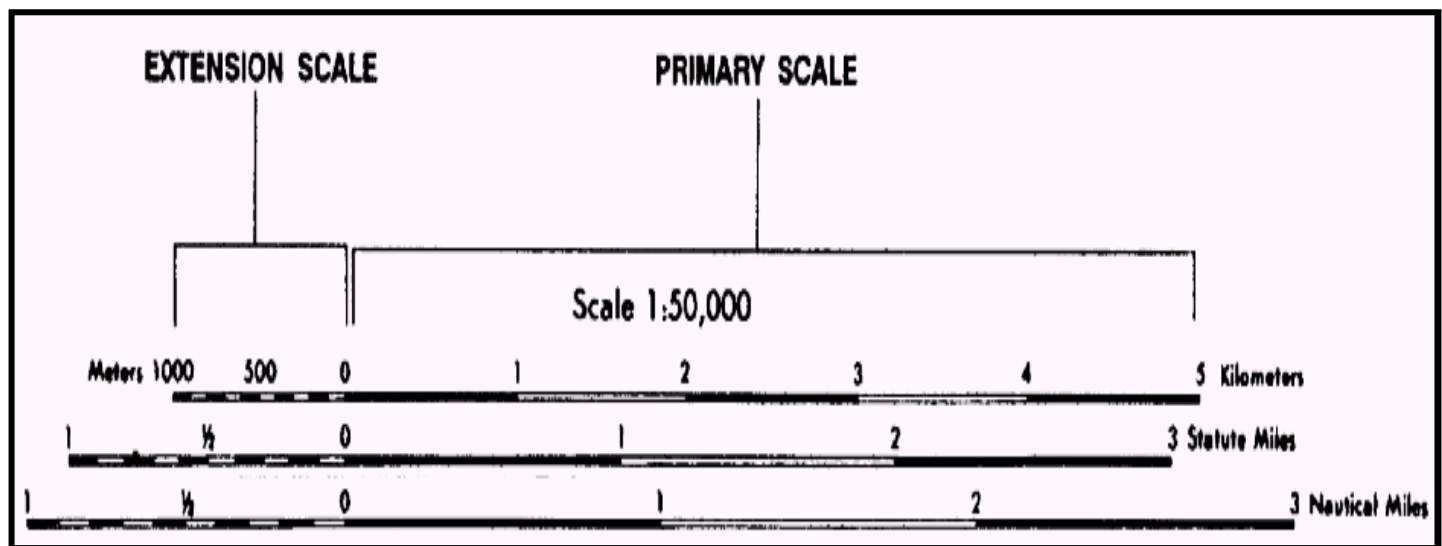


Figure 29

The bar scale shows the "primary scale" in full units of measure to the right of zero (0), and the "extension scale" left of zero shows the unit divided into tenths.

The number and types of measurement found on bar scales will vary. The most commonly used units of measurement are meters, yards, statute miles, and nautical miles. As you can see on you Tenino map, the bar scale provides all four of these measurements.

---

Types of  
Distance  
Measuring

The two types of distances you can measure on a map are straight-line distance and curved or road distance. In order to measure them on a map you will need:

1. A straight edge piece of paper long enough to cover your selected points on the map.
2. A sharp pencil used for marking tick marks between map points.

Straight-line  
Distance,  
continued

**NOTE:** You will now review the method to determine straight-line distance between two points. As you follow the steps below, you will use the figure given below and also perform the task on your Tenino Map.

**Straight-line.** A straight-line distance is the shortest route between two points. To convert a straight-line map distance to miles, meters, or yards, perform the following:

Step 1. Determine the two points between which you want to find the straight-line distance.

Step 2. Align a straight edge piece of paper on the map so that the edge of the paper touches both points on the map.

Step 3. Place a tickmark on the paper for both points, Figure 30.

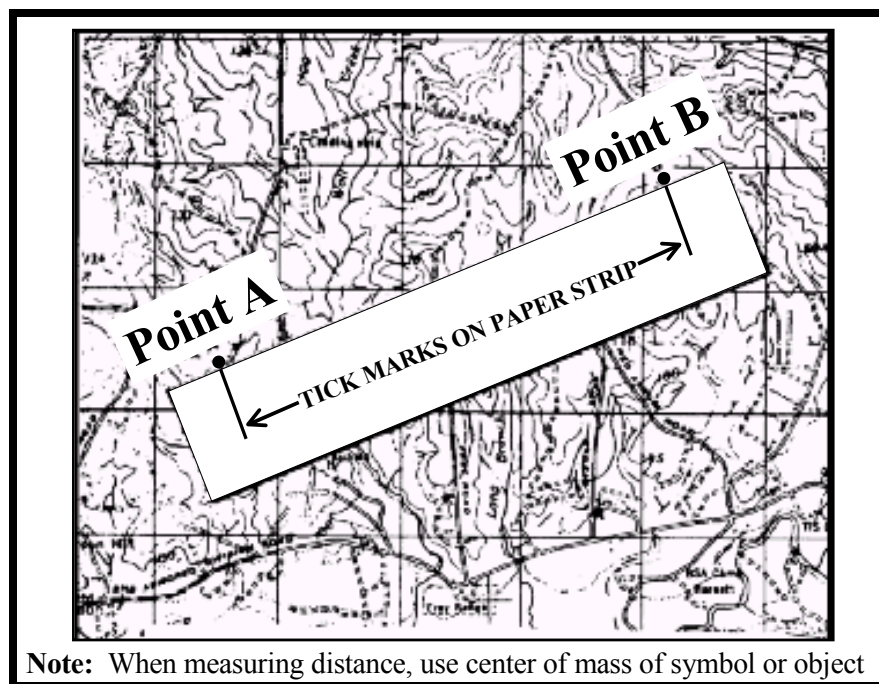


Figure 30



Straight-line  
Distance,  
continued

**NOTE:** At this time go to your Tenino map and find Grid EG079874. At this point you should find BM 83, Point A. Next, find the TV Relay Tower at Grid EG126877, this is Point B. Once done, conduct steps two and three.

Step 4. Align the piece of paper on the bar scale for the ground unit of measure that you need, and read the distance from the graphic scale to the nearest tenth of a unit, Figure 31.

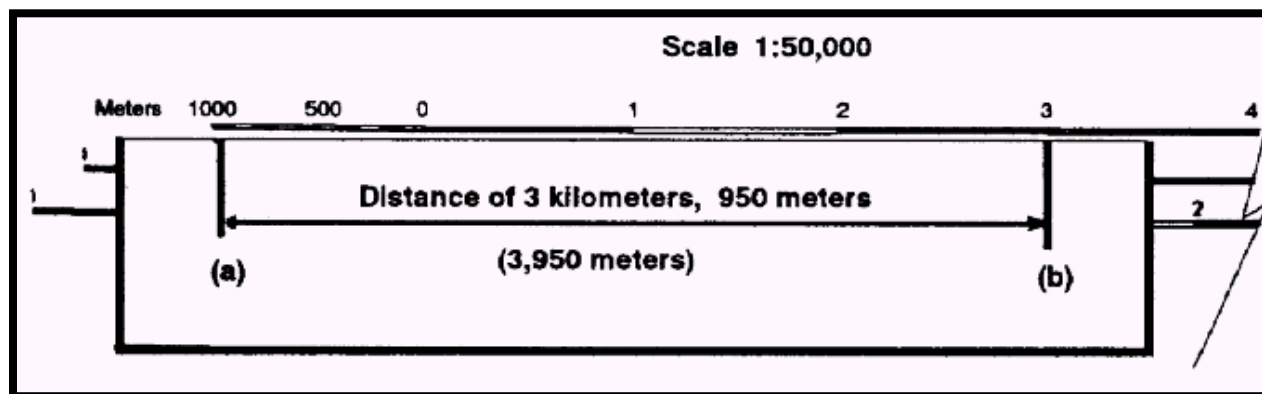


Figure 31

Step 5. Since the military measures distance in meters, lay your straight edge piece of paper on the meter bar on your Tenino map. You line up the tickmarks so that the right end is on a full 1000 meter increment in the primary scale and the other tickmark is on the inside of the extension scale. The only time your left tick mark does not fall in the extension scale is when you have a distance that is a full 1000-meter increment. In that case the left tickmarks will fall on Zero (0). By following this step of instruction, your right tickmark should line up on the 4000 meter mark, and your left tick mark should line up on 600.

Step 6. You obtain the total distance by adding the 600 meters from the extension scale to the 4000 meters from the primary scale. Therefore, you have a total straight-line distance of 4600 meters from BM 86 to the TV relay tower.

Now you will find another straight-line distance; however this time, you will have to break down the extension scale into tenths to interpolate (estimate) the distance between the 100-meter marks on the extension scale, Fig 31.

Go to your Tenino map and find the distance in meters between the water towers in grid squares EG0982 and EG1185.

**NOTE:** Make sure your pencil is sharp, you need to be as precise as possible.

Straight-line  
Distance,  
continued

If you followed the steps above, the distance between the two water towers is 3,450 meters. In this instance the right tickmark lined up on 3000 meters on the primary scale, and the left tickmark fell halfway between the 400- and 500-meter marks on the extension scale. You must interpolate, and you should have estimated at a distance of 50 meters, the distance between the 400- and 500-meter marks on the extension scale. Therefore, you add the 450 meters to your 3000 meters from the primary scale. This gives you a total straight-line distance of 3,450 meters.

Now you will work a straight-line distance, when the distance measured (a) to (b) is longer than the bar scale. This is simple to do following the steps above with one additional step. Simply place the right tickmark on the largest number in the primary scale, and place a tickmark under the highest number of the extension scale (c) so you will know how much distance you have already measured, Figure 32, part A.

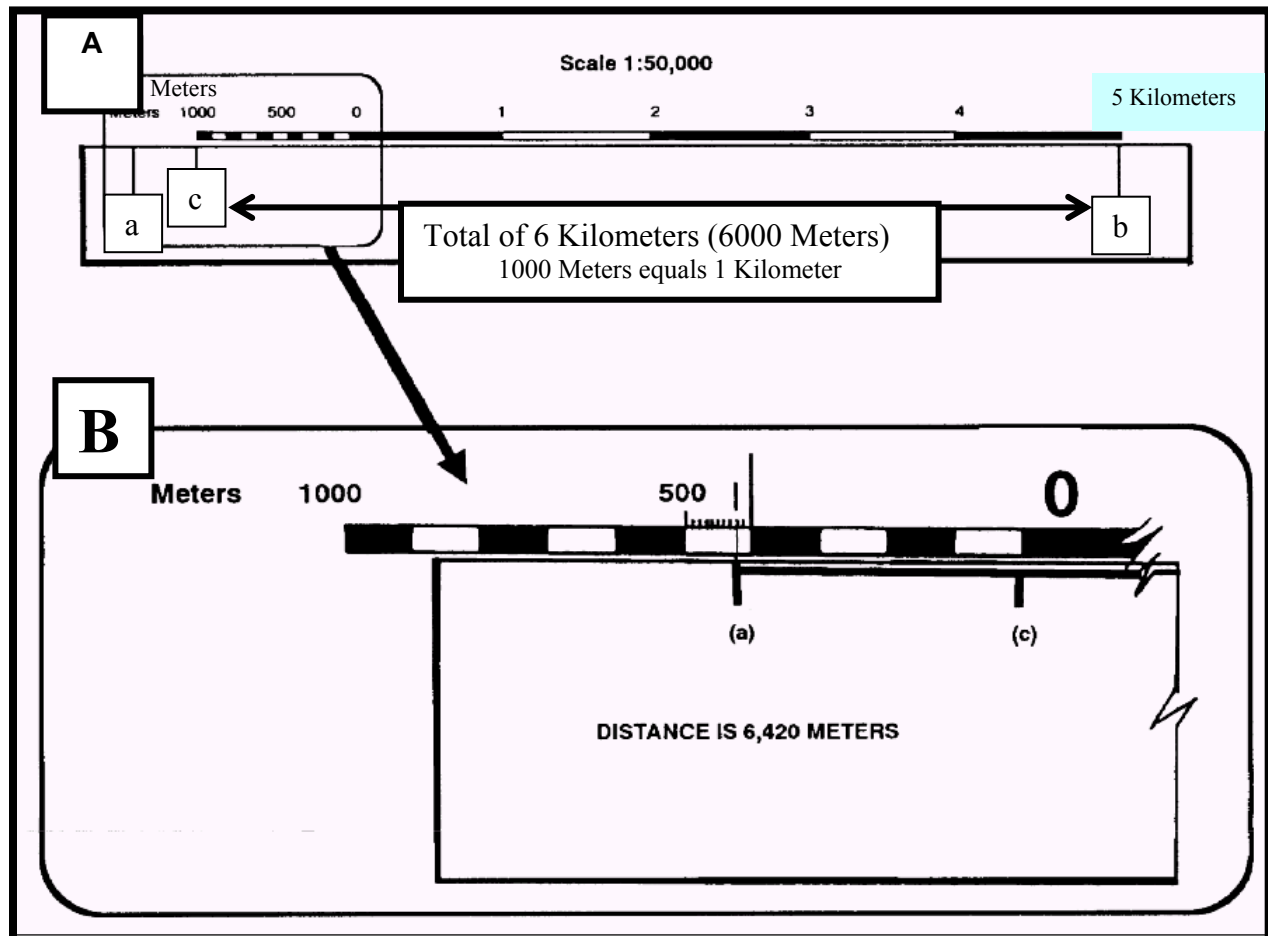


Figure 32

Straight-line  
Distance,  
continued

---

Take out your Tenino map and mark your straight-line measurement between the horizontal control point "Skook" in grid square EG1682 and the water tower in grid square EG1088. Mark your points A and B, then place your measurement on the meter bar scale, and mark your point C on your piece of paper, see Figure 32, part A.

Once you mark the distance point C between points A and B, slide the paper where as new point C is lined up in the primary scale on one of the 1000 meter tickmarks and point A lining up somewhere in the extension scale. In Figure 32, part B, the distance happens to be less than 1000 meters, so (c) lines up under the Zero (0) of the extension scale.

On your Tenino map, you see that your point C will line up under the 2000 meter mark in the primary scale and point A falls in the extension scale between the 600 meter mark and the 700 meter mark.

Now you must add everything up, as follows:

|                                    |                     |
|------------------------------------|---------------------|
| Distance between Points B and C:   | 6,000 meters.       |
| Distance between Point C and Zero: | 2,000 meters.       |
| Distance between Zero and Point B: | <u>640 meters*</u>  |
| <b>Total:</b>                      | <b>8,640 meters</b> |

**Note:** \*Don't forget, when a tickmark falls between two 100-meter marks, you must interpolate (estimate) the distance. The estimated distance between the 600 meter mark and the 700 meter mark appears to be 40 meters. With a 5 percent margin of error, your distance should read between 8208 and 9072 meters.

---

Curved or Road  
Distance

The bar scales are simple to use, and there is a need for very precise work; however, many map users may find or arrive at different results. Did you come up with 8640 meters as we did with the above straight-line distance? Hopefully you were no more than 5 percent off. Just the sharpness of your pencil can make a difference. As you will see, when measuring curved or road distances, the variation of measurements will increase.

To measure curved or road distances, you will also use a straight edge piece of paper to measure the distance along a winding road, stream, or any other route following an irregular course. For the rest of this lesson, we will use roads, but remember you use the same process for any route that is irregular.

---

Curved or Road  
Distance,  
continued

**NOTE:** Before starting, make sure your pencil is sharp and you have a clean piece of paper with a straight edge. You will use the figures provided below and you will also measure a road on your Tenino map.

**NOTE:** It does not matter if you measure from point A to point B or vice versa. It also does not matter if you place your paper above, below, left, or right of the road **as long as you measure along the same side all the time and do not cross the road.**

**Step 1.** Mark on your map starting point A and finishing point B. See Figure 33.

**Step 2.** Place a tick mark near one end of a straight edge piece of paper.

**Step 3.** Align the straight edge of the paper with the road on the map so that the tick mark is on one of the points (start point in the example) and the edge of the paper extends along the route to a point where the route changes direction. See Figure 33.

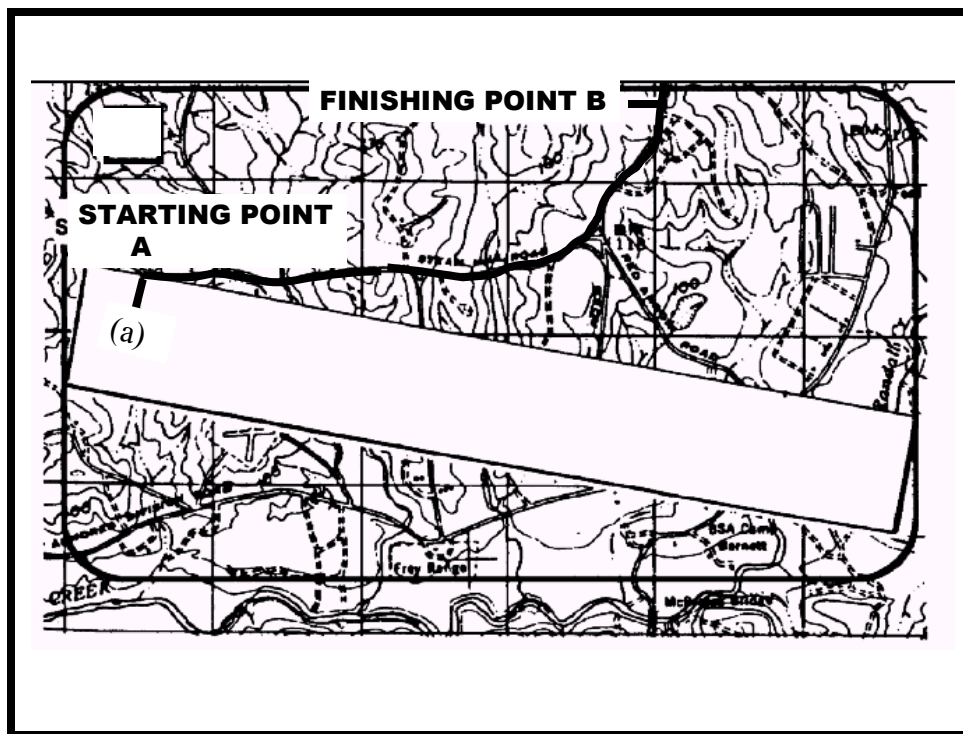


Figure 33

Curved or Road  
Distance,  
continued

**Step 4.** At the point where the road changes direction and does not follow the edge of the paper, place a tick mark at that point on your map and the piece of paper, Figure 34.

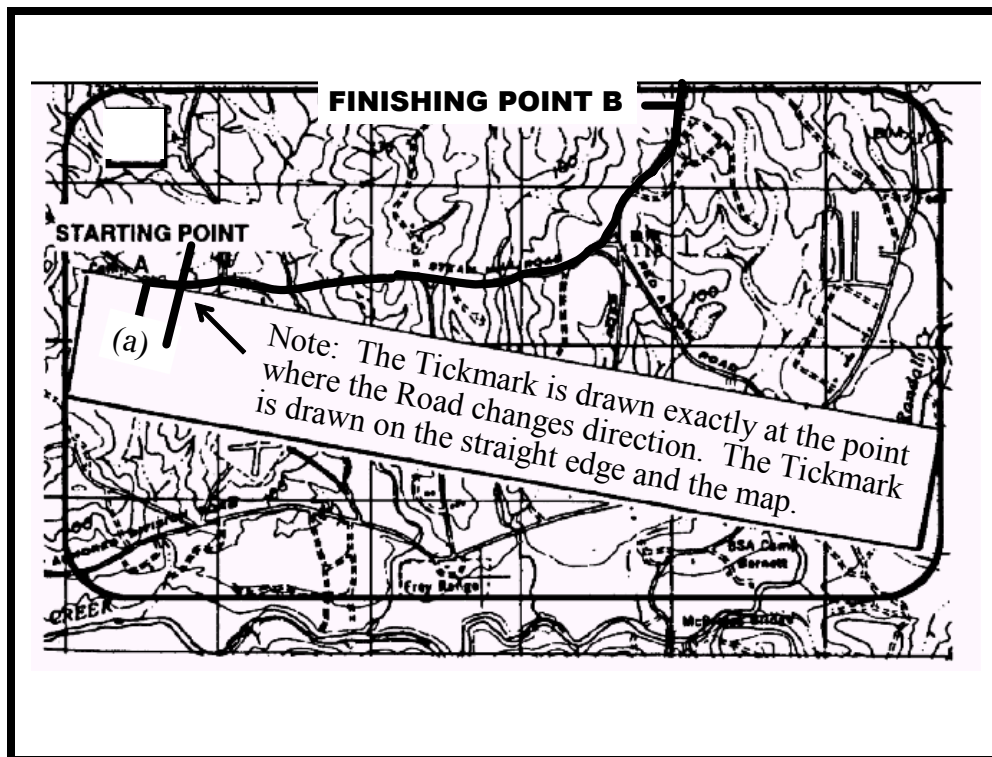


Figure 34

**NOTE:** Now it is time to take out your Tenino map and accomplish the first four steps above. On your map select the horizontal control station "Skook" in grid square EG16108255 as Point A and the bridge in grid square EG13558355 as point B.

**NOTE:** Don't forget to measure from the center of mass of the object or symbol.

**Step 5.** Rotate the paper so that the tickmark you just made on the paper and map are aligned and the straight edge follows the road until the road changes direction again. As before, place a tickmark on the piece of paper and the map at the location where the road changes direction. Continue this process until you reach Point B, Figure 35.

Curved or Road  
Distance,  
continued

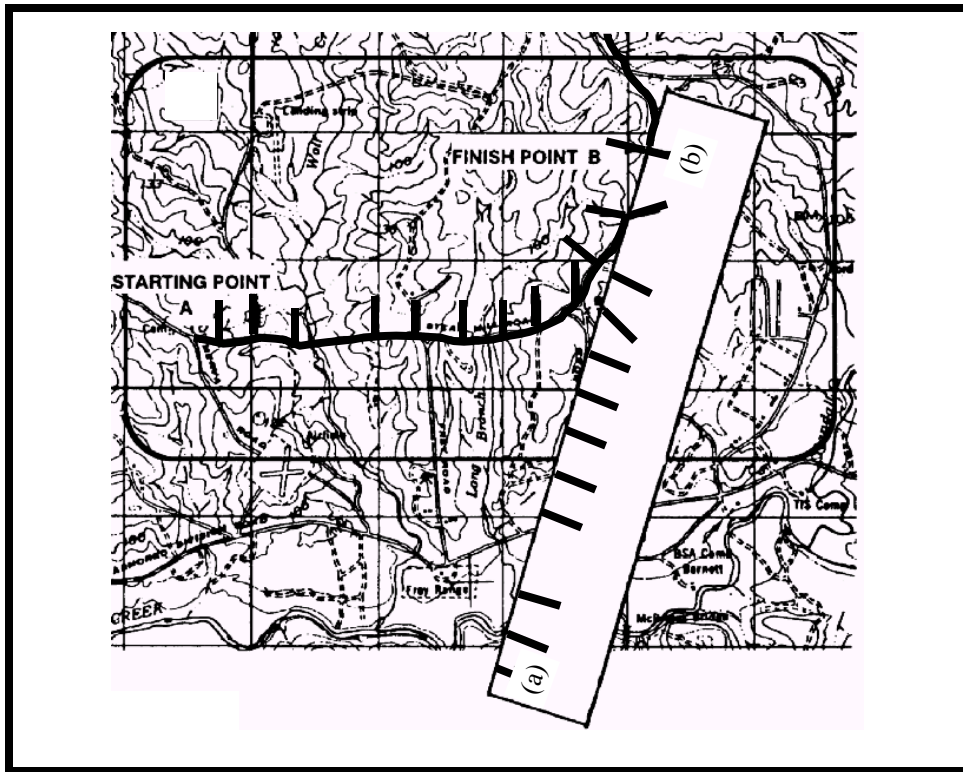


Figure 35

**NOTE:** Continue with step 5 on your Tenino map until you reach Point B. Once you reach Point B, you have successfully taken the curved road or route and turned it into a straight-line measurement on your piece of paper.

**Step 6.** Now that you have a straight-line measurement, determine the distance on the bar scale the same way to you learned to measure straight-line distances.

**NOTE:** After determining the distance on your meter bar scale on the Tenino map, your distance should be 3240 meters. With a 10 percent error margin, your distance should read between 2916 meters and 3564 meters.

Now let's take time out to check your proficiency in determining distances on a map by measuring straight-line distances and curved or road distances. Take Quiz 3 on the next page.

### Quiz 3

---

#### Quiz 3

Take a few moments now to review task 8, Measure Distance on a Map.

You will need your Tenino map, straight edge pieces of paper, and a sharp pencil. If you experience any problems, go back through this RTP or ask your fellow student or SGL for assistance.

**NOTE:** Do not use this page for your answers unless directed by the SGL. Write the questions on a separate piece of paper and then answer them.

---

#### Question 1

What is the straight-line distance in meters, from the road junction located at EG11159339 to the road junction at EG13558919?

---

#### Question 2

What is the straight-line distance in meters from the water tank in grid square EG1088 and the Deschutes Fire Tower in grid square EG1795?

---

#### Question 3

What is the road distance in meters from the bridge in grid square EG1198 to the road junction at EH12750111?

---

#### Question 4

What is the road distance, in meters, from the road junction at EG149884 to the road junction at EG168884?

---

#### Question 5

What is the shortest road distance in meters from the bridge in grid square EG0385 to the church in grid square EG0687?

---

## Determine Direction Without a Compass

### Task

This section of the RTP teaches--

|                     |  |
|---------------------|--|
| <b>Task Number:</b> | App C, Task 14, STP 21-1-SMCT  |
| <b>Task Title:</b>  | Determine direction without a compass.   |
| <b>Conditions:</b>  | During daylight and at night (with a clear view of the Big Dipper), given a wristwatch (not digital), you must determine direction in a field environment with natural vegetation available. |
| <b>Standards:</b>   | Identified north and east within 15 degrees IAW FM 3-25.26 (SH-2), Chapter 9, p SH-2-51; STP 21-1-SMCT, Aug 03, p C-52.  |

### Shadow-Tip Method

The shadow-tip method is a simple and accurate method of finding direction by the sun. You can use it to find the four cardinal directions (north, south, east, and west).

**Step 1.** Place a stick or branch (A) into the ground at a level spot where the sun will cast a distinctive shadow, see A, Figure 35. Place an object (stone, twig, etc) at the tip of the shadow, see B, Figure 35. This first shadow mark is always the west direction.

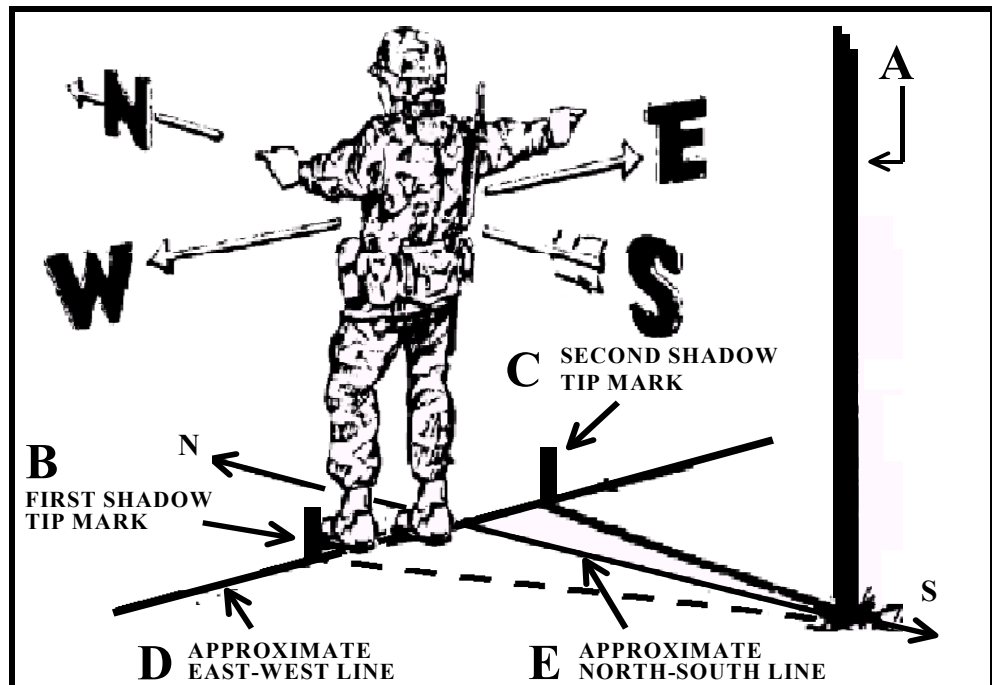


Figure 35



Shadow-Tip  
Method,  
continued

---

**Step 2.** Wait 10 to 15 minutes until the shadow tip moves. Mark the new tip of the shadow in the same way as you did the first shadow tip, see C, Figure 35. This will be your eastern setting.

**NOTE.** Since the sun rises in the east and sets in the west, the first shadow tip you mark is always west and the second mark is always east.

**Step 3.** Draw a line through the two marks/points that you made of the shadow tips to get an approximate east-west line, see D, Figure 35.

**Step 4.** Standing with the first mark (west) to your left, the other directions become simple. You are facing north, to your right is east and to your rear is south, Figure 35.

**NOTE.** A line drawn perpendicular to the east-west line at any point is the approximate north-south line, see E, Figure 35.

---

Watch Method

You can use a watch to also determine the approximate true north and true south. You must use a watch that has hands.

1. North Temperate Zone. For standard time, point the hour hand toward the sun. You can find a south line between the hour hand and 1200 hours, Figure 36. For daylight saving time, you will find the north-south line between the hour hand and 1300 Hours.

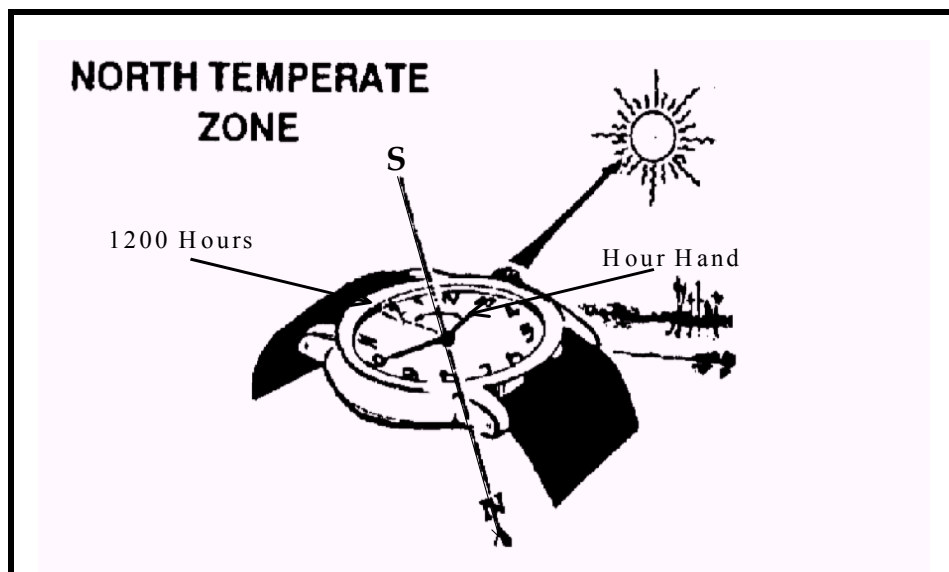


Figure 36

---

Watch Method,  
continued

**NOTE:** If there is any doubt as to which end of the line is north, remember that the sun is in the east before noon and west after noon.

2. Southern Temperate Zone. Refer to Chapter 9, FM 3-25.26 (SH-2), page 9-8 for instructions on this method.

Star Method at  
Night, Northern  
Hemisphere

The main constellations to learn are the Ursa Major--Big Dipper--and Cassiopeia. Neither of these constellations ever set. They are always visible on a clear night. Use them to locate the North Star, also known as Polaris or Polar Star. The North Star forms part of the Little Dipper--Ursa Minor--handle and could cause confusion with the Big Dipper. Prevent confusion by using both the Big Dipper and Cassiopeia together. The Big Dipper and Cassiopeia are always directly opposite of each other with the North Star between them, Figure 37. They rotate in a counterclockwise direction around the North Star. So, the North Star stays stationary in the sky.

Star Method at  
Night, Northern  
Hemisphere

The Big Dipper is a seven-star constellation in the shape of a dipper. The two stars forming the outer lip of the dipper are "pointer stars" because they direct you to the North Star.

Mentally draw a line using the two "pointer stars." Starting with the "pointer star" at the closed end of the Big Dipper, draw a line through the second "pointer star" to a distance of about five times the distance between the pointer stars. At this point you will find the North Star.

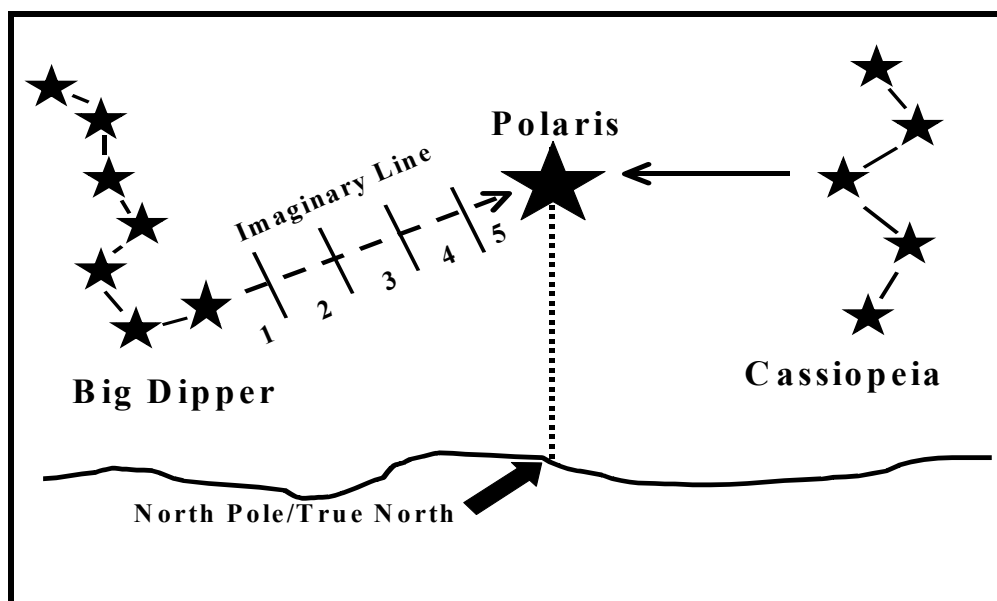


Figure 37

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Cassiopeia has five stars that form a shape like a "W" or "M" on its side. The North star is straight out from Cassiopeia's center star, Figure 37.

Once you find the North Star, you locate the North Pole or True North by drawing an imaginary line directly to the earth from the North Star.

**NOTE:** The North Star is less than one degree off true north and does not move from its place in the sky because the axis of the earth points towards it. This is why the Big Dipper and Cassiopeia rotate around the North Star.

---

Star Method at  
Night, Southern  
Hemisphere

Refer to Chapter 9, FM 3-25.26 (SH-2), page SH-2-59 and SH-2-60, for information on the star method at night, southern hemisphere.

---

## Quiz 4

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### Quiz 4

Take a few moments now to review task 14, Determine Direction Without a Compass.

After sunset, go out on the NCOA grounds and look for the Big Dipper and Cassiopeia to find the North Star.

**NOTE:** Do not write your answers on the sheet below unless directed by the SGL. Write the questions on a separate piece of paper and answer them.

---

#### Question 1

When using the shadow-tip method to determine direction, where on the shadow do you place a mark, stone, etc? \_\_\_\_\_

---

#### Question 2

When you place an object (stone, twig, etc.) to mark your first shadow, which directional setting have you made? \_\_\_\_\_

---

#### Question 3

What line do you set by drawing a line from the first shadow mark to the second shadow mark? \_\_\_\_\_

---

#### Question 4

If you draw a line perpendicular anywhere to the approximate east-west line, what line will you have made? \_\_\_\_\_

---

#### Question 5

Once you establish your approximate east-west line on the shadow tip method, how do you position yourself on that line to determine north, south, east, or west? \_\_\_\_\_

---

#### Question 6

In the northern temperate zone, what piece on the watch do you point toward the sun? \_\_\_\_\_

---

#### Question 7

What is the difference between determining direction in the northern temperate zone during daylight saving and standard times? \_\_\_\_\_

---

## Quiz 4, cont

---

**Question 8** Which two constellations can direct you to the North Star? \_\_\_\_\_  
and \_\_\_\_\_.

---

**Question 9** Which two stars on the Big Dipper point to the North Star, and what are they called? \_\_\_\_\_

---

**Question 10** How far out from the Big Dipper do you draw your imaginary line to the North Star? \_\_\_\_\_.

---

**Question 11** When you have found the North Star, which North have you found?

- a. True North.
- b. Grid North.
- c. Magnetic North.

---

**Question 12** In which direction does Cassiopeia and the Big Dipper rotate around the North Star?

- a. Clockwise.
- b. North to South.
- c. Counterclockwise.
- d. They do not rotate around the North Star, they are fixed in the sky.

---

## Orient a Map to the Ground by Map Terrain Association

### Task

This section of the RTP teaches--

|                     |   |
|---------------------|---|
| <b>Task Number:</b> | App C, Task 11, STP 21-1-SMCT   |
| <b>Task Title:</b>  | Orient a map to the ground by map terrain association.  |
| <b>Conditions:</b>  | Given a standard 1:50,000-scale military map in the field in daylight.  |
| <b>Standard:</b>    | Oriented the map to within 30 degrees of north IAW FM 3-25.26 (SH-2), Chapter 11, p SH-2-75; STP 21-1-SMCT, Aug 03, p C-44. |

### Terrain Association

You can orient your map by terrain association when you don't have a compass, or you want to make a quick reference as you move across country.

Using this method requires a careful examination of the map and the ground. You must know your approximate location and a knowledge of the terrain features appearing on your map so you can compare them with the physical features on the ground.

Hold the map in a horizontal position and line up the features you see on the ground with those on the map. If you have a compass, you can check your orientation by:

1. Placing a compass along one of the north-south grid lines to keep from orienting the map in the wrong direction, meaning 180 degrees out.
2. Aligning two or more features, e.g., a swamp to the left, and a water tower near a known city.

## Quiz 5

---

### Quiz 5

**NOTE TO STUDENTS:** Utilize the points located in the NCOA area or areas designate by the NCOA, 1:50,000 map of the local area, lensatic compass, pencil and paper, and quiz sheet 5. Orient your map to the ground by terrain association. Use your compass to ensure you are within 30 degrees of north including the incorporation of the declination constant. Should you have difficulties, contact your SGL or fellow students to compare your findings.

**NOTE TO NCOA:** Provide students a map of the local area, and points throughout the NCOA, or areas in close proximity, where students can orient their maps by terrain association. Students must orient their maps to within 30 degrees of north, including the incorporation of the declination constant. Provide the student with Quiz Sheet 5.

---

## Determine a Location on the Ground by Terrain Association

### Task

This section of the RTP teaches--

|                     |   |
|---------------------|---|
| <b>Task Number:</b> | App C, Task 7, STP 21-1-SMCT  |
| <b>Task Title:</b>  | Determine a location on the ground by terrain association.  |
| <b>Conditions:</b>  | In the field during daylight, while at an unknown location on the ground, given a standard 1:50,000-scale map of the area, pencil, paper, a coordinate scale and protractor, and a known point on the ground. |
| <b>Standards:</b>   | Determined the six-digit coordinate of your location with a 100-meter tolerance within seven minutes IAW FM 3-25.26 (SH-2), Chapter 11, p SH-2-75; STP 21-1-SMCT, Aug 03, p C-33.                             |

### Determine Location by Terrain Association

First you must determine the terrain features of your location. You must have a knowledge of the terrain features appearing on your map so you can compare them with the physical features on the ground at your location.

Orient the map to the ground by terrain association, and then determine the four cardinal directions (north, south, east, and west). Remember, you can determine the directions by lining up known terrain features on the ground with those on your map, e.g., swamp on the left, and a known town on the right. Also, you can use the shadow-tip method of direction.

To determine your location, you must relate the terrain features on the ground to those shown on the map. After determining where the terrain features on the ground and those on your map coincide, determine the six-digit grid coordinate of your location using the coordinate scale and protractor.



## Quiz 6

---

### Quiz 6

**NOTE TO STUDENTS:** Utilize the points located in the NCOA area or areas designated by the NCOA, map of the local area, pencil, paper, GTA 5-2-12, and Quiz Sheet 6. Determine your location on the ground by terrain association--within a 100 meter tolerance--by providing a six-digit coordinate.

**NOTE TO NCOA:** Set up points through out the NCOA, or points in close proximity, where students can determine a location on the ground by terrain association to the standards described above. Provide the students with quiz sheet 6.

---

**This concludes the RTP**

## Quiz Answer Sheet 1

---

### Answers to Quiz 1

All answers are either in the RTP or on the Tenino map.

---

#### Question 1

1-Black. 2-Blue. 3-Brown. 4-Green. 5-Red. 6-Red-Brown.

Ref: Page RTP-2.

---

#### Question 2

1. Black: Cultural (man-made) features other than roads.
2. Blue: Water.
3. Brown: All relief features--contour lines on old maps--cultivated land on red-light readable maps.
4. Green: Vegetation.
5. Red: Major roads, built-up areas, special features on old maps.
6. Red-Brown: All relief features and mains roads on red-light readable maps.

Ref: Page RTP-2.

---

#### Question 3

In the "legend," located in the lower left margin.

Ref: Page RTP-3.

---

#### Question 4

1. Map Series Name: Washington
2. Scale: 1:50,000
3. Series Number: V791

Ref: Tenino map and page RTP-4 provide you with the location of these items on a map sheet.

---

#### Question 5

1477 III.

Ref: Tenino Map, adjoining sheets diagram, lower right margin, and page RTP-6.

---

#### Question 6

The declination diagram.

Ref: Page RTP-6.

---

## Answers to Quiz 1, cont

---

**Question 7** Lower margin of large-scale maps.

Ref: Page RTP-6.

---

**Question 8** more precise.

Ref: Page RTP-8.

---

**Question 9** 1,000 meters.

Ref: Page RTP-8.

---

**Question 10** Left to right, then up.

Ref: Page RTP-9.

---

**Question 11** Six-digits.

Ref: Page RTP-9.

---

**Question 12**

- a. Swamp.
- b. Road intersection.
- c. Lake.
- d. Tanks.
- e. McIntosh Lake
- f. Deschuters Fire Tower.

Ref: Tenino map.

---

**Question 13**

- a. Water tower.
- b. Road intersection.
- c. Pitman Lake.
- d. Building.
- e. Road loop/turnaround.
- f. Open pit, mine, or quarry--active.

Ref: Tenino map.

---

## Answers to Quiz 1, cont

- 
- Question 14**
- a. EG03148523.
  - b. EG10258885.
  - c. EG10659576.
  - d. EG08349357.
  - e. EH04450433.
  - f. EH11300291.

Ref: Tenino map.

---

- Question 15**
- c. Ridge.

Ref: Page RTP-20 and RTP-24.

---

- Question 16**
- b. Draw.

Ref: Page RTP-21 and RTP-24.

---

- Question 17**
- c. Hill.

Ref: Page RTP-19 and RTP-24.

---

- Question 18**
- Draws and Spurs.

Ref: Page RTP-21, RTP-22, and RTP-24.

---

- Question 19**
- d. Saddle

Ref: Page RTP-19 and RTP-24.

---

- Question 20**
- c. Valley

Ref: Page RTP-20 and RTP-24.

---

## Answers to Quiz 3

---

### Answers to Quiz 3

The following are the answers to the review questions of task 8, Measure Distance on a Map.

All answers are either in the RTP or on the Tenino map.

---

#### Question 1

4885 meters, with 5 percent margin of error, between 4641 and 5129 Meters,

Ref: Page RTP-38 and RTP-39.

---

#### Question 2

9750 meters, with 5 percent margin of error, between 9263 and 10,237 meters.

Ref: Pages RTP-38 thru RTP-42

---

#### Question 3

3150 Meters, with 10 percent margin of error, between 2835 and 3465 meters.

Ref: Pages RTP-43 thru RTP-45.

---

#### Question 4

2250 Meters, with 10 percent margin of error, between 2025 and 2475 meters.

Ref: Pages RTP-43 thru RTP-45.

---

#### Question 5.

3960 meters, with 10 percent margin of error, between 3564 and 4356 meters.

Ref: pages RTP-38 thru RTP-45.

---

## Answers to Quiz 4

---

### Answers to Quiz 4

The following are the answers to the review questions of task 14, Determine Direction Without a Compass.

---

#### Question 1

At the tip of the shadow.

Ref: Page RTP-47.

---

#### Question 2

West.

Ref: Page RTP-47.

---

#### Question 3

The approximate east-west line.

Ref: Page RTP-48.

---

#### Question 4

The approximate north-south line.

Ref: Page RTP-48.

---

#### Question 5.

Stand with the first mark (west) to your left, meaning you are facing north, east is to the right and south to the rear.

Ref: Page RTP-48.

---

#### Question 6.

The hour hand.

Ref: Page RTP-48.

---

#### Question 7.

During standard time, you determine the south line half way between the hour hand and the 1200 hours on the dial. For daylight savings time, the south line is half way between the hour hand and the 1300 hours on the dial.

Ref: Page RTP-48.

---

## Answers to Quiz 4, cont

---

**Question 8.**      Ursa Major (containing the Big Dipper), and Cassiopeia,

Ref: Page RTP-49.

---

**Question 9.**      The two stars that form the outer lip of the Big Dipper. We call them pointer stars.

Ref: Page RTP-49.

---

**Question 10.**    A distance of about five times the distance between the "pointer stars."

Ref: Page RTP-49.

---

**Question 11.**    a. True North.

Ref: Page RTP-50.

---

**Question 12.**    c. Counterclockwise.

Ref: Page RTP-49.

---

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**U.S. ARMY SERGEANTS MAJOR ACADEMY**

**Primary Leadership Development Course  
(PLDC)**

**The Army Training System  
TRAINING SUPPORT PACKAGE**



**"NO ONE IS MORE PROFESSIONAL THAN I"**

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## TRAINING SUPPORT PACKAGE (TSP)

|  |  |
|--|--|
| <b>TSP Number / Title</b>              | W222 / COMBAT ORDERS   |
| <b>Effective Date</b>                  | 01 Mar 2005  |
| <b>Supersedes TSP(s) / Lesson(s)</b>   | W222, Combat Orders, Oct 03 w/CS.  |
| <b>TSP Users</b>                       | 600-PLDC, Primary Leadership Development Course<br>600-PLDC (MOD), Primary Leadership Development Course (Modified)  |
| <b>Proponent</b>                       | The proponent for this document is the Sergeants Major Academy.  |
| <b>Improvement Comments</b>            | <p>Users are invited to send comments and suggested improvements on DA Form 2028, <i>Recommended Changes to Publications and Blank Forms</i>. Completed forms, or equivalent response, will be mailed or attached to electronic e-mail and transmitted to:</p> <p>COMDT USASMA<br/>ATTN ATSS DCP<br/>BLDG 11291 BIGGS FIELD<br/>FORT BLISS TX 79918-8002</p> <p>Telephone (Comm) (915) 568-8405<br/>Telephone (DSN) 978-8405</p> |
| <b>Security Clearance / Access</b>     | Unclassified   |
| <b>Foreign Disclosure Restrictions</b> | FD5. This product/publication has been reviewed by the product developers in coordination with the USASMA foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.   |

## PREFACE

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**Purpose**

This Training Support Package provides the instructor with a standardized lesson plan for presenting instruction for:

**Task Number****Task Title****Individual**

|              |   |
|--------------|---|
| 071-326-3049 | Conduct Troop-Leading Procedures for an Operation |
| 071-326-5502 | Issue a Fragmentary Order                         |
| 071-326-5503 | Issue a Warning Order                             |
| 071-326-5505 | Issue an Oral Operation Order                     |
| 071-326-5626 | Prepare an Oral Operations Order                  |
| 071-990-0004 | Conduct Precombat Checks                          |

---

This TSP  
Contains

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| Section II Introduction .....   | 9           |
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---

**COMBAT ORDERS**  
**W222 / Version 1**  
**01 Oct 2003**

**SECTION I. ADMINISTRATIVE DATA**

|  |  |   |  |
|--|--|---|--|
| <b>All Courses Including This Lesson</b> | <u>Course Number</u>   | <u>Version</u>                                    | <u>Course Title</u>                              |
|  | 600-PLDC   | 1   | Primary Leadership Development Course            |
|  | 600-PLDC MOD   | 1   | Primary Leadership Development Course (Modified) |
| <b>Task(s) Taught(*) or Supported</b>    | <u>Task Number</u>   | <u>Task Title</u>                                 |  |
|  | <u>INDIVIDUAL</u>  |   |  |
|  | 071-326-3049 (*)   | Conduct Troop-Leading Procedures for an Operation |  |
|  | 071-326-5502 (*)   | Issue a Fragmentary Order                         |  |
|  | 071-326-5503 (*)   | Issue a Warning Order                             |  |
|  | 071-326-5505 (*)   | Issue an Oral Operation Order                     |  |
|  | 071-326-5626 (*)   | Prepare an Oral Operations Order                  |  |
|  | 071-990-0004 (*)   | Conduct Precombat Checks                          |  |
| <b>Reinforced Task(s)</b>                | <u>Task Number</u>   | <u>Task Title</u>                                 |  |
|  | None   |   |  |
| <b>Academic Hours</b>                    | The academic hours required to teach this lesson are as follows:   |   |  |
|  |  | <u>Resident Hours/Methods</u>                     |  |
|  |  | 3 hrs   | / Conference / Discussion                        |
|  |  | 1 hr  | / Practical Exercise (Performance)               |
|  | Test   | 0 hrs   |  |
|  | Test Review  | 0 hrs   |  |
|  | Total Hours:   | 4 hrs   |  |
| <b>Test Lesson Number</b>                |  | <u>Hours</u>                                      | <u>Lesson No.</u>                                |
|  | Testing  |   |  |
|  | (to include test review)   | 1 hr 30 mins                                      | WE03 version 1                                   |
|  |  | 2 hr 30 mins                                      | WE version 2                                     |
| <b>Prerequisite Lesson(s)</b>            | <u>Lesson Number</u>   | <u>Lesson Title</u>                               |  |
|  | W221   | Map Reading                                       |  |
| <b>Clearance Access</b>                  | Security Level: Unclassified<br>Requirements: There are no clearance or access requirements for the lesson.  |   |  |
| <b>Foreign Disclosure Restrictions</b>   | FD5. This product/publication has been reviewed by the product developers in coordination with the USASMA foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions. |   |  |

|   |   |                                  |                    |                               |            |            |
|---|---|----------------------------------|--------------------|-------------------------------|------------|------------|
| References                                | <u>Number</u>   | <u>Title</u>                     | <u>Date</u>        | <u>Additional Information</u> |            |            |
|   | FM 7-8  | INFANTRY RIFLE PLATOON AND SQUAD | 22 Apr 1992        | W/CH-1, 1 Mar 2001            |            |            |
| Student Study Assignments                 | Before class, read the following--  |                                  |                    |                               |            |            |
|   | <ul style="list-style-type: none"><li>• SH-1, Advance Sheet</li><li>• SH-2, Extracts material from FM 7-8.</li><li>• SH-3, Extracted material from Task Number 071-990-0004, Conduct Pre-combat checks.</li></ul> |                                  |                    |                               |            |            |
|   | During class--  |                                  |                    |                               |            |            |
|   | <ul style="list-style-type: none"><li>• Participate in classroom discussions.</li><li>• Complete PE-1, PE-2, PE-3, and PE-4.</li></ul>  |                                  |                    |                               |            |            |
|   | After class--   |                                  |                    |                               |            |            |
|   | <ul style="list-style-type: none"><li>• Turn in recoverable reference materials.</li></ul>  |                                  |                    |                               |            |            |
| Instructor Requirements                   | 1:8, SSG, PLDC graduate, ITC, and SGITC qualified   |                                  |                    |                               |            |            |
| Additional Support Personnel Requirements | <u>Name</u>   | <u>Stu Ratio</u>                 | <u>Qty</u>         | <u>Man Hours</u>              |            |            |
|   | None  |                                  |                    |                               |            |            |
| Equipment Required for Instruction        | <u>ID Name</u>  | <u>Stu Ratio</u>                 | <u>Instr Ratio</u> | <u>Spt</u>                    | <u>Qty</u> | <u>Exp</u> |
|   | 1005-00-073-9421<br>RIFLE, 5.56 MILLIMETER  | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 1005-00-264-8261<br>MAGAZINE 30RD AMMO  | 3:1                              | 1:2                | No                            | 1          | No         |
|   | 4230-01-101-3984<br>DECONTAMINATING KIT, SKIN   | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 5120-00-878-5932<br>INTRENCHING TOOL, HAND  | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 6730-00-577-4813<br>SCREEN, PROJECTION  | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 6730-00-P53-8147<br>Projector, Overhead   | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 7110-00-132-6651<br>CHALKBOARD  | 1:16                             | 1:2                | No                            | 1          | Yes        |
|   | 7520-01-424-4867<br>EASEL, DISPLAY AND TRAINING   | 1:16                             | 1:2                | No                            | 1          | Yes        |
|   | 7530-00-619-8880<br>PAD, WRITING PAPER  | 1:16                             | 1:2                | No                            | 1          | Yes        |
|   | 8405-00-935-3257<br>PONCHO, WET WEATHER   | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 8415-01-110-9981<br>BAND, HELMET, CAMOUFLAGE  | 1:16                             | 1:2                | No                            | 1          | Yes        |
|   | 8415-01-303-8945<br>COVER, HELMET, CAMOUFLAGE PATTERN   | 1:16                             | 1:2                | No                            | 1          | No         |
|   | 8465-00-001-6471<br>SUSPENDERS, INDIVIDUAL EQUIPMENT  | 1:16                             | 1:2                | No                            | 1          | No         |

|  |      |     |    |   |     |
|--|------|-----|----|---|-----|
| 8465-00-001-6474<br>CARRIER, INTRENCHING TOOL          | 1:16 | 1:2 | No | 1 | No  |
| 8465-00-001-6477<br>STRAP, WEBBING                     | 1:16 | 1:2 | No | 1 | Yes |
| 8465-00-001-6482<br>CASE, SMALL ARMS AMMUNITION        | 2:16 | 1:2 | No | 1 | No  |
| 8465-00-165-6838<br>CUP, WATER CANTEEN                 | 2:16 | 1:2 | No | 1 | No  |
| 8465-00-860-0256<br>COVER, WATER CANTEEN               | 2:16 | 1:2 | No | 1 | No  |
| 8465-00-927-7485<br>COVER, WATER CANTEEN               | 1:16 | 1:2 | No | 1 | Yes |
| 8465-00-935-6814<br>CASE, FIELD FIRST AID DRESSING-UN  | 1:16 | 1:2 | No | 1 | No  |
| 8465-01-019-9103<br>FIELD PACK                         | 1:16 | 1:2 | No | 1 | No  |
| 8465-01-073-8326<br>FRAME, FIELD PACK                  | 1:16 | 1:2 | No | 1 | No  |
| 8465-01-109-3369<br>MAT, SLEEPING                      | 1:16 | 1:2 | No | 1 | No  |
| 8465-01-115-0026<br>CANTEEN, WATER                     | 2:16 | 1:2 | No | 1 | No  |
| 8465-01-118-8173<br>CANTEEN, WATER                     | 1:16 | 1:2 | No | 1 | No  |
| 8465-01-120-0675<br>BELT INDIVIDUAL EQUIPMENT: WEBBING | 1:16 | 1:2 | No | 1 | No  |
| 8465-01-445-6274<br>MODULAR SLEEP SYSTEM               | 1:16 | 1:2 | No | 1 | No  |
| 8470-01-092-7435<br>CHIN STRAP                         | 1:16 | 1:2 | No | 1 | No  |
| 8470-01-092-7528<br>HELMET, GROUND TROOPS'-PARACHUTIS  | 1:16 | 1:2 | No | 1 | No  |
| 8470-01-442-1429<br>HEADBAND, GROUND TROOPS'-PARACHUT  | 1:16 | 1:2 | No | 1 | Yes |
| E63317<br>COMPASS LENSATIC                             | 1:16 | 1:2 | No | 1 | No  |
| M11895<br>MASK, PROTECTIVE FIELD M17                   | 1:16 | 1:2 | No | 1 | No  |
| * Before Id indicates a TADSS                          |      |     |    |   |     |

**Materials  
Required**

**Instructor Materials:**

- TSP.
- VGTs: 1 thru 34.

