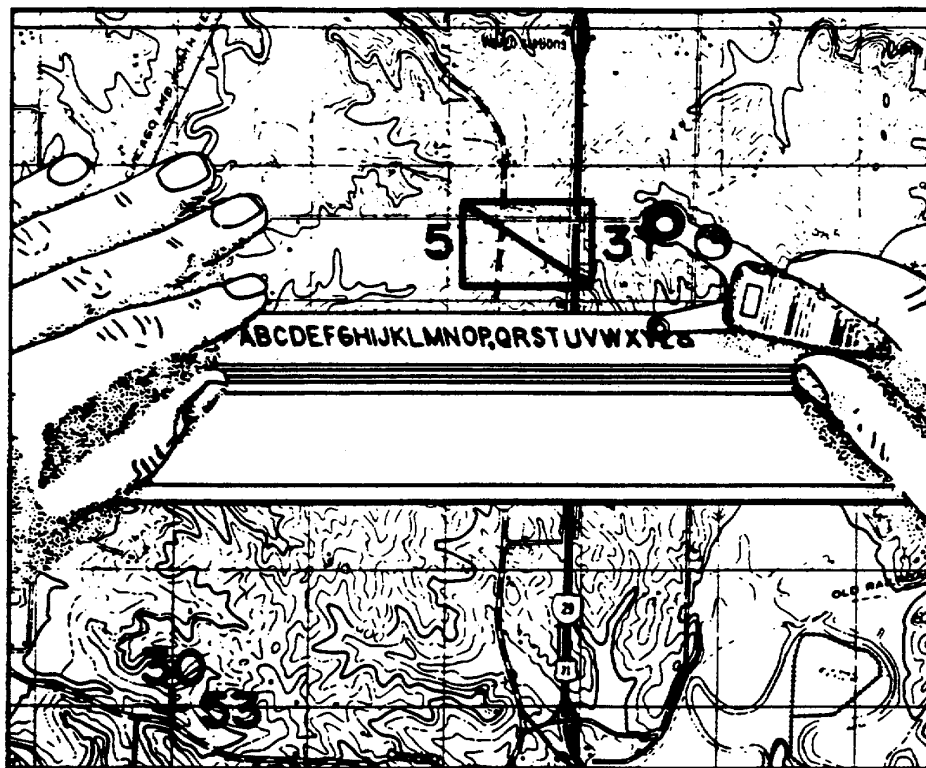


US ARMY ENGINEER SCHOOL

MAP OVERLAYS

Cartography IX



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT
ARMY CORRESPONDENCE COURSE PROGRAM

A
I
P
D



US ARMY CARTOGRAPHIC SPECIALIST
MOS 81C BASIC CARTOGRAPHY COURSE
MAP OVERLAYS
CARTOGRAPHY IX

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SUBCOURSE NUMBER EN5309

US Army Engineer School
Fort Belvoir, Virginia

Six Credit Hours

GENERAL

The Cartography IX (Map Overlays) subcourse, part of the Cartographic Specialist MOS 81C Basic Cartography Course, is designed to teach the knowledge and skills necessary to prepare map overlays. Techniques, materials, equipment, and uses of map overlays will be discussed. This subcourse is presented in four lessons corresponding to a terminal objective.

Lesson 1
OVERLAY USES AND PREPARATION MATERIALS

OBJECTIVE: Identify four types of overlays and their uses. Identify the materials and equipment used to prepare overlays.

CONDITIONS: You will be given information on the uses of the overlay and the materials used in its preparation and an Army Correspondence Course Program (ACCP) examination response sheet.

STANDARDS: Demonstrate knowledge of four types of overlays and materials necessary for preparing overlays by responding correctly to 75 percent of the examination questions pertaining to this lesson.

Lesson 2

THE SITUATION OVERLAY

OBJECTIVE: Identify the process used in developing a military symbol. Identify the techniques and procedures used in the preparation of the situation overlay.

TASK: 051-257-1215, Draft a Map Overlay.

CONDITIONS: You will be given information on the military symbol, the techniques and procedures used to prepare a situation overlay, and an ACCP examination response sheet.

STANDARDS: You should be able to demonstrate knowledge of the procedures for preparing situation overlays by responding correctly to 75 percent of the examination questions pertaining to this lesson.

Lesson 3

SELECTION, CORRECTION, AND SPECIAL OVERLAYS

OBJECTIVE: Identify the procedures used in preparing the selection, correction, and special overlays.

TASK: 051-257-1215, Draft a Map Overlay.

CONDITIONS: You will be given information on procedures for preparing selection, correction, and special overlays and an ACCP examination response sheet.

STANDARDS: You should be able to demonstrate knowledge of the procedures for preparing selection, correction, and special overlays by responding correctly to 75 percent of the examination questions pertaining to this lesson.

Lesson 4

LETTERING SETS

OBJECTIVE: Describe the components of the lettering sets and the procedures for their use.

TASK: 051-257-1231, Prepare Names Overlay Using a Lettering Set.

CONDITIONS: You will be given information on the lettering sets and an ACCP examination response sheet.

STANDARDS: You should be able to demonstrate knowledge of the components of the lettering sets and the procedures for their use by responding correctly to 75 percent of the examination questions pertaining to this lesson.

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INTRODUCTION

A map is a graphic representation of the features on the earth's surface, usually on a plane surface and at an established scale. Through the use of overlays, maps become more specialized tools. An overlay is a transparent or translucent medium upon which specific military information is plotted at scale relative to the map used as a base or reference. The information on an overlay may show details not appearing, or requiring special emphasis, on the map base.

Lesson 1
OVERLAY USES AND PREPARATION MATERIALS

OBJECTIVE

Identify four types of overlays and their uses. Identify the materials used to prepare overlays.

CONDITIONS

You will be given information on the uses of the overlay and the materials used in its preparation and an ACCP examination response sheet.

STANDARDS

You are expected to demonstrate knowledge of four types of overlays and materials necessary for preparing overlays by responding correctly to 75 percent of the examination questions pertaining to this lesson.

CREDIT HOUR

One

REFERENCES

FM 21-32
TM 5-6675-316-14-HR

***** IMPORTANT NOTICE *****

THE PASSING SCORE FOR ALL ACCP MATERIAL IS NOW 70%.

PLEASE DISREGARD ALL REFERENCES TO THE 75% REQUIREMENT.

Lesson 1/Learning Event 1

Learning Event 1

IDENTIFY FOUR TYPES OF OVERLAYS AND THEIR USES

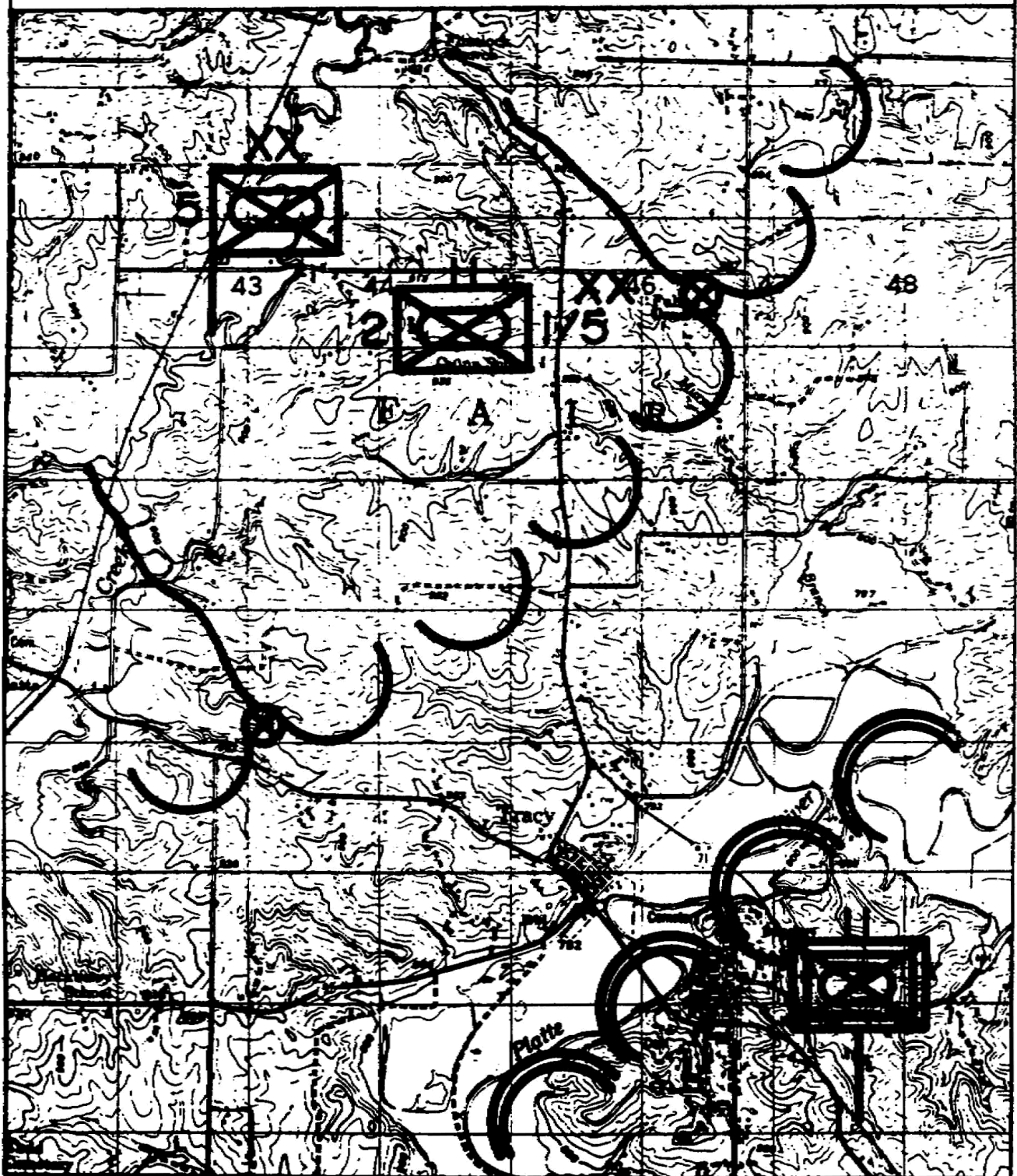
Overlays that contain information of a temporary nature and require distribution are usually reproduced as overlays to be used in conjunction with a map base. Overlays that contain information of a permanent nature and require distribution are reproduced as overprints. An overlay becomes an overprint when the information plotted on it is printed directly on a map, rather than being used in conjunction with it. Overprints obscure other information and make a map a specialized tool.

The information portrayed on an overlay determines its use. This lesson will discuss four types of overlays: the situation overlay, the selection overlay, the correction overlay, and the special overlay.

Situation overlay. Situation overlays contain information that is a combination of plotted unit and weapon symbols with objectives, boundaries, routes of march, and other control measures. This information provides a rapid and easily understood means by which a commander or staff officer may express an operational plan or concept of friendly or enemy situations. The situation overlay is an indispensable tool for quickly and accurately portraying battle activity.

Most situation overlays are used in conjunction with rapid dissemination of operation orders and plans. They may be hand drawn With colored markers or with pen and ink using templates for more accurate drafting. Figure 1 shows a portion of a situation overlay superimposed on a map.

FIGURE 1. SITUATION OVERLAY



Lesson 1/Learning Event 1

Selection overlay. Selection overlays contain information that already appears on the map used as its base or reference. The purpose of a selection overlay is to emphasize selected information so that it becomes easy to read. The information may be power lines emphasized for pilot use or all roads, four lanes or wider, emphasized for convoys. In most instances, selection overlays are reproduced as overprints.

Figure 2 shows a portion of a map on which the power lines have been emphasized. Figure 3 shows the same portion of the map without the power lines emphasized. Notice how easy it is to read the power lines when they are emphasized.

FIGURE 2. SELECTION OVERLAY

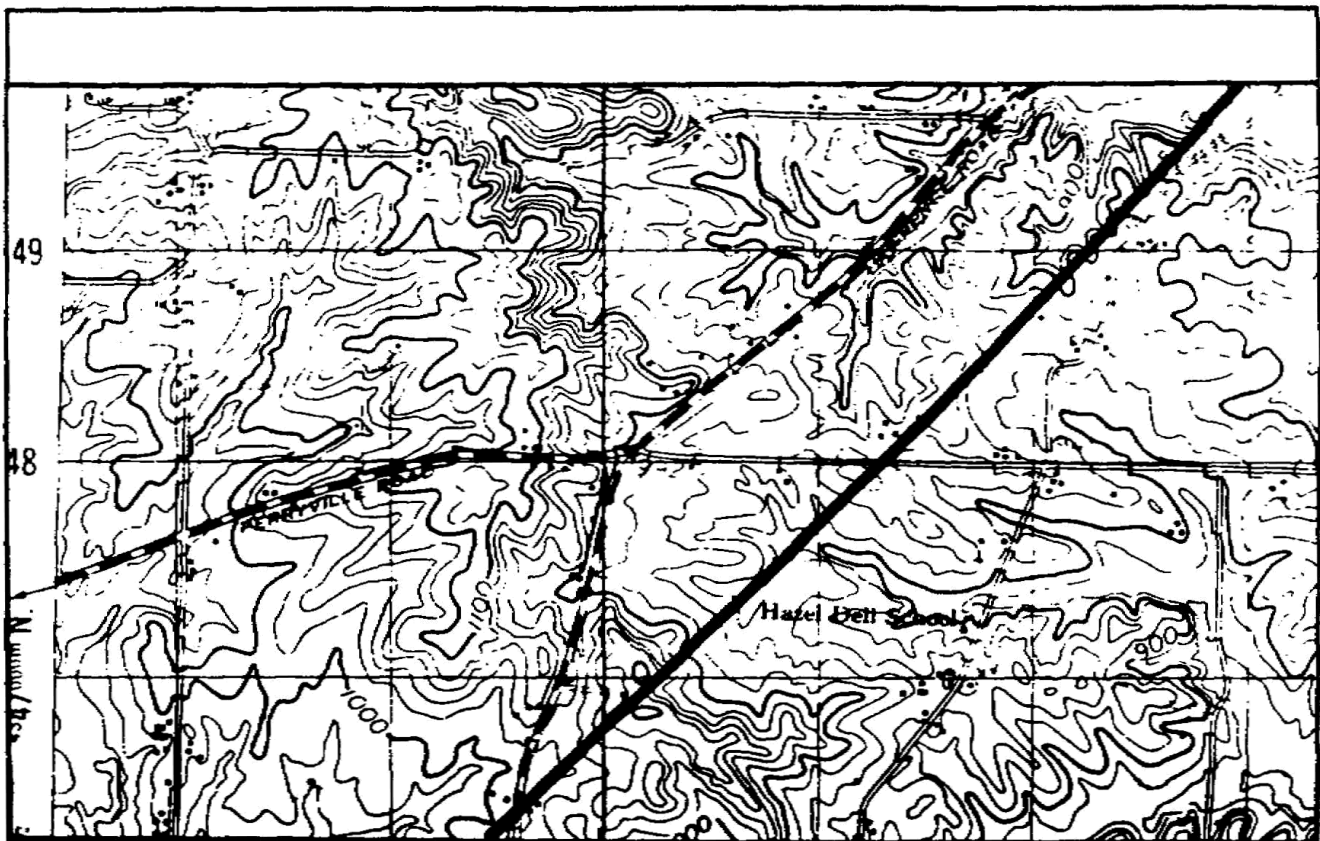
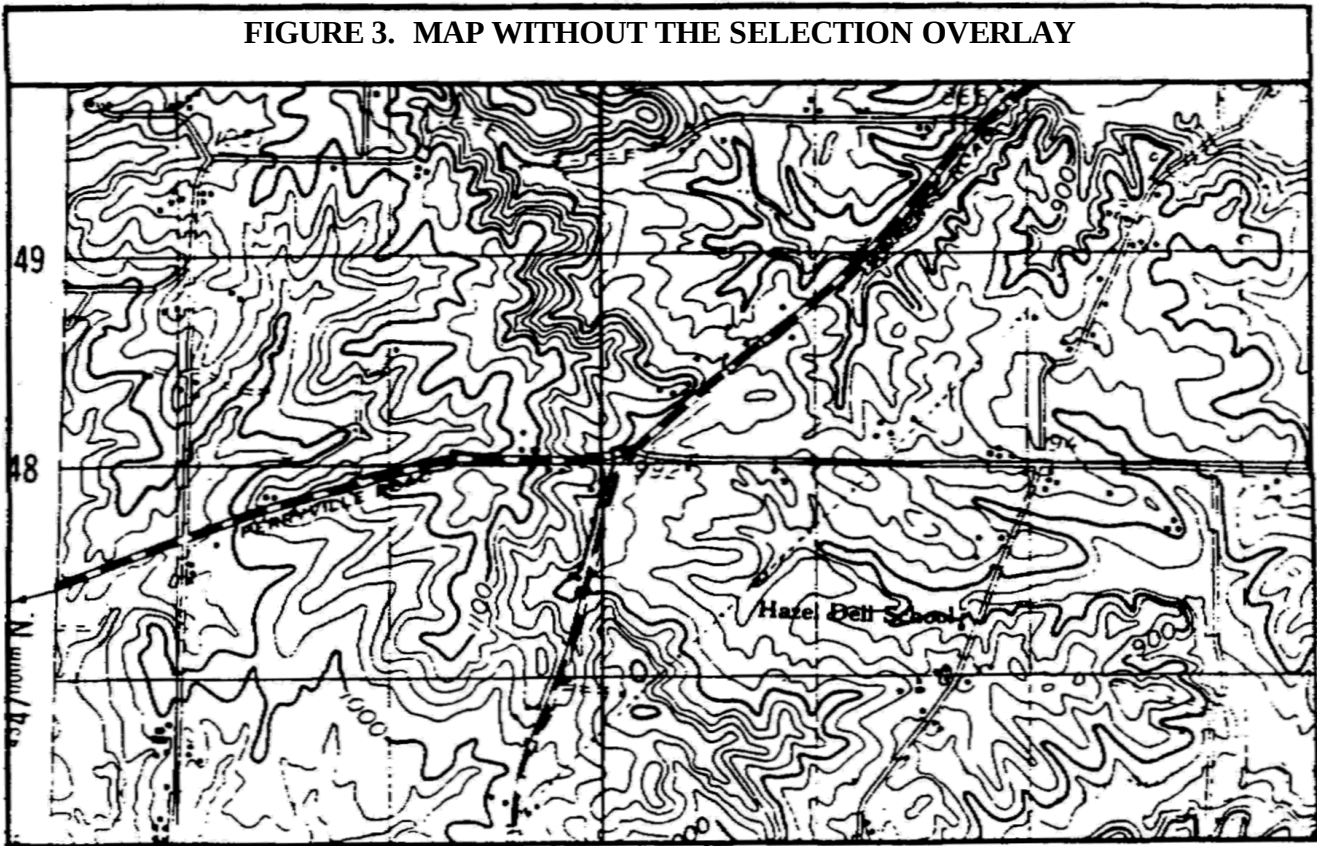


FIGURE 3. MAP WITHOUT THE SELECTION OVERLAY

Correction overlay. Correction overlays provide information that corrects information contained in the map used as its base. A correction overlay is most commonly used as an overprint to correct maps that are to be distributed before a required revision can be completed. Figure 4 (page 6) shows a correction overlay overprinted on a map. Figure 5 (page 6) shows the same map without the correction. In addition to correcting the existing map, a correction overlay alerts the user to the possibility that other errors may exist on the map. If an overlay is being prepared for a map with information other than that shown on the correction overlay, the correction overlay information is combined into the other overlay.

