# SOLDIER'S MANUAL AND TRAINER'S GUIDE

## MOS 25M

## MULTIMEDIA ILLUSTRATOR

## SKILL LEVELS 1/2/3

DISTRIBUTION RESTRICTION:  Approved for public release; distribution is unlimited.

# HEADQUARTERS, DEPARTMENT OF THE ARMY

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| **SOLDIER TRAINING** | **HEADQUARTERS** |
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## MOS 25M
## MULTIMEDIA ILLUSTRATOR
## SKILL LEVELS 1/2/3

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## Subject Area 2:  Illustration/Multimedia

## Skill Level 2

## Subject Area 3:  Facility Administrator

## Skill Level 3

## Subject Area 4:  Facility Manager

# PREFACE

This publication is for soldiers holding military occupational specialty (MOS) 25M skill levels (SLs) 1 through 3 and for trainers and first line supervisors.  It contains standardized training objectives, in the form of task summaries, to train and evaluate soldiers on critical tasks which support unit missions during wartime.  Trainers and first-line supervisor should ensure soldiers holding MOS 25M10/20/30 have access to this publication.  It should be made available in the soldier's work area, unit learning center, and unit libraries.

This manual applies to both Active and Reserve Component soldiers.

The proponent for this publication is the US Army Signal Center and Fort Gordon.  Send comments and recommendations on DA Form 2028 directly to Commander, US Army Signal Center and Fort Gordon, ATTN:  ATZH-DTM-I, Fort Gordon, Georgia  30905-5074.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

# CHAPTER 1

# INTRODUCTION

## 1-1. GENERAL

a. This manual identifies the individual MOS training requirements for soldiers in MOS 25M. Commanders, trainers, and soldiers should use it to plan, conduct, and evaluate individual training in units. This manual is the primary MOS reference to the self-development and training of every 25M soldier.

b. Use this manual with the soldier's manual of common tasks (STP 21-1-SMCT and STP 21-24-SMCT), Army training and evaluation programs (ARTEPs), and FM 25-101, *Battle-Focused Training*, to establish effective training plans and programs which integrate soldier, leader, and collective tasks.

## 1-2. TASK SUMMARIES

a. Task summaries outline the wartime performance requirements of each critical task in the soldier's manual (SM). They provide the soldier proficiency on training. As a minimum, task summaries include information you must know and the skills that you must perform to standards for each task. The format for the task summaries included in this SM is as follows:

(1) **Task title**. The task title identifies the action to be performed.

(2) **Task number**. A 10-digit number identifies each task or skill. Include this task number, along with the task title, in any correspondence relating to the task. To determine which tasks are testable at each skill level, refer to Chapter 2, Part 2, Critical Tasks. The first two numbers of the last four of each task DO NOT indicate the skill levels testable for that particular task.

(3) **Conditions**. The task conditions identify all the equipment, tools, references, job aids, and supporting personnel which the soldier needs to perform the task in wartime. This section identifies any environmental conditions that can alter task performance, such as visibility, temperature, and wind. This section also identifies any specific cues or events (a chemical attack or identification of a threat vehicle) which trigger task performance.

(4) **Standards**. The task standards describe how well and to what level you must perform a task under wartime conditions. Standards are typically described in terms of accuracy, completeness, and speed.

(5) **Training and evaluation**. This section may contain the training information outline (performance steps in ASAT), evaluation preparation, and evaluation guide (performance measures in ASAT). The training information outline/performance steps include detailed training information. The evaluation preparation subsection indicates necessary modification to task performance in order to train and evaluate a task that cannot be trained to the wartime standard under wartime conditions. It may also include special training and evaluation preparation instructions to accommodate these modifications and any instructions that should be given to the soldier before evaluation. The evaluation guide/performance measures identify

the specific actions that the soldier must do to successfully complete the task.  These actions are listed in a Pass/Fail format for easy evaluation.  Each task contains a feedback statement (Evaluation Guidance in ASAT) that indicates the requirements (for the number of performance measures passed) for receiving a GO on the evaluations.

(6)  **References**.  This section identifies references that provide more detailed and thorough explanations of task performance requirements than that are given in the task summary description.

b.  Additionally, some task summaries include safety statements and notes.  Safety statements (danger, warning, and caution) alert user to the possibility of immediate death, personal injury, or damage to equipment.  Notes provide a small, extra supportive explanation or hint relative to the performance measures.

## 1-3.  SOLDIER'S RESPONSIBILITIES

Each soldier is responsible for performing individual tasks that the first-line supervisor identifies based on the unit's mission essential task list (METL).  The soldier must perform the task to the standards listed in the SM.  If a soldier has a question about how to do a task, or which tasks in the manual he must perform, it is the soldier's responsibility to ask the first-line supervisor for clarification.  The first-line supervisor knows how to perform each task, or can direct the soldier to the appropriate training materials.

## 1-4.  NCO SELF-DEVELOPMENT AND THE SOLDIER'S MANUAL

a.  Self-development is one of the key components of the leader development program.  It is a planned progressive and sequential program followed by leaders to enhance and sustain their military competencies.  It consists of individual study, research, professional reading, practice, and self-assessment.  Under the self-development concept, the NCO, as an Army professional, has the responsibility to remain current in all phases of the MOS.  The SM is the primary source of the NCO to use in maintaining MOS proficiency.

b.  Another important resource for NCO self-development is the Army Correspondence Course Program (ACCP).  Soldiers should refer to DA Pamphlet 351-20, *Army Correspondence Course Program Catalog*, for information on enrolling in this program and a list of courses, or write to:  Army Institute for Professional Development, US Army Training Support Center, ATTN: ATIC-IPS, Newport News,  VA 23628-0001.

c.  Unit learning centers are valuable resources for planning self-development programs.  They can help access enlisted career maps, training support products, and extension training materials, such as field manuals (FM), technical manuals (TM), and training extension course (TEC) lessons.  It is the soldier's responsibility to use these materials to maintain performance.

## 1-5.  TRAINING SUPPORT

This manual includes the following appendixes and information which provide additional training support information.

(1)  Appendix A, Excerpt from the Electronic Imaging Course.

(2)  Appendix B, Drafting Tools and Techniques.

(3)  Appendix C, Three Dimensional Drawing.

(4)  Appendix D, Letter Graphics Projects.

(5)  Appendix E, Electronic Page Layout.

(6)  Appendix F, Hypertext Markup Language (HTML).

(7)  Appendix G, Organize Graphics Work Flow.

(8)  Appendix H, Evaluating a Graphics Project.

(9)  Appendix I, Still Photography Editing and Processing System (SPEPS).

(10) Appendix J, Project Evaluation Checklist.

(11) Appendix K, Drawing the Human Form.

(12) Appendix L, DA Form 5164-R (Hands-on Evaluation).

(13) Glossary.  The glossary is a single comprehensive list of acronyms, abbreviations, definitions and letter symbols.

(14) References.  This section contains two lists of references, required and related, which support training of all tasks in this SM.  Required references are listed in the conditions statement and are required for the soldier to do the task.  Related references are materials that provide more detailed information and a more thorough explanation of task performance.

## 1-6.  OPTIONAL INFORMATION

a.  All soldiers and NCOs in MOS 25M should be acquainted with the skill and training progression for the Combat Documentation/Production Specialists, training problems unique to MOS 25M, and the career management field (CMF) structure.

b.  The career progression chart for MOS 25M is shown in Figure 1-1.  It shows the entry level soldier and the path he must follow to SL5.  There are no decision points for the 25M soldier.

c.  The tasks in this SM are common in commercial industry.  In some cases, a specific piece of equipment or software is identified.  However, any commercial equipment or software available can be used following the manufacturer's operating instructions manual, as long as the equipment or software used meets job standards.  Unlike most table(s) of organization and equipment (TOE) units, visual information units may not be equipped with the same model or type of equipment or software.  It is necessary that the soldier have an opportunity to train by using the same type of equipment or software referenced in this SM.  Keep in mind that the self-development test is based on specific information contained in this manual.  Many tasks in the combat documentation production specialist field must be learned through on-the-job training.  Some of the latest techniques strongly recommended that all soldiers have access to commercial technical production literature available at post libraries or through local purchase.

d.  Emphasis on battle focus for the multimedia illustrator needs to be on tasks related to receiving, processing, and transmitting digital imagery; decision graphics; preparing map overlays; preparation of command presentations; field maintenance and operation of the SPEPS; and deploying field portable computer systems.  Training assignments must include graphic documentation of the unit, while training for its wartime mission. These activities would include historical documentation, combat operation decision-making processes, news coverage, and training exercises.

e.  Comments or questions on material in this manual may be directed to the Branch Chief, US Army, Signal Corps Regimental NCO Academy Detachment, ATTN:  ATZH-SDT-T, Chief Training Development, Fort Meade, MD 20755-5805, telephone DSN 923-5805/5802 or commercial (301) 677-5805/5802.

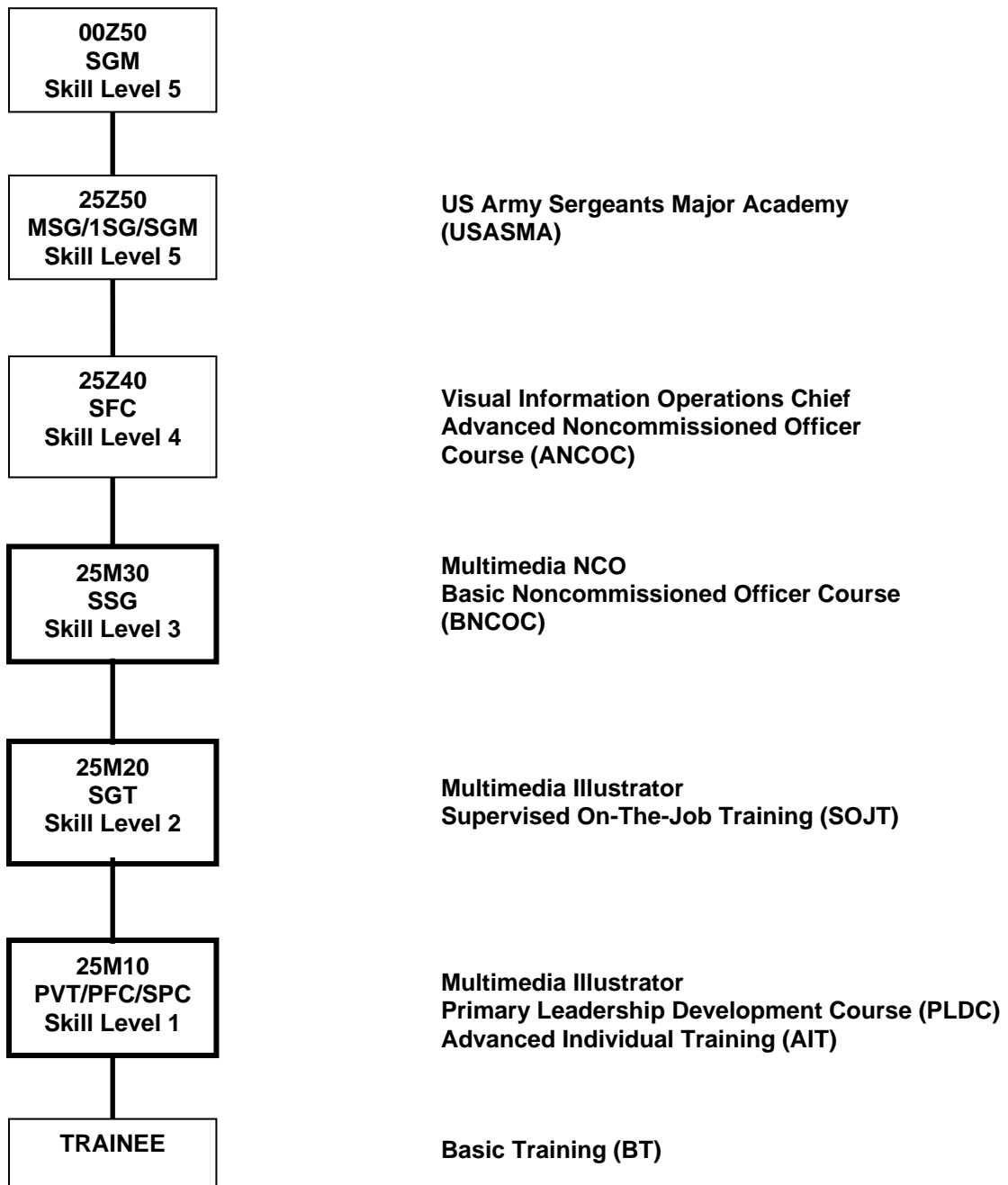| | |
|---|---|
| **00Z50**<br>**SGM**<br>**Skill Level 5** | |
| **25Z50**<br>**MSG/1SG/SGM**<br>**Skill Level 5** | **US Army Sergeants Major Academy**<br>**(USASMA)** |
| **25Z40**<br>**SFC**<br>**Skill Level 4** | **Visual Information Operations Chief**<br>**Advanced Noncommissioned Officer**<br>**Course (ANCOC)** |
| **25M30**<br>**SSG**<br>**Skill Level 3** | **Multimedia NCO**<br>**Basic Noncommissioned Officer Course**<br>**(BNCOC)** |
| **25M20**<br>**SGT**<br>**Skill Level 2** | **Multimedia Illustrator**<br>**Supervised On-The-Job Training (SOJT)** |
| **25M10**<br>**PVT/PFC/SPC**<br>**Skill Level 1** | **Multimedia Illustrator**<br>**Primary Leadership Development Course (PLDC)**<br>**Advanced Individual Training (AIT)** |
| **TRAINEE** | **Basic Training (BT)** |

*Figure 1-1.  Skill level and training progression, MOS 25M.*

# CHAPTER 2

# TRAINER'S GUIDE (TG)

## 2-1. GENERAL

a. The TG identifies the essential components of a unit training plan for individual training. Units have different training needs and requirements based on differences in environment, location, equipment, dispersion (actual manning of graphic shops), and similar factors. Therefore, the TG is a guide used for conducting unit training and not as a rigid standard.

b. The TG provides information necessary for planning training requirements for this MOS.

(1) Identifies subject areas in which to train soldiers.

(2) Identifies the critical tasks for each subject area.

(3) Specifies where soldiers are trained.

(4) Recommends how often each task should be trained to sustain proficiency.

(5) Recommends a strategy for training soldiers to perform higher level tasks.

## 2-2. BATTLE FOCUSED TRAINING

As described in FM 25-100, *Training the Force,* and FM 25-101, *Battle Focused Training,* the commander must first define the METL as the basis for unit training. Unit leaders use the METL to identify the collective, leader, and soldier tasks that support accomplishment of the METL. Unit leaders then assess the status of training and lay out the training objective and the plan for accomplishing needed training. After preparing the long- and short-range plans, leaders then execute and evaluate training. Finally, the unit's training preparedness is reassessed and the training management cycle begins again. This process ensures the unit has identified what is important for the wartime mission, the training focus is applied to the necessary training, and training meets established objectives and standards.