**Student Materials:**

- SH-1, Advance Sheet.
- SH-2, Extracted material from FM 7-8.
- SH-3, Extracted material from Task Number 071-990-004.

**NOTE:** Issued handouts to student during inprocessing.

- Pen or pencil and writing paper.



**Classroom,  
Training Area,  
and Range  
Requirements**

---

CLASSROOM (40X40 PER 16 STUDENTS)

---

**Ammunition  
Requirements**

| <u><b>Id</b></u> | <u><b>Name</b></u> | <u><b>Exp</b></u> | <u><b>Stu<br/>Ratio</b></u> | <u><b>Instr<br/>Ratio</b></u> | <u><b>Spt Qty</b></u> |
|------------------|--------------------|-------------------|-----------------------------|-------------------------------|-----------------------|
| None             |                    |                   |                             |                               |                       |

---

**Instructional  
Guidance**

**NOTE:** Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

Before class--

- Read and study all TSP material and be ready to conduct the class.
- This TSP has questions throughout to check learning or generate discussion among the group members. You may add any questions you deem necessary to bring a point across to the group or expand on any matter discussed.
- You must know the information in this TSP well enough to teach from it, not read from it.
- This TSP presents references at the beginning of some of the paragraphs. This allows you to inform your students of where they should look in the reference to follow your instruction.

During class--

- Provide the students PE-1, PE-2, PE-3, and PE-4 in Appendix C.
- Detail one Soldier to be a demonstrator, and provide him with the following equipment for the instruction of conducting precombat checks of personnel. Ensure Soldier wears the equipment as prescribed by the NCOA SOP. Provide demonstrator camouflage sticks and material to camouflage his weapon and helmet.
  - Helmet, ballistic with camouflage cover.
  - Canteen, 1 quart and cover with water (2 each).
  - Case of small arms (2 each).
  - Magazines (6) (blank ammunition not required).
  - Pistol belt, suspenders, and first-aid pouch.
  - Protective mask with decontamination kit.
  - Rifle, rubber or M16A2.

After class--

- Collect all recoverable materials after the examination for this lesson.
-

**Proponent  
Lesson Plan  
Approvals**

| <u>Name</u>             | <u>Rank</u> | <u>Position</u>     | <u>Date</u> |
|-------------------------|-------------|---------------------|-------------|
| Berta, Frank W          | CIV         | Training Specialist | 01 Mar 2005 |
| LeGloahec, Victor A     | SGM         | Chief, PLDC         | 01 Mar 2005 |
| Bennett-Green, Agnes D. | SGM         | Chief, CMDD         | 01 Mar 2005 |

## SECTION II. INTRODUCTION

|   |
|---|
| Method of Instruction: <u>Conference / Discussion</u>       |
| Technique of Delivery: <u>Small Group Instruction (SGI)</u> |
| Instructor to Student Ratio is: <u>1:8</u>                  |
| Time of Instruction: <u>5 mins</u>                          |
| Media: <u>None</u>  |

### Motivator

To help prepare and develop your spirit of warrior ethos--standing ready to deploy, engage, and destroy the enemy--you will learn that one of the warrior leader's critical roles is receiving and issuing combat orders. Warriors must fight, survive, and win on the battlefield. You will have to shoot, move, communicate, secure and sustain, and do it quickly. To accomplish this, you will receive and issue combat orders almost constantly. The way you receive, interpret, and issue these orders can determine whether you and your fellow warriors survive or die. These orders must be simple, direct, complete, and timely. You must be consistent and thorough; because the way your Soldiers execute--based on the orders you give--will have a definite impact on the success or failure of your missions and contribute to the warrior ethos.

### Terminal Learning Objective

**NOTE:** Inform the students of the following Terminal Learning Objective requirements. At the completion of this lesson, you [the student] will:

|                    |  |
|--------------------|--|
| <b>Action:</b>     | Implement a squad level combat order.  |
| <b>Conditions:</b> | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.   |
| <b>Standards:</b>  | Implemented a squad level combat order by-- <ul style="list-style-type: none"><li>• Conducting troop-leading procedures.</li><li>• Ensuring the conduct of precombat checks.</li><li>• Preparing three types of combat orders: operation order (OPORD), warning order (WARNO), and fragmentary order (FRAGO).</li><li>• Interpreting the commander's intent of a combat order.</li></ul> IAW FM 7-8. |

### Safety Requirements

Instructors act as safety instructors during the conduct of all training. Ensure students observe safe practices at all times. If conducting the practical exercise outside, take precautions dependent on the weather. Training area should be generally flat and free from debris.

|                                     |   |
|-------------------------------------|---|
| <b>Risk Assessment Level</b>        | Low. Determined by instructor.  |
| <b>Environmental Considerations</b> | <p><b>NOTE:</b> It is the responsibility of all Soldiers and DA civilians to protect the environment from damage.</p> <p>None</p>   |
| <b>Evaluation</b>                   | <p>You will take a written examination. The examination will contain questions from this lesson. You must correctly answer 70 percent or more of the questions on the examination to receive a GO.</p> <p><b>NOTE:</b> Inform the students where their examinations will take place as posted on the training schedule and when they will receive feedback on the tests. Include any retest information.</p> <p>During this lesson you will complete four practical exercises. The first PE will evaluate your ability to conduct precombat checks. You will perform this PE prior to and during the situational training exercise (STX). The second PE will evaluate your ability to extract a squad order from the platoon order. The third PE will evaluate your ability to determine the commander's intent from the operation order, and the fourth PE will evaluate your ability to extract a squad fragmentary order from the platoon's fragmentary order. The PEs will not affect your academic rating for the course.</p> <p>During the field training exercise, your ability to interpret and issue combat orders and to conduct troop-leading procedures is part of your demonstrated leadership evaluation.</p> |
| <b>Instructional Lead-In</b>        | <p>To be an effective leader, you must plan, prepare, and coordinate for a mission.</p> <p>In combat you will be responsible for planning and executing a combat mission.</p> <p>Knowing how to prepare and issue combat orders will help you be successful as a leader and help in strengthening your warrior ethos of deploying, engaging, and destroying the enemy.</p> <p>During this lesson we will discuss three types of combat orders--warning order (WARNO), operation order (OPORD), and fragmentary order (FRAGO). Our objective is to provide you with an understanding of combat orders and procedures for issuing these orders. We'll also show you a valuable tool as a leader by discussing troop-leading procedures. Troop-leading procedures help ensure you don't overlook anything important when preparing for any type of tactical mission. <u>Troop-leading procedures will serve as the basis for your tactical leadership evaluation.</u></p>  |

### SECTION III. PRESENTATION

**NOTE:** Inform the students of the Enabling Learning Objective requirements.

#### A. ENABLING LEARNING OBJECTIVE

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Prepare three types of combat orders: operation order (OPORD), warning order (WARNO), and fragmentary order (FRAGO).   |
| <b>CONDITIONS:</b> | In a classroom environment culminating in a situational training exercise and given a squad.   |
| <b>STANDARDS:</b>  | Prepared the three types of combat orders <ul style="list-style-type: none"><li>• Operations order (OPORD)</li><li>• Warning order (WARNO)</li><li>• Fragmentary order (FRAGO)</li></ul> IAW FM 7-8. |

#### 1. Learning Step / Activity 1. Combat Orders

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr  
Media: VGT-1 thru VGT-9

#### Combat Orders

Ref: FM 7-8, Chapter 2 or SH-2

The first type of combat order we will discuss is the operation order. This will serve as a foundation for the other types of orders to follow.

QUESTION: What is an operation order?

ANSWER: A directive issued by the leader to his subordinate leaders in order to effect the coordinated execution of a specific operation.

Ref: SH-2, page SH-2-9, para 2-3

Let's discuss the five paragraphs of an OPORD.

**NOTE:** Have students refer to SH-2, pages SH-2-9 through SH-2-16.

#### Para 1, Situation

QUESTION: What is the first paragraph of the operation order?

ANSWER: The situation.

**NOTE:** When you show VGT-1, show one bullet at a time when the students answer the questions asked.

## SHOW VGT-1, SITUATION

**SITUATION**

- **ENEMY FORCES**
  - Composition, disposition, strength, capabilities and most probable course of action.
- **FRIENDLY FORCES**
  - Mission and action of units two levels up and flank units.
- **ATTACHMENTS & DETACHMENTS**
  - Who they are and the time effected.

W222/MAR05/VGT-1

QUESTION: What does the situation paragraph tell us?

ANSWER: Information essential to the subordinate leader's understanding of the situation. Information on enemy forces, friendly forces, and attachments and detachments.

Ref: SH-2, pages SH-2-9 and SH-2-10, Fig 2-2, 1a thru 1c

QUESTION: What information about enemy forces does it tell us?

ANSWER: Disposition, composition, capabilities, and strength most probable course of action.

Ref: SH-2, page SH-2-9, Fig 2-2, Annotated Format 1a(1) thru (3)

QUESTION: What information about friendly forces does it give us?

ANSWER: A verbatim statement of the higher unit commander's mission statement and the mission of the units left, right, forward, and rear.

Ref: SH-2, page SH-2-10, Fig 2-2, Annotated Format 1b thru 1b(6)

QUESTION: What information on attachments and detachments does the situation paragraph provide?

ANSWER: Units attached or detached from the platoon, and effective time of attachment/detachment.

Ref: SH-2, page SH-2-10, Fig 2-2, Annotated Format 1c

## REMOVE VGT- 1, SITUATION

**NOTE:** Have a student read the situation paragraph from Fig 2-2, Example Oral (Defend), page SH-2-9.

This is the situation paragraph of an operation order.

QUESTION: What does this paragraph tell us about the enemy?

ANSWER:

- Composition (light battalion).
- Location (east side Comanche Rd).
- Movement (traveling SSW).
- Strength (85 percent).

## **Para 2, Mission**

QUESTION: What is the second paragraph of an operation order?

ANSWER: The mission paragraph.

Ref: SH 2, page SH-2-10, Fig 2-2, Annotated Format 2

QUESTION: What information does the mission paragraph give you?

ANSWER: It states the mission in a clear, concise statement of the tasks to accomplish. It contains the "who" (unit), the "what" (attack, defend, delay, etc.), the "when" (date and time group), the "why" (seize, prevent, penetration of positions), and "where" (generally grid coordinates).

Ref: SH-2, page SH-2-10, Fig 2-2, Annotated Format 2

## **SHOW VGT-2, MISSION**

**MISSION**

States the mission in a clear concise statement of the task, containing the following information:

- WHO.
- WHAT.
- WHEN.
- WHY.
- WHERE.

W222/MAR05/VGT-2

## **REMOVE VGT-2**

**NOTE:** Fig 2-2 gives an example of a mission paragraph. Have a student read the mission paragraph Example, Oral (Defend) from SH-2, page SH-2-10.

**NOTE:** The answers to the following five questions come from SH-2, page SH-2-10, Fig 2-2, Example, Oral (Defend), Mission.

QUESTION: Who receives the mission?

ANSWER: 1st platoon.

QUESTION: What will they do?

ANSWER: Defend Hill 202.

QUESTION: When?

ANSWER: 121000 Jun.

QUESTION: Why?

ANSWER: To destroy the enemy in EA Fox and prevent the envelopment of 2d platoon.

QUESTION: Where?

ANSWER: In vicinity of GL 123456.

**NOTE:** Ask students if they have any questions about the mission paragraph and provide answers.

### **Para 3, Execution**

QUESTION: What is the third paragraph of an operation order?

ANSWER: The execution paragraph.

Ref: SH-2, page SH-2-11, Fig 2-2, Format 3

### **SHOW VGT-3, EXECUTION**

**EXECUTION**

- The “How To” Information needed to accomplish the mission.
- Usually in four parts:
  - Concept of operation.
  - Tasks to maneuver units.
  - Tasks to combat support units.
  - Coordinating instructions.

W222/MAR05/VGT-3

The execution paragraph is usually in four parts. It includes the concept of operation, tasks to maneuver units, tasks to combat support units, and coordinating instructions. Let's first look at the concept of operation.

### **REMOVE VGT- 3**

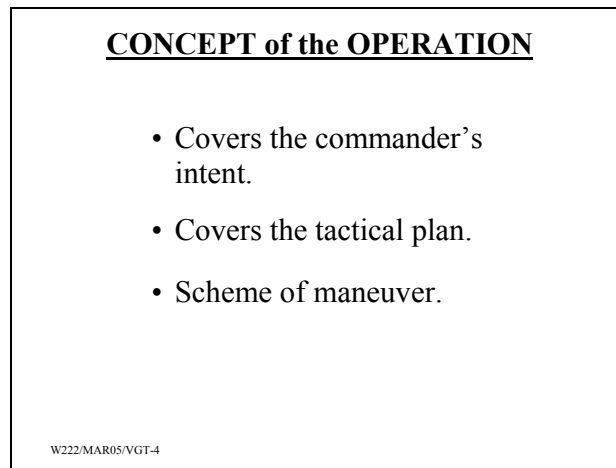
QUESTION: What does the concept of operation tell us?



ANSWER: It explains, in general terms, how the platoon--as a whole--will accomplish the mission. It identifies the most important task for the platoon/squad (mission-essential task, and any other essential tasks). If applicable, it designates the decisive point, form of maneuver of defensive techniques, and any other significant factors or principles.

Ref: SH-2, page SH-2-11, Fig 2-2, Annotated Format 3a

#### **SHOW VGT-4, CONCEPT OF THE OPERATION**



#### **REMOVE VGT-4**

The commander's intent provides each Soldier the knowledge of the end result of what the commander wants to accomplish. The concept of operation also includes the scheme of maneuver, which covers the ultimate objective and the fire support.

**NOTE:** Have a student read the execution paragraph Example, Oral (Defend): Intent, Maneuver, and Fires, page SH-2-11.

**NOTE:** The answers to the following four questions come from SH-2, page SH-2-11, Fig 2-2, Example, Oral (Defend), Execution, Maneuver, and Fires.

QUESTION: What is the commander's intent?

ANSWER: To occupy BP2 with two squads forward and one in depth, destroy forces in EA Fox, and prevent envelopment of main effort.

QUESTION: What does the scheme of maneuver tell us?

ANSWER: The ultimate objective, the mission, movement techniques, direction, order of march, and primary missions for each element.

QUESTION: What does the fire support tell us?

ANSWER: Priority of fires.

QUESTION: In this example, who has priority of fires?

ANSWER: 3rd squad initially.

The next two parts of the execution paragraph are--

- Tasks to Maneuver Units.
- Tasks to Combat Support Units.

You only need to list those items not covered during the concept of the operation. Ensure when you issue a task that you also issue a purpose that supports the task. Some units may not have combat units attached to them. In this case, you may not use Task to Combat Support Units.

**NOTE:** Uncover each bullet as you discuss them.

**SHOW VGT-5, TASKS TO MANEUVER/COMBAT SUPPORT UNITS**

**TASKS TO MANEUVER/COMBAT  
SUPPORT UNITS**

- Gives the exact mission of all subordinate units.

**COORDINATING INSTRUCTIONS**

- The tactical instruction and details of coordination that apply to two or more units.

W222/MAR05/VGT-5

**QUESTION:** In Fig 2-2, Example, Oral (Defend) on page SH-2-2, what are the tasks of the maneuver units?

**ANSWER:**

- 1st squad: occupy and prepare BP 2A, prepare supplementary position to prevent Flank Attack, prepare OP 1, and construct Obstacle 1.
- 2d squad: occupy and prepare BP 2B, provide one person to help with minefield and Obstacle 2.
- 3d squad: occupy and prepare BP 2C, Observation Post 2, and Obstacle 2. 3d squad: occupy and prepare BP 2C, Observation Post 2, and Obstacle 2

**Ref:** SH-2, page SH-2-12, Fig 2-2, 3b Example, Oral (Defend), Task to Maneuver Units:

The last part of the execution paragraph is coordinating instructions.

**QUESTION:** What do the coordinating instructions tell us?

**ANSWER:** The tactical instructions and details of coordination that apply two or more elements.

**Ref:** SH-2, page SH-2-12, Fig 2-2, Example Annotated Format, Coordinating Instructions.

The coordinating instructions subparagraph will also include risk reductions and control measures, which are unique to the operation but not included in unit SOPs.

QUESTION: In our example, what are the coordinating instructions for the squads?

ANSWER: "All squads responsible for constructing protective and tactical (FLP) wire obstacles direction to their front."

Ref: SH-2, page SH-2-12, 3d, Coordinating Instructions, Example, Oral (Defend)

## **REMOVE VGT- 5**

### **Para 4, Service Support**

The fourth paragraph of the OPORD is the service support paragraph. It covers administrative instructions and support provided for the operation.

QUESTION: What should you find included in the service support paragraph?

ANSWER: CSS instruction and arrangements supporting the operation that are of primary interest to the platoon. For example, supply, transportation, maintenance, medical evacuation and personnel.

Ref: SH-2, page SH-2-13, Annotated Format 4

## **SHOW VGT-6, SERVICE SUPPORT**

**SERVICE SUPPORT**

1. Supply.
2. Transportation.
3. Services.
4. Maintenance
5. Medical evacuation.

W222/MAR05/VGT-6

**NOTE:** Ask students if they have any questions about the service support paragraph and provide answers.

## **REMOVE VGT- 6**

### **Para 5, Command and Signal**

The fifth and final paragraph is the command and signal paragraph.

QUESTION: What information is in the command and signal paragraph?

ANSWER: a. Command.

- (1) Location of the higher unit commander and CP.
- (2) Location of the platoon leader or CP.
- (3) Location of the PSG or alternate CP.
- (4) Succession of command (if different from the SOP).

b. Signal.

- (1) SOI index in effect.
- (2) Listening silence, if applicable
- (3) Methods of communication in priority.
- (4) Emergency signals, final signals.
- (5) Code words.

Ref: SH-2, page SH-2-14, Annotated Format 5a and b

**SHOW VGT-7, COMMAND AND SIGNAL**

**COMMAND AND SIGNAL**

- Location of key leaders.
- Chain of command.
- Frequencies.
- Call signs.
- Code words.

W222/MAR05/VGT-7

As a minimum, signal should include the frequencies and call signs, restricted signals, challenges and passwords, and code words.

**NOTE:** Ask students if they have any questions about the purpose, format, or content of the operation order and provide answers.

**REMOVE VGT- 7**

Ref: SH-2, Chapter 2, para 2-2b, pages SH-2-2 thru SH-2-5

**Warning Order**

The warning order (WARNO) is a preliminary notice of an order or action that is to follow. Warning orders help subordinate units and their staffs prepare for new missions. These orders maximize subordinates' planning time, provide essential details of the impending operation, and detail major time-line events that accompany mission execution. The amount of detail a

warning order includes depends on the information and time available when the leader issues the order. The warning order clearly informs the recipient of what task he must do now as well as informs him of possible future tasks. The warning order provides the initial instructions with enough information to begin preparation as soon as possible. Unit SOPs should prescribe who attends all warning orders and actions that units take upon receipt, e.g., drawing ammunition, rations, water, and checking communications equipment. The warning order has no specific format; however, one technique is to use the five-paragraph OPORD format and may include the following information.

**NOTE:** Tell students to turn to page SH-2-3 and follow along as you explain the WARNO.

**SHOW VGT-8, WARNO INFORMATION**

**WARNO Information**

- Situation--Brief description of the enemy and friendly situation.
- Mission--Concise statement of the task and purpose.
- Execution--Brief Statement of the tentative concept of the operation.
  - Time Schedule, earliest time of move, inspection times, time and place of OPORD.
  - Tasks to subordinate key personnel.
- Service support--CSS tasks to be accomplished that are different from the TACSOP.
- Command And Signal--Location of CP succession of command (if not SOP0). SOI in effect. Signal/code words.

W222/MAR05/VGT-8

Ref: SH-2, page SH-2-2, para 2-2b

**REMOVE VGT-8**

**Fragmentary Order (FRAGO)**

QUESTION: What is the purpose of a FRAGO?

ANSWER: To change an existing order. Normally follows the OPORD format but addresses only those elements that have changed.

Ref: SH-2, chapter 2, page SH-2-14, para 2-3b

A FRAGO is either oral or written and addresses only those parts of the original OPORD that have changed. Normally the leader uses the OPORD five-paragraph format with headings. After each heading, state either "No Change" or the new information. This ensures that the

recipients know they have received the entire FRAGO, especially if sending the FRAGO over the radio. The FRAGO differs from an OPORD only in the degree of detail provided. It refers to previous orders and provides brief and specific instructions. The higher headquarters issues a new OPORD when there is a complete change of the tactical situation or when many changes make the current order ineffective.

**NOTE:** Discuss with students how the FRAGO follows the five-paragraph OPORD format.

**SHOW VGT-9, FRAGO**

**FRAGO**

- Address only parts of the OPORD that change.
- Uses the same sequence of the OPORD.
- Needs to be a brief outline of the changes and instructions should be specific.

W222/MAR05/VGT-9

**REMOVE VGT- 9**

**CHECK ON LEARNING:**

QUESTION: Which type of order should you use to provide initial instructions to your squad so they have the maximum amount of time to prepare for the impending mission?

Answer: Warning order.

Ref: SH-2, page SH-2-2, para 2-2b

QUESTION: Which paragraph of the OPORD provides details of specific missions for subordinate units?

Answer: Execution.

Ref: SH-1, page SH-2-11, Fig 2-2, para 3

Break: TIME: 00:50 to 01:00

## B. ENABLING LEARNING OBJECTIVE

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Conduct troop-leading procedures.  |
| <b>CONDITIONS:</b> | In a classroom environment culminating in a situational training exercise and given a squad. |
| <b>STANDARDS:</b>  | Conducted troop-leading procedures in accordance with FM 7-8.                                |

### 1. Learning Step / Activity 1. Identify Troop-Leading Procedures

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr  
Media: VGT-10 thru VGT-19

#### **Troop-Leading Procedures**

Ref: SH-2 (FM 7-8), page SH-2-2, para 2-2

Troop-leading is the process a leader goes through to prepare his unit to accomplish a tactical mission. You will use troop-leading procedures as a guide to prepare for combat missions or tactical operations. Troop leading procedures help make sure that you don't overlook anything important when preparing for a mission. There are normally eight steps in the troop leading process.

**NOTE:** When you ask the next question, Show VGT-10 and uncover the answers as the students answer them.

QUESTION: What are the eight steps in the troop-leading process?

#### **SHOW VGT-10, TROOP LEADING PROCEDURES**

##### **TROOP-LEADING PROCEDURES**

- STEP 1: Receive the mission.
- STEP 2: Issue the warning order.
- STEP 3: Make a tentative plan.
- STEP 4: Start necessary movement.
- STEP 5: Reconnoiter.
- STEP 6: Complete the plan.
- STEP 7: Issue complete order.
- STEP 8: Supervise.

W222/MAR05/VGT-10

Ref: SH-2, page SH-2-2, para 2-2

You'll note that the steps of troop-leading procedures interrelate so much that even though they have an established sequence, you do not have to perform the steps in order. Depending on the situation, you can change the sequence or even skip some of the steps. Keep in mind that the troop-leading procedures are guidelines that have worked in the past and still work today.

You need to understand and memorize what each step means to use them whenever you prepare for any type of operation. You'll find that they will help you organize and make the best use of your available time. Next to the assigned mission, time is your major consideration. You must allow your subordinates all the time you can to prepare for the impending mission. Let's examine each step of the troop leading procedures.

## **REMOVE VGT-10**

### **Step 1, Receive the Mission**

**NOTE:** Before showing VGT-11, instruct the students to turn to page SH-2-2 (SH-2) and prepare to answer and discuss questions concerning troop-leading procedures. Uncover the bullet comments one at a time after students answer the following questions.

QUESTION: What is the first step in troop leading procedures?

ANSWER: Receive the mission.

## **SHOW VGT-11, RECEIVE THE MISSION**

### **Troop-Leading Procedure #1, Receive the Mission**

- By receiving the alert from the platoon leader, you complete the first step of the troop leading procedures.
- You may receive the mission alert in the form of a warning order or a fragmentary order.
- On receipt of the order, analyze your mission using METT-T and start your planning process.

W222/MAR05/VGT-11

QUESTION: How will you most likely receive the mission?

ANSWER: In the form of a warning order or a fragmentary order.



Ref: SH-2, page SH-2-2, para 2-2a

QUESTION: What does the leader immediately do once he receives the mission?

ANSWER: Analyze the order using the factors of METT-T.

Ref: SH-2, page SH-2-2, para 2-2a

### **REMOVE VGT-11**

**NOTE:** Before showing VGT-12, ask the following question, and then uncover the bullet comments one at a time as the students respond to the questions.

QUESTION: What does the acronym METT-T stand for?

ANSWER: Show VGT-12.

### **SHOW VGT-12, MISSION ANALYSIS USING METT-T**

#### **Mission Analysis Using METT-T**

- Mission: What is the nature of the mission?
- Enemy: What do we actually know about the enemy?
- Terrain and Weather: How will they affect the mission?
- Troops: What Soldiers are available for the mission?
- Time: How much time is available?

W222/MAR05/VGT-12

Ref: SH-2, page SH-2-2, para 2-2a

QUESTION: What are the main questions you need to ask yourself about METT-T?

ANSWER: See VGT 12.

Ref: SH-2, page SH-2-2, para 2-2a

Some other things you need to keep in mind are what supplies and equipment you will need for the mission and what the special tasks are that you will need to assign.

Ref: SH-2, page SH-2-2, para 2-2a(1) and (2)

The leader should use no more than one third of the available time for his own planning and issuing of the operation order. His subordinates need the remaining two thirds of

the available time for their planning time. In scheduling preparation activities, the leader should work backwards from the line of departure (LD) or defend time. We call this reverse planning. You must allow enough time for the completion of each task.

## **REMOVE VGT- 12, MISSION ANALYSIS**

### **Step 2, Issue a Warning Order**

**NOTE:** When you introduce the next paragraph, Show VGT-12, but only the title of the VGT. Show the bullets of the VGT as the students answer the questions.

The second step of the troop-leading procedure is to issue the warning order. You need to issue the warning order as soon as possible to allow as much preparation time as possible for your squad.

The leader issues the warning order with whatever information he has available at the time. An example of a thorough warning order is in SH-2, page SH-2-3, Fig 2-1.

## **SHOW VGT-13, TROOP-LEADING PROCEDURE #2, Issue a Warning Order**

### **Troop-Leading Procedure #2, Issue a Warning Order**

- The warning order has no specific format, but one technique is to follow the five-paragraph OPORD format.
- You should provide the following information if available:
  - Mission or nature of the operation.
  - Who is participating.
  - Time of the operation.
  - Time and place of the OPORD.

W222/MAR05/VGT-13

QUESTION: In what format do you issue a WARNO?

ANSWER: See VGT-13.

Ref: SH-2, page SH-2-2, para 2-2b

QUESTION: What information do you provide in the WARNO if available?

ANSWER: See VGT-13.

Ref: SH-2, page SH-2-2, para 2-2b

## **REMOVE VGT-13**

### Step 3, Make a Tentative Plan

#### SHOW VGT-14, TROOP LEADING PROCEDURE #3, Make a Tentative Plan

**NOTE:** Uncover the bullets one at a time. Select students to read the specific paragraphs from SH-2, pages SH-2-5 and SH-2-6, to clarify Making a Tentative Plan.

**Troop Leading Procedure #3,  
Make a Tentative Plan**

The leader bases his estimate on analysis using METT-T:

- Mission.
- Enemy.
- Terrain (OCOKA) and weather.
  - Observation and fields of fire.
  - Cover and concealment.
  - Obstacles.
  - Key Terrain.
  - Avenues of Approach.
- Troops and time available.

W222/MAR05/VGT-14

Ref: SH-2, page SH-2-5, para 2-2c

The third step of the troop-leading procedure is to make a tentative plan. Once you have alerted your Soldiers to what is going to happen, you need to decide just how you intend to carry out your mission. You must use METT-T factors to decide on your plan of action. When considering the effects of the terrain, you should examine the OCOKA factors.

QUESTION: What do the letters in the acronym OCOKA stand for?

ANSWER:

- Observation and fields of fire.
- Cover and concealment.
- Obstacles.
- Key terrain.
- Avenues of approach.

You must consider each of the factors along with the weather, troops available, and time available to compare alternatives. From your alternatives, draw conclusions that form the basis of your plan of action. At your level, someone higher than you may decide how you are to accomplish your mission. Nevertheless, you need to understand the process so you can inform your Soldiers. You will eventually use your tentative plan to prepare the operations order.

#### **Step 4, Start Necessary Movement**

Ref: SH-2, page SH-2-7, para 2-2d

The fourth step of the troop-leading procedures is to start necessary movement. The unit may have to begin movement while the leader is still planning the mission. This step can happen at any time during the troop-leading procedure process. It is possible that you may not have to move at all depending on what your mission is, such as defend in place.

**NOTE:** Show VGT-15, uncovering the bullet comments as previously stated.. Refer students to SH-2, page SH-2-7 for clarification.

#### **SHOW VGT-15, TROOP-LEADING PROCEDURE #4, Start Necessary Movement**

**Troop-Leading Procedure #4,  
Start Necessary Movement**

- Squad moves while platoon leader completes his plan or conducts reconnaissance.
- May be under control of company XO, 1SG, PSG, or squad leader.
- Can occur anywhere in the troop leading procedures.

W222/MAR05/VGT-15

#### **REMOVE VGT-15**

#### **Step 5, Reconnoiter**

The fifth step is to reconnoiter the area where you will perform the mission. The best way to do this is to walk the ground. Sometimes you will not be able to do this because of enemy activity or lack of time. You may have to do a map reconnaissance of the area.

**NOTE:** Show VGT-16, uncovering the bullet comments as previously stated. Refer students to SH-2, page SH-2-7 for clarification.

**SHOW VGT-16, TROOP-LEADING PROCEDURE #5, Reconnoiter**

**Troop-Leading Procedure #5,  
Reconnoiter**

- When time allows, conduct actual reconnaissance.
- When time does not allow, conduct map reconnaissance.
- Must consider risk inherent in moving forward of friendly lines, or into unoccupied area.

W222/MAR05/VGT-16

**REMOVE VGT-16**

**Step 6, Complete the Plan**

**NOTE:** Show VGT-17, uncovering the bullet comments as previously stated. Refer students to SH-2, page SH-2-7 for clarification.

**SHOW VGT-17, TROOP-LEADING PROCEDURE #6, Complete the Plan**

**Troop-Leading Procedures #6,  
Complete the Plan**

- Based on METT-T.
- Meets commander's intent.

W222/MAR05/VGT-17

Step six is to complete the plan. Based on your tentative plan and your reconnaissance, you now finalize your plan. You complete your plan based on the reconnaissance and any changes in the situation. You should review your mission as you received it to ensure the plan meets the requirements of the mission and stays within the framework of the commander's intent. Your plan will become the OPORD.

**REMOVE VGT-17**

**Step 7, Issue the Complete Plan**

**NOTE:** Show VGT -18, uncovering the bullet comments as previously stated. Refer students to SH-2, page SH-2-7 for clarification.

**SHOW VGT-18, TROOP-LEADING PROCEDURE #7, Issue the Complete Order**

**Troop-Leading Procedure #7,  
Issue the Complete Order**

- Issue the order overlooking the defensive terrain, or on a terrain model or sketch.
- Cover mission, commander's intent, concept of the operation and assigned tasks.
- Quiz Soldiers to make sure they understand the order.

W222/MAR05/VGT-18

Ref: SH-2, page SH-2-7, para 2-2g

The seventh step of the troop-leading procedure is to issue the complete OPORD. When possible, issue the order from a location where your Soldiers can see their objective. If you can't do this, use a terrain model, map, or sketch. Ensure your Soldiers understand the mission. They need to know how you plan to accomplish the mission and where they fit into the overall plan. You will normally complete Step 7 orally. The platoon leader will also orally issue his order to the squad leaders. It is critical for you to get the information your Soldiers need, without unnecessary "nice to know" information that will cause confusion.

Although a simple thing, you must remember to have a means of writing notes available, and one that will survive in bad weather. The best plan in the world is worthless if rain has washed it off onto the ground.

**REMOVE VGT-18**

**Step 8, Supervise**

Ref: SH-2, page SH-2-7, para 2-2h

The eighth step of the troop-leading procedure is to supervise, which includes conducting rehearsals and inspections. After you issue the operation order, you need

to check to make sure that your Soldiers carry out your instructions. If you have time before an operation, have your Soldiers rehearse the mission.

**NOTE:** Show VGT-19 and ask the following questions uncovering the bullet comments as the students answer. Refer the students to SH-2, pages SH-2-7 and SH-2-8, para 2-2h(1) thru (2).

**SHOW VGT-19, TROOP-LEADING PROCEDURE #8, Supervise**

**Troop-Leading Procedure #8, Supervise**

- **Rehearsals:**
  - Practice essential tasks to improve performance.
  - Reveal weaknesses or problems with the plan.
  - Coordinate actions of subordinates.
  - Improve Soldier understanding of the operation, fostering confidence in themselves.
- **Inspections:**
  - Weapons and Ammunition.
  - Uniforms and equipment.
  - Mission-essential equipment.
  - Soldiers' understanding of mission and responsibilities.
  - Communication.
  - Rations and water.
  - Camouflage.

W222/MAR05/VGT-19

QUESTION: What are four reasons why a leader uses rehearsals?

ANSWER: See VGT-19.

Ref: SH-2, page SH-2-7 and SH-2-8, para 2-2h(1)

Rehearsals also include the practice of having squad leaders brief their planned actions in execution sequence to the platoon leader. Also, leaders should conduct rehearsals on terrain that resembles the actual ground and in similar conditions.

Prior to the issuance of the OPORD, you may begin rehearsing battle drills and other SOP items so once you receive the ORORD you can begin rehearsal on mission specific tasks.

Squad leaders should conduct initial inspections shortly after receipt of the warning order. The platoon sergeant and platoon leaders should make the final inspections.

QUESTION: What should the squad leader inspect for that the platoon sergeant and platoon leader will be inspecting for?

ANSWER: See VGT-19.

Ref: SH-2, page SH-2-7 and SH-2-8, para 2-2h(1)

## REMOVE VGT-19

Troop-leading procedures will guide you step-by-step and help you prepare your Soldiers for any type of operation. Memorize the troop leading procedures and use them as a mental checklist to make sure that you do not overlook anything important. Keep in mind that no single individual can do everything by himself, not even you. Use your subordinates, and get the job done right.

## CHECK ON LEARNING

QUESTION: What are the eight steps of the troop-leading procedures that will help you prepare your Soldiers to accomplish a tactical mission?

ANSWER:

- Step 1. Receive the mission.
- Step 2. Issue a warning order.
- Step 3. Make a tentative plan.
- Step 4. Start necessary movement.
- Step 5. Reconnoiter.
- Step 6. Complete the plan.
- Step 7. Issue the complete order.
- Step 8. Supervise.

Ref: SH-2, page SH-2-2, para 2-2

QUESTION: What are three ways you can receive a mission?

ANSWER: In a warning order (WARNO), an operation order (OPORD), or a fragmentary order (FRAGO).

Ref: SH-2, page SH-2-2, para 2-2a

QUESTION: What acronym describes the basis on which the platoon leader formulates his plan?

ANSWER: METT-T.

Ref: SH-1 (FM 7-8), SH-2-6 para 2-2c

QUESTION: What does the acronym METT-T stand for?

ANSWER: **M**ission, **E**nemy, **T**errain, **T**roops available, and **T**ime available.

Ref: SH-2, page SH-2-6, para 2-2c(1) through (4)

QUESTION: When considering the military aspects of terrain, which acronym do we use, and what does the acronym stand for?

ANSWER:

- **OCOKA**
- **O**bservations and field of fire.
- **C**over and concealment.
- **O**bstacles.



- **Key terrain.**
- **Avenues of approach.**

Ref: SH-2, page SH-2-6, para 2-2c(3)

Break TIME: 01:50 to 02:00

## 2. Learning Step / Activity 2. Conduct Precombat Checks

Method of Instruction: Conference / Discussion  
 Technique of Instruction: Small Group Instruction (SGI)  
 Instructor to Student Ratio: 1:8  
 Time of Instruction: 35 mins  
 Media: VGT-20 thru VGT-23

Ref: SH-3 (Task: 071-990-0004), page SH-3-2, LS/A 1

We will now discuss how to inspect Soldiers, their equipment, and their mission knowledge prior to departure on their mission.

Soldiers preparing for combat face multiple taskings, all of which have an impact on the success of the unit's mission. As leaders, we take on the added responsibility to assist our Soldiers in their preparation for combat. Part of this preparation is verifying that each Soldier has the proper equipment, is physically fit, and is adequately informed to assist in the unit's mission accomplishment. We refer to this responsibility as "conducting precombat checks".

### **Characteristics of a Soldier's Combat Load**

Ref: SH-3 (Task: 071-990-0004), page SH-3-2 thru SH-3-6, LS/A 1

In order to properly inspect your Soldiers combat load, you must familiarize yourself with the unit SOP. It is a critical leader task determining a Soldier's combat load.

The combat load that a Soldier carries is METT-T dependent and is mission essential--as determined by the commander based on realistic expectations--required for the Soldier to fight and survive immediate combat operations. So, when planning missions, commanders must consider the combat load of Soldiers. You cannot expect Soldiers to carry all the gear and supplies necessary to cover every contingency. Your primary consideration is how

much the Soldier can carry without impairing his combat effectiveness.

Ref: SH-3 (Task: 071-990-0004), page SH-3-4, LS/A 1c

The physical limitation of individual Soldiers, stress, and the weight of equipment and munitions all affect the Soldier's ability to carry his required load and meet mission requirements. Combat load weights will vary and should not exceed the prescribed weight by the unit SOP. There are two components you must consider:

QUESTION: What are the two components of a combat load?

ANSWER: Fighting load and approach march load.

Ref: SH-3 (Task: 071-990-0004), page SH-3-4, LS/A 1c

QUESTION: What is the definition of a fighting load, and what equipment does a fighting load consist of?

ANSWER: Essential items needed to fight, not exceeding 48 pounds.

### **SHOW VGT-20, FIGHTING LOAD**

**NOTE:** Undercover the bullet comments one at a time as the students respond to the question.

| <b><u>Fighting Load</u></b>                     |              |
|---|--------------|
|   | Weight (lbs) |
| Bayonet with scabbard.                          | 1.3          |
| Canteen, 1-quart and cover with water (2 each). | 5.6          |
| Case, small arms (2 each).                      | 1.8          |
| Grenade, fragmentation (4).                     | 4.0          |
| Helmet, ballistic.                              | 3.4          |
| Magazines (6) w/180 round of 5.56mm.            | 5.4          |
| Pistol belt, suspenders, and first-aid pouch.   | 1.6          |
| Protective mask with decontamination kit.       | 3.0          |
| Rifle, M16A2 with 30 round 5.56 ball.           | 8.8          |
| TOTAL   | 34.9         |

W222/MAR05/VGT-20

Ref: SH-3 (Task: 071-990-0004), page SH-3-4, LS/A 1c(1)

### **REMOVE VGT-20**

Ref: SH-3 (Task: 071-990-0004), page SH-3-4, LS/A 1c(2)

The approach march load includes those items needed in addition to the fighting load. This load includes items needed for extended operations. Soldiers drop these loads

prior to engagement with the enemy or other operations. The approach load should not exceed 72 pounds.

QUESTION: What equipment does an approach march load consist of?

ANSWER: See VGT-21.

#### **SHOW VGT-21, APPROACH MARCH LOAD**

**NOTE:** Undercover the bullet comments one at a time as the students respond to the question.

| <b><u>Approach March Load</u></b>       |              |
|---|--------------|
|   | Weight (lbs) |
| ALICE, medium with frame.               | 6.3          |
| Bag, waterproof.                        | 0.8          |
| Canteen, 2-quart, and cover with water. | 4.8          |
| E-tool with carrier.                    | 2.5          |
| Liner, poncho.                          | 1.6          |
| Poncho, nylon.                          | 1.3          |
| Rations, MRE (2 each).                  | 2.6          |
| Toilet articles.                        | 2.0          |
| Towel.                                  | 0.2          |
| TOTAL                                   | 22.1         |

W222/MAR05/VGT-21

Ref: SH-3 (Task: 071-990-0004), page SH-3-5, Fig 1-3

#### **REMOVE VGT-21**

Ref: SH-3 (Task: 071-990-0004), page SH-3-4, LS/A 1c(2)

Not only is it important that we ensure that Soldiers have and carry the appropriate equipment and carry them at the appropriate time based on the METT-T, but it is also important to manage where the Soldier carries the equipment. For example, in his ALICE pack, or on his load carrying equipment (LCE).

The leader determines--based on the METT-T--what Soldiers carry in their rucksacks within immediate reach. Leaders will require items common to everyone's load placed in the same location. You must check those items carried by your Soldiers to ensure that nothing prevents them from taking well-aimed shots. Soldiers should not carry anything on the front side of the LCE.

#### **Personnel Precombat Checks**

Ref: SH-3 (Task: 071-990-0004), page SH-3-5 thru SH-3-6, LS/A 2

**NOTE:** Have one student detailed to come to class equipped with a basic combat fighting load (see items below), ready for inspection to act as your illustrator while you demonstrate how to conduct a precombat check on personnel. Ensure Soldier wears camouflage and camouflages his helmet and weapon.

**NOTE:** Provide the demonstrator with the NCOA's field SOP on how to set up his LCE. Also camouflage sticks and material to camouflage his helmet and weapon.

Demonstrator Combat Fighting Load:

- Helmet, ballistic with camouflage cover.
- Canteen, 1-quart and cover with water (2 each).
- Case small arms (2 each).
- Magazines (6) (blank ammunition not required).
- Pistol belt, suspenders, and first-aid pouch.
- Protective mask with decontamination kit.
- Rifle, Rubber or M16A2.

Ref: SH-3 (Task: 071-990-0004), page SH-3-6

**NOTE:** While you instruct this portion the class, call on a student to inspect the demonstrator. Ask the inspecting student if the demonstrator meets the standards.

1. To begin your inspection, start at the head and check to see if the Soldier used perfume, aftershave, soaps or body deodorants.
  - a. Headgear: Check if the helmet is serviceable and the chinstrap is snug and comfortable. Also, check the camouflage cover for slits to insert twigs or foliage for additional camouflage. Be sure that the camouflage breaks up the outline of the helmet.
  - b. Check camouflage: Check the Soldier's camouflage. The Soldier must paint the shiny areas of his face (forehead, cheekbones, nose and chin) with a dark color. He should lighten shadow areas (around the eyes, under the nose, and under the chin). When painting, the Soldier should use bold, irregular patterns. He should cover all exposed skin areas including the face, chin, front and back of the neck, ears, and the back of the hands completely.
2. Check for identification tags and identification card. Make sure he taped his ID tags together and to the chain so they cannot slide or rattle.

3. Check uniform clothing items for mission compatibility and adequate environmental protection. Check the uniform clothing for serviceability, fit, and general appearance. Faded battle dress uniforms lose the ability to deflect infra-red detection devices.

4. Check the field suspenders and equipment belt for proper fit and position. The Soldier should attach the back suspender snap hooks at each side of the two center top eyelets at the back of the equipment belt. He should have attached the front suspender snap hooks to the eyelets on the back of the ammunition cases. The equipment belt should not be snug.

**NOTE:** If a Soldier wears a rucksack, ensure that it does not exceed the prescribed combat load weight.

5. Check the footgear for fit and serviceability. Ensure the Soldier is wearing the proper layers and type of socks that protect his feet from the elements.

6. Check the Soldier's feet for blisters, sores, or evidence of rashes. A Soldier cannot fight effectively if his feet render him immobile. Ensure the Soldier has performed the necessary foot care needed to preserve healthy feet.

7. Check to ensure the Soldier is sufficiently hydrated and has eaten all meals scheduled. Fatigue and fear are two combat factors that can burn up a Soldier's stored energy. A Soldier who sacrifices nutrition prior to combat is more likely to succumb to both.

8. Note discrepancies and submit the list to the proper authority; follow-up to ensure the Soldier replaced his missing and nonfunctional items immediately.

It is critical for leaders to understand how to check these items from memory. You will all have a chance to demonstrate how to check personnel when you conduct precombat checks during the situational training exercise (STX) as part of your troop leading procedures.

### **Equipment Precombat Checks**

Ref: SH-3 (Task: 071-990-0004), page SH-3-7, LS/A 3

The next area we will discuss is the inspection of equipment.

1. Before inspecting equipment, study the applicable technical manuals (TMs). Pay particular attention to the section on preventive maintenance checks and services. Also, follow the unit SOP to identify the basic issue items included in the combat load.
2. Check load-carrying equipment (LCE) for accountability according to the SOP. Check the clips and buckles for serviceability. Check that the Soldiers have securely attached all items to the field suspenders and equipment belt. Check all items for serviceability, and note any item that is missing or nonfunctional. Have the Soldier jump up and down to ensure there are no loose items that will cause rattling.
3. Water and Nutrition. Check to make sure the Soldiers have filled their canteens to capacity with potable water. Make sure that they have the quantity of MREs required.
4. Weapon and Ammunition. Check to make sure the Soldier has his assigned weapon and his basic load of ammunition. Check the weapon for cleanliness and ensure that it is functional. Note any discrepancies.
5. Threat Protection Equipment. Check to see that the Soldier is carrying the proper threat protection equipment as prescribed by SOP. Ensure that the equipment is serviceable and ready for wear. Note any discrepancies and missing items.
6. Submit all lists of discrepancies to the proper authority and follow-up to ensure the Soldiers replace all missing and nonfunctional items immediately.

### **Mission Knowledge Precombat Checks**

Ref: SH-3 (Task: 071-990-0004), pages SH-3-7 through SH-3-9, LS/A 4

We just finished discussing the precombat checks leaders are responsible for as far as personnel and equipment inspections. There is one more critical precombat check to discuss, and that is the Soldiers' knowledge and understanding of the mission and their specific responsibilities. Until the leader checks their knowledge of the mission, he cannot know what they understand.

QUESTION: What is the minimum that your Soldiers should understand about the mission?

ANSWER: See VGT-22.

**NOTE:** Show the answers on the VGT as the students answer.

**SHOW VGT-22, MISSION KNOWLEDGE**

**Mission Knowledge**

As a minimum, the Soldier should understand--

- The nature of the operation.
- Who is participating.
- Time of the operation.
- Assigned tasks.

W222/MAR05/VGT-22

Ref: SH-3 (Task: 071-990-0004), page SH-3-7 and SH-3-8, para 4 General

As a minimum, your Soldiers should understand the mission or the nature of the operation, who is participating in the operation, and time of the operation. They must also know their assigned tasks.

**REMOVE VGT-22**

To make maximum use of time, the leader may ask questions regarding mission knowledge concurrently with the inspection of personnel and equipment. The next visual aid shows the areas the leader should cover.

**SHOW VGT-23, UNIT MISSION (TASK & PURPOSE)**

**Unit Mission (Task & Purpose)**

As a minimum, check for the following:

- Who.
- What.
- Where.
- When.
- Why.

W222/MAR05/VGT-23

Check to make sure the Soldier knows the unit's mission (task & purpose). As a minimum, check for who, what, where, when & why. Check to make sure the Soldier has prepared himself to accomplish any specific tasks assigned to him. The unit SOP should provide an in-depth description of the specific responsibilities associated with mission tasks.

For example, some important mission tasks include--

- Actions on the objective.
- Assaulting a trench, bunker or building.
- Actions at the assault position.
- Breaching obstacles (mine and wire).
- Using special weapons or demolitions.
- Actions on unexpected enemy contact.

Ref: SH-3 (Task: 071-990-0004), page SH-3-8, para 4 General

Check to make sure the Soldier knows the concept of the operation, to include control measures. In most cases, leaders will use rehearsals to practice essential tasks and improve Soldier understanding of the concept of the operation. Rehearsals foster confidence in the Soldiers. During rehearsals, the squad leaders brief their planned actions in execution sequence to the platoon leader.

Leaders use control measures to assign responsibilities, coordinate fires and maneuver, control combat operations, and clarify their concept of the operation. They also use control measures to clarify their intent, focus the platoon or squad effort, and ensure synchronization. Control measures ensure the distribution of fires throughout the platoon's area of responsibility and the initial positioning and subsequent maneuver of squads. Each control measure should have a specific purpose that contributes to mission accomplishment.

Some graphic control measures in the offense include the following: assembly area, attack position, line of departure, boundaries, routes, release points, start points, axis of advance, direction of attack, phase lines, checkpoints, assault positions, and objectives.



Fire commands and control measures for individual and key weapons also constitute a type of control measure. Weapon control measures include range cards, sectors of fire, principle direction of fire, final protective line, final protective fires and target reference points.

Soldiers must also understand the higher commander's intent. Check to make sure the Soldier knows the higher headquarters commander's intent. He should be able to give you the stated version that defines the purpose of the operation and the relationship among the force, the enemy, and the terrain. Immediately correct any evidence of lack of knowledge.

### **CHECK ON LEARNING**

QUESTION: What two items of mission knowledge must Soldiers know at a minimum?

ANSWER: Nature of the operation and their assigned tasks.

Ref: SH-3 (Task: 071-990-0004), page SH-3-7, para 4a

### **C. ENABLING LEARNING OBJECTIVE**

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Interpret the commander's intent of a combat order.  |
| <b>CONDITIONS:</b> | In a classroom environment culminating in a situational training exercise and given a squad. |
| <b>STANDARDS:</b>  | Interpreted the commander's intent from an OPOD IAW FM 7-8.                                  |

#### **1. Learning Step / Activity 1. The Commander's Intent**

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 5 mins  
Media: VGT-24

#### **Commander's Intent**

Ref: SH-2 (FM 7-8), page SH-2-11

Let's now discuss the commander's intent of a mission.

QUESTION: In which paragraph of the operation order is the commander's intent?

ANSWER: The execution paragraph.

Ref: SH-2, page SH-2-11, Figure 2-2, Annotated Format 3

The commander's intent is a statement of what the unit must do to succeed with respect to the enemy and the terrain and provides each Soldier the knowledge of the commander's desired end state. In other words, it is what the commander wants to accomplish and how he plans to accomplish it. It provides the link between the mission and the concept of operation (the method or tactical plan) by stating the key tasks for subordinate elements. Key tasks are those missions that elements must perform, or accomplishment of required conditions, to achieve the stated purpose of the operation--the mission (para 2 of the OPORD).

**SHOW VGT-24, COMMANDER'S INTENT**

**COMMANDER'S INTENT**

- Lets each Soldier know what the commander wants done and how they should accomplish the mission.
- Allows Soldiers to accomplish the mission though a certain task may have to be done differently than what the commander wanted.

W222/MAR05/VGT-24

Situations change, and you may not be able to accomplish a given task as planned, but you may be able to do that task in a different manner and still meet the commander's intent, if you know what that intent is. This concept allows leaders more flexibility in how to accomplish the mission on the ever-changing battlefield.

**CHECK ON LEARNING**

QUESTION: In which paragraph of the OPORD can you normally find the commander's intent?

ANSWER: Execution.

Ref: SH-2 (FM 7-8), page SH-2-11, Annotate Format 3 Execution

QUESTION: What does the commander's intent provide?

ANSWER: The end result the commander wants to accomplish.

Ref: SH-2 (FM 7-8), page SH-2-11, Examples Oral Attack and Defend.

**D. ENABLING LEARNING OBJECTIVE**

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Practical Exercises 1 thru 4   |
| <b>CONDITIONS:</b> | In a Field Environment, Demonstrate your ability to interpret and issue combat orders and to conduct troop leading procedures. |
| <b>STANDARDS:</b>  | Demonstrated your ability to interpret and issue combat orders and conducted troop leading procedures.                         |

1. Learning Step / Activity 1. Conduct Precombat Checks/ PE-1  
Method of Instruction: Practical Exercise (Performance)  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 10 mins  
Media: PE-1
2. Learning Step / Activity 2. Prepare a Squad Warning Order/PE-2  
Method of Instruction: Practical Exercise (Performance)  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 10 mins  
Media: VGT-25 thru VGT-27 (Solutions)
3. Learning Step / Activity 3. Prepare Elements of a Squad Operation Order/ PE-3  
Method of Instruction: Practical Exercise (Performance)  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 15 mins  
Media: PE-3
4. Learning Step / Activity 4. Prepare A Squad Fragmentary Order/PE-4  
Method of Instruction: Practical Exercise (Performance)  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 15 mins  
Media: PE-4

#### SECTION IV. SUMMARY

|   |
|---|
| Method of Instruction: <u>Conference / Discussion</u>       |
| Technique of Delivery: <u>Small Group Instruction (SGI)</u> |
| Instructor to Student Ratio is: <u>1:8</u>                  |
| Time of Instruction: <u>5 mins</u>                          |
| Media: <u>None</u>  |

#### Check on Learning

QUESTION: If available, what four essential elements of information should you provide in the warning order to your squad?