FIGURE 4. CORRECTION OVERLAY

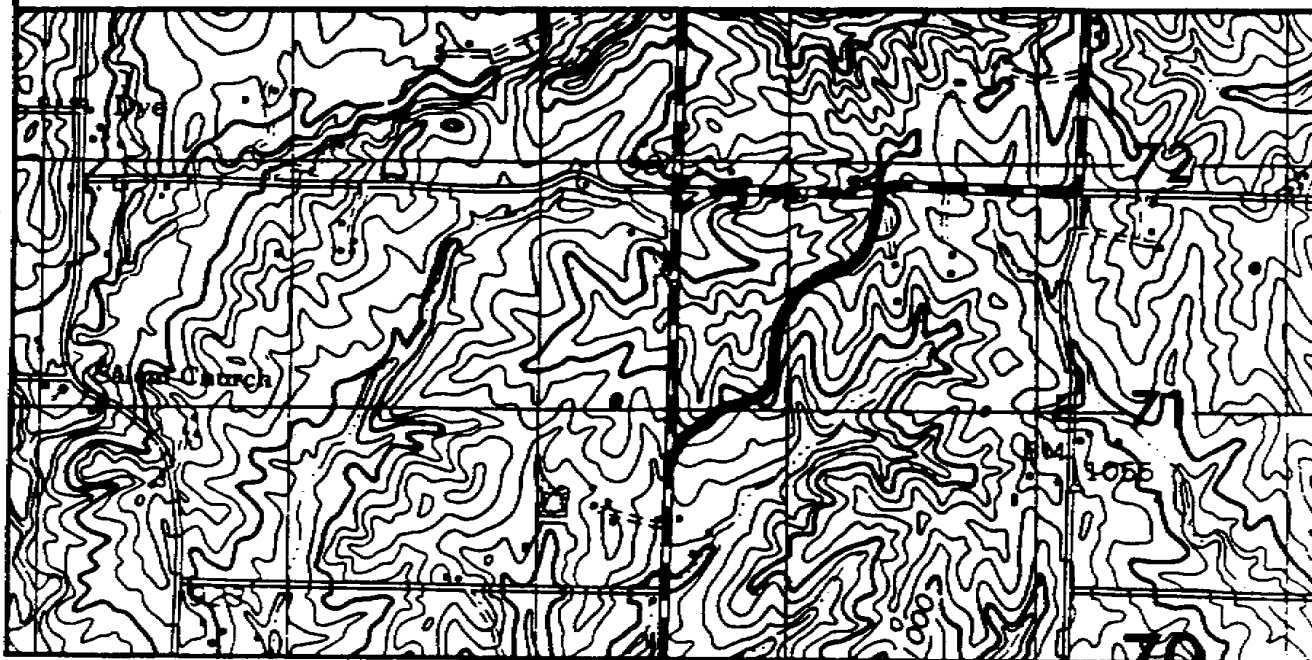
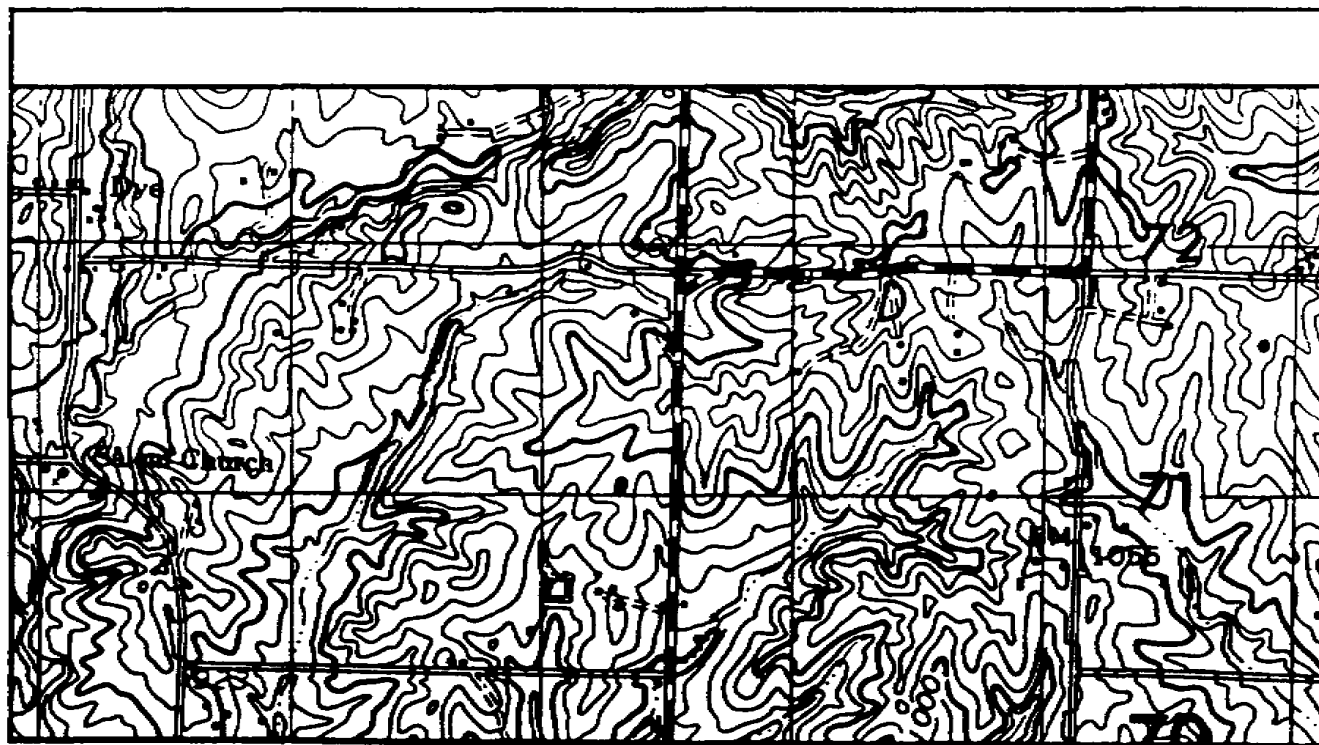


FIGURE 5. MAP WITHOUT THE CORRECTION OVERLAY



Special overlay. Special overlays are used to portray any information a commander needs to have disseminated. The purpose of special overlays is to show the required information in relation to existing map features. The information shown on special overlays is unlimited. Some examples of information shown on special overlays are as follows:

- Cross-country movement
- Elevation layer tints
- Fields of fire
- Cover and concealment
- Soils
- Slope
- Obstacles
- Avenues of approach
- Off limits/restricted areas
- Zones of entry

Special overlays are often reproduced as overprints because they are usually for wide dissemination.

Lesson I/Learning Event 2

Learning Event 2

IDENTIFY THE MATERIALS AND EQUIPMENT USED TO PREPARE OVERLAYS

Drafting materials and equipment are essential to produce an overlay. Drawing surfaces, drawing pens, drafting tools, light tables, and lettering sets provide the cartographer with the means to draft the overlay accurately and professionally.

Drawing Surfaces. The Army cartographic units use a frosted plastic sheet in the preparation of overlays. This drawing material has been selected for several overall qualities.

Translucence. Translucence is of special concern in the preparation of overlays because not only is a considerable amount of tracing done but it is possible to see the map underneath for registration purposes. Translucent drawing surfaces make it possible to produce contact negatives or positive plates, which eliminates the need for camera work if the overlay is to be an overprint.

Dimensional stability. Dimensional stability refers to the amount of expansion or shrinkage due to humidity and changes in temperature. The flexible plastic base films used in the Army undergo a relatively small change in dimension as temperature and humidity vary.

Ink adherence. A drawing surface must not only accept ink but must accept enough ink to provide an opaque image. The drawing surfaces available for Army use will accept standard drafting inks.

Strength. An overlay must withstand repeated rolling, unrolling, and some reproduction processes if it is to be an overprint. The drawing surface used for overlay preparation is durable.

Erasing quality. The drawing surface gives the cartographer the ability to remove ink and pencil marks without damaging the surface. This ability is necessary to make corrections and revise line work.

Reaction to wetting. Because the Army uses water-based inks, the drawing surfaces are resistant to shrinkage and curling when wet.

Technical Pens. The drawing pens that Army cartographic units use in the preparation of overlays belong to a class of pens called technical pens. Technical pens have a cylinder-shaped point, and ink is fed through a small hole in the cylinder (Figure 6). When used freehand in its special holder (Figure 7), it is suited for those lines that should maintain a constant width no matter what direction they follow. Technical pens come in sets with a range of point sizes.

FIGURE 6. CYLINDER-SHAPED POINT

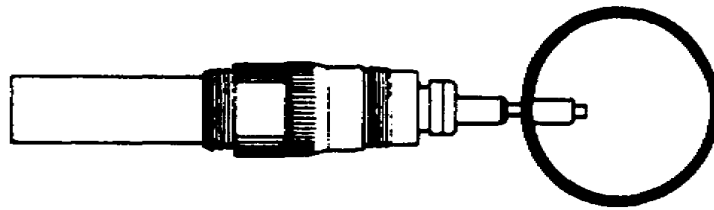


FIGURE 7. POINT AND HOLDER



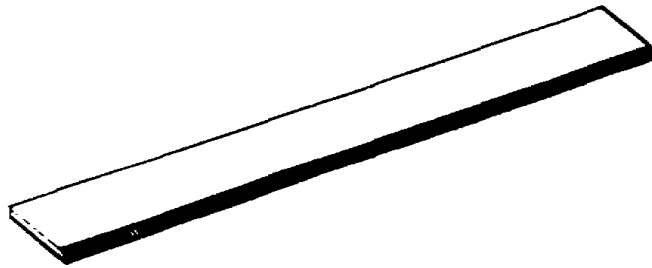
It is important to keep all pens clean because ragged lines (gray instead of black lines) and lines of inconsistent width often result from dirty or clogged pens. The pens must be kept clean during use because bits of lint and other debris are constantly being picked up from the drafting surface.

Lesson 1/Learning Event 2

Drafting Tools. A cartographer's drafting tools requirement varies from job to job. The drafting tools listed here should be on hand to aid in preparing an overlay.

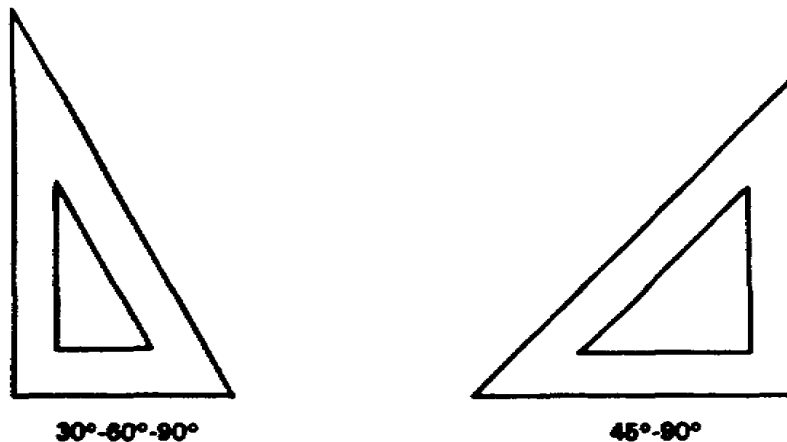
Straightedge. A straightedge is a metal bar ranging in length from 12 inches to 42 inches. It is approximately 4 inches wide and about 1/8 inch in thickness (Figure 8). When the requirement is for a straight line, the metal straightedge should be used.

FIGURE 8. STRAIGHTEDGE

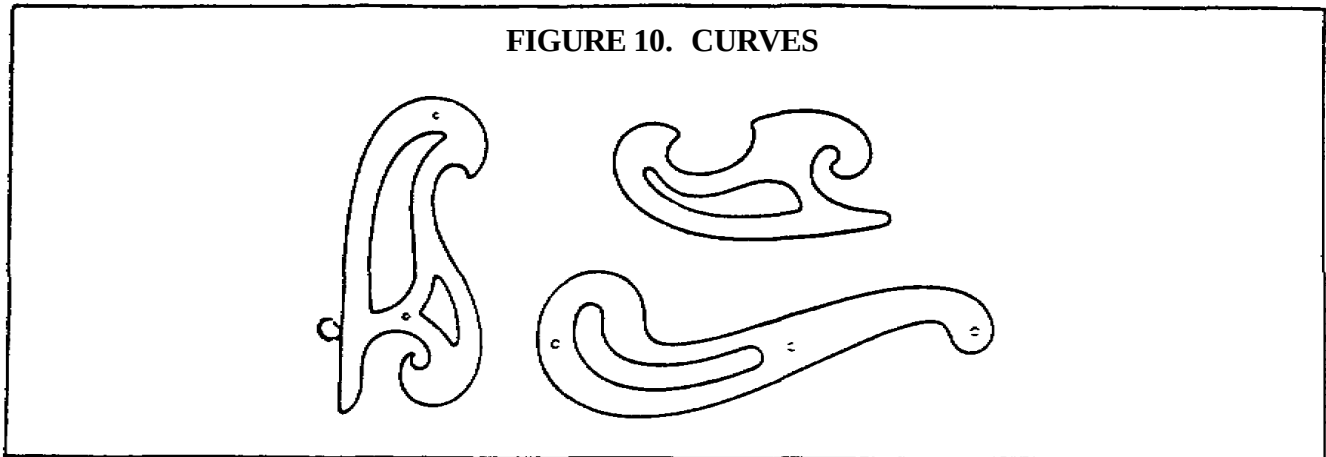


Triangles. There are two kinds of triangles: 30° - 60° - 90° and 45° - 90° (Figure 9). Most are made of clear, hard plastic, but some are metal. Plastic triangles are subject to knicks and chips along the edge. They may be used as straightedges, but care should be taken to ensure they are not damaged.

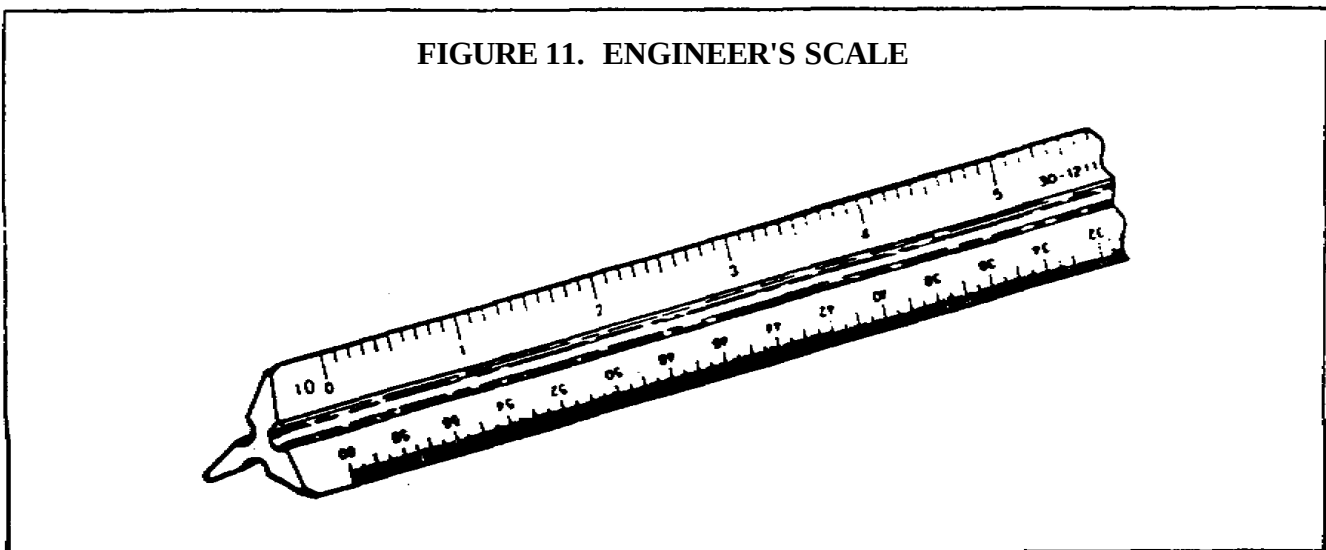
FIGURE 9. TRIANGLES



Curves. Curves come in many shapes. The three most commonly found in cartographic units are shown in Figure 10. The curves are made of a hard, clear plastic. Like the plastic triangles, plastic curves are subject to damage along the edges.



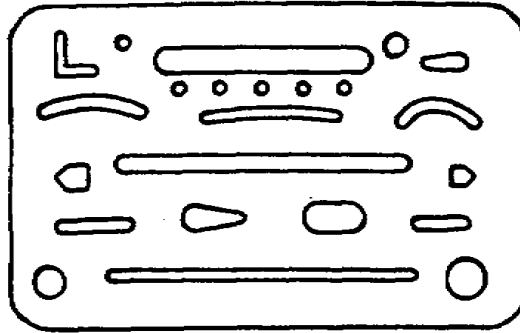
Engineer's scale. The engineer's scale is triangular in shape. The scale is 12 inches long with its six edges divided into 10, 20, 30, 40, 50, and 60 parts to an inch (Figure 11).



Lesson 1/Learning Event 2

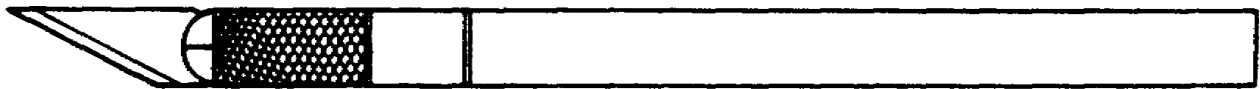
Erasing shield. The erasing shield is a thin metal template approximately 2 1/2 by 4 inches (Figure 12). The erasing shield allows the cartographer to erase unwanted lines while leaving other work untouched.

FIGURE 12. ERASING SHIELD



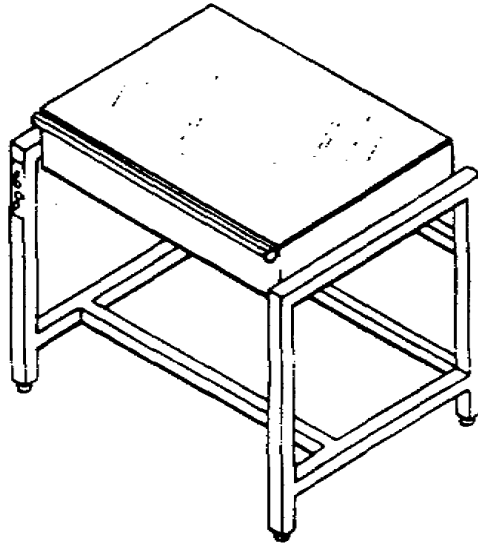
Craftsman's knife. The craftsman's knife is a blade held in a pencil-shaped holder (Figure 13). It is used for etching ink away in small areas.

FIGURE 13. CRAFTSMAN'S KNIFE



Light Table. The light table is not a requirement for all types of overlays; however, if any tracing or plotting is required, the light table aids in drafting. The light table is made of wood or metal; the top has been equipped with a frosted glass surface and a compartment to house fluorescent lights (Figure 14). The light reflecting up from the compartment projects images on the map base through the translucent drawing surface.

FIGURE 14. LIGHT TABLE



Lesson 1/Learning Event 2

Lettering Sets. Lettering sets aid in freehand lettering. There is a mechanical lettering set (Figure 15) and a cut-through lettering set (Figure 16). Lettering sets will be discussed in Lesson 4.

FIGURE 15. MECHANICAL LETTERING SET

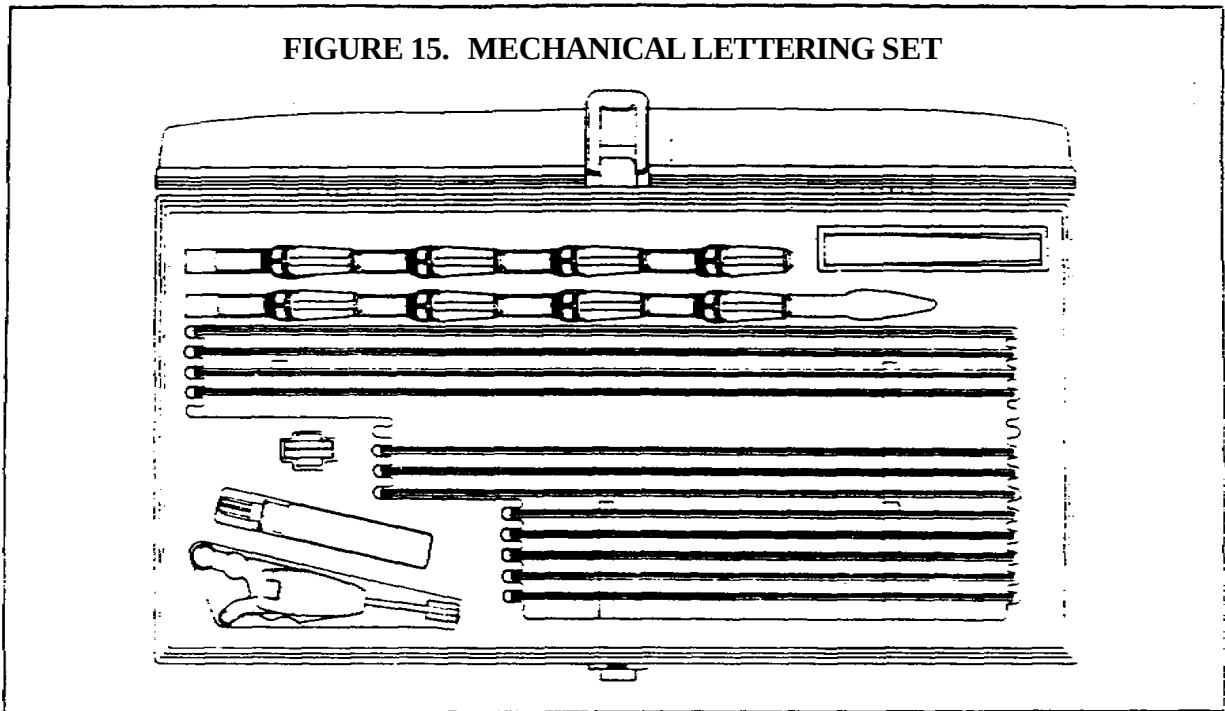
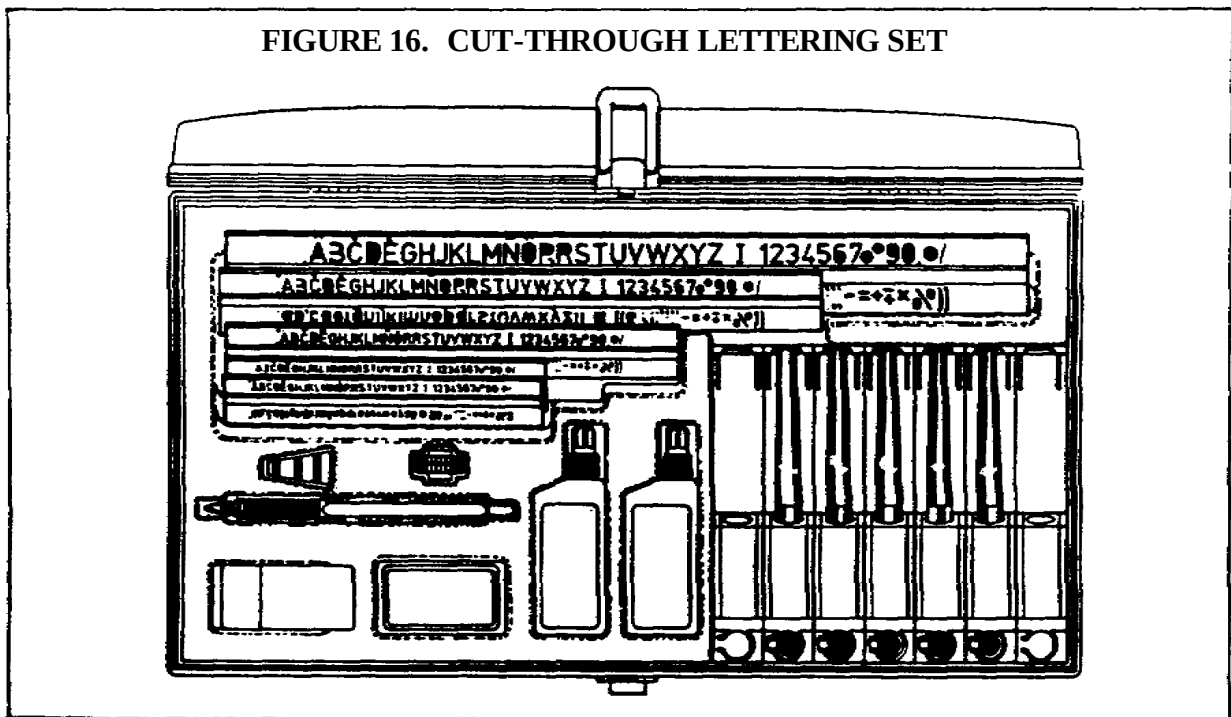


FIGURE 16. CUT-THROUGH LETTERING SET



Lesson 1/Learning Event 2

Lesson 1 discussed overlay uses and materials and equipment necessary to prepare overlays. In Lesson 2 you will learn how to use the materials and equipment in the preparation of situation overlays.