## 2-3. RELATIONSHIP OF SOLDIER TRAINING PUBLICATIONS (STPs) TO BATTLE FOCUSED TRAINING

a. The two key components of enlisted STPs are the TG and SM. The TG and SM give leaders important information to help in the battle focused training process. The TG relates soldier and leader tasks in the MOS and SL to duty positions and equipment. It provides information on where the task is trained, how often training should occur to sustain proficiency, and who in the unit should be trained. As leaders go through the assessment and planning stages, they should use the TG as an important tool in identifying <u>what</u> needs to be trained.

b. The execution and evaluation of soldier and leader training should rely on the Armywide training objective and standards in the SM task summaries. The task summaries ensure that

soldiers in any unit or location have the same definition of task performance, and that trainers evaluate the soldiers to the same standard.

c. The following diagram shows the relationship between battle focused training and the use of the TG and SM. The left-hand side of the diagram (taken from FM 25-101) shows the soldier training process, while the right side of the diagram shows how the STP supports each step of this process.

### BATTLE FOCUS PROCESS                             STP SUPPORT PROCESS

| BATTLE FOCUS PROCESS | STP SUPPORT PROCESS |
|---|---|
| SELECTS SUPPORTING SOLDIER TASKS | USES TG TO RELATE TASKS TO METL |
| CONDUCTS TRAINING ASSESSMENT | USES TG TO DEFINE WHAT SOLDIER TASKS TO ASSESS |
| DETERMINES TRAINING OBJECTIVES | USES TG TO SET OBJECTIVES |
| DETERMINES STRATEGY AND PLANS FOR TRAINING | USES TG TO RELATE SOLDIER TASKS TO STRATEGY |
| CONDUCTS PRE-EXECUTION CHECKS | USES SM TO DETERMINE TRAINING PREPARATION |
| EXECUTES TRAINING AND CONDUCTS AFTER-ACTION REVIEW | USES SM TASK SUMMARY AS SOURCE FOR TASK PERFORMANCE |
| EVALUATES TRAINING AGAINST ESTABLISHED STANDARDS | USES SM TASK SUMMARY AS STANDARD FOR EVALUATION |

## 2-4. TRAINER'S RESPONSIBILITIES

Training soldier and leader tasks to standard and relating this training to collective mission-essential tasks is the NCO trainer's responsibility.  Trainers use the steps below to plan and evaluate training.

(1) **Identify soldier and leader training requirements.**  The NCO determines which tasks soldiers need to train on using the commander's training strategy.  The unit's METL and ARTEP and MOS Training Plan (MTP) in the TG are sources for helping the training define the individual training needed.

(2) **Plan the training.**  Training for specific tasks can usually be integrated or conducted concurrently with other training or during "slack periods."  The unit's ARTEP can assist in identifying soldier and leader tasks that can be trained and evaluated concurrently with collective task training and evaluation.

(3) **Gather the training references and materials.**  The SM task summary list all references which can assist the trainer in preparing for the training of that task.

(4) **Determine risk assessment and identify safety concerns.**  Analyze the risk involved in training a specific task under the current conditions at the time of scheduled training.  Ensure that your training preparation takes into account those cautions, warnings, and dangers associated with each task.

(5) **Train each soldier.**  Show the soldier how the task is done to standard and explain step-by-step how to do the task.  Give each soldier one chance to do the task step-by-step.

(6) **Emphasize training at mission-oriented protection posture (MOPP) level 4.** Soldiers may have difficulty performing even the very simple tasks in a nuclear/chemical environment.  The combat effectiveness of the soldier and the unit can degrade quickly when trying to perform in MOPP4.  Practice is the best way to improve and ensure performance.

(7) **Check each soldier.**  Evaluate how well each soldier performs the tasks in this manual.  Conduct these evaluations during individual training sessions or while evaluating soldier proficiency during the conduct of unit collective tasks.  Use the information in the MTP as a guide to determine how often to train the soldier in each task to ensure that soldiers sustain proficiency.

(8) **Record the results.**  The leader book referred to in FM 25-101, Appendix B, is used to record task performance and gives the leader total flexibility on the method of recording training. The trainer may use DA Forms 5164-R (Hands-On Evaluation) and 5165-R (Field Expedient Squad Book) as part of the leader book.  The forms are optional and locally reproducible.  STP 21-24-SMCT contains a copy of the forms and instructions for their use.

(9) **Retrain and evaluate.**  Work with each soldier until he can perform the task to specific SM standards.

## 2-5.  EVALUATION GUIDE

An evaluation guide exists for each task summary in the SM.  Each evaluation guide contains one or more performance measures that identify what the trainer needs to observe to score a soldier's performance.  Each step is clearly identified by a P (pass) and F (fail), located under the result column on each evaluation guide.  Some tasks involve a process that the trainer must evaluate an "end product" resulting from doing the task.  The following are some general points about using the evaluation guide to evaluate soldiers.

(1)  Review the guide to become familiar with the information on which the soldier will be scored.

(2)  Ensure that the necessary safety equipment and clothing needed for proper performance of the job are on hand at the training site.

(3)  Prepare the test site according to the Conditions section of the task summary.  Some tasks contain special evaluation preparation instructions.  These instructions tell the trainer what modifications must be made to the job conditions to evaluate the task.  Reestablish the test site to the original requirements after evaluating each soldier to ensure that conditions are the same for each soldier.

(4)  Advise each soldier of the information in the Brief Soldier section of the task summary before evaluating.

(5)  Score each soldier according to the performance measures and Evaluation Guidance section in the task summary.

(6)  Record the date and task performance (GO or NO-GO) in the leader book.

## 2-6.  TRAINING TIPS FOR THE TRAINER

a.  **Prepare yourself.**

(1)  Get training guidance from your chain of command on when to train, which soldiers to train, availability of resources, and training site.

(2)  Get the training objective (tasks, conditions, and standards) from the task summary in this manual.

(3)  Ensure you can do the task.  Review the task summary and references in the References section.  Practice doing the task or, if necessary, have someone train you on the task.

(4)  Choose a training method.  Some tasks provide recommended training methods.

(5)  Prepare a training outline consisting of informal notes on what you want to cover during your training session.

(6)  Practice your training presentation.

b. **Prepare the resources.**

(1)  Obtain the required resources identified in the conditions statement for each task.

(2)  Gather equipment and ensure it is operational.

(3)  Coordinate the use of training aids and devices.

(4)  Prepare the training site according to the conditions statement and Evaluation Preparation section of the task summary, as appropriate.

c. **Prepare the soldiers.**

(1)  Tell the soldier what task to do and how well it must be done.  Refer to the standard statement and Evaluation Preparation section for each task, as appropriate.

(2)  Caution soldiers about safety, environment, and security.

(3)  Provide any necessary training on basic skills that soldiers must have before they can be trained on the task.

(4)  Pretest each soldier to determine who needs training in what areas by having the soldier perform the task.  Use DA Form 5164-R and the evaluation guidance in each task summary to make this determination.

d. **Train the soldiers who failed the pretest.**

(1)  Demonstrate how to do the task or the specific performance steps to those soldiers who could not perform to SM standards.  Have soldiers study the appropriate materials.

(2)  Have soldiers practice the task until they can perform it to SM standards.

(3)  Evaluate each soldier using the evaluation guide.

(4)  Provide feedback to those soldiers who fail to perform it to SM standards and have them continue to practice until they can perform to SM standards.

e. **Record results in the leader book.**

# 2-7.  MOS TRAINING PLAN

One of the key components of the TG is the MOS Training Plan (MTP).  The MTP has two parts to assist the commander in preparing a unit training plan which satisfies integration, cross-train, train-up, and sustainment training requirements for soldiers in this MOS.

(1)  Part One of the MTP shows the relationship of an MOS SL between duty position and critical tasks.  The critical tasks are grouped by task commonality into subject areas.

(a)  Section I list subject area numbers and titles used throughout the MTP.  The subject areas define the training requirements for each duty position within an MOS and relate duty positions to subject areas and cross-training and train-up/merger requirements.

- **Duty position column.**  Contains the MOS duty positions, by skill level, which have different training requirements.

- **Subject area column.**  Lists by subject area number, the subject areas in which the soldier must be proficient for that duty position.

- **Cross-train column.**  Lists the recommended duty position for which soldiers should be cross-trained.

- **Train-up/merger column.**  Lists the corresponding duty position for the next higher SL or MOS the soldier will merge into upon promotion.

(b)  Section II identifies the total training requirements in terms of subject areas listed in Section I for each duty position in an MOS.

(2)  Part Two lists by subject areas, the critical tasks to be trained in an MOS, task number, task title, location, sustainment training frequency, and training SL.

- **Subject area column.**  Lists the subject area number and title in the same order as in the MTP, Part One, Section I.

- **Task numbers column.**  Lists the task numbers for all tasks included in the subject area.

- **Task titles column.**  Lists the task title.

- **Training location column.**  Identifies the training location where the task is first trained to STP standards.  If the task is first trained to standard in the unit, the word "Unit" will be in this column.  If the task is first trained to standard in the training base, it will identify the resident course where the task was taught.  Figure 2-1 contains a list of training locations and their brevity codes.

| | |
|---|---|
| **AIT** | Advanced Individual Training |
| **BNCOC** | Basic Noncommissioned Officer Course |
| **UNIT** | Trained in the Unit |

*Figure 2-1.  Training locations.*

- **Sustainment training frequency column.**  Indicates the recommended frequency at which tasks should be trained to ensure soldier maintains task proficiency.  Figure 2-2 identifies the frequency codes to use in this column.

| | |
|---|---|
| **AN** | Annually |
| **SA** | Semiannually |

*Figure 2-2.  Sustainment training frequency codes.*

- **Sustainment training SL column.**  Lists the SL of the MOS for which soldiers must receive sustainment training to ensure they maintain proficiency to SM standards.

- **Drill/ARTEP column.**  Lists drill and ARTEP tasks by number that the individual critical task supports.  This establishes the crosswalk between individual and collective training.

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**MOS TRAINING PLAN**
**MOS 25M**
**PART ONE:  SUBJECT AREAS AND DUTY POSITIONS**

**SECTION 1.  SUBJECT AREA CODES**

| Skill Level 1 | Skill Level 2 | Skill Level 3 |
|---|---|---|
| 1.  Equipment Operation<br>2.  Illustration/Multimedia | 3.  Facility Administrator | 4.  Facility Manager |

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**MOS TRAINING PLAN**
**MOS 25M**
**PART ONE**

**SECTION II.  DUTY POSITION TRAINING REQUIREMENTS**

| SL | DUTY POSITION | SUBJECT AREAS | CROSS-TRAIN | TRAIN-UP MERGER |
|---|---|---|---|---|
| SL1 | Multimedia Illustrator | 1-3 | NA | 25M2 Multimedia Illustrator |
| SL2 | Multimedia Illustrator | 1-3 | NA | 25M3 Multimedia Illustrator |
| SL3 | Multimedia Illustrator | 1-4 | NA | 25Z4 Visual Information Operations Chief |

| PART TWO.  CRITICAL TASKS | | | | | |
|---|---|---|---|---|---|
| **DUTY POSITION TASKS** | | | **Skill Levels 1-3 MOS 25M** | | |
| **Subject Area** | **Task Number** | **Title** | **Training Location** | **Sust Tng Freq** | **Sust Tng SL** |
| 1. Equipment Operation | 113-578-4002 | RECEIVE A DIGITAL IMAGE VIA SATELLITE IN SUPPORT OF A COMBAT MISSION | AIT | AN | 1-3 |
| | 113-578-4003 | RECEIVE A DIGITAL IMAGE VIA LANDLINE IN SUPPORT OF A COMBAT MISSION | AIT | AN | 1-3 |
| | 113-578-4004 | PROCESS A DIGITAL IMAGE IN SUPPORT OF A COMBAT MISSION | AIT | AN | 1-3 |
| | 113-626-2001 | INITIALIZE STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS) IN A TACTICAL ENVIRONMENT | AIT | AN | 1-3 |
| | 113-626-2002 | PERFORM PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) ON STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS) | AIT | AN | 1-3 |
| 2. Illustration/ Multimedia | 113-578-6015 | WRITE A VISUAL INFORMATION CAPTION | AIT | AN | 1-3 |
| | 113-579-1037 | PREPARE CHARTS | AIT | AN | 1-3 |
| | 113-579-1054 | CONSTRUCT A TECHNICAL DRAWING | AIT | AN | 1-3 |
| | 113-579-4015 | CREATE AN ILLUSTRATION | AIT | AN | 1-3 |
| | 113-579-5060 | PREPARE TACTICAL GRAPHIC OVERLAYS | AIT | AN | 1-3 |
| | 113-579-5065 | PREPARE ILLUSTRATIONS FOR DISPLAY | AIT | AN | 1-3 |
| | 113-579-8005 | DESIGN AN ELECTRONIC PAGE LAYOUT | AIT | AN | 1-3 |
| | 113-579-8006 | CREATE AN ELECTRONIC ILLUSTRATION | AIT | AN | 1-3 |
| | 113-579-8007 | CREATE AN ELECTRONIC MULTIMEDIA VISUAL | AIT | AN | 1-3 |
| 3. Facility Administrator | 113-578-4005 | TRANSMIT A  DIGITAL IMAGE VIA SATELLITE IN SUPPORT OF A COMBAT MISSION | AIT | AN | 1-3 |
| | 113-578-4006 | TRANSMIT  A DIGITAL IMAGE VIA LANDLINE IN SUPPORT OF A COMBAT MISSION | BNCOC | SA | 2-3 |
| | 113-578-4007 | PERFORM UPDATE OF A DIGITAL ARCHIVE | UNIT | AN | 2-3 |
| | 113-578-4008 | PREPARE COLOR SEPARATIONS FOR REPRODUCTION | BNCOC | AN | 2-3 |
| | 113-578-6017 | MAINTAIN A TECHNICAL REFERENCE LIBRARY | UNIT | AN | 2-3 |
| | 113-579-6003 | ASSIGN GRAPHICS PROJECTS | BNCOC | AN | 2-3 |
| | 113-579-6005 | INVENTORY GRAPHICS SUPPLIES AND EQUIPMENT | UNIT | AN | 2-3 |
| | 113-579-6006 | ESTABLISH DRAWING RESEARCH FILE (MORGUE FILE) | BNCOC | AN | 2-3 |
| | 113-579-7002 | EVALUATE A GRAPHICS PROJECT | BNCOC | AN | 2-3 |
| 3. Facility Administrator (cont) | 113-579-8008 | COMBINE VISUALS FOR A MULTIMEDIA PRESENTATION | BNCOC | AN | 2-3 |

| PART TWO.  CRITICAL TASKS | | | | | |
|---|---|---|---|---|---|
| **DUTY POSITION TASKS** | | | **Skill Levels 1-3 MOS 25M** | | |
| **Subject Area** | **Task Number** | **Title** | **Training Location** | **Sust Tng Freq** | **Sust Tng SL** |
| 4. Facility Manager | 113-579-7003 | WRITE A GRAPHICS FACILITY STANDING OPERATING PROCEDURE (SOP) | BNCOC | AN | 3 |
| | 113-579-8009 | ESTABLISH A WEBSITE | BNCOC | AN | 3 |
| | 113-579-8010 | MAINTAIN A WEBSITE | BNCOC | AN | 3 |
| | 113-579-8011 | ESTABLISH A DIGITAL ARCHIVE FILE | BNCOC | AN | 3 |
| | 113-626-2003 | PREPARE STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS) FOR TACTICAL DEPLOYMENT | BNCOC | AN | 3 |

# CHAPTER 3

# MOS/SKILL LEVEL TASKS

## Skill Level 1
## Subject Area 1:  Equipment Operation

**RECEIVE A DIGITAL IMAGE VIA SATELLITE IN SUPPORT OF A COMBAT MISSION**
**113-578-4002**

**Conditions:**  In a tactical or garrison environment, given a sending station; image in JPEG format; computer with modem; graphic imaging software, such as Adobe PhotoShop and communication software, such as Timbuktu or White Night that is compatible with sender's communication software; Magnaphone MX-2020P portable satellite or equivalent; compass; azimuth and elevation angle charts; hardware and software manuals; telex and telephone country codes; a telephone; all cables and connectors required by hardware manufacturer; and a compatible power source.