ANSWER:

- The mission or nature of the operation.
- Who is participating in the operation.
- Time of the operation.
- Time and place for issuance of the completed order

Ref: SH-2 (FM 7-8), page SH-2-3, para 2-2b

QUESTION: What paragraph of the OPORD provides information on enemy forces, friendly forces, and attachments and detachments?

ANSWER: Situation.

Ref: SH-2 (FM 7-8), pages SH-2-9 and SH-2-10, Fig 2-2, Format 1a and b

QUESTION: What paragraph of the OPORD provides the location of the leaders during the operation?

ANSWER: Command and Signal.

Ref: SH-2 (FM 7-8), page SH-2-14, Figure 2-2, Format 5a

QUESTION: What is the purpose of the FRAGO?

ANSWER: To make a change to an existing order.

Ref: SH-2 (FM 7-8), page SH-2-14, para 2-2b.

QUESTION: You must decide how you intend to carry out your mission. On what factors must you base your tentative plan?

ANSWER: METT-T, which is--

- Mission.
- Enemy.
- Terrain.
- Troops.
- Time available.

Ref: SH-2 (FM 7-8), page SH-2-6, para 2-2c

**Check on  
Learning,**  
continued

---

QUESTION: In what paragraph can you find the leader's intent?

ANSWER: Execution.

Ref: SH-2 (FM 7-8), page SH-2-11, Figure 2-2, Format 3 and 3a

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**Review /  
Summarize  
Lesson**

During this class you learned the steps in the troop leading process, and you studied three of the five types of combat orders: the OPORD, WARNO, and FRAGO. You also learned where to find the information to interpret the commander's intent for a mission. This information will help you plan, prepare, and coordinate for a mission, especially when operating in a combat environment.

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## SECTION V. STUDENT EVALUATION

### Testing Requirements

---

**NOTE:** Describe how the student must demonstrate accomplishment of the TLO. Refer student to the Student Evaluation Plan.

You will take a one hour written examination. The examination will contain questions from this lesson. You must answer correctly 70 percent or more of the questions on the examination to receive a GO.

### Feedback Requirements

---

**NOTE:** Feedback is essential to effective learning. Schedule and provide feedback on the evaluation and any information to help answer students' questions about the test. Provide remedial training as needed.

**NOTE:** Inform the students of where the examination will take place as posted on the training schedule and when they will receive feedback on the test. Include any retest information.

---

Enabling Learning Objective A

Learning Step 1

VGT-1, Situation

## **SITUATION**

- **ENEMY FORCES**
  - Composition, disposition, strength, capabilities and most probable course of action.
- **FRIENDLY FORCES**
  - Mission and action of units two levels up and flank units.
- **ATTACHMENTS & DETACHMENTS**
  - Who they are and the time effected.

W222/MAR05/VGT-1

## **MISSION**

States the mission in a clear concise statement of the task, containing the following information:

- WHO.
- WHAT.
- WHEN.
- WHY.
- WHERE.

W222/MAR05/VGT-2



## **EXECUTION**

- The “How To” Information needed to accomplish the mission.
- Usually in four parts:
  - Concept of operation.
  - Tasks to maneuver units.
  - Tasks to combat support units.
  - Coordinating instructions.

W222/MAR05/VGT-3

## **CONCEPT of the OPERATION**

- Covers the commander's intent.
- Covers the tactical plan.
- Scheme of maneuver.

W222/MAR05/VGT-4

## **TASKS TO MANEUVER/COMBAT SUPPORT UNITS**

- Gives the exact mission of all subordinate units.

## **COORDINATING INSTRUCTIONS**

- The tactical instruction and details of coordination that apply to two or more units.

W222/MAR05/VGT-5

## **SERVICE SUPPORT**

1. Supply.
2. Transportation.
3. Services.
4. Maintenance
5. Medical evacuation.

W222/MAR05/VGT-6

## **COMMAND AND SIGNAL**

- Location of key leaders.
- Chain of command.
- Frequencies.
- Call signs.
- Code words.

W222/MAR05/VGT-7

## **WARNO Information**

- **Situation--Brief description of the enemy and friendly situation.**
- **Mission--Concise statement of the task and purpose.**
- **Execution--Brief Statement of the tentative concept of the operation.**
  - **Time Schedule, earliest time of move, inspection times, time and place of OPORD.**
  - **Tasks to subordinate key personnel.**
- **Service support--CSS tasks to be accomplished that are different from the TACSOP.**
- **Command And Signal--Location of CP succession of command (if not SOP0). SOI in effect. Signal/code words.**

W222/MAR05/VGT-8

## **FRAGO**

- Address only parts of the OPORD that change.
- Uses the same sequence of the OPORDER.
- Needs to be a brief outline of the changes and instructions should be specific.

W222/MAR05/VGT-9

## **TROOP-LEADING PROCEDURES**

STEP 1: Receive the mission.

STEP 2: Issue the warning order.

STEP 3: Make a tentative plan.

STEP 4: Start movement.

STEP 5: Reconnoiter.

STEP 6: Complete the plan.

STEP 7: Issue operations order.

STEP 8: Supervise.



## **Troop Leading Procedure #1, Receive the Mission**

- By receiving the alert from the platoon leader, you complete the first step of the troop leading procedures.
- You may receive the mission alert in the form of a warning order or a fragmentary order.
- On receipt of the order, analyze your mission using METT-T and start your planning process.

W222/MAR05/VGT-11

## **Mission Analysis Using METT-T**

- Mission: What is the nature of the mission?
- Enemy: What do we actually know about the enemy?
- Terrain and Weather: How will they affect the mission?
- Troops: What Soldiers are available for the mission?
- Time: How much time is available?

W222/MAR05/VGT-12

## **Troop-Leading Procedure #2, Issue a Warning Order**

- The warning order has no specific format, but one technique is to follow the five-paragraph OPORD format.
- You should provide the following information if available:
  - Mission or nature of the operation.
  - Who is participating.
  - Time of the operation.
  - Time and place of the OPORD.

W222/MAR05/VGT-13

## **Troop-Leading Procedure #3, Make a Tentative Plan**

The leader bases his estimate on analysis using METT-T:

- Mission.
- Enemy.
- Terrain (OCOKA) and weather.
  - Observation and fields of fire.
  - Cover and concealment.
  - Obstacles.
  - Key Terrain.
  - Avenues of Approach.
- Troops and time available.

W222/MAR05/VGT-14

## **Troop-Leading Procedure #4, Start Necessary Movement**

- Squad moves while platoon leader completes his plan or conducts reconnaissance.
- May be under control of company XO, 1SG, PSG, or squad leader.
- Can occur anywhere in the troop leading procedures.

W222/MAR05/VGT-15

## **Troop-Leading Procedure #5, Reconnoiter**

- When time allows, conduct actual reconnaissance.
- When time does not allow, conduct map reconnaissance.
- Must consider risk inherent in moving forward of friendly lines, or into unoccupied area.

W222/MAR05/VGT-16

## **Troop-Leading Procedures #6, Complete the Plan**

- Based on METT-T.
- Meets commander's intent.

W222/MAR05/VGT-17

## **Troop-Leading Procedure #7, Issue the Complete Order**

- Issue the order overlooking the defensive terrain, or on a terrain model or sketch.
- Cover mission, commander's intent, concept of the operation and assigned tasks.
- Quiz soldiers to make sure they understand the order.

W222/MAR05/VGT-18



## **Troop-Leading Procedure #8, Supervise**

- **Rehearsals:**
  - Practice essential tasks to improve performance.
  - Reveal weaknesses or problems with the plan.
  - Coordinate actions of subordinates.
  - Improve Soldier understanding of the operation, fostering confidence in themselves.
- **Inspections:**
  - Weapons and Ammunition.
  - Uniforms and equipment.
  - Mission-essential equipment.
  - Soldiers' understanding of mission and responsibilities.
  - Communication.
  - Rations and water.
  - Camouflage.

W222/MAR05/VGT-19

Learning Step 2

VGT-20, Fighting Load

## **Fighting Load**

|   | Weight (lbs) |
|---|--------------|
| Bayonet with scabbard.                          | 1.3          |
| Canteen, 1-quart and cover with water (2 each). | 5.6          |
| Case, small arms (2 each).                      | 1.8          |
| Grenade, fragmentation (4).                     | 4.0          |
| Helmet, ballistic.                              | 3.4          |
| Magazines (6) w/180 round of 5.56mm.            | 5.4          |
| Pistol belt, suspenders, and first-aid pouch.   | 1.6          |
| Protective mask with decontamination kit.       | 3.0          |
| Rifle, M16A2 with 30 round 5.56 ball.           | 8.8          |
| TOTAL   | 34.9         |

W222/MAR05/VGT-20

## **Approach March Load**

|   | Weight (lbs) |
|---|--------------|
| ALICE, medium with frame.               | 6.3          |
| Bag, waterproof.                        | 0.8          |
| Canteen, 2-quart, and cover with water. | 4.8          |
| E-tool with carrier.                    | 2.5          |
| Liner, poncho.                          | 1.6          |
| Poncho, nylon.                          | 1.3          |
| Rations, MRE (2 each).                  | 2.6          |
| Toilet articles.                        | 2.0          |
| Towel.                                  | 0.2          |
| TOTAL                                   | 22.1         |

W222/MAR05/VGT-21

## **Mission Knowledge**

As a minimum, the Soldier should understand--

- The nature of the operation.
- Who is participating.
- Time of the operation.
- Assigned tasks.

W222/MAR05/VGT-22

## **Unit Mission (Task & Purpose)**

As a minimum, check for the following:

- Who.
- What.
- Where.
- When.
- Why.

W222/MAR05/VGT-23

## **COMMANDER'S INTENT**

- Lets each Soldier know what the commander wants done and how they should accomplish the mission.
- Allows Soldiers to accomplish the mission though a certain task may have to be done differently than what the commander wanted.

W222/MAR05/VGT-24

## **PE-2, Platoon Warning Order**

Our mission is to attack the town of Corona at 1830. The enemy has some good positions in the buildings. There may also be enemy tanks in the town. Draw six grenades and one AT-4 for each man. Each squad will carry 10 blocks of C4, 10 non-electric blasting caps, 10 fuse lighters, 100 feet of detonating cord, and 15 feet of fuse. The platoon sergeant will tell you where and when you can pick it up. Let me know by 1330 if you have any problems with radios or weapons. Meet me back here at 1405. At that time, we will move up to the ridge overlooking the town, where I will give the complete order.

W222/MAR05/VGT-25

## **SPE-2, Solution to PE-2**

Four minimum essential elements in a warning order and any special instructions: (Ref: SH-2 [FM 7-8], page SH-2-2, para 2-2b)

- The mission: Attack town of Corona.
- Who is participating in the operations: Squad as part of the platoon.
- Time of the operation: 1830.
- Time and place for issuance of the complete order: 1515.
- Any special instructions: The equipment that each man will carry; Sgt Evans' team tasks concerning demolition, PVT Smiths task to carry rope and grappling hook.

W222/MAR05/VGT-26



## **SPE-2, Solution to PE-2, cont**

Our mission is <sup>1</sup>**to attack the town of Corona** at <sup>3</sup>**1830** as <sup>2</sup>**part of the platoon**. The enemy has well-prepared positions in the buildings and probably has tanks with him. <sup>5</sup>**Each man will carry six grenades and one law**, in addition to the standard load for rifles and grenade launchers. <sup>5</sup>**Sergeant Evan, your team will handle our demolitions: draw 10 blocks of C4, 10 non-electric blasting caps, 10 fuse igniters, 100 feet of detonating cord, and 15 feet of fuse. Make sure you test burn the fuse. Private Smith, carry a climbing rope and grappling hook.** The platoon sergeant will be here in 20 minutes to tell us where and when we can pick up our ammunition and equipment. I'm leaving now to get the platoon order. Sergeant Jones is in charge until I get back. <sup>4</sup>**We will meet here at 1515 for the OPORD.**

W222/MAR05/VGT-27

## **SPE-3, Solution to PE-3**

**Commander's intent:** To control the road between Hill 301 and Hill 309 in case of possible enemy counterattack.

W222/MAR05/VGT-28

## **SPE-3, Solution to PE-3, cont**

**Concept of operation for 1st Squad:** (Modify the wording in the underlined areas to apply to the other elements.)

The 1st squad's mission, our mission, is to attack and seize the left part of Hill 301, located here. We attack dismounted, crossing the LD at 0600 in column formation using traveling overwatch behind 2d squad and the Platoon Headquarters, with 3d squad following us. Our carrier provides overwatching fires from Hill 294, located here. Our assault position is Catfish Creek where we deploy in line formation: our squad on the left; 2d squad, base squad, in the center; and 3d squad on the right to seize Hill 301, Objective RED. After we seize Objective RED, we have to watch this road between us and 1st Platoon on Hill 309 for possible enemy counterattack. A 15-minute artillery prep will begin at 0550. We consolidate on Objective RED from 9 to 11 with 12 being east. We link with 2d squad at 11. The 3d Platoon may come up to pass through us to continue the attack. Our carrier will move forward on order and join us on the objective. No one is to advance more than 100 meters beyond the crest of the hill.

W222/MAR05/VGT-29

## **Platoon Fragmentary Order**

|                             |   |
|-----------------------------|---|
| Situation: Enemy & Friendly | “Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the Carrier Element.”   |
| Mission                     | “No change.”  |
| Orders to Subordinate Units | “2d squad and 3d Squad continue to attack to seize Objective RED. 1st squad moves to Hill 294 and helps the Carrier Element contain the enemy.”   |
| Fire Support                | “Priority of fire remains with 2d Platoon.”   |
| Coordinating Instructions   | “2d Squad must coordinate with 1st squad of 3d Platoon to ensure the left flank is secure. The platoon’s 1st squad will annihilate the enemy’s tank section first and then assume their positions.” |

W222/MAR05/VGT-30

## **SPE-4, Prepare Squad FRAGO**

### **1ST Squad**

|                             |   |
|-----------------------------|---|
| Situation: Enemy & Friendly | "Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the Carrier Element." |
| Mission                     | "Our 1st squad will annihilate the enemy's tank section first and then assume that position."                   |
| Orders to Subordinate Units | "No Change."  |
| Fire Support                | "No Change."  |
| Coordinating Instructions   | "No Change."  |

W222/MAR05/VGT-31

## **SPE-4, Prepare Squad FRAGO**

### **2d Squad**

|                             |   |
|-----------------------------|---|
| Situation: Enemy & Friendly | “Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the Carrier Element.”   |
| Mission                     | “No Change.”  |
| Orders to Subordinate Units | “No Change.”  |
| Fire Support                | “No Change.”  |
| Coordinating Instructions   | “2d squad must coordinate with 1st squad of 3d Platoon to ensure the left flank is secure. The platoon’s 1st squad will annihilate the enemy’s tank section first and then assume their positions.” |

W222/MAR05/VGT-32

## **SPE-4, Prepare Squad FRAGO**

### **3d Squad**

|                             |   |
|-----------------------------|---|
| Situation: Enemy & Friendly | “Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the Carrier Element.” |
| Mission                     | “No Change.”  |
| Orders to Subordinate Units | “No Change.”  |
| Fire Support                | “No Change.”  |
| Coordinating Instructions   | “No Change.”  |

W222/MAR05/VGT-33

## **SPE-4, Prepare Squad FRAGO**

### **PLT HQ**

|                             |   |
|-----------------------------|---|
| Situation: Enemy & Friendly | “Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the Carrier Element.” |
| Mission                     | “No Change.”  |
| Orders to Subordinate Units | “No Change.”  |
| Fire Support                | “No Change.”  |
| Coordinating Instructions   | “No Change.”  |

W222/MAR05/VGT-34



**Appendix B - Test(s) and Test Solution(s) (N/A)**

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## Appendix C Practical Exercises and Solutions)

| This appendix contains the items listed in this table: |                |
|--|----------------|
| Item/Title   | Pages          |
| PE-1, Conduct Precombat Checks                         | C-1 thru C-4   |
| PE-2, Prepare a Squad Warning Order                    | C-5 thru C-8   |
| SPE-2, Prepare a Squad Warning Order                   | C-9            |
| PE-3, Prepare Elements of a Squad Operation Order      | C-10 thru C-12 |
| SPE-3, Prepare Elements of a Squad Operation Order     | C-13           |
| PE-4, Prepare a Squad Fragmentary Order                | C-14 thru C-17 |
| SPE-4, Prepare a Squad Fragmentary Order               | C-18 and C-19  |

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## Appendix C - Practical Exercises and Solutions

### PRACTICAL EXERCISE(S)/SOLUTION(S) FOR LESSON 1: W222 version 1

#### PRACTICAL EXERCISE SHEET PE-1

**Title** Conduct Precombat Checks

**Lesson Number / Title** W222 version 1 / Combat Orders

**Introduction** You learned about the principles and techniques required to conduct precombat checks of personnel, equipment, and mission knowledge. You will put these principles and techniques into practice during the STX as part of your leadership responsibilities.

**Motivator** The lives of your Soldiers and the success of your mission rely heavily on the combat readiness of the individual Soldier. As a leader, you have a primary responsibility to ensure that each Soldier is combat ready. Precombat checks of the Soldier, his equipment, and his knowledge of the mission begins the initial focus of how to accomplish this responsibility.

This practical exercise (PE-1) will provide you with an opportunity to conduct precombat checks in a hands-on environment.

**Terminal Learning Objective** **NOTE:** The instructor should inform the students of the following Terminal Learning Objective covered by this practical exercise.

At the completion of this lesson, you [the student] will:

|                    |  |
|--------------------|--|
| <b>Action:</b>     | Implement a Squad Level Combat Order.  |
| <b>Conditions:</b> | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.   |
| <b>Standards:</b>  | Implemented a squad level combat order by-- <ul style="list-style-type: none"><li>• Conducting troop-leading procedures.</li><li>• Ensuring the conduct of precombat checks.</li><li>• Preparing three types of combat orders:<ul style="list-style-type: none"><li>– Operation order (OPORD)</li><li>– Warning order (WARNO), and</li><li>– Fragmentary order (FRAGO).</li></ul></li><li>• Interpreting the commander's intent of a combat order in accordance with FM 7-8.</li></ul> |

**Safety Requirements** Instructors act as safety instructors during the conduct of all training. Ensure students observe safe practices at all times. If conducting the practical exercise outside, take precautions dependent on the weather. Training area should be generally flat and free from debris.

**Risk Assessment** Low - Determined by Instructor

**Environmental Considerations** None

|                              |   |
|------------------------------|---|
| <b>Evaluation</b>            | <ul style="list-style-type: none"> <li>Students: Using the precombat checklist--page C-3 (PE-1)--and the mission briefing for the STX, you will inspect each other, taking not more than 10 minutes per person. Record any deficiencies that the inspected Soldier cannot correct on the spot.</li> <li>Instructors observe the inspection and grade the inspecting Soldier with the same checklist. Upon completion of the inspection, provide feedback to the inspecting student.</li> <li>Conduct of precombat inspections is a course requirement; however, this is a no graded exercise.</li> </ul>  |
| <b>Instructional Lead-In</b> | <p>This practical exercise will test your ability to inspect your Soldiers in preparation for combat. Using the mission briefing and Student Handout checklists, you will fulfill the role as unit leaders and ensure your Soldiers are ready for combat.</p>   |
| <b>Resource Requirements</b> | <p>Field equipment as specified in the academy SOP, STX mission briefing and Pre-combat Checklist, page C-3 and C-4.</p>  |
| <b>Special Instructions</b>  | <ul style="list-style-type: none"> <li>Students will perform this PE right before departing for the STX, after donning their field equipment IAW NCOA SOP and receiving the STX mission statement.</li> <li>NCOA commandant determines the exact time for conducting the PE.</li> <li>Students will assemble equipment according to NCOA SOP.</li> <li>Students will partner up with a Soldier and inspect each other using the check sheets on page C-3 and C-4.</li> <li>SGLs will observe and note deficiencies on the check sheets on pages C-3 and C-4.</li> <li>SGLs will provide feedback to the Soldiers of their performance.</li> <li>SGLs will ensure--once the PE is complete--the students correct all deficiencies critical to mission performance prior to the STX phase.</li> </ul> |
| <b>Procedures</b>            | <ul style="list-style-type: none"> <li>Draw field equipment according to NCOA SOP.</li> <li>Receive mission briefing.</li> <li>Pair up with designated partner.</li> <li>You have 15 minutes to prepare equipment according to mission METT-T considerations and SOP guidance.</li> <li>You have 10 minutes per person to inspect each other.</li> <li>Record information of deficiencies not corrected on the spot and provide them to the SGL.</li> <li>Correct critical deficiencies prior to beginning STX phase.</li> </ul>  |
| <b>Feedback Requirements</b> | <p>Rapid, immediate feedback is essential to effective learning. This is a graded exercise, but is not required for successful course completion, nor does it become part of the permanent student record. However, the goal is to ensure that all students have prepared themselves for the STX. Instructors will ensure students correct deficiencies prior to departing for STX.</p>   |

## PRECOMBAT CHECKLIST

| <b>1. INSPECT PERSONNEL</b>  | <b>GO</b> | <b>NO-GO</b> |
|--|-----------|--------------|
| Start at head, check headgear and camouflage. Ensure Soldier has not used perfumed aftershave, soap or body deodorants.  |           |              |
| Check to ensure the Soldier is wearing his ID tags and is carrying his ID card. Check to ensure he taped the ID tags together and to the chain so they cannot slide or rattle.   |           |              |
| Check to ensure the Soldier is wearing the appropriate clothing items to provide him maximum environmental protection. Check uniform for general appearance, fit and serviceability. Faded battle dress uniforms lose the ability to deflect infra-red detection devices.                      |           |              |
| Check field suspenders for proper fit and position. If the Soldier wears a rucksack, ensure that it does not exceed the prescribed combat load weights.  |           |              |
| Check the footgear for fit and serviceability. Ensure the Soldier is wearing the proper layers and type of socks to ensure proper protection from the elements.  |           |              |
| Check the Soldier's feet for blisters, sores or evidence of rashes.  |           |              |
| Check to ensure the Soldier has hydrated sufficiently and has eaten all meals scheduled.   |           |              |
| Note all discrepancies and submit to the proper authority. Follow-up to ensure missing and nonfunctional items are replaced immediately.   |           |              |
| <b>2. INSPECT EQUIPMENT</b>  | <b>GO</b> | <b>NO-GO</b> |
| Check LBE/LCE items for accountability. Check the clips and buckles for serviceability. Check items to ensure the Soldier securely attached the items to the field suspenders and belt and will not cause any rattling. Check all items for serviceability, and note any item that is missing. |           |              |
| Check to make sure the Soldier filled his canteens to capacity with potable water. Make sure the Soldier has the quantity or MREs required that he must carry.   |           |              |
| Check to make sure the Soldier has his assigned weapon and his basic load of ammunition. Check the weapon for cleanliness and ensure that it is functional. Note any discrepancies.  |           |              |
| Check to see the Soldier is carrying the proper threat protection equipment as prescribed by SOP. Ensure the equipment is serviceable and ready for donning. Note any discrepancies and missing items.   |           |              |
| Submit all lists of discrepancies to the proper authority and follow-up to ensure replacement of missing and nonfunctional items immediately.  |           |              |
| <b>3. Check Mission Knowledge</b>  | <b>GO</b> | <b>NO-GO</b> |
| Check to make sure the Soldier knows the unit's mission (task & purpose). AS a minimum, the Soldier should know who, what, where, when, & why. Check to make sure the Soldier is prepared to accomplish any specific tasks assigned to him.  |           |              |
| Check to make sure the Soldier knows the higher headquarters commander's intent.   |           |              |
| Check to make sure the Soldier knows the concept of operation, to include control measures.  |           |              |
| Immediately correct any evidence of lack of knowledge.   |           |              |

**GRADING SHEET 1 TO PRACTICAL EXERCISE 1 (MISSION KNOWLEDGE)**

| <b>MISSION UNDERSTANDING</b> | <b>GO</b> | <b>NO-GO</b> |
|------------------------------|-----------|--------------|
| <b>1. WHO:</b>               |           |              |
| <b>2. WHAT:</b>              |           |              |
| <b>3. WHEN:</b>              |           |              |
| <b>4. WHERE:</b>             |           |              |
| <b>5. WHY:</b>               |           |              |

| <b>INDIVIDUAL TASKS</b> | <b>GO</b> | <b>NO-GO</b> |
|-------------------------|-----------|--------------|
| <b>1. WHO:</b>          |           |              |
| <b>2. WHAT:</b>         |           |              |
| <b>3. WHEN:</b>         |           |              |
| <b>4. WHERE:</b>        |           |              |
| <b>5. WHY:</b>          |           |              |



## PRACTICAL EXERCISE SHEET PE-2

|                                     |  |                |                                       |                    |  |                   |  |
|-------------------------------------|--|----------------|---------------------------------------|--------------------|--|-------------------|--|
| <b>Title</b>                        | Prepare a Squad Warning Order  |                |                                       |                    |  |                   |  |
| <b>Lesson</b>                       | W222 version 1 / Combat Orders   |                |                                       |                    |  |                   |  |
| <b>Number / Title</b>               |  |                |                                       |                    |  |                   |  |
| <b>Introduction</b>                 | As a leader you must survive, fight, and win on the battlefield. You will be responsible for planning and executing combat missions. The way you receive and issue combat orders can determine whether you and your Soldiers survive or die.   |                |                                       |                    |  |                   |  |
| <b>Motivator</b>                    | This practical exercise will help you evaluate your ability to analyze an order and to determine the information you must include in a squad warning order.  |                |                                       |                    |  |                   |  |
| <b>Terminal Learning Objective</b>  | <p><b>NOTE:</b> The instructor should inform the students of the following Terminal Learning Objective covered by this practical exercise.</p> <p>At the completion of this lesson, you [the student] will:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>Action:</b></td><td>Implement a Squad Level Combat Order.</td></tr> <tr> <td><b>Conditions:</b></td><td>In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.</td></tr> <tr> <td><b>Standards:</b></td><td>           Implemented a squad level combat order by--           <ul style="list-style-type: none"> <li>Conducting troop-leading procedures.</li> <li>Ensuring the conduct of precombat checks.</li> <li>Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul> </td></tr> </table> | <b>Action:</b> | Implement a Squad Level Combat Order. | <b>Conditions:</b> | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition. | <b>Standards:</b> | Implemented a squad level combat order by-- <ul style="list-style-type: none"> <li>Conducting troop-leading procedures.</li> <li>Ensuring the conduct of precombat checks.</li> <li>Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul> |
| <b>Action:</b>                      | Implement a Squad Level Combat Order.  |                |                                       |                    |  |                   |  |
| <b>Conditions:</b>                  | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.   |                |                                       |                    |  |                   |  |
| <b>Standards:</b>                   | Implemented a squad level combat order by-- <ul style="list-style-type: none"> <li>Conducting troop-leading procedures.</li> <li>Ensuring the conduct of precombat checks.</li> <li>Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul>   |                |                                       |                    |  |                   |  |
| <b>Safety Requirements</b>          | Instructors act as safety instructors during the conduct of all training. Ensure students observe safe practices at all times. If conducting the practical exercise outside, take precautions dependent on the weather. Training area should be generally flat and free from debris.   |                |                                       |                    |  |                   |  |
| <b>Risk Assessment</b>              | Low - Determined by Instructor   |                |                                       |                    |  |                   |  |
| <b>Environmental Considerations</b> | None   |                |                                       |                    |  |                   |  |
| <b>Evaluation</b>                   | We will discuss and answer any questions about this PE as a group.   |                |                                       |                    |  |                   |  |

---

**Instructional Lead-In**

This PE requires you to apply the information you learned in this lesson to correctly extract a squad order from the platoon order.

---

**Resource Requirements****Instructor Materials:**

- PE-2, pages C-7 and C-8 or VGT-25.
  - Page C-9 or VGTs 26 and 27.
- 

**Special Instructions**

None

---

**Procedures**

- Handout pages C-7 or show VGT-25, Platoon Warning Order.
  - Hand out page C-8
  - From the platoon WARNO, students will--in the next 15 minutes--fill in the following information on page C-8:
    - The four essential elements in a warning order and any special instructions.
    - A written squad warning order.
  - After 15 minutes, call on some students to read their answers to the class.
  - Hand out the schoolhouse solution, C-9, or show the solutions, using VGTs 26 and 27.
  - Answer any questions.
  - Go directly to PE-3.
- 

**Feedback Requirements**

SGLs will provide feedback on each group's work.

---

### **Platoon Warning Order**

Our mission is to attack the town of Corona at 1830. The enemy has some good positions in the buildings. There may also be enemy tanks in the town. Draw six grenades and one AT-4 for each man. Each squad will carry 10 blocks of C4, 10 non-electric blasting caps, 10 fuse lighters, 100 feet of detonating cord, and 15 feet of fuse. The platoon sergeant will tell you where and when you can pick it up. Let me know by 1330 if you have any problems with radios or weapons. Meet me back here at 1405. At that time, we will move up to the ridge, overlooking the town, where I will give the complete order.

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1. The Mission: (The nature of the operations) \_\_\_\_\_

2. Who is participating in the operation. \_\_\_\_\_

3. Time of the operations. \_\_\_\_\_

4. Time and place for issuance of the complete order. \_\_\_\_\_

5. Any special instructions \_\_\_\_\_

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**SOLUTION FOR  
PRACTICAL EXERCISE SHEET PE-2**

**SPE-2, Solution to Prepare a Squad Warning Order**

---

If Available, the four minimum essential elements in a warning order.

- |   |  |
|---|--|
| 1. The Mission: (The nature of the operations)        | <u>Attack the town of Corona.</u>  |
| <hr/>   |  |
| 2. Who is participating in the operation.             | <u>The squad as part of the platoon.</u>   |
| <hr/>   |  |
| 3. Time of the operations.                            | <u>At 1830</u>   |
| <hr/>   |  |
| 4. Time and place for issuance of the complete order. | <u>1515</u>  |
| <hr/>   |  |
| 5. Any special instructions                           | <u>Each man will carry six grenades and one LAW. SGT Evans' team will handle the squads demolitions and draw 10 blocks of C4, 10 nonelectric blasting caps, 10 fuse igniters, 100 feet of detonating cord, and 15 feet of fuse. Make sure you test burn the fuse. Private Smith, carry a climbing rope and grappling hook.</u> |
- 

**Squad Warning Order**

Our mission is <sup>1</sup>**to attack the town of Corona** at <sup>3</sup>**1830** as <sup>2</sup>**part of the platoon**. The enemy has well-prepared positions in the buildings and probably has tanks with him. <sup>5</sup>**Each man will carry six grenades and one LAW**, in addition to the standard load for rifles and grenade launchers. <sup>5</sup>**Sergeant Evans, your team will handle our demolitions: draw 10 blocks of C4, 10 non-electric blasting caps, 10 fuse igniters, 100 feet of detonating cord, and 15 feet of fuse. Make sure you test burn the fuse. Private Smith, carry a climbing rope and grappling hook.** The platoon sergeant will be here in 20 minutes to tell us where and when we can pick up our ammunition and equipment. I'm leaving now to get the platoon order. Sergeant Jones is in charge until I get back. <sup>4</sup>**We will meet here at 1515 for the OPORD.**

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### PRACTICAL EXERCISE SHEET PE-3

|                                     |  |                |                                       |                    |  |                   |  |
|-------------------------------------|--|----------------|---------------------------------------|--------------------|--|-------------------|--|
| <b>Title</b>                        | Prepare Elements of a Squad Operation Order  |                |                                       |                    |  |                   |  |
| <b>Lesson Number / Title</b>        | W222 version 1 / Combat Orders   |                |                                       |                    |  |                   |  |
| <b>Introduction</b>                 | As a leader you must survive, fight, and win on the battlefield. When you receive an order, you must clearly understand what your unit has to accomplish in relation to the ground and to the other units.   |                |                                       |                    |  |                   |  |
| <b>Motivator</b>                    | This practical exercise will help you evaluate your ability to determine the commander's intent and to prepare the concept of operation for a squad's OPORD.   |                |                                       |                    |  |                   |  |
| <b>Terminal Learning Objective</b>  | <p><b>NOTE:</b> The instructor should inform the students of the following Terminal Learning Objective covered by this practical exercise.</p> <p>At the completion of this lesson, you [the student] will:</p> <table border="1"> <tr> <td><b>Action:</b></td><td>Implement a Squad Level Combat Order.</td></tr> <tr> <td><b>Conditions:</b></td><td>In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.</td></tr> <tr> <td><b>Standards:</b></td><td>           Implemented a squad level combat order by--           <ul style="list-style-type: none"> <li>• Conducting troop-leading procedures.</li> <li>• Ensuring the conduct of precombat checks.</li> <li>• Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>• Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul> </td></tr> </table> | <b>Action:</b> | Implement a Squad Level Combat Order. | <b>Conditions:</b> | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition. | <b>Standards:</b> | Implemented a squad level combat order by-- <ul style="list-style-type: none"> <li>• Conducting troop-leading procedures.</li> <li>• Ensuring the conduct of precombat checks.</li> <li>• Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>• Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul> |
| <b>Action:</b>                      | Implement a Squad Level Combat Order.  |                |                                       |                    |  |                   |  |
| <b>Conditions:</b>                  | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.   |                |                                       |                    |  |                   |  |
| <b>Standards:</b>                   | Implemented a squad level combat order by-- <ul style="list-style-type: none"> <li>• Conducting troop-leading procedures.</li> <li>• Ensuring the conduct of precombat checks.</li> <li>• Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>• Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul>   |                |                                       |                    |  |                   |  |
| <b>Safety Requirements</b>          | Instructors act as safety instructors during the conduct of all training. Ensure students observe safe practices at all times. If conducting the practical exercise outside, take precautions dependent on the weather. Training area should be generally flat and free from debris.   |                |                                       |                    |  |                   |  |
| <b>Risk Assessment</b>              | Low - Determined by Instructor   |                |                                       |                    |  |                   |  |
| <b>Environmental Considerations</b> | None   |                |                                       |                    |  |                   |  |
| <b>Evaluation</b>                   | We will discuss and answer any questions about this PE as a group.   |                |                                       |                    |  |                   |  |
| <b>Instructional Lead-In</b>        | This PE requires you to apply the information you learned in this lesson to correctly determine the commander's intent and to prepare the concept of operation for a squad's OPORD.  |                |                                       |                    |  |                   |  |

**Resource Requirements**

---

Pencil and paper.

---

**Special Instructions**

- During this PE you will demonstrate your ability to write a statement of the commander's intent and the concept of operation for a squad's OPORD.
- Divide the group into four small groups. Designate each group as 1st squad, 2d squad, 3d squad, and platoon headquarters. Each squad will:
- Allow 15 minutes for the groups to write the commander's intent statement and the concept of operations for their squad.
  - Write a statement of what they deem is the commander's intent based on the Execution paragraph of the OPORD.
  - Write a concept of operations.

Pass out page C-12 and explain the procedures outlined below.

- Have each group select a representative to present the group's commander's intent statement and write it on the board so all can compare their statements with each others' statements and the schoolhouse statement.
- Each group's representative will present their concept of operation.
- Discuss the statements and concepts of operations using the guidance in the Solutions to Practical Exercise 3 on page C-13 or Show VGT-28.
- Answer any questions.
- Go directly to PE-4.

**Feedback Requirements**

---

SGLs will provide feedback on each group's work.

---

## **Execution Paragraph of the Platoon Operation Order**

### **3. EXECUTION:**

**a. Concept of operation.** The 2d platoon will attack dismounted crossing the line of departure (LD) at 0600. We will cross the LD in column formation using the traveling overwatch technique. Order of march will be 2d squad, platoon headquarters, 1st squad, 3d squad. The carrier element will provide overwatching fires from Hill 294 (NB 780916). When we reach Catfish Creek, our assault position, we will deploy in line formation with 1st squad on the left, 2d squad as the base squad in the center, and 3d squad on the right to seize Hill 301, Objective RED. By seizing Objective RED, we will be able to control all movement on the road between Hills 309 (NB 783910) and 301 (NB 782918). If the enemy counterattacks, the company commander thinks they may try to use the road. By seizing Hill 309, Objective BLUE, on our left, 1st Platoon will assist in protecting the battalion's flank against enemy counterattack. The 3d Platoon will be following during the assault and prepared to continue the assault if needed. There will be a 15-minute artillery preparation beginning at 0550. We have priority of fires. My map shows the targets I have chosen. Make sure you mark them on your map before you leave.

#### **b. Missions for subordinate units:**

- (1) 1st squad: Consolidate from 9 to 11.
- (2) 2d squad: Consolidate from 11 to 1.
- (3) 3d squad: Consolidate from 1 to 3.
- (4) Carrier element:
  - (a) Support assault from Hill 294.
  - (b) Shift fires on order to northeast.
  - (c) Move to objective on order.

#### **c. Coordinating instructions:**

- (1) 2d squad is base squad during assault.
- (2) In consolidation, 12 o'clock is east.
- (3) Limit of advance is 100 meters beyond crest of the hill.

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**SOLUTION FOR  
PRACTICAL EXERCISE SHEET PE-3**

**SPE-3, Solution to Prepare Elements of A Squad Operation Order**

---

**Commander's intent:** To control the road between Hill 301 and Hill 309 in case of possible enemy counterattack.

**Concept of operation for 1st squad:** (Modify the wording in the underlined areas to apply to the other elements.)

The 1st squad's mission, our mission, is to attack and seize the left part of Hill 301, located here. We attack dismounted, crossing the LD at 0600 in column formation using traveling overwatch behind 2d squad and the platoon headquarters, with 3d squad following us. Our carrier provides overwatching fires from Hill 294, located here. Our assault position is Catfish Creek where we deploy in line formation: our squad on the left; 2d squad, base squad, in the center; and 3d squad on the right to seize Hill 301, Objective RED. After we seize Objective RED, we have to watch this road between us and 1st platoon on Hill 309 for possible enemy counterattack. A 15-minute artillery prep will begin at 0550. We consolidate on Objective RED from 9 to 11 with 12 being east. We link with 2d squad at 11. The 3d platoon may come up to pass through us to continue the attack. Our carrier will move forward on order and join us on the objective. No one is to advance more than 100 meters beyond the crest of the hill.

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## PRACTICAL EXERCISE SHEET PE-4

|                                     |  |                |                                       |                    |  |                   |  |
|-------------------------------------|--|----------------|---------------------------------------|--------------------|--|-------------------|--|
| <b>Title</b>                        | Prepare a Squad Fragmentary Order  |                |                                       |                    |  |                   |  |
| <b>Lesson Number / Title</b>        | W222 version 1 / Combat Orders   |                |                                       |                    |  |                   |  |
| <b>Introduction</b>                 | As a leader you must survive, fight, and win on the battlefield. When you receive a change in the tactical situation or to the operation order, you must issue brief, specific, and timely instructions in a FRAGO.  |                |                                       |                    |  |                   |  |
| <b>Motivator</b>                    | This practical exercise will help you evaluate your ability to extract a squad's fragmentary order from the platoon's fragmentary order.   |                |                                       |                    |  |                   |  |
| <b>Terminal Learning Objective</b>  | <p><b>NOTE:</b> The instructor should inform the students of the following Terminal Learning Objective covered by this practical exercise.</p> <p>At the completion of this lesson, you [the student] will:</p> <table border="1"> <tr> <td><b>Action:</b></td><td>Implement a squad level combat order.</td></tr> <tr> <td><b>Conditions:</b></td><td>In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.</td></tr> <tr> <td><b>Standards:</b></td><td>           Implemented a squad level combat order by--           <ul style="list-style-type: none"> <li>• Conducting troop-leading procedures.</li> <li>• Ensuring the conduct of precombat checks.</li> <li>• Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>• Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul> </td></tr> </table> | <b>Action:</b> | Implement a squad level combat order. | <b>Conditions:</b> | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition. | <b>Standards:</b> | Implemented a squad level combat order by-- <ul style="list-style-type: none"> <li>• Conducting troop-leading procedures.</li> <li>• Ensuring the conduct of precombat checks.</li> <li>• Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>• Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul> |
| <b>Action:</b>                      | Implement a squad level combat order.  |                |                                       |                    |  |                   |  |
| <b>Conditions:</b>                  | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.   |                |                                       |                    |  |                   |  |
| <b>Standards:</b>                   | Implemented a squad level combat order by-- <ul style="list-style-type: none"> <li>• Conducting troop-leading procedures.</li> <li>• Ensuring the conduct of precombat checks.</li> <li>• Preparing three types of combat orders:               <ul style="list-style-type: none"> <li>– Operation order (OPORD)</li> <li>– Warning order (WARNO)</li> <li>– Fragmentary order (FRAGO)</li> </ul> </li> <li>• Interpreting the commander's intent of a combat order IAW FM 7-8.</li> </ul>   |                |                                       |                    |  |                   |  |
| <b>Safety Requirements</b>          | Instructors act as safety instructors during the conduct of all training. Ensure students observe safe practices at all times. If conducting the practical exercise outside, take precautions dependent on the weather. Training area should be generally flat and free from debris.   |                |                                       |                    |  |                   |  |
| <b>Risk Assessment</b>              | Low - Determined by Instructor   |                |                                       |                    |  |                   |  |
| <b>Environmental Considerations</b> | None   |                |                                       |                    |  |                   |  |
| <b>Evaluation</b>                   | We will discuss and answer any questions about this PE as a group.   |                |                                       |                    |  |                   |  |
| <b>Instructional Lead-In</b>        | This PE requires you to apply the information you learned in this lesson to extract information needed to write your squad's fragmentary order.  |                |                                       |                    |  |                   |  |

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**Resource Requirements**

Pencil and paper

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**Special Instructions**

Read the platoon's FRAGO on the next page and as a group, write a FRAGO for your unit. You have eight minutes to complete this exercise.

- Pass out page C-16, Platoon FRAGO, or show VGT-30 and read the procedures outlined below.
- Have the Soldiers remain in their designated group/squad, but have them select a different representative to present the group/squad's FRAGO.
- Give each group a blank worksheet, page C-17 and instruct the following:
  - You have 8-minutes to write a squad FRAGO based off the Platoon FRAGO.
  - Fill in the blank worksheet for your particular squad.
  - You will brief your FRAGO to the class.
- After the groups brief their squad FRAGOs, hand out pages C-18 and C-19 or show VGT-31 through 34 for a solution.
- Answer any questions.

---

**Procedures**

SGLs will provide feedback on each group's work.

---



### **Platoon Fragmentary Order**

|                                    |   |
|------------------------------------|---|
| <b>Situation: Enemy/Friendly</b>   | "Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the carrier element."   |
| <b>Mission</b>                     | "No Change."  |
| <b>Orders to Subordinate Units</b> | "2d squad and 3d squad continue attack to seize Objective RED. 1st squad moves to Hill 294 and helps the carrier element contain the enemy."  |
| <b>Fire Support</b>                | "Priority of fire remains with 2d platoon."   |
| <b>Coordinating Instructions</b>   | "2d squad must coordinate with 1st squad of 3d platoon to ensure the left flank is secure. The platoon's 1st squad will annihilate the enemy's tank section first and then assume their positions." |

---

|                                    |  |
|------------------------------------|--|
| <b><u>1st Squad</u></b>            |  |
| <b>Situation: Enemy/Friendly</b>   |  |
| <b>Mission</b>                     |  |
| <b>Orders to Subordinate Units</b> |  |
| <b>Fire Support</b>                |  |
| <b>Coordinating Instructions</b>   |  |

|                                    |  |
|------------------------------------|--|
| <b><u>2d Squad</u></b>             |  |
| <b>Situation: Enemy/Friendly</b>   |  |
| <b>Mission</b>                     |  |
| <b>Orders to Subordinate Units</b> |  |
| <b>Fire Support</b>                |  |
| <b>Coordinating Instructions</b>   |  |

|                                    |  |
|------------------------------------|--|
| <b><u>3d Squad</u></b>             |  |
| <b>Situation: Enemy/Friendly</b>   |  |
| <b>Mission</b>                     |  |
| <b>Orders to Subordinate Units</b> |  |
| <b>Fire Support</b>                |  |
| <b>Coordinating Instructions</b>   |  |

|                                    |  |
|------------------------------------|--|
| <b><u>Platoon Headquarters</u></b> |  |
| <b>Situation: Enemy/Friendly</b>   |  |
| <b>Mission</b>                     |  |
| <b>Orders to Subordinate Units</b> |  |
| <b>Fire Support</b>                |  |
| <b>Coordinating Instructions</b>   |  |

**SOLUTION FOR  
PRACTICAL EXERCISE SHEET PE-4**

**SPE-4, Solution to Prepare a Fragmentary Order**

---

**1st Squad**

|                                    |   |
|------------------------------------|---|
| <b>Situation: Enemy/Friendly</b>   | "Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the carrier element." |
| <b>Mission</b>                     | "Our 1st squad will annihilate the enemy's tank section first and then assume that position."                   |
| <b>Orders to Subordinate Units</b> | "No change."  |
| <b>Fire Support</b>                | "No change."  |
| <b>Coordinating Instructions</b>   | "No change."  |

---

**2d Squad**

|                                    |   |
|------------------------------------|---|
| <b>Situation: Enemy/Friendly</b>   | "Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the carrier element." |
| <b>Mission</b>                     | "No change."  |
| <b>Orders to Subordinate Units</b> | "No change."  |
| <b>Fire Support</b>                | "No change."  |
| <b>Coordinating Instructions</b>   | Coordinate with 1st squad of 3d platoon to ensure left flank is secure.   |

---

**3d Squad**

|                                    |   |
|------------------------------------|---|
| <b>Situation: Enemy/Friendly</b>   | "Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the carrier element." |
| <b>Mission</b>                     | "No change."  |
| <b>Orders to Subordinate Units</b> | "No change."  |
| <b>Fire Support</b>                | "No change."  |
| <b>Coordinating Instructions</b>   | "No change."  |

---

**Platoon Headquarters**

|                                    |   |
|------------------------------------|---|
| <b>Situation: Enemy/Friendly</b>   | "Estimate a tank section, in well-prepared positions in vicinity of Hill 294, has stopped the carrier element." |
| <b>Mission</b>                     | "No change."  |
| <b>Orders to Subordinate Units</b> | "No change."  |
| <b>Fire Support</b>                | "No change."  |
| <b>Coordinating Instructions</b>   | "No change."  |

---

## Appendix D, HANDOUTS FOR LESSON 1: W222 version 1

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This appendix contains the items listed in this table--

| <b>Title/Synopsis</b>   | <b>Pages</b>        |
|---|---------------------|
| SH-1, Advance Sheet   | SH-1-1 and SH-1-2   |
| SH-2, Extracts from FM 7-8                                      | SH-2-1 thru SH-2-16 |
| SH-3, Extract from Task 071-990-0004, Conduct Pre Combat Checks | SH-3-1 thru SH-3-9  |

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## STUDENT HANDOUT 1

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This student handout contains advance sheet.

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# Student Handout 1

## Advance Sheet

### Overview

This lesson discusses troop-leading procedures and explains three types of combat orders: warning order (WARNO), operation order (OPORD), and fragmentary order (FRAGO). You will also learn the importance of and what you must concern yourself with while conducting precombat checks.

### Learning Objective

Terminal Learning Objective (TLO)

|                    |   |
|--------------------|---|
| <b>Action:</b>     | Implement a squad level combat order.   |
| <b>Conditions:</b> | In a classroom environment, culminating in a situational training exercise, and given a platoon operation order in a simulated combat condition.  |
| <b>Standards:</b>  | <p>Implemented a squad level combat order by--</p> <ul style="list-style-type: none"><li>• Conducting troop-leading procedures.</li><li>• Ensuring the conduct of precombat checks.</li><li>• Preparing three types of combat orders:<ul style="list-style-type: none"><li>- Operation order (OPORD)</li><li>- Warning order (WARNO), and</li><li>- Fragmentary order (FRAGO).</li></ul></li><li>• Interpreting the commander's intent of a combat order</li></ul> <p>IAW FM 7-8.</p> |

ELO A Prepare three types of combat orders: operation order (OPORD), warning order (WARNO), and fragmentary order (FRAGO).

ELO B Conduct troop-leading procedures.

ELO C Interpret the commander's intent of a combat order.

ELO D Practical Exercises one through four.

### Assignments

The student assignments for this lesson are:

- Read SH-1, Advance sheet.
- Read SH-2, Extracted material from FM 7-8.
- Read SH-3, Extracted material Task Number 071-990-0004, Conduct Pre-combat Checks.

### Additional Subject Area Resources

None

### Bring to Class

You must bring the following materials to class:

- Pencil or pen and writing paper.
- All referenced material received for this lesson.

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## Student Handout 2

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This student handout contains extracted material from FM 7-8.

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**Disclaimer:** The developer downloaded the extracted material from the web. The test is verbatim from the source document; therefore, it may contain passive voice, misspellings, grammatical errors, etc., and may not be in compliance with the Army Writing Style Program.

### RECOVERABLE PUBLICATION

YOU RECEIVED THIS DOCUMENT IN A DAMAGE-FREE CONDITION. DAMAGE IN ANY WAY TO INCLUDE HIGHLIGHTING, PENCIL MARKS, OR MISSING PAGES WILL SUBJECT YOU TO PECUNIARY LIABILITY (STATEMENT OF CHARGES, CASH COLLECTION ETC.) TO RECOVER PRINTING COSTS.

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## 2-2. TROOP-LEADING PROCEDURE

Troop leading is the process a leader goes through to prepare his unit to accomplish a tactical mission. It begins when he is alerted for a mission. It starts again when he receives a change or a new mission. The troop-leading procedure comprises the steps listed below. Steps 3 through 8 may not follow a rigid sequence. Many of them may be accomplished concurrently. In combat, rarely will leaders have enough time to go through each step in detail. Leaders must use the procedure as outlined, if only in abbreviated form, to ensure that nothing is left out of planning and preparation, and that their Soldiers understand the platoon's and squad's mission and prepare adequately. They continuously update their estimates throughout the preparation phase and adjust their plans as appropriate.

**STEP 1. Receive the mission.**

**STEP 2. Issue a warning order.**

**STEP 3. Make a tentative plan.**

**STEP 4. Start necessary movement.**

**STEP 5. Reconnoiter.**

**STEP 6. Complete the plan.**

**STEP 7. Issue the complete order.**

**STEP 8. Supervise.**

a. **STEP 1. Receive the Mission.** The leader may receive the mission in a warning order, an operation order (OPORD), or a fragmentary order (FRAGO). He immediately begins to analyze it using the factors of METT-T:

- What is the **MISSION**?
- What is known about the **ENEMY**?
- How will **TERRAIN** and weather affect the operation?
- What **TROOPS** are available?
- How much **TIME** is available?

(1) The leader should use no more than one third of the available time for his own planning and for issuing his operation order. The remaining two thirds is for subordinates to plan and prepare for the operation. Leaders should also consider other factors such as available daylight and travel time to and from orders and rehearsals. In the offense, the leader has one third of the time from his receipt of the mission to the unit's LD time. In the defense, he has one third of the time from mission receipt to the time the squad or platoon must be prepared to defend.

(2) In scheduling preparation activities, the leader should work backwards from the LD or defend time. This is reverse planning. He must allow enough time for the completion of each task.

b. **STEP 2. Issue a Warning Order.** The leader provides initial instructions in a warning order. The warning order contains enough information to begin preparation as soon as possible. Platoon SOPs should prescribe who will attend all warning orders and the actions they must take upon receipt: for example, drawing ammunition, rations and water, and checking communications equipment. The warning order has no specific format. One technique is to use the five-paragraph OPORD format.

The leader issues the warning order with all the information he has available at the time. He provides updates as often as necessary. The leader never waits for information to fill a format. A sample warning order is in Figure 2-1. If available, the following information may be included in a warning order.