Lesson 1/Review Exercise

Lesson 1

REVIEW EXERCISE

Now that you have read through the instructional material for Lesson 1, check your understanding by completing the review exercises without looking back to the lesson. When you have completed as many of the exercises as you can, turn to the solutions on page 17 and check your responses. If you do not understand a solution, go back and restudy the lesson.

1. An indispensable tool for portraying battle activity quickly and accurately is the _____ overlay.
2. The purpose of the _____ overlay is to emphasize selected information so that it becomes easy to read.
3. To correct maps that are to be distributed before a required revision can be completed, a _____ overlay is used.
4. Avenues of approach may be portrayed on a _____ overlay.
5. A drawing surface must not only accept ink but must accept enough ink to provide an _____ image.

REVIEW EXERCISE SOLUTIONS

1. situation (page 2)
2. selection (page 4)
3. correction (page 5)
4. special (page 7)
5. opaque (page 8)

Lesson 2

Lesson 2 THE SITUATION OVERLAY

OBJECTIVE

Identify the process used in developing a military symbol. Identify the techniques and procedures used in the preparation of the situation overlay.

TASK

051-257-1215, Draft a Map Overlay.

CONDITIONS

You will be given information on the military symbol, the techniques and procedures used to prepare a situation overlay, and an ACCP examination response sheet.

STANDARDS

You should be able to demonstrate knowledge of the procedures for preparing situation overlays by responding correctly to 75 percent of the examination questions pertaining to this lesson.

CREDIT HOURS

Two

REFERENCES

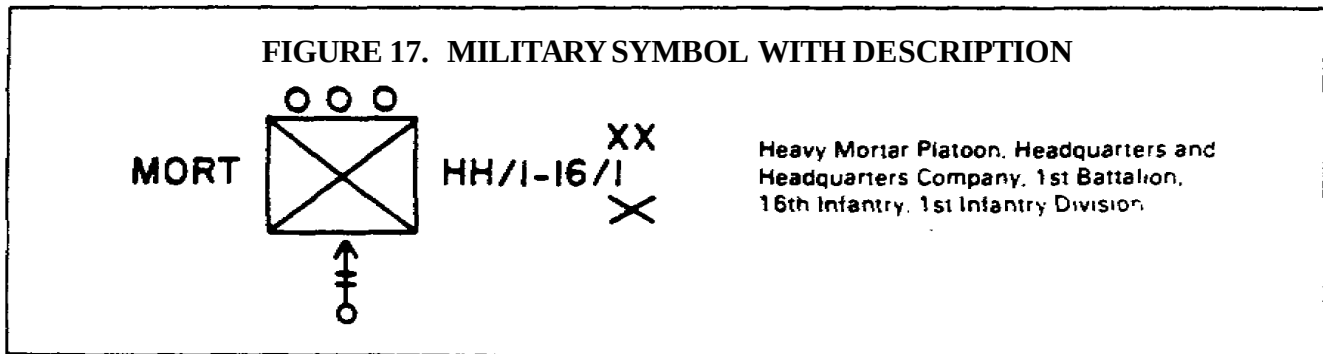
FM 101-5-1
STP 5-81C1-SM
AR 310-25

Learning Event 1

IDENTIFY THE PROCESS OF DEVELOPING A MILITARY SYMBOL

Standardization of military symbols is essential if tactical information is to be relayed without misunderstanding on situation overlays.

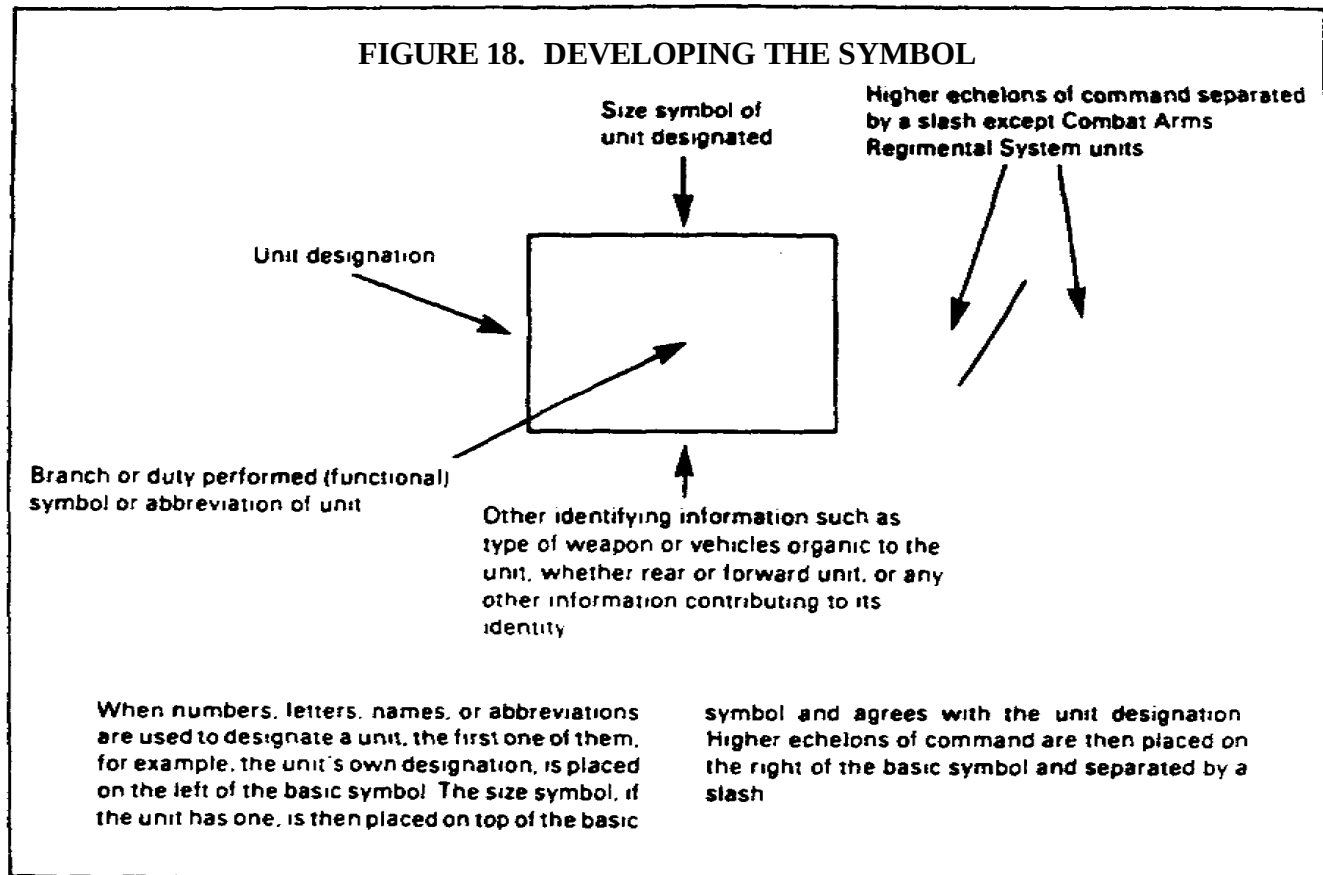
A military symbol is defined as a sign composed of a diagram, number, letter, abbreviation, color, or combination thereof, that is used to identify and distinguish a particular military unit, activity, or installation (Army Regulation [AR] 310-25). Figure 17 shows an example of a military symbol for a unit as well as a description of the unit that the symbol portrays.



The guidelines for the pictorial representation of tactical situations through the use of military symbols are established in Field Manual (FM) 101-5-1. The FM provides reference material and guidance for military personnel engaged in the production and utilization of maps, operational plans, orders, overlays, and reports as well as aerial photographs, other map substitutes, and organizational charts.

Lesson 2/Learning Event 1

The manual does not attempt to depict all military symbols; instead, a uniform method is presented for pictorially portraying various military organizations, activities, and items of equipment. Once familiar with the prescribed system, any desired symbol may be easily developed (Figure 18).



Basic symbols. Geometric figures form the basic symbols used to represent units, installations, and activities. Some of the more common figures are shown in Figure 19.

FIGURE 19. BASIC SYMBOLS

A unit (rectangle)



A field headquarters or headquarters echelon of a unit (staff is always to the left)



An observation or listening post



A combat service support element of a US combat unit (brigade trains and below)



A combat service support installation or activity



A combat service support unit that performs duties as part of a field army support command (FASCOM), a corps support command (COSCOM), or a division support brigade



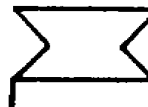
A headquarters or headquarters echelon of a field army or corps support command or division support brigade combat service support unit (staff is always to the left)



A combat service support unit that performs duties within the communications zone (COMMZ)



A headquarters or headquarters echelon of a combat service support unit within the COMMZ



Lesson 2/Learning Event 1

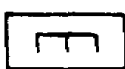
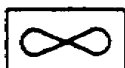
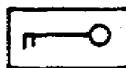
Unit size symbols. To show the size of a specific unit, the appropriate size symbols are placed on top of the basic symbol (Figure 20).

FIGURE 20. UNIT SIZE SYMBOLS

Squad	○
Section or unit larger than a squad but smaller than a platoon	○○
Platoon or detachment	○○○
Company, battery, or troop	I
Battalion or squadron	II
Group or regiment	III
Brigade or equivalent command	X
Division	XX
Corps	XXX
Army	XXXX
Army Group	XXXXX

Arm or branch of service, symbols. To show the arm or branch of service for a specific unit, the appropriate symbol is placed within the basic symbol. Some samples are shown in Figure 21.

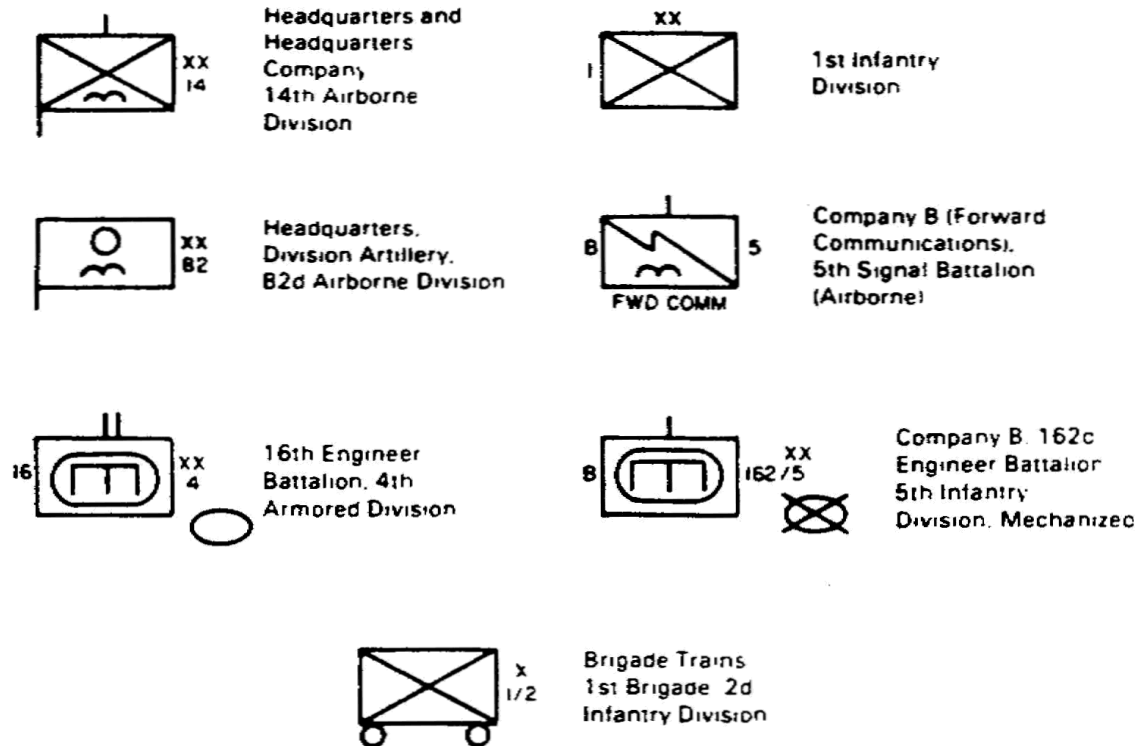
FIGURE 21. ARM OR BRANCH OF SERVICE SYMBOLS

	Armor		Medical
	Army Security Agency		Military Intelligence
	Field Artillery		Airborne
	Chemical (CBR)		Military Police
	Cavalry or Reconnaissance		Ordnance
	Engineer		Postal
	Aviation		Quartermaster
	Infantry		Signal

Lesson 2/Learning Event 1

Unit symbols. Some examples of unit symbols are shown in Figure 22.

FIGURE 22. UNIT SYMBOLS



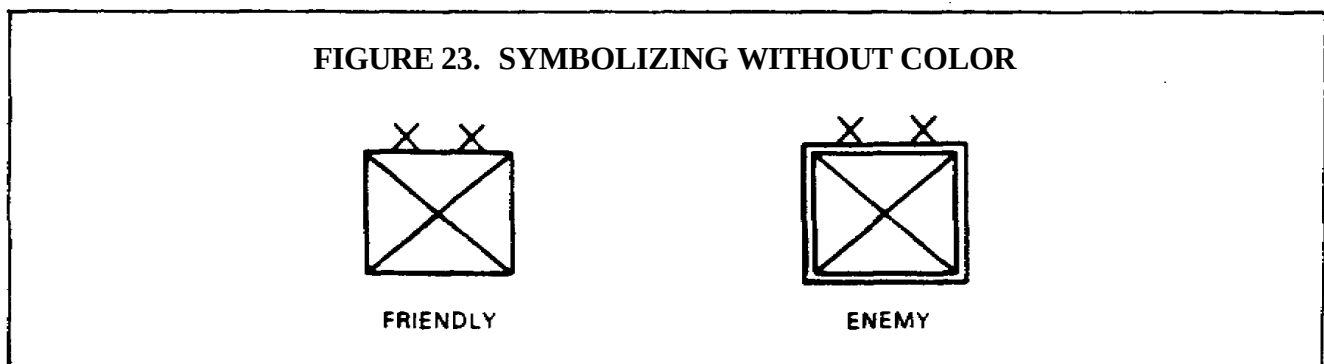
Learning Event 2

IDENTIFY SITUATION OVERLAY TECHNIQUES

Colors. Colors are used on situation overlays to denote the following:

- Blue or Black. Friendly units, installations, equipment, and activities.
- Red. Enemy units, installations, equipment, and activities.
- Yellow. Friendly or enemy areas of chemical, biological, or radiological contamination.
- Green. Friendly or enemy man-made obstacles.

If other colors are used, a suitable explanation in the margin or legend is given. If only one color is available, or pen and ink is used, friendly symbols are outlined with single lines: enemy symbols, with double lines (Figure 23).



Lesson 2/Learning Event 2

Present and proposed locations. Basic unit and installation symbols are drawn with either solid or broken lines. A solid line symbol represents a present or actual location. A broken line symbol represents a proposed or future location (Figure 24). The center of mass of the symbol indicates the general vicinity of the center of mass of the unit. If a staff is added to identify a headquarters, the base of the staff indicates the precise location of the headquarters. Basic symbols, other than headquarters symbols, may be placed on a central staff, extended or bent as required, to show precise location (Figure 25).

FIGURE 24. PROPOSED OR FUTURE LOCATION OF UNIT

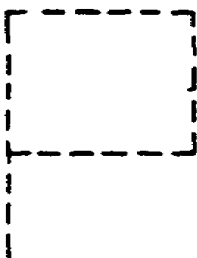
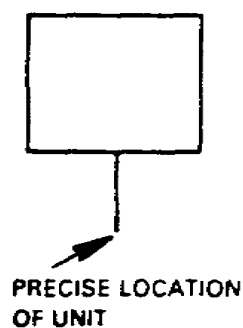
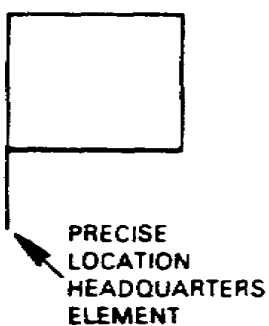
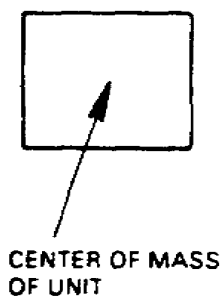
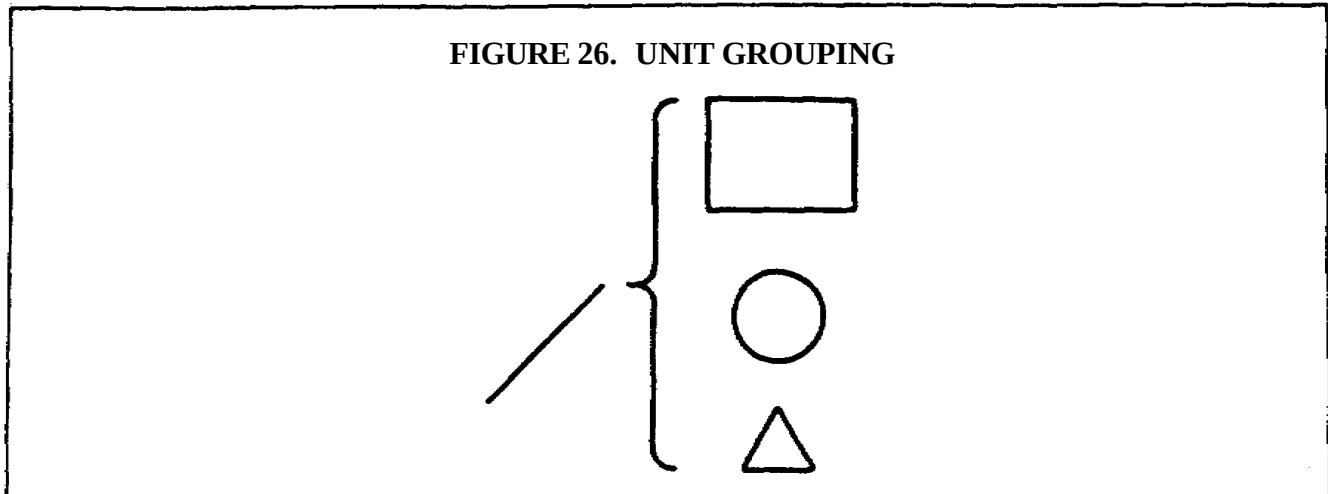


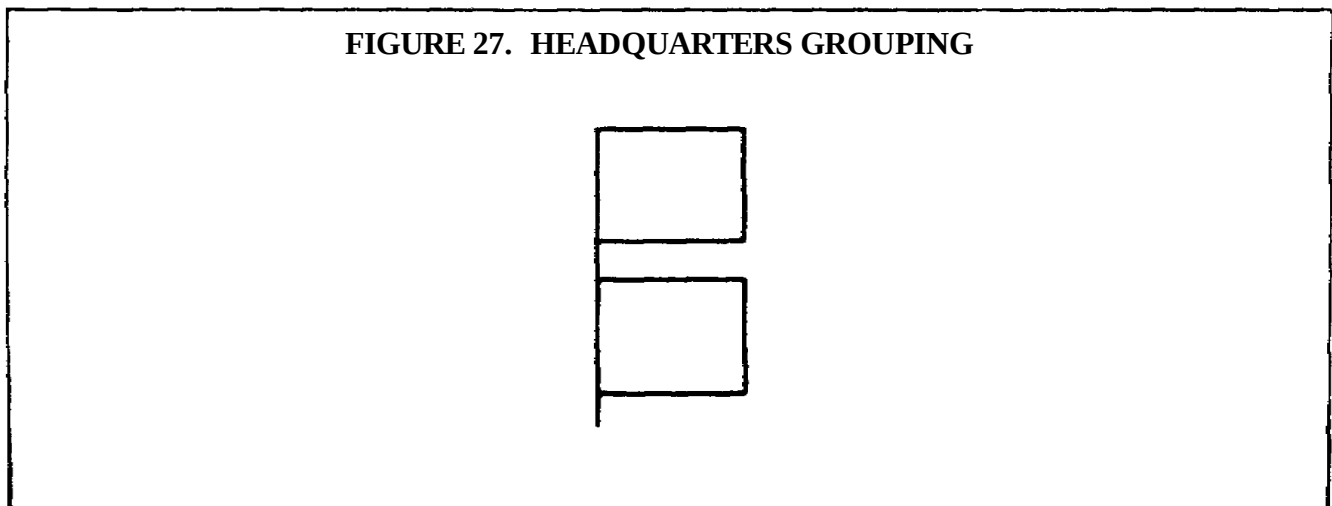
FIGURE 25. LOCATION OF UNITS



Unit groupings. If a group of units or installations other than headquarters is at one location, the grouping of symbols may be enclosed with a bracket and the exact location may be indicated with a staff (Figure 26).