**Standards:**  The standards are met when an uncorrupted copy of the image file is saved in a JPEG format.

| Performance Measures | Results | |
|---|---|---|
| 1.  Assemble magnaphone. | P | F |
|    a.  Assemble antenna following manufacturer's instructions. | P | F |
|    b.  Choose correct azimuth and elevation angle. | P | F |
|    c.  Power up magnaphone.  Terminal responds with a menu when system is warmed up. | P | F |
|    d.  Choose proper land earth station for satellite being used. | P | F |
|    e.  Ensure strong signal with signal strength meter. | P | F |
|    f.  Call international operator to test signal strength (11#). | P | F |
| 2.  Connect computer to the magnaphone using computer's modem and cables. | P | F |
| 3.  Open Timbuktu/remote communication software. | P | F |
| 4.  Set proper baud rate and script settings. | P | F |
|    a.  Go to communication settings. | P | F |
|    b.  Set proper baud rate to match customers' settings (9600 bits per second (bps) recommended for satellite transmission). | P | F |
|    c.  Click on CONNECT VIA button. | P | F |
|    d.  Set proper script for satellite transmission. | P | F |
| 5.  Answer incoming call.  Click on the EXCHANGE FILES button. | P | F |
| 6.  When transfer of files is complete, click on DONE button. | P | F |
| 7.  Click on HANG UP button in the CONNECTED TO menu. | P | F |

| Performance Measures | Results | |
|---|---|---|
| 8. Open file in PhotoShop to check quality of the file. | P | F |
| 9. If file is corrupted, notify sender. | P | F |
| 10. Repeat the process if necessary. | P | F |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                                **Related**
                                                       Appendix A (25M)

## RECEIVE A DIGITAL IMAGE VIA LANDLINE IN SUPPORT OF A COMBAT MISSION
## 113-578-4003

**Conditions:**  In a tactical or garrison environment, given a sending station; computer with modem; graphic imaging software, such as Adobe PhotoShop and communication software, such as Timbuktu or White Night that is compatible with sender's communication software; hardware and software manuals; telex and telephone country codes; a telephone, class A access to local telephone company; all cables and connectors required by hardware manufacturer; and a compatible power source.

**Standards:**  The standards are met when an uncorrupted copy of the image file is saved in a JPEG format.

| Performance Measures | Results | |
|---|---|---|
| 1. Connect computer to local telephone line using computer's modem and cables. | P | F |
| 2. Open Timbuktu/remote communication software. | P | F |
| 3. Set proper baud rate and script settings. | P | F |
| 4. Answer incoming call. | P | F |
| 5. When transfer of files is completed, click on DONE button. | P | F |
| 6. Click on HANG UP button in the CONNECTED TO menu. | P | F |
| 7. Open file in PhotoShop to check quality of the file. | P | F |
| 8. If file is corrupted, notify sender. | P | F |
| 9. Repeat the process if necessary. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
**Required**                                    **Related**
                                                Appendix A (25M)

## PROCESS A DIGITAL IMAGE IN SUPPORT OF A COMBAT MISSION
## 113-578-4004

**Conditions:**  In a tactical or garrison environment, given a computer; all connecting cables; Kodak driver for Adobe PhotoShop or equivalent installed on computer; continuous tone printer, such as Kodak XL 7720 digital; images from a digital camera, such as Kodak DCS 200; and a DA Form 3903-R requesting images either be processed and stored on a diskette or printed.

**Standards:**  The standards are met when the finished product is saved in the requested format or printed out to the requester's satisfaction.

| Performance Measures | Results | |
|---|---|---|
| 1. Connect camera to computer system. | P | F |
|    a. Ensure that the computer and camera are turned off before connecting them. | P | F |
|    b. Connect per manufacturer's directions. | P | F |
|    c. Turn the camera on. | P | F |
|    d. Wake up the system by lightly pressing the SHUTTER RELEASE button. | P | F |
|    e. Turn on the computer. | P | F |
|    f. Launch Adobe PhotoShop or equivalent graphics package. | P | F |
|    g. Pull down the PhotoShop file menu and choose the camera from the ACQUIRED submenu and wait until the dialogue box appears. | P | F |
| 2. Acquire an image. | P | F |
|    a. Click on the ACQUIRE button or double click on the thumbnail image (not the preview image). | P | F |
|    b. Wait until the camera dialogue box closes and the image appears in the PhotoShop window. | P | F |
|    c. Edit the image as necessary. | P | F |
| 3. Save the image. | P | F |
|    a. Save the image to diskette, if requested.  Archive the image if appropriate. | P | F |
|    b. Save the image to a temporary directory if printing. | P | F |
| 4. Printing the image. | P | F |
|    a. Print image. | P | F |
|    b. Compare output with the image on the monitor. | P | F |
|    c. Make color corrections as necessary.  Depending on system, adjustments may be made on the printer or within the graphic package. | P | F |
| 5. Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                      **Related**
                                        Appendix A (25M)

**INITIALIZE STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS) IN A TACTICAL ENVIRONMENT**
**113-626-2001**

**Conditions:**  Given a SPEPS, a generator or local power source, a portable satellite with International Maritime Satellite (INMARSAT) terminal or landline, a graphic system, to include but not limited to an automated data processor with CD-ROM, video monitor, flatbed scanner, 35mm slide scanner, modem, communications interface, color printer, writable compact disk, zip drive or Bernoulli, selected software, accessories TC 11-6, TM 9-2320-280-10, TM 9-6115-642-10, TM 9-6115-660-13&P, graphic shop's SOP, and all reference materials related to each piece of equipment, such as manufacturers' manuals.

**Standards:**  The standards are met when the SPEPS unit is fully operational.

| Performance Measures | Results | |
|---|---|---|
| 1. Identify power source. | P | F |
|    a. Local power source 110 VAC. | P | F |
|    b. Generator. | P | F |
| 2. Install grounding rod and wire for both generator and S-250 shelter as stated in TC 11-6. | P | F |
| 3. Run power cable from generator to S-250 shelter. | P | F |
| 4. Perform checks on power setup and circuit board before turning on main power switch to the S-250 shelter. | P | F |
| 5. Set up satellite IAW manufacturer's manual. | P | F |
| 6. Connect phone lines, landlines, and satellite to modem. | P | F |
| 7. Turn power to S-250 shelter on. | P | F |
|    a. In cold weather, turn on heater to dry out any moisture in equipment and circuits. | P | F |
|    b. In hot or humid weather, turn on air-conditioning unit to cool down and reduce the amount of moisture in the air. | P | F |
| 8. Turn on power to the equipment and conduct an operations check. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
| Required | Related |
|---|---|
| Manufacturers' Manuals | Appendix A (25M) |
| TC 11-6 | |
| TM 9-2320-280-10 | |
| TM 9-6115-642-10 | |
| TM 9-6115-660-13&P | |

## PERFORM PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) ON STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS)
### 113-626-2002

**Conditions:**  In a tactical or garrison environment, given a SPEPS, to include but not limited to an automated data processor with CD-ROM, video monitor, flatbed scanner, 35mm slide scanner, modem, communications interface, color printer, writable compact disk, zip drive or Bernoulli, selected software, and accessories; DA Pam 738-750, TC 11-6, TM 9-2320-280-10, TM 9-6115-642-10, TM 9-6115-660-13&P, and all reference materials related to each piece of equipment, such as manufacturers' manuals; graphic shop's SOP, a soft cloth, mild cleaner, vacuum, and DA Form 2404.

**Standards:**  The standards are met when PMCS is done in compliance with appropriate manuals and equipment is operational.  Document equipment that is found to be non-operational on a DA Form 2404 and turn in for repair.

| Performance Measures | Results | |
|---|---|---|
| 1. Ensure electronic equipment is properly grounded. | P | F |
| 2. Visually inspect all equipment for damage or missing parts. | P | F |
| 3. Inspect the surge suppressor for serviceability. | P | F |
| 4. Plug all electronic equipment into the surge suppressor to protect against power surges and spikes. | P | F |
|     a. Ensure power switch is in the OFF position before plugging in equipment. | P | F |
|     b. Always turn off electrical equipment before unplugging it. | P | F |
| 5. Clean equipment as needed. | P | F |
|     a. Wipe equipment free of dust and dirt using a soft cloth and mild cleaner. | P | F |
|     b. Vacuum dust from air vents as needed. | P | F |
| 6. Inspect cables for cracks or loose wires; allow enough room for cables to hang or lay without bending or crimping. | P | F |
| 7. Conduct periodic software maintenance. | P | F |
|     a. Organize files into folders.  Do not allow files to float around in the system folders, main directory, and root directory. | P | F |
|     b. Optimize disk space by periodically defragging the hard drive. | P | F |
|     c. Run a background diagnostic program to identify potential problems. | P | F |
| 8. Perform an operational check by editing and processing digital imagery. | P | F |
| 9. Troubleshoot any problems by referring to manufacturers' manuals first.  If problems continue, contact a representative of the product for further assistance. | P | F |
| 10. Prepare DA Form 2404 on all equipment. | P | F |
|     a. Annotate all deficiencies and parts required and turn into maintenance for repairs. | P | F |
|     b. If no deficiencies are found, initial and date the form. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| Required | Related |
|---|---|
| DA Pam 738-750 | Appendix A (25M) |
| Manufacturers' Manuals | |
| TC 11-6 | |
| TM 9-2320-280-10 | |
| TM 9-6115-642-10 | |
| TM 9-6115-660-13&P | |

# Subject Area 2:  Illustration/Multimedia

**WRITE A VISUAL INFORMATION CAPTION**
**113-578-6015**

**Conditions:**  In a tactical or garrison environment, given a blank DD Form 2537, pen or marker, negative preservers and negatives, photo prints or illustrations, Message 0206010833Z Dec 95, and DA Pam 25-91.

**Standards:**  The standards are met when the visual information identification number (VIRIN) is legibly written on the border area of the negative/print/illustrations in the sequence prescribed. The written caption must contain who, what, where, when, why, and/or how, so that the event/illustration is fully explained.

| Performance Measures | Results | |
|---|---|---|
| 1.  Review DD Form 2537. | P | F |
|     a. Project/exercise/event title. | P | F |
|     b. VIRIN. | P | F |
|     c. Date recorded. | P | F |
|     d. Camera operator. | P | F |
|     e. Media/film type. | P | F |
|      f. Tape/roll/disc number. | P | F |
|     g. Classification of media. | P | F |
|     h. Classification of caption. | P | F |
|      i. Classification authority. | P | F |
| 2. Synopsis/cover story. | P | F |
|     a. Location. | P | F |
|     b. Description of project/activity/exercise/event. | P | F |
| 3. Individual imagery descriptions. | P | F |
|     a. Camera number. | P | F |
|     b. Time code (HR:MIN:SEC/negative/slide number). | P | F |
|     c. Description (who, what, when, where, how, and why). | P | F |
|     d. Classification of scene/image. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any steps, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| Required | Related |
|---|---|
| DA Pam 25-91 | |
| MSG 0206010833Z Dec 95 | |

**PREPARE CHARTS**
**113-579-1037**

**Conditions:**  Given DA Form 3903-R with chart requirements; markers or a lettering device (typewriter, Leroy lettering instrument, Kroy, computer, or the equivalent); flat surface large enough to support paper, such as a Field Drafting Kit or drawing board; drawing tools, such as a T-square or straightedge; protractor; compass; ruler; pencils (standard and nonreproducible blue); pens; ink; masking tape; erasers (steel or vinyl); acetate (if requested on DA Form 3903-R); paper, such as poster board or flip chart; tape (Chartpak), and/or toning material.

**Standards:**  The standards are met when the chart presents the data in a manner acceptable to the requester.

**Performance Steps**

1.  General construction.
    a. The title is the first element considered.  Titles should be centered at the top of the chart and in capital letters.  It should be clear and concise.  Under no circumstance should the clarity of the title be sacrificed for brevity.  The phrase or phrases of the title should not be broken at the end of each line.  It should be laid out so that each line represents a single thought.
    b. The organization of the body of the table is as important as the layout of the title.  Poor planning leads to confusion or misrepresentation of data.  The arrangement must present the data simply and clearly.  Data must be arranged alphabetically, geographically, chronologically, or in some other logical order, depending upon the intended use of the table and the data presented.
      (1)  Column is the term for vertical listings.
      (2)  Row is the term for horizontal listings.
      (3)  Boxhead contains the captions (titles) of the columns.
      (4)  Captions must clearly describe the data in the columns.
    c. Footnotes are used to clarify items in the table that require further explanation.  A reader's attention is usually directed to a footnote by an asterisk (*) or some other symbol.  Never use one symbol to identify different footnotes.  If a footnote applies to more than one entry, however, place its symbol after each entry to which the footnote applies.