- The mission or nature of the operation.
- Who is participating in the operation.
- Time of the operation.
- Time and place for issuance of the operation order.

| FORMAT           | ANNOTATED FORMAT  | EXAMPLE, ORAL (ATTACK)  |
|------------------|---|---|
| <b>SITUATION</b> | Brief description of the enemy and friendly situations. Point out key location on the ground, map or sketch. Attachment and detachment to the squad/platoon             | <p>"This is a warning order. Hold your question until I finish.</p> <p>"The scouts have identified a motorized rifle platoon with at least two BTRs defending Hill 876, vic GL 123456. They are digging in and it looks like they plan to defend the road junction at GL 126463. the rest of the enemy company is further to the west, around Hill 899.</p> <p>"Captain Williams just issued a warning order for the company to prepare for an infiltration at 0200, 11 July to seize Hill 876 in order to provide suppressive fires for the battalion's main attack on Hill 899.</p> <p>"There are no attachments or detachments</p> |
| <b>MISSION</b>   | Concise statement of the task and purpose (who, what, when, where, and why). If not all information is known, state which parts of the mission statement are tentative. | "3d Plt attacks 11 0200 Jul 91 to seize Hill 876 (GL 123456) in order to provide fires on Hill 899 in support of the battalion's attack.  |
| <b>EXECUTION</b> | brief statement of the tentative concept of the operation.  | "We will be one of the two assault platoon along with 2d Plt. 1st Plt will be the base of fire along with the company mortars and dragons.  |

Figure 2-1. Example of platoon warning order

| FORMAT                           | ANNOTATED FORMAT  | EXAMPLE, ORAL (ATTACK)  |
|----------------------------------|---|---|
| <b>EXECUTION<br/>(continued)</b> | <p>Time schedule:</p> <ul style="list-style-type: none"> <li>Earliest time of move.</li> <li>Time and place of OPORD</li> <li>Probable execution time.</li> <li>Inspection times and items to be inspected different from SOP.</li> <li>Rehearsal time, location, and actions to be rehearsed.</li> </ul> | <p>“Time schedule is as follows:</p> <p>LD time is 0200.</p> <p>The earliest we will have to move is 2330.</p> <p>After 2330, we have to be ready to move within 10 minutes of the order to do so.</p> <p>My final inspection will be at 2300, here at the CP.</p> <p>We have a company rehearsal for team leaders on op at 1600 at the company CP. We will meet here at 1530 and move together. I want a platoon rehearsal for team leaders, squad leaders, the aid man, the FO, and of course, SFC Fowler (the PSG) her at our CP at 1330. We will do a full platoon rehearsal at 2100 so we can do it at least once in the dark. Platoon rehearsals will be for actions at the objective. Squads rehearse breaching and react to contact drills on your own.</p> <p>My OPORD will be here at the platoon CP at 1030.</p> |
|                                  | <p>Tasks to subordinate key personnel:</p> <ul style="list-style-type: none"> <li>Platoon sergeant</li> <li>Squad leaders</li> <li>RATELO</li> <li>Aid man</li> <li>Attachments</li> </ul> <p>To Soldiers helping prepare OPORD.</p> <p>As needed to others</p>   | <p>“SFC Fowler, talk to me about resupply after this warning order. I want you to plan for casualty evacuation and to give paragraph 4 of the OPORD.</p> <p>“SSG Crawford, you and your squad will be the lead squad. Make sure you recon the route from her to the LD.</p> <p>“SGT Brown (FO). I need you to get the fire plan from the FIST ASAP, so we see what additional targets we need.</p> <p>“SSG Steele, send SGT White and his team up here in 20 minutes to begin making the terrain model of the objective.</p>  |

| FORMAT                        | ANNOTATED FORMAT  | EXAMPLE, ORAL (ATTACK)  |
|-------------------------------|---|---|
|                               | Additional general instructions   |   |
| <b>SERVICE<br/>SUPPORT</b>    | CSS tasks to be accomplished that are different from the TACSOP                             | "Each squad will carry four AT4s to sue against the BTRs or any bunkers we find.  |
| <b>COMMAND<br/>AND SIGNAL</b> | Location of CP succession of command (if not SOP).<br>SOI in effect.<br>Signals/code words. | "No change to platoon organization. the platoon CP will stay here. SOI we have is still in effect.<br><br>"The time now 06720. What are you quesitons |

Figure 2-1. Example of platoon warning order (continued).

c. **STEP 3. Make a Tentative Plan.** The leader develops an estimate of the situation to use as the basis for his tentative plan. The estimate is the military decision making process. It consists of five steps: detailed mission analysis, situation analysis and course of action development, analysis of each course of action, comparison of each course of action, and decision. The decision represents the tentative plan. The leader updates the estimate continuously and refines his plan accordingly. He uses this plan as the start point for coordination, reconnaissance, task organization (if required), and movement instructions.



He works through this problem solving sequence in as much detail as time available allows. As the basis of his estimate, the leader considers the factors of METT-T:

(1) **Mission.** The leader considers his mission as given to him by his commander. He analyzes it in light of the commander's intent two command levels higher, and derives the essential tasks his unit must perform in order to accomplish the mission.

(2) **Enemy.** The leader considers the type, size, organization, tactics, and equipment of the enemy he expects to encounter. He identifies their greatest threat to his mission and their greatest vulnerability.

(3) **Terrain.** The leader considers the effect of terrain and weather on enemy and friendly forces using the guidelines below (OCOKA):

(a) *Observation and fields of fire.* The leader considers ground that allows him observation of the enemy throughout his area of operation. He considers fields of fire in terms of the characteristics of the weapons available to him; for example, maximum effective range, the requirement for grazing fire, and the arming range and time of flight for antiarmor weapons.

(b) *Cover and concealment.* The leader looks for terrain that will protect him from direct and indirect fires (cover) and from aerial and ground observation (concealment).

(c) *Obstacles.* In the attack, the leader considers the effect of restrictive terrain on his ability to maneuver. In the defense, he considers how he will tie in his obstacles to the terrain to disrupt, turn, fix, or block an enemy force and protect his own forces from enemy assault.

(d) *Key terrain.* Key terrain is any locality or area whose seizure or retention affords a marked advantage to either combatant. The leader considers key terrain in his selection of objectives, support positions, and routes in the offense, and on the positioning of his unit in the defense.

(e) *Avenues of approach.* An avenue of approach is an air or ground route of an attacking force of a given size leading to its objective or key terrain in its path. In the offense, the leader identifies the avenue of approach that affords him the greatest protection and places him at the enemy's most vulnerable spot. In the defense, the leader positions his key weapons along the avenue of approach most likely to be used by the enemy.

(f) **Weather.** In considering the effects of weather, the leader is most interested in visibility and trafficability.

(4) **Troops available.** The leader considers the strength of subordinate units, the characteristics of his weapon systems, and the capabilities of attached elements as he assigns tasks to subordinate units.

(5) **Time available.** The leader refines his allocation of time based on the tentative plan and any changes to the situation.

d. **STEP 4. Start Necessary Movement.** The platoon may need to begin movement while the leader is still planning or forward reconnoitering. The platoon sergeant or a squad leader may bring the platoon forward, usually under the control of the company executive officer or first sergeant. This step could occur at any time during the troop-leading procedure.

e. **STEP 5. Reconnoiter.** If time allows, the leader makes a personal reconnaissance to verify his terrain analysis, adjust his plan, confirm the usability of routes, and time any critical movements. When time does not allow, the leader must make a map reconnaissance. The leader must consider the risk inherent in conducting reconnaissance forward of friendly lines. Sometimes the leader must rely on others (for example, scouts) to conduct the reconnaissance if the risk of contact with the enemy is high.

f. **STEP 6. Complete the Plan.** The leader completes his plan based on the reconnaissance and any changes in the situation. He should review his mission, as he received it from his commander, to ensure that his plan meets the requirements of the mission and stays within the framework of the commander's intent.

g. **STEP 7. Issue the Complete Order.** Platoon and squad leaders normally issue oral operations orders.

(1) To aid subordinates in understanding the concept for the mission, leaders should issue the order within sight of the objective or on the defensive terrain. When this is not possible, they should use a terrain model or sketch.

(2) Leaders must ensure that subordinates understand the mission, the commander's intent, the concept of the operation, and their assigned tasks. Leaders may require subordinates to repeat all of part of the order or demonstrate on the model or sketch, their understanding of the operation. They should also quiz their Soldiers to ensure that all Soldiers understand the mission. Chapter 5 provides a list of questions that leaders can ask to determine if the Soldiers understand the mission.

h. **STEP 8. Supervise.** The leader supervises the unit's preparation for combat by conducting rehearsals and inspections.

(1) **Rehearsals.** The leader uses rehearsals to--

- Practice essential tasks (improve performance).
- Reveal weaknesses or problems in the plan.
- Coordinate the actions of subordinate elements.
- Improve Soldier understanding of the concept of the operation (foster confidence in Soldiers).

(a) Rehearsals include the practice of having squad leaders brief their planned actions in execution sequence to the platoon leader.

(b) The leader should conduct rehearsals on terrain that resembles the actual ground, and in similar light conditions.

(c) The platoon may begin rehearsals of battle drills and other SOP items before the receipt of the operation order. Once the order has been issued, it can rehearse mission specific tasks.

(d) Some important tasks to rehearse include--

- Actions on the objective.
- Assaulting a trench, bunker, or building.
- Actions at the assault position.
- Breaching obstacles (mine and wire).
- Using special weapons or demolitions.
- Actions on unexpected enemy contact.

(2) **Inspections.** Squad leaders should conduct initial inspections shortly after receipt of the warning order. The platoon sergeant spot checks throughout the unit's preparation for combat. The platoon leader and platoon sergeant make a final inspection. They should inspect--

- Weapons and ammunition.
- Uniforms and equipment.
- Mission-essential equipment.
- Soldier's understanding of the mission and their specific responsibilities.
- Communications.
- Rations and water.
- Camouflage.

Deficiencies noted during earlier inspections.

## 2-3. OPERATION ORDER FORMAT

An operation order (OPORD) is a directive issued by the leader to his subordinate leaders in order to effect the coordinated execution of a specific operation.

a. The leader briefs his OPORD orally from notes that follow the five-paragraph format below (Figure 2-2).

| FORMAT                   | ANNOTATED FORMAT   | EXAMPLE, ORAL<br>(ATTACK)  | EXAMPLE, ORAL<br>(DEFEND)   |
|--------------------------|--|--|---|
| <b>TASK ORGANIZATION</b> | <b>Task Organization:</b> Explain how the unit is organized for the operation. If there is no change to previous task organization, indicate "no change."  | "Task organization is 1st Squad with two of the platoon's machine guns, 2d Squad, 3d Squad."   | "Task organization is 1st Squad, 2d Squad with one machine gun team, 3d Squad with one machine gun team."   |
| <b>1. SITUATION</b>      | <b>1. SITUATION;</b> Provide information essential to the subordinate leader's understanding of the situation.   | "Situation:  | "Situation:   |
| <b>a. Enemy Forces</b>   | <p>a. Enemy Forces. Refer to the overlay or sketch. Include pertinent intelligence provided by higher HQ and other facts and assumptions about the enemy. This analysis is stated as conclusions and addressed--</p> <ul style="list-style-type: none"> <li>(1) Disposition, composition, and strength.</li> <li>(2) Capabilities. A listing of what the enemy is able to do and how well.</li> <li>(3) Most probable course of action.</li> </ul> | <p>"Enemy forces: The scouts have confirmed a full strength motorized rifle squad on our portion of the company objective. They are dug in and expected to fight hard to retain this terrain. Their approximate positions and orientation are as reflected on the terrain model.</p> | <p>"Enemy forces: An enemy light battalion about 85% strength is expected to be traveling SSW paralleling the east side of Comanche Road on the night of 12 June as the supporting effort of a regiment attack. We anticipate their scouts to reconnoiter any time after 1200, 12 June.</p> |

Figure 2-2. Example Operation Order

| FORMAT                                | ANNOTATED FORMAT  | EXAMPLE, ORAL<br>(ATTACK)  | EXAMPLE, ORAL<br>(DEFEND)   |
|---------------------------------------|---|--|---|
| <b>b. Friendly Forces</b>             | <p>b. Friendly Forces. Provide information that subordinates need to accomplish their tasks.</p> <p>(1) Higher unit. A verbatim statement of the higher unit commander's mission statement from paragraph 2 and concept of the operation statement from paragraph 3a.</p> | <p>"Friendly forces: Company C seizes OBJ FOX, vicinity of GL 162827 to prevent enemy from concentrating combat power against the battalion main effort, Company A on OBJ COW. The CO's intent is to isolate the northern portion of the objective preventing the MRP main effort from concentrating against our breach in the south. He wants to execute the breach and pass through the main attack as quickly as possible. This will prevent enemy from affecting the battalion attack.</p> | <p>"Friendly forces: Company A defends NLT 121000 Jun 91 to destroy the enemy, vicinity of GL 123456 (EA FOX) and GL 127439 (EA PUP) to prevent the envelopment of Company B, the battalion main effort. The CO's intent is to occupy the BP with one platoon forward destroying any reconnaissance elements. Two platoons will concentrate fires on EA FOX. The main effort destroys vehicles in forward half of EA FOX. One platoon will disrupt enemy forces preventing envelopment of our main effort. Once reconnaissance elements are destroyed, that platoon will suppress enemy forces in EA PUP. Battalion obstacles will force enemy into EA PUP and FOX.</p> |
|                                       | (2) Left unit's mission   | "On our left, 1st Platoon fix enemy on OBJ FOX to allow 2d platoon to establish a breach.  | "On our left, Company B defends the high ground to the west, vicinity of GL111461.  |
|                                       | (3) Right unit's mission  | "On our ;right, 2d Platoon establish a breach, vicinity of GL 163826 to allow main attack to clear OBJ FOX.  | "On our ;right, 2d Platoon, company main effort, defends BP 1 to destroy enemy in EA FOX.   |
|                                       | (4) Forward unit's mission  |  | "Scout Platoon screens forward of our company BP. They will withdraw through 2d Platoon.  |
|                                       | (5) Mission of the unit in reserve or following.  | "To our rear, Company mortars suppress enemy on OBJ FOX to screen breaching effort.  |   |
|                                       | (6) Units in support or reinforcing the high unit   |  |   |
| <b>c. Attachments and Detachments</b> | c. Attachments and Detachments. when not shown under Task Organization list here or in an annex, units attached or detached from the platoon, together with the effective times.  | "Attachments and detachments: The platoon has three Dragons attached, which will remain under platoon control until seizure of objective.  | "Attachments and detachments: None  |
| <b>2. MISSION</b>                     | <b>2. MISSION:</b> Provide a clear, concise statement of the task to be accomplished and the purpose for doing it (WHO, WHAT, WHEN, WHERE, AND WHY). The leader derives the mission from his mission analysis.  | "Mission: 3d Platoon attacks 140200 Jun 91 to seize western edge of Hill 652 (OBJ CAT), vicinity of GL 170834 preventing disruption of battalion main attack.  | "Mission: 1st Platoon defends Hill 202 (BP 2) NLT 121000 Jun 91 to destroy enemy in EA FOX vicinity of GL 123456 to prevent the envelopment of 2d Platoon.  |

Figure 2-2. Example Operation Order (continued)

| FORMAT  | ANNOTATED FORMAT   | EXAMPLE, ORAL<br>(ATTACK)   | EXAMPLE, ORAL<br>(DEFEND)  |
|---|--|---|--|
| <b>3. EXECUTION Intent.</b><br><br><b>a. Concept of the Operation</b> | <b>3. EXECUTION:</b><br>Intent. give the stated vision that defines the purpose of the operation and the relationship among the force, the enemy, and the terrain.<br>a. Concept of the Operation. Refer to the operation overlay and concept sketch. Explain, in general terms, how the platoon, as a whole, will accomplish the mission. Identify the most important task for the platoon (mission-essential task_ and any other essential tasks. If applicable, designate the decisive point, form of maneuver of defensive techniques, and any other significant factors or principles. Limit this paragraph to six sentences.   | “Execution:<br>“Concept of the operation: My intent is to penetrate OBJ CAT from the northeast. Then, we will move through the breach site. One squad will suppress the trench line allowing main attack to maneuver and enter the trench. Once the foothold is established, we will clear the trench line from east to west. Key to the mission is speed in establishing the foothold (decisive point) and providing suppressive fires allowing main attack access to trench line. This should keep them busy and keep them from disrupting the battalion main attack. | “Execution:<br>“Concept of operation: My intent is to occupy BP 2 with two squads forward and one in depth. We will destroy forces in EA FOX and prevent envelopment of main effort. One squad destroys lead element forces, vicinity of minefield forcing tem to move into EA FOX. We will then destroy him as he enter this area (decisive point). We cannot envelop 2d Platoon. |
| <b>(1) Maneuver.</b>  | (1) Maneuver. Address all squads and attachment by name, giving each of them an essential task. Designate the platoon's main effort; that is, who will accomplish the most important task. All other tasks must relate to the main effort. Give mission statements for each subordinate element.   | “Maneuver: 1st Squad suppress trench line to allow 2d Squad to enter the trench line. 2d Squad, the main effort, clears trench line preventing disruption of battalion attack. 3d Squad establishes foothold in trench line allowing 2d Squad to enter trench line.   | “Maneuver: 1st Squad destroy lead element to cause the enemy to deploy. 2d Squad, main effort, destroy the enemy in EA FOX to prevent th envelopment of 2d Platoon; 3d Squad bock enemy forces attempting to envelop 2d Squad. Once the enemy crosses Comanche Road, all element should be firing.   |
| <b>(2) Fires.</b>   | (2) Fires. Refer to the fire support overlay and target list. Describe the concept of fire support to synchronize and complement the scheme of maneuver. If applicable, address priority of fires (9nclude changes), priority targets (who controls fires on them), and any restrictive control measures on the sue of fires.<br>(3) Additional combat support assets (engineer, DAD). State the concept of employment of any combat support attachments or who gets priority of their use, how they are to be used (priority of effort), and how they will be controlled and by whom. (Do not include information that belongs in the Coordinating Instructions subparagraph) | “Fires: Purpose of fires is to screen observation of breaching operation. 1st Squad has priority of 60-mm mortar fire. During consolidation, 3d Squad will have priority of fires. Battalion will fire a three-minute preparatory fire on OBJ COW to disrupt enemy command and control.   | “Fires: Priority of fires is to 3d Squad initially, priority shift to 2d Squad during the enemy's assault.   |

Figure 2-2. Example Operation Order

| FORMAT                                   | ANNOTATED FORMAT   | EXAMPLE, ORAL<br>(ATTACK)   | EXAMPLE, ORAL<br>(DEFEND)  |
|--|--|---|--|
| <b>b. Tasks to Maneuver Units</b>        | b. Tasks to Maneuver Units. Specify tasks, other than those listed in paragraph 3a(1), and the purpose of each, for squads and attachments. List each in separate numbered subparagraphs. Address the reserve last. State any priority of sequence.  | <p>"Tasks to maneuver units: 1st Squad, shift fires to contact point 1, allowing 2d Platoon a clear approach into the trench line.</p> <p>"2d Squad, prepare satchel charges for bunkers.</p> <p>"3d Squad, b prepared to assist main attack.</p>   | <p>"Tasks to maneuver units: 1st Squad occupy and prepare BP 2A, prepare your supplementary position here (point out on terrain model), to prevent flank attack. Prepare OP1 and construct obstacle 1.</p> <p>"2d Squad occupy and prepare BP 2B, construction obstacle 2, and provide one man to company to assist in establishing this minefield. Have that man report to the 1SG at the company CP GL 119445, at 1400 today.</p> <p>"3d Squad occupy and prepare BP 2C, prepare OP 2, and construction obstacle 3.</p>      |
| <b>c. Tasks to Combat Support Units.</b> | c. Tasks to Combat Support Units. A platoon may receive an attachment of CS units; for example, and engineer squad, List tasks to CS units in subparagraphs in the order they appear in the task organization. List only those specific tasks that must be accomplished by these units not specified elsewhere.  | "Tasks to combat support units: Mortars will occupy firing position, vicinity of GL 167828 NLT 150425R Jun91.   |  |
| <b>d. Coordinating Instructions</b>      | <p>d. Coordinating Instructions. List details of coordination and control applicable to 2 or more units in the platoon. Items that may be addressed include--</p> <p>Priority intelligence requirements, intelligence requirements, and reporting tasks.</p> <p>Mission-oriented protective posture level (see Section XI).</p> <p>Troop safety and operational exposure guidance (Section XI).</p> <p>Engagement and disengagement criteria and instruction.</p> <p>Fire distribution and control measures.</p> <p>Consolidation and reorganization instruction (other than SOP items).</p> | <p>"Coordinating Instruction: Order of march for Company C is 1st Platoon, CP, 2d Platoon, Mortars, 3d Platoon.</p> <p>"Order of march for the platoon is 1st Squad, HQ, 2d Squad, 3d Squad. Movement formation is platoon file, traveling.</p> <p>"LD time 142300RJun 91. Depart the AA at 142130 Jun91.</p> <p>"MOPP1 in effect.</p> <p>"Platoon rehearsal for key leaders, 1300. Company rehearsal, 1400.</p> <p>"Consolidation is IAW terrain model.</p> <p>"Timing:</p> <p>1300 Plt rehearsal</p> <p>1400 Co rehearsal</p> <p>1700 Inspection</p> <p>1730 chow</p> <p>1830 Rest</p> <p>2100 Night rehearsal</p> <p>0045 Stand to</p> | <p>"Coordinating Instruction: All squads responsible for constructing protective and tactical (FLP) wire obstacles direction to their front. The PSG will coordinate that effort.</p> <p>"ADA weapons status: TIGHT.</p> <p>"Priority of work per platoon TACSOP.</p> <p>"Security:</p> <p>20% until 112000 Jun 91</p> <p>50% until defend time</p> <p>" Timing:</p> <p>10 Jun 1700 Chow</p> <p>11 Jun 0515 Stand to</p> <p>0700 Chow</p> <p>1000 Inspection</p> <p>1700 Chow</p> <p>12 Jun 0515 Stand to</p> <p>0700 Chow</p> |

Figure 2-2. Example Operation Order

| FORMAT   | ANNOTATED FORMAT   | EXAMPLE, ORAL<br>(ATTACK)  | EXAMPLE, ORAL<br>(DEFEND)   |
|--|--|--|---|
|  | <p>Reporting requirements; for example, crossing PLs or check points.</p> <p>Terrorism and counterterrorism instruction.</p> <p>Specified tasks that pertain to more than one squad or element.</p> <p>Rules of engagement.</p> <p>Order of march and other movement instructions (consider an Annex</p>   | <p>0115 Final inspection</p> <p>0200 LD time</p> <p>0515 Assault time</p>                              | <p>0900 Final Inspection of Positions</p> <p>1000 defend time continue to improve positions as required.</p>  |
| <b>4. SERVICE SUPPORT</b>  | <p><b>4. SERVICE SUPPORT.</b></p> <p>Include CSS instruction and arrangements supporting the operation that are of primary interest to the platoon. Include changes to establish SOPs or a previously issued order. Paragraph 4 is often prepared and issued by the PSG.</p>   | "Service Support:  | "Service Support:   |
| <b>a. General.</b>   | <p>a. General. Reference the SOPs that govern the sustainment operations of the unit. Provide current and proposed company trains locations, casualty and damaged equipment collection points, and routes to and from them.</p>  | "Company Trains will be located at trail intersection, vicinity of GL 161823 after seizure of OBJ FOX. | "Company trains located just west of the road intersection, vicinity of GL 118440.  |
| <p><b>b. Material and Services</b></p> <p><b>(1) Supply</b></p> <p><b>(2) Transportation</b></p> | <p>b. Material and Services:</p> <p>(1) Supply. Include information on all classes of supply of interest to the platoon. When applicable, lists constraints and limitation, specific operating hours, distribution methods or schedules and other information which alters the standard manner in which supplies are managed, controlled, handled, or distributed.</p> |  | <p>"Class I, T-MRE-T until defend time, then MRE-MRE-MRE.</p> <p>"Class IV, preconfigured loads will arrive at our position 1000 this morning. PSG, have a six-man detail ready to assist in off-loading.</p> |
| <b>(3) Services</b>  | <p>(3) Services. Include information or instructions that prescribe the type of service available, designation, and location of the facility and service for service.</p>  |  |   |
| <b>(4) Maintenance</b>   | <p>(4) Maintenance. Include any information that differs from the established SOP on maintenance of weapons and equipment.</p>   |  |   |

Figure 2-2. Example Operation Order



| FORMAT                         | ANNOTATED FORMAT  | EXAMPLE, ORAL<br>(ATTACK)   | EXAMPLE, ORAL<br>(DEFEND)   |
|--------------------------------|---|---|---|
| <b>(5) Medical Evacuation.</b> | (5) Medical evacuation. Identify procedures for evacuation of wounded if they differ from the SOP>  | "Company casualty collection points are located along the infiltration lane. Platoon CCP after seizure of OBJ CAT will be directly behind the BTR position.   | "The platoon CCP will be located here. The company has been allocated one ambulance. PSG, find a route from the company trains to our location for the ambulance to get to us, as well as a litter evacuation route.  |
| <b>d. Personnel</b>            | d. Personnel. Identify the EPW collection point and any additional instruction on EPW handling not covered.   | "Company expects to receive some replacements late 15 Jun. We should receive two 11B10s.<br>"EPW collection point will be behind 1st Squad on the objective.  | "the Chaplain will hold a nondenominational service at the company CP at 2000 today. Squad leaders report the number of men wishing to attend to the PSG by 1400. PSG, get that information to the 1SG.   |
| <b>e. Miscellaneous</b>        | e. Miscellaneous. Include instruction for the destruction of supplies and any other information no covered elsewhere.   |   |   |
| <b>5. COMMAND AND SIGNAL.</b>  | <b>5. COMMAND AND SIGNAL</b>  |   |   |
| <b>a. Command.</b>             | a. Command.<br>(1) Location of the higher unit commander and CP.<br>(2) Location of the platoon leader or CP.<br>(3) Location of the PSG or alternate CP.<br>(4) Succession of command (if different from the SOP). | "Command: Commander will follow us. he will set up CP in the vicinity of the trench line.<br>"I will follow 1st Squad during movement and will assault with 2d Squad. PSG will follow 2d Squad, then move to the support-by-fire position with 1st Squad. | "Command: Commander will be located with main effort.<br>"The platoon CP and the alternate are located here and here (point out on terrain model).  |
| <b>b. Signal</b>               | b. Signal><br>(1) SOI index in effect.<br>(2) Listening silence, if applicable<br>(3) Methods of communication in priority.<br>(4) Emergency signals, final signals.<br>(5) code words.                             | "Signal: The number combination password is seven.<br>"The time is now 1007. What are your questions?"  | "Signal: Company cease fire signal is two green star clusters followed by one red.<br>"Code word for execution EA FOX with machine gun fire is GOLDSTRIKE and for all weapons firing is BLACKSMITH.<br>"Running password for returning patrols and OPs is MOOSEBREATH followed by the number of Soldiers returning.<br>"The time is now 0912. What are your questions?" |

Figure 2-2. Example Operation Order (continued)

b. The leader uses a fragmentary order (FRAGO) to change an existing order. He normally uses the OPOD format, but addresses only those elements that have changed. The leader should make his instructions brief, simple, clear, and specific.

c. Annexes provide the instructions for conducting specific operations (such as air assault, boat and truck movement, stream crossings, establishing patrol bases, and airborne insertions), if they are so detailed that a platoon SOP is insufficient for a particular situation. The format is the same as the five-paragraph OPORD.

d. An operation overlay is a tracing of graphic control measures on a map. It shows boundaries, unit positions, routes, objectives, and other control measures. It helps to clarify the operation order. Platoons normally trace their overlays from the company operations map. Squad leaders transfer control measures on to their maps as needed. The subordinate's need for higher unit graphics must be balanced against the risk of the enemy obtaining this information.

e. When possible, the leader uses the actual terrain or a terrain model to brief his OPORD. He may also use concept sketches--large, rough drawings of the objective areas--to show the flow of events and actions clearly.

(1) **Concept sketch.** The sketch shows the locations and positions of objectives, control measures, and key terrain in relation to each other. It is not necessarily drawn to scale.

(2) **Terrain model.** A terrain model is a three-dimensional scale model of the terrain (Figure 2-3). It is effective for briefing and discussing the actions on the objective. It may depict the entire mission area. However, for offense missions, priority should be given to building a model of the objective area.

(a) It should be built oriented to the ground (north on the model is north on the ground) and should show the main terrain features in the area.

(b) The next step after orienting the model to the ground is the construction of grid squares. The leader should identify the grid squares that the model will show. These ensure a more accurate model.

(c) The terrain model should depict key terrain, friendly control measures, and enemy dispositions.

(d) Materiel for constructing the model includes string, yarn (various colors), chalk (colored), 3x5 cards, target markers, or unit markers.

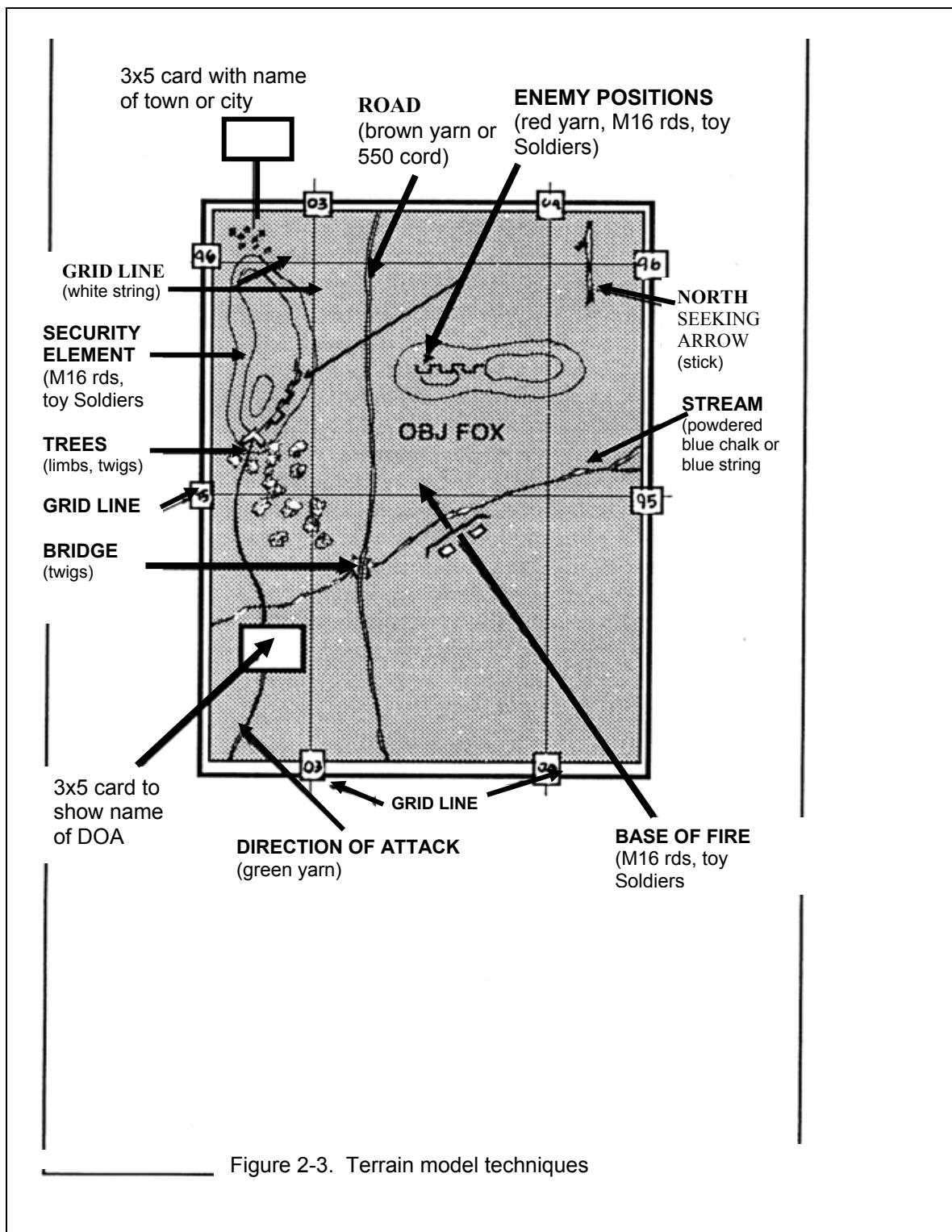


Figure 2-3. Terrain model techniques

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## Student Handout 3

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**This student handout contains extracted material from Task Number 071-990-0004,  
Conduct Pre Combat Checks**

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**Disclaimer:** The developer downloaded the extracted material from the web. The test is verbatim from the source document; therefore, it may contain passive voice, misspellings, grammatical errors, etc., and may not be in compliance with the Army Writing Style Program.

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**TASK 071-990-0004**  
**Conduct Precombat Checks**

**CONDITIONS:** Given the anticipatory orders for combat (warning order), personnel and equipment to be inspected, a specified amount of time, an inspection site, a unit standard operating procedure (SOP) detailing a Soldier's combat load (mission essential equipment) and writing materials.

**STANDARD:** Within the time specified, inspect personnel and equipment and check for mission knowledge of Soldiers assigned to your supervision. Note deficiencies for immediate corrective action.

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**Instructional  
Lead-In**

Soldiers preparing for combat are faced with multiple taskings, all of which could impact on the success of the unit's mission. As leaders, we take on the added responsibility to assist our Soldiers in their preparation for combat. Part of this preparation is associated with the task of verifying that each Soldier is properly equipped, physically prepared and adequately informed to assist in the unit's mission accomplishment. We refer to this task as *Conduct Precombat Checks*.

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**SECTION III**      PRESENTATION

**1**      Learning Step/Activity 1 Identify characteristics of a combat load.

a. GENERAL.

(1) Prior to inspection, familiarize yourself with the unit SOP as it pertains to a Soldier's load. Determining the Soldier's load is a critical leader task.

(2) The Soldier's load is always METT-T dependent and must be closely monitored. Soldiers cannot afford to carry unnecessary equipment into battle.

(3) The individual load must not be based on the gear and supplies needed to meet every contingency.

(a) The primary consideration is not how much a Soldier can carry, but how much he can carry without impaired combat effectiveness - mentally or physically.

(b) The leader should not expect his Soldiers to carry enough gear for all possible combat situations. Instead, items to be contained in the load must be based on realistic expectations.

---

b. FACTORS AFFECTING THE SOLDIER'S LOAD.

(1) Commanders at all levels must understand the factors affecting the Soldier's load and the subsequent capabilities or limitations produced in the unit.

(2) The physical limitations of individual Soldiers, stress, and the weight of equipment and munitions all affect the Soldier's ability to carry his required load. These factors must be carefully analyzed by the leader in the load determination process.

(a) Physical Limitations. A Soldier's ability to react to the enemy is reduced by the burden of his load. Load carrying causes fatigue and lack of agility, placing Soldiers at a disadvantage when rapid reaction to the enemy is required. For example, the time a Soldier needs to complete an obstacle course is increased from 10 to 15 per cent, depending on the configuration of the load, for every 10 pounds of equipment carried. It is likely that a Soldier's agility in the assault will be degraded similarly.

(b) Munitions and Equipment. As the modern battlefield becomes more sophisticated, increasingly heavy munitions and new types of target acquisition and communications equipment will be required by front-line Soldiers to defeat the enemy. The additional equipment adds weight to the Soldier's load. Soldiers who must carry heavy loads restrict the mobility of their units. Figure 1-1 (VGT 1-1) provides a summary of the additional weights carried by specialized combat teams.

---

| Combat Team   | Individual Carrying Weight (LB) |
|---|---------------------------------|
| Antiarmor Team  | 111, 101, 90                    |
| Mortar Team (after distributing 100 mortar rounds of 3.5 pounds each) | 83                              |
| Fire Support Team   | 92-95                           |
| M60 Machine Gun Team  | 78-87                           |
| Radio Operators   | 84                              |

FIGURE 1-1: Typical Carrying Weights of Specialized Combat Teams



---

c. **COMBAT LOAD.** (VGT 1-2) Combat load is mission essential equipment carried by the Soldier, as determined by the commander, required for the Soldier to fight and survive immediate combat operations. Combat load weights will vary and should not exceed prescribed weights by SOP. There are two components:

(1) **Fighting Load.** (VGT 1-3) The fighting load is made up of essential items needed to fight including bayonet, weapons and ammunition, clothing, helmet and LBE. Items are added or deleted based on METT-T and other factors. The fighting load weight should not exceed 48 lbs. Figure 1-2 (VGT 1-4) provides an example of a basic fighting load.

---

| <b>FIGHTING LOAD</b>                           |                     |
|--|---------------------|
|  | <b>Weight (lbs)</b> |
| Bayonet with scabbard                          | 1.3                 |
| Canteen, 1-quart and cover with water (2 each) | 5.6                 |
| Case, small arms (2 each)                      | 1.8                 |
| Grenade, fragmentation (4)                     | 4.0                 |
| Helmet, ballistic                              | 3.4                 |
| Magazines (6) with 180 rounds of 5.56mm        | 5.4                 |
| Pistol belt, suspenders, and first-aid pouch   | 1.6                 |
| Protective mask with decontamination kit       | 3.0                 |
| Rifle, M16A2 with 30 rounds 5.56 ball          | 8.8                 |
| TOTAL  | 34.9                |

FIGURE 1-2: Example of a Basic Fighting Load

---

(2) **Approach March Load.** (VGT 1-5) The approach march load includes those items that are needed for extended operations. These are dropped in an assault position, ORP or other points before or on enemy contact. Items may be added or deleted from this list based on METT-T and other factors. The approach march load weight should not exceed 72 lbs. Figure 1-3 (VGT 1-6) provides an example of an approach march load.

---

---

| APPROACH MARCH LOAD                    |              |
|--|--------------|
|  | Weight (lbs) |
| ALICE, medium with frame               | 6.3          |
| Bag, waterproof                        | 0.8          |
| Canteen, 2-quart, and cover with water | 4.8          |
| E-tool with carrier                    | 2.5          |
| Liner, poncho                          | 1.6          |
| Poncho, nylon                          | 1.3          |
| Rations, MRE (2 each)                  | 2.6          |
| Toilet articles                        | 2.0          |
| Towel                                  | 0.2          |
| TOTAL                                  | 22.1         |

FIGURE 1-3: Example of Basic Approach March Load

---

(3) Load Management Techniques. The leader decides, based on METT-T, what will be carried in the rucksack and what will be carried within immediate reach of the Soldier.

(a) Items common to everyone's load are located in the same place. The placement of items carried needs to be checked to ensure that nothing prevents the Soldier from taking well-aimed shots. Items should not be carried on the front side of the LBE.

NOTE: Pass out student handout D-1, Weights of Common Items Used in Combat.

(b) This handout will help you in determining the weight of your Soldier's combat load. Remember to consider realistic expectations of the mission requirements, and, do not attempt to cover every contingency. The commander determines the basic combat load for the Soldiers assigned to his unit and publishes his guidance in the unit SOP.

---

## 2

Learning Step/Activity 2 Conduct a Precombat check of personnel.

---

a. Inspecting Personnel. [NOTE: Have an assistant trainer equipped with a basic combat fighting load be ready for inspection and act as your illustrator during the demonstration.] Whenever possible, make immediate on-the-spot corrections.

---

(1) Start at the head. Make sure the Soldier has not used perfumed aftershave, soaps or body deodorants.

(a) Check headgear. The helmet is made of a high strength Kevlar laminate. Check the chin strap to ensure that it fits snug, but comfortably. The camouflage cover has slits for inserting twigs or foliage for additional camouflage, be sure that the outline of the helmet is broken up by this camouflage.

(b) Check camouflage. The shiny areas of the face (forehead, cheekbones, nose and chin) should be painted with a dark color. Shadow areas (around the eyes, under the nose, and under the chin) should be lightened. Painting is done in bold irregular patterns. All exposed skin areas including the face, chin, front and the back of the neck, ears, and the back of hands must be covered completely.

(2) Check for identification tags and identification card. Make sure the ID tags are taped together and to the chain so they cannot slide or rattle.

(3) Check uniform clothing items for mission compatibility and adequate environmental protection. Check the uniform clothing for serviceability, fit and general appearance. Faded battle dress uniforms lose the ability to deflect infra-red detection devices.

(4) Check the field suspenders and equipment belt for proper fit and position. The back suspender snap hooks are attached at each side of the two center top eyelets at the back of the equipment belt. The front suspender snap hooks are attached to the eyelets on the back of the ammunition cases. The equipment belt should not be snug. [NOTE: if a rucksack is worn, ensure that it does not exceed the prescribed combat load weight.]

(5) Check the footgear for fit and serviceability. Ensure the Soldier is wearing the proper layers and type of socks to ensure that his feet will be protected from the elements.

(6) Check the Soldier's feet for blisters, sores or evidence of rashes. A combat Soldier's effectiveness is greatly diminished when his feet render him immobile. Ensure the Soldier has performed the necessary foot care needed to preserve healthy feet.

(7) Check to ensure the Soldier has hydrated sufficiently and has eaten all meals scheduled. Fatigue and fear are two combat factors that can burn up a Soldier's stored energy. A Soldier who sacrifices nutrition prior to combat is more likely to succumb to both.

(8) Note discrepancies and submit the list to the proper authority; follow-up to ensure missing and non-functional items are replaced immediately.

---

3.

---

Learning Step/Activity 3 Conduct a Precombat check of equipment.

---

a. Inspecting Equipment. [NOTE: Have an assistant trainer equipped with a basic combat fighting load be ready for inspection and act as your illustrator during the demonstration.] Whenever possible, make on-the-spot corrections.

(1) Before inspecting, study the applicable technical manuals (TM). Pay particular attention to the section on preventive maintenance checks and services. Follow the unit SOP to identify the basic issue items that are included in the combat load.

(2) Load-Bearing Equipment. Check items for accountability according to the SOP. Check the clips and buckles for serviceability. Check items to ensure they are securely attached to the field suspenders and equipment belt. Check all items for serviceability, and note any item that is missing or non-functional. Have the Soldier jump up and down to ensure there is no loose items that will cause rattling.

(3) Water and Nutrition. Check to make sure the canteens are filled to capacity with potable water. Make sure the Soldier has the quantity of MREs required to be carried.

(4) Weapon and Ammunition. Check to make sure the Soldier has his assigned weapon and his basic load of ammunition. Check the weapon for cleanliness and ensure that it is functional. Note any discrepancies.

(5) Threat Protection Equipment. Check to see that the Soldier is carrying the proper threat protection equipment as prescribed by SOP. Ensure that the equipment is serviceable and ready for donning. Note any discrepancies and missing items.

(6) Submit all lists of discrepancies to the proper authority and follow-up to ensure missing and non-functional items are replaced immediately.

---

4.

---

Learning Step/Activity 4 Conduct a Precombat check of mission knowledge.

---

a. GENERAL. (VGT 2-1) The leader inspects the Soldier's understanding of the mission and his specific responsibilities. As a minimum, the Soldier should understand the mission or the nature of the operation, who is participating in the operation, time of the operation, and their assigned tasks. To make maximum use of time, questions regarding mission knowledge may be asked concurrently with the inspection of personnel and equipment.

---

---

(1) (VGT 2-2) Check to make sure the Soldier knows the unit's mission (task & purpose). As a minimum, check for *who, what, where, when & why*. Check to make sure the Soldier is prepared to accomplish any specific taskings assigned to him. The unit SOP provides an in-depth description of the specific responsibilities associated with mission tasks. Some important mission tasks include:

- (a) Actions on the objective.
- (b) Assaulting a trench, bunker or building.
- (c) Actions at the assault position.
- (d) Breaching obstacles (mine and wire).
- (e) Using special weapons or demolitions.
- (f) Actions on unexpected enemy contact.

(2) Check to make sure the Soldier knows the concept of the operation, to include control measures. (VGT 2-3) In most cases, leaders will use rehearsals to practice essential tasks and improve Soldier understanding of the concept of the operation. Rehearsals foster confidence in the Soldiers. During rehearsals, the squad leaders brief their planned actions in execution sequence to the platoon leader.

(a) Leaders use control measures to assign responsibilities, coordinate fires and maneuver, control combat operations and clarify their concept of the operation. Leaders use control measures to clarify their intent, focus the platoon or squad effort, and ensure synchronization. Control measures ensure the distribution of fires throughout the platoon's area of responsibility and the initial positioning and subsequent maneuver of squads. Each control measure should have a specific purpose that contributes to mission accomplishment.

(b) Some graphic control measures in the offense include: assembly area, attack position, line of departure, boundaries, route, release point, start point, axis of advance, direction of attack, phase line, checkpoint, assault position, and objective.

(c) Fire commands and control measures for individual and key weapons also constitute a type of control measure. Weapon control measures include range cards, sectors of fire, principle direction of fire, final protective line, final protective fires and target reference points.

---

---

(3) (VGT 2-4) Check to make sure the Soldier knows the higher headquarters commander's intent. He should be able to give you the stated version that defines the purpose of the operation and the relationship among the force, the enemy and the terrain.

(4) Immediately correct any evidence of lack of knowledge.

---

**W223**

**Conduct Movement (Version 2)**

**OCT 04**

# **U.S. ARMY SERGEANTS MAJOR ACADEMY**

## **Primary Leadership Development Course (PLDC)**

### **The Army Training System TRAINING SUPPORT PACKAGE**



**"NO ONE IS MORE PROFESSIONAL THAN I"**

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## TRAINING SUPPORT PACKAGE (TSP)

|  |  |
|--|--|
| <b>TSP Number / Title</b>              | W223 / CONDUCT MOVEMENT  |
| <b>Effective Date</b>                  | 01 Oct 2004  |
| <b>Supersedes TSP(s) / Lesson(s)</b>   | W223, Conduct Movement, dtd Oct 03 w/changes   |
| <b>TSP Users</b>                       | 600-PLDC, Primary Leadership Development Course<br>600- PLDC (MOD), Primary Leadership Development Course Modified   |
| <b>Proponent</b>                       | The proponent for this document is the Sergeants Major Academy.  |
| <b>Improvement Comments</b>            | <p>Users are invited to send comments and suggested improvements on DA Form 2028, <i>Recommended Changes to Publications and Blank Forms</i>. Completed forms, or equivalent response, will be mailed or attached to electronic e-mail and transmitted to:</p> <p>COMDT USASMA<br/>ATTN ATSS DCP<br/>BLDG 11291 BIGGS FIELD<br/>FT BLISS TX 79918-8002</p> <p>Telephone (Comm) (915) 568-8405<br/>Telephone (DSN) 978-8405</p> |
| <b>Security Clearance / Access</b>     | Unclassified   |
| <b>Foreign Disclosure Restrictions</b> | FD5. This product/publication has been reviewed by the product developers in coordination with the USASMA foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.   |

## PREFACE

---

### Purpose

This Training Support Package provides the instructor with a standardized lesson plan for presenting instruction for:

| <u>Task Number</u> | <u>Task Title Individual</u>                                |
|--------------------|---|
| 071-326-0502       | Move Under Direct Fire                                      |
| 071-326-0503       | Move Over, Through, or Around Obstacles (Except Minefields) |
| 071-326-0515       | Select a Movement Route Using a Map                         |
| 071-326-0608       | Use Visual Signaling Techniques.                            |
| 071-326-5605       | Control Movement of a Fire Team                             |
| 071-331-0815       | Practice Noise, Light, and Litter Discipline                |

---

**This TSP  
Contains**

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| Appendix C - Practical Exercises and Solutions     C - .....  | 1           |
| Appendix D - Student Handouts     D - .....   | 1           |

**Conduct Movement  
W223 / Version 2  
01 Oct 2003**

**SECTION I. ADMINISTRATIVE DATA**

|  |   |  |  |
|--|---|--|--|
| <b>All Courses Including This Lesson</b> | <u>Course Number</u><br>600-PLDC  | <u>Version</u><br>2  | <u>Course Title</u><br>Primary Leadership Development Course |
| <b>Task(s) Taught(*) or Supported</b>    | <u>Task Number</u>  | <u>Task Title</u>  |  |
|  |   | <u>INDIVIDUAL</u>  |  |
|  | 071-326-0502 (*)  | Move Under Direct Fire   |  |
|  | 071-326-0503 (*)  | Move Over, Through, or Around Obstacles (Except Minefields)              |  |
|  | 071-326-0515 (*)  | Select a Movement Route Using a Map                                      |  |
|  | 071-326-0608 (*)  | Use Visual Signaling Techniques  |  |
|  | 071-326-5605 (*)  | Control Movement of a Fire Team  |  |
|  | 071-331-0815 (*)  | Practice Noise, Light, and Litter Discipline                             |  |
| <b>Collective Tasks Taught</b>           | 07-3-1189   | Conduct Actions at Danger Areas  |  |
|  | 07-3-1270   | Conduct Tactical Movement (Mounted or Dismounted)                        |  |
| <b>Reinforced Task(s)</b>                | <u>Task Number</u>  | <u>Task Title</u>  |  |
|  | 071-329-1006  | Navigate From One Point On the Ground to Another Point While Dismounted. |  |
| <b>Academic Hours</b>                    | The academic hours required to teach this lesson are as follows:  |  |  |
|  | <u>Resident Hours/Methods</u>   |  |  |
|  | 2 hrs   | 35 mins / Conference / Discussion  |  |
|  |   | 25 mins / Demonstration  |  |
|  | 3 hrs   | / Practical Exercise (Performance)                                       |  |
| Test                                     | 0 hrs   |  |  |
| Test Review                              | 0 hrs   |  |  |
|  | Total Hours:  | 6 hrs  |  |
| <b>Test Lesson Number</b>                |   | <u>Hours</u>   | <u>Lesson No.</u>  |
|  | Testing<br>(to include test review)   | 1 hr 30 mins   | WE03 version 1   |
|  |   | 2 hr 30 mins   | WE version 2   |
| <b>Prerequisite Lesson(s)</b>            | <u>Lesson Number</u>  | <u>Lesson Title</u>  |  |
|  | W222  | Combat Orders  |  |
| <b>Clearance Access</b>                  | Security Level: Unclassified<br>Requirements: There are no clearance or access requirements for the lesson. |  |  |

**Foreign Disclosure Restrictions**

FD5. This product/publication has been reviewed by the product developers in coordination with the USASMA foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.

**References**

| <u>Number</u>  | <u>Title</u>   | <u>Date</u> | <u>Additional Information</u> |
|----------------|--|-------------|-------------------------------|
| FM 3-25.26     | MAP READING AND LAND NAVIGATION                          | 20 Jan 2005 |                               |
| FM 7-8         | INFANTRY RIFLE PLATOON AND SQUAD                         | 22 Apr 1992 | w/change 1, 1 Mar 2001        |
| FM 21-60       | VISUAL SIGNALS   | 30 Sep 1987 |                               |
| FM 21-75       | COMBAT SKILLS OF THE SOLDIER                             | 03 Aug 1984 |                               |
| STP 21-1-SMCT  | SOLDIER'S MANUAL OF COMMON TASKS SKILL LEVEL 1           | 31 Aug 2003 |                               |
| STP 21-24-SMCT | SOLDIER'S MANUAL OF COMMON TASKS (SMCT) SKILL LEVELS 2-4 | 31 Aug 2003 |                               |

**Student Study Assignments**

Before class--

- Study Student Handouts 2, 5, and 7.
- Read Student Handouts 1, 3, 4, 5, 6, 8, and 9.

During class--

- Participate in classroom discussion and practical exercises.

After class--

- Turn in recoverable references after the examination for this lesson.

**Instructor Requirements**

1:8, SSG, PLDC graduate, ITC, and SGITC qualified.

**Additional Support Personnel Requirements**

| <u>Name</u> | <u>Stu Ratio</u> | <u>Qty</u> | <u>Man Hours</u> |
|-------------|------------------|------------|------------------|
| None        |                  |            |                  |

| Equipment<br>Required<br>for Instruction | <u>ID<br/>Name</u>                                       | <u>Stu<br/>Ratio</u> | <u>Instr<br/>Ratio</u> | <u>Spt</u> | <u>Qty</u> | <u>Exp</u> |
|--|--|----------------------|------------------------|------------|------------|------------|
|  | 1005-00-073-9421<br>RIFLE, 5.56 MILLIMETER               | 1:16                 | 1:2                    | No         | 1          | No         |
|  | 1005-00-264-8261<br>MAGAZINE 30RD AMMO                   | 1:16                 | 1:2                    | No         | 1          | No         |
|  | 6730-00-577-4813<br>SCREEN, PROJECTION                   | 1:16                 | 1:2                    | No         | 1          | No         |
|  | 6730-00-P53-8147<br>Projector, Overhead                  | 1:16                 | 1:2                    | No         | 1          | No         |
|  | 7110-00-132-6651<br>CHALKBOARD                           | 1:16                 | 1:2                    | No         | 1          | Yes        |
|  | 7510-00-161-6215<br>RULER, NONMETALLIC                   | 1:16                 | 1:2                    | No         | 1          | Yes        |
|  | 7520-01-424-4867<br>EASEL, DISPLAY AND TRAINING          | 1:16                 | 1:2                    | No         | 1          | Yes        |
|  | 7530-00-619-8880<br>PAD, WRITING PAPER                   | 1:16                 | 1:2                    | No         | 1          | Yes        |
|  | 8415-01-110-9981<br>BAND, HELMET, CAMOUFLAGE             | 1:1                  | 1:2                    | No         | 1          | Yes        |
|  | 8415-01-303-8945<br>COVER, HELMET, CAMOUFLAGE PATTERN    | 1:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-00-001-6471<br>SUSPENDERS, INDIVIDUAL EQUIPMENT     | 1:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-00-001-6482<br>CASE, SMALL ARMS AMMUNITION          | 2:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-00-165-6838<br>CUP, WATER CANTEEN                   | 2:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-00-860-0256<br>COVER, WATER CANTEEN                 | 2:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-00-935-6814<br>CASE, FIELD FIRST AID DRESSING-UN    | 1:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-01-115-0026<br>CANTEEN, WATER                       | 2:1                  | 1:2                    | No         | 1          | No         |
|  | 8465-01-120-0675<br>BELT INDIVIDUAL EQUIPMENT: WEBBING   | 1:1                  | 1:2                    | No         | 1          | No         |
|  | 8470-01-092-7435<br>CHIN STRAP                           | 1:1                  | 1:2                    | No         | 1          | No         |
|  | 8470-01-092-7528<br>HELMET, GROUND TROOPS'-PARACHUTIST   | 1:1                  | 1:2                    | No         | 1          | No         |
|  | 8470-01-442-1429<br>HEADBAND, GROUND TROOPS'-PARACHUTIST | 1:1                  | 1:2                    | No         | 1          | Yes        |
|  | *GTA 5-2-12<br>COORDINATE SCALE AND PROTRACTOR           | 1:1                  | 1:2                    | No         | 1          | No         |
|  | M11895<br>MASK, PROTECTIVE FIELD M17                     | 1:1                  | 1:2                    | No         | 1          | No         |
|  | *SERIES<br>MAPSHEET, LOCAL TRAINING AREA, 1:50,000       | 1:1                  | 1:2                    | No         | 1          | No         |
|  | * Before Id indicates a TADSS                            |                      |                        |            |            |            |

---

**Materials  
Required****Instructor Materials:**

- TSP.
- Any equipment required by the NCOA's SOP.

**Student Materials:**

- Advance sheet.
  - Pen or pencil and writing paper.
  - Any materials required by the NCOA's SOP.
- 

**Classroom,  
Training Area,  
and Range  
Requirements**

CLASSROOM (40x0 PER 16 STUDENTS)  
FIELD TRAINING SITE 1 KM x1 KM

---

**Ammunition  
Requirements**

| <u><b>Id</b></u> | <u><b>Name</b></u> | <u><b>Exp</b></u> | <u><b>Stu<br/>Ratio</b></u> | <u><b>Instr<br/>Ratio</b></u> | <u><b>Spt<br/>Qty</b></u> |
|------------------|--------------------|-------------------|-----------------------------|-------------------------------|---------------------------|
| None             |                    |                   |                             |                               |                           |

---

**Instructional  
Guidance**

**NOTE:** Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

Before class--

- Read and study all TSP material and be ready to conduct the class.
- This TSP has questions throughout to check on learning or generate discussion among the group members. You may add any questions you deem necessary to bring a point across to the group or expand on any matter discussed.
- You must know the information in this TSP well enough to teach from it, not read from it.
- This TSP presents references at the beginning of some of the paragraphs. This allows you to inform your students of where they would look in the reference to follow your instruction.

During class--

- Conduct the class in accordance with this TSP.
- Issue Student Handouts one thru nine during inprocessing.

After class--

- Collect all recoverable materials after the examination for this lesson.