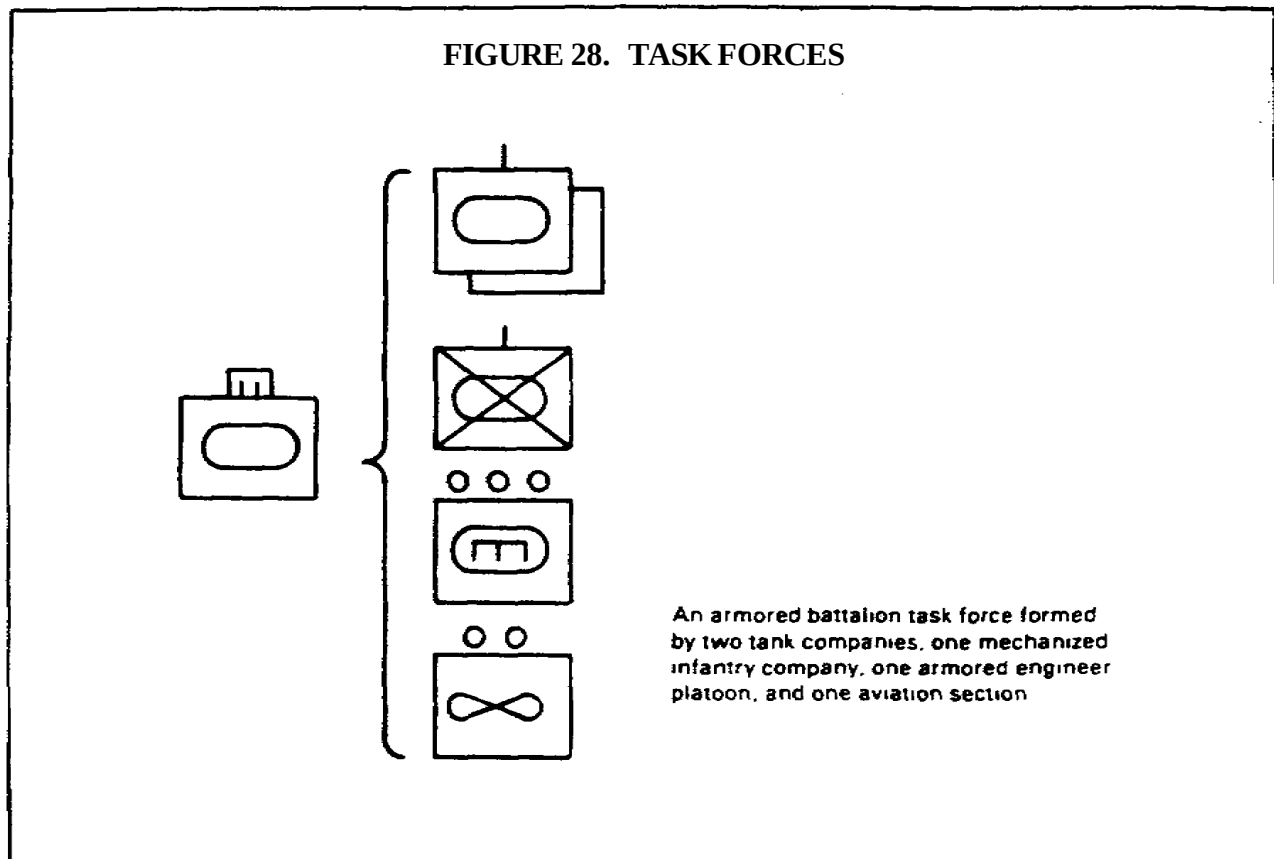


Headquarters grouping. If several headquarters are at one location, more than one symbol may be placed on a single staff (Figure 27).

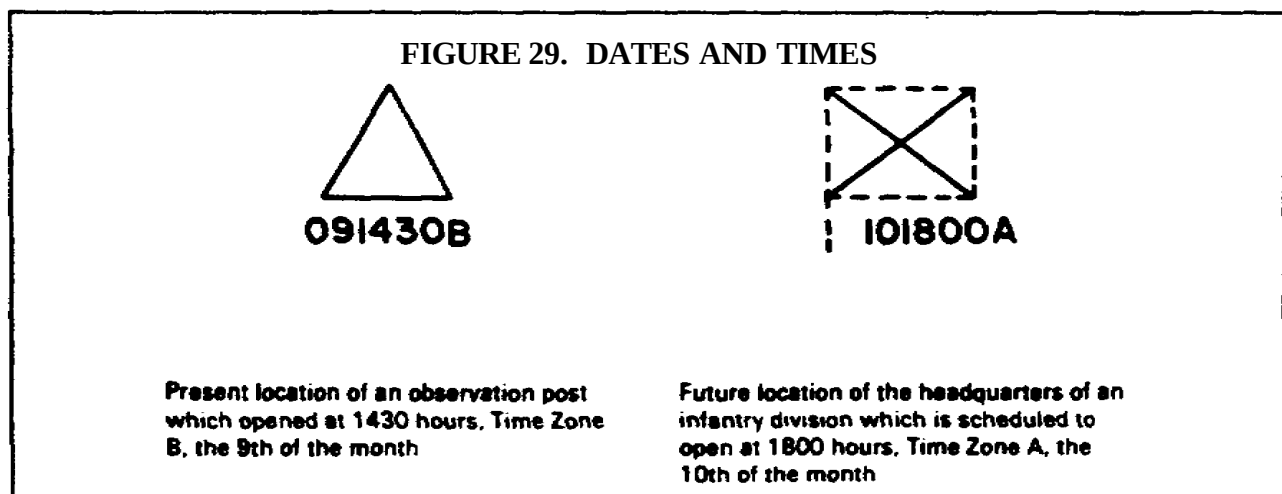


Lesson 2/Learning Event 2

Task forces. Units forming a temporary grouping may be shown under one command by the use of one bracket (Figure 28).

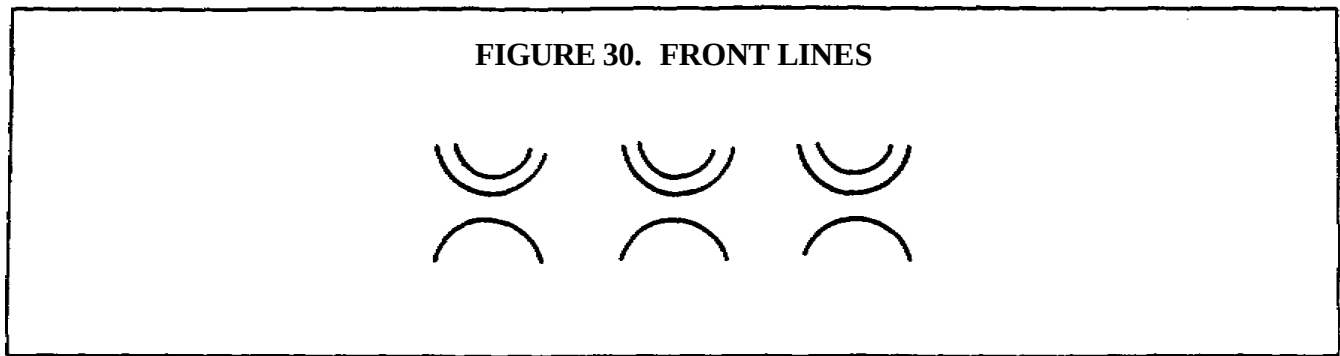


Dates and times. Dates and times, such as the opening of an observation post or the expected arrival of an infantry unit in a new location, may be written under or inside the symbol (Figure 29).

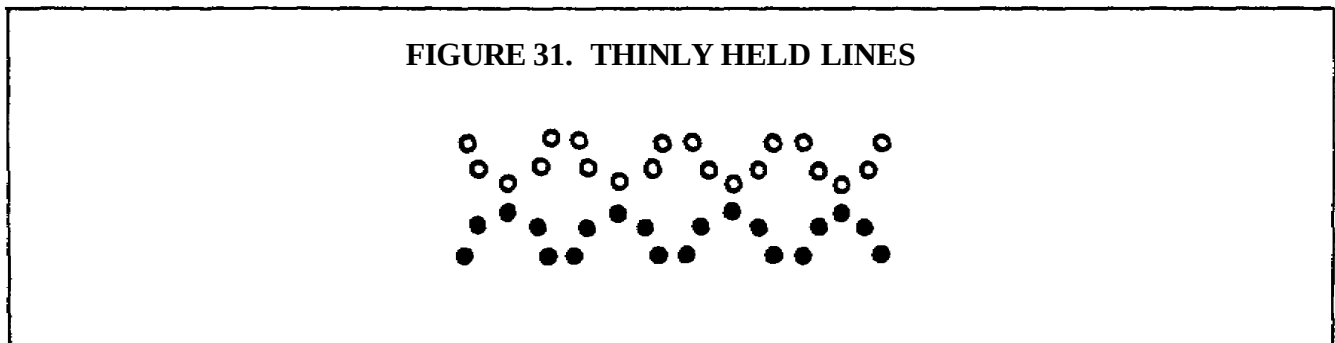


On enemy situation overlays, a date-time group indicates the time that the incident or event occurred or that the unit or installation was reported.

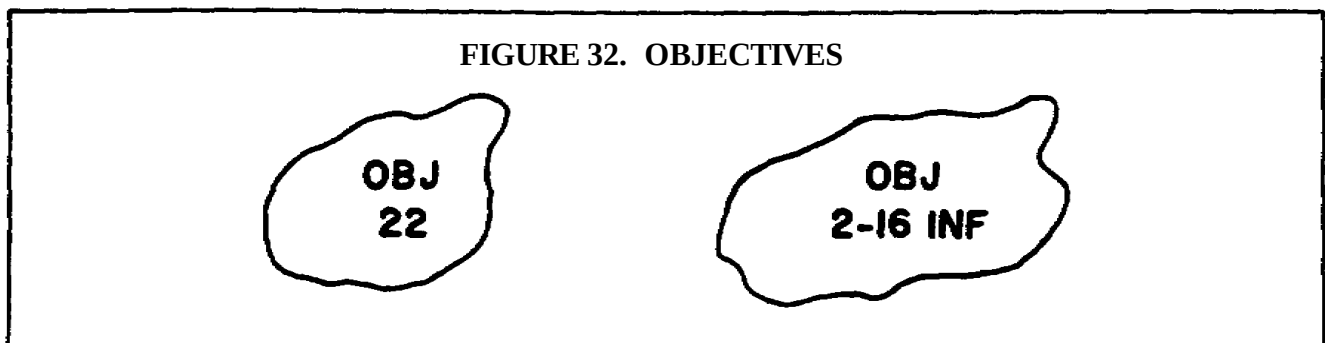
Front lines. Front lines are marked by a series of lines that curve away from opposing forces. If only one color is used, enemy front lines are represented by double lines (Figure 30).



Thinly held or patrolled parts of the lines are marked as a series of dots. If only one color is used, thinly held enemy lines are represented by open dots. The dots do not indicate strength or location of patrols (Figure 31).

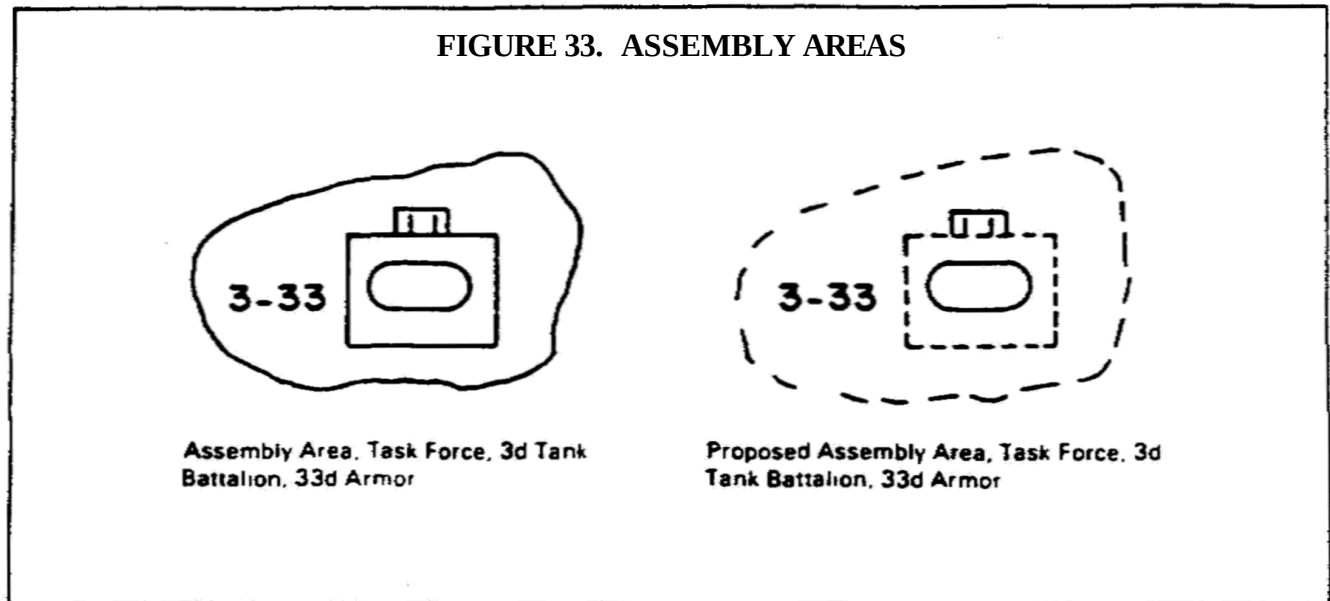


Objectives. Objectives and intermediate objectives are enclosed and identified by the abbreviation OBJ and a number, letter, code name, or unit designation (Figure 32).

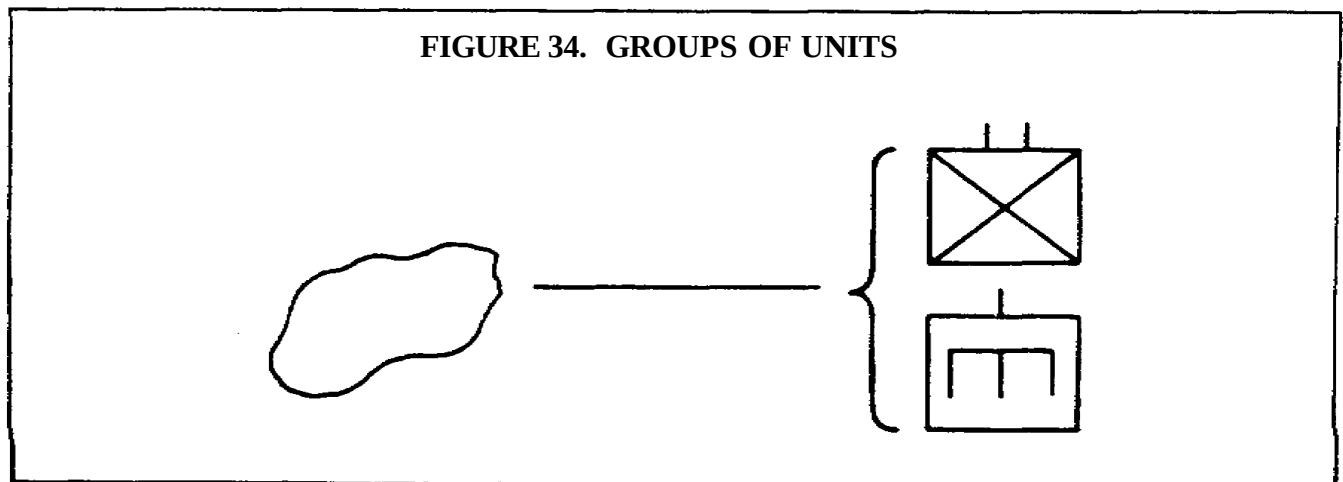


Lesson 2/Learning Event 2

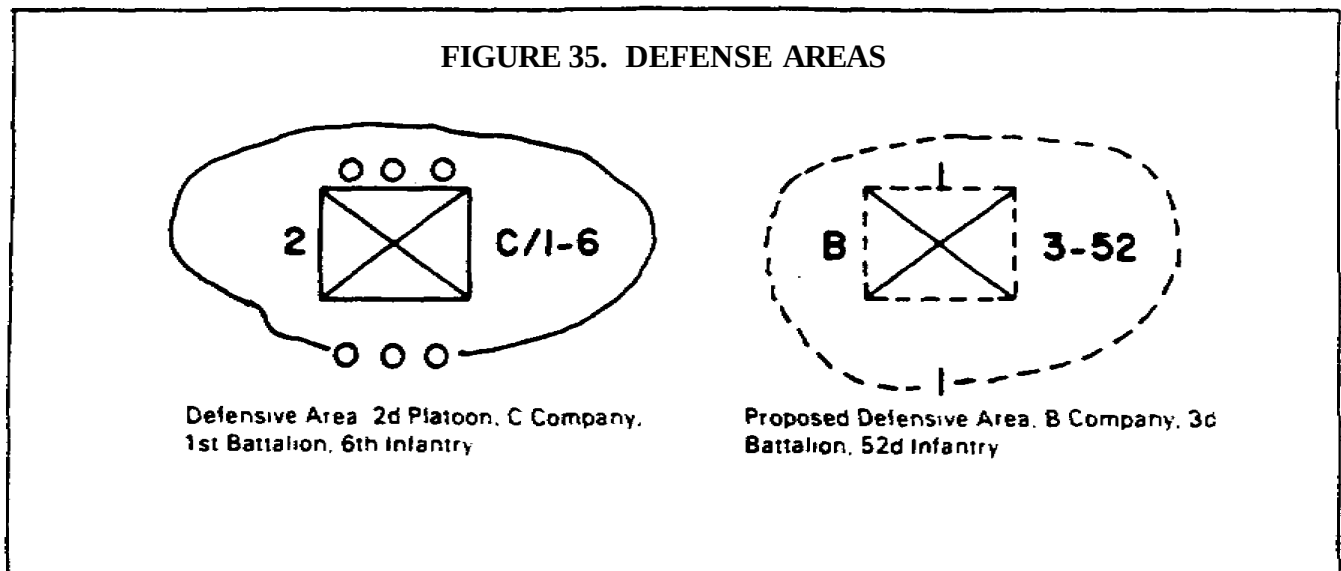
Assembly areas. Assembly areas are enclosed and the unit symbol is placed in the center. Proposed assembly areas are shown with broken lines (Figure 33).



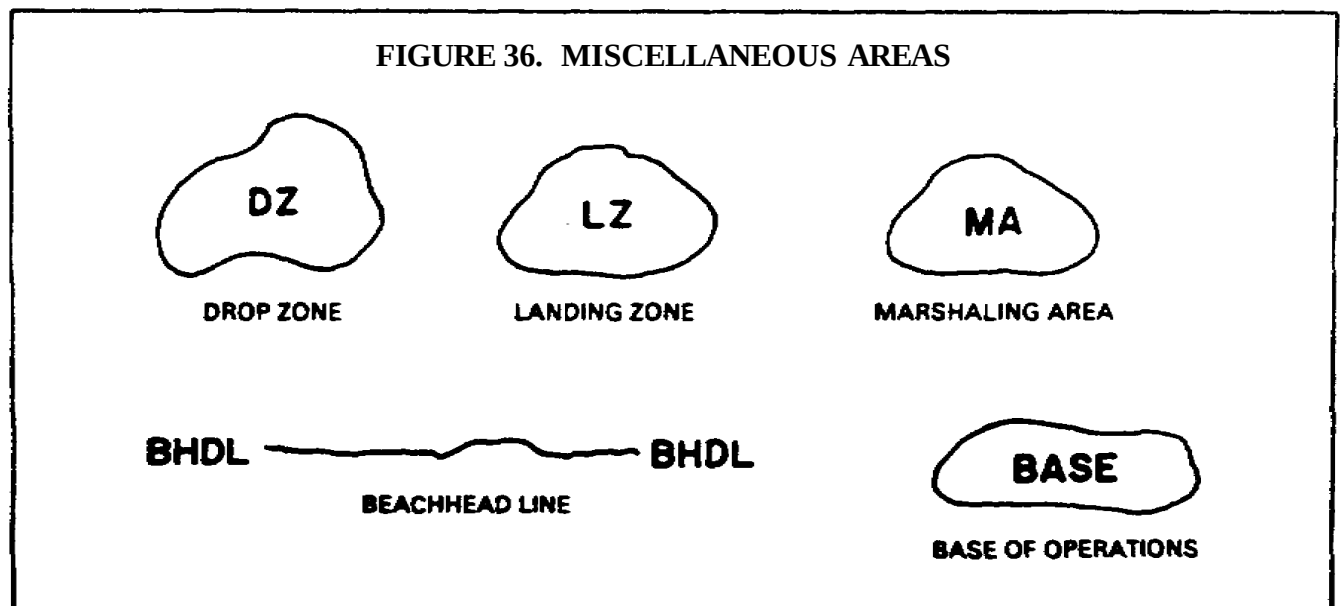
If an area is allocated to a group of units, it is often convenient to displace the unit symbols (Figure 34).



Defensive areas. If an area is occupied and defense of the area is prepared, a line including the size symbol of the defending unit encloses the area; the closed side of the symbol is oriented toward the most likely enemy threat. If desired, the military symbol of the defending unit may be entered in the center of the enclosed area (Figure 35).

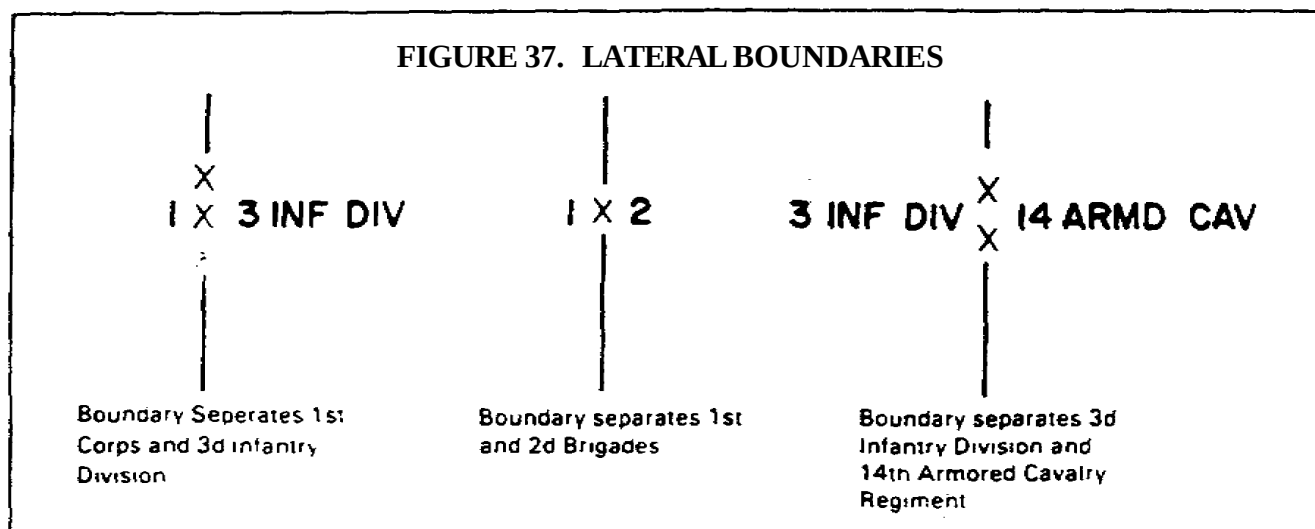


Miscellaneous areas. Unit symbols may be placed within the designated areas in Figure 36 to indicate unit assignment.