2.  Types of charts.
    a. Bar chart.
      (1)  Determine the reference frame.  If the values are both positive numbers, the entire graph can be constructed in quadrant I.  See Figure 3-1.
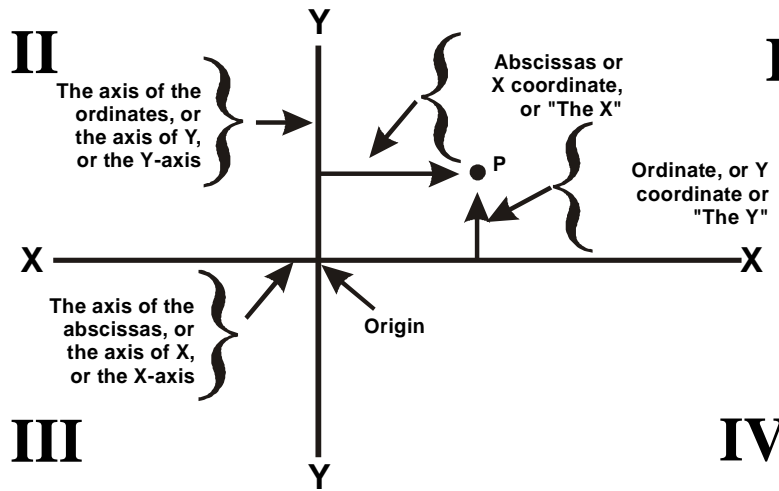
**Performance Steps**



*Figure 3-1.  Reference frame with x-axis and y-axis.*

(2) Determine on which axis to plot the different sets of values.  As a general rule, plot constant values along the x-axis and the dependent values along the y-axis.  In Figure 3-2, the years are constant value and the cost values are the dependent values.
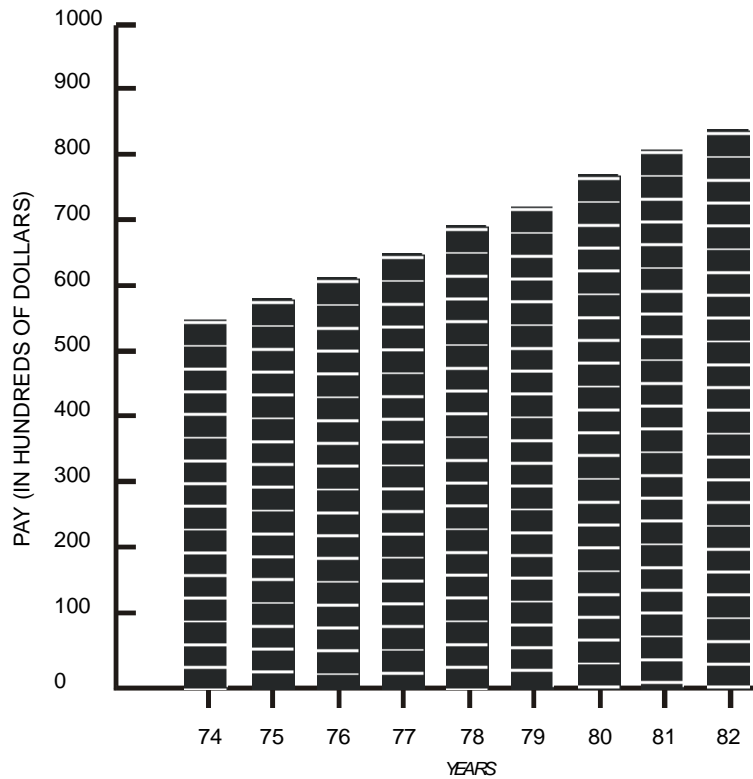


*Figure 3-2.  Typical bar chart.*

**Performance Steps**

        (3) Select the paper size and scale of the bar graph.  When laying out a bar graph, try to fill the entire page proportionately.  Remember to allow for margins around the graph for text and explanatory notes.

        (4) Layout the x-axis.  The intervals between the bars and spaces are drawn equally except for the front and back spaces.  These two spaces are drawn half the width of the bar.  To do this correctly, determine the total number of spaces needed, number of bars plus number of whole spaces.  The scale is placed at a convenient angle that covers the number of spaces needed as shown in Figure 3-2.  The zero of the scale is placed at point A and the last point on line AC falls on line BC, with line BC being any length.  Using a scale, mark off the number of equally divided spaces you need.  Place a half bar width space before the first bar.  If there is too many constant values to give a full bar's width space between bars, spaces may be reduced to no less than half of a bar's width, making the beginning and ending space a quarter of a bar's width.

        (5) Layout the y-axis.  Determine the largest value that will be shown.  Determine what scale to use, keeping in mind that the increments should not be so close or so great that the information is lost.

        (6) Plot the given data.  Bar charts are not intended to be precise.  They are comparisons of approximates.  If the chart is to be perfectly accurate, label the top of each bar with its value.  A horizontal line is never drawn through a bar.

        (7) Finish the chart.

           (a) Ink in all the lines on the chart.  Use thicker lines for the outside box.  Use thinner lines for the scales that run horizontally across the chart.

           (b) Pattern tapes, opaque tapes, or zip-tone patterns, if available, can be used for the bars.  Pattern tapes are made in regular and irregular arrangements of design.  Some are in the pattern of hatch marks or repeated designs.  Pattern tapes also come in many colors.  Opaque tapes are solid rolls of color.  Zip-tone is a transparent adhesive sheet.  The sheet is covered with different patterns, dots, lines, or solid colors.  You apply this sheet to areas of a chart, creating different tonal effects.

           (c) Add the lettering and figures, centering each in its appropriate place.

    b. Pie charts.

        (1) Determine what percent of the whole each component represents.  Add up the total units.  The total units equal 100 percent.  Divide each separate unit by total units.  You will get a decimal for an answer.  Multiply the answer by 100 to get its percentage of the whole.

**Performance Steps**

    (2) Determine how many degrees of the circle will be needed to represent the item. There are 360 degrees in a circle, therefore 3.6 degrees equals 1 percent. Multiply each percentage by 3.6 to determine the number of degrees needed for that item. See Figure 3-3
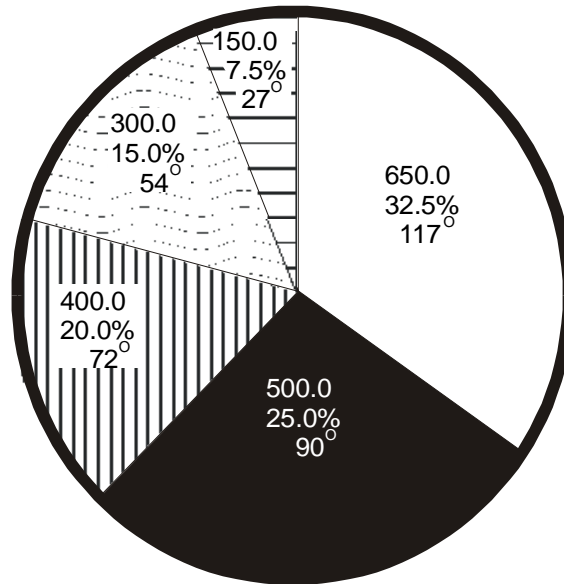


*Figure 3-3. Pie chart shows how to determine what percent of the whole each component represents.*

    (3) Start constructing the actual pie chart. Select the paper size and circle size. When doing the layout, fill the paper proportionally, allowing for text, legends, and other information. If more than one pie chart is used on the same presentation, make them the same size.

**Performance Steps**

      (a) Draw a circle with a compass. Use a protractor to lay out each segment. The largest segment should start at 12 o'clock and go clockwise from largest to smallest. See Figure 3-4.
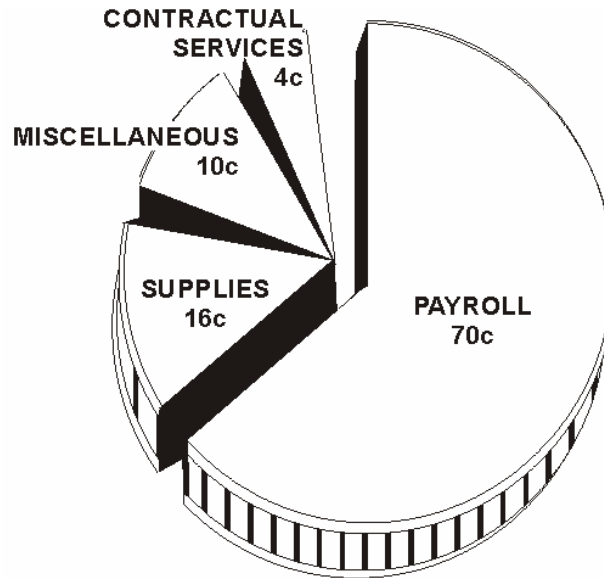


***Figure 3-4. Example of the layout of the segments of a pie chart beginning with the largest to the smallest.***

      (b) Lay out the text on the chart. The lettering on a pie chart should indicate the percentage and how it relates to each sector. Do not indicate the number of degrees of a sector. If a sector is too small to enclose the lettering, place the lettering close enough to the sector so that the reader can read it without taking his eyes off of the circle. When it is not possible to letter directly on the sectors, place a legend in the lower right hand corner.

   (4) Finish the chart.

      (a) Verify the data and your calculations.

      (b) Ink in all the lines on the chart. Crosshatch or color the individual sectors.

      (c) Ink in or use Chartpak for the text.

 c. Organization charts.

   (1) Organization charts should be limited to be effective. The chart should show lines of authority, responsibility, span of control, and functional authority. The military uses three basic types of organizational charts: structural, functional, and positional, as well as combinations of the three types.

    (a) The structural organizational chart is the most common and simplified method of presenting the organizational plan. It shows the basic control relationships and reporting responsibilities of a unit. The textual information it contains is minimum. This chart can be devised for any organization, regardless of size. See Figures 3-5 and 3-6.
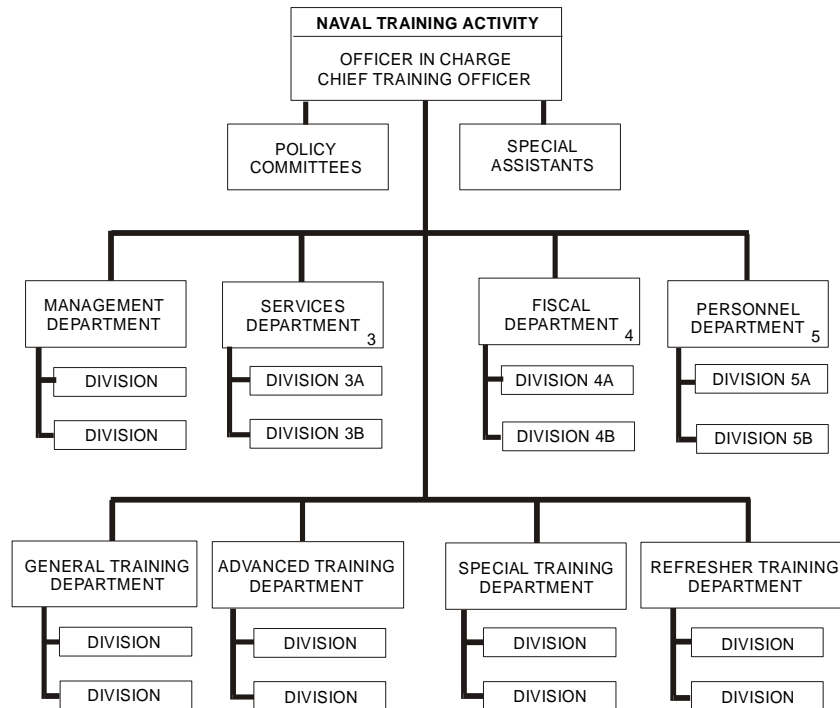
**Performance Steps**

```
                        NAVAL TRAINING ACTIVITY
                         OFFICER IN CHARGE
                        CHIEF TRAINING OFFICER

            POLICY                          SPECIAL
          COMMITTEES                       ASSISTANTS

   MANAGEMENT      SERVICES           FISCAL          PERSONNEL
   DEPARTMENT     DEPARTMENT 3      DEPARTMENT 4     DEPARTMENT 5

     DIVISION      DIVISION 3A        DIVISION 4A      DIVISION 5A

     DIVISION      DIVISION 3B        DIVISION 4B      DIVISION 5B

  GENERAL TRAINING  ADVANCED TRAINING  SPECIAL TRAINING  REFRESHER TRAINING
    DEPARTMENT        DEPARTMENT         DEPARTMENT         DEPARTMENT

     DIVISION          DIVISION           DIVISION           DIVISION

     DIVISION          DIVISION           DIVISION           DIVISION
```

*Figure 3-5.  Large structural organizational chart.*

```
                      ENGINEER
                    CONSTRUCTION
                      SUPPORT
                      COMPANY

  COMPANY      EQUIPMENT   MAINTENANCE   ASPHALT      QUARRY
HEADQUARTERS    PLATOON      PLATOON     PLATOON      PLATOON

              PLATOON       ORDINANCE      ENGINEER
            HEADQUARTERS   MAINTENANCE   MAINTENANCE
                             SECTION       SECTION
```
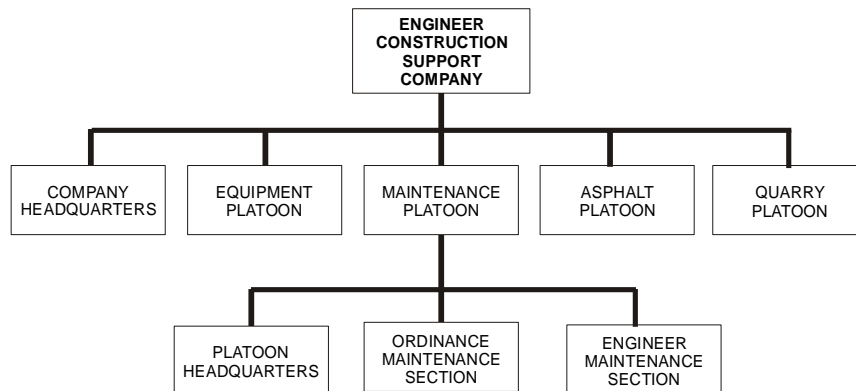
*Figure 3-6.  Small structural organizational chart.*