**NOTE:** The students will need four M16s or Rubber M16s for every eight students for demonstration of Learning Step Activity 1 to Enabling Learning Objective 2, high crawl, low crawl, and rush.

---

**Proponent  
Lesson Plan  
Approvals**

---

| <u>Name</u>          | <u>Rank</u> | <u>Position</u>     | <u>Date</u> |
|----------------------|-------------|---------------------|-------------|
| Berta, Frank         | GS-11       | Training Specialist |             |
| LeGloahec, Victor    | SGM         | Chief, NCOES        |             |
| Bennett-Green, Agnes | SGM         | Chief, CMDD         |             |



## SECTION II. INTRODUCTION

|   |
|---|
| Method of Instruction: <u>Conference / Discussion</u>       |
| Technique of Delivery: <u>Small Group Instruction (SGI)</u> |
| Instructor to Student Ratio is: <u>1:8</u>                  |
| Time of Instruction: <u>5 mins</u>                          |
| Media: <u>None</u>  |

### Motivator

You are a warrior and a member of a warrior team. You live the Army values and always place the mission first and never accept defeat. You will never quit or leave a fallen comrade behind. Warriors have discipline, and they keep themselves physically and mentally tough. They train to maintain proficiency in their warrior tasks and drills, and they will always maintain their arms, equipment, and themselves. Warriors are experts and professionals standing ready to deploy, engage, and destroy the enemies of America. To help prepare and develop your spirit of warrior ethos, you will learn what the warrior leader's role is in leading soldiers in dismounted movement. Our Army expects its junior warrior leaders to know the movement techniques and formations used to employ a squad-size element to engage and destroy the enemy.

### Terminal Learning Objective

**NOTE:** Inform the students of the following Terminal Learning Objective requirements. At the completion of this lesson, you [the student] will:

|                    |   |
|--------------------|---|
| <b>Action:</b>     | Lead a team/squad in dismounted movement.   |
| <b>Conditions:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.   |
| <b>Standards:</b>  | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT. |

|                                     |  |
|-------------------------------------|--|
| <b>Safety Requirements</b>          | Local SOPs.  |
| <b>Risk Assessment Level</b>        | Low  |
| <b>Environmental Considerations</b> | <p><b>NOTE:</b> It is the responsibility of all soldiers and DA civilians to protect the environment from damage.</p> <p>None</p>  |
| <b>Evaluation</b>                   | <ul style="list-style-type: none"> <li>You will take a written examination. The examination will contain questions from this lesson. You must correctly answer 70 percent or more of the questions on the examination to receive a GO.</li> <li>You will receive an evaluation on your ability to lead a team/squad in movement during the end of course situational training exercise. It is a non-graded event.</li> </ul> <p><b>NOTES:</b></p> <ul style="list-style-type: none"> <li>Inform the students where and when their examination will take place as posted on the training schedule and when they will receive feedback on the test. Include any retest information.</li> <li>Inform the students that they must turn in all recoverable reference material after the examination.</li> </ul> |
| <b>Instructional Lead-In</b>        | <p>This TSP will provide you with a basic knowledge of moving a team/squad--using arm-and-hand signals--in the appropriate team/squad movements and formations, ensuring security during movement and halts, based on the tactical situation. You will use what you learn today to strengthen your warrior ethos by sharpening your proficiency in military skills and leadership in order to deploy, engage, and destroy the enemy. You will practice these skills in a walk through, and your SGL will evaluate you on these skills during the end of course situational training exercise (STX).</p>  |

### SECTION III. PRESENTATION

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**NOTE:** There are no scheduled breaks identified in this TSP due to time spent during PEs and demonstrations. SGLs will allow students a ten minute break as the situation presents itself, approximately every 50 minutes.

**NOTE:** Inform the students of the Enabling Learning Objective requirements.

#### A. ENABLING LEARNING OBJECTIVE

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Select a movement route using a map.  |
| <b>CONDITIONS:</b> | Given an operation or fragmentary order, a 1:50,000 scale military map, and a compass.  |
| <b>STANDARDS:</b>  | Selected a route that took advantage of maximum cover and concealment; ensured observation and fields of fire for the overwatch or fire support elements; allowed positive control of all elements; and accomplished the mission quickly without unnecessary or prolonged exposure to enemy fire IAW FM 3-25.26 (SH-2) and STP 21-24-SMCT, Task 1 (SH-7). |

#### 1. Learning Step / Activity 1. Map Route Selection

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 25 mins  
Media: VGT-1 and VGT-2

Ref: SH-2 (FM 3-25.26), p SH-2-2, para 11-4 and p SH-2-5, para 11-5

Military cross-country navigation is intellectually demanding because it is imperative that the unit, crew, and vehicle survive and successfully complete the move in order to accomplish its mission. However, the unnecessary use of a difficult route makes navigation too complicated. It creates more noise when proceeding over it and causes wear and tear on equipment and personnel. Using difficult routes can also increase the need for recovery operations, needlessly complicate recovery operations, and waste scarce time. On receipt of a tactical mission, the leader begins his troop-leading procedures and makes a tentative plan. He bases the tentative plan on a good terrain analysis.

Ref: SH-2 (FM 3-25.26), p SH-2-5 and SH-2-6, para 11-5

There are four steps to land navigation:

Step 1. Know where you are.

Step 2. Plan the route.

Step 3. Stay on the route.

Step 4. Recognize the objective.

**Step One, Know Where You Are:** Step one is plain and simple, you must know where you are on the ground at all times. This includes knowing where you are relative to the following:

**SHOW VGT-1, STEP 1, KNOW WHERE YOU ARE**

**Step 1, Know Where You Are**

- **Your directional orientation.**
- **The direction and distances to your objective.**
- **Other landmarks and features.**
- **Any impassable terrain, the enemy, and danger areas.**
- **Both advantages and disadvantages presented by the terrain between you and your objective.**

W223/OCT 04/VGT1

Ref: SH-2 (FM 3-25.26), p SH-2-5, para 11-5a

You can only accomplish step one by knowing how to read a map and recognizing/identifying specific terrain and other features. You have to determine and estimate direction; pace, measure, and estimate distances; and plot and estimate a position by resection.

**REMOVE VGT-1**

**Step 2, Plan the Route:** The route you plan will depend upon the size of the unit you are leading. In your instance, you will be leading a section or a squad. Also the route depends on the length and type of movement you will conduct during your movement. You must consider the factors on VGT-2 when selecting the route or routes you will follow.

## SHOW VGT-2, STEP 2, PLAN THE ROUTE

| <b><u>STEP 2, Plan the Route</u></b>   |  |
|--|--|
| <ul style="list-style-type: none"><li>• Travel time.</li><li>• Travel distance.</li><li>• Maneuver room needed.</li><li>• Trafficability.</li><li>• Load-bearing capacities of the soil.</li><li>• Energy expenditure of soldiers.</li></ul> | <ul style="list-style-type: none"><li>• Factors of METT-T.</li><li>• Tactical aspect of terrain (OCOKA).</li><li>• Ease of logistical support.</li><li>• Potential for surprising the enemy.</li><li>• Availability of control and coordination features.</li><li>• Availability of good checkpoints and steering marks.</li></ul> |
| W223/OCT 04/VGT2   |  |

Ref: SH-2 (FM 3-25.26), p SH-2-5, para 11-5b

**NOTE:** Ask the students why the factors listed on the VGT are important for planning their route.

What all this means is that the route you select must come from careful map study; it should address the requirements of the mission, tactical situation, and time available. The route must also provide for ease of movement and navigation.

### REMOVE VGT-2

QUESTION: FM 3-25.26 talks about three route-selection criteria that are important for small-unit movements when planning a route. What are they?

ANSWER: Cover, concealment, and availability of reliable checkpoint features.

Ref: SH-2 (FM 3-25.26), p SH-2-5, para 11-5b

Availability of reliable checkpoint features is more critical when selecting a route that you must cover during night operations. The degree of visibility and ease of recognition are the keys to the proper selection of these features.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5b(1)

QUESTION: What is cover?

ANSWER: Cover is protection from the effects of fire.

Ref: SH-2 (FM 3-25.26), p SH-2-2, para 11-4a(2), and SH-2-4, para 11-4b(3)(c)

Ref: SH-7 (STP 21-24-SMCT), Task 1, pp SH-7-2 and SH-7-3

When planning your route, you must take advantage of everything the terrain offers to protect and cover your squad, especially if you are beyond the forward edge of battle area (FEBA)

(FEBA). You must also consider the enemy's weapon capabilities and the known or suspected enemy emplacements. You must visualize a cross section of the terrain and determine where the enemy will not be able to place effective direct fire on your route. You accomplish this by using every ravine or depression in the ground you can, or even the slope of the land.

QUESTION: What is concealment?

ANSWER: Concealment is protection from observation.

Ref: SH-2 (FM 3-25.26), p SH-2-2, para 11-4a(2) and SH-2-4, 11-4b(3)(c)

Ref: SH-7 (STP 21-24-SMCT), Task 1, p SH-7-3, para 1c (2)

During your study of the map, you must consider concealment not only on the ground but from the air as well. If you are in vehicles, you have to consider the dust or exhaust from the vehicles; they can reveal you to the enemy.

QUESTION: What are the best checkpoint features?

ANSWER: Linear features that cross the route.

Ref: SH-2 (FM 3-25.26), p SH-2-5, para 11-5b(2)

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5b(2 thru 5)

Perennial streams, hard top roads, ridges, valleys, railroads, and power transmissions lines are examples of good checkpoints. Next, it is best to select features that represent elevation changes of at least two contour intervals such as hills, depressions, spurs, and draws. Do not depend on cultural features and vegetation because they are most likely to have changed since the map's last revision. Be alert to see and recognize the checkpoints you identified on your map. It is especially important to recognize the checkpoints along the route to help prevent mistakes while navigating your route.

Traveling along a valley floor or near the crest (not on) of a ridgeline, usually offers easy movement, good navigation checkpoints, and sufficient cover and concealment. It is best to follow terrain features whenever possible and not to fight them.

Ref: SH-7 (STP 21-24-SMCT), Task: 1, p SH-7-3, para 1b thru 4

You will move depending on the probability of enemy contact. If your route takes you into an area where you expect enemy contact, you have to plan your route where your overwatch or fire support positions can provide cover fire for the team that is moving. The positions must have good observation and field of fire. Weapons must have a good observation to fire at known or suspected enemy position along your movement route. You must have observation to control the maneuver of your elements if they make contact.

Your route must give your overwatch teams the best fields of fire; without them, your weapons will not be as effective. They must be in position to provide suppressive fires immediately. Overwatch teams must be able to see your route and fire in your support all the way to your objective.

Select routes that provide the most favorable tactical advantage and meet mission requirements. If enemy air is active or enemy ground forces are in the area of the route, take maximum advantage of cover and concealment. If speed of movement is critical, the route should be over the most easily negotiable terrain, avoiding difficult obstacles. The route should include movement from one easily distinguishable terrain feature to another.

When ordered to move, you must check the terrain based on the above considerations and select the quickest and safest route.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5c

**Step 3, Stay on the Route:** You can stay on your correct route by staying on your compass reading. Also, by recognizing the various checkpoints or landmarks from the map in their anticipated positions and sequences as you pass them (terrain association). These are checkpoints and landmarks that you identified while studying your map and planning the route. The best way to stay on the route is by using both compass readings and terrain association.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5d

**Step 4, Recognize the objective:** Your final destination is rarely a highly recognizable feature such as a dominant hilltop or road junction. Soldiers seldom miss these types of features. They are often dangerous places for soldiers to occupy. The relatively small, obscure place is most likely the destination.

During the navigation, one minor error may cause a squad to miss its target/destination.

QUESTION: How can a team travel over unfamiliar terrain and know when it reaches its destination?

ANSWER: Select a recognizable checkpoint reasonably close to the destination.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5d

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5d

Once you find the recognizable terrain feature near your final destination, plan a short, fine-tuned last leg from the new *expanded objective* to the final destination. For example, you may be able to plan and execute the move as a series of sequenced movements from one checkpoint or landmark to another using both the terrain and a compass to keep you on the correct course. Finally, after arriving at the last checkpoint, you might follow a specific compass azimuth and pace off the relatively short, known distance to the final, pinpoint destination. You can also use this procedure, known as **point navigation**, for short movement out from a unit position to an observation point or a coordinate point.

Ref: SH-7 (STP 21-24-SMCT), Task 1, p SH-7-3, para 4

Special-purpose maps and aerial photographs can assist you in selecting your route. If those aids are available, use them to ensure that you have the most current information.

Map reconnaissance, however, is not a substitute for ground reconnaissance. If time is available and the tactical situation permits, reconnoiter the route that you have to move over.



## CHECK ON LEARNING

**QUESTION:** When establishing checkpoints on your route, what are the best checkpoints to look for and give two examples?

**ANSWER:** Linear features that cross the route, e.g., year round running streams, hard top roads, ridges, valleys, railroads, and power transmission lines.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5b(2)

**QUESTION:** What are the four steps to land navigation?

**ANSWER:**

1. Know where you are.
2. Plan the route.
3. Stay on the route.
4. Recognize the objective.

Ref: SH-2 (FM 3-25.26), pp SH-2-5 and 2-6, para 11-5a thru 11-5d

**QUESTION:** What is the advantage of selecting a checkpoint reasonably close to the final destination and why?

**ANSWER:** Since most objectives are rarely a highly recognizable feature, they may be more difficult to find. By selecting a checkpoint that is easily recognizable in the area close to your objective, you may conduct a procedure called point navigation. That is, you plan a short, fine-tuned last leg by following a specific compass azimuth and pacing off the relatively short, known distance to the final, pinpoint destination.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5d

### 2. Learning Step / Activity 2. Select a Movement Route Using a Map.

Method of Instruction: PE

Technique of Delivery: Small Group Instruction (SGI)

Instructor to Student Ratio: 1:8

Time of Instruction: 30 mins

Media: PE-1

**NOTE:** Conduct PE-1 (see Appendix C).

**NOTE:** PE serves as a check on learning.

## B. ENABLING LEARNING OBJECTIVE

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Lead a team/squad using basic movement techniques.  |
| <b>CONDITIONS:</b> | In a classroom and field environment culminating in an STX and given a team/squad of soldiers.  |
| <b>STANDARDS:</b>  | Led a squad/team using basic techniques by demonstrating an understanding of movement fundamentals; employing the appropriate movement technique, and employing the appropriate method of movement IAW FM 7-8 (SH-4) and FM 21-75 (SH-3). |

1. Learning Step / Activity 1. Movement Fundamentals

Method of Instruction: Conference / Demonstration  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 25 mins  
Media: VGT-3 and VGT-4

Ref: SH-4 (FM 7-8), p SH-4-15, and SH-3 (FM 21-75), p SH-3-2.

**Movement Fundamentals**

**NOTE:** Portions of the ELO should take place outside to demonstrate the different crawls described in this ELO. There is a PE following ELO 3 that will cover other points of instruction in this ELO.

You are a squad leader or team leader in a combat environment. The situation separated your squad/team from your unit and you are on your own. Your task, move from one location to another. Regardless of your mission or situation, you need to leave one area and get to another. What is the best way for you to move your team/squad? This is what we are going to talk about. We'll start our discussion with the basic fundamentals of movement.

**NOTE:** Tell students to turn to SH-4 (FM 7-8), p SH-4-15, and SH-3 (FM 21-75), p SH-3-2.

**QUESTION:** FM 7-8 states that there are five fundamentals of movement and FM 21-75 lists an additional fundamental. What are those fundamentals, and why are they important?

**ANSWER:**

1. FM 7-8. Move on covered and concealed routes: This reduces exposure to enemy observation. This type of movement also limits your use of terrain that can restrict your movement.
2. FM 7-8. Avoid likely ambush sites: This reduces unnecessary risks. Ambushes can be very deadly and give the enemy the advantage.
3. FM 7-8. Enforce camouflage, noise, and light discipline: By enforcing these disciplines, you reduce the chance of detection and increase your chance of surprising the enemy.
4. FM 7-8. Maintain all-round security, to include air guards: Security provides you with early warning and keeps the leader informed of enemy activity.
5. FM 7-8. Use formations and movement techniques based on mission, enemy, terrain, troops and time available (METT-T): When you choose the movement formation/technique, you choose it for control, flexibility, and security.
6. FM 21-75. Do not move directly forward from covered positions: This will reduce skylining (your exposure to enemy fire) and will keep the enemy from pinpointing your position.

QUESTION: Other than walking, there are three other methods of individual movement,. What are they?

**NOTE:** Call on a student to answer and to demonstrate the method. You will discuss later in the lesson when to use these methods of movement.

ANSWER:

1. Low crawl
2. High crawl
3. Rush

Ref: SH-3 (FM 21-75), pp SH-3-2 thru SH-3-4, para Methods of Movement

You learned in your reading assignments that a movement technique is the manner in which a squad uses to traverse terrain. There are three movement techniques.

QUESTIONS: What are the three movement techniques?

ANSWER: 1. Traveling  
2. Traveling Overwatch  
3. Bounding Overwatch

Ref: SH-4 (FM 7-8), p SH-4-5, para 2-10a(1) thru (3)

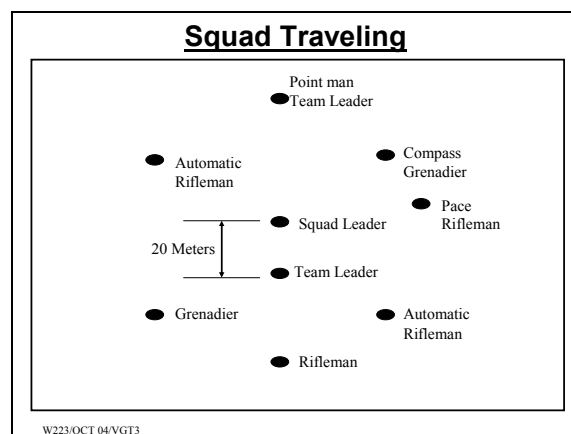
You will determine which movement technique to use based on the likelihood of enemy contact. You have to decide if enemy contact is not likely, possible, or expected.

QUESTION: What type movement do you use when enemy contact is not likely?

ANSWER: Traveling.

Ref: SH-4 (FM 7-8), p SH-4-6, para 2-10a (1)

### SHOW VGT-3, SQUAD TRAVELING



Ref: SH-4 (FM 7-8), p SH-4-7, para 2-10a(1), Figure 2-19

When you need to move quickly and there's no reason to believe the enemy is in the area, use traveling. When traveling, one fire team follows about 20 meters behind the other fire team. The squad leader positions himself where he can control movement and navigation of both fire teams.

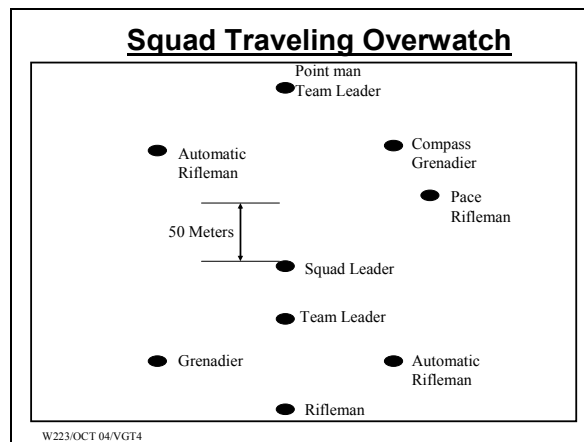
### REMOVE VGT 3

QUESTION: What type of movement do you use when enemy contact is possible?

ANSWER: Traveling overwatch.

Ref: SH-4 (FM 7-8), p SH-4-6, para 2-10a(2)

### SHOW VGT-4, SQUAD TRAVELING OVERWATCH



Ref: SH-4 (FM 7-9), p SH-4-7, Figure 2-20

In traveling overwatch, the trail team follows the lead team by about 50 meters. The intent is to prevent the entire element from being engaged by the enemy. The squad leader positions himself about 50 meters behind the lead team and leads the trail team. It is important to note that distances between formations and the location of the squad leader in the formation are guides. Actual distances between formations will depend on terrain, weather, and visibility. The leader's location will depend on his ability to control movement, navigation, and the activity of his unit. There are no hard and fast rules for every situation.

### REMOVE VGT-4

QUESTION: What type of movement technique do you use when you expect enemy contact?

ANSWER: Bounding overwatch.

Ref: SH-4 (FM 7-8), p SH-4-7, para 2-10a(3)

You use bounding overwatch when you believe the enemy is nearby, when danger is imminent, or when crossing a large open danger area. In bounding overwatch, one fire team moves forward (bounds) while the other team overwatches from a position where it can best support the bounding team by fire. The overwatch team must control the route that the bounding team will use. A bound is usually no more than 150 meters forward of the overwatching team or the limit of effective small arms fire. The lead fire team overwatches first. Each soldier takes up a position that provides cover, concealment, and a good field of fire. Depending on the amount of cover and concealment, the bounding team moves all at once, singly, or in pairs by short rushes or crawling from position to position. The squad leader normally stays with the overwatching team. When your group has five soldiers or less, it moves in one wedge and cannot conduct bounding overwatch by itself. It can overwatch another squad or it can bound, but it cannot do both at the same time.

Ref: SH-3 (FM 21-75), p SH-3-2

### **Methods of Movement**

Earlier we identified the methods of movement: walking, low crawling, high crawling, and rushing.

Move your soldiers by the best method for the situation. Usually, you'll move using short rushes, high crawl, or low crawl.

QUESTION: What are the advantages of the low crawl and when would you use it?

ANSWER: It gives your soldiers the lowest silhouette and you use it to cross where the concealment is very low and enemy fire or observation prevents you from getting up.

Ref: SH-3 (FM 21-75), pp SH-3-2 and SH-3-5

QUESTION: What are the advantages of the high crawl and when would you use it?

ANSWER: The high crawl allows you to move faster than the low crawl. It still provides you with a low silhouette. You use this crawl when there is good concealment but enemy fire prevents you from getting up.

Ref: SH-3 (FM 21-75), p SH-3-3

QUESTION: What are advantages of the rush and when would you use it?

ANSWER: The rush is the fastest way to move from one position to another when enemy fire allows brief exposure.

Ref: SH-3 (FM 21-75), p SH-3-3

Your soldiers can rush singly, in pairs, or by fire teams in 3 to 5 second rushes. Don't have your soldiers "hit the ground" in the open just because they have been up for 5 seconds. Have them look for positions that offer cover and concealment before starting their rush. Once they select a new position, they get up quickly and run to the new position. When the route is through an open area, they should rush by zigzagging. If necessary, they should hit the ground, roll right or left and then rush again. If they have been firing from one position for some time, they should crawl or roll from their position before rushing forward. This may fool the enemy who may have spotted their position.

## CHECK ON LEARNING

QUESTION: What are the six fundamentals of movement we mentioned?

ANSWER: 1. FM 7-8. Move on covered and concealed routes.  
2. FM 7-8. Avoid likely ambush sites.  
3. FM 7-8. Enforce camouflage, noise, and light discipline.  
4. FM 7-8. Maintain all-round security, to include air guards.  
5. FM 7-8. Use formations and movement techniques based on METT-T.  
6. FM 21-75. Do not move directly forward from covered positions.

Ref: SH-4 (FM 7-8), pp SH-4-15; SH-3 (FM 21-75), p SH-3-2

QUESTION: What are the three techniques of movement?

ANSWER: 1. Traveling.  
2. Traveling overwatch.  
3. Bounding overwatch.

Ref: SH-4 (FM 7-8), pp SH-4-5 thru SH-4-7, para 2-10a(1) thru (3).

QUESTION: Other than walking, what are the other three methods of individual movement?

ANSWER: 1. Low crawl.  
2. High crawl.  
3. Rush

Ref: SH-3 (FM 21-75), p SH-3-2 thru SH-3-3

**C. ENABLING LEARNING OBJECTIVE**

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Lead a team/squad in movement formations using proper hand signals and security during movement and at halts.  |
| <b>CONDITIONS:</b> | In a classroom environment culminating in a situational training exercise given a team/squad of soldiers.  |
| <b>STANDARDS:</b>  | Led a team/squad in movement using appropriate formations, hand signals and security during movement and at halts IAW FM 7-8 (SH-4) and FM 21-60 (SH-5). |

1. Learning Step / Activity 1. Movement Formations

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 20 mins  
Media: VGT-5 thru VGT-8

Ref: SH-4 (FM 7-8), p SH-4-2, para 2-7

**Movement Formations**

Formations are arrangements of elements and soldiers in relation to each other. Fire teams and squads use formations for control, flexibility, and security. You select the formation based on your analysis of the factors of METT-T.

QUESTION: What does the acronym METT-T stand for?

ANSWER: Mission, enemy, terrain and weather, troops and time.

Ref: SH-2 (FM 3-25.26), p SH-2-3 thru SH-2-5

Ref: SH-4 (FM 7-8), p SH-4-2, para 2-7

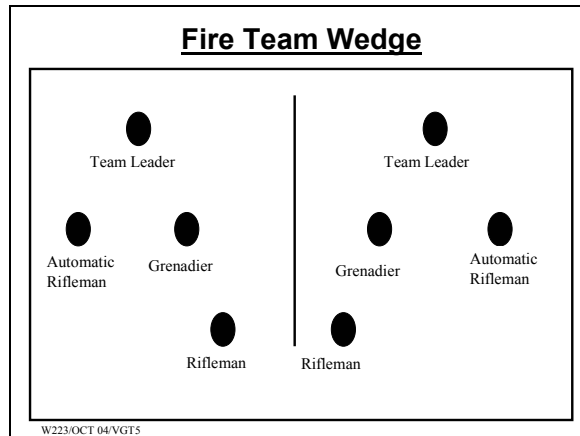
When you move a small group of soldiers in a combat environment, you must form them as a squad and move them as two fire teams. Keep METT-T in mind when selecting your movement techniques and formations.

Your soldiers must be able to see the fire team leader. The fire team leaders must be able to see the squad leader, and the squad leader must be able to see the

team leaders. The distance between each person, and team, will also vary according to METT-T.

### **Fire Team Wedge and File Formations**

#### **SHOW VGT-5, FIRE TEAM WEDGE**



Ref: SH-4 (FM 7-8), pp SH-4-2 thru SH-4-5

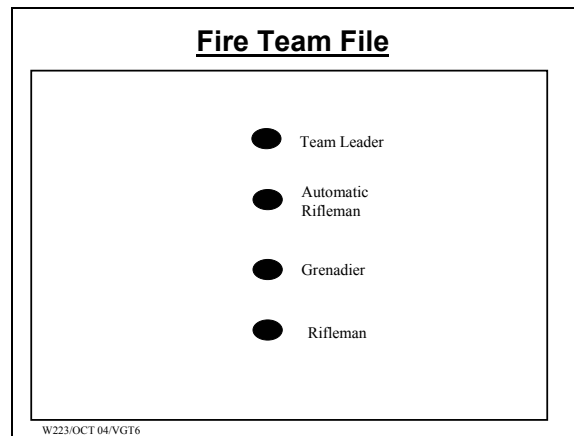
Fire teams normally move in a wedge formation. When used, the wedge formation allows the fire team leader to lead by example. He controls the fire team by telling them to follow him and do as he does. When he moves to the left, his soldiers move to the left. When he gets down, they get down, and when he shoots, they shoot. If the fire team leader is going to lead by example, all his soldiers must be able to see him. Normally you want to keep a 10-meter interval between soldiers. There may be times when the wedge formation will change based on the terrain or some other factor. This should only be a temporary condition, and as soon as the condition changes, soldiers should spread back into the wedge without a command to do so.

When the terrain precludes use of the wedge formation, fire teams use the file formation.

#### **REMOVE VGT-5**



## SHOW VGT-6, FIRE TEAM FILE



Ref: SH-4 (FM 7-8), p SH-4-3, Figure 2-5

**NOTE:** Inform the students that there will be a PE/demonstration following this portion of class so they will be able to see how the formations look and the distances between soldiers.

## REMOVE VGT-6

### Squad Formations:

We will now discuss the squad formations. Squad formations describe the relationships between the fire teams.

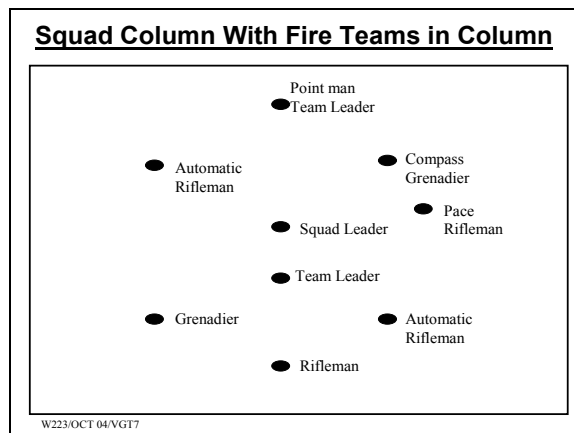
**QUESTION:** What are the three squad formations?

**ANSWER:**

1. Squad Column.
2. Squad Line.
3. Squad File.

Ref: SH-4 (FM 7-8), p SH-4-3, Figures 2-7 thru 2-9

## SHOW VGT-7, SQUAD COLUMN WITH FIRE TEAMS IN COLUMN



Ref: SH-4 (FM 7-8), p SH-4-4, Figure 2-7

Ref: SH-4 (FM7-8), p SH-4-4, para 2-9a

The squad column is the squad's most common formation. It provides good dispersion laterally and in depth without sacrificing control and facilitates maneuver. The lead squad is the base fire team. When the squad moves independently or as the rear element of a squad, the rifleman in the trail fire team provides rear security.

QUESTION: What fire team formations are the fire teams in when the squad is in column formation?

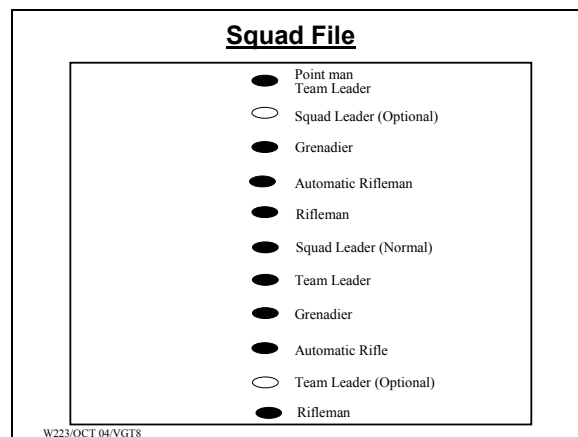
ANSWER: Wedge

Ref: SH-4 (FM 7-8), pp SH-4-2 and SH-4-4, Figures 2-4 and 2-7

### REMOVE VGT-7

The squad can provide maximum firepower to the front when traveling in a squad line. When a squad is acting as the base squad, the fire team on the right is the base fire team.

### SHOW VGT-8, SQUAD FILE



Ref: SH-4 (FM 7-8), p Sh-4-5, Figure 2-8

Ref: SH-4 (FM 7-8), p SH-4-4, para 2-9b and Figure 2-8

**NOTE:** Accomplish this during the PE following ELO C.

Ref: SH-4 (FM 7-8), p SH-4-5, para 2-8c

When not traveling in a column or line, the squad travels in a file. The squad file has the same characteristics as the fire team file. The squad leader should move to the second or first position if he desires to increase his control over the formation and to exert greater morale. Being at the front, he can make decisions immediately.

QUESTION: What can a squad leader do to add control at the rear of the formation?

ANSWER: Move a team leader to the rear of the formation, placing him next to last in the file, in front of the rear guard rifleman.

Ref: SH-4 (FM 7-8), p SH-4-5, para 2-8c, and Figure 2-9

### **REMOVE VGT-8**

## **2. Learning Step / Activity 2. Arm-and-Hand Signals**

Method of Instruction: Demonstration  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 25 mins  
Media: None

Ref: SH-5 (FM 21-60), pp SH-5-2 thru SH-5-14

### **Arm-and-Hand Signals**

As a squad leader or fire team leader, you control and lead your soldiers. We already talked about being out front and leading by example. You lead by example and you control using voice commands, arm-and-hand signals, and other visual or sound signals, such as whistles.

We will concentrate on hand-and-arm signals. As a homework assignment, we tasked you to read arm-and-hand signals in SH-5-1, FM 21-60, para 2-4 and 2-5.

#### **NOTE:**

- Instruct students to reference their SH-5 (FM 21-60).
- Demonstrate the 35 hand signals and ensure students repeat the signals.
- Watch the students perform the signals and make corrections.
- Once finished demonstrating all the signals, test students by randomly asking them to perform certain arm-and-hand signals. Allow them to use their reference.

### **CHECK ON LEARNING**

The random checking of arm-and-hand signals during this learning step activity meets the requirements of conducting a check on learning.

## **3. Learning Step / Activity 3. Security During Movements and at Halts**

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 10 mins  
Media: None

Ref: SH-9 (FM7-8), p SH-9-2, para 1-9

Security is all important, and you must ensure that security is constant during movements and during halts.

During movement, teams/squads enhance security by--

- Using cover and concealment.
- Moving as fast as the situation allows.
- Using appropriate movement formations and techniques.
- Using Individual camouflage that is appropriate to the terrain and season.
- Use of terrain, as you studied earlier.

Ref: SH-9 (FM 7-8), p SH-9-2, para 2-4

The formations and movement techniques you decide to use also provide security by--

- Positioning each soldier so that he can observe and fire into a specific sector that overlaps with other soldier's sectors of fire.
- Placing a small element forward to allow the squad to make contact with only the lead element and give the remainder of the squad freedom to maneuver.
- Providing overwatch for a portion of the squad.

Ref: SH-9, (FM 7-8), pp SH-9-3, para 2-4c thru e

When you select the formation and technique, you must consider other requirements such as speed and control as well as security.

During short halts, teams/squads enhance security by the soldiers--

- Spreading out and assuming prone positions behind cover.
- Watching their same sectors that they are responsible for during movement.
- Establishing an observation post.
- Orienting machine guns and antiarmor weapons along likely enemy approaches.
- Remaining alert and keeping movement to a minimum.
- Using night vision devices during hours of darkness.

During long halts, the squad--

- Establishes a perimeter defense.
- Prepares for the defense.
- Prepares, for additional security, the squad leader may set up an ambush providing a specific location and instructions concerning the initiation and conduct of the ambush and the link-up and the team with the squad.

4. Learning Step / Activity 4. Conduct Movement

Method of Instruction: PE  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1hr 30 mins  
Media: PE-2

Conduct PE-2 (see Appendix C).

**CHECK ON LEARNING**

The demonstration during the learning step meets the requirement of conducting a check on learning.

**D. ENABLING LEARNING OBJECTIVE**

|                    |   |
|--------------------|---|
| <b>ACTION:</b>     | Lead a team/squad at danger areas.  |
| <b>CONDITIONS:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers. |
| <b>STANDARDS:</b>  | Led a team/squad through the actions necessary to cross a danger area IAW FM 7-8 (SH-6).                      |

1. Learning Step / Activity 1. Perform Actions at a Danger Area (While Dismounted)

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 40 mins  
Media: VGT-9 thru VGT-14

Ref: SH-6 (FM 7-8), p SH-6-2, para 2-11

**Perform Actions at a Danger Area (While Dismounted)**

As a leader conducting tactical movement in an area of operation, you will encounter some type of danger area. This lesson will show you how to cross that danger area without sacrificing time, equipment, or personnel to accomplish your mission.

**NOTE:** FM 7-8 refers to procedures for crossing danger areas at the platoon level. The procedures described below are the same procedures a smaller unit uses to cross a danger area.

Question: How must a platoon cross a danger area?

Answer: With great caution and as quickly as possible.

Ref: SH-6 (FM 7-8), p SH-6-2, para 2-11

A danger area is any place on a route where the squad leader determines that the enemy may observe, fire, or both on his squad. Squads try to avoid danger areas. If a squad must cross a danger area, it does so with great caution and as quickly as possible.

**NOTE:** Ask the students to explain some of the danger areas that they may encounter while conducting movements in a field situation.

Ref: SH-6 (FM 7-8), p SH-6-2, para 2-11a

There are several different types of danger areas that you as a leader will encounter while moving through your area of operations. Below are seven examples of some danger areas that you may encounter.

**NOTE:** Discuss the following examples of danger areas and crossing procedures.

- Open areas
- Roads and trails
- Villages
- Enemy positions
- Minefields
- Streams
- Wire obstacles

**NOTE:** If at all possible, you should bypass danger areas.

**QUESTION:** Based on what considerations does a leader decide on how a squad will cross a danger area?

**ANSWER:** Based on the time he has, the size of the unit, the size of the danger area, the fields of fire into the area, and the amount of security he can post.

Ref: SH-6-3 (FM 7-8), para 2-11b(1)

As a squad--during movement--you may be moving as the lead squad/team of a larger unit when you encounter a danger area that your squad must cross.

**QUESTION:** What are the four steps necessary to cross danger areas?

**ANSWER:**

1. Designate near-and far-side security.
2. Secure the near side security (right, left, and rear flanks).
3. Reconnoiter and secure the far side.
4. Execute crossing the danger area.

Ref: SH-6, (FM 7-8), p SH-6-3, para 2-11b

The squad leader decides how the squad will cross based on the time he has, the size of the unit, the size of the danger area, the fields of fire into the area, and the amount of security he can post. A small unit may cross all at once, in buddy teams, or one soldier at a time. A large unit normally crosses its elements one at a time. As each element crosses, it moves to an overwatch position or to the far-side rally point until told to continue movement.

To maintain momentum, trailing squads normally cross the danger area without conducting their own reconnaissance or establishing far-side security. The lead squad conducts reconnaissance and maintains far-side security for the whole force.

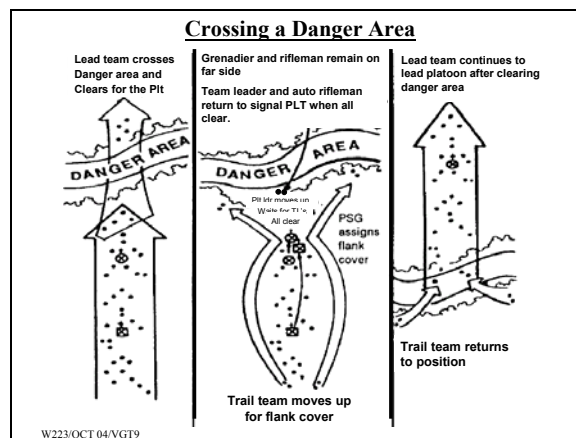
**NOTE:** The secured area must be large enough to allow the full deployment of the remainder of the unit.

**QUESTION:** When operating as an independent squad who decides where the squad will cross the linear danger area?

**ANSWER:** The squad leader reconnoiters the danger area and selects the crossing point that provides the best cover and concealment.

Ref: SH-6 (FM 7-8), p SH-6-3, para 2-11c

#### **SHOW VGT-9, CROSSING A DANGER AREA**



Ref: Sh-6 (FM 7-8), p SH-6-3, Figure 2-27

Ref: SH-6 (FM 7-8), pp SH-6-3 and SH-6-4

As a squad leader of an independent squad or of the lead squad for a larger unit you come across a linear danger area. You must move your squad through the

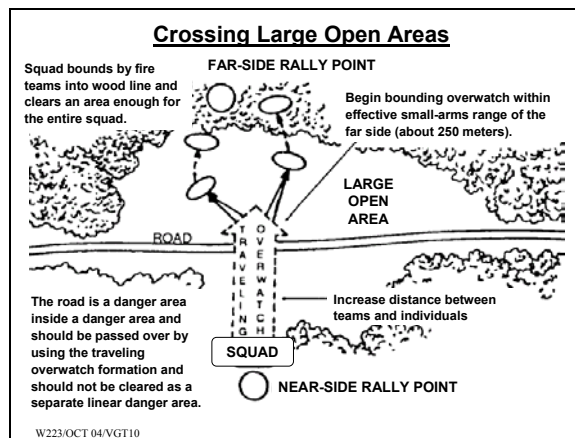
danger area or assume responsibilities of the base squad during the crossing.

**NOTE:** Direct the students to turn to p SH-6-4 of SH-6 and discuss the squad's actions to cross a linear danger area. Call on students to read the 16 actions.

### REMOVE VGT-9

The two most common danger areas are the large and small open areas. They each require different methods that you must know in order to successfully cross them.

### SHOW VGT-10, CROSSING LARGE OPEN AREAS



Ref: SH-6 (FM 78-8), p Sh-6-5, Figure 2-28

Ref: SH-6 (FM 7-8), pp SH-6-4 and SH-6-5, para 2-11d

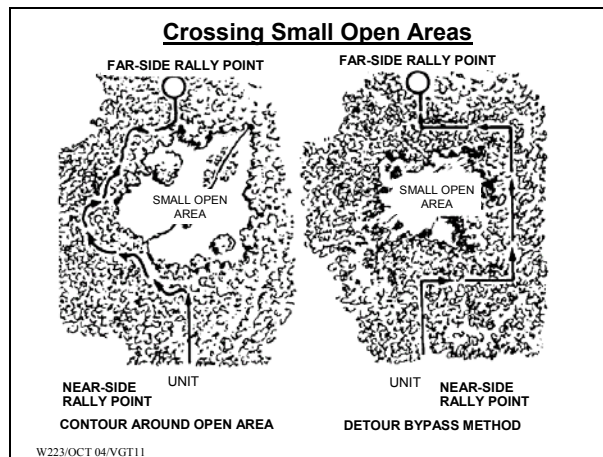
You must use a combination of traveling overwatch and bounding overwatch techniques to cross a large danger area that the squad cannot bypass due to time. Units use the traveling overwatch technique to save time. At any point in the open area where the squad leader expects enemy contact or where the squad comes within range of small arms fire of the far side (about 250 meters), the squad moves using the bounding overwatch technique. Once beyond the open area, the squad reforms and continues the mission.

### REMOVE VGT-10

There are two techniques leaders may use to cross small danger areas in the time allowed for the mission: detour bypass and contouring around the open area.



## SHOW VGT-11, CROSSING SMALL OPEN AREAS



Ref: SH-6 (FM 7-8), p SH-6-6, Figure 2-29

Ref: SH-6 (FM 7-8), p SH-6-5, para 2-11e

**Detour bypass method:** By the use of 90 degree turns to the right or left, the squad moves around the open area until reaching the far side where it then continues its mission. Do not add to the distance of the planned route the pace count of the offset and return legs.

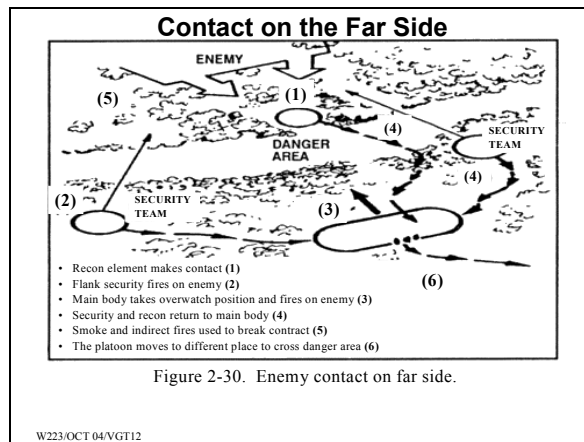
**Contouring around the open area:** The leader designates a rally point on the far side with the movement azimuth, decides which side of the open area to contour around (after considering the distance, terrain, cover and concealment), and moves around the open area. He uses the wood line and vegetation for cover and concealment. When the squad arrives at the rally point on the far side, the leader reassumes the azimuth to the objective area and continues the mission.

## REMOVE VGT-11

**NOTE:** Visual aids VGT-12 through VGT-14 provide the procedures and responsibilities of the elements when enemy contacts occur in and around the danger area: VGT-12, Contact on the Far Side, VGT-13, Contact on a Road or Trail, and VGT-14, Contact on the Near Side.

**NOTE:** Discuss the actions teams take using the visual aids. You will also cover this information in later lessons.

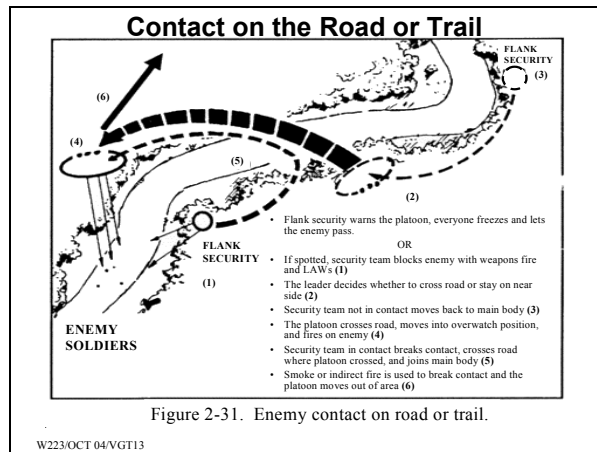
## SHOW VGT-12, CONTACT ON THE FAR SIDE



Ref: SH-6 (FM 7-8), p SH-6-6, Figure 2-30

## REMOVE VGT-12

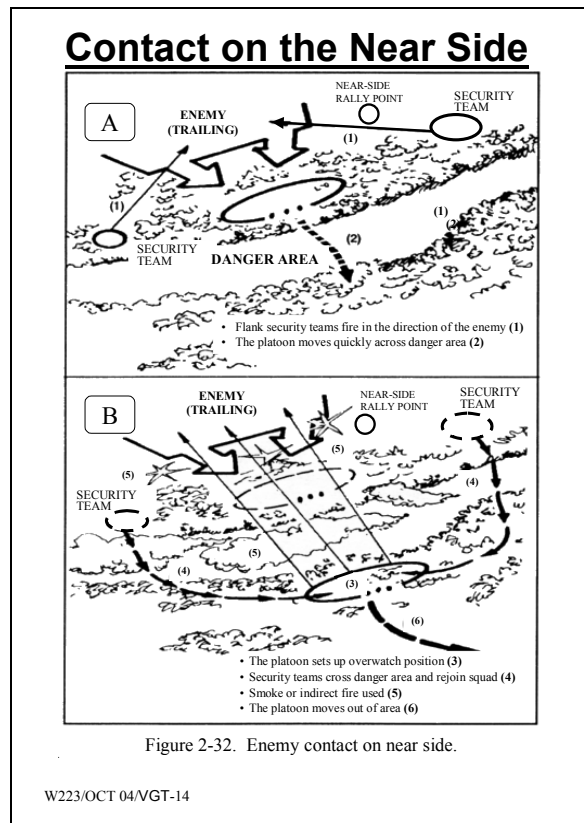
## SHOW VGT-13, CONTACT ON THE ROAD OR TRAIL



Ref: SH-6 (FM 7-8), p SH-6-7, Figure 2-31

## REMOVE VGT-13

## SHOW VGT-14, CONTACT ON THE NEAR SIDE



Ref: SH-6 (FM7-8), p SH-6-8, Figure 2-32

## REMOVE VGT-14

### CHECK ON LEARNING

QUESTION: What is a danger area?

ANSWER: Any place on a route where the squad leader determines that the enemy may observe, fire, or both on his squad.

Ref: SH-6 (FM 7-8), p SH-6-2, para 2-11

QUESTION: What is the first step for a squad when it crosses a danger area independently or as the lead element of a larger force?

ANSWER: Designate near-and far-side rally points.

Ref: SH-6 (FM 7-8), p SH-6-3, para 2-11b

QUESTION: Who is responsible for clearing the far side of a danger area when crossing a linear danger area?

ANSWER: The far-side security will clear the far side of the danger area.

Ref: SH-6 (FM 7-8), p SH-6-4, para 2-11c(8)

QUESTION: What are the two techniques used when crossing a small open area?

ANSWER: Detour bypass method and contouring around the open area.

Ref: SH-6, (FM 7-8), p SH-6-5, para 2-11e

2. Learning Step / Activity 2. Crossing Danger Areas

Method of Instruction: PE  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 1 hr  
Media: PE-3

**NOTE:** SGLs will allow students a ten minute break as the situation presents itself, approximately every 50 minutes.

Conduct PE-3 (see Appendix C).

E. **ENABLING LEARNING OBJECTIVE**

|                    |  |
|--------------------|--|
| <b>ACTION:</b>     | Enforce detection prevention measures.   |
| <b>CONDITIONS:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.  |
| <b>STANDARDS:</b>  | Enforced detection prevention measures by maintaining noise, light, and litter discipline denying detection IAW STP 21-24-SMCT (SH-8) and FM 21-75 (SH-3). |

1. Learning Step / Activity 1. Enforce Detection Prevention Measures

Method of Instruction: Conference / Discussion  
Technique of Delivery: Small Group Instruction (SGI)  
Instructor to Student Ratio: 1:8  
Time of Instruction: 20 mins  
Media: None

Ref: SH-8 (STP 21-1-SMCT)

**Noise discipline.** Whether in a fixed position or moving as part of a squad, keep all noise to an absolute minimum. Any noise out of the ordinary, especially noises that can come about only from a human, can betray the location of the unit to the enemy.

Such noises include, among other things, speech or any metal contact.

You can take various steps to reduce the chances of betraying the squad by sound. These include Tape or pad metal clips or other attachments to prevent their striking other objects. Ensure soldiers tighten their weapon slings or wrap them

around the weapon and tuck in loose ends. Make sure, however, not to restrict the moving parts of the weapon, it could prevent its operation.

Prior to departing on any kind of movement--where contact with the enemy is possible--make sure you "noise check" your soldiers. Have them jump up and down in place and adjust or pad their equipment as needed. Use radios and field phones only when necessary, keeping the volume at a level that only the radio operator can hear.

During movement, control the squad through arm-and-hand signals rather than voice. Therefore, everyone should be able to see the leader. Also, squad members should repeat any arm-and-hand signals given to ensure that all members of the squad received the signal.

During the hours of darkness, sound travels farther. This means that you take greater care to reduce all talking and other sounds. Sounds can also mask other sounds. For example, wind or rain tends to mask movement through underbrush. You may consider timing your movement to coincide with the movement of vegetation caused by the wind.

**Light discipline.** Light sources attract the human eye, especially in periods of limited visibility. The longer the exposure to darkness, the greater the eye's sensitivity to light becomes. It is possible for the enemy to detect and pinpoint your position by the glow from a single cigarette or the flare of a match or lighter.

You must consider and mask all possible sources of illumination, whether generated or reflected. Of all lights, white light is the easiest to detect over distance as it incorporates all colors of light in the spectrum visible to the human eye.

The use of filters or colored light bulbs will reduce the risk of detection, but the best method is to avoid the use of any light at all.

If for any reason you need light, you must ensure you shield the light from view from any direction. Masking may be little more than throwing a poncho over the individuals using the light (such as doing a map check during movement) to employing blankets or other material to block windows in a building.

When considering masking lights, no light is too small. Soldiers sometimes unintentionally give away their positions by checking their watches for time.

You must pay attention in dealing with nominally dull surfaces, such as the metal parts of weapons or the metal clips on load carrying equipment (LCE). Over a period of time and repeated use, these surfaces can become polished and reflect light that can expose your position. Frequently inspect all such surfaces, and as necessary, darken them with a substance that does not reflect light.

An additional consideration in dealing with light in periods of limited visibility is the soldier's own night vision. Whenever a soldier is about to become exposed to a light source, he should cover one eye in order to retain the night vision in that eye.

**Litter discipline.** Litter discipline can be critical to operations. During the Civil War, the Northern forces formulated their battle plan for Antietam based on the Northern Army of Virginia's operational orders wrapped around three cigars, found by a Union soldier on the ground of an abandoned Confederate camp site. Historians can only wonder what would have been the consequences of General Lee's operations that summer if the Northern forces had not found his plans as litter on the battlefield.

When a unit stops to consume a meal, leaders must ensure that soldiers police up all refuse. The location and number of open packets will tell the enemy the number of personnel in the unit. After every stop, soldiers must ensure that nothing is left to give the enemy any clue that they were in the area. The policing of litter is not solely for the places where your unit stops but also when on the move. Trail soldiers should check the trail for items lost or dropped by those ahead of them.

Assigning soldiers to collect the squad's trash and carry it until they can properly dispose of the trash is one possible solution. They may bury it on site if the time and situation allow. However, if you decide to bury it on site, you must ensure that you camouflage the site to prevent its detection.

An important aspect in dealing with all litter is a careful examination of what it contains. It is important that you do not discard any document that may provide the enemy with any type of intelligence about your unit.

**CHECK ON LEARNING:** Conduct a check on learning and summarize the ELO.

### **CHECK ON LEARNING**

QUESTION: When complying with noise discipline what should you not do to your weapon?

ANSWER: Be careful not to restrict the moving parts of the weapon which could prevent its operation.

Ref: SH-8 (STP 21-1 SMCT), Task 071-331-0815

#### SECTION IV. SUMMARY

|   |
|---|
| Method of Instruction: <u>Conference / Discussion</u>       |
| Technique of Delivery: <u>Small Group Instruction (SGI)</u> |
| Instructor to Student Ratio is: <u>1:8</u>                  |
| Time of Instruction: <u>15 mins</u>                         |
| Media: <u>None</u>  |

#### Check on Learning

QUESTION: What are the four steps to land navigation?

ANSWER: Know where you are, plan the route, stay on the route, and recognize the objective.

Ref: SH-2 (FM 3-25.26), pp SH-2-5 and SH-2-6, para 11-5a thru d

QUESTION: What are decision points?

ANSWER: Checkpoints located at places where changes in direction are necessary.

Ref: SH-2 (FM 3-25.26), p SH-2-6, para 11-5b(3)

QUESTION: What does OCOKA stand for?

ANSWER: Observations and Fields of Fire, Cover and Concealment, Obstacles, Key Terrain, Avenues of Approach.

Ref: SH-2 (FM 3-25.26), p SH-2-2, para 11-4a

QUESTION: What does your unit's ability to move depend on?

ANSWER: Your movement skills and those of your soldiers.

Ref: SH-3 (FM 21-75), p SH-3-2, para Movement Techniques

QUESTION: Which method of movement is the fastest way to move from one position to another?

ANSWER: The rush movement.

Ref: SH-3 (FM 21-75), p SH-3-3, para Methods of Movement (Rush)

QUESTION: On what factors does the leader base the selection of a movement technique?

ANSWER: The likelihood of enemy contact and the need for speed.

Ref: SH-4 (FM 7-8), p SH-4-5, para 2-10



**Check on  
Learning,  
cont**

QUESTION: If enemy contact is not likely and speed is necessary, what movement technique would you use?

ANSWER: Traveling.

Ref: SH-4 (FM 7-8), p SH-4-6, para 2-10a(1)

QUESTION: Why do squads use formations?

ANSWER: For control, flexibility, and security.