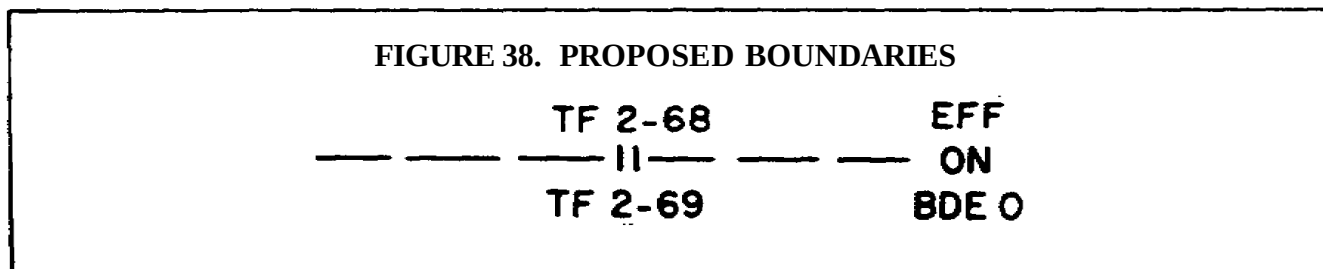


Lesson 2/Learning Event 2

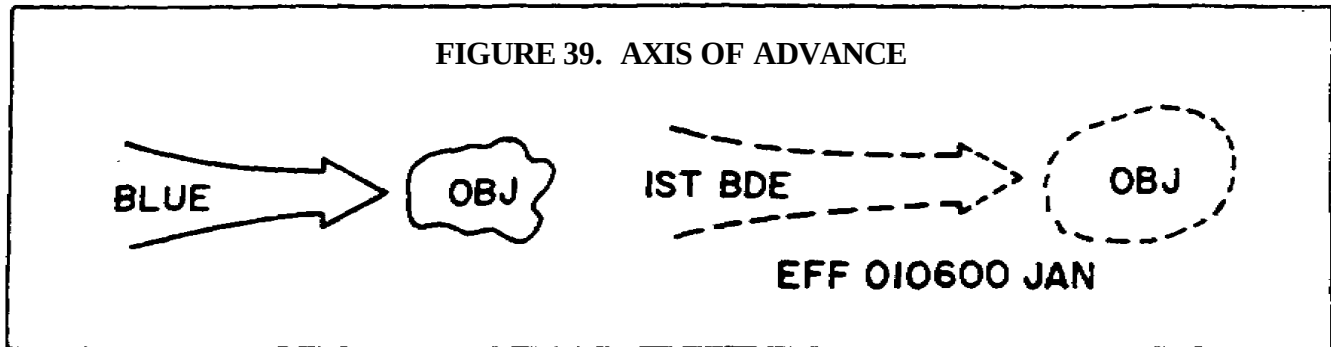
Lateral boundaries. Boundaries are marked by a solid line with the size indication of the unit shown at convenient intervals. The designations of units supplemented by arm or branch and national designation, if necessary, are placed on either side of the size indication. If a lateral boundary separates units of unequal size, the symbol for the larger is used (Figure 37).



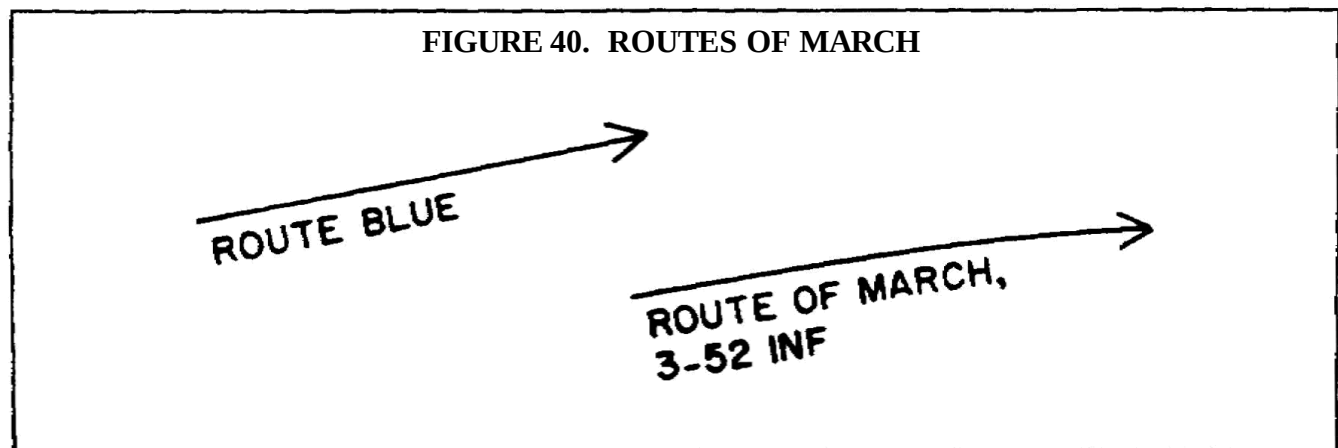
Proposed boundaries. Future or proposed boundaries are shown with broken lines and are labeled to indicate date and time or condition of effect and the headquarters establishing the boundary (Figure 38).



Axis of advance. An axis of advance is normally assigned a code name or unit designation. Unit designation will be used if there is a possibility of misunderstanding. A proposed axis of advance is shown in broken lines and labeled with the time or condition when effective. An axis of advance arrow should extend only as far as this form of control is essential to the overall plan (Figure 39).

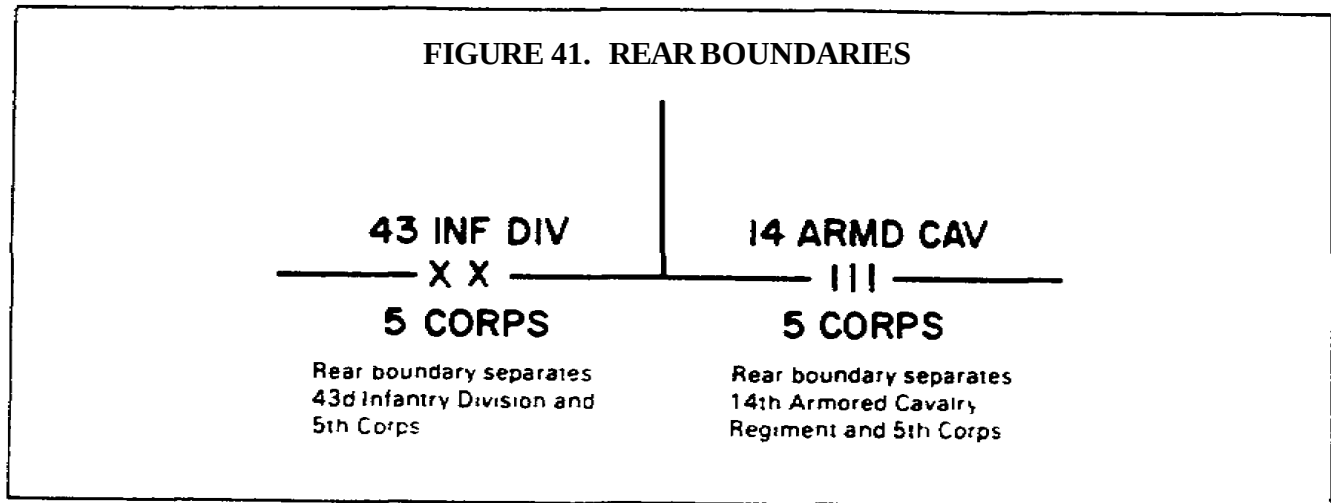


Direction of attack and routes of march. A direction of attack arrow is not labeled. Routes of march (such as advance, withdrawal, and main supply), however, are labeled with their purpose and/or code name or unit designation. The arrow follows the specific route (Figure 40).

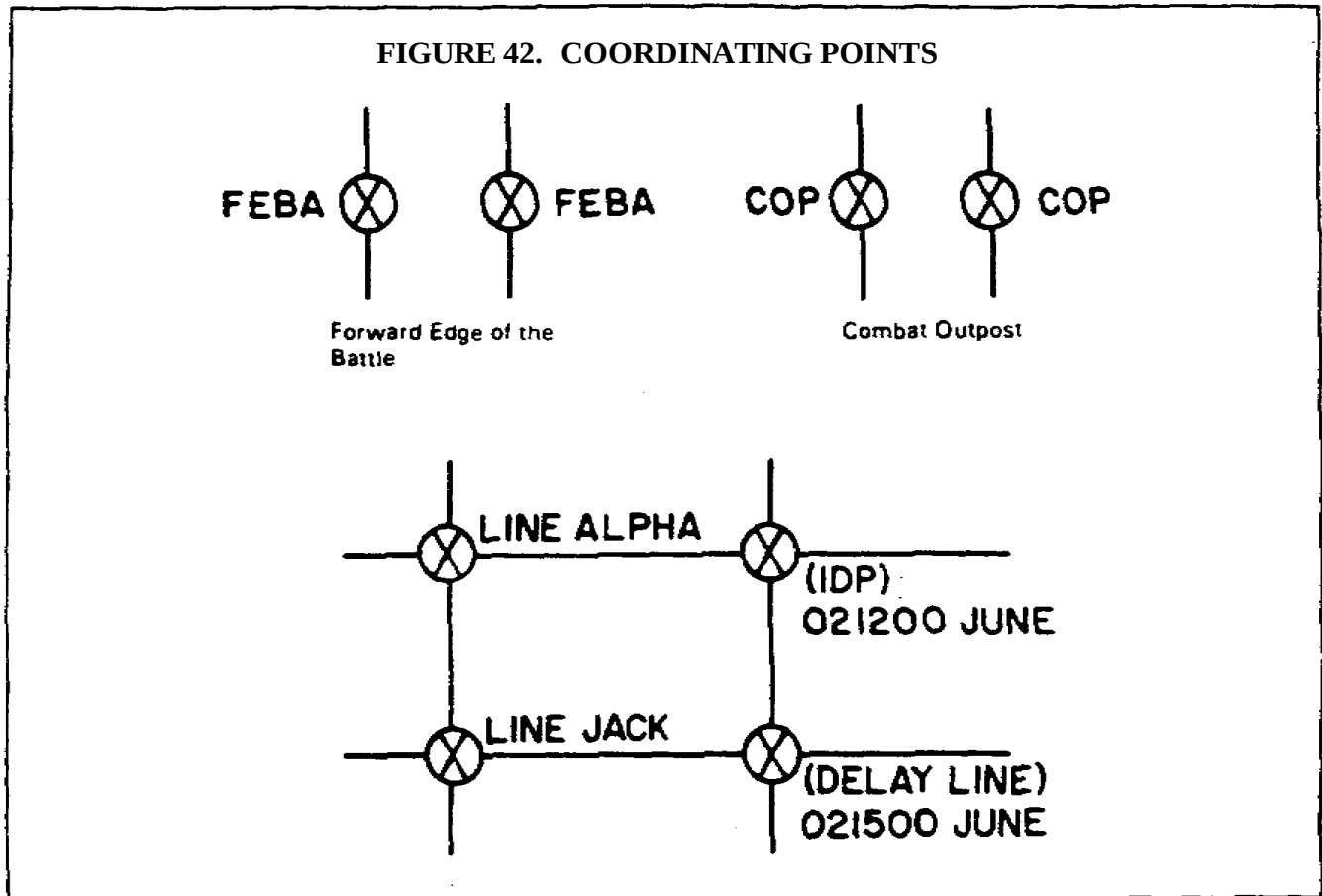


Lesson 2/Learning Event 2

Rear boundaries. If a rear boundary is shown, the size indication along the boundary corresponds to the smaller unit or, in other words, to the commanded unit and not the commanding unit. Arm or branch and nationality of units are shown when required to prevent confusion (Figure 41).



Coordinating point. A coordinating point is shown by drawing a circle on the selected terrain feature and placing an "X" in the center. Coordinating points are used in conjunction with boundaries to designate defensive areas and to show where delay lines and lateral boundaries intersect (Figure 42).



There are more drafting techniques and symbols than are covered here. All techniques and symbols are covered fully in FM 101-5-1.

Lesson 2/Learning Event 3

Learning Event 3

IDENTIFY THE PROCEDURES USED IN PREPARING A SITUATION OVERLAY

The procedures used in the preparation of situation overlays consist of three general steps: (1) registration of the overlay material to the base map, (2) drafting the information, and (3) adding marginal data.

Registration. Registration of the overlay material is done using grid intersections located in two opposite corners of the base map. Registration aligns one component (the overlay) to the other component (the base map) and allows them to be realigned if they should become separated.

Note: Remember, an overlay covered with information is useless if the user does not know where the information should be positioned in relation to the base map.

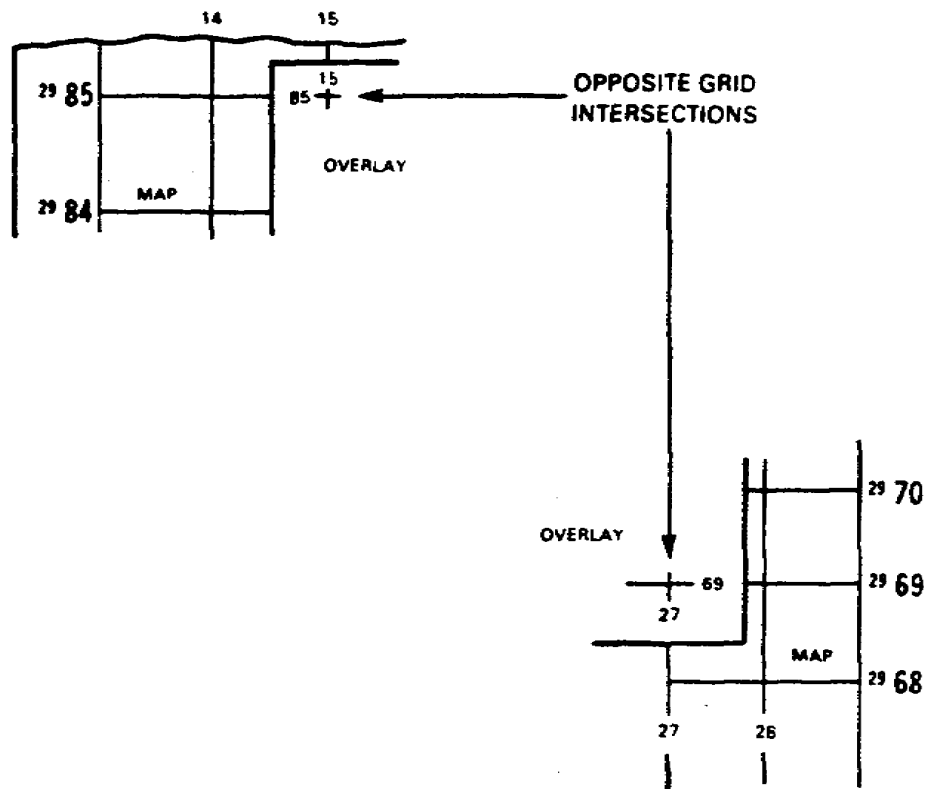
Listed below are the steps necessary to register the situation overlay:

- Orient the overlay material over the map area to be referenced and attach it to the map temporarily with tape.
- Select grid intersections near opposite corners of the overlay.
- Trace the grid intersections and label each with the proper grid numbers (Figure 43).

Drafting the Information. The information for situation overlays is supplied by intelligence sources. It usually consists of descriptions for symbolization and coordinates (Universal transverse mercator [UTM] grid or geographic) for position. There will also be instructions as to the classification, the number of copies required, and printing (if required).

Positioning. Using the UTM or geographic coordinates provided, plot the positions of each unit, installation, and activity on the base map.

FIGURE 43. REGISTRATION OF THE SITUATION OVERLAY



Drafting the military symbols. Draft the units, installations, and activities in accordance with specific instructions and FM 101-5-1. Use the plotted positions on the base map to position the symbols on the overlay. Use colored pencils or pen and ink to draft the symbols. If the overlay is to be lithographically reproduced, pen and ink must be used. If the overlay is to be a supplement to orders or reports, only that information which is directly concerned with them is shown. All the required type is freehand lettered; or if time permits, all type should be produced with a lettering set.

Adding Marginal Data. When all required detail has been plotted on the overlay, the information in Figure 44 (page 38) is printed as close to the lower right hand corner as detail permits.

Title and objective. This tells the reader why the overlay was made and may also give the actual location. For example, "Road Reconnaissance" is not as specific as "Route 146 Road Reconnaissance."

Lesson 2/Learning Event 3

Date and time. Any overlay should contain the latest possible information. An overlay received in time is very valuable to the planning staff and may affect the entire situation; an overlay that has been delayed for any reason may be of little use. Therefore, the exact time the information was obtained aids the receivers in determining its reliability and usefulness.

Map reference. The sheet name, sheet number, map series number, and scale must be included. If the reader does not have the map used for the overlay, this provides the information necessary to obtain it.

Author. The name, rank, and organization of the author, supplemented with a date and time of preparation of the overlay, tell the reader if there was a difference between the time that the information was obtained and the time that it was reported.

Legend. This is only necessary when nonstandard symbols are used. If it is necessary to invent nonstandard symbols to show the required information, the legend must clarify what these symbols mean.

FIGURE 44. MARGINAL INFORMATION

CLASSIFICATION

TITLE: Location of Minefield

DATE & TIME OF INFORMATION:

MAP REFERENCE

Sheet Name:

Sheet No:

Map Series No:

Scale:

PREPARED BY

Name & Rank:

Organization:

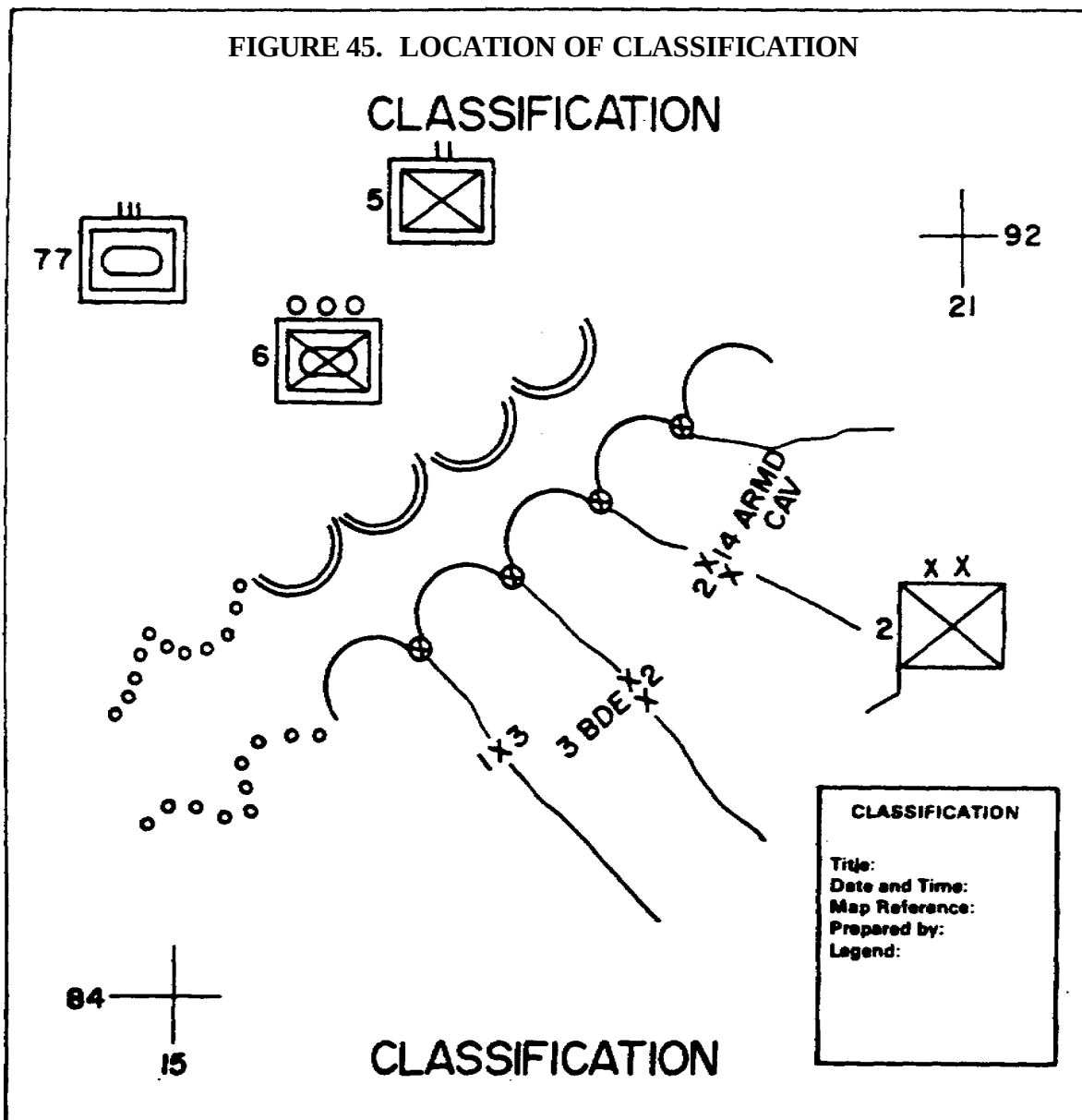
Date & Time:

LEGEND

- 1. 3 Arty pieces, size unk covering minefield and approach to the bridge**

Security classification. This must correspond to the highest classification of either the map or the information placed on the overlay. If the information and the map are unclassified, this should be stated. The location of the classification notes is shown in Figure 45 and shall appear in all three locations as shown.

Additional information. Any other information that amplifies the overlay shall also be included, as briefly as possible.



In Lesson 2 you learned how to prepare situation overlays. Lesson 3 will teach you how to prepare selection, correction, and special overlays.

Lesson 2/Review Exercise

Lesson 2

REVIEW EXERCISE

Now that you have read through the instructional material for Lesson 2, check your understanding by completing these review exercises without looking back to the lesson. When you have completed as many of the exercises as you can, turn to the solutions on page 41 and check your responses. If you do not understand a solution, go back and restudy the lesson.

1. A sign composed of a diagram, number, letter, abbreviation, color, or combination thereof, that is used to identify and distinguish a particular military unit, activity, or installation is a _____.
2. A triangular shaped symbol is used to represent an _____ or _____.
3. On the field headquarters symbol, the staff is always on the _____.
4. What color is used to denote areas of chemical, biological, or radiological contamination?