(b)  A functional organizational chart is used to show the role of the components of an organization and what they represent.  The blocks of the chart contain statements of what each component does within the organization.  See Figure 3-7.
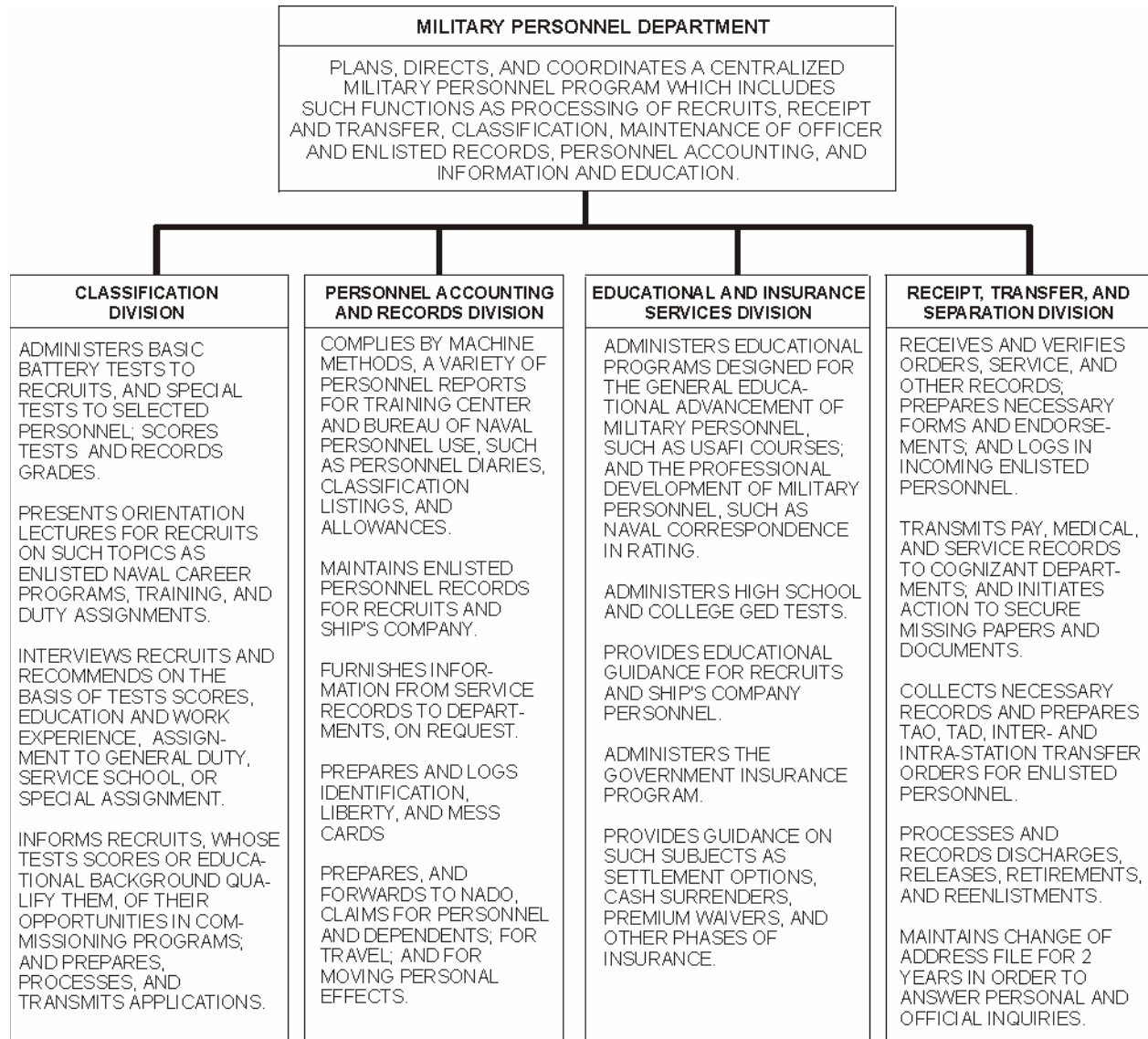
**Performance Steps**

| MILITARY PERSONNEL DEPARTMENT | | | |
|---|---|---|---|
| PLANS, DIRECTS, AND COORDINATES A CENTRALIZED MILITARY PERSONNEL PROGRAM WHICH INCLUDES SUCH FUNCTIONS AS PROCESSING OF RECRUITS, RECEIPT AND TRANSFER, CLASSIFICATION, MAINTENANCE OF OFFICER AND ENLISTED RECORDS, PERSONNEL ACCOUNTING, AND INFORMATION AND EDUCATION. | | | |

| CLASSIFICATION DIVISION | PERSONNEL ACCOUNTING AND RECORDS DIVISION | EDUCATIONAL AND INSURANCE SERVICES DIVISION | RECEIPT, TRANSFER, AND SEPARATION DIVISION |
|---|---|---|---|
| ADMINISTERS BASIC BATTERY TESTS TO RECRUITS, AND SPECIAL TESTS TO SELECTED PERSONNEL; SCORES TESTS AND RECORDS GRADES.<br><br>PRESENTS ORIENTATION LECTURES FOR RECRUITS ON SUCH TOPICS AS ENLISTED NAVAL CAREER PROGRAMS, TRAINING, AND DUTY ASSIGNMENTS.<br><br>INTERVIEWS RECRUITS AND RECOMMENDS ON THE BASIS OF TESTS SCORES, EDUCATION AND WORK EXPERIENCE, ASSIGN-MENT TO GENERAL DUTY, SERVICE SCHOOL, OR SPECIAL ASSIGNMENT.<br><br>INFORMS RECRUITS, WHOSE TESTS SCORES OR EDUCA-TIONAL BACKGROUND QUA-LIFY THEM, OF THEIR OPPORTUNITIES IN COM-MISSIONING PROGRAMS; AND PREPARES, PROCESSES, AND TRANSMITS APPLICATIONS. | COMPLIES BY MACHINE METHODS, A VARIETY OF PERSONNEL REPORTS FOR TRAINING CENTER AND BUREAU OF NAVAL PERSONNEL USE, SUCH AS PERSONNEL DIARIES, CLASSIFICATION LISTINGS, AND ALLOWANCES.<br><br>MAINTAINS ENLISTED PERSONNEL RECORDS FOR RECRUITS AND SHIP'S COMPANY.<br><br>FURNISHES INFOR-MATION FROM SERVICE RECORDS TO DEPART-MENTS, ON REQUEST.<br><br>PREPARES AND LOGS IDENTIFICATION, LIBERTY, AND MESS CARDS<br><br>PREPARES, AND FORWARDS TO NADO, CLAIMS FOR PERSONNEL AND DEPENDENTS; FOR TRAVEL; AND FOR MOVING PERSONAL EFFECTS. | ADMINISTERS EDUCATIONAL PROGRAMS DESIGNED FOR THE GENERAL EDUCA-TIONAL ADVANCEMENT OF MILITARY PERSONNEL, SUCH AS USAFI COURSES; AND THE PROFESSIONAL DEVELOPMENT OF MILITARY PERSONNEL, SUCH AS NAVAL CORRESPONDENCE IN RATING.<br><br>ADMINISTERS HIGH SCHOOL AND COLLEGE GED TESTS.<br><br>PROVIDES EDUCATIONAL GUIDANCE FOR RECRUITS AND SHIP'S COMPANY PERSONNEL.<br><br>ADMINISTERS THE GOVERNMENT INSURANCE PROGRAM.<br><br>PROVIDES GUIDANCE ON SUCH SUBJECTS AS SETTLEMENT OPTIONS, CASH SURRENDERS, PREMIUM WAIVERS, AND OTHER PHASES OF INSURANCE. | RECEIVES AND VERIFIES ORDERS, SERVICE, AND OTHER RECORDS; PREPARES NECESSARY FORMS AND ENDORSE-MENTS; AND LOGS IN INCOMING ENLISTED PERSONNEL.<br><br>TRANSMITS PAY, MEDICAL, AND SERVICE RECORDS TO COGNIZANT DEPART-MENTS; AND INITIATES ACTION TO SECURE MISSING PAPERS AND DOCUMENTS.<br><br>COLLECTS NECESSARY RECORDS AND PREPARES TAO, TAD, INTER- AND INTRA-STATION TRANSFER ORDERS FOR ENLISTED PERSONNEL.<br><br>PROCESSES AND RECORDS DISCHARGES, RELEASES, RETIREMENTS, AND REENLISTMENTS.<br><br>MAINTAINS CHANGE OF ADDRESS FILE FOR 2 YEARS IN ORDER TO ANSWER PERSONAL AND OFFICIAL INQUIRIES. |

*Figure 3-7.  Functional organizational chart.*

(c) The position chart (or billet assignment) is used to show the various positions held by each individual within an organization.  These charts will show names, billets, and titles or grades of personnel as they fit into the organization; or show billet, titles, and grades without reference to names of individuals involved.  See Figure 3-8.
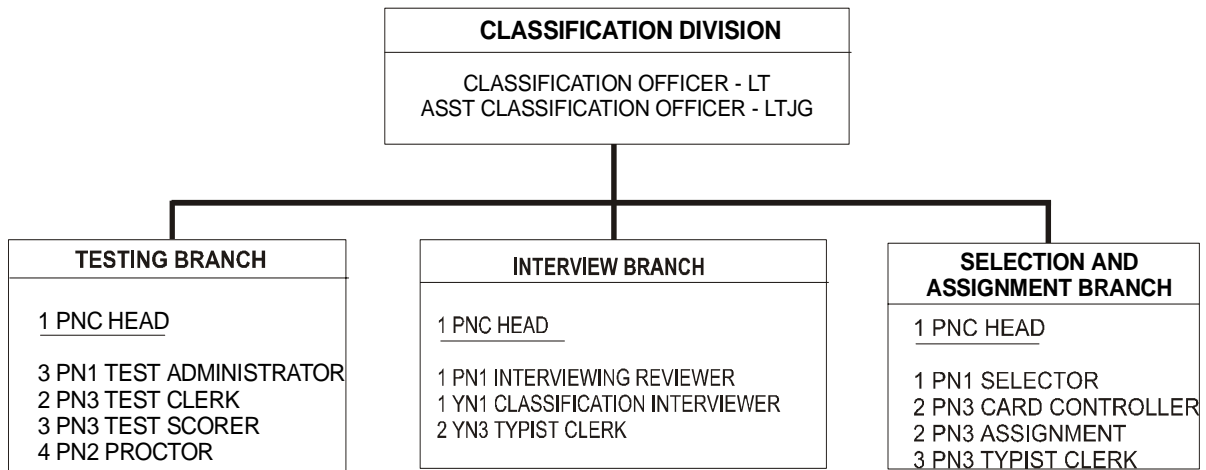
**Performance Steps**

```
                    ┌─────────────────────────────────┐
                    │      CLASSIFICATION DIVISION     │
                    ├─────────────────────────────────┤
                    │  CLASSIFICATION OFFICER - LT     │
                    │  ASST CLASSIFICATION OFFICER - LTJG │
                    └─────────────────────────────────┘
```

| TESTING BRANCH | INTERVIEW BRANCH | SELECTION AND ASSIGNMENT BRANCH |
|---|---|---|
| 1 PNC HEAD | 1 PNC HEAD | 1 PNC HEAD |
| 3 PN1 TEST ADMINISTRATOR | 1 PN1 INTERVIEWING REVIEWER | 1 PN1 SELECTOR |
| 2 PN3 TEST CLERK | 1 YN1 CLASSIFICATION INTERVIEWER | 2 PN3 CARD CONTROLLER |
| 3 PN3 TEST SCORER | 2 YN3 TYPIST CLERK | 2 PN3 ASSIGNMENT |
| 4 PN2 PROCTOR | | 3 PN3 TYPIST CLERK |

*Figure 3-8.  Position chart.*

(2) In selecting what type of chart you should develop, determine what information the chart needs to convey and then determine the simplest format to express that information.  You may prefer to combine all three of the basic types into one chart if the organization is small and simple.  If too much information is presented, the chart will be too difficult to read and may be confusing.

(3) An organizational chart should conform to a distinct format.  The arrangement of a chart should contain five main points:  simplicity, clarity, completeness, symmetry, and unity.

 (a) Simplify an organization chart by eliminating the confusing or complicating elements.  Do not simplify just for the sake of making it easier to construct.

 (b) Clarity is related to simplicity.  A chart with only a limited number of organizational component blocks joined by a small number of lines can be simple.  Lines should never cross.  Blocks must be labeled and titles not omitted.  Figures 3-9 and 3-10 illustrate good examples of organizational charts and contain other suggestions to simplify the chart layouts.

**Performance Steps**
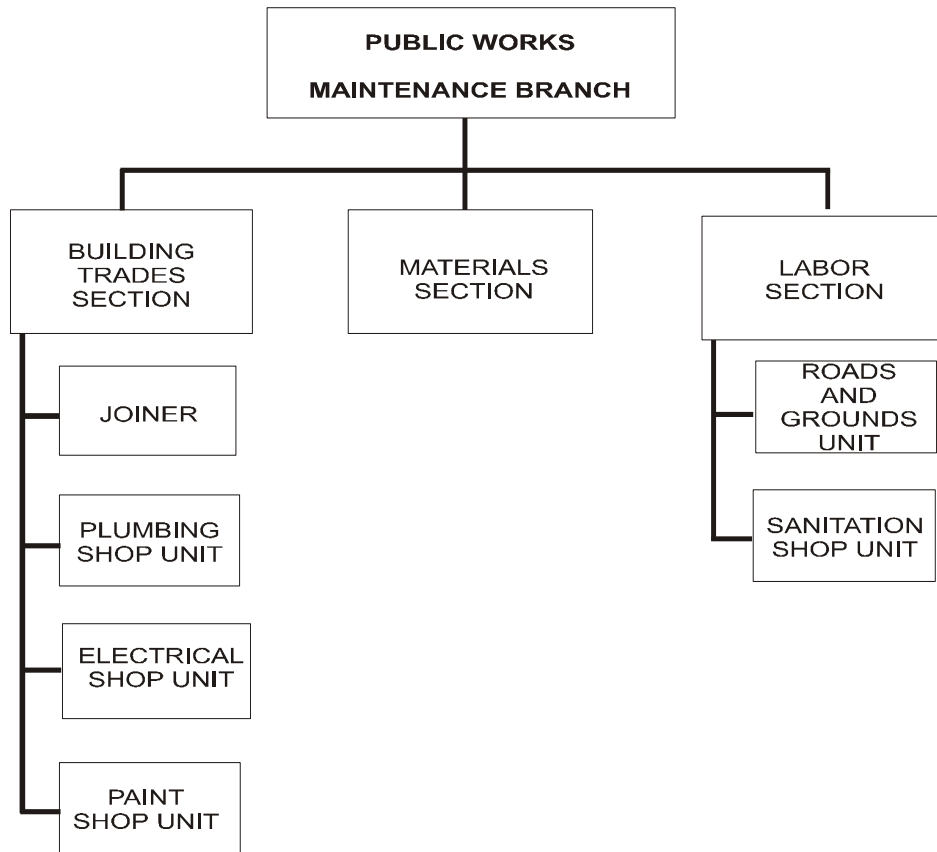


*Figure 3-9. Organizational chart with a limited number of
organizational component blocks.*
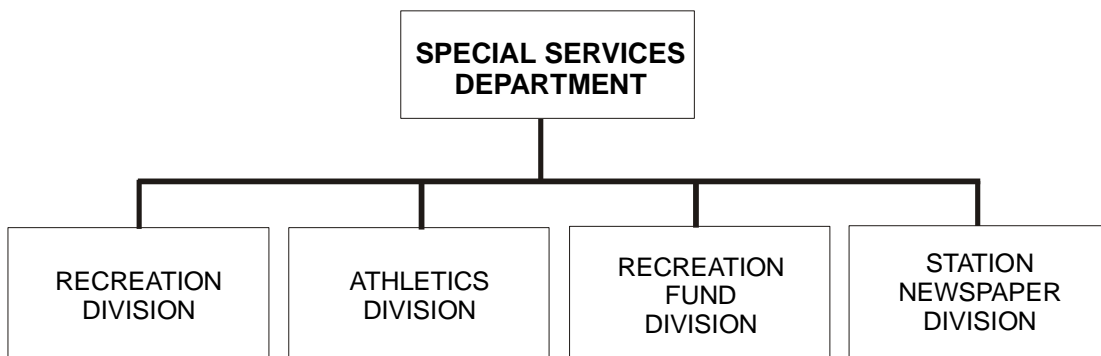


*Figure 3-10. A simple organizational chart layout.*

(c) Unity means each component is interrelated to the other components in a
chart. This is done by a connecting line or through other organizational
components. No branch section, unit, or staff element can exist by itself,
unconnected to the organization. Each element must be clearly subordinate
to command authority.