Ref: SH-4 (FM 7-8), p SH-4-2, para 2-7

QUESTION: What are the two fire team formations?

ANSWER: Wedge and File

Ref: SH-4 (FM 7-8), pp SH-4-2 and SH-4-3, para 2-7a and b

QUESTION: what is the normal interval in a fire team wedge formation?

ANSWER: 10 meters

Ref: SH-4 (FM 7-8), p SH-4-2, para 2-7a

QUESTION: What is the squad's most common squad formation?

ANSWER: Squad column.

Ref: SH-4 (FM 7-8), p SH-4-4, para 2-8a

QUESTION: When crossing a large danger area, what types of movement techniques would you use?

ANSWER: Combination of traveling overwatch and bounding overwatch.

Ref: SH-6 (FM 7-8), p SH-6-4, para 2-11d

QUESTION: What are the two methods used when crossing a small danger area?

ANSWER: Detour bypass method and contouring around the open area.

Ref: SH-6 (FM 7-8), p SH-6-5, para 2-11e

QUESTION: Once in range of enemy small arms fire, what movement technique should you use?

ANSWER: Bounding overwatch technique.

Ref: SH-6 (FM 7-8), p SH-6-4, para 2-11d

---

**Check on  
Learning,  
cont**

QUESTION: What degree of turns do you use when applying the detour bypass method of crossing a small open area?

ANSWER: 90 degree turns.

Ref: SH-6 (FM 7-8), p SH-6-5, para 2-11e(1)

QUESTION: What discipline are you practicing if you avoid all unnecessary vehicular and foot movement?

ANSWER: Noise discipline.

Ref: SH-8, STP 21-1-SMCT, p SH-8-2, Performance Step 1.a

QUESTION: Where does the squad leader orient the squad's machine guns and antiarmor weapons during short halts?

ANSWER: Along likely enemy approaches.

Ref: SH-9 (FM-7-8), p SH-9-3, para 2-4c

**Review /  
Summarize  
Lesson**

---

During this class you learned how to plan and conduct movements individually and collectively as a unit. You now have the basic knowledge and ability to select the best possible route that you and your squad will need to navigate in order to successfully complete your mission. We have used time proven techniques to teach you how to use the right formation with the right terrain and enemy situation. We have also taught you how to cross danger areas that you may encounter.

---

## SECTION V. STUDENT EVALUATION

### Testing Requirements

---

**NOTE:** Describe how the student must demonstrate accomplishment of the TLO. Refer student to the Student Evaluation Plan.

- You will take a written examination. The examination will contain questions from this lesson. You must correctly answer 70 percent or more of the questions on the examination to receive a GO.
- You will receive an evaluation on your ability to lead a team/squad in movement during the end of course situational training exercise. It is a non-graded event.

**NOTES:**

- Inform the students where and when their examination will take place as posted on the training schedule and when they will receive feedback on the test. Include any retest information.
- Inform the students that they must turn in all recoverable reference material after the examination.

### Feedback Requirements

---

**NOTE:** Feedback is essential to effective learning. Schedule and provide feedback on the evaluation and any information to help answer students' questions about the test. Provide remedial training as needed.

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Enabling Learning Objective A

Learning Step 1

VGT-1, Step 1, Know Where You Are

## **Step 1, Know Where You Are**

- **Your directional orientation.**
- **The direction and distances to your objective.**
- **Other landmarks and features.**
- **Any impassable terrain, the enemy, and danger areas.**
- **Both advantages and disadvantages presented by the terrain between you and your objective.**

W223/OCT 04/VGT1

## **STEP 2, Plan the Route**

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>● Travel time.</li><li>● Travel distance.</li><li>● Maneuver room needed.</li><li>● Trafficability.</li><li>● Load-bearing capacities of the soil.</li><li>● Energy expenditure of soldiers.</li></ul> | <ul style="list-style-type: none"><li>● Factors of METT-T.</li><li>● Tactical aspect of terrain (OCOKA).</li><li>● Ease of logistical support.</li><li>● Potential for surprising the enemy.</li><li>● Availability of control and coordination features.</li><li>● Availability of good checkpoints and steering marks.</li></ul> |
|--|--|

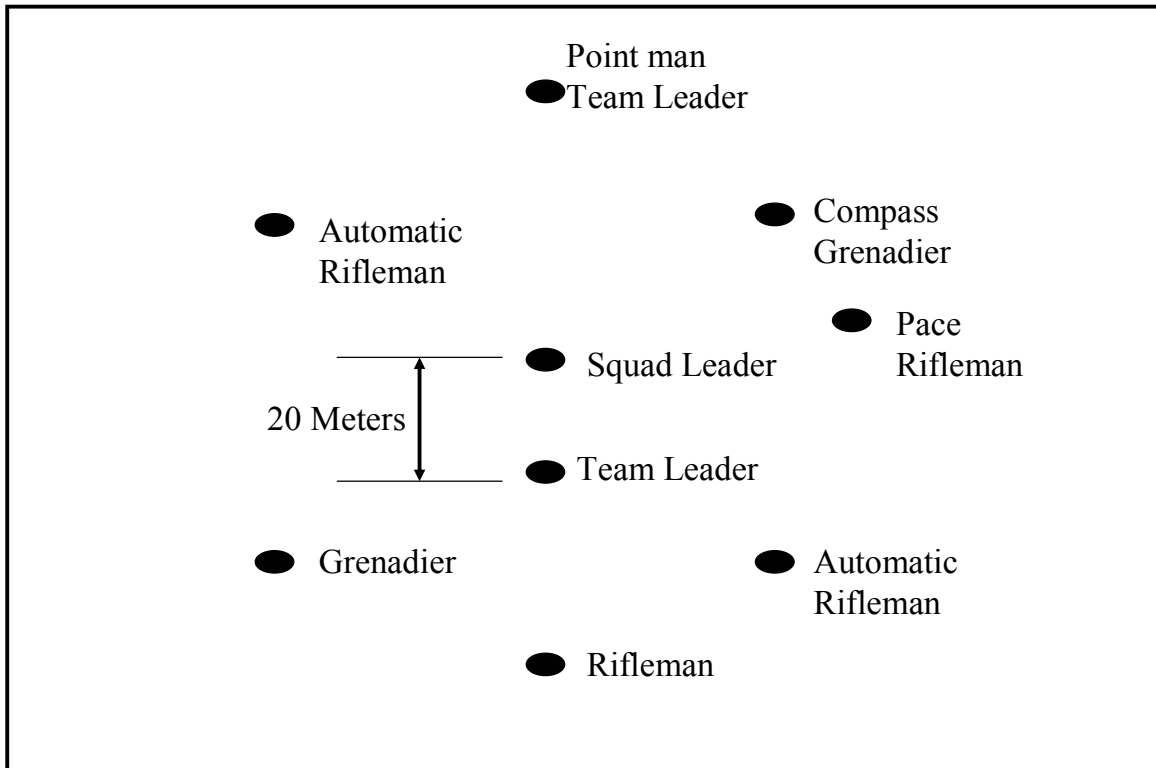
W223/OCT 04/VGT2

Enabling Learning Objective B

Learning Step 1

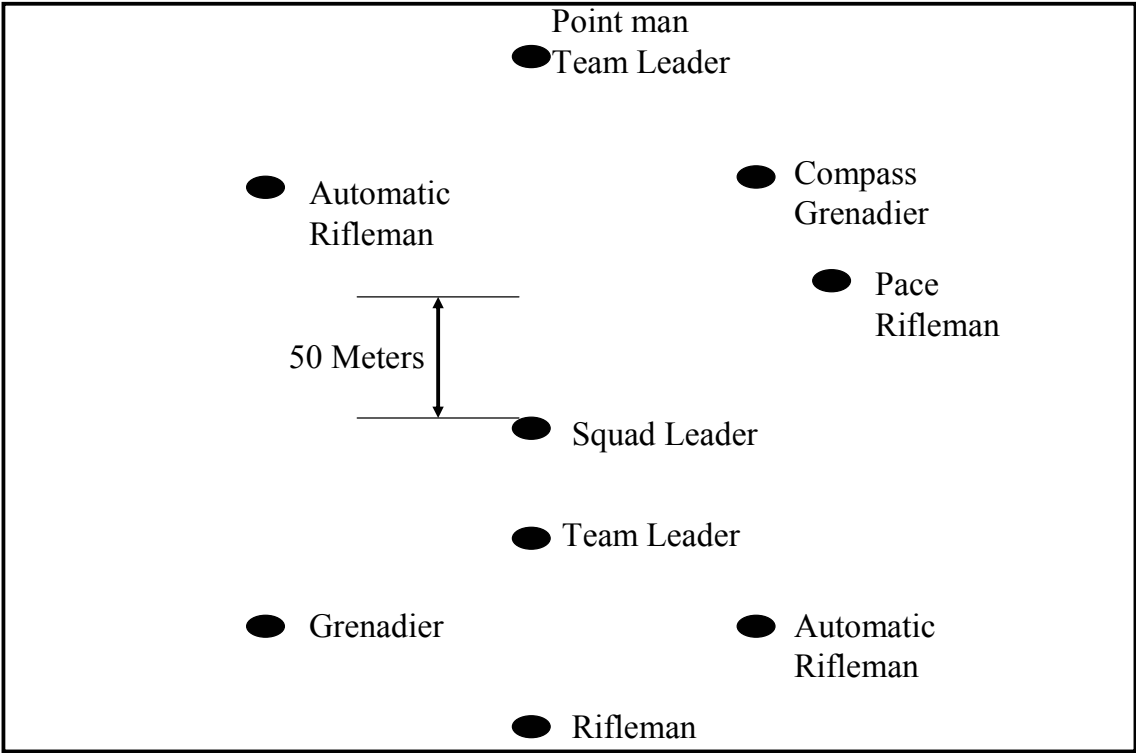
VGT-3, Squad Traveling

## Squad Traveling



W223/OCT 04/VGT3

# Squad Traveling Overwatch



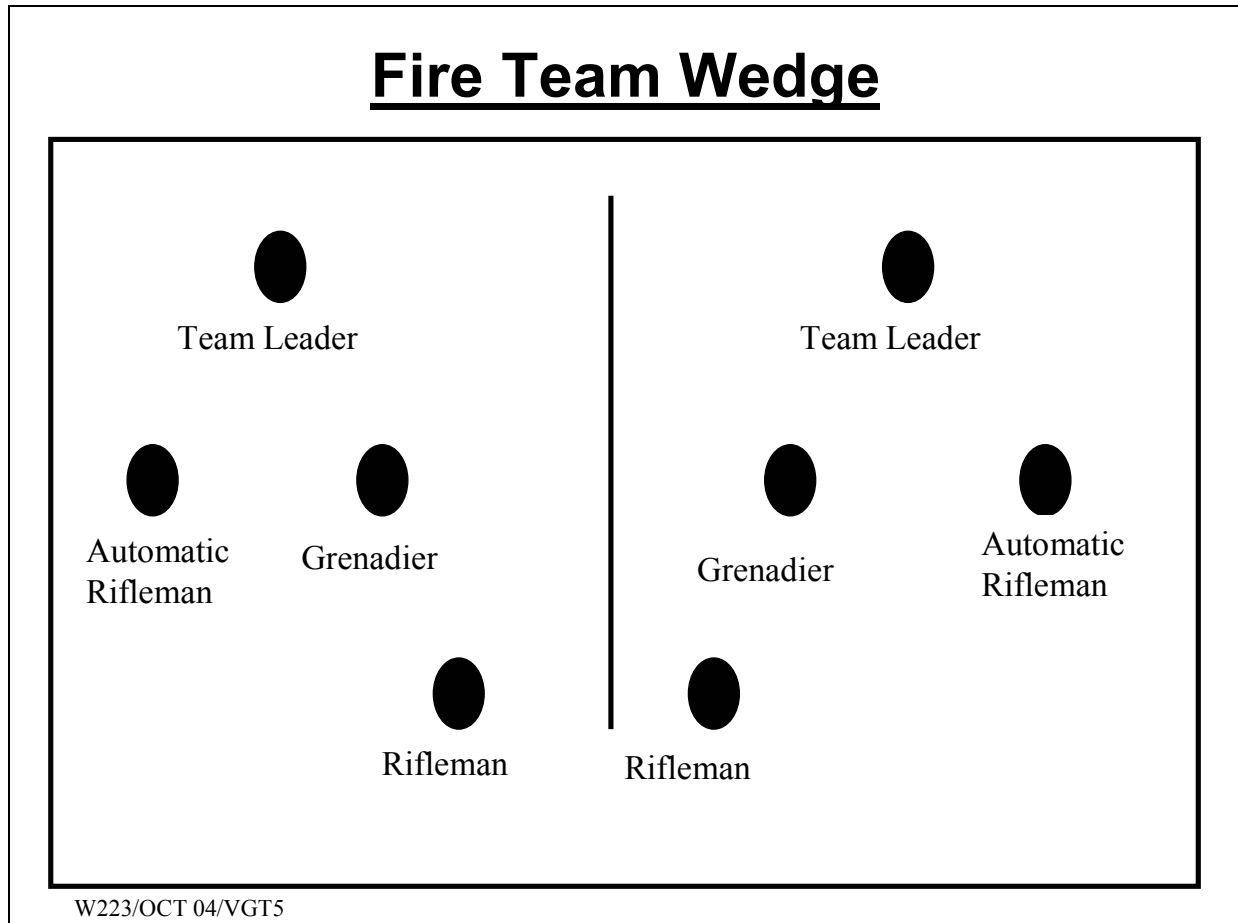
W223/OCT 04/VGT4



Enabling Learning Objective C

Learning Step 1

VGT-5, Fire Team Wedge



## **Fire Team File**

 Team Leader

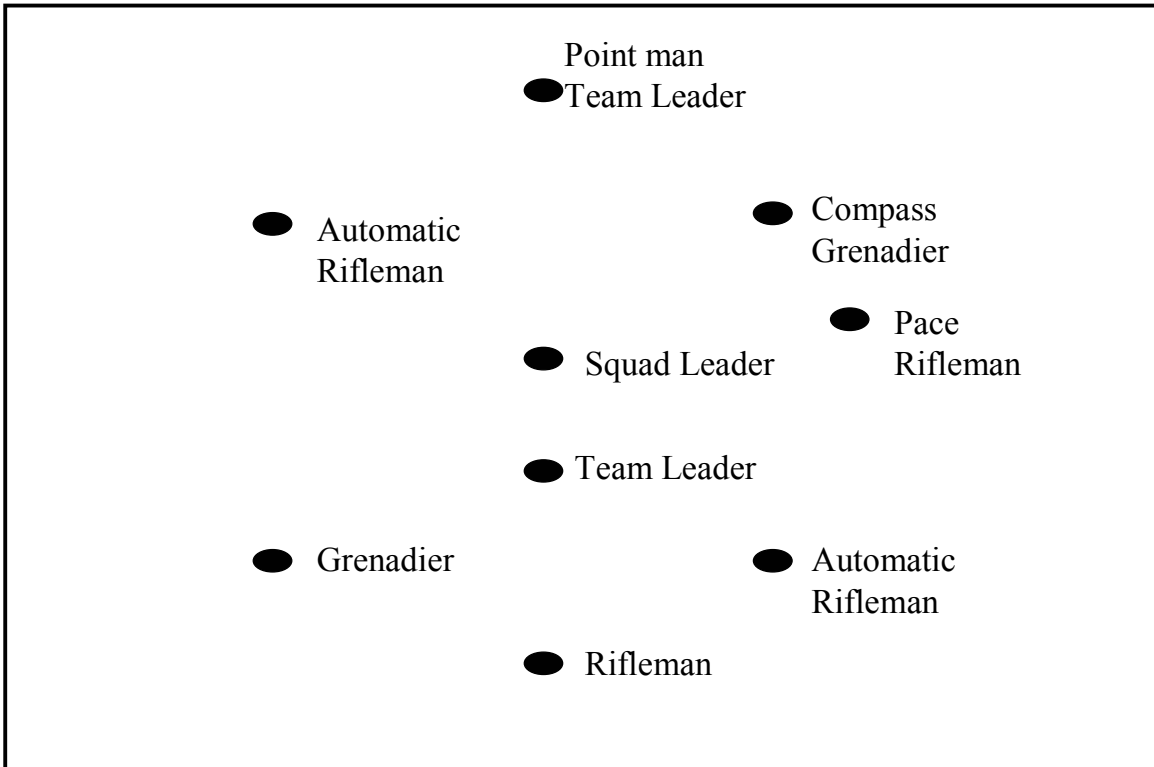
 Automatic  
Rifleman

 Grenadier

 Rifleman












W223/OCT 04/VGT6

## **Squad Column With Fire Teams in Column**



W223/OCT 04/VGT7

# Squad File

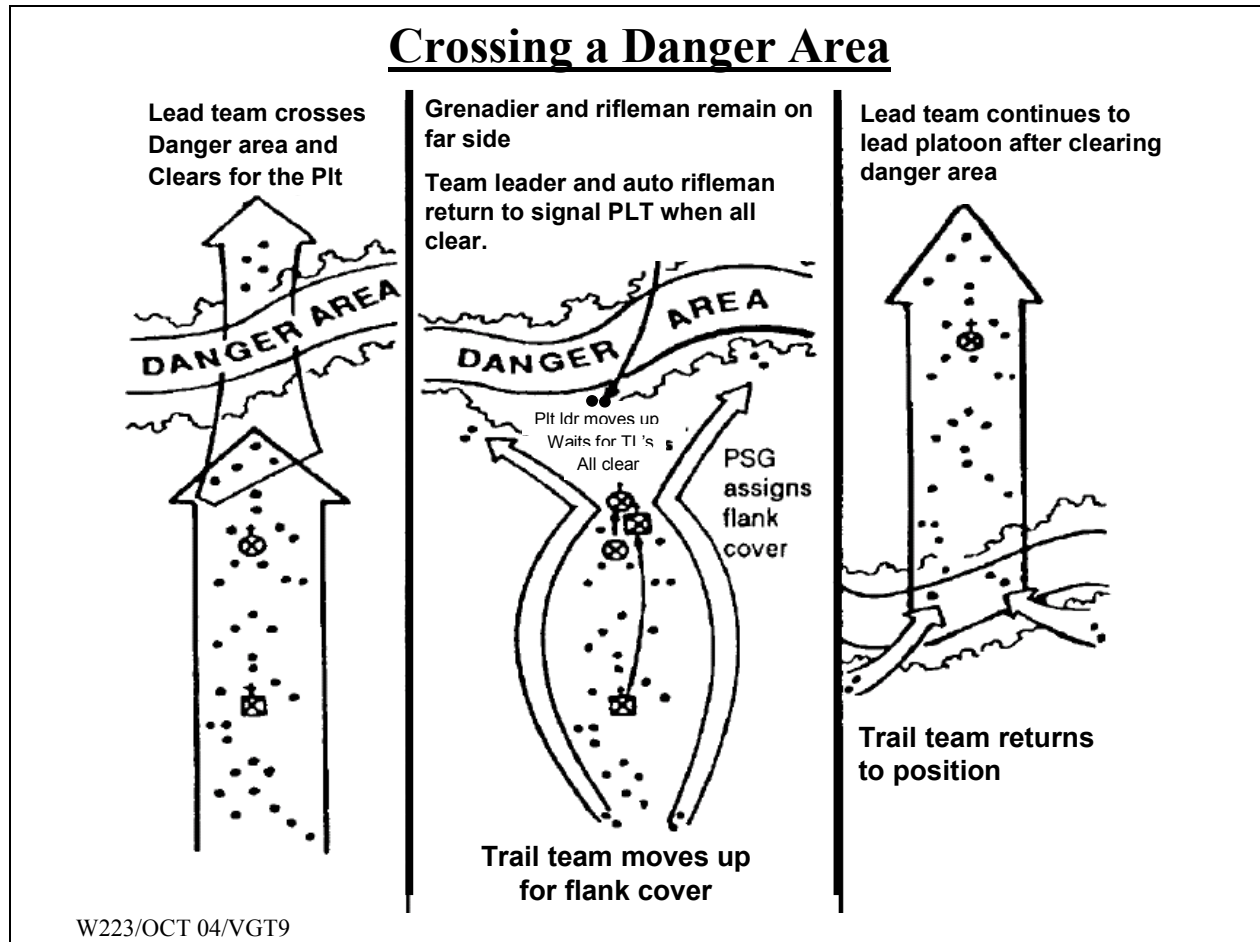
|   |                          |
|---|--------------------------|
|    | Point man<br>Team Leader |
|    | Squad Leader (Optional)  |
|    | Grenadier                |
|    | Automatic Rifleman       |
|    | Rifleman                 |
|    | Squad Leader (Normal)    |
|    | Team Leader              |
|    | Grenadier                |
|    | Automatic Rifle          |
|  | Team Leader (Optional)   |
|  | Rifleman                 |

W223/OCT 04/VGT8

Enabling Learning Objective D

Learning Step 1

VGT-9, Crossing a Danger Area

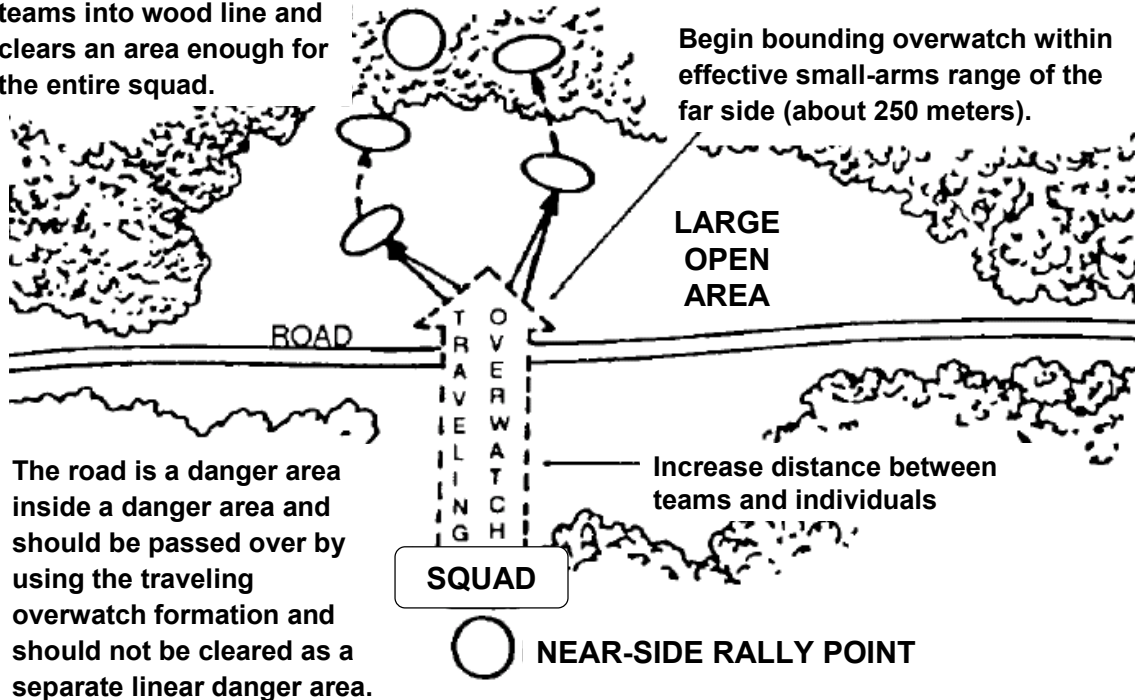


## Crossing Large Open Areas

Squad bounds by fire teams into wood line and clears an area enough for the entire squad.

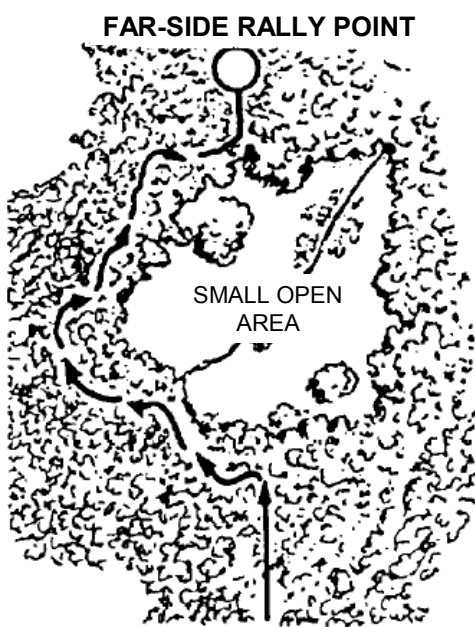
**FAR-SIDE RALLY POINT**

Begin bounding overwatch within effective small-arms range of the far side (about 250 meters).

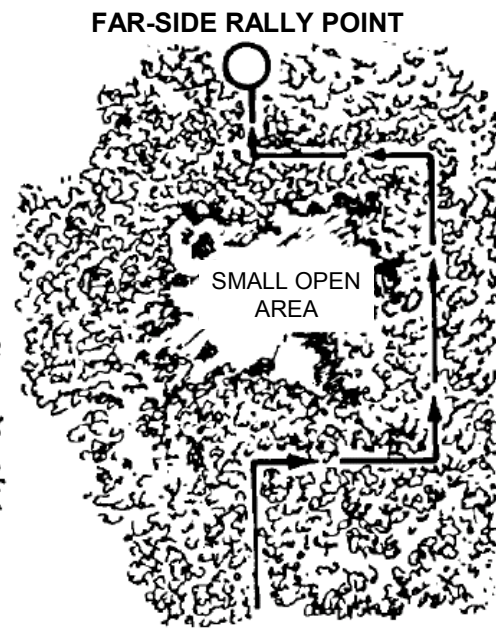


W223/OCT 04/VGT10

## **Crossing Small Open Areas**



**NEAR-SIDE  
RALLY POINT**  
**UNIT**  
**CONTOUR AROUND OPEN AREA**



**NEAR-SIDE  
RALLY POINT**  
**UNIT**  
**DETOUR BYPASS METHOD**

W223/OCT 04/VGT11

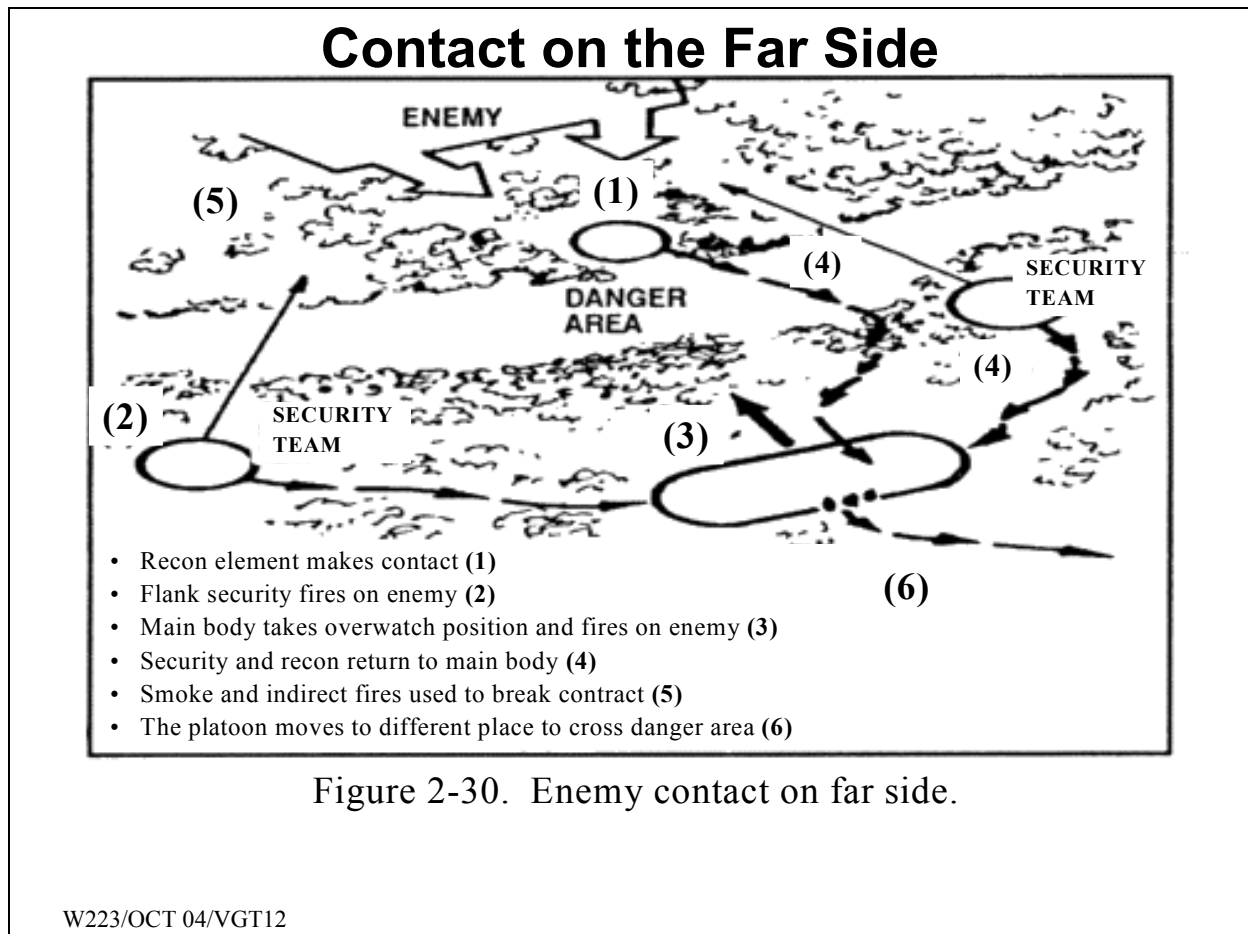
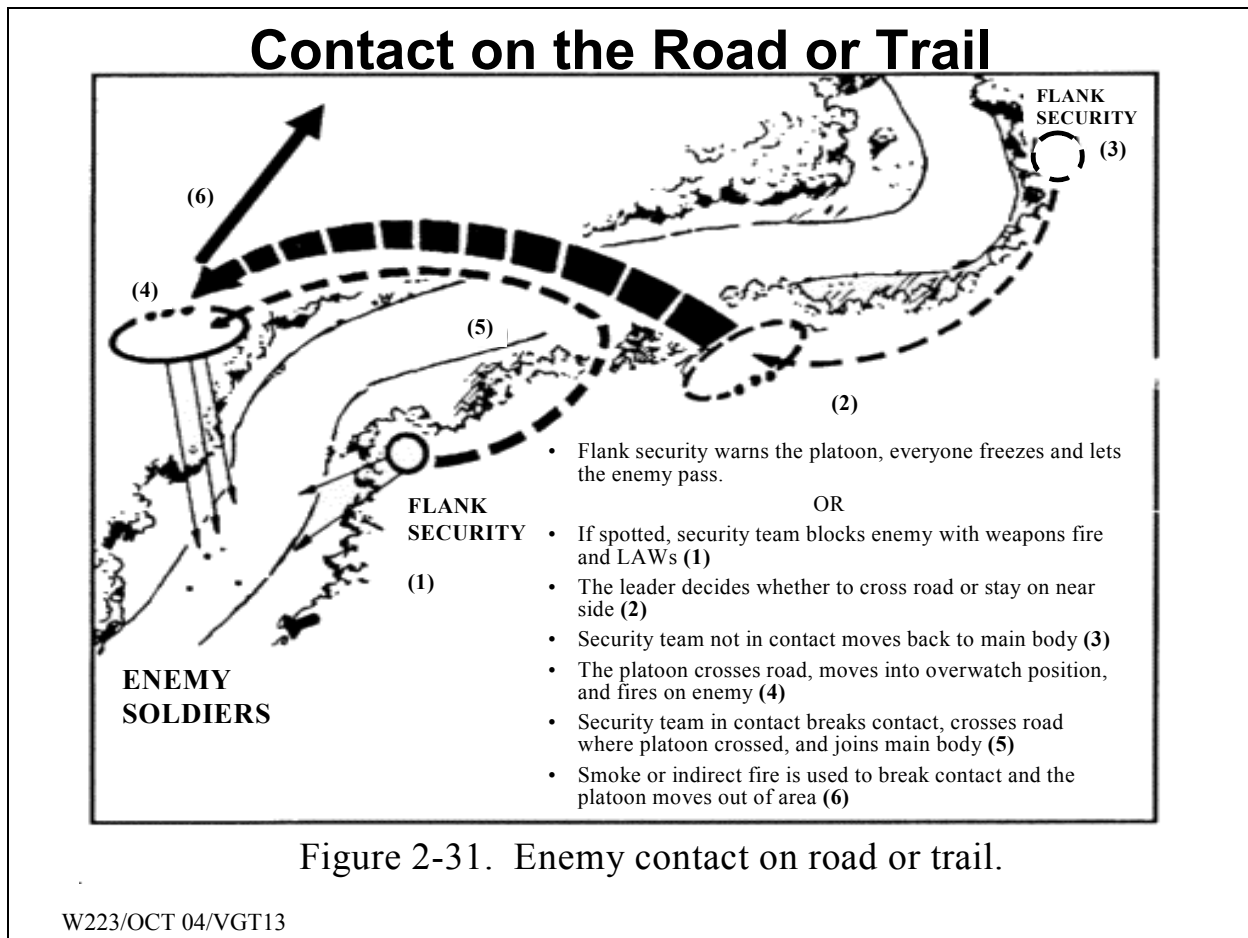


Figure 2-30. Enemy contact on far side.





# Contact on the Near Side

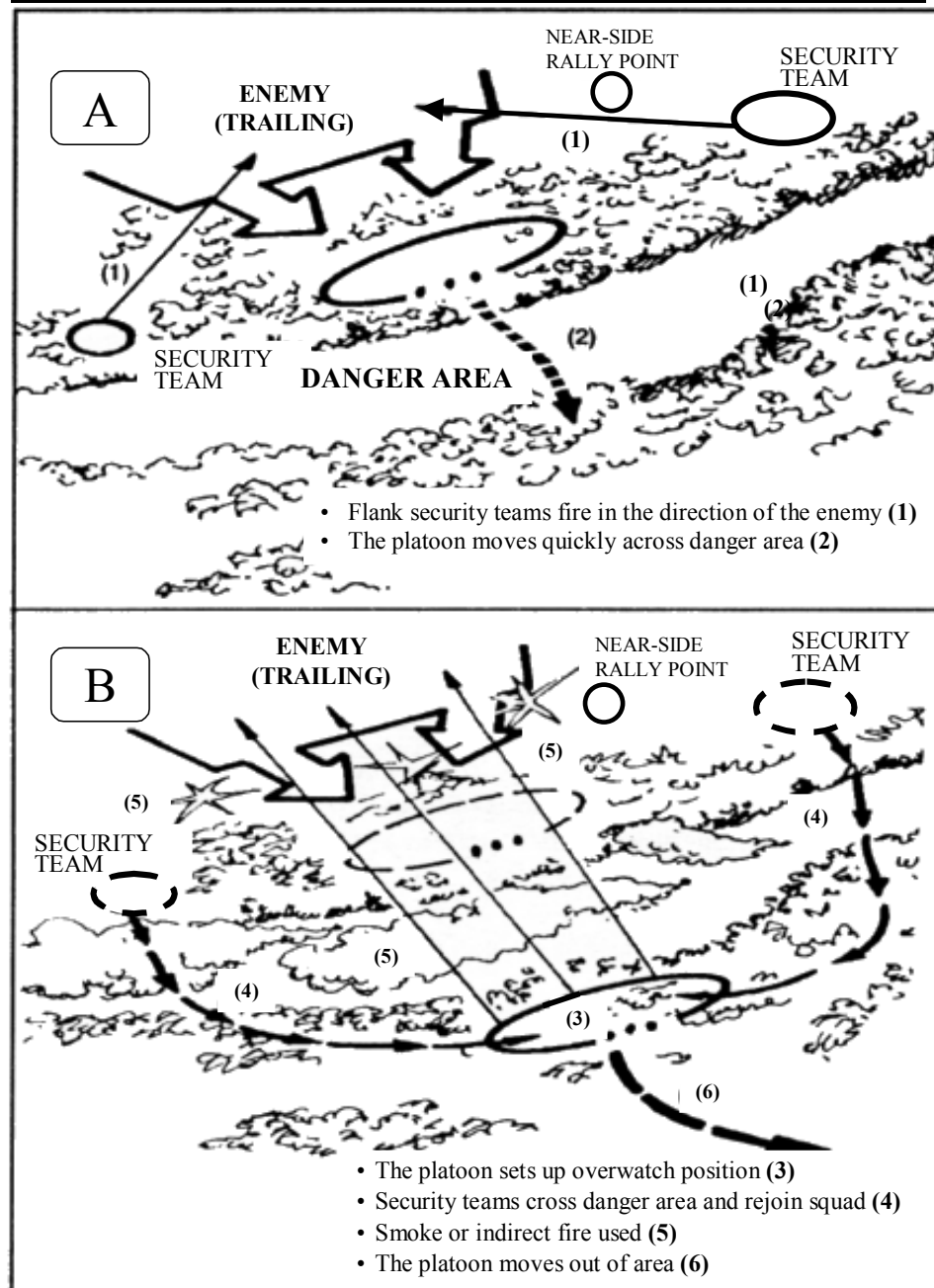


Figure 2-32. Enemy contact on near side.

W223/OCT 04/VGT-14

**Appendix B Test(s) and Test Solution(s) (N/A)**

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**Appendix C, PRACTICAL EXERCISES: W223 Version 2**

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This appendix contains the items listed in this table--

| <b>Title/Synopsis</b>   | <b>Page</b>   |
|---|---------------|
| PE-1, Select a Movement Route Using a Map.                    | C-2 thru C-3  |
| SPE-1, Solution for PE-1, Select a Movement Route Using a Map | C-4           |
| PE-2, Conduct Movement  | C-5 thru C-8  |
| PE-3, Crossing Danger Areas                                   | C-9 thru C-11 |

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## PRACTICAL EXERCISE 1

|                                     |  |                |   |                    |   |                   |   |
|-------------------------------------|--|----------------|---|--------------------|---|-------------------|---|
| <b>Title</b>                        | Select a Movement Route Using a Map.   |                |   |                    |   |                   |   |
| <b>Lesson Number/Title</b>          | W223 version 2 / Conduct Movement  |                |   |                    |   |                   |   |
| <b>Introduction</b>                 | <p>This practical exercise is going to give you experience in selecting a route from one point to another using a map based on the information provided to you in a FRAGO or OPORD.</p>  |                |   |                    |   |                   |   |
| <b>Motivator</b>                    | <p>One key to success in tactical missions is the ability to move from one point to another undetected by the enemy. Your objective is to find a route that will allow for movement using terrain that provides cover and concealment for your section/squad. You will use the four steps during this exercise to select a route to a destination to accomplish a mission provided to you on an operations order (OPORD) or fragmentary order (FRAGO).</p>   |                |   |                    |   |                   |   |
| <b>Terminal Learning Objective</b>  | <p><b>NOTE:</b> Inform the students of the following Terminal Learning Objective requirements.</p> <p>At the completion of this lesson, you [the student] will:</p> <table><tr><td><b>Action:</b></td><td>Lead a team/squad in dismounted movement.</td></tr><tr><td><b>Conditions:</b></td><td>In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.</td></tr><tr><td><b>Standards:</b></td><td>Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT.</td></tr></table> | <b>Action:</b> | Lead a team/squad in dismounted movement. | <b>Conditions:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers. | <b>Standards:</b> | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT. |
| <b>Action:</b>                      | Lead a team/squad in dismounted movement.  |                |   |                    |   |                   |   |
| <b>Conditions:</b>                  | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.  |                |   |                    |   |                   |   |
| <b>Standards:</b>                   | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT.  |                |   |                    |   |                   |   |
| <b>Safety Requirements</b>          | None   |                |   |                    |   |                   |   |
| <b>Risk Assessment Level</b>        | Low  |                |   |                    |   |                   |   |
| <b>Environmental Considerations</b> | None   |                |   |                    |   |                   |   |
| <b>Evaluation</b>                   | This is not a graded exercise.   |                |   |                    |   |                   |   |

---

**Instructional Lead-In**

You will take the information presented in this lesson plan and prepare a movement route from one point on the map to another. You will take into consideration the situation based on a FRAGO or OPORD your SGL issues to you.

---

**Resource Requirements****Instructor Materials:**

SGL Materials--TSP

**Student Materials:**

Students must have--

- Pencil.
  - Paper.
  - Map of the local STX training area.
  - GTA 5-2-12 Coordinate Scale and Protractor.
  - Copy of a FRAGO or OPORD.
- 

**Special Instructions**

NCOA--

- Maps used will be of the local STX training area. This will allow the students to become familiar with the STX training area prior to the STX.
  - Develop a FRAGO or OPORD for the students to use in their planning of the movement route.
  - Provide the students with a start point and an ending point on the map and instruct them to formulate the best route based on the terrain and the information on the FRAGO or OPORD.
  - Develop an instruction sheet on how to conduct the PE.
  - Develop a solution sheet, slide, or other means to provide the solution to the students upon completion of the exercise.
- 

**Procedures**

NCOAs may develop their own procedures to conduct this PE; however, the students must meet the following standards when they select a route on their map: Their routes must offer--

- Maximum cover.
  - Maximum concealment.
  - Good observation to fire at known or suspected enemy positions along movement route.
  - Best fields of fire.
  - The most favorable tactical advantage.
  - Positive control of all elements.
- 

**Feedback Requirements**

This is a not a graded PE. However, students will perform this same task during the STX when they serve in their leadership role. This task will be part of the students graded performance in the field while serving in a leadership position.

---



**SOLUTION FOR  
PRACTICAL EXERCISE 1**

NCOA developed.

Select a Movement Route Using a Map.

This is not a graded exercise.

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## PRACTICAL EXERCISE 2

|                                    |   |                |   |                    |   |                   |   |
|------------------------------------|---|----------------|---|--------------------|---|-------------------|---|
| <b>Title</b>                       | Conduct Movement  |                |   |                    |   |                   |   |
| <b>Lesson Number/Title</b>         | W223 version 2 / Conduct Movement   |                |   |                    |   |                   |   |
| <b>Introduction</b>                | <p>For the next hour and a half you will be walking through the three movement techniques using movement formations while ensuring security during movement and halts based on METT-T, and using arm-and-hand signals.</p>  |                |   |                    |   |                   |   |
| <b>Motivator</b>                   | <p>You learned and practiced earlier how to select a movement route using a map. Now the next thing you must accomplish is to move on that route using the proper movement techniques in a movement formation, while ensuring security during movement and halts, using hand and arm signals.</p> <p>Your SGL will line you up in formations where you can observe the formations and distances and walk through the three movement techniques. You will move across an area using the movement techniques and formations you talked about during class.</p>  |                |   |                    |   |                   |   |
| <b>Terminal Learning Objective</b> | <p><b>NOTE:</b> Inform the students of the following Terminal Learning Objective requirements.</p> <p>At the completion of this lesson, you [the student] will:</p> <table><tr><td><b>Action:</b></td><td>Lead a team/squad in dismounted movement.</td></tr><tr><td><b>Conditions:</b></td><td>In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.</td></tr><tr><td><b>Standards:</b></td><td>Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT.</td></tr></table>  | <b>Action:</b> | Lead a team/squad in dismounted movement. | <b>Conditions:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers. | <b>Standards:</b> | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT. |
| <b>Action:</b>                     | Lead a team/squad in dismounted movement.   |                |   |                    |   |                   |   |
| <b>Conditions:</b>                 | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.   |                |   |                    |   |                   |   |
| <b>Standards:</b>                  | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT.   |                |   |                    |   |                   |   |
| <b>Safety Requirements</b>         | <p>Prior to the start of any exercise, students must receive thorough briefings on safety, medical, and environmental hazards.</p> <ul style="list-style-type: none"><li>• The chief instructor (CI) of PLDC at each NCOA will conduct a safety risk assessment and a safety briefing as appropriate.</li><li>• Fluid replacement policy for warm weather training (average acclimated soldier wearing BDU, hot weather).</li></ul> <p>The Army reviewed its policy for warm weather training as the result of a soldier's death and other instances of soldier hospitalization during 1997. The determination was that these soldiers suffered from over-hydration. The revised fluid replacement chart (below) describes the revised amounts of fluid replacement and work/rest cycles for acclimatized soldiers undergoing training. Of particular note is the fact that the revised maximum <b>hourly</b> fluid intake should <b>NOT</b> exceed 1.25 quarts, and the revised maximum daily fluid intake should <b>NOT</b> exceed 12 liters.</p> |                |   |                    |   |                   |   |

| Heat Category | WBGT Index, °F | Easy Work  |                     | Moderate Work |                     | Hard Work  |                    |
|---------------|----------------|------------|---------------------|---------------|---------------------|------------|--------------------|
|               |                | Work /Rest | Water Intake, Qt/hr | Work /Rest    | Water Intake, Qt/hr | Work /Rest | Water Intake Qt/hr |
| 1             | 78-81.9        | NL         | 1/2                 | NL            | 3/4                 | 40/20 min  | 3/4                |
| 2 Green       | 82-84.9        | NL         | 1/2                 | 50/10 min     | 3/4                 | 30/30 min  | 1                  |
| 3 Yellow      | 85-87.9        | NL         | 3/4                 | 40/20 min     | 3/4                 | 30/30 min  | 1                  |
| 4 Red         | 88-89.9        | NL         | 3/4                 | 30/30 min     | 3/4                 | 20/40 min  | 1                  |
| 5 Black       | >90            | 50/10 min  | 1                   | 20/40 min     | 1                   | 10/50 min  | 1                  |

- The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hrs of work in the specified heat category. Individual water needs will vary + or – 1/4 qt/hr.
- NL = no limit to work time per hour. Rest means minimal physical activity (sitting or standing) and accomplished in shade if possible.
- **CAUTION: Hourly fluid intake should not exceed 1 1/4 quarts.**
- **Daily fluid intake should not exceed 12 Liters.**
- **NOTE:** MOPP gear adds 10° F to WBGT Index.
- **NOTE:** Wearing body armor adds 5° F to WBGT Index

| Easy Work   | Moderate Work  | Hard Work  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Weapon maintenance.</li> <li>• Walking hard surface at 2.5 mph, ≤ 30 lb. load</li> <li>• Guard duty.</li> <li>• Marksmanship training.</li> <li>• Drill and Ceremony.</li> </ul> | <ul style="list-style-type: none"> <li>• Walking loose sand at 2.5 mph, no load.</li> <li>• Walking hard surface at 3.5 mph, &lt; 40 lb. load.</li> <li>• Calisthenics.</li> <li>• Patrolling.</li> <li>• Individual movement techniques. e.g. low crawl, high crawl.</li> <li>• Defensive position construction.</li> </ul> | <ul style="list-style-type: none"> <li>• Walking loose sand at 2.5 mph with load.</li> <li>• Walking hard surface at 3.5 mph, ≥ 40 lb. load.</li> <li>• Field assaults.</li> </ul> |

**Risk Assessment Level**

Low

**Environmental Considerations**

Check with local environmental office for local requirements.

**Evaluation**

- AAR
- This PE is not a graded exercise.
- Some skills you learn during this PE, you will apply during the tactical leadership evaluations conducted during the STX.

---

**Instructional  
Lead-In**

This PE is a culmination of all that you have learned to this point of this lesson plan “conduct movement.” You will lead and participate in a walk through--using hand and arm signals--of the three movement techniques in squad/team movement formations.

I will form you up into two fire teams to demonstrate and walk you through--

- Wedge formation.
- Traveling.
- Traveling overwatch.
- Bounding overwatch
- Fire and maneuver.

Pay attention to my demonstrations. You will have to lead a team using these techniques during the STX. Ask questions as I guide you through this exercise.

---

**Resource  
Requirements****Instructor Materials:**

- SGL Materials--TSP

**Student Materials:**

**NOTE:** Issued to students during inprocessing.

- Advance sheet in Appendix D, pen or pencil and writing paper and any materials required by the NCOA's SOP.

---

**Special  
Instructions**

- The PE is not to train students to be infantrymen or to place unrealistic emphasis on tactics.
- Design the PE so that the crux of the exercise is to see how well students use the skills and knowledge they learned during the class.
- Conduct this exercise as a walk through.
- Upon completion of all walk throughs, provide some of the students with an oral OPORD/FRAGO for the squad to move. Based on the OPORD/FRAGO the SGL gives, the assigned squad leader must determine the movement technique and formation of the squad/team.
- The intent of this PE is not to have the squad reach task proficiency but rather that the students participate in a collective training event.

**NOTE:** The SGL must continuously evaluate and critique the students as they progress through the walk throughs.

- While mission accomplishment is important, the SGLs must place their emphasis on the students' ability to lead soldiers, think, reason, organize, and
-

---

**Special  
Instructions,**  
continued

- communicate, not mission accomplishment. Soldiers are to learn the basic execution of the task performed.
- Uniform/Equipment:
  - BDUs with field cap
  - LCE with two canteens of water.
  - 4 M16s or Rubber M16s per group of 8.
  - Other uniform/equipment requirements IAW NCOA SOP.
- Student-led AARs must occur whenever possible, followed by a cadre AAR to reinforce the learning process. Students and cadre may conduct these AARs at the conclusion of an event, when student leaders change, or at the end of the PE. SGLs should place their students in a relaxed posture for the AARs. This will aid in the learning process. An example of a relaxed posture is the students grounding their equipment. This of course depends on time available or the situation and is solely the SGL's call.
- Recommended sequence of events:
  - Students move outside.
  - One group walks through the PE while other groups observe.
  - Conduct an AAR.
  - Second group walks through the PE while other groups observe.
  - Conduct an AAR.
  - Repeat until all groups have run through the exercise.
  - Select some students to lead a squad. Provide them with an oral OPOD/FRAGO.  
Tell the student to select the proper movement technique and formation, and to move the squad out based on the orders.
  - Conduct an AAR.

---

**Procedures**

None.

---

**Feedback  
Requirements**

SGLs will conduct AARs frequently throughout the exercise.

---

### PRACTICAL EXERCISE 3

---

**Title** Crossing Danger Areas

---

**Lesson Number/Title** W223 version 3 / Conduct Movement

---

**Introduction** For the next hour you will be walking through the procedures in crossing a danger area using movement techniques and movement formations based on METT-T and using arm-and-hand signals.

---

**Motivator** You learned and practiced earlier how to select a movement route using a map and proper movement techniques in a movement formation using arm-and-hand signals. Now we will add these newly learned skills and use them to cross danger areas.

Your SGL will line you up in formations where you will walk through the procedures to cross a danger area.

---

**Terminal Learning Objective** **NOTE:** Inform the students of the following Terminal Learning Objective requirements.  
At the completion of this lesson, you [the student] will:

|                    |   |
|--------------------|---|
| <b>Action:</b>     | Lead a team/squad in dismounted movement.   |
| <b>Conditions:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.   |
| <b>Standards:</b>  | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures, and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75, STP 21-1-SMCT, and STP 21-24 SMCT. |

---

**Safety Requirements** Prior to the start of any exercise, students must receive thorough briefings on safety, medical, and environmental hazards.

- The chief instructor (CI) of PLDC at each NCOA will conduct a safety risk assessment and a safety briefing as appropriate.
- Fluid replacement policy for warm weather training (average acclimated soldier wearing BDUs, hot weather).

The Army reviewed its policy for warm weather training as the result of a soldier's death and other instances of soldier hospitalization during 1997. The determination was that these soldiers suffered from over-hydration. The revised fluid replacement chart (below) describes the revised amounts of fluid replacement and work/rest cycles for acclimatized soldiers undergoing training. Of particular note is the fact that the revised maximum **hourly** fluid intake should **NOT** exceed 1.25 quarts, and the revised maximum daily fluid intake should **NOT** exceed 12 liters.

---

| Heat Category | WBGT Index, °F | Easy Work  |                     | Moderate Work |                     | Hard Work  |                    |
|---------------|----------------|------------|---------------------|---------------|---------------------|------------|--------------------|
|               |                | Work /Rest | Water Intake, Qt/hr | Work /Rest    | Water Intake, Qt/hr | Work /Rest | Water Intake Qt/hr |
| 1             | 78-81.9        | NL         | 1/2                 | NL            | 3/4                 | 40/20 min  | 3/4                |
| 2 Green       | 82-84.9        | NL         | 1/2                 | 50/10 min     | 3/4                 | 30/30 min  | 1                  |
| 3 Yellow      | 85-87.9        | NL         | 3/4                 | 40/20 min     | 3/4                 | 30/30 min  | 1                  |
| 4 Red         | 88-89.9        | NL         | 3/4                 | 30/30 min     | 3/4                 | 20/40 min  | 1                  |
| 5 Black       | >90            | 50/10 min  | 1                   | 20/40 min     | 1                   | 10/50 min  | 1                  |

- The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hrs of work in the specified heat category. Individual water needs will vary + or – 1/4 qt/hr.
- NL = no limit to work time per hour. Rest means minimal physical activity (sitting or standing) and accomplished in shade if possible.
- **CAUTION: Hourly fluid intake should not exceed 1 1/4 quarts.**
- **Daily fluid intake should not exceed 12 Liters.**
- **NOTE:** MOPP gear adds 10° F to WBGT Index.
- **NOTE:** Wearing body armor adds 5° F to WBGT Index

| Easy Work   | Moderate Work  | Hard Work  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Weapon maintenance.</li> <li>• Walking hard surface at 2.5 mph, ≤ 30 lb. load</li> <li>• Guard duty.</li> <li>• Marksmanship training.</li> <li>• Drill and Ceremony.</li> </ul> | <ul style="list-style-type: none"> <li>• Walking loose sand at 2.5 mph, no load.</li> <li>• Walking hard surface at 3.5 mph, &lt; 40 lb. load.</li> <li>• Calisthenics.</li> <li>• Patrolling.</li> <li>• Individual movement techniques. e.g. low crawl, high crawl.</li> <li>• Defensive position construction.</li> </ul> | <ul style="list-style-type: none"> <li>• Walking loose sand at 2.5 mph with load.</li> <li>• Walking hard surface at 3.5 mph, ≥ 40 lb. load.</li> <li>• Field assaults.</li> </ul> |

**Risk Assessment Level**

Low

**Environmental Considerations**

Check with local environmental office for local requirements.

**Evaluation**

- AAR
- This PE is not a graded exercise.
- Some skills you learn during this PE, you will apply during the tactical leadership evaluations conducted during the STX.



**Instructional  
Lead-In,  
continued**

---

This PE is a culmination of all that you have learned to this point of this lesson plan “conduct movement.” You will lead and participate in a walk through to cross a danger area, using the proper movement techniques and hand and arm signals to cross a danger area.