5. If only one color is available, enemy symbols are outlined with _____.
6. A broken line symbol represents a _____ or _____ location.
7. What field manual covers military symbols? _____
8. Registration of the situation overlay is accomplished by using _____ in opposite corners of the base map.
9. When nonstandard symbols are used, a _____ is required to clarify the symbols.
10. The security classification appears in _____ places on a situation overlay.

REVIEW EXERCISE SOLUTIONS

1. military symbol (page 19)
2. observation, listening post (page 21)
3. left (page 21)
4. yellow (page 25)
5. double lines (page 25)
6. proposed, future (page 26)
7. FM 101-5-1 (page 19)
8. grid intersections (page 36)
9. legend (page 38)
10. three (page 38)

Lesson 3

Lesson 3 SELECTION, CORRECTION, AND SPECIAL OVERLAYS

OBJECTIVE

Identify the procedures used in preparing selection, correction, and special overlays.

TASK

051-257-1215, Draft a Map Overlay.

CONDITIONS

You will be given information on procedures for preparing selection, correction, and special overlays and an ACCP examination response sheet.

STANDARDS

You should be able to demonstrate knowledge of the procedures for preparing selection, correction, and special overlays by responding correctly to 75 percent of the examination questions pertaining to this lesson.

CREDIT HOUR

One

REFERENCES

STP 5-81C1-SM

Learning Event

IDENTIFY THE PROCEDURES USED IN PREPARING SELECTION, CORRECTION, AND SPECIAL OVERLAYS

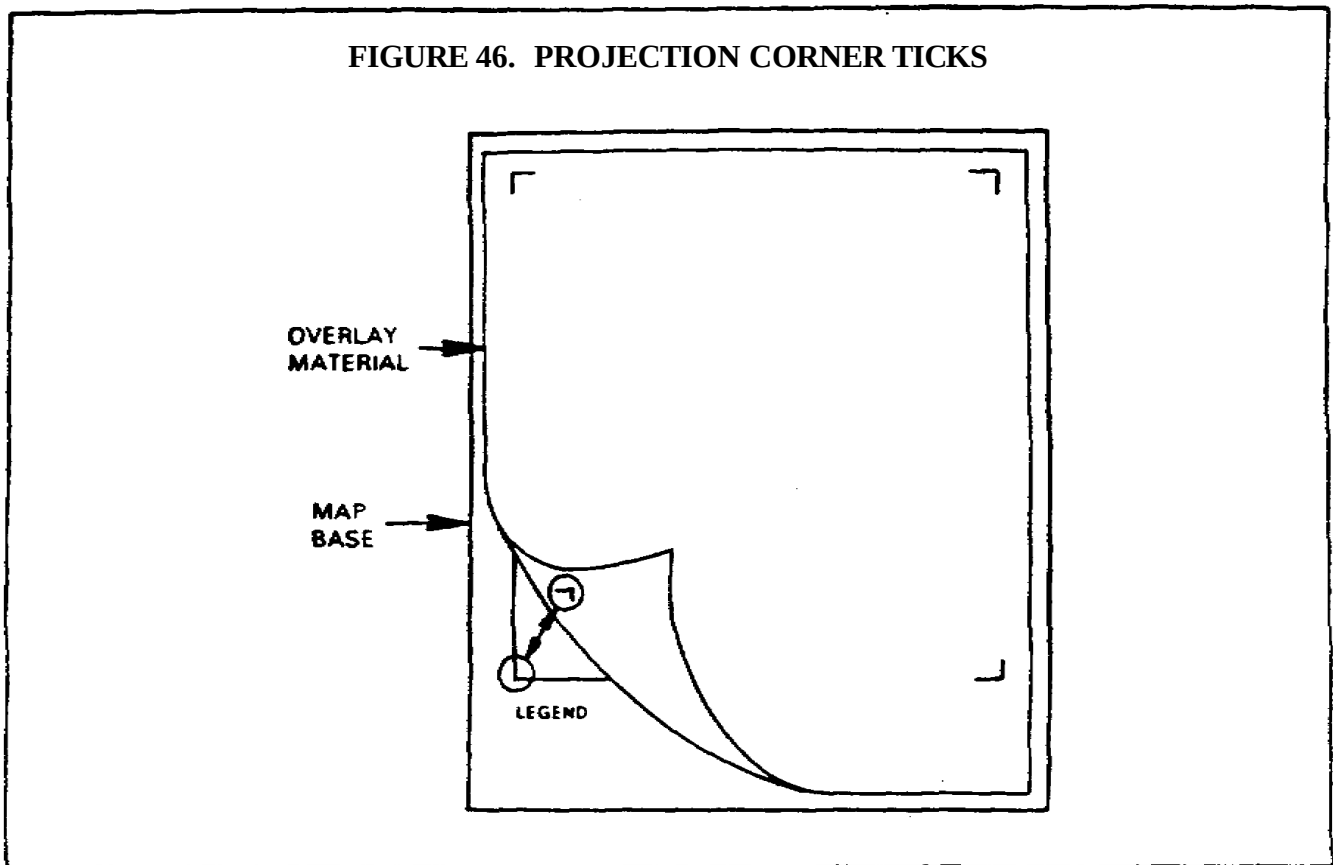
The selection, correction, and special overlays are prepared in much the same manner as the situation overlay. The three steps to prepare them are (1) registration of the overlay material to the base map, (2) drafting the information, and (3) adding marginal data.

Registration. Registration of the overlay material to the base map is done using grid intersections (discussed for the situation overlay) or projection corner ticks. If the overlay is to be a single overlay, or if it is to be lithographically reproduced as an overlay, grid intersections are used to register it. If the overlay is being prepared for lithographic reproduction as an overprint, projection corner ticks are used to register it. Registration using the projection corner ticks consists of tracing the projection corners from the base map. Registration steps are listed below:

- Secure the overlay material. Secure the overlay material, at least the size of the map, to the map with tape.
- Ink the projection corners. Use a pen to ink the projection corners on the overlay (Figure 46 on page 44). The pen size and length of the corner ticks will be given on the Technical Operations Order (TOO) for the project.

To identify the overlay, label the overlay in the lower right corner with sheet name and sheet number of the base map. If the overlay is to be reproduced lithographically, also indicate the color and screen (if applicable).

FIGURE 46. PROJECTION CORNER TICKS



Drafting the Information. Review the TOO for all symbolization and pen sizes.

Selection overlay. The selection overlay emphasizes information already appearing on the map base. The TOO will state the features to be emphasized on the overlay, their symbolization, and pen size.

Correction overlay. The correction overlay allows for a quick correction to outdated maps. Along with the TOO, additional source material will be provided to show where to draft the necessary corrections. The source may be an annotated photograph or a map with the corrections drawn on it.

Special overlay. The special overlay consists of any type information that does not fit into any of the other categories. The TOO will state the necessary specifications, and source material will provide the necessary positioning data.

Technique. It is important to realize that many of the pen sizes used for symbolization are larger than the feature they will be symbolizing. For drafting features correctly, the center of the symbol is positioned in the same spot as the center of the feature it is emphasizing.

Color. If the overlay is to be reproduced in more than one color, a separate overlay must be prepared for each color.

Adding Marginal Data. All marginal data will be prepared in accordance with the TOO for the project. Some items that must appear are listed below.

Title. The title tells the user why the overlay was made. This applies to the selection and special overlays. The correction overlay does not use a title.

Date. Any overlay should contain the latest possible information. The date that the information was obtained aids the user in determining its reliability and usefulness.

Map reference. This is needed only if the overlay is not to be reproduced as an overprint. If the reader does not have the map used for the overlay, the map reference will provide the information necessary to obtain it.

Preparer's note. The preparer's note gives the preparing organization and the person who directed the preparation of the overlay. It may also contain disclaimers, currency statements, and special notes. This is not required for a correction overlay.

Symbol legend. A symbol legend will appear to clarify any symbols used that are nonstandard.

Classification note. For overlays that are not to be reproduced as overprints, the classification must appear at least three times in the title block and at both the north and south margins. For overlays that are to be reproduced as overprints, the classification must be placed at the north and south margins in such a manner that differentiates itself from the rest of the map. A third classification marking is placed somewhere on the overlay so that if the map is folded and rolled, a classification note will be visible.

In Lesson 3, you learned how to prepare selection, correction, and special overlays. Lesson 4 will teach you the components of lettering sets and their uses. Lettering sets are used to add a professional touch to pen and ink overlays.

Lesson 3/Review Exercise

Lesson 3

REVIEW EXERCISE

Now that you have read through the instructional materials for Lesson 3, check your understanding by completing the review exercises without looking back to the lesson. When you have completed as many of the exercises as you can, turn to the solutions on page 47 and check your responses. If you do not understand a solution, go back and restudy the lesson.

1. If the overlay is being prepared for lithographic reproduction as an overprint, _____ are used to register it.
2. For all specifications for symbolizations and pen sizes, review the _____.

REVIEW EXERCISE SOLUTIONS

1. projection corner ticks (page 43)
2. TOO (page 44)

Lesson 4

Lesson 4 LETTERING SETS

OBJECTIVE

Describe the components of the lettering sets and the procedures for their use.

TASK

051-257-1231, Prepare a Names Overlay Using a Lettering Set.

CONDITIONS

You will be given information on the lettering sets and an ACCP examination response sheet.

STANDARDS

You should be able to demonstrate knowledge of the components of the lettering sets and the procedures for their use by responding correctly to 75 percent of the examination questions pertaining to this lesson.

CREDIT HOURS

Two

REFERENCES

STP 5-81C1-SM
FM 5-553

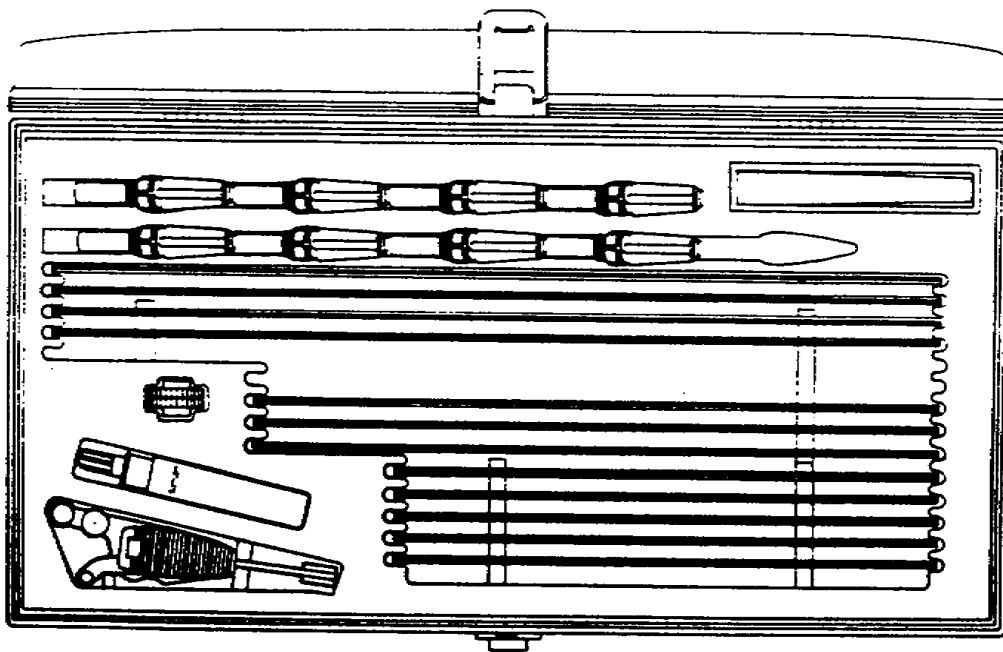
Learning Event 1

IDENTIFY THE COMPONENTS OF LETTERING SETS AND THEIR USES

Lettering sets add a professional touch to pen and ink overlays. They produce neat, uniform lettering. There are two types of lettering sets available: a mechanical lettering set and a cut-through lettering set.

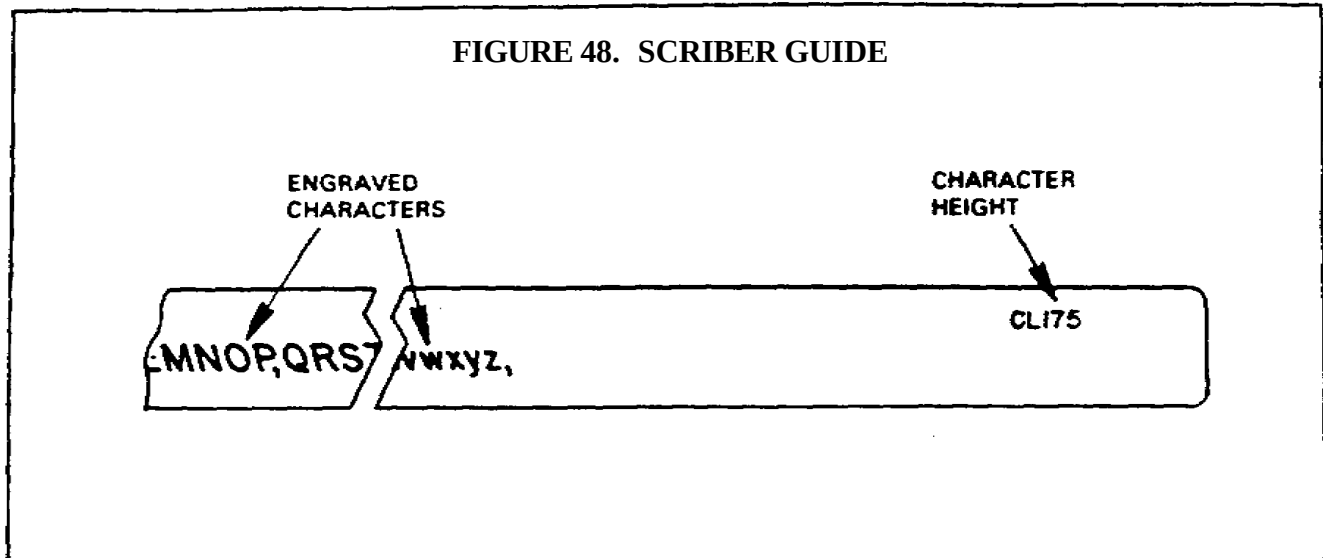
The Mechanical Lettering Set. The mechanical lettering set is used primarily for title blocks and marginal data. Mechanical lettering is executed with a pen in a scribe guided by a scribe guide. The standard mechanical lettering set (Figure 47) consists of a set of scribe guides, a scribe guide holder, a scribe, a set of pens, and a bottle of ink.

FIGURE 47. MECHANICAL LETTERING SET



Lesson 4/Learning Event 1

Scriber guides. Scriber guides are made of laminated plastic with characters and a tail pin guide engraved in the face. The height of the characters and the suggested pen size for the scriber guide is given in the upper right hand corner of the guide (Figure 48).

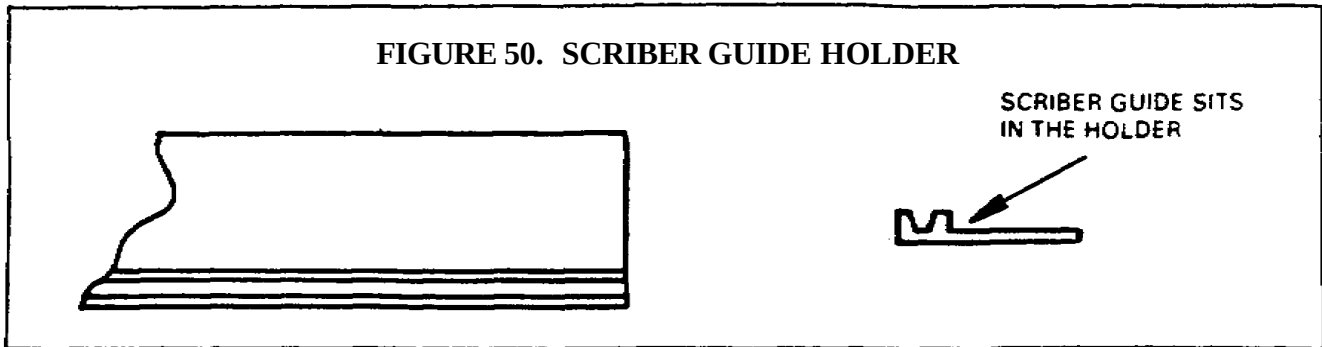


The character height is shown in Figure 48 as 175. This number represents a character height of 17.5 millimeters. Figure 49 lists the scriber guides, the suggested pen number to use, and the letter height that each scriber guide can produce. The range of letter height in the standard set is 1.3 millimeter to 20.0 millimeters.

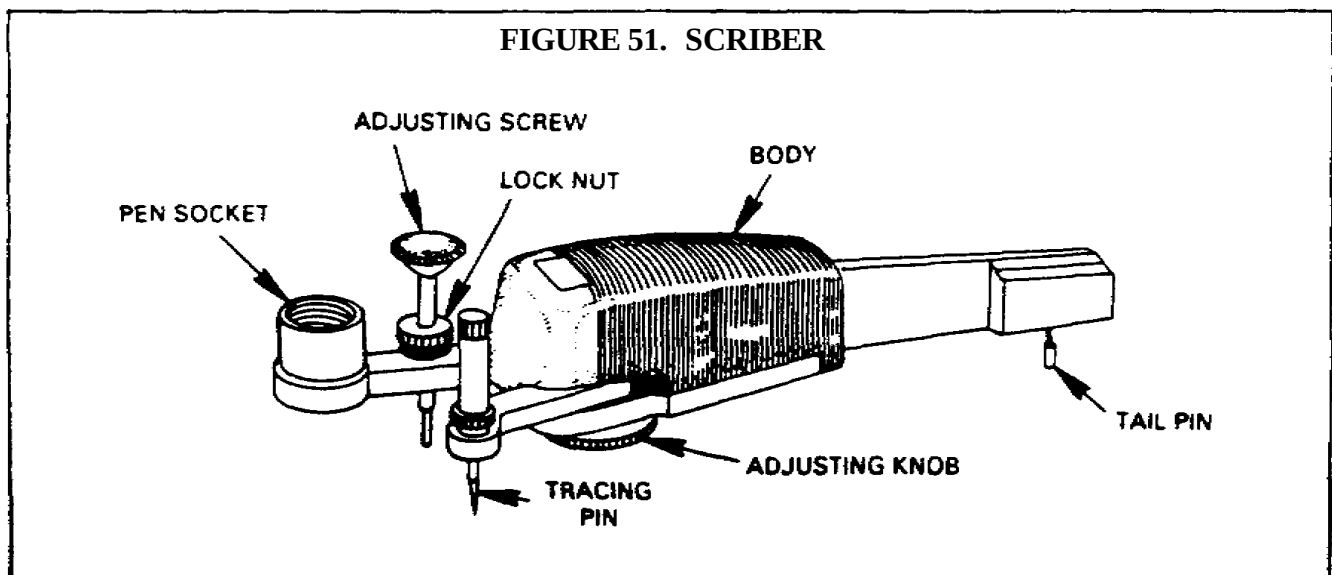
FIGURE 49. LETTER HEIGHT RANGE

Scriber Guide No.	Use Pen No.	Letter Height
3004-CL-13	.13	1.3 mm (0.051 in)
3004-CL-18	.18	1.8 mm (0.071 in)
3004-CL-25	.25	2.5 mm (0.098 in)
3004-CL-35	.35	3.5 mm (0.138 in)
3004-CL-50	.50	5.0 mm (0.197 in)
3004-CL-70	.70	7.0 mm (0.276 in)
3004-CL-100	1.00	10 mm (0.394 in)
3004-CL-140	1.40	14 mm (0.551 in)
3004-C-200	2.00	20 mm (0.787 in)
3004-L-200	2.00	20 mm (0.787 in)

Scriber guide holder. The scriber guide holder (Figure 50) holds the scriber guides. The holder allows the guides to slide freely back and forth to position characters. To prevent smudging, the guides slide on the holder instead of on the drawing.



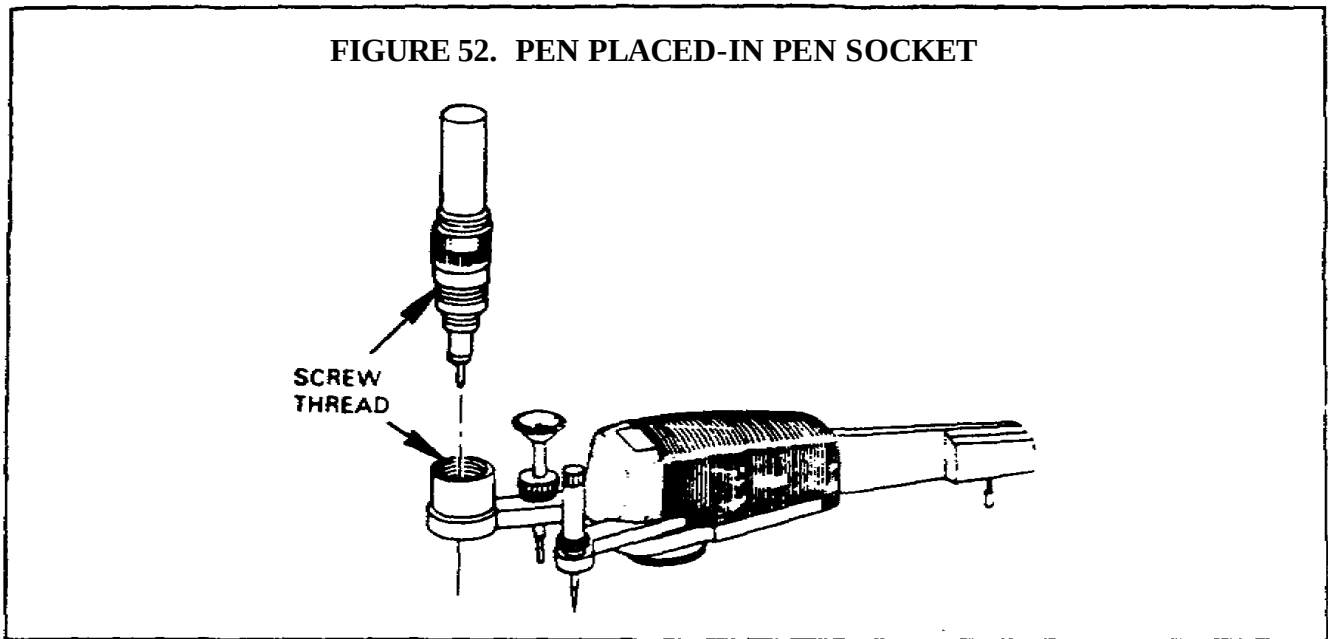
Scriber. The scriber holds the pen in alignment and controls its motion as the tracing pin guides through the character grooves on the scriber guide. The scriber consists of a tracing pin, a pen socket, an adjusting screw, a lock nut, a tail pin, an adjusting knob, and a body (Figure 51).