**Performance Steps**

      (4) An organization chart intended for use by only local activities may be prepared on any size paper.  However, if the chart is to be reproduced, prepare it on an 8 1/2 x 11 sheet of paper.  A chart to be reproduced by photographic means should be prepared according to the print shop's requirements.

        (a) Lettering may be produced by typing, Leroy, Chartpak, or any means available.

        (b) Layout lines are drawn with nonreproducible blue pencil.  When the layout is finalized, retrace the lines with ink or tape.  Line weights may the same throughout, but for easier reading and a better looking chart, use heavier line weight for authority blocks.

        (c) Block sizes may vary, but in a structural chart, the top block is the largest with the other blocks decreasing in size at each lower level.  In order to achieve balance and clarity in structural charts and other types of organizational charts, when suitable, make the blocks proportional in size.  This is a general rule and need not apply to other types of organization charts.

        (d) When drawing a functional chart, you must allow more space for the functional statements than would be available under this rule.  Here the block size for the lower echelon may have to be increased when drawing position charts.

      (5) An organization chart uses the following line convention types.  See Figure 3-11.



**Existing Full-Time Subdivision**

**Existing Full-Time Subdivisions to be Created**

**Full-Time Subdivisions to be Abolished**

**Inactive Command Components (Functions Performed by Another Activity)**
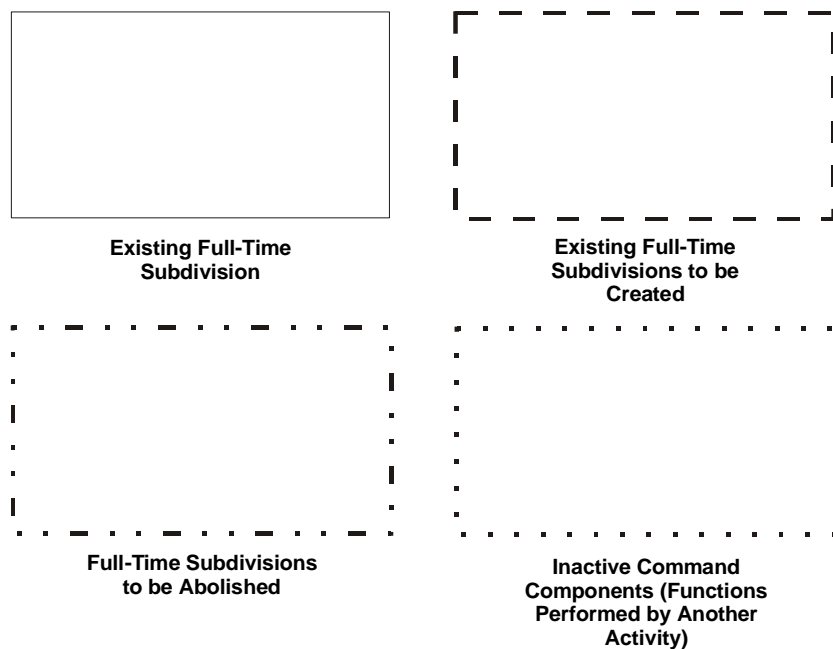
*Figure 3-11.  Block line breaks in organizational chart squares.*

        (a) A solid rectangle for existing full-time subdivisions.

        (b) A hidden line (- - -) rectangle for existing full-time subdivisions to be created.

        (c) Alternating dot-dot-dash blocks for full-time subdivisions to be abolished.

**Performance Steps**

        (d) Dotted line rectangles are used for inactive command components whose functions are currently being performed by another activity or will be manned up on mobilization.  There are many variations that can be used for other situations.  Do not forget to label the dot-dot-dash and the dot-dot-dot blocks and explain them in the legend.

    (6) When an individual occupies two or more billets, place an asterisk (*) in the appropriate blocks.  See Figure 3-12.



**A**

ADMINISTRATIVE
ASSISTANT*

**B**

**C**

ADMINISTRATIVE
ASSISTANT*

ADMINISTRATIVE
ASSISTANT*

**\* Part-time splitting of function.
Same person performs the duties of
Administrative Assistant to A, B, and C.**
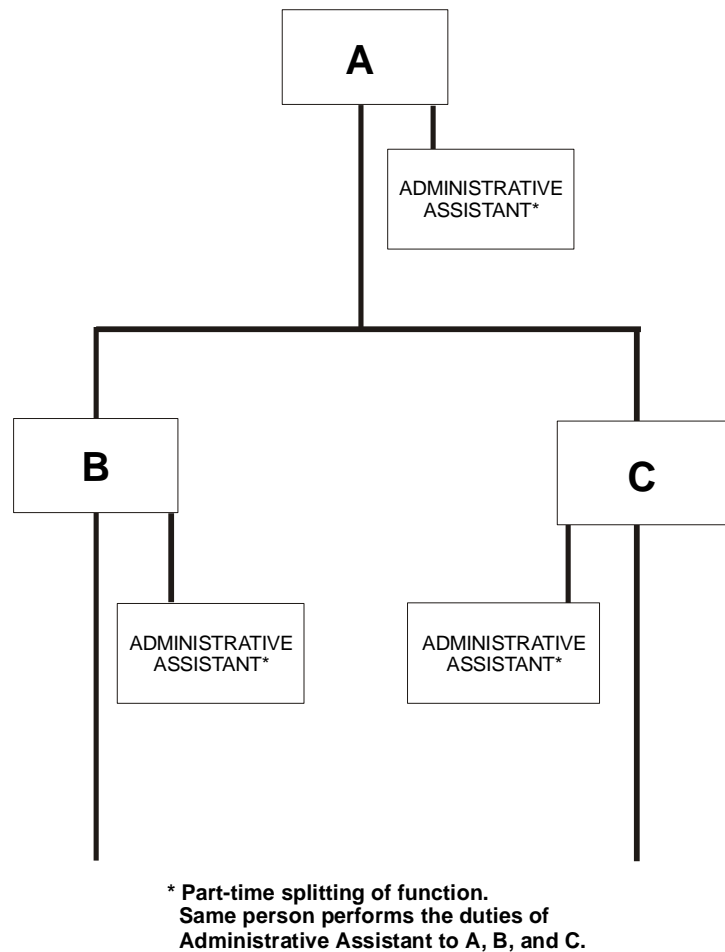
*Figure 3-12.  An example of an organizational chart that shows an individual occupying two or more billets.*

    (7) The authority lines are shown as solid vertical or horizontal lines that start from and enter into the center of each block.  Never use diagonal lines.  Construct lines so that they do not cross each other.  This only complicates the chart.  Unit blocks directly under a section block are connected with authority lines centered on the unit as shown.

    (8) Draw hidden lines (- - -) to connect the blocks to denote liaison or intercommunication between two components.

| Performance Measures | Results | |
|---|---|---|
| 1. Check DA Form 3903-R. | P | F |
| a. Type of chart required. | P | F |
| b. Purpose. | P | F |
| c. Time constraints. | P | F |
| d. Size required. | P | F |
| 2. Check for existing guidance (facility SOP and supervisor). | P | F |
| 3. Check for available equipment and supplies. | P | F |
| 4. Lay out and letter chart with a pencil or nonreproducible blue pencil. | P | F |
| 5. Check the chart for accuracy. | P | F |
| a. Spacing. | P | F |
| b. Spelling. | P | F |
| c. Uniformity. | P | F |
| d. Completeness. | P | F |
| e. Correctness. | P | F |
| f. Positioning of elements. | P | F |
| g. Data. | P | F |
| 6. Ink in or use tape (such as Chartpak) to produce the lines/graphics. | P | F |
| 7. Inspect the chart for compliance with DA Form 3903-R. | P | F |
| 8. Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| | Appendix B (25M) |
| | Appendix D (25M) |
| | Appendix J (25M) |

## CONSTRUCT A TECHNICAL DRAWING
## 113-579-1054

**Conditions:**  Given DA Form 3903-R with technical drawing requirements; FM 5-553; field drafting kit; drawing paper; drafting tools, such as T-square or straightedge; protractor; compass; ruler; pencils (standard and nonreproducible blue); pens; ink; masking tape; erasers (steel or vinyl); acetate (if requested on DA Form 3903-R); paper, such as poster board or flip chart; tape (Chartpak); and/or toning material.

**Standards:**  The standards are met when drawings are without smudges, lines are opaque and consistent for the length of the entire line, and if drawn to scale, the drawing is accurate to within 1/32 of an inch.

**Performance Steps**

1.  A technical drawing is a broad term that applies to any drawing used to express ideas or concepts where accurate proportions and/or relationships are essential.  An inaccurate drawing is worthless.  The three types of drawings you need to be familiar with are orthographic, isometric, and oblique (see Figure 3-13).  As an illustrator, you may be called upon to produce an accurate orthographic drawing of a captured piece of equipment, or just the opposite, create an isometric drawing from a blue print.



**Isometric**

**Oblique**

**Orthographic**
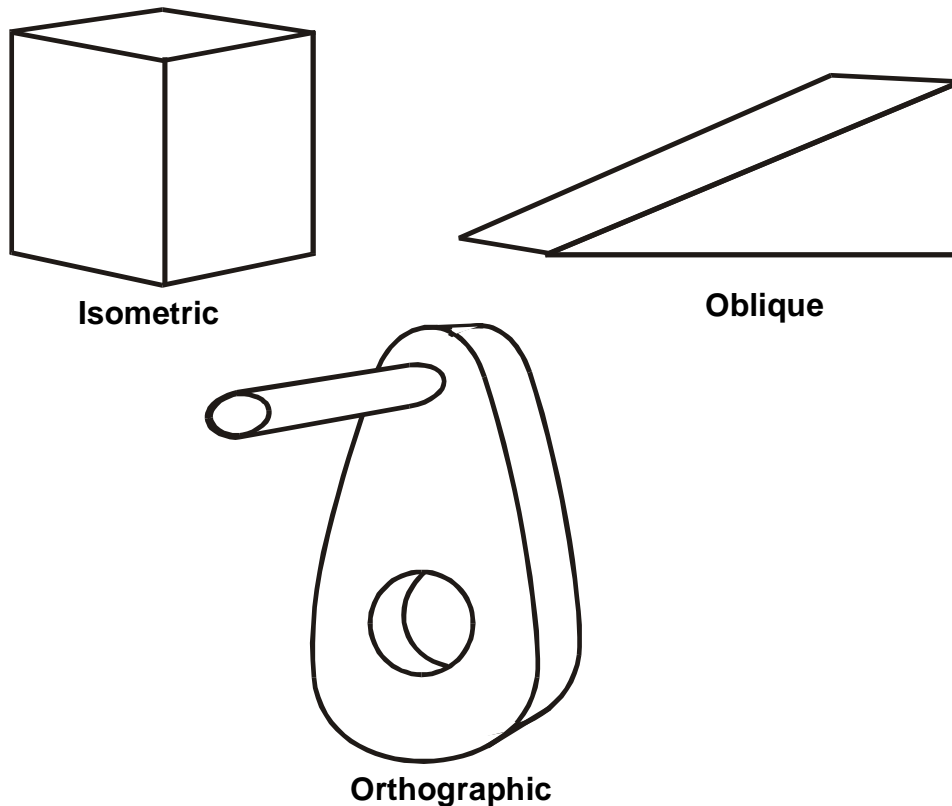
*Figure 3-13.  Three types of technical drawings.*

**Performance Steps**

   2. General construction.
       a. Lines.  There are many different kinds of lines used on a technical drawing.  Visible, hidden, leader, center, and phantom lines are the most common.  Each has a specific thickness, consistency, pattern, and use that is defined below.  An example of each is given in Figure 3-14.
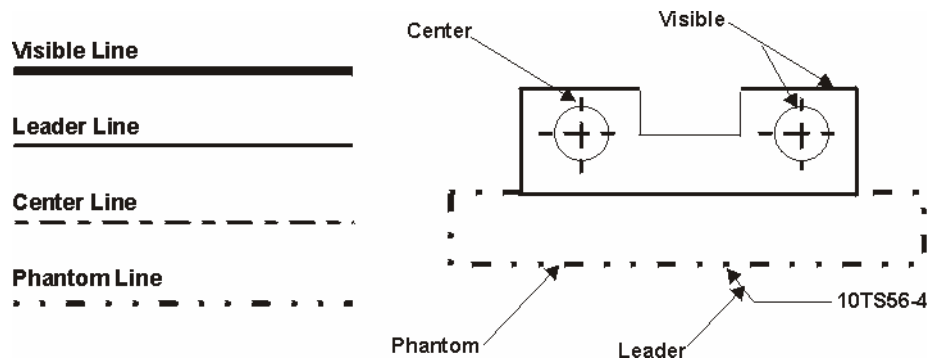


*Figure 3-14.  Four types of lines commonly used on technical drawings.*

        (1) Visible lines are heavy, thick black lines approximately .02 inches thick.  Visible lines are uniform in color and density and are used to define the visible edges of an object.
        (2) Leader lines are thin black lines about .01 inches thick.  Leader lines should be noticeably thinner and are used when dimensioning an object.
        (3) Center lines are thin black lines drawn in a long line-space-short line-space pattern approximately half as thick as visible lines.  The long sections can be drawn at any convenient length, but the short sections must be approximately 1/8-inch long and the intermittent spaces should be approximately 1/16-inch long.  Except for this line-space pattern, centerlines are identical to leader lines and are used to define the center of all or part of an object.  Most commonly used to define the center of holes, centerlines may also be used to help dimension an object.
        (4) Phantom lines are thin black lines drawn in a long line-space-short line - space - short line-space-long line pattern, approximately half the thickness of the visible line.  The long sections may be varied in length, but the short lines must be 1/8-inch long and the intermittent spaces should be approximately 1/16-inch long.  These lines are used to show something that is relative to, but not really a part of the object being drawn.
       b. Lettering.  There are a few acceptable styles of letters and numbers, such as Arial and Helvetica, for a technical drawing.  Either style is acceptable.  The height should be either 1/8-inch or 3/16-inch, although the individual drawing requirements should be taken into consideration when deciding on letter height.
       c. Creating a parallel line to a specified distance.  Set a compass to distance G.  Set the compass anywhere along line A-B.  Draw an arc on one side of line A-B.  Draw another arc on the same side of line A-B as the first arc.  Draw a line tangent to both arcs.  See Figure 3-15.

**Performance Steps**

Given: Line A-B and distance G.

1. Using a compass set anywhere along line A-B, construct an arch of radius G as shown.
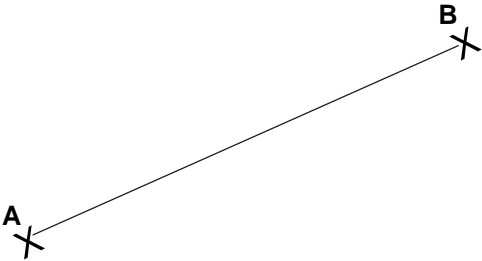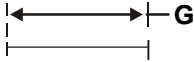
Problem: Construct a line parallel to line A-B at distance G.