I will form you up into two fire teams to demonstrate and walk you through the procedures to cross a danger area:

Pay attention to my demonstrations. You will lead a team using these techniques during the STX. Ask questions as I guide you through this exercise.

---

**Resource  
Requirements**

**Instructor Materials:**

- SGL Materials--TSP

**Student Materials:**

**NOTE:** Issued to students during inprocessing.

- Advance sheet in Appendix D, pen or pencil and writing paper and any materials required by the NCOA's SOP.

---

**Special  
Instructions**

- The PE is not to train students to be infantrymen or to place unrealistic emphasis on tactics.
- Design the PE so that the crux of the exercise is to see how well students use the skills and knowledge they learned during the class.
- Conduct this exercise as a walk through.
- Upon completion of all walk throughs, provide some of the students with an oral OPORD/FRAGO for the squad to move. Based on the OPORD/FRAGO the SGL gives, the assigned squad leader must determine the movement technique and formation of the squad/team and move across the danger area.
- The intent of this PE is not to have the squad reach task proficiency but rather to have the students participate in collective training event.

**NOTE:** The SGL must continuously evaluate and critique the students as they progress through the walk throughs.

- While mission accomplishment is important, the SGLs must place their emphasis on the students' ability to lead soldiers, think, reason, organize, and communicate, not mission accomplishment. Soldiers are to learn the basic execution of the task performed.
-

**Special  
Instructions,**  
continued

- 
- Uniform/equipment:
    - BDUs with field cap.
    - LCE with two canteens of water.
    - M16s or Rubber M16 (Optional to perform this task).
    - Other uniform/equipment requirements IAW NCOA SOP.
  - Student-led AARs must occur whenever possible, followed by a cadre AAR to reinforce the learning process. Students and cadre may conduct these AARs at the conclusion of an event, when student leaders change, or at the end of the PE. SGLs should place their students in a relaxed posture for the AARs. This will aid in the learning process. An example of a relaxed posture is the students grounding their equipment. This of course depends on time available or the situation and is solely the SGL's call.
  - Recommended sequence of events:
    - Students move outside.
    - One group walks through the PE while other groups observe.
    - Conduct an AAR.
    - Second group walks through the PE while other groups observe.
    - Conduct an AAR.
    - Repeat until all groups have run through the exercise.
    - Select some students to lead a squad. Provide them with an oral OPORD/FRAGO.
    - Tell the student to select the proper movement technique and formation, to move the squad out based on the orders, and to cross the danger area.
    - Conduct an AAR
- 

**Procedures**

None.

---

**Feedback  
Requirements**

SGLs will conduct AARs frequently throughout the exercise.

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**Appendix D, HANDOUTS FOR LESSON 1: W223 Version 1**

---

This Appendix contains the items listed in this table--

| <b>Title/Synopsis</b>  | <b>Page</b>         |
|--|---------------------|
| SH-1, Advance Sheet  | SH-1-1 and SH-1-2   |
| SH-2, Extract from FM 3-25.26, Map Reading and Land Navigation, Jul 01     | SH-2-1 thru SH-2-6  |
| SH-3, Extract from FM 21-75, Combat Skills of the Soldier, Aug 84          | SH-3-1 thru SH-3-5  |
| SH-4, Extract from FM 7-8, Infantry Rifle Platoon and Squad, Apr 92        | SH-4-1 thru SH-4-15 |
| SH-5, Extract from FM 21-60, Visual Signals, Sep 87.                       | SH-5-1 thru SH-5-14 |
| SH-6, Extract from FM 7-8, Infantry Rifle Platoon and Squad, Apr 92        | SH-6-1 thru SH-6-8  |
| SH-7, Extract from STP 21-24-SMCT, Soldier's Manual of Common Tasks Aug 03 | SH-7-1 thru SH-7-4  |
| SH-8, Extract from STP 21-1-SMCT, Soldier's Manual of Common Tasks, Aug 03 | SH-8-1 thru SH-8-3  |
| SH-9, Extract from FM 7-8, Infantry Rifle Platoon and Squad, Apr 92        | SH-9-1 thru SH-9-3  |

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## **Student Handout 1**

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This student handout contains the Advance Sheet.

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## Student Handout 1

### Advance Sheet

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**Lesson Hours** This lesson consists of 2 hours and 35 minutes of small group instruction, 25 minutes of demonstration, and 3 hours of practical exercises.

---

**Overview** During this lesson you will learn some basic techniques and procedures used to employ a squad-sized element in combat. You will learn the basics of moving a squad/team--using arm-and-hand signals and using the appropriate movements techniques in the proper movement formations based on the tactical situation.

---

**Learning Objective** Terminal Learning Objective (TLO).

|                    |  |
|--------------------|--|
| <b>Action:</b>     | Lead a team/squad in dismounted movement.  |
| <b>Conditions:</b> | In a classroom environment culminating in a situational training exercise and given a team/squad of soldiers.  |
| <b>Standard:</b>   | Led a team/squad in a selected route while dismounted using different formations and movements with visual signals; enforced detection procedures; and crossed a danger area IAW FM 3-25.26, FM 7-8, FM 21-60, FM 21-75., STP 21-1-SMCT, and STP 21-24 SMCT. |

ELO A Select a movement route using a map.

ELO B Lead a team/squad using basic movement techniques.

ELO C Lead a team/squad in movement formations using proper hand signals and security during movement and at halts.

ELO D Lead a team/squad at danger areas.

ELO E Enforce detection prevention measures.

---

**Assignments** The student assignments for this lesson are:

- Study SH-2, SH-5, and SH-7.
  - Read SH-1, 3, 4, 5, 6, 8, and 9.
-

---

**Bring to Class**

You must bring the following materials to class:

- All reference material received.
- Pencil or pen and writing paper.
- LCE with two canteens of water.
- Field cap (soft cap).
- Other equipment as directed by NCOA SOP.

---

**Note to Students**

It is your responsibility to do the homework prior to class. We expect you to come to class prepared. You will participate in small group discussion. We expect you to also participate in the discussion by providing information you learned from your study and your personal and observed experiences. Failure to study and read the assignments above will result in your inability to participate with the rest of the group. Not having your input affects the group's ability to discuss fully the information.

---



## Student Handout 2

### Extract from FM 3-25.26, Map Reading and Land Navigation,

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This student handout contains five pages of extracted material from FM 3-25.26, Chapter 11. Bring all reference materials to class.

| Page               | (Reading/Study) Requirement           |
|--------------------|---------------------------------------|
| SH-2-2 thru SH-2-6 | Study Chapter 11, para 11-4 and 11-5. |

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## CHAPTER 11

# TERRAIN ASSOCIATION

*Failure to make use of the vast amounts of information presented by the map and available to the eye on the ground reduces the chances for success in land navigation. The soldier who has repeatedly practiced the skills of identifying and discriminating among the many types of terrain and other features knows how these features are mapped. He can begin to visualize the shape of the land by studying the map, estimate distances, and perform quick resection from the many landmarks he sees is the one who will be at the right place to help defeat the enemy on the battlefield. This chapter tells how to orient a map with and without a compass, how to find locations on a map as well as on the ground, how to study the terrain, and how to move on the ground using terrain association and dead reckoning.*

### 11-4. TACTICAL CONSIDERATIONS

Military cross-country navigation is intellectually demanding because it is imperative that the unit, crew, or vehicle survive and successfully complete the move in order to accomplish its mission. However, the unnecessary use of a difficult route makes navigation too complicated, creates more noise when proceeding over it, causes wear and tear on equipment and personnel, increases the need for and needlessly complicate recovery operations, and wastes scarce time. On receipt of a tactical mission, the leader begins his troop-leading procedures and makes a tentative plan. He bases the tentative plan on a good terrain analysis. He analyzes the considerations covered in the following mnemonics—OCOKA and METT-T.

a. **OCOKA.** The terrain should be analyzed for observation and fields of fire, cover and concealment, obstacles, key terrain, and avenues of approach.

(1) **Observation and Fields of Fire.** The purpose of observation is to see the enemy (or various landmarks) but not be seen by him. Anything that can be seen can be hit. Therefore, a field of fire is an area that a weapon or a group of weapons can cover effectively with fire from a given position.

(2) **Cover and Concealment.** Cover is shelter or protection (from enemy fire) either natural or artificial. Always try to use covered routes and seek cover for each halt, no matter how brief it is planned to be. Unfortunately, two factors interfere with obtaining constant cover. One is time and the other is terrain. Concealment is protection from observation or surveillance, including concealment from enemy air observation. Before, trees provided good concealment, but with modern thermal and infrared imaging equipment, trees are not always effective. When you are moving, concealment is generally secondary; therefore, select routes and positions that do not allow covered or concealed enemy near you.

(3) **Obstacles.** Obstacles are any obstructions that stop, delay, or divert movement. Obstacles can be natural (rivers, swamps, cliffs, or mountains) or they may be artificial (barbed wire entanglements, pits, concrete or metal anti-mechanized traps). They can be readymade or constructed in the field. Always consider any possible obstacles along your movement route and, if possible, try to keep obstacles between the enemy and yourself.

(4) **Key Terrain.** Key terrain is any locality or area that the seizure or retention of affords a marked advantage to either combatant. Urban areas that are often seen by higher headquarters as being key terrain because they are used to control routes. On the other hand, an urban area that is destroyed may be an obstacle instead. High ground can be key because it dominates an area with good observation and fields of fire. In an open area, a draw or wadi (dry streambed located in an arid area) may provide the only cover for many kilometers, thereby becoming key. You should always attempt to locate any area near you that could be even remotely considered as key terrain.

(5) **Avenues of Approach.** These are access routes. They may be the routes you can use to get to the enemy or the routes they can use to get to you. Basically, an identifiable route that approaches a position or location is an avenue of approach to that location. They are often terrain corridors such as valleys or wide, open areas.

b. **METT-T.** Tactical factors other than the military aspects of terrain must also be considered in conjunction with terrain during movement planning and execution as well. These additional considerations are mission, enemy, terrain and weather, troops, and time available.

(1) **Mission.** This refers to the specific task assigned to a unit or individual. It is the duty or task together with the purpose that clearly indicates the action to be taken and the reason for it—but not how to do it. Training exercises should stress the importance of a thorough map reconnaissance to evaluate the terrain. This allows the leader to confirm his tentative plan, basing his decision on the terrain's effect on his mission.

(a) Marches by foot or vehicle are used to move troops from one location to another. Soldiers must get to the right place, at the right time, and in good fighting condition. The normal rate for an 8-hour foot march is 4 kmph. However, the rate of march may vary, depending on the following factors:

- Distance.
- Time allowed.
- Likelihood of enemy contact.
- Terrain.
- Weather.
- Physical condition of soldiers.
- Equipment/weight to be carried.
- A motor march requires little or no walking by the soldiers, but the factors affecting the rate of march still apply.

(b) Patrol missions are used to conduct combat or reconnaissance operations. Without detailed planning and a thorough map reconnaissance, any patrol mission may not succeed. During the map reconnaissance, the mission leader determines a primary and alternate route to and from the objectives.

(c) Movement to contact is conducted whenever an element is moving toward the enemy but is not in contact with the enemy. The lead element must orient its movement on the objective by conducting a map reconnaissance, determining the location of the objective on both the map and the ground, and selecting the route to be taken.

(d) Delays and withdrawals are conducted to slow the enemy down without becoming decisively engaged, or to assume another mission. To be effective, the element leader must know where he is to move and the route to be taken.

(2) **Enemy.** This refers to the strength, status of training, disposition (locations), doctrine, capabilities, equipment (including night vision devices), and probable courses of action that impact upon both the planning and execution of the mission, including a movement.

(3) **Terrain and Weather.** Observation and fields of fire influence the placement of positions and crew-served weapons. The leader conducts a map reconnaissance to determine key terrain, obstacles, cover and concealment, and likely avenues of approach.

(a) Key terrain is any area whose control affords a marked advantage to the force holding it. Some types of key terrain are high ground, bridges, towns, and road junctions.

(b) Obstacles are natural or man-made terrain features that stop, slow down, or divert movement. Consideration of obstacles is influenced by the unit's mission. An obstacle may be an advantage or disadvantage, depending upon the direction of attack or defense. Obstacles can be found by conducting a thorough map reconnaissance and study of recent aerial photographs.

(c) Cover and concealment are determined for both friendly and enemy forces. Concealment is protection from observation; cover is protection from the effects of fire. Most terrain features that offer cover also provide concealment from ground observation. There are areas that provide no concealment from enemy observation. These danger areas may be large or small open fields, roads, or streams. During the leader's map reconnaissance, he determines any obvious danger areas and, if possible, adjusts his route.

(d) Avenues of approach are routes by which a unit may reach an objective or key terrain. To be considered an AA, a route must provide enough width for the deployment of the size force for which it is being considered. The AAs are also considered for the subordinate enemy force. For example, a company determines likely AAs for an enemy platoon; a platoon determines likely AAs for an enemy squad. Likely AAs may be either ridges, valleys, or by air. By examining the terrain, the leader determines the likely enemy AAs based on the tactical situation.

(e) Weather has little effect on dismounted land navigation. Rain and snow could possibly slow down the rate of march, that is all. But during mounted land navigation, the navigator must know the effect of weather on his vehicle. (See Chapter 12 for mounted land navigation.)

(4) **Troops.** Consideration of your own troops is equally important. The size and type of the unit to be moved and its capabilities, physical condition, status of training, and types of equipment assigned all affect the selection of routes, positions, fire plans, and the various decisions to be made during movement. On ideal terrain such as relatively level ground with little or no woods, a platoon can defend a front of up to 400 meters. The leader must conduct a thorough map reconnaissance and terrain analysis of the area his unit is to defend. Heavily wooded areas or very hilly areas may reduce the front a platoon can defend. The size of the unit must also be taken into consideration when planning a movement to contact. During movement, the unit must retain its ability to maneuver. A small draw or stream may reduce the unit's maneuverability but provide excellent concealment. All of these factors must be considered.

(a) Types of equipment that may be needed by the unit can be determined by a map reconnaissance. For example, if the unit must cross a large stream during its movement to the objective, ropes may be needed for safety lines.

(b) Physical capabilities of the soldiers must be considered when selecting a route. Crossing a large swampy area may present no problem to a physically fit unit, but to a unit that has not been physically conditioned, the swampy area may slow or completely stop its movement.

(5) **Time Available.** At times, the unit may have little time to reach an objective or to move from one point to another. The leader must conduct a map reconnaissance to determine the quickest route to the objective; this is not always a straight route. From point A to point B on the map may appear to be 1,000 meters, but if the route is across a large ridge, the distance will be greater. Another route from point A to B may be 1,500 meters—but on flat terrain. In this case, the quickest route would be across the flat terrain; however, concealment and cover may be lost.

## **11-5. MOVEMENT AND ROUTE SELECTION**

One key to success in tactical missions is the ability to move undetected to the objective. There are four steps to land navigation. Being given an objective and the requirement to move there, you must know where you are, plan the route, stay on the route, and recognize the objective.

a. **Know Where You Are (Step 1)** You must know where you are on the map and on the ground at all times and in every possible way. This includes knowing where you are relative to—

- . Your directional orientation.
- . The direction and distances to your objective.
- . Other landmarks and features.
- . Any impassable terrain, the enemy, and danger areas.
- . Both the advantages and disadvantages presented by the terrain between you and your objective.

This step is accomplished by knowing how to read a map, recognize and identify specific terrain and other features; determine and estimate direction; pace, measure, and estimate distances, and both plot and estimate a position by resection.

b. **Plan the Route (Step 2)** Depending upon the size of the unit and the length and type of movement to be conducted, several factors should be considered in selecting a good route or routes to be followed. These include—

- . Travel time.
- . Travel distance.
- . Maneuver room needed.
- . Trafficability.
- . Load-bearing capacities of the soil.
- . Energy expenditure by troops.
- . The factors of METT-T.
- . Tactical aspects of terrain (OCOKA)
- . Ease of logistical support.
- . Potential for surprising the enemy.
- . Availability of control and coordination features.
- . Availability of good checkpoints and steering marks.

In other words, the route must be the result of careful map study and should address the requirements of the mission, tactical situation, and time available. It must also provide for ease of movement and navigation.

(1) Three route-selection criteria that are important for small-unit movements are cover, concealment, and the availability of reliable checkpoint features. The latter is weighted even more heavily when selecting the route for a night operation. The degree of visibility and ease of recognition (visual effect) are the key to the proper selection of these features.

(2) The best checkpoints are linear features that cross the route. Examples include perennial streams, hard-top roads, ridges, valleys, railroads, and power transmission lines. Next, it is best to select features that represent elevation changes of at least two contour intervals such as hills, depressions, spurs, and draws. Primary reliance upon cultural features and vegetation is cautioned against because they are most likely to have changed since the map was last revised.

(3) Checkpoints located at places where changes in direction are made mark your **decision points**. Be especially alert to see and recognize these features during movement. During preparation and planning, it is especially important to review the route and anticipate where mistakes are most likely to be made so they can be avoided.

(4) Following a valley floor or proceeding near (not on) the crest of a ridgeline generally offers easy movement, good navigation checkpoints, and sufficient cover and concealment. It is best to follow terrain features whenever you can—not to fight them.

(5) A lost or a late arriving unit, or a tired unit that is tasked with an unnecessarily difficult move, does not contribute to the accomplishment of a mission. On the other hand, the unit that moves too quickly and carelessly into a destructive ambush or leaves itself open to air strikes also have little effect. Careful planning and study are required each time a movement route is to be selected.

c. **Stay on the Route (Step 3)** In order to know that you are still on the correct route, you must be able to compare the evidence you encounter as you move according to the plan you developed on the map when you selected your route. This may include watching your compass reading (dead reckoning) or recognizing various checkpoints or landmarks from the map in their anticipated positions and sequences as you pass them (terrain association). A better way is to use a combination of both.

d. **Recognize the Objective (Step 4)** The destination is rarely a highly recognizable feature such as a dominant hilltop or road junction. Such locations as this are seldom missed by the most inexperienced navigators and are often dangerous places for soldiers to occupy. The relatively small, obscure places are most likely to be the destinations.

(1) Just how does a soldier travel over unfamiliar terrain for moderate to great distances and know when he reaches the destination? One minor error, when many are possible, can cause the target to be missed.

(2) The answer is simple. Select a checkpoint (reasonably close to the destination) that is not so difficult to find or recognize. Then plan a short, fine-tuned last leg from the new *expanded objective* to the final destination. For example, you may be able to plan and execute the move as a series of sequenced movements from one checkpoint or landmark to another using both the terrain and a compass to keep you on the correct course. Finally, after arriving at the last checkpoint, you might follow a specific compass azimuth and pace off the relatively short, known distance to the final, pinpoint destination. This procedure is called *point navigation*. A short movement out from a unit position to an observation post or to a coordination point may also be accomplished

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## Student Handout 3

### Extract from FM 21-75, Combat Skills of the Soldier, Aug 84

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This student handout contains four pages extracted from FM 21-75, Chapter 3.  
Bring all reference materials to class.

| Pages              | Reading Requirement                  |
|--------------------|--------------------------------------|
| SH-3-2 thru SH-3-5 | Read page 3-2 thru para 1, page 3-5. |

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## MOVEMENT TECHNIQUES

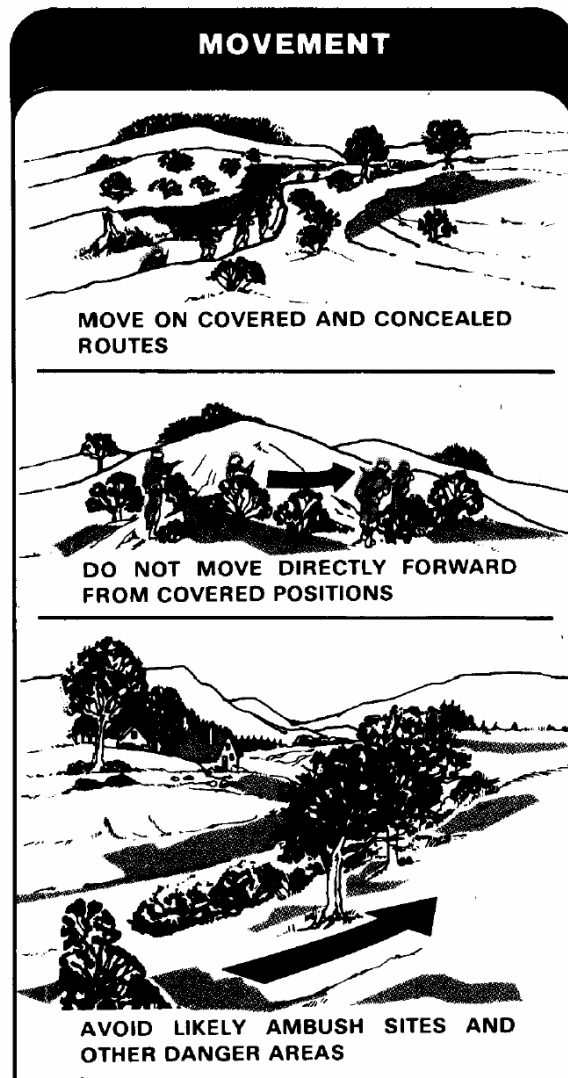
Your unit's ability to move depends on your movement skills and those of your fellow soldiers. Use the following techniques to avoid being seen or heard by the enemy:

- Camouflage yourself and your equipment.
- Tape your dog tags together and to the chain so they cannot slide or rattle. Tape or pad the parts of your weapon and equipment that rattle or are so loose that they may snag (the tape or padding must not interfere with the operation of the weapon or equipment). Jump up and down and listen for rattles.
- Wear soft, well-fitting clothes.
- Do not carry unnecessary equipment. Move from covered position to covered position (taking no longer than 3 to 5 seconds between positions).
- Stop, look, and listen before moving. Look for your next position before leaving a position.
- Look for covered and concealed routes on which to move.
- Change direction slightly from time to time when moving through tall grass.
- Stop, look, and listen when birds or animals are alarmed (the enemy may be nearby).
- Use battlefield noises, such as weapon noises, to conceal movement noises.
- Cross roads and trails at places that have the most cover and concealment (large culverts, low spots, curves, or bridges).
- Avoid steep slopes and places with loose dirt or stones.

- Avoid cleared, open areas and tops of hills and ridges.

## METHODS OF MOVEMENT

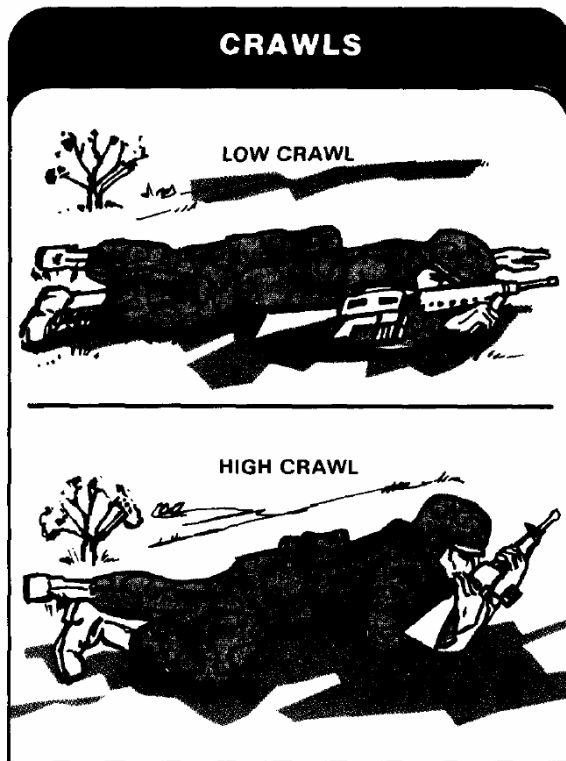
In addition to walking, you may move in one of three other methods — low crawl, high crawl, or rush.



The low crawl gives you the lowest silhouette. Use it to cross places where the conceal-

ment is very low and enemy fire or observation prevents you from getting up. Keep your body flat against the ground. With your firing hand, grasp your weapon sling at the upper sling swivel. Let the front handguard rest on your forearm (keeping the muzzle off the ground), and let the weapon butt drag on the ground.

To move, push your arms forward and pull your firing side leg forward. Then pull with your arms and push with your leg. Continue this throughout the move.



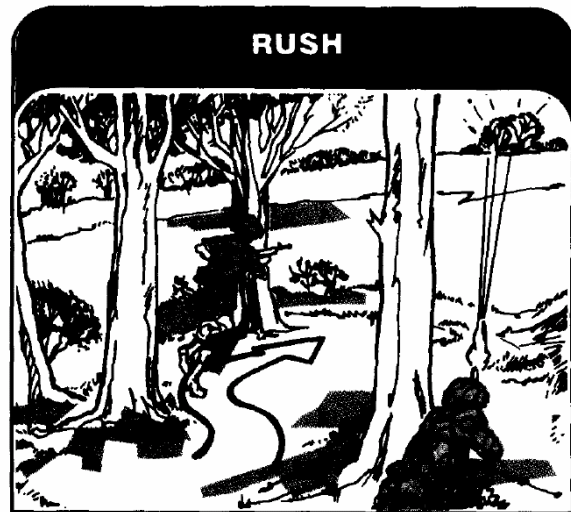
The **high crawl** lets you move faster than the low crawl and still gives you a low silhouette. Use this crawl when there is good concealment but enemy fire prevents you from getting up. Keep your body off the ground and resting on your forearms and lower legs. Cradle your weapon in your arms and keep its muzzle off the ground. Keep your knees well behind your buttocks so your body will stay low.

To move, alternately advance your right elbow and left knee, then your left elbow and right knee.

The **rush** is the fastest way to move from one position to another. Each rush should last from 3 to 5 seconds. The rushes are kept short to keep enemy machine gunners or riflemen from tracking you. However, do not stop and hit the ground in the open just because 5 seconds have passed. Always try to hit the ground behind some cover. Before moving, pick out your next covered and concealed position and the best route to it.

Make your move from the **prone position** as follows:

- Slowly raise your head and pick your next position and the route to it.
- Slowly lower your head.
- Draw your arms into your body (keeping your elbows in).
- Pull your right leg forward.
- Raise your body by straightening your arms.
- Get up quickly.
- Run to the next position.



When you are ready to stop moving, **do the following:**

- Plant both of your feet.
- Drop to your knees (at the same time slide a hand to the butt of your rifle).
- Fall forward, breaking the fall with the butt of the rifle.
- Go to a prone firing position.

If you have been firing from one position for some time, the enemy may have spotted you and may be waiting for you to come up from behind cover. So, before rushing forward, roll or crawl a short distance from your position. By coming up from another spot, you may fool an enemy who is aiming at one spot, waiting for you to rise.

When the route to your next position is through an open area, rush by zigzagging. If necessary, hit the ground, roll right or left, then rush again.

## MOVING WITH STEALTH

Moving with stealth means moving quietly, slowly, and carefully. This requires great patience.

To move with stealth, use the **following techniques:**

- Hold your rifle at port arms (ready position).
- Make your footing sure and solid by keeping your body's weight on the foot on the ground while stepping.
- Raise the moving leg high to clear brush or grass.
- Gently let the moving foot down toe first, with your body's weight on the rear leg.

- Lower the heel of the moving foot after the toe is in a solid place.
- Shift your body's weight and balance to the forward foot before moving the rear foot.
- Take short steps to help maintain balance.

At night, and when moving through dense vegetation, avoid making noise. Hold your weapon with one hand, and keep the other hand forward, feeling for obstructions.

When going into a prone position, use the **following techniques:**

- Hold your rifle with one hand and crouch slowly.
- Feel for the ground with your free hand to make sure it is clear of mines, tripwires, and other hazards.
- Lower your knees, one at a time, until your body's weight is on both knees and your free hand.
- Shift your weight to your free hand and opposite knee.
- Raise your free leg up and back, and lower it gently to that side.
- Move the other leg into position the same way.
- Roll quietly into a prone position.

Use the following techniques **when crawling:**

- Crawl on your hands and knees. Hold your rifle in your firing hand. Use your nonfiring hand to feel for and make clear spots for your hands and knees to move to.

- Move your hands and knees to those spots, and put them down softly.

## IMMEDIATE ACTIONS WHILE MOVING

This section furnishes guidance for the immediate actions you should take when reacting to enemy indirect fire and flares.

### REACTING TO INDIRECT FIRE

If you come under indirect fire while moving, quickly look to your leader for orders. He will either tell you to run out of the impact area in a certain direction or will tell you to follow him. If you cannot see your leader, but can see other team members, follow them. If alone, or if you cannot see your leader or the other team members, run out of the area in a direction away from the incoming fire.

### FOLLOWING A TEAM LEADER OUT OF IMPACT AREA



## Student Handout 4

### Extracts from FM 7-8, Infantry Rifle Platoon and Squad, Apr 92

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This student handout contains 14 pages extracted from FM 7-8, Chapter 2. Bring all reference material to class.

| Pages               | Reading Requirement     |
|---------------------|-------------------------|
| SH-4-2 thru SH-4-5  | Study para 2-7 and 2-8. |
| SH-4-5 thru SH-4-14 | Study para 2-10.        |
| SH-4-15             | Study para 2-15.        |

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## Section III. MOVEMENT

This section discusses formations, movement techniques, and actions during movement for infantry platoons and squads.

### 2-7. FIRE TEAM FORMATIONS

Formations are arrangements of elements and soldiers in relation to each other. Squads use formations for control flexibility and security. Leaders choose formations based on their analysis of the factors of METT-T. [Figure 2-6](#), compares formations. Leaders are up front in formations. This allows the fire team leader to lead by example, "Follow me and do as I do." All soldiers in the team must be able to see their leader.

| MOVEMENT FORMATIONS | WHEN NORMALLY USED   | CHARACTERISTICS |                              |  |          |
|---------------------|--|-----------------|------------------------------|--|----------|
|                     |  | CONTROL         | FLEXIBILITY                  | FIRE CAPABILITIES/ RESTRICTIONS                                  | SECURITY |
| FIRE TEAM WEDGE     | BASIC FIRE TEAM FORMATION                                      | EASY            | GOOD                         | ALLOWS IMMEDIATE FIRES IN ALL DIRECTIONS                         | GOOD     |
| FIRE TEAM FILE      | CLOSE TERRAIN, DENSE VEGETATION, LIMITED VISIBILITY CONDITIONS | EASIEST         | LESS FLEXIBLE THAN THE WEDGE | ALLOWS IMMEDIATE FIRES TO THE FLANKS. MASK MOST FIRE TO THE REAR | LEAST    |

a. **Wedge.** The wedge is the basic formation for the fire team. The interval between soldiers in the wedge formation is normally 10 meters. The wedge expands and contracts depending on the terrain. When rough terrain, poor visibility, or other factors make control of the wedge difficult, fire teams modify the wedge. The normal interval is reduced so that all team members can still see their team leader and the team leaders can still their squad leader. The sides of the wedge can contract to the point where the wedge resembles a single file. When moving in less rugged terrain, where control is easier, soldiers expand or resume their original positions. ([Figure 2-4](#))

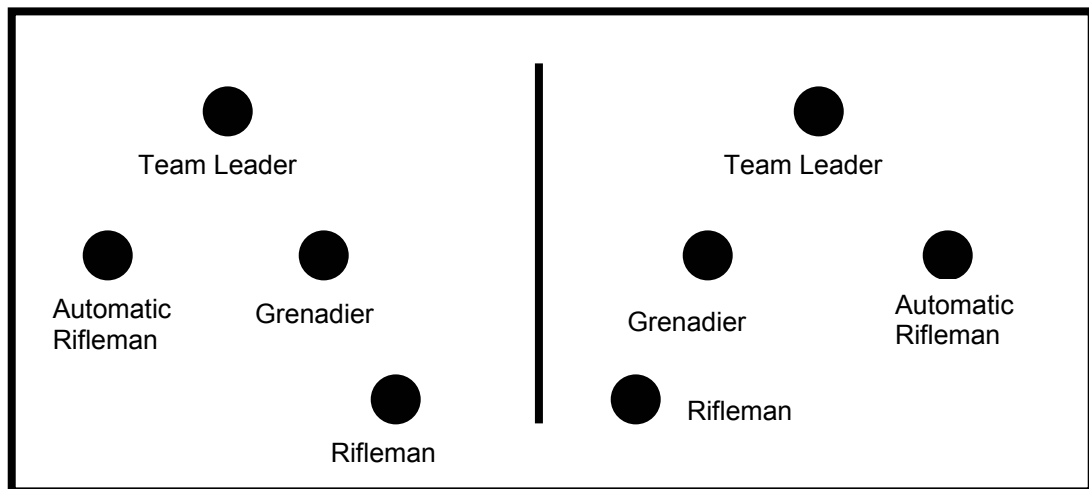


Figure 2-4. Fire team wedge

b. **File.** When the terrain precludes use of the wedge, fire teams use the file formation ([Figure 2-5](#))

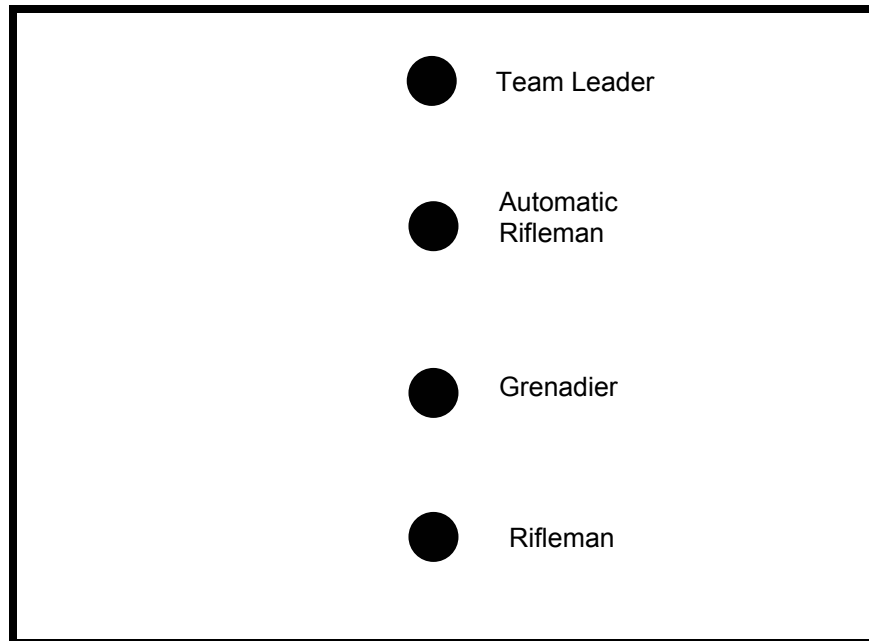


Figure 2-5. Fire team file

## 2-8. SQUAD FORMATIONS

Squad formations describe the relationships between fire teams in the squad. They include the squad column and squad line. A comparison of the formations is in [Figure 2-10](#).

| MOVEMENT FORMATIONS | WHEN NORMALLY USED   | CHARACTERISTICS             |   |   |  |
|---------------------|--|-----------------------------|---|---|--|
|                     |  | CONTROL                     | FLEXIBILITY   | FIRE CAPABILITIES/ RESTRICTIONS   | SECURITY   |
| SQUAD COLUMN        | SQUAD PRIMARY FORMATION  | GOOD                        | FACILITATES MANEUVER<br>GOOD DISPERSION<br>Laterally and in depth | ALLOWS LARGE VOLUME OF FIRE TO THE FLANK--<br>LIMITED VOLUME TO THE FRONT   | ALL-ROUND  |
| SQUAD LINE          | WHEN MAXIMUM FIRE POWER IS REQUIRED TO THE FRONT                 | NOT AS GOOD AS SQUAD COLUMN | LIMITED MANEUVER CAPABILITY (BOTH FIRE TEAMS COMMITTED)           | ALLOWS MAXIMUM IMMEDIATE FIRE TO THE FRONT                                  | GOOD TO THE FRONT<br>LITTLE TO THE FLANKS AND REAR |
| SQUAD FILE          | CLOSE TERRAIN<br>VEGETATION,<br>LIMITED VISIBILITY<br>CONDITIONS | EASIEST                     | MOST DIFFICULT FORMATION FROM WHICH TO MANEUVER                   | ALLOWS IMMEDIATE FIRE TO THE FLANK<br>MASKS MOST FIRE TO THE FRONT AND REAR | LEAST  |

Figure 2-10

a. **Squad Column.** The squad column is the squad's most common formation. It provides good dispersion laterally and in depth without sacrificing control, and facilitates maneuver. The lead fire team is the base fire team. When the squad moves independently or as the rear element of the platoon, the rifleman in the (rail fire team provides rear security ([Figure 2-7](#))

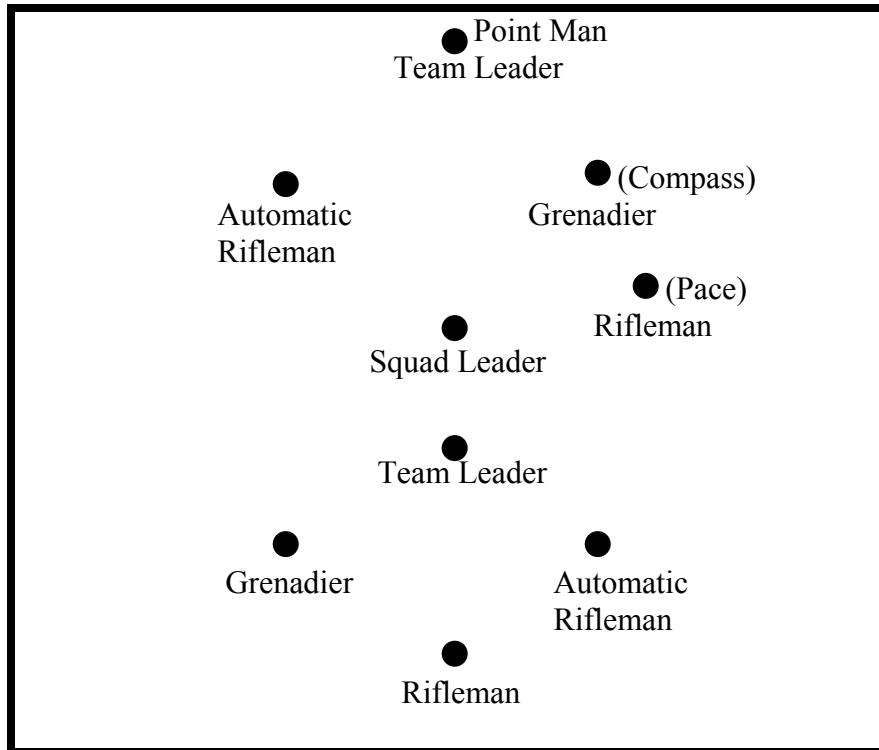


Figure 2-7. Squad column with fire teams in column

b. **Squad Line.** The squad line provides maximum firepower to the front ([Figure 2-8](#)). When a squad is acting as the base squad, the fire team on the right is the base fire team.

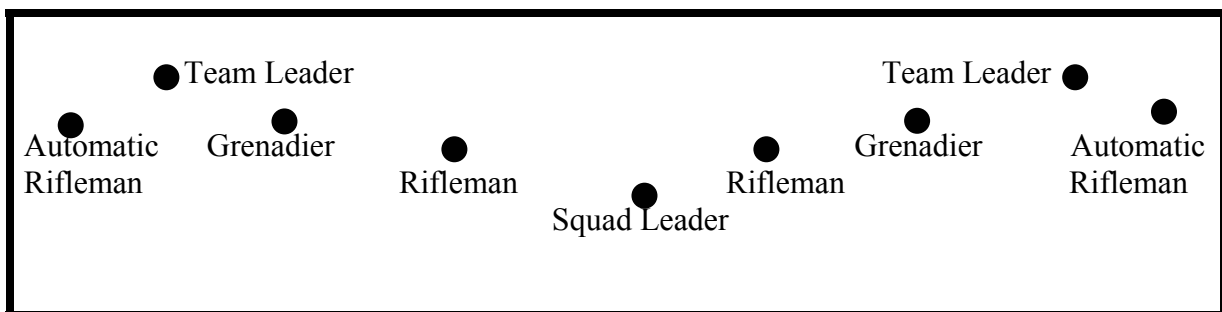


Figure 2-8. Squad line

c. **Squad File.** When not traveling in a column or line, squads travel in file. The squad file has the same characteristics as the fire team file. If the squad leader desires to increase his control over the formation, exert greater morale presence by leading from the front, and be immediately available to make key decisions, he will move forward to the first or second position. Additional control over the rear of the formation can be provided by moving a team leader to the last position. ([Figure 2-9.](#))

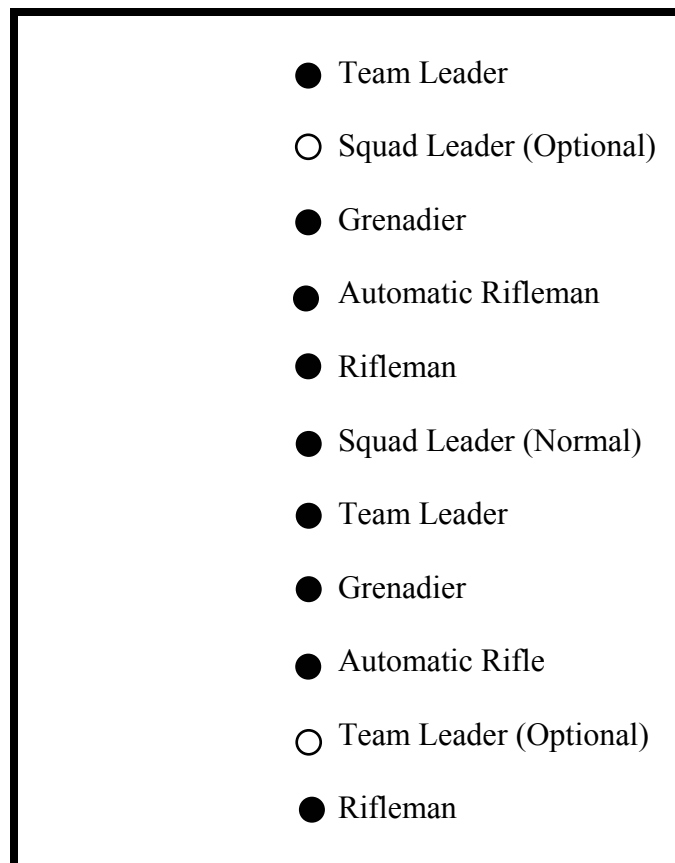


Figure 2-9, Squad file

## 2-10. MOVEMENT TECHNIQUES

A movement technique is the manner a platoon uses to traverse terrain. There are three movement techniques: traveling, traveling overwatch, and bounding overwatch. The selection of a movement technique is based on the likelihood of enemy contact and the need for speed. Factors to consider for each technique are control, dispersion, speed, and security ([Figure 2-18](#)). Movement techniques are not fixed formations. They refer to the distances between soldiers, teams, and squads that vary based on mission, enemy, terrain, visibility, and any other factor that affects control. Soldiers must be able to see their fire team leader. The squad leader must be able to see his fire team leaders. The platoon leader should be able to see his lead squad leader. Leaders control movement with arm-and-hand signals. They use radios only when needed. Any of the three movement techniques (traveling, traveling overwatch, bounding overwatch) can be used with any formation.

| MOVEMENT TECHNIQUES | WHEN NORMALLY USED | CHARACTERISTICS |            |         |          |
|---------------------|--------------------|-----------------|------------|---------|----------|
|                     |                    | CONTROL         | DISPERSION | SPEED   | SECURITY |
| TRAVELING           | CONTACT NO LIKELY  | MORE            | LESS       | FASTEST | LEAST    |
| TRAVELING OVERWATCH | CONTACT POSSIBLE   | LESS            | MORE       | SLOWER  | MORE     |
| BOUNDING OVERWATCH  | CONTACT EXPECTED   | MOST            | MOST       | SLOWEST | MOST     |

Figure 2-18. Movement techniques and characteristics

a. **Techniques of Squad Movement.** The platoon leader determines and directs which movement technique the squad will use.

(1) **Traveling.** Traveling is used when contact with the enemy is not likely and speed is needed ([Figure 2-19](#)).

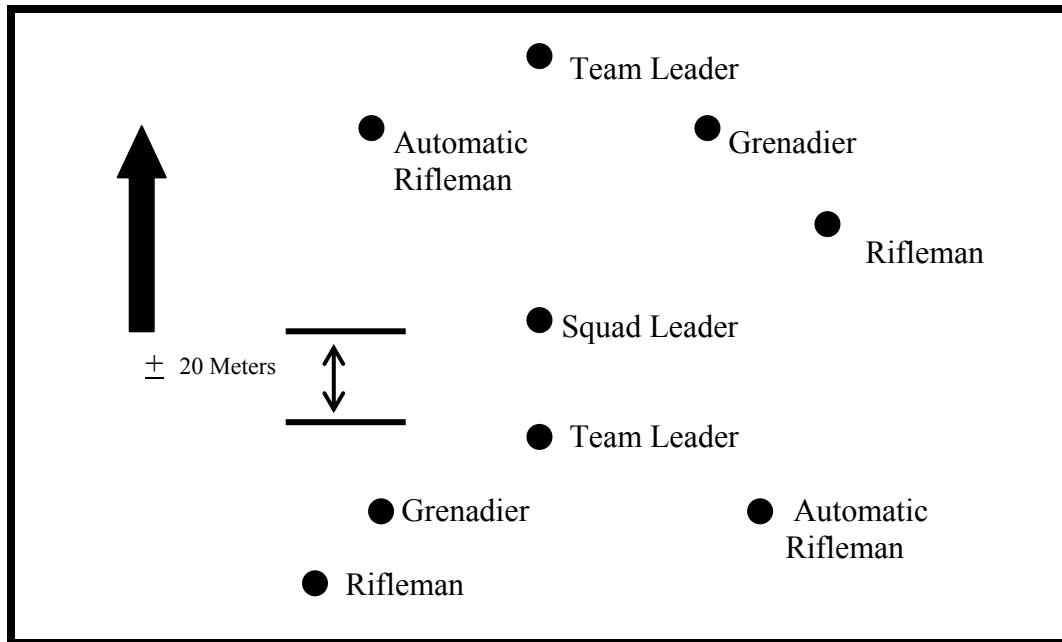


Figure 2-19. Squad traveling

(2) **Traveling overwatch.** Traveling overwatch is used when contact is possible ([Figure 2-20](#)). Attached weapons move near the squad leader and under his control so he can employ them quickly.

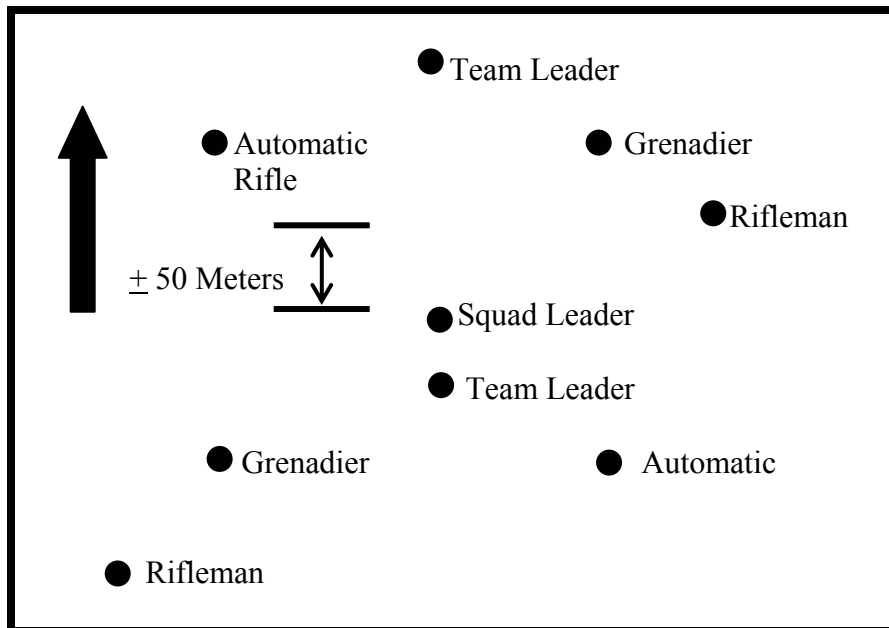


Figure 2-20. Squad traveling overwatch

(3) **Bounding overwatch.** Bounding overwatch is used when contact is expected, when the squad leader feels the enemy is near (movement, noise, reflection, trash, fresh tracks, or even a hunch), or when a large open danger area must be crossed.

(a) The lead fire team overwatches first. Soldiers scan for enemy positions. The squad leader usually stays with the overwatch team. ([Figure 2-21](#)).

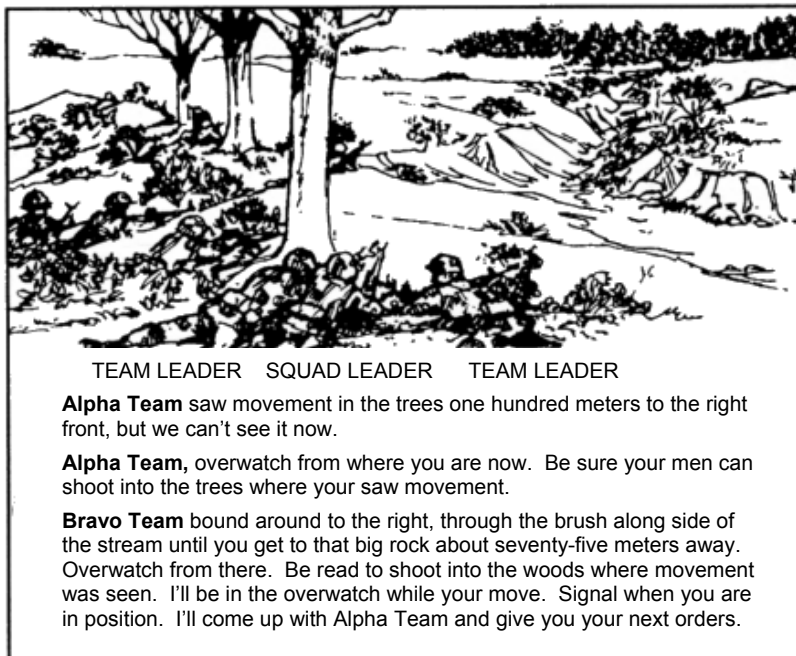


Figure 2-21, Example of squad leader's order to bound.

- (b) The trail fire team bounds and signals the squad leader when his team completes its bound and is prepared to overwatch the movement of the other team.
- (c) Both team leaders must know if successive or alternate bounds will be used and which team the squad leader will be with. The overwatching team leader must know the route and destination of the bounding team. The bounding team leader must know his team's destination and route, possible enemy locations, and actions to take when he arrives there. He must also know where the overwatching team will be, and how he will receive his instructions. The cover and concealment on the bounding team's route dictates how its soldiers move.
- (d) Teams can bound successively or alternately. Successive bounds are easier to control; alternate bounds can be faster. ([Figure 2-22](#))

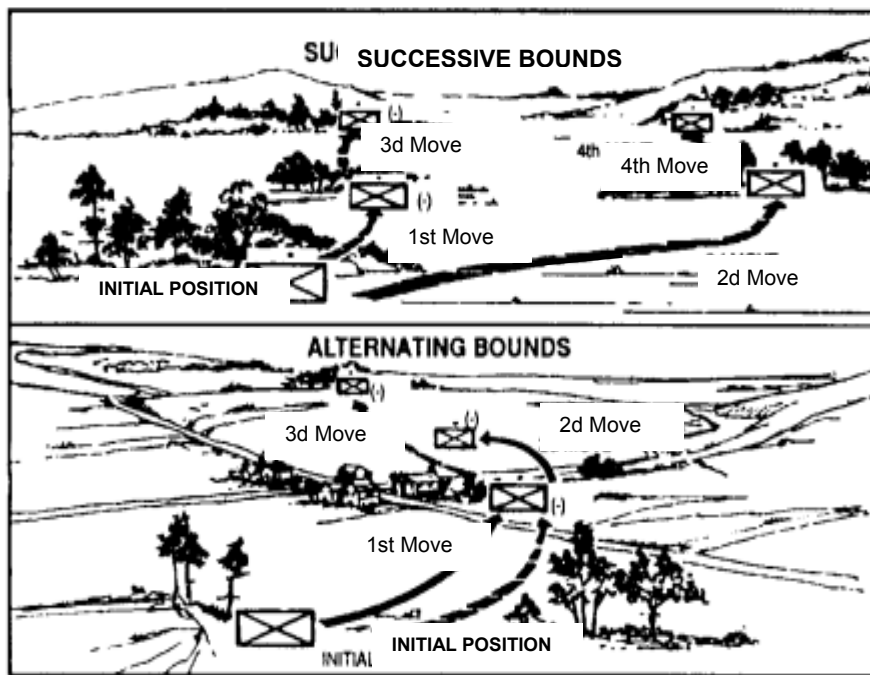


Figure 2-22. Squad successive and alternate bounds

**b. Techniques of Platoon Movement.** The platoon leader determines and directs which movement technique the platoon will use.

- (1) **Traveling.** Traveling is used when enemy contact is not likely and speed is needed ([Figure 2-23](#)).