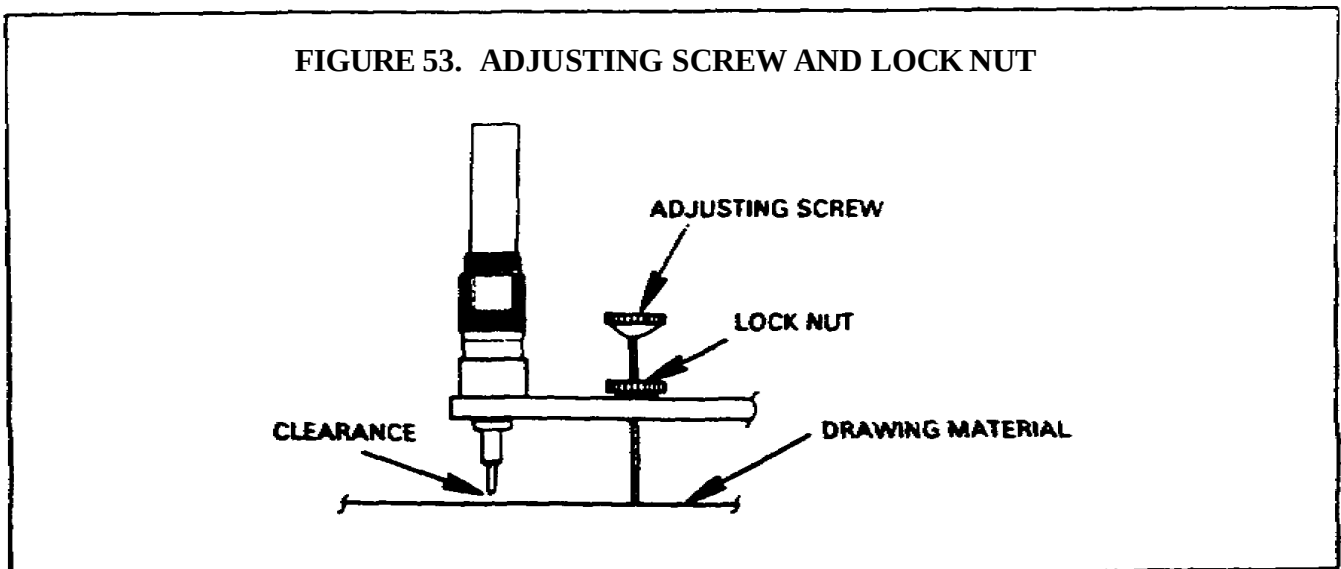
- Tracing pin. The tracing pin follows the character grooves on the scriber guide. The tracing pin arm is adjustable.

Lesson 4/Learning Event 1

- Pen socket. The pen socket holds the pen. The pen socket and the pen are screw threaded. The pen is screwed into the socket and is held securely (Figure 52).

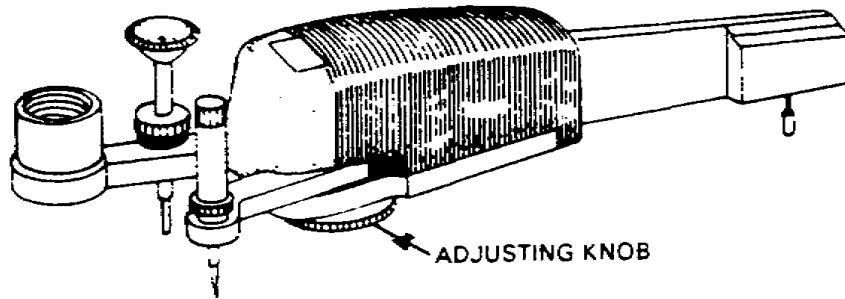


- Adjusting screw. The adjusting screw sets the distance between the pen point and the overlay material (Figure 53).
- Lock nut. The lock nut secures the adjusting screw once the desired positioning is achieved (Figure 53).



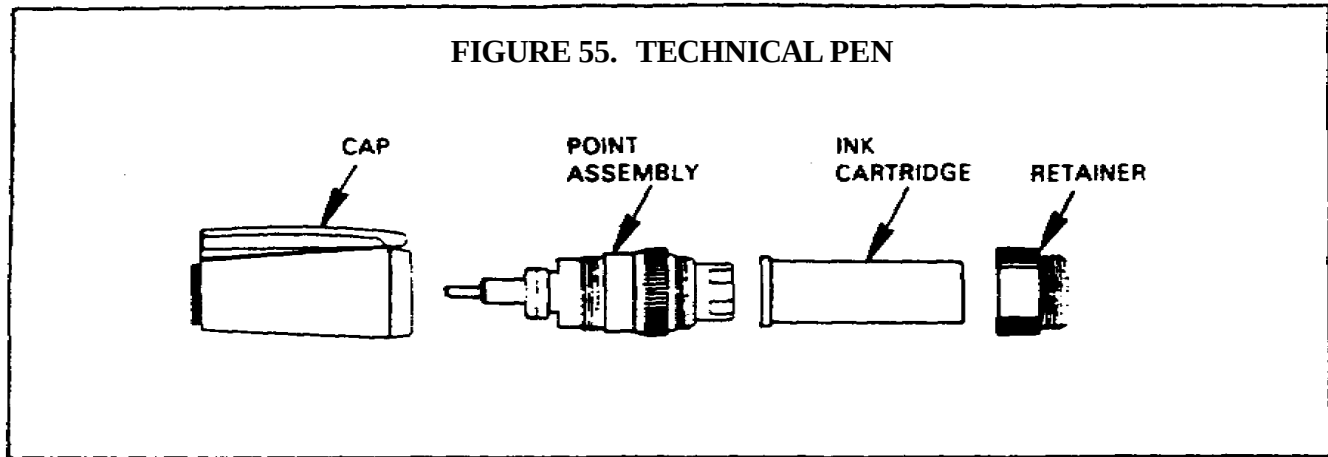
- Tail pin. The tail pin sits in the tail pin guide on the scriber guide. The tail pin and the tail pin guide work together to ensure the inked letters are on a common parallel.
- Adjusting knob. The adjusting knob controls the movement of the tracing pin arm. The tracing pin arm can be adjusted so that the scriber can produce vertical or slanted lettering. Moving the adjusting knob to the left will release the tracing pin arm. Once the tracing pin arm is in the desired position, the adjusting knob is moved back to the right to secure it (Figure 54).

FIGURE 54. ADJUSTING KNOB



Lesson 4/Learning Event 1

Pens. The pens are standard technical pens (Lesson 1/ Learning Event 2). The mechanical lettering set comes with nine pens ranging in point size 1.3 millimeters to 20.0 millimeters. Each pen is composed of a point assembly, a cap, and a see-through refillable ink cartridge (Figure 55).



Ink. A standard drafting ink comes with the set. The ink used with the set may be any drafting ink, available through supply channels, that is opaque and adheres to the drawing materials.

The Cut-Through Lettering Set. The cut-through lettering set is used primarily for the lettering on overlays appearing in the image area of the base map. It is also used for title blocks and marginal data if time restraints do not allow the use of the mechanical lettering set.

The standard cut-through lettering set (Figure 56) consists of a set of five cut-through guides, a set of five pens in a seven-pen module holder, two nib keys, a bottle of ink, a bottle of liquid eraser, an eraser strip in a holder, a drafting film eraser, an eraser strip sharpener, and a sponge.

Cut-through lettering guides. The cut-through lettering guides work on the same principle as stencils. Each lettering guide has upper and lower case letters, numerals, and assorted symbols (Figure 57).

FIGURE 56. CUT-THROUGH LETTERING SET

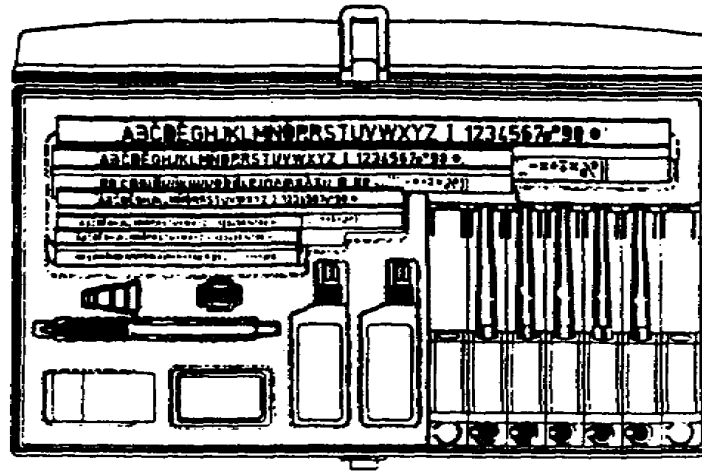
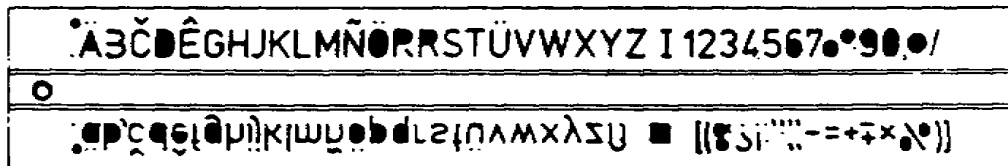


FIGURE 57. CUT-THROUGH LETTERING GUIDE



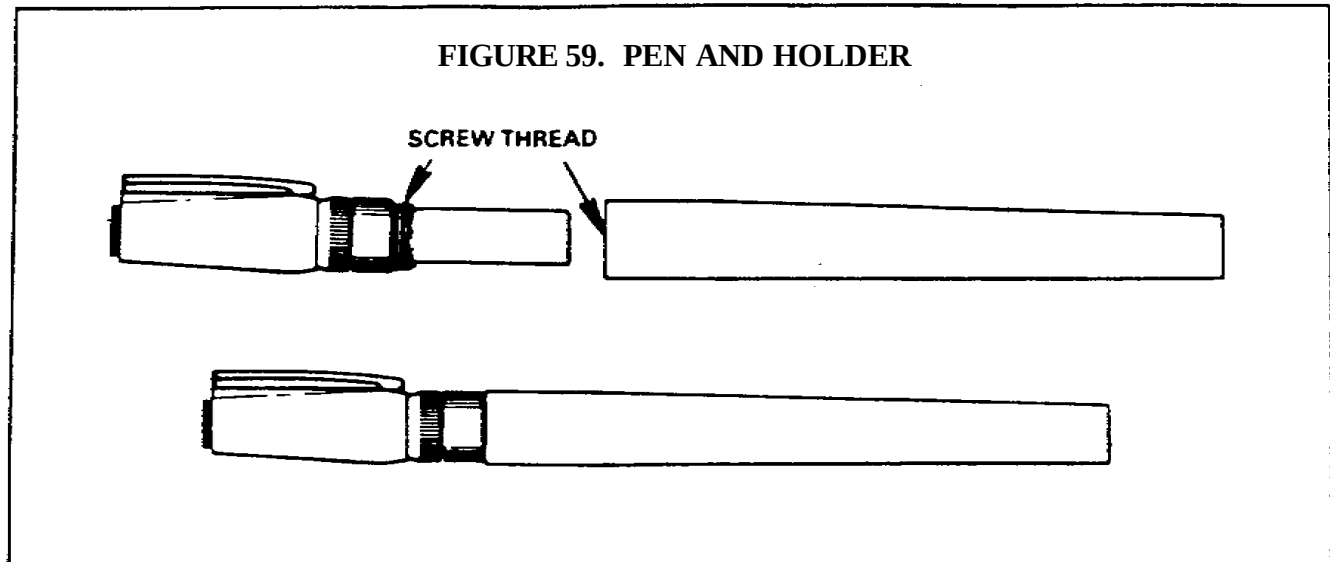
The height of the characters and the suggested pen size for the guide is given in the center of the guide. Figure 58 lists the cut-through guides, the suggested pen number, and the letter height each guide produces. The range of letter height in the standard set is 2.5 millimeters to 10.0 millimeters.

FIGURE 68. LETTER HEIGHT RANGE

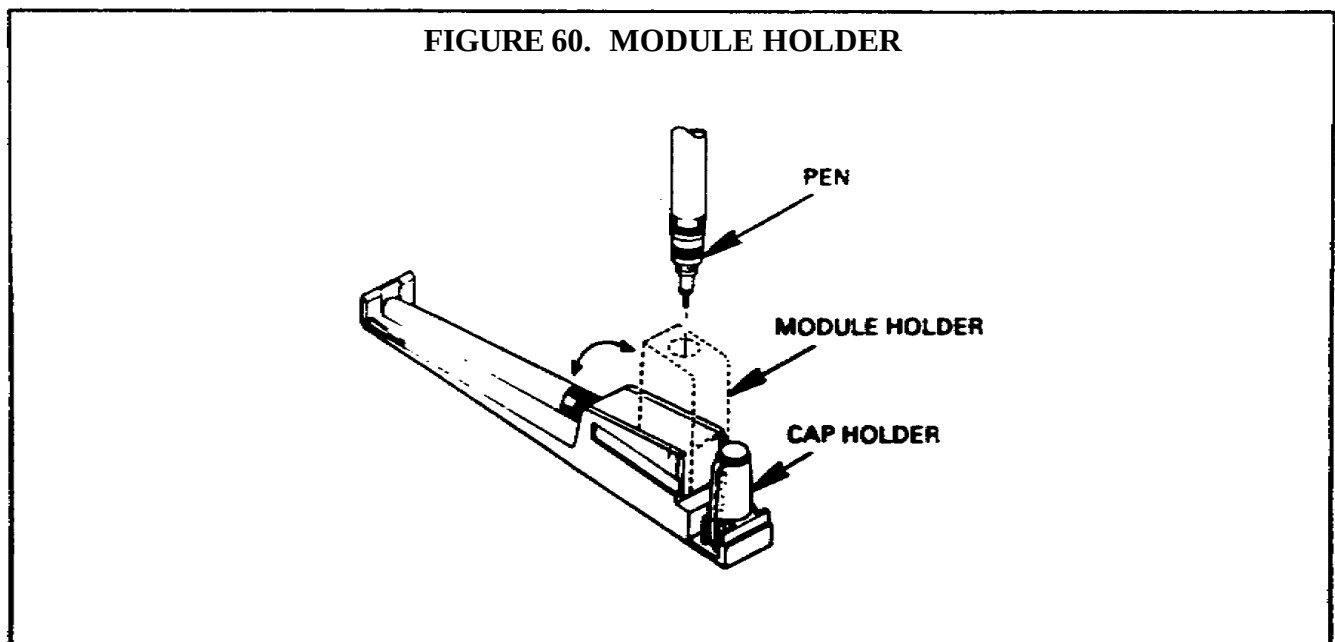
Guide No.	Use Pen No.	Letter Height
3036-25	.25	2.5 mm (0.098 in)
3036-35	.35	3.5 mm (0.138 in)
3036-50	.50	5.0 mm (0.197 in)
3036-70	.70	7.0 mm (0.276 in)
3036-100	1.00	10 mm (0.394 in)

Lesson 4/Learning Event 1

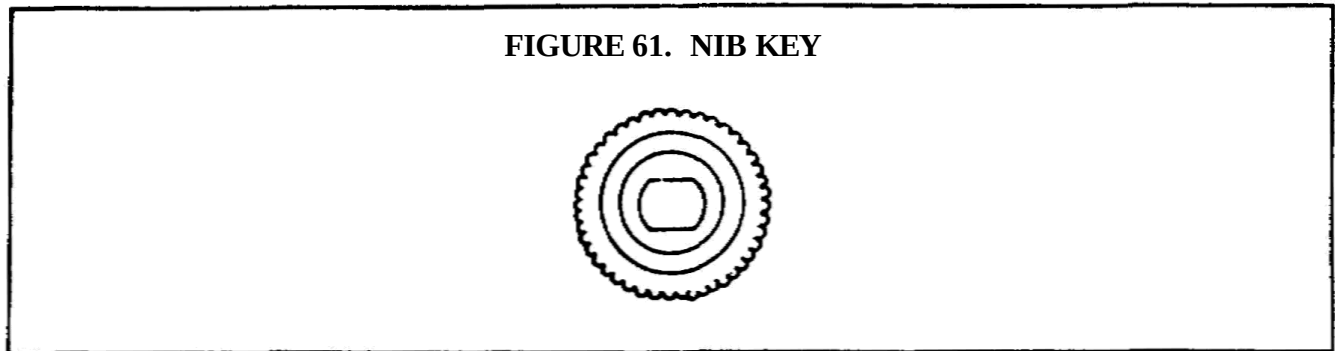
Pens and module holder. The pens are the same as those that come in the mechanical lettering set with the addition of a holder (Figure 59). The holder provides an easy grip and better balance when using the pens with the cut-through lettering guides.



The module holder provides airtight storage for the pens. The module releases the pen quickly from a clamped position. The pen clamps back into the module to keep the pen ready to letter (Figure 60).



Nib keys. Nib keys are used to release the point on the pen for cleaning or replacement. The nib key fits down over the point and is turned to release the point (Figure 61).



Ink. A standard drafting ink comes with the set. The ink used with the set may be any drafting ink, available through supply channels, that is opaque and adheres to the drawing material.

Liquid eraser. The liquid eraser, used in conjunction with a sponge and solid eraser, removes unwanted ink from the drawing material.

Eraser strip with holder. The eraser strip with holder is designed for use in congested areas of ink. It has a slender shape that allows for controlled, precise erasing.

Drafting film eraser. The drafting film eraser is used to remove ink from the drawing material without harming the surface.

Eraser strip sharpener. The eraser strip sharpener is designed to sharpen the eraser strip to a round point to facilitate its use in congested areas.

Sponge. The sponge is moistened with the liquid eraser. The erasers are dabbed on the moistened sponge. The liquid eraser increases the erasing capabilities of the erasers.

Lesson 4/Learning Event 2

Learning Event 2

IDENTIFY THE PROCEDURES USED TO PRODUCE LETTERING ON AN OVERLAY USING LETTERING SETS

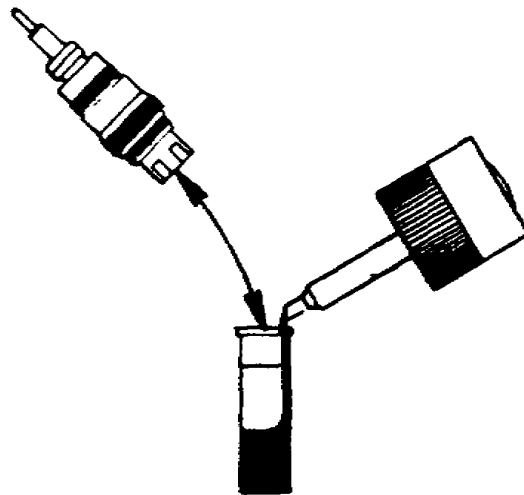
When using either the mechanical lettering set or the cut-through lettering set, it is necessary to orient the overlay to the base map. The overlay is oriented using the procedures stated in Lesson 2, Learning Event 3 or Lesson 3, Learning Event 1, depending on the intended use of the overlay.

Procedures To Produce Lettering Using the Mechanical Lettering Set.

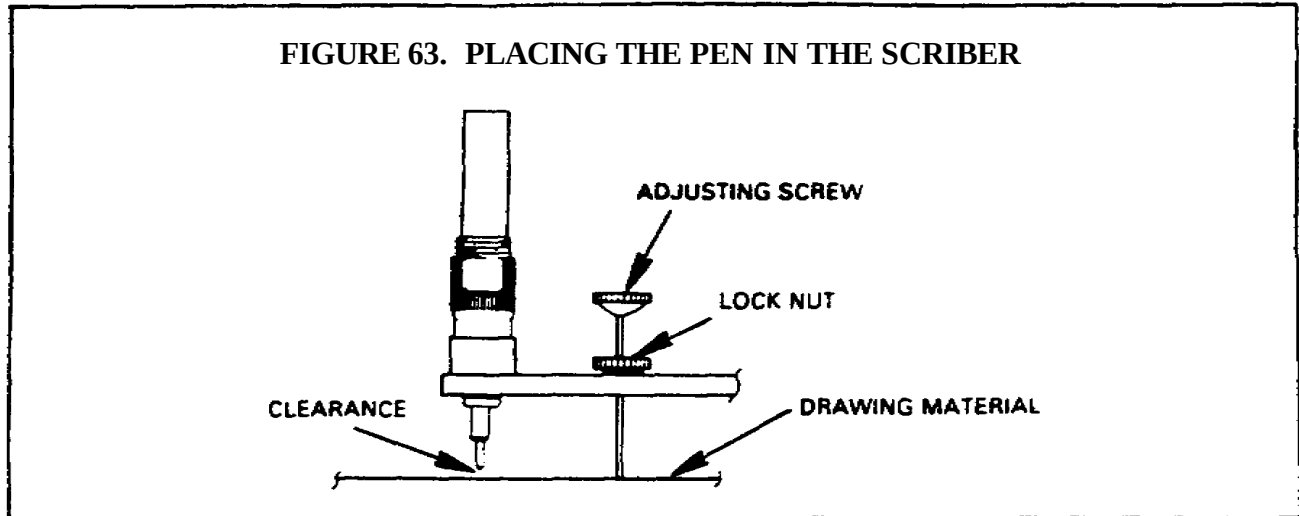
Select the scribe guide and pen size. Review the Technical Operations Order (TOO) to determine the required height and pen size. Select the scribe guide that will give the correct letter height. If the pen size is not stated on the TOO, refer to the scribe guide. Remember that the suggested pen size is given on the upper right-hand corner of the scribe guide.

Prepare the pen. Fill the pen with drafting ink. Remove the ink cartridge and fill it to 1/2 inch from the top. Hold the cartridge upright and put the point assembly back in place (Figure 62). Turn the pen point down and shake gently to start the ink flowing.