Anywhere along Line A-B
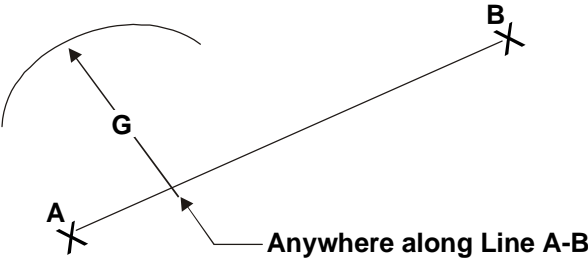
2. Construct another arch of radius G as shown.
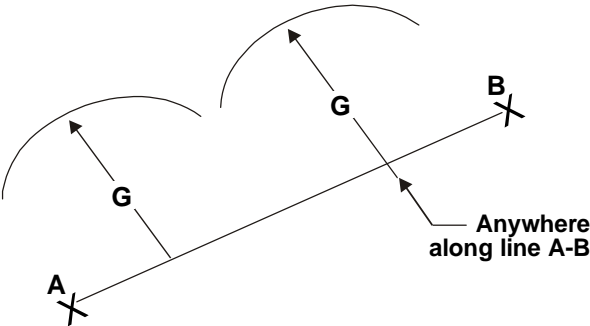
3. Construct a line tangent to both arcs.

Line parallel to line A-B at distance G

Anywhere along line A-B
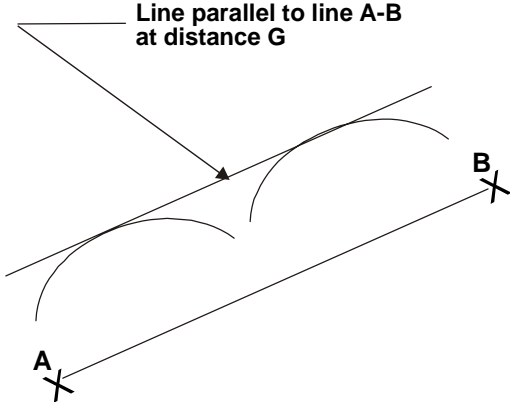
*Figure 3-15. Creating a parallel line to a specified distance.*

    d. Bisecting a line.  Set a compass to a radius that is greater than 1/2 the length of line A-B.  Place the compass at one end of line A-B and draw an arc through line A-B.  Place the compass at the opposite end and repeat the process.  Draw a line through the two points created by the intersecting arcs.  See Figure 3-16.

**Performance Steps**

Given: Line A-B.

1. Construct an arch of radius R. Use point A as

R = any radius of greater length than 1/2 line A-

B

A

A

B

R

A
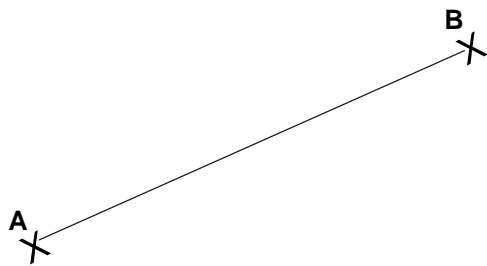
Problem: Divide line A-B into two equal parts.
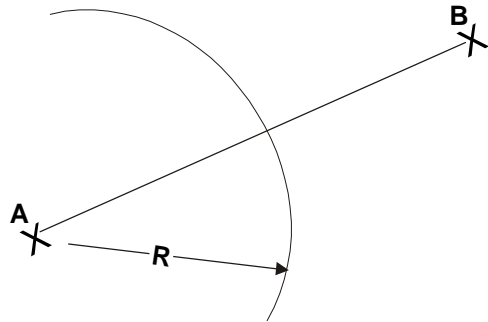
2. Construct an arch of radius R. Use point B as center.

3. Define the intersection of the arcs as points 3 and 4.
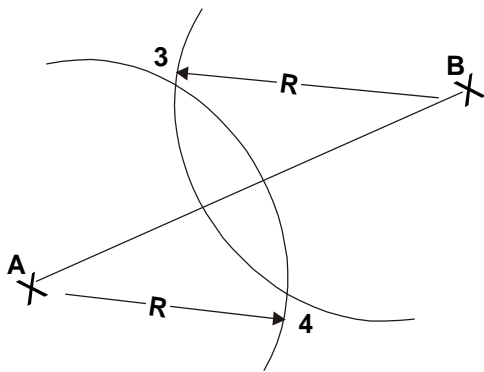
4. Connect points 3 and 4 with a construction lin

5. Define point 5 where line 3-4 intersects line A
   Line A-5 = line 5-B.

3

R

B

A

R

4

3

5

B

A

4
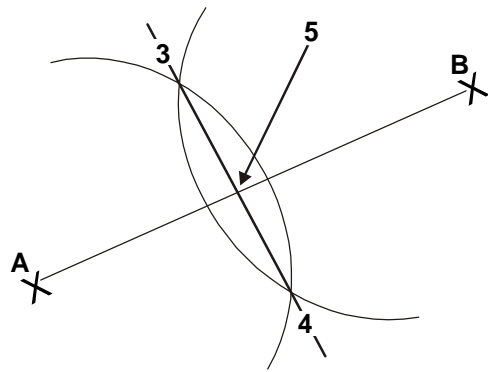
*Figure 3-16.  Bisecting a line.*

    e. Divide a line into any number of equal parts.  Construct a line A-X at any acute angle
       to line A-B.  Mark off five equal spaces along line A-X and construct line B-5.  Any size
       space may be used as long as it remains equal.  Draw lines 4-F, 3-E, 2-D, and 1-C
       parallel to line B-5.  See Figure 3-17.

**Performance Steps**

Given: Line A-B
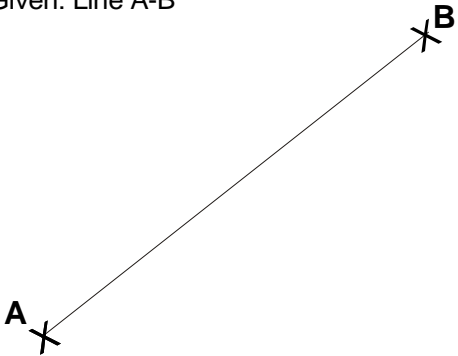


Problem: Divide line A-B into five equal parts.
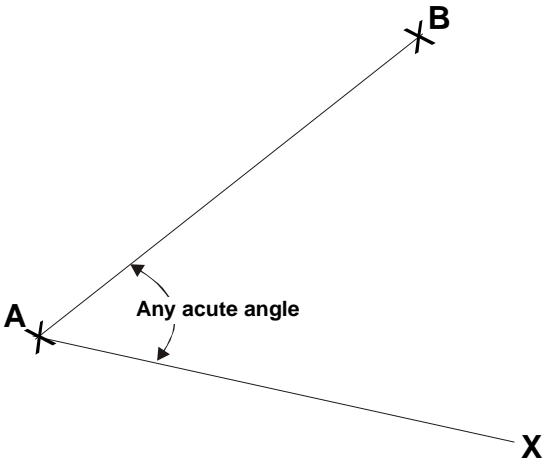
1. Construct a line A-X at any acute angle to line A-B.

Any acute angle

2. Mark off five equal spaces along line A-X and construct line B-5.
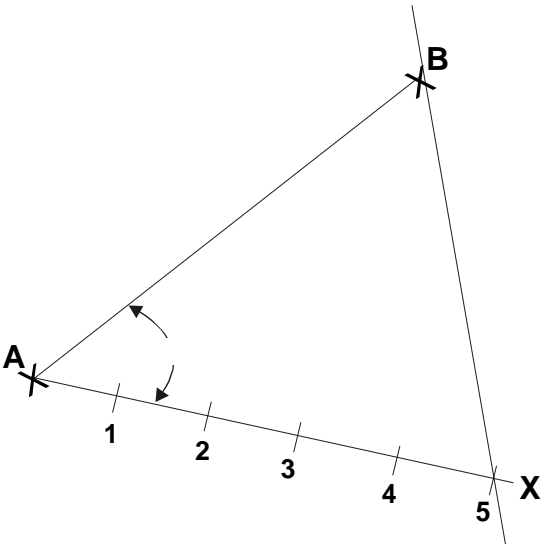
3. Draw lines 4-F, 3-E, 2-D, and 1C parallel to line B-5.

Five equal spaces
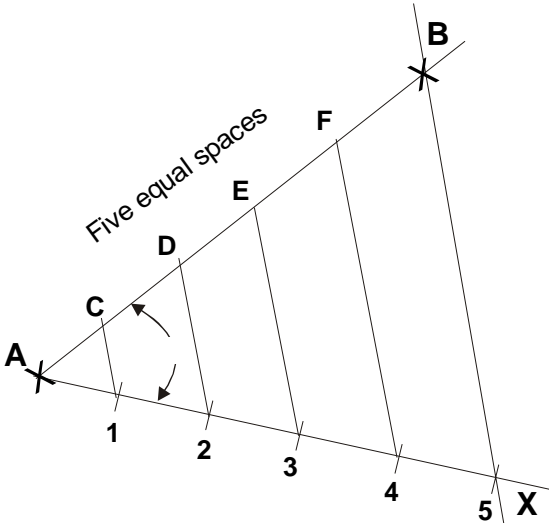
1-C = C-D = D-E = E-F = F-B

**NOTE: Any size spaces may be used as long as they are all equal in length.**

***Figure 3-17. Dividing a line into any number of equal parts.***

f. Bisecting an angle.  Draw an arc through angle A-B-C.  Using points 1 and 2, construct two more arcs.  Draw points 1 and 2, construct two more arcs.  Draw a line from B through 3.  See Figure 3-18.

**Performance Steps**

Given: Angle A-B-C.

Problem: Bisect angle A-B-C.

1. Construct an arc of radius R. Use point B as center.

2. Using points 3 and 4 as centers, construct two more arcs of radius R as shown.

3. Define points 3 and 4 where the arc intersects lines B-A and B-C.

4. Define the intersection of the two arcs as point 5.

5. Construct line B-5.

Angle A-B-5 = Angle 5-B-C
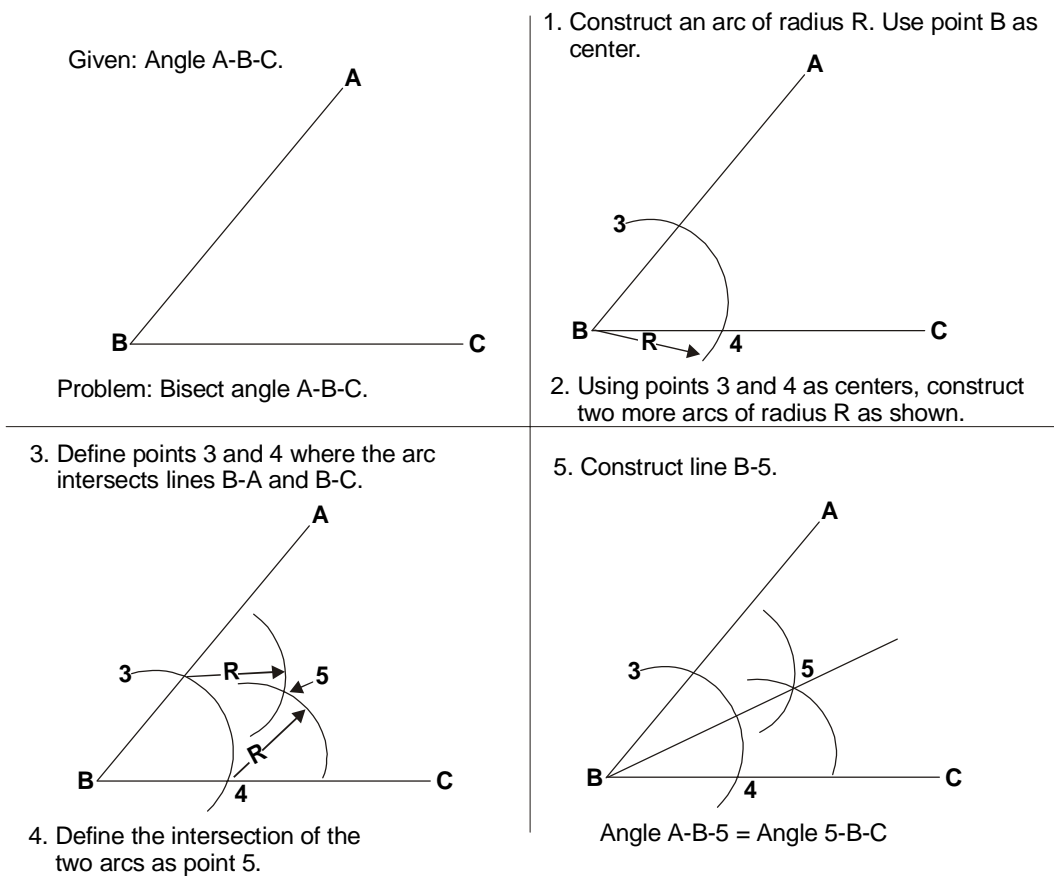
**Figure 3-18.  Bisecting an angle.**

g. Dimensioning guidelines.
  (1) Place dimensions so that there are no misunderstanding as to which surface is being dimensioned.
  (2) Be sure that all surfaces are addressed and that no edges are left out.
  (3) Dimensions should be at a constant height, either 1/8-inch or 3/16-inch.
  (4) Do not attempt to stuff a dimension in a space or an angle that is too small.  It is more important that the dimension is legible.
  (5) Unless it is absolutely unavoidable, do not place dimensioning lines within an object being defined.
  (6) Do not double dimension.  One dimension per edge is sufficient.  Giving the same dimension on another view may cause confusion.
  (7) A dimension line should be placed no closer than 3/8-inch to the object. Dimensions should be evenly spaced.
  (8) Attempt to keep all leader lines at the same angle.  Leader lines should not change direction until after they have extended beyond the outside edge object and any other dimension or extension lines.  End a leader line in a short horizontal line, leading the reader's eye to the appropriate note or dimension.
  (9) Be consistent when using fractions or decimals.  Do not mix the two.  This applies to lettering as well.  Use either an unidirectional or an aligned approach.

**Performance Steps**

   (10) Always specify whether a hole or an arc dimension is a diameter (DIA) or a radius (R).  Dimension holes on views where they appear as circles.

   (11) Do not run extension or dimension lines through other extension or dimension lines unless absolutely unavoidable.  This applies to leader lines as well.

   (12) Always include overall dimensions except on objects that have rounded ends.