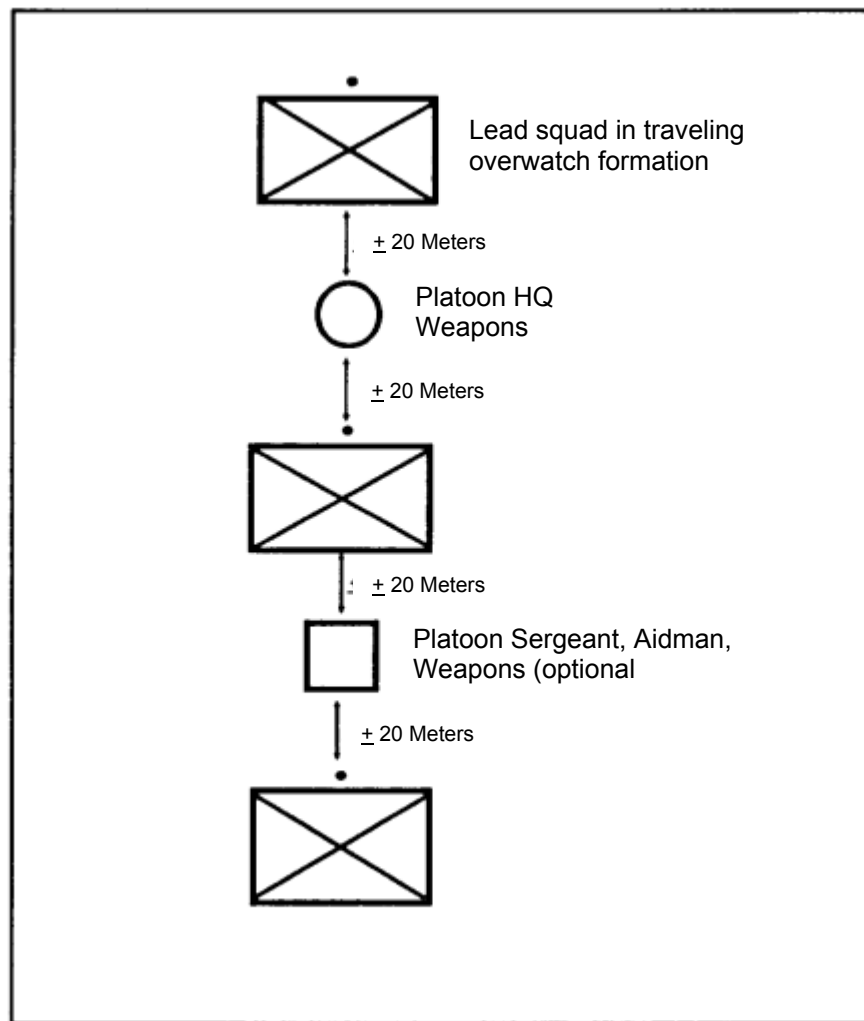


Figure 2-23. Platoon traveling

(2) **Traveling overwatch.** Traveling overwatch is used when contact is possible but speed is needed ([Figure 2-24](#)). The platoon leader moves where he can best control the platoon. The platoon sergeant travels with the trailing squad, though he is free to move throughout the formation to enforce security, noise and light discipline, and distances between squads. The lead squad uses traveling overwatch, and the trailing squads use traveling.



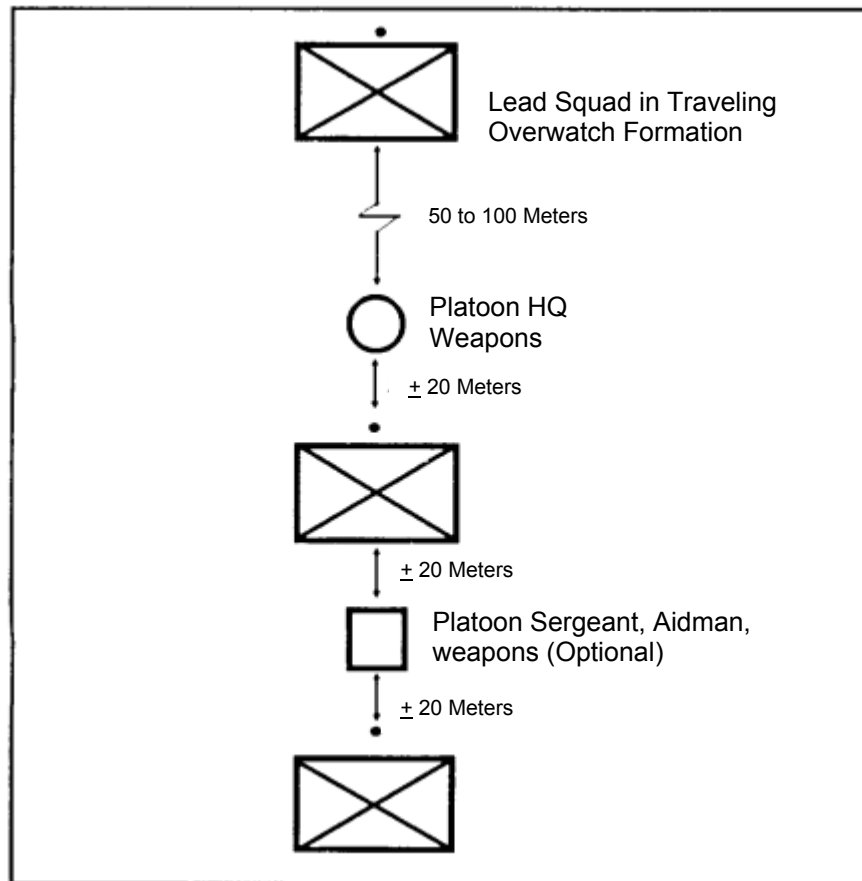


Figure 2-24. Platoon traveling overwatch.

(3) **Bounding overwatch.** Bounding overwatch is used when contact is expected ([Figure 2-25](#)). Platoons conduct bounding overwatch using successive or alternate bounds.

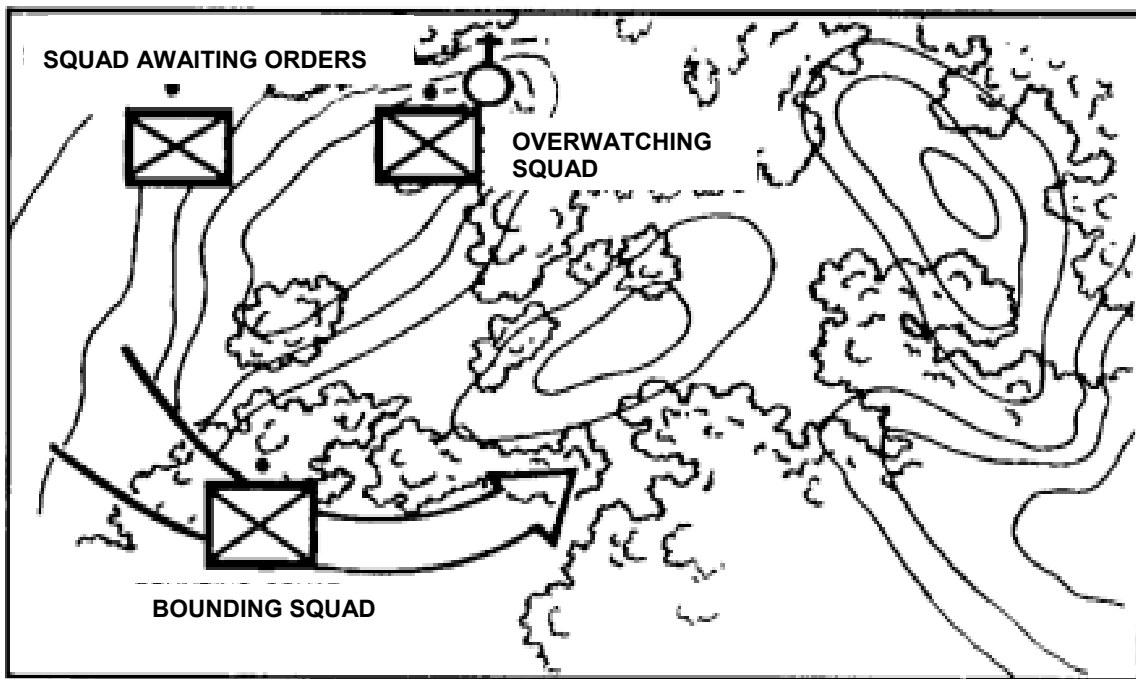


Figure 2-25. Platoon bounding overwatch

(a) *One squad bounding.* One squad bounds forward to a chosen position, then it becomes the overwatching element unless contact is made en route. The bounding squad can use either traveling overwatch, bounding overmatch, or individual movement techniques (low and high crawl, and short rushes by fire team or pairs)

(b) *One squad overwatching.* One squad overwatches the bounding squad from covered positions from which it can see and suppress likely enemy positions. Soldiers use sunning techniques to view their assigned sector. The platoon leader remains with the overmatching squad. Normally, the platoon's machine guns are located with the overwatching squad also.

(c) *One squad awaiting orders.* One squad is uncommitted and ready for employment as directed by the platoon leader. The platoon sergeant and the leader of the squad awaiting orders position themselves close to the platoon leader.

(d) *Considerations.* When deciding where to have his bounding squad go, a platoon leader considers--

- The requirements of the mission.
- Where the enemy is likely to be.
- The routes to the next overwatch position.
- The ability of an overwatching element's weapons to cover the bound.
- The responsiveness of the rest of the platoon.
- The fields of fire at the next overwatch position.

(e) *Instructions.* Before a bound, the platoon leader gives an order to his squad leaders from the overwatch position ([Figure 2-26](#)). He tells and shows them the following:

- The direction or location of the enemy (if known)
- The positions of the overwatching squad.
- The next overwatch position.
- The route of the bounding squad.
- What to do after the bounding squad reaches the next position.
- What signal the bounding squad will use to announce it is prepared to overwatch.
- How the squad will receive their next orders.

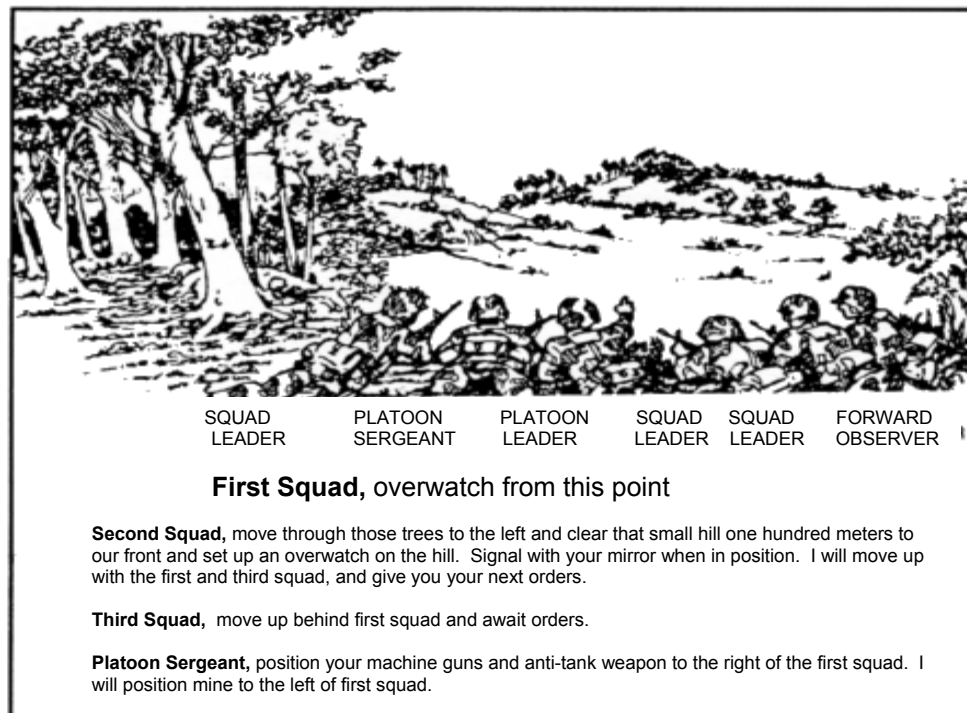


Figure 2-26. Example of platoon leader's order for bounding overwatch

(f) *Machine guns.* The machine guns are normally employed in one of two ways:

- Attach both guns to the overwatch squad(s)
- One machine gun with the overwatch squad and the other with the bounding squad. This technique requires the guns to move between squads as they leave the overwatch to join the bounding squad.

c. **Individual Movement Techniques.** Individual movement techniques include the high and low crawl and short rushes (three to five seconds) from one covered position to another. (See [FM 21-75](#)).

- d. **Other Movement Situations.** The platoon can use other formations for movement.
- (1) ***Movement with armored vehicles.*** For a detailed discussion of working with armored vehicles, see [Section IX](#).
- (2) ***Movement by water.*** The platoon avoids crossing water obstacles when possible. Leaders should identify weak or nonswimmers and pair them with a good swimmer in their squad.
- (a) When platoons or squads must move into, through, or out of rivers, lakes, streams, or other bodies of water, they treat the water obstacle as a danger area. While on the water, the platoon is exposed and vulnerable. To offset the disadvantages, the platoon--
- Moves during limited visibility.
  - Disperses.
  - Camouflages thoroughly.
  - Moves near the shore to reduce the chances of detection.
- (b) When moving in more than one boat, the platoon--
- Maintains tactical integrity and self-sufficiency.
  - Cross loads key soldiers and equipment.
  - Makes sure that the radio is with the leader.
- (c) If boats are not available, several other techniques can be used such as--
- Swimming.
  - Poncho rafts.
  - Air mattresses.
  - Waterproof bags.
  - A 7/16-inch rope used as a semisubmersible one-rope bridge or safety line.
  - Water wings (made from a set of trousers)
- (3) ***Tactical marches.*** Platoons conduct two types of tactical marches with the company. They are foot marches and motor marches.
- (a) ***Foot marches.*** See [FM 21-18](#).
- (b) ***Motor marches.*** The platoon conducts motor marches like any other tactical movement. Special requirements may include--
- Protection. Sandbagging the bottom of the truck to protect the soldiers from mines.
  - Observation. Removing bows and canvas to allow 360-degree observation and rapid dismount.
  - Inspection. Inspecting vehicle and driver to ensure they are ready. Checking fuel level and driver's knowledge of the route, speed, and distance between vehicles.
  - Loading. The platoon should load vehicles keeping fire team, squad, and platoon integrity. For example, fire teams and squads intact on the same vehicle and platoons in the same serial. Additionally, key leaders, weapons, and equipment should be cross loaded.
  - Rehearsals. Rehearsing immediate action to enemy contact (near and far ambush, air attack) ensuring the driver knows what to do.
  - Air guards. Posting air guards for each vehicle.

(4) ***Movement during limited visibility conditions.*** At night or when visibility is poor, a platoon must be able to function the same as during day. It must be able to control, navigate, maintain security, move, and stalk at night or during limited visibility.

(a) *Control.* When visibility is poor, the following methods aid in control:

- Selected personnel use of night vision devices.
- Leaders move closer to the front.
- The platoon reduces speed.
- Each soldier uses two small strips of luminous tape on the rear of his helmet to allow the soldier behind him to see.
- Leaders reduce the interval between soldiers and between units to make sure they can see each other.
- Leaders conduct headcounts at regular intervals and after each halt to ensure personnel accountability.

(b) *Navigation.* To assist in navigation during limited visibility, leaders use--

- Terrain association (general direction of travel coupled with recognition of prominent map and ground features)
- Dead reckoning (compass direction and specific distances or legs)     At the end of each leg, leaders should verify their location.
- Movement routes that parallel identifiable terrain features.
- Guides or marked routes.
- GSRs to vector units to the proper location.
- Position-location devices.

(c) *Security.* For stealth and security in night moves, squads and platoons--

- Designate a point man to maintain alertness, the lead team leader to navigate, and a pace man to count the distance traveled. Alternate compass and pace men are designated.
- Allow no smoking, no lights, and no noise.
- Use radio-listening silence.
- Camouflage soldiers and equipment.
- Use terrain to avoid detection by enemy surveillance or night vision devices.
- Make frequent listening halts.
- Mask the sounds of movement with artillery fires.

(d) *Night walking.* Proficiency in night walking is gained through practice. A soldier walking at night looks ahead, then slowly lifting his right foot, he cases it forward about 6 inches to the front of the left foot. While easing his foot forward and keeping his toes pointed downward, the soldier feels for twigs and trip wires. He slowly places his foot on the ground. Confident of solid, quiet footing, the soldier slowly moves his weight forward, hesitates, then repeats the process with the other foot. This technique is slow and time-consuming.

(e) *Stalking.* Soldiers stalk to get as close as they can to an enemy sentry, patrol, or base. This is best described as a slow, crouching night walk. The soldier watches the enemy continuously. When close to the enemy, the soldier squints to help conceal light reflected by his eyes. He breathes slowly through his nose. If

the enemy looks in his direction, the soldier freezes. He takes advantage of the background to blend with shadows and to prevent glare or contrast. Soldiers move during distractions such as gusts of wind, vehicle movement, loud talking, or nearby weapons fire.

**2-15b. Move to Defensive Positions.** The platoon applies fundamentals of movement:

- (1) Move on covered and concealed routes.
- (2) Avoid likely ambush sites.
- (3) Enforce camouflage, noise, and light discipline.
- (4) Maintain all-round security, to include air guards.
- (5) Use formations and movement techniques based on METT-T.

## Student Handout 5

### Extract from FM 21-60, Visual Signals, Sep 87

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This student handout contains 13 pages extracted from FM 21-60, Chapter 2.  
Bring all reference materials to class.

| Pages               | Reading Requirement    |
|---------------------|------------------------|
| SH-5-2 thru SH-5-14 | Read para 2-4 and 2-5. |

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Strike the fist of one hand several times in rapid succession against the palm of the other hand.

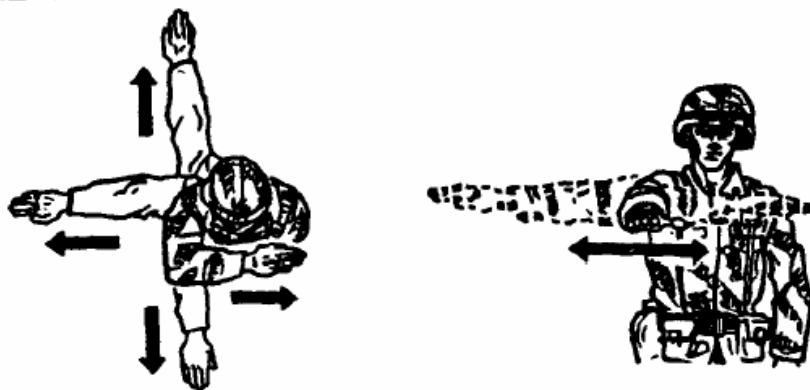
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**Figure 2-28. OUT OF ACTION.**

## **2-4. Signals for Combat Formations and Battle Drills**

### **a. Signals, General (Figures 2-29 through 2-57).**

- (1) Leaders of dismounted units use arm-and-hand signals to control the movement of individuals, teams, and squads. These signals are used by infantry and also by combat support and combat service support elements organized for infantry missions (Figures 2-29 through 2-45).
- (2) Leaders of mounted units use arm-and-hand signals to control individual vehicles and platoon movement. When distances between vehicles increase, flags (wrapped and tied) can be used as an extension of the arm to give the signals. From some vehicles (for example, Bradley, M2), the arm-and-hand signals will be distorted (Figures 2-46 through 2-50).
- (3) Signals for drills are illustrated in Figures 2-51 through 2-57.



Extend either arm vertically overhead; wave the arm and hand to the front, left, right, and rear, with the palm toward the direction of each movement.

Figure 2-29. DISPERSE.



Raise the arm vertically overhead, palm to the front, and wave in large horizontal circles.

**NOTE:** Signal is normally followed by the signaler pointing to the assembly or rally site.

Figure 2-30. ASSEMBLE or RALLY.



Point toward person(s) or unit(s); beckon by holding the arm horizontally to the front, palm up, and motioning toward the body.

Figure 2-31. JOIN ME, FOLLOW ME, or COME FORWARD.

---

Simulate the movement of the right hand in removing the bayonet from the scabbard and fixing it on the rifle.



Figure 2-32. FIX BAYONETS.

---

Raise the fist to the shoulder; thrust the fist upward to the full extent of the arm and back to shoulder level; do this rapidly several times.



Figure 2-33. INCREASE SPEED, DOUBLE TIME, or RUSH.

---

Extend the arm horizontally sideward, palm to the front, and wave the arm slightly downward several times, keeping the arm straight. Do not move the arm above the horizontal.

**NOTE:** This is the same signal as SLOW DWN when directing vehicles (Figure 2-13). The difference in meaning must be understood from the context in which they are used.



Figure 2-34. QUICK TIME.



Hold the rifle in the ready position at shoulder level. Point the rifle in the direction of the enemy.

---

Figure 2-35. ENEMY IN SIGHT.



Extend the arm at a 45-degree angle from the side, above the horizontal, palm down, and then lower the arm to the side.

---

Figure 2-36. TAKE COVER.



Extend the arms downward and to the sides of an angle of 45-degrees below the horizontal, palms to the front.

---

Figure 2-37. WEDGE.

---

Raise the arms and extend them 45 degrees above the horizontal.



Figure 2-38. VEE.



Extend the arms parallel to the ground

Figure 2-39. LINE.

---

Raise one arm above the head and rotate it in a small circle.



Figure 2-40. COIL.



Extend the right arm and raise it 45 degrees above the shoulder. Extend the left arm 45 degrees below the horizontal and point toward the ground.

Figure 2-41. ECHELON LEFT.

---



Extend the left arm and raise it 45 degrees above the shoulder. Extend the right arm 45 degrees below the horizontal and point toward the ground.

Figure 2-42. ECHELON RIGHT.

---



Extend the arms so that upper arms are parallel to the ground and the forearms are perpendicular. Raise the arms so they are fully extended above the head. Repeat.

Figure 2-43. STAGGERED COLUMN.

---

---

Raise and extend the arm overhead. Move it to the right and left. Continue until the formation is executed.



Figure 2-44. COLUMN.

---

Extend the arms parallel to ground. Bend the arms until the forearms are perpendicular. Repeat.



Figure 2-45 HERRINGBONE

- b. Mechanized Movement Techniques. Signals for movement techniques are used by mechanized units to indicate which manner of traversing terrain will be used by a unit (Figures 2-46 through 2-50).

---

Extend the arm overhead and swing it in a circle from the shoulder.



Figure 2-46. TRAVELING.





Extend both arms and raise them up and down.

---

Figure 2-47. TRAVELING OVERWATCH.



Extend one arm to a 45 degree angle. Bend the arms and tap the helmet. Repeat

---

Figure 2-48. BOUNDING OVERWATCH. COVER MY MOVE.



Extend the arm to the left and raise it up and down.

---

Figure 2-49. MOVE TO LEFT.



---

Extend the arm to the right and raise it up and down.



---

Figure 2-50 MOVE TO RIGHT

- c. **Drills.** Drills are a rapid, reflexive response executed by a small unit. These signals are used to initiate drills (Figures 2-51 through 2-57).

---

Extend the left arm parallel to the ground. Bend the arm until the forearm is perpendicular. Repeat.



---

Figure 2-51. CONTACT LEFT.

---

Extend the right arm parallel to the ground. Bend the arm until the forearm is perpendicular. Repeat.



---

Figure 2-52. CONTACT RIGHT.



Extend both arms parallel to the ground. Raise the right arm until it is overhead. Repeat.

---

Figure 2-53. ACTION LEFT.



Extend both arms parallel to the ground. Raise the left arm until it is overhead. Repeat

---

Figure 2-54. ACTION RIGHT.



Raise the fist to shoulder level and thrust it several times in the desired direction of action

---

Figure 2-55. ACTION FRONT (RIGHT, LEFT or REAR), FIGHT ON FOOT, or ASSAULT FIRE (DISMOUNTED TROOPS).

---

Bend the arms with forearms at a 45 degree angle. The forearms are crossed. Repeat.



Figure 2-56. AIR ATTACK.

---



Extend the arms and fists. Bend the arms to the shoulders. Repeat

---

Figure 2-57. NUCLEAR, BIOLOGICAL, CHEMICAL ATTACK.

## 2-5. Patrolling Arm-and-Hand Signals

Patrolling is conducted by many type units. Infantry units patrol in order to conduct combat operations. Other units patrol for reconnaissance and security. Successful patrols require clearly understood communication signals among members of a patrol (Figures 2-58 through 2-63).



Point at the palm of one hand with the index finger of the other hand.

---

Figure 2-58. MAP CHECK.



Tap the heel of boot repeatedly with an open hand.

---

Figure 2-59. PACE COUNT.



Raise the hand to the ear with the thumb and little finger extended.

---

Figure 2-60. RADIOTELEPHONE OPERATOR FORWARD.

---

Tap the back of the helmet  
Repeatedly with an open hand.



Figure 2-61. HEAD COUNT.

---

Draw the right hand, palm  
Down, across the neck in a  
Throat-cutting motion from  
Left to right.

**NOTE:** This movement is  
The same as Figure 2-17,  
STOP ENGINES. The dif-  
ference in meanings is under-  
stood from the context in  
which it is used.



Figure 2-62. DANGER AREA.

---

Raise the fist to head level.



Figure 2-63. FREEZE.

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## Student Handout 6

### Extract from FM 7-8, Infantry Rifle Platoon and Squad, April 92.

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This student handout contains seven pages extracted from FM 7-8, Chapter 2.  
Bring all reference material to class.

| Pages              | Reading Requirement         |
|--------------------|-----------------------------|
| SH-6-2 thru SH-6-8 | Study Chapter 2, para 2-11. |

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## CHAPTER 2

### OPERATIONS

*This chapter provides techniques and procedures used by infantry platoons and squads. These techniques are used throughout the planning and execution phases of platoon and squad tactical operations.*

#### Section I. COMMAND AND CONTROL

This section discusses mission tactics, troop-leading procedure, combat orders, and techniques for preparing a platoon to fight. These topics pertain to all combat operations. Their application requires time. With more time, leaders can plan and prepare in depth. With less time, they must rely on previously rehearsed actions, battle drills, and standing operating procedures.

#### 2-11. ACTIONS AT DANGER AREAS

A danger area is any place on a route where the leader's estimate process tells him that his platoon might be exposed to enemy observation, fire, or both. Platoons try to avoid danger areas. If a platoon must cross a danger area, it does so with great caution and as quickly as possible.

a. **Types of Danger Areas.** The following are some examples of danger areas and crossing procedures.

(1) **Open areas.** Conceal the platoon on the near side and observe the area. Post security to give early warning. Send an element across to clear the far side. When cleared, cross the remainder of the platoon at the shortest exposed distance and as quickly as possible.

(2) **Roads and trails.** Cross roads or trails at or near a bend, a narrow spot, or on low ground.

(3) **Villages.** Pass villages on the downwind side and well away from them. Avoid animals, especially dogs, which might reveal the presence of the platoon.

(4) **Enemy positions.** Pass on the downwind side (the enemy might have scout dogs). Be alert for trip wires and warning devices.

(5) **Minefields.** Bypass minefields if at all possible--even if it requires changing the route by a great distance. Clear a path through minefields only if necessary.

(6) **Streams.** Select a narrow spot in the stream that offers concealment on both banks. Observe the far side carefully. Emplace near and far-side security for early warning. Clear the far side, then cross rapidly but quietly.

(7) **Wire obstacles.** Avoid wire obstacles (the enemy covers obstacles with observation and fire).

**b. Crossing of Danger Areas.** When the platoon crosses a danger area independently or as the lead element of a larger force, it must--

- Designate near- and far-side rally points.
- Secure the near side (right, left flanks, and rear security).
- Reconnoiter and secure the far side.
- Execute crossing the danger area.

(1) The platoon leader or squad leader decides how the unit will cross based on the time he has, the size of the unit, the size of the danger area, the fields of fire into the area, and the amount of security he can post. A small unit may cross all at once, in buddy teams, or one soldier at a time. A large unit normally crosses its elements one at a time. As each element crosses, it moves to an overwatch position or to the far-side rally point until told to continue movement.

(2) To maintain momentum, trailing platoons normally cross the danger area without conducting their own reconnaissance or establishing far-side security. The lead platoon conducts reconnaissance and maintains far-side security for the whole force.

NOTE: The secured area must be large enough to allow the full deployment of the remainder of the unit.

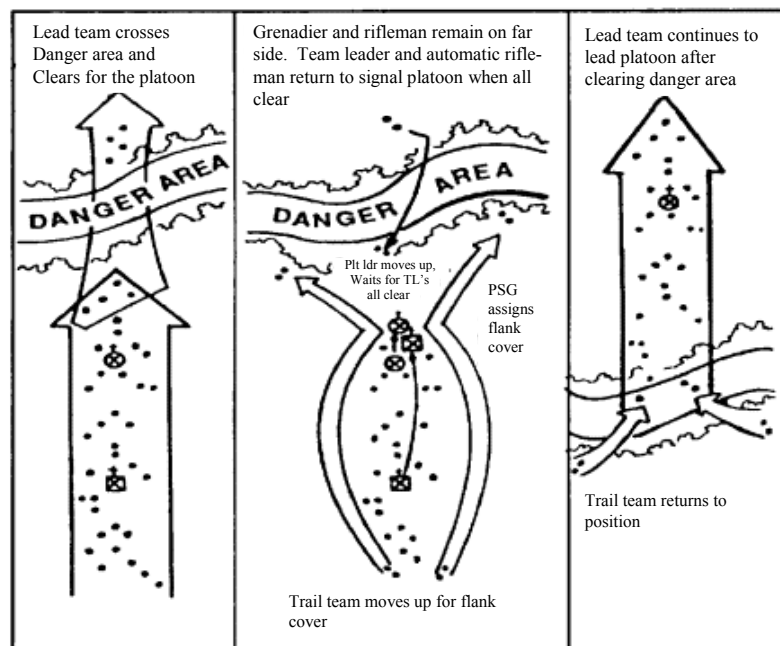


Figure 2-27. Crossing a danger area.

**c. Crossing of linear Danger Areas (Platoon).** The platoon crosses the danger area in the formation and location specified by the platoon leader. On the far side of the danger area, platoon personnel and equipment are accounted for. The platoon continues the mission. ([Figure 2-27.](#))

- (1) When the lead team signals "danger area" (relayed throughout the platoon), the platoon halts.
- (2) The platoon leader moves forward, confirms the danger area, and determines what technique the platoon will use to cross. The platoon sergeant also moves forward to the platoon leader.
- (3) The platoon leader informs all squad leaders of the situation and the near-side and far-side rally points.
- (4) The platoon sergeant directs positioning of the near-side security (usually conducted by the trail squad). These two security teams may follow him forward when the platoon halts and a danger area signal is passed back.
- (5) The platoon leader reconnoiters the danger area and selects the crossing point that provides the best cover and concealment.
- (6) Near-side security observes to the flanks and overmatches the crossing.
- (7) When the near-side security is in place, the platoon leader directs the far-side security team to cross the danger area.
- (8) The far-side security team clears the far side.
- (9) The far-side security team leader establishes an OP forward of the cleared area.
- (10) The far-side security team signals to the squad leader that the area is clear. The squad leader relays the message to the platoon leader.
- (11) The platoon leader selects the method the platoon will use to cross the danger area.
- (12) The platoon quickly and quietly crosses the danger area.
- (13) Once across the danger area, the main body begins moving slowly on the required azimuth.
- (14) The near-side security element, controlled by the platoon sergeant, crosses the danger area where the platoon crossed. They may attempt to cover any tracks left by the platoon.
- (15) The platoon sergeant ensures everyone crosses and sends up the report.
- (16) The platoon leader ensures accountability and resumes movement at normal speed.

**NOTE:** The same principles stated above are used when crossing a smaller unit across a danger area.

**d. Crossing of Large Open Areas.** This is an area so large that the platoon cannot bypass due to the time to accomplish the mission ([Figure 2-28](#)). A combination of traveling overwatch and bounding overwatch is used to cross the open area. The traveling overwatch technique is used to save time. At any point in the open area where contact may be expected or once the squad or platoon comes within range of small-arms fire of the far side (about 250 meters), the squad or platoon moves using the bounding overwatch technique. Once beyond the open area, the squad or platoon reforms and continues the mission.

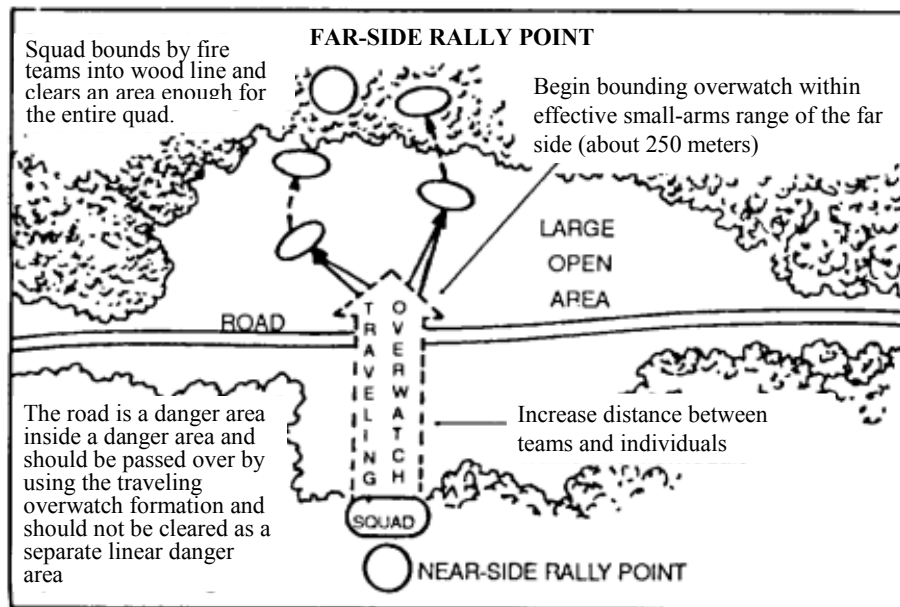


Figure 2-28. Crossing large open area.

**e. Crossing of Small Open Areas.** This is an open area small enough so that it may be bypassed in the time allowed for the mission. Two techniques can be used:

(1) **Detour bypass method.** By the use of 90-degree turns to the right or left, the squad or platoon moves around the open area until the far side is reached, then continues the mission. The pace count of the offset and return legs is not added to the distance of the planned route.

(2) **Contouring around the open area.** The leader designates a rally point on the far side with the movement azimuth, decides which side of the open area to contour around (after considering the distance, terrain, cover and concealment), and moves around the open area. He uses the wood line and vegetation for cover and concealment. When the squad or platoon arrives at the rally point on the far side, the leader reassumes the azimuth to the objective area and continues the mission ([Figure 2-29](#)).

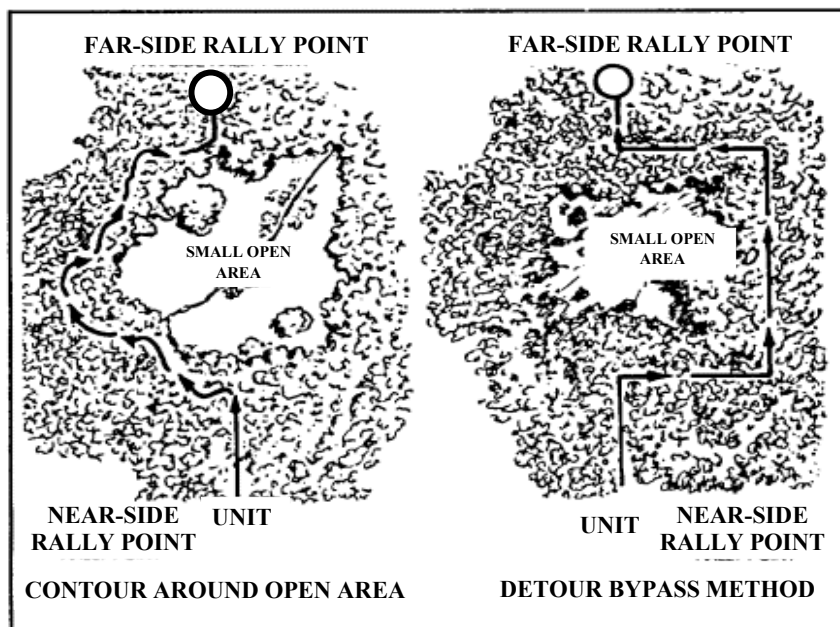


Figure 2-29. Cross a small open area.

**f. Enemy Contact at Danger Areas.** If the platoon makes enemy contact in or around the danger area, see [Figure 2-30](#) for contact on far side, [Figure 2-31](#) for contact on a road or trail, or [Figure 2-32](#) for contact on near side.

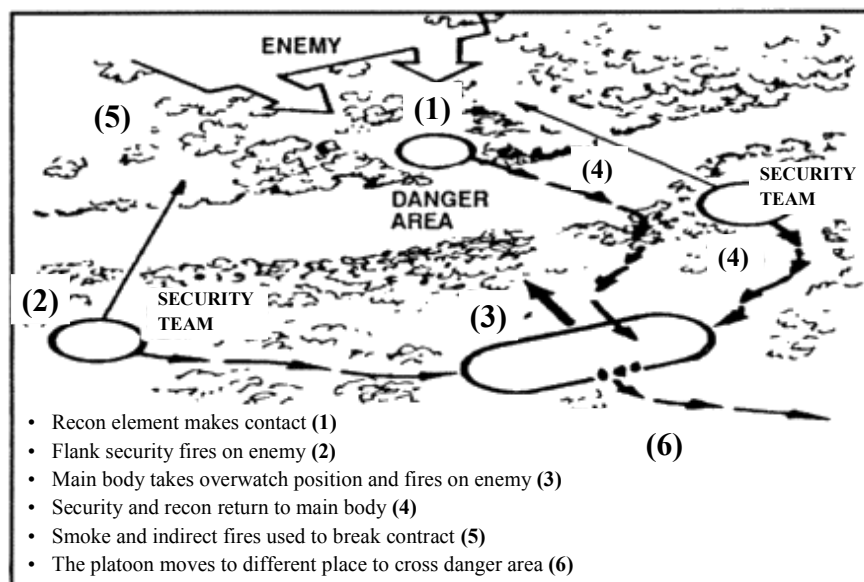


Figure 2-30. Enemy contact on far side.

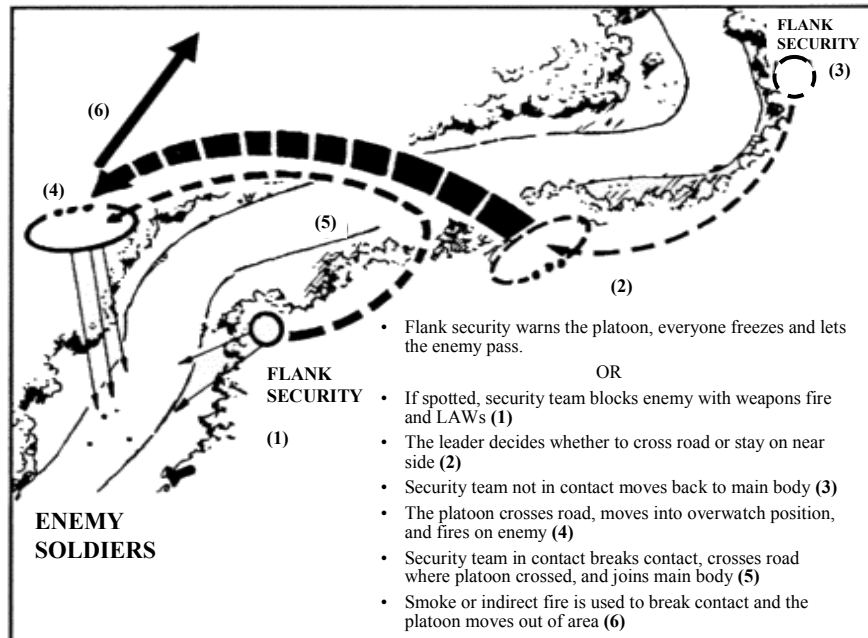


Figure 2-31. Enemy contact on road or trail.

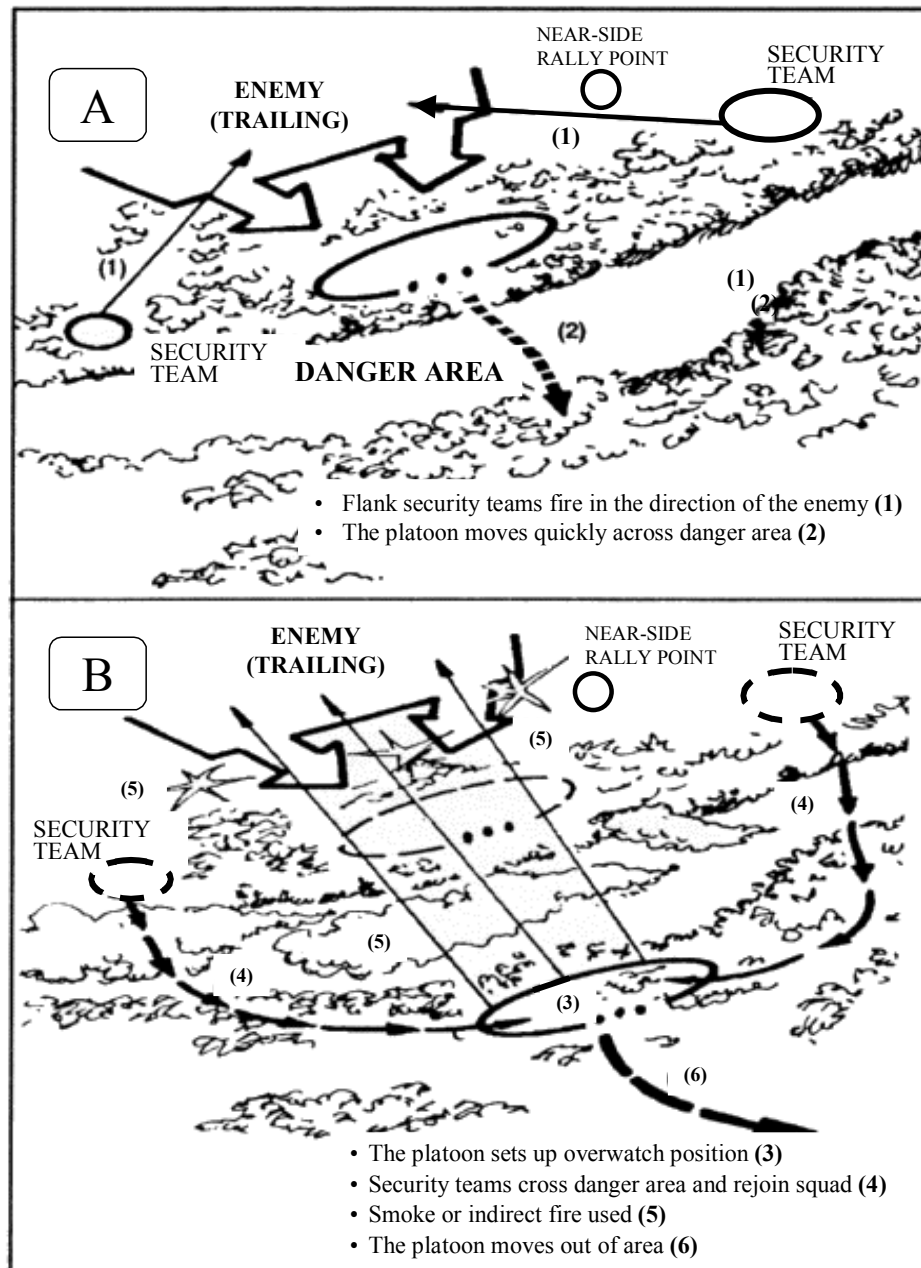


Figure 2-32. Enemy contact on near side.

NOTE: Squads react to contact the same as platoons

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## Student Handout 7

### Extract from STP 21-24-SMCT-1, 1 Aug 03

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This student handout contains three pages extracted from STP 21-24-SMCT, Task 1. Select a Route Using a Map. Bring all reference material to class.

| Pages              | Reading Requirement |
|--------------------|---------------------|
| SH-7-2 thru SH-7-4 | Study Task 1.       |

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## APPENDIX C- LAND NAVIGATION SKILLS AND KNOWLEDGES

### Land Navigation Skills and Knowledges Supporting Skill Level 1 Land Navigation Tasks

1. Select a Movement Route Using a Map
  2. Identify Topographic Symbols on a Military Map
  3. Identify Terrain Features on a Map
  4. Determine the Grid Coordinates of a Point on a Military Map
  5. Determine a Magnetic Azimuth Using a Lensatic Compass
  6. Determine the Elevation of a Point on the Ground Using a Map
  7. Determine a Location on the Ground by Terrain Association
  8. Measure Distance on a Map
  9. Convert Azimuths
  10. Orient a Map Using a Lensatic Compass
  11. Orient a Map to the Ground by Map-Terrain Association
  12. Locate an Unknown Point on a Map and on the Ground by Intersection
  13. Locate an Unknown Point on a Map and on the Ground by Resection
  14. Determine Direction without a Compass
  15. Determine Azimuths Using a Protractor
  16. Compute Back Azimuths
- 

#### Select a Movement Route Using a Map

**Conditions:** Given an operation or fragmentary order, a 1:50, 000 scale military map and a compass.

**Standards:** Selected a route with the following characteristics:

1. Took advantage of maximum cover and concealment.
2. Ensured observation and field of fire for the overwatch or fire support elements.
3. Allowed positive control of all elements.
4. Accomplished the mission quickly without unnecessary or prolonged exposure to enemy fire.

#### Performance Steps

1. Select the route that makes the best use of terrain. Your platoon spends more time moving than fighting in combat. Because a moving unit usually contacts the enemy at a time and place of the enemy's choosing, you must use terrain to your best advantage. Proper use of terrain has two advantages:

- a. Cover and concealment to protect the platoon during movement.
- b. Maximum effectiveness of the platoon's weapons.

2. To properly use those advantages, you must understand the military aspects of terrain and be able to apply them to any given situation, whether it be a defense, a delay or a road march behind the forward edge of the battle area (FEBA).

a. The primary requirement for any type of movement on the battlefield is cover and concealment..

(1) Cover is any type of shielding from the effects of weapon fire, especially direct fire. You must take advantage of every ravine or depression in the ground to protect and cover your

## STP 21-1-SMCT

force, especially if you are forward of the FEBA. You must evaluate the terrain, the abilities of the enemy's weapons systems, and the position of known or suspected enemy emplacement. Visualize a cross section of the terrain and determine where the enemy cannot place effective direct fire on your proposed route.

(2) Concealment is anything that hides or disguises your force. You must consider concealment from both air and ground observation. If you are mechanized, exhaust smoke or dust can reveal your unit to the enemy.

- b. If you are moving in an area where contact with the enemy is expected, you must ensure that your proposed route can be covered by fire from your overwatch or fire support positions. Those positions must have good observation and fields of fire.

(1) Direct fire weapons must have good observation to fire known or suspected enemy positions along your movement route. You must have observation to control the maneuver of your elements, if they make contact. Consider the effects of smoke and dust from friendly and enemy fire.

(2) Select a route that gives your unit the best field of fire. Your machine guns and antitank weapons must have good fields of fire to be effective. They must be in a position to provide suppressive fires immediately. Using your crew-served weapons to overwatch your movement, they must be able to observe your route and fire in your support all the way to the objective. The overwatch positions that you select must have unobstructed fields of fire to the next overwatch position.

3. Select the route that provides the most favorable tactical advantage and meets the mission requirements. If enemy air is active or enemy ground forces are in the area of the route, you must take maximum advantage of cover and concealment. If speed of movement is critical, the route should be over the most easily negotiable terrain, avoiding difficult obstacles. The route should include movement from one easily distinguishable terrain feature to another. When ordered to move, you must check the terrain based on the above considerations and select the quickest and safest route.

4 Planning a route can be aided by the use of special purpose maps and aerial photographs. If those aids are available, use them to ensure that you have the most current information.

5 Map reconnaissance, however, is no substitute for ground reconnaissance. If time is available and the tactical situation permits, reconnoiter the route that you have to move over.

**Evaluation Preparation:** SETUP: In a field environment, provide the soldier with a 1:50,000-scale military map of the area and a compass, and issue him an oral or written operation order.

**BRIEF SOLDIER:** Tell the soldier to select a route of movement between two given points (marked on the map) where the likelihood of enemy contact is unknown. The soldier must select a route that offers the best cover and concealment, ensure the best observation and fields of fire for support elements, allow positive control of elements, and accomplish the mission without unnecessary or prolonged exposure to enemy fire.

### Performance Measures

|   | <u>GO</u> | <u>NO GO</u> |
|---|-----------|--------------|
| 1. Made a map reconnaissance of the area that must be moved over.                       | _____     | _____        |
| 2. Selected a route that offers:  | _____     | _____        |
| a. Maximum cover.   |           |              |
| b. Maximum concealment.   |           |              |
| c. Good observation to fire at known or suspected enemy positions along movement route. |           |              |
| d. Best fields of fire.   |           |              |
| e. Most favorable tactical advantage.   |           |              |
| f. Positive control of all elements.  |           |              |

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**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier fails any steps, show him what was done wrong and how to do it correctly.

### **References**

#### **Required**

FM 7-7

FM 7-8

#### **Related**

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## Student Handout 8

### Extract from STP 21-1-SMCT-1, Aug 03

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This student handout contains two pages extracted from STP 21-1-SMCT, Task 071-331-0815, Practice Noise, Light, and Litter Discipline. Bring all reference material to class.

| Pages              | Reading Requirement     |
|--------------------|-------------------------|
| SH-8-2 thru SH-8-3 | Read Task 071-331-0815. |

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## STP 21-1-SMCT

### Practice Noise, Light, and Litter Discipline 071-331-0815

**Conditions:** As a member of an element conducting a tactical mission.

**Standards:** Ensure that:

1. Noise was kept at a minimum.
2. No light was visible to the enemy.
3. The area was free of litter and other evidence of the unit's presence.

#### Performance Steps

1. Comply with noise discipline.
  - a. Avoid all unnecessary vehicular and foot movement.
  - b. Secure (with tape or other materials) metal parts (for example, weapon slings, canteen cups, identification [ID] tags) to prevent them from making noise during movement.
  - c. Be careful not to restrict moving parts of weapons if doing so would prevent their operation.
  - d. Talk only when necessary to conduct or explain operations.
  - e. Use radios only when necessary, keeping the volume low so only you can hear the radio.
2. Comply with light discipline.
  - a. Do not smoke except when concealed from enemy view.

Note: Smoking at night should be restricted, as the enemy can see and smell the smoke.

- b. Conceal flashlights and other light sources so that the light is filtered (for example, under a poncho).
    - c. Cover anything that reflects light (for example, metal surfaces, vehicles, glass).
    - d. Use all available natural concealment.  
Camouflage all vehicles and equipment..
3. Comply with litter discipline.
  - a. Take all litter (empty food containers, empty ammunition cans or boxes, old camouflage) to established collection points when occupying a position.
  - b. Carry all litter with you until you can dispose of it without leaving any trace when moving.

**Evaluation Preparation:** Setup: Schedule this exercise in conjunction with field maneuvers or field exercises or use defensive positions.

#### Performance Measures

GO      NO GO

1. Complied with noise discipline by:

\_\_\_\_\_

  - a. Avoiding all unnecessary vehicular and foot movement.
  - b. Securing metal parts, preventing them from making noise during movement.
  - c. Being careful not to restrict moving parts of secured weapons, preventing operation.
  - d. Talking only when necessary to conduct or explain operations.
  - e. Using radios only when necessary, keeping the volume low so that only you can hear the radio.

2. Complied with light discipline by: \_\_\_\_\_
- 3.
- a. Smoking only when concealed from enemy view.
  - b. Concealing flashlights and other light sources so that the light is filtered.
  - c. Covering anything that reflects light.
  - d. Using all available natural concealment.
  - e. Camouflaging all vehicles and equipment.
3. Complied with litter discipline by: \_\_\_\_\_
- a. Taking all litter to established collection points when occupying a position.
  - b. Carrying all litter with you until you can dispose of it without leaving any trace when moving.

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

#### References

**Required**  
FM 7-8

**Related**

## Student Handout 9

### Extract from FM 7-8, Infantry Rifle Platoon and Squad, Apr 92

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This student handout contains two pages extracted from FM 7-8, Infantry Rifle Platoon and Squad. Bring all reference material to class.

| Pages              | Reading Requirement            |
|--------------------|--------------------------------|
| SH-9-2 thru SH-9-3 | Read pages SH-9-2 thru SH-9-3. |

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# CHAPTER 1

## DOCTRINE

*The US Army's basic fighting doctrine is called AirLand Battle. It reflects time proven fundamentals, and structure of modern warfare, and the experience of combat. AirLand Battle doctrine provides a specific mission for infantry forces.*

### Section I. FUNDAMENTALS

Among the infantry's basic fundamentals are the principles of war, the elements of combat power, and the tenets of AirLand Battle. These fundamentals have application s at the platoon and squad level. This section provides the mission of the infantry and the doctrine principles basic to the infantry rifle platoon and squad. These principles form the basis for platoon and squad tactics, techniques, procedures, and drills. This section also discusses the elements of combat power and the skills required of leaders and soldiers at the small-unit level.

#### 1-9. SECURITY

Security includes any measure taken by platoons and squads against actions that may reduce their effectiveness. It involves avoiding detection by the enemy or deceiving the enemy about friendly positions and intentions. It also includes finding the enemy and knowing as much about his positions and intentions as possible. Security allows units to retain freedom of action and is an inherent part of all platoon operations. Platoons and squads secure themselves when they move, attack, and defend. As part of a larger formation, thy may undertake security operations that involve patrolling; establishing squad-sized Ops on a screen line; or executing advance, flank, or rear guard missions for the main body in a movement to contact..

a. **Security During Movement.** Platoons and squads enhance security during movement by--

- Using the proper movement formation and technique.
- Moving as fast as the situation will allow. This may degrade the enemy's ability to detect the platoon or squad and the effectiveness of his fires once detected.
- Moving along terrain that offers cover and concealment.
- Enforcing noise and light discipline.
- Using proper camouflage techniques.

## CHAPTER 2

### OPERATIONS

*This chapter provides techniques and procedures used by infantry platoons and squads. These techniques are used throughout the planning and execution phases of platoon and squad tactical operations.*

### Section II. SECURITY

#### 2-4. SECURITY DURING MOVEMENT

Security during movement includes the actions that units take to secure themselves and the tasks given to units to provide security for a larger force.

a. Platoons and squads enhance their own security during movement through the use of covered and concealed terrain; the use of the appropriate movement formation and technique; the actions taken to secure danger areas during crossing; the enforcement of noise, light, and radiotelephone discipline; and the use of proper individual camouflage techniques.

(2) **Formations and movement techniques.** Formations and movement techniques provide security by--

- Positioning each soldier so that he can observe and fire into a specific sector that overlaps with other sectors.
- Placing a small element forward to allow the platoon to make contact with only the lead element and give the remainder of the platoon freedom to maneuver.
- Providing overwatch for a portion of the platoon.

In selecting formations and movement techniques leaders must consider other requirements such as speed and control as well as security.

c. During short halts, soldiers spread out and assume prone positions behind cover. They watch the same sectors that were assigned to them for the movement. Leaders establish Ops, and orient machine guns and antiarmor weapons along likely enemy approaches. Soldiers remain alert and keep movement to a minimum. During limited visibility, leaders incorporate the use of night vision devices.

d. During long halts, the platoon establishes a perimeter defense (See Chapter 1). The platoon leaders ensures that the platoon halts on defensible terrain. He establishes the defense using the same considerations discussed in Section V.

e. For additional security during halts, the platoon leader may establish a squad-sized ambush. He must provide a specific location and instructions concerning the initiation and conduct of the ambush and the link-up of the squad with the platoon.