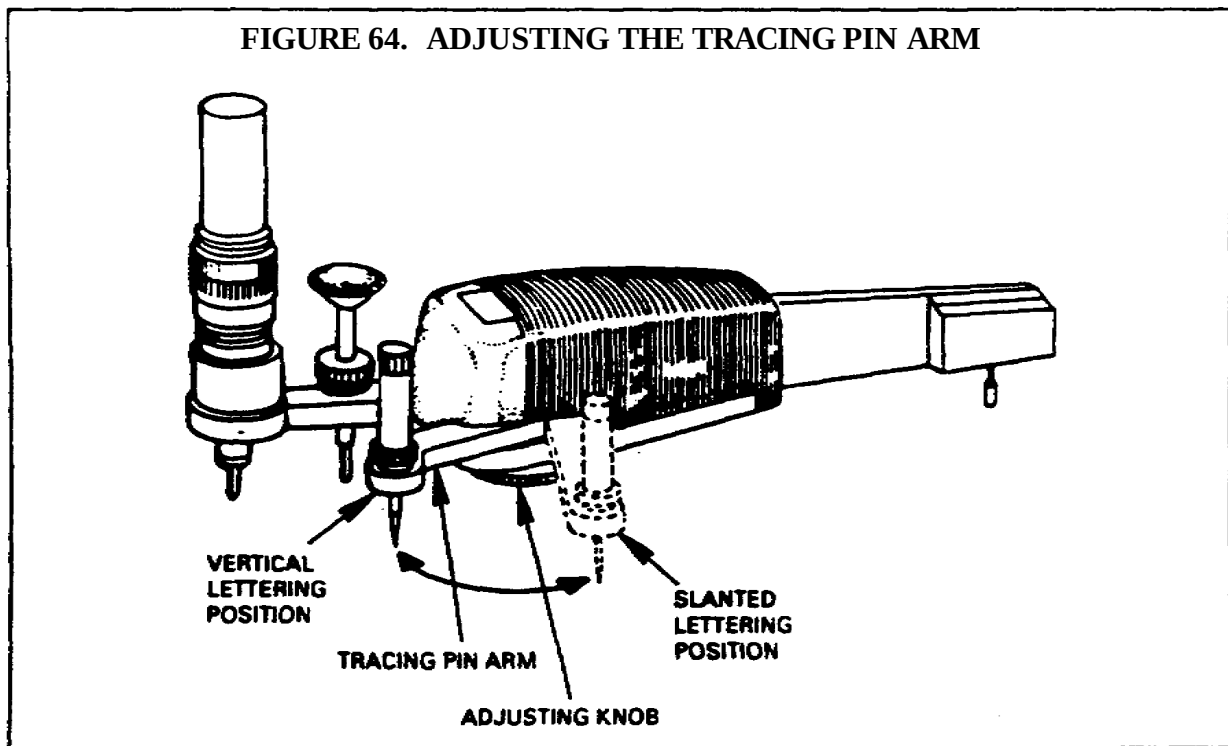
FIGURE 62. FILLING THE INK CARTRIDGE



Prepare the scribe. Place the pen into the scribe. The pen socket on the scribe and the lower portion of the pen are both screw threaded. Screw the pen into the pen socket on the scribe. Set the adjusting screw so that the pen point does not touch the drawing material (Figure 63).



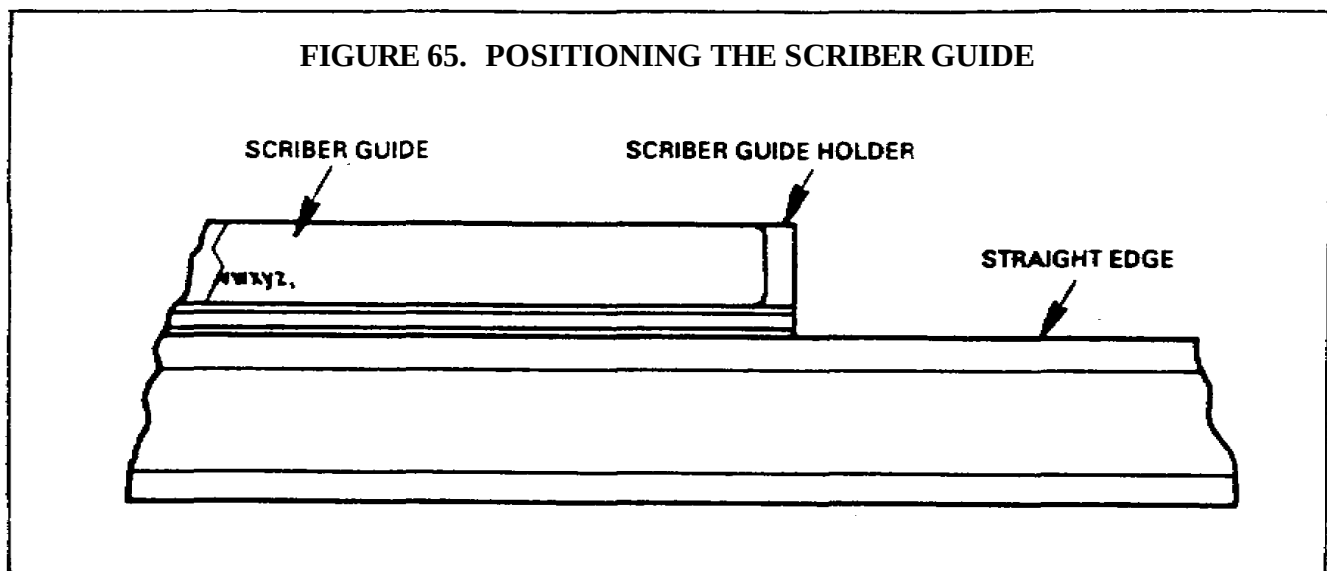
Adjust the tracing pin arm. Loosen the adjusting knob on the scribe and move the tracing pin arm as close to the pen socket as movement allows. Tighten the adjusting knob. Putting the tracing pin arm in this position will cause the scribe to produce vertical lettering. Use only vertical lettering on topographic overlays (Figure 64).



Lesson 4/Learning Event 2

Position the scribe. Orient the scribe guide holder. Place the scribe guide holder horizontally underneath the area to be lettered. The actual lettering will be just above the scribe guide holder.

- Align the scribe guide holder. Align the scribe guide holder to the marginal information on the base map if marginal data is being inked. Align the scribe guide holder to the south neat line if information in the body of the overlay is being inked.
- Position the straightedge. Position a metal straightedge along the lower edge of the scribe guide holder. Make sure the straightedge is aligned accordingly.
- Position the scribe guide. Place the scribe guide on the scribe guide holder. The characters on the scribe guide should be right reading (Figure 65).

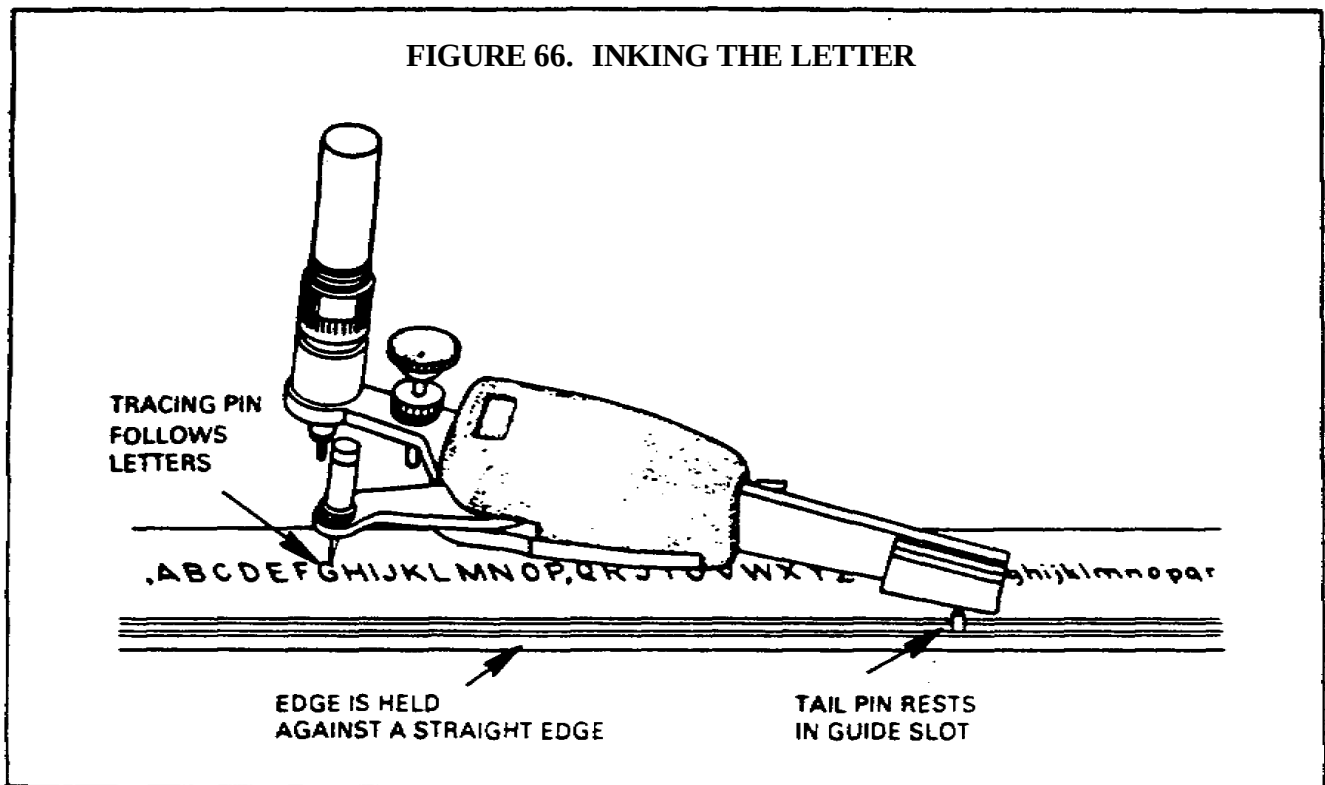


- Position the scribe. Place the scribe on the scribe guide so that the tail pin rests in its guide on the scribe guide. The tracing pin should be set in the groove of the first letter to be inked.

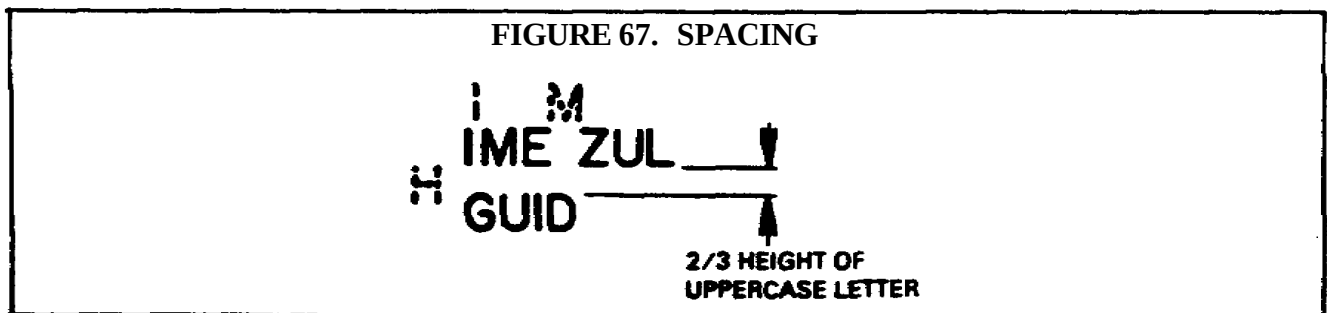
Letter the overlay. To begin lettering, slide the scribe guide and scribe so the first letter to be inked is under the area on the overlay where the letter is to appear.

- Lower the pen. Use the adjusting pin to lower the pen point enough so the ink will flow.

- Ink the letter. Use the tracing pin to follow the character groove and at the same time keep the tail pin in its groove (Figure 66).



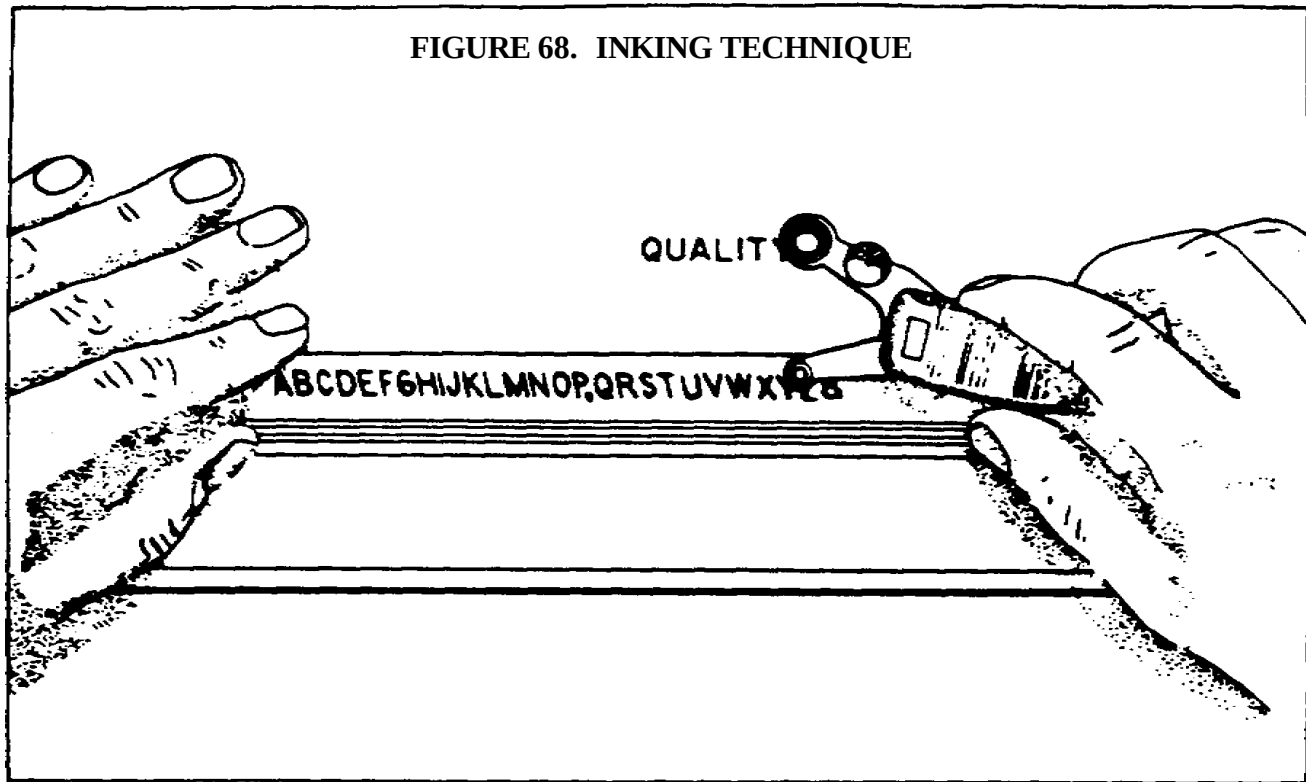
- Space the letters. Spacing between letters and words is done visually. Letters in a word should be spaced so that the letter "I" will fit between letters. Words should be spaced so that the letter "M" will fit between words. Lines should be spaced so that $\frac{2}{3}$ of the height of an uppercase letter will fit between them (Figure 67).



For each line of lettering required, the scribe guide must be repositioned. Ensure that the ink is opaque, the words are spelled correctly, and the overlay is free of smudges and smears.

Lesson 4/Learning Event 2

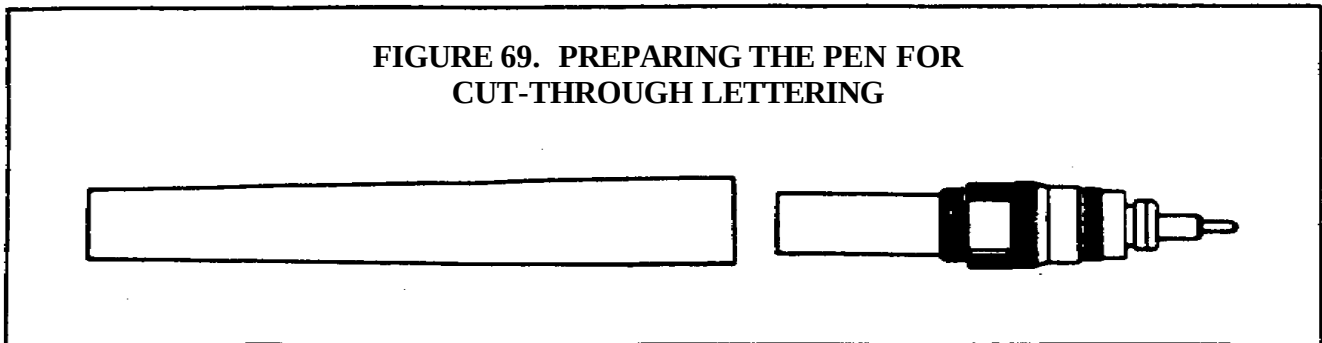
Technique. Hold the straightedge in position with the ball of the left hand against it. The fingers of the left hand hold the scribe guide in its holder against the straightedge and move the scribe guide when necessary. The scribe is held between the thumb and the first three fingers of the right hand. The little finger of the right hand presses the right side of the scribe guide with holder against the straightedge, preventing slipping from the motion of the tracing pin in the character grooves (Figure 68).



Procedures To Produce Lettering Using the Cut-Through Lettering Set.

Select the cut-through guide and pen size. Review the TOO to determine the required letter height and pen size. Select the cut-through guide that will give the correct letter height. If the pen size is not stated on the TOO, refer to the guide. Remember that the suggested pen size is given on the center of the guide.

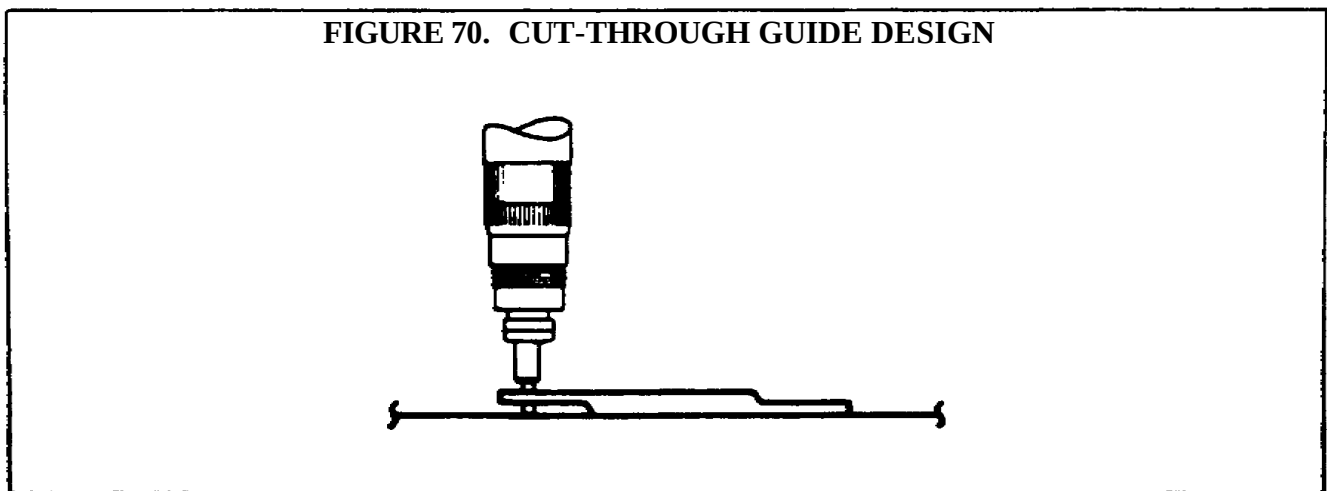
Prepare the pen. Prepare the pen the same way it was prepared for the mechanical lettering set. After it is filled with ink, screw on the holder (Figure 69).



Position the cut-through guide. Position the cut-through guide directly on the area to be lettered. Move it so that the first cut-through letter to be inked is positioned directly under the area it is to appear.

Letter the overlay.

Ink the letters. Hold the pen vertically and follow the letter on the cut-through guide. The cut-through guide is designed in a “Z” shape so the ink will not smear (Figure 70).



Space the letters. Space the letters using the guide lines given for the mechanical lettering set. Ensure that the ink is opaque, the words are spelled and positioned correctly, and the overlay is free of smudges and smears.

Lesson 4/Review Exercise

Lesson 4

Review Exercise

Now that you have read through instructional material for Lesson 4, check your understanding by completing these review exercises without looking back to the lesson. When you have completed as many of the exercises as you can, turn to the solutions on page 65 and check your responses. If you do not understand a solution, go back and restudy the lesson.

1. Vertical or slanted lettering may be produced using the mechanical lettering set by adjusting the _____ arm.
2. The mechanical lettering set is used primarily for title blocks and _____.
3. The ink cartridge is filled to _____ inch from the top.
4. To lower the pen point enough so the ink will flow, use the _____ screw.
5. Letters in a word should be spaced so that the letter _____ will fit in between them.
6. Lines should be spaced so that $\frac{2}{3}$ of the height of an _____ letter will fit between them.

REVIEW EXERCISE SOLUTIONS

1. tracing pin (page 53)
2. marginal data (page 49)
3. 1/2 (page 58)
4. adjusting (page 60)
5. I (page 61)
6. uppercase (page 61)

Glossary

GLOSSARY

ACCP	Army Correspondence Course Program
AR	Army regulation
ARMD CAV	armored cavalry regiment
ASA	Army Security Agency
BDE	brigade
BHDL	beachhead line
CARS	Combat Arms Regimental System
CBR	chemical, biological and radiological
COMMZ	communications zone
COP	combat outpost
COSCOM	corps support command
DZ	drop zone
FASCOM	Field Army Support Command
FEBA	forward edge of the battle area
FM	field manual
FWD COMM	forward communications
HH	headquarters and headquarters company
IDP	initial delay position
INF DIV	infantry division
LZ	landing zone
MA	marshaling area
MI	military intelligence
MORT	heavy mortar platoon
MP	military police
OBJ	objective
TF	task force
TM	technical manual
UTM	universal transverse mercator (grid)
TOO	Technical Operations Order