 3. Orthographic projections are views of an object that are perpendicular to the object surface and the drawing surface.  There are an infinite number of possible projections, the most logical being top, bottom, left side, right side, front, and back.  In an effort to avoid confusion, use the top, the front and the right side as the views for a technical drawing.

  a. Drawings are divided into zones.  Each zone contains one orthographic view with all the information for that view.  The zones are separated by crossed-construction lines called principal plane lines which are similar to a mathematical coordinate system.  They are omitted on finished drawings.  See Figure 3-19.
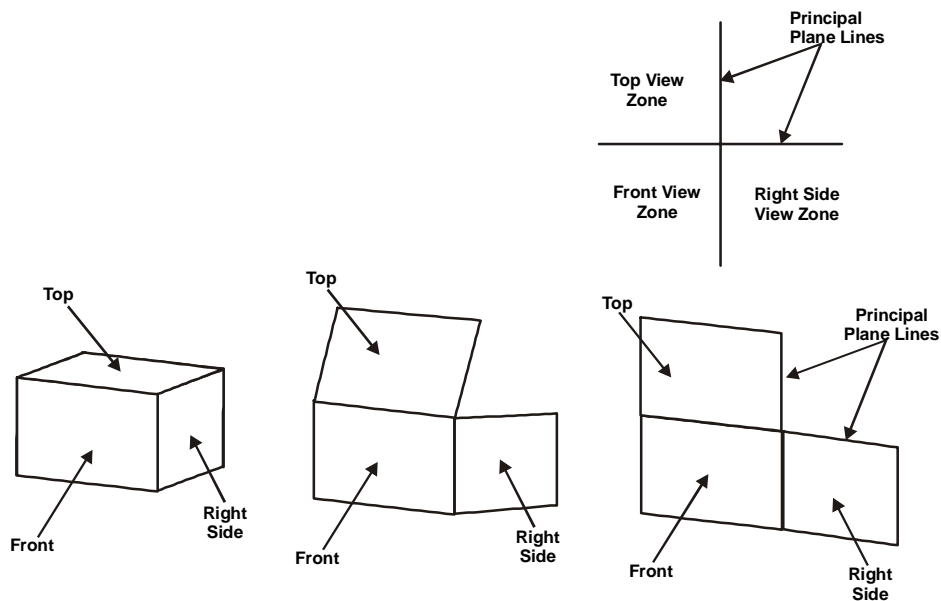


*Figure 3-19.  Principal plane lines and how they were developed initially.*

  b. Reduced to its simplest form, projection theory may be used to transfer a single point from one view to another.

   (1) Project the front view of point 1 into the right side view zone.  Drawing a horizontal principal plane line does this.  The tendency here is to draw the projection line too short, meaning extension may be required later on.  All that is known at this point is that the right side view is somewhere along the projection line.

   (2) Draw a line 45 degrees up and to the right from the intersecting point of the principal lines.  This is called a miter line.

**Performance Steps**

(3) Project the top view of point 1 into the right side view zone. This is done by drawing a horizontal construction line to the right, parallel to the horizontal principal plane line until it touches the 45-degree miter line. When the projection line touches the miter line, it goes from horizontal to vertical. To continue the projection line, draw a vertical construction line, parallel to the vertical principal plane line, extending down into the right side view zone. Draw the projection line through and beyond the horizontal projection line.

(4) The intersection of the two projection lines is the right side view of point 1. Label it.

(5) The projection of lines between views follows directly from point projection theory. Simply keep in mind that a line is the visible connection of two or more points.

(6) Project point 1 into the right side view. See Figure 3-20.
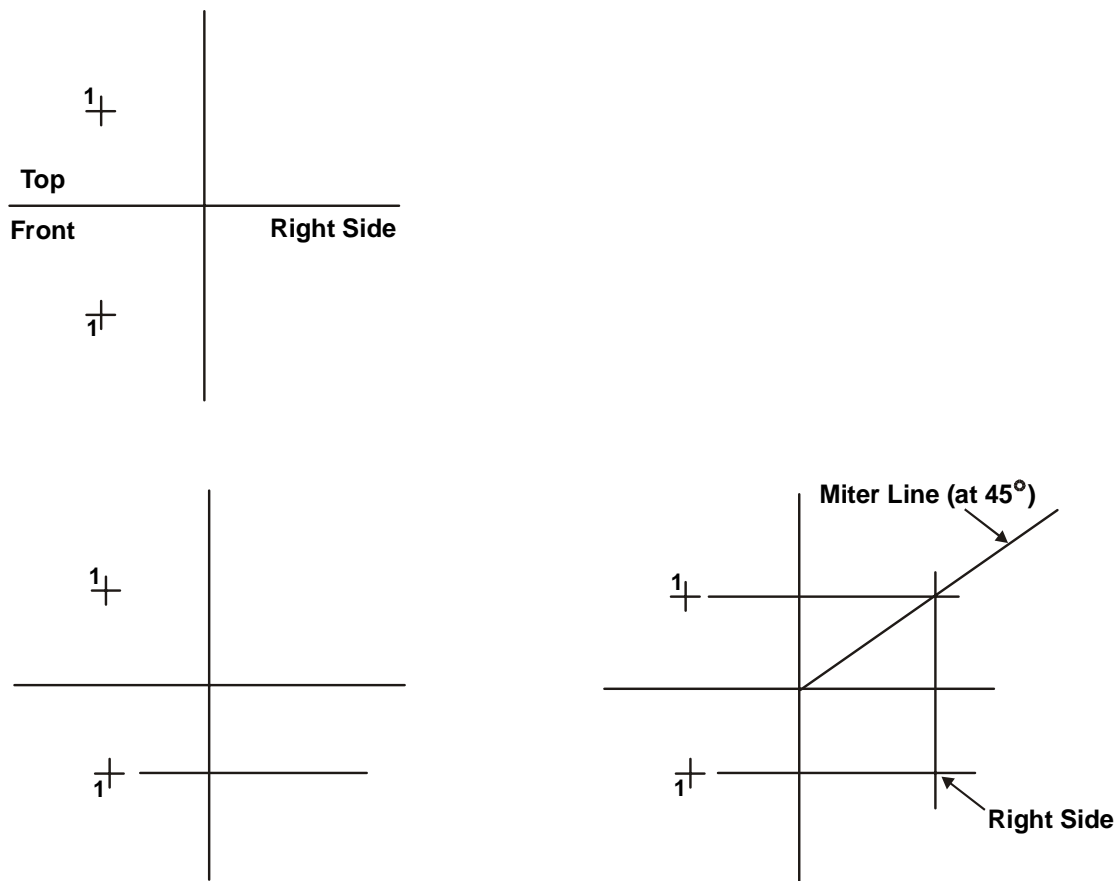


*Figure 3-20. Projection of point 1 into the right side view.*

(7) Project point 2 into the right side view.

(8) Connect points 1 and 2 with an object line. This is the right side view of line 1-2.

c. As line projection theory is derived from point projection theory, plane projection theory follows directly from line projection theory. Remember that a plane is the area enclosed within a series of lines interconnected end to end.

(1) Identify the lines that define the plane 1-2, 2-4, 4-3, and 3-1.

(2) Project the individual points 1, 2, 3, and 4 into the right side view. See Figure 3-21.
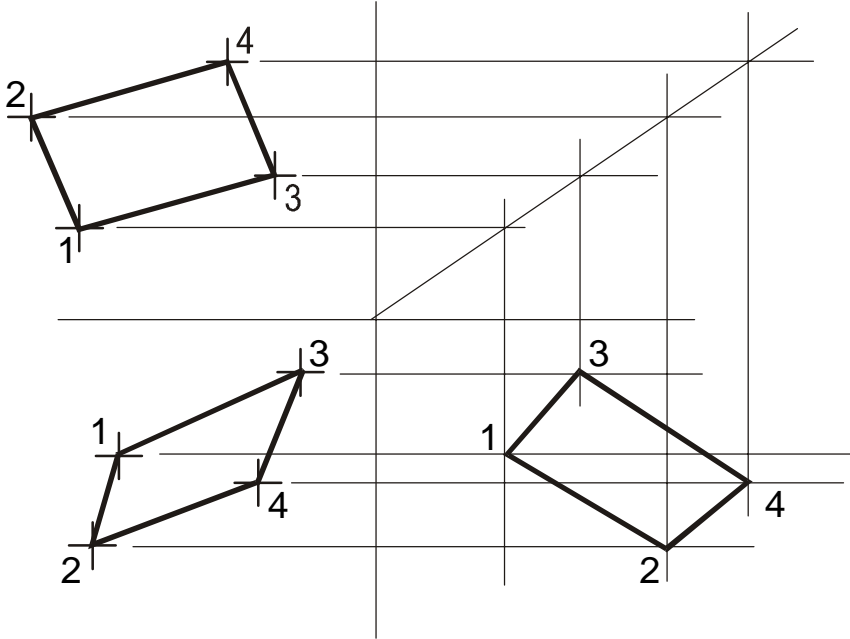
**Performance Steps**



***Figure 3-21.  Projection of individual points 1, 2, 3, and 4 into the
right side view.***

      (3)  Draw in the object lines, the lines that will define the plane.

4.  An isometric drawing is a three-dimensional representation of an object that does not use
perspective.  It is used to convey technical information of an object.  All isometric drawings
are based on a 120-degree axis system.  The object in an isometric drawing is position so
that the front, top, and right side appear as shown in Figure 3-22.  All dimensional values
for the axis or lines parallel to the axis are taken directly from the orthographic views.  This
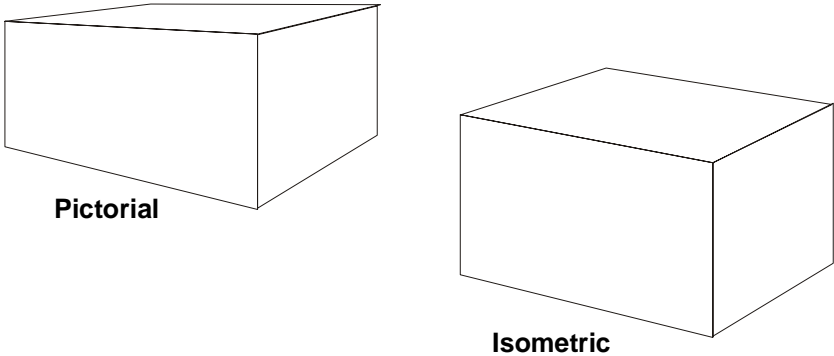includes the basic height, width, and length of the object.



**Pictorial**

**Isometric**

***Figure 3-22.  A comparison between an isometric drawing and
a pictorial drawing.***

    a.  Lightly lay out a rectangular box whose measurements correspond to the dimensions
given in the orthographic views.

**Performance Steps**

b. Lightly lay out the specific shape of the object.  Transfer measurements for the axis or line parallel to the axis directly from the orthographic views to the isometric drawing.  See Figure 3-23.
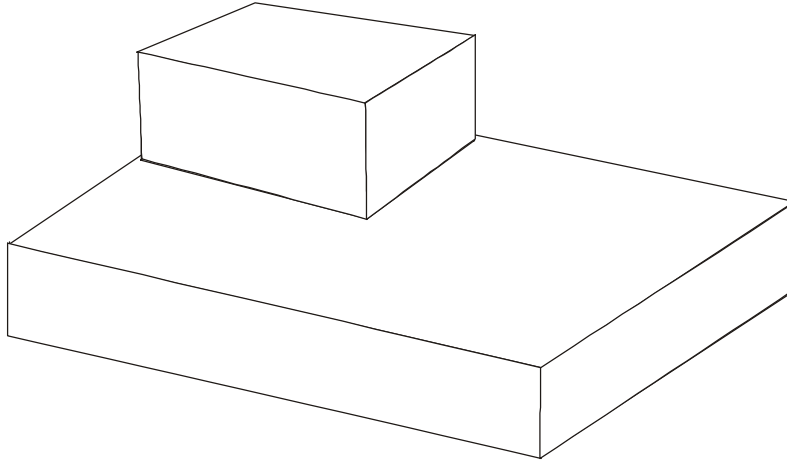


***Figure 3-23.  Transferring measurements from the orthographic view to the isometric drawing.***

c. Check your work to verify measurements.
d. Erase all construction lines and smudges.
e. Darken in all final lines.

5. Oblique drawings are easier to draw than isometric drawings, but they contain more inherent visual distortion.  See Figure 3-24.
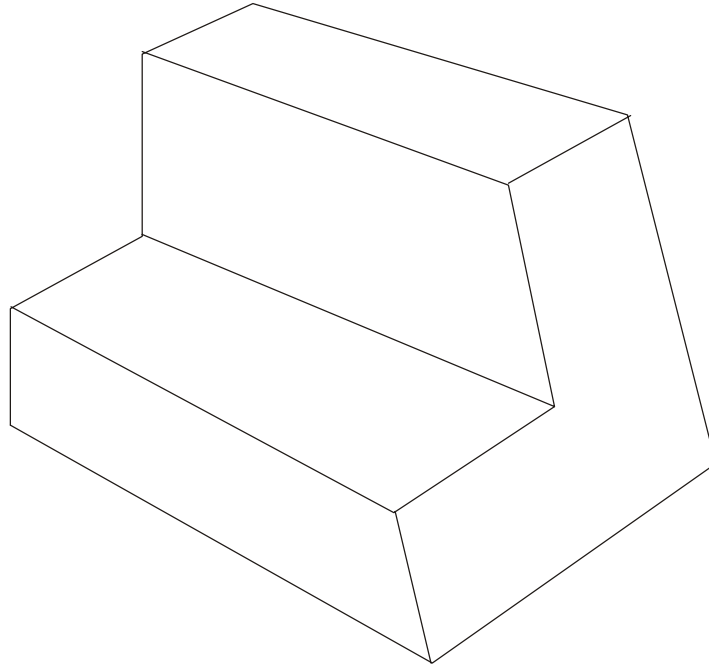
**Performance Steps**



*Figure 3-24.  Oblique drawing.*

a. The basic reference system for oblique drawings is the 90-degree relationship between the left-hand axis and the vertical axis.  Because of this 90-degree relationship, the front view and all surfaces parallel to it are almost identical to the front view of an orthographic drawing.  This makes it easier to transfer information between the two different front views.

b. The receding lines may be drawn at any convenient angle.  Upward and to the right at either 30 degrees or 45 degrees is most commonly used.  The choice of which receding angle to use depends on which angle best shows the object.

c. Dimensional values are directly transferable from view of the orthographic drawings to the front view of the oblique drawing.  Transfer circles as circles, not as ellipses as in isometric drawings.  Angles directly transfer.  Dimensional values for all other views are not directly transferable.  They can only be transferred from the orthographic views to the receding axis of the oblique drawing.

d. Oblique drawings do not normally include hidden lines, although they may be used if special emphasis is required.

| Performance Measures | Results | |
|---|---|---|
| 1.  Check DA Form 3903-R. | P | F |
|     a.  Type of drawing required. | P | F |
|     b.  Size required. | P | F |
|     c.  Time restraints. | P | F |
| 2.  Check for available equipment and supplies. | P | F |
| 3.  Lay out drawing with a pencil or nonreproducible blue pencil. | P | F |

| **Performance Measures** | **Results** | |
|---|---|---|
| 4. Check accuracy. | P | F |
|     a. Angles (plus or minus 1/2 degree). | P | F |
|     b. Line length and placement (plus or minus 1/32 degree). | P | F |
|     c. Dimensions. | P | F |
|     d. Spelling. | P | F |
|     e. Appropriate line type. | P | F |
|     f. Uniform line weights. | P | F |
| 5. Ink in drawing. | P | F |
| 6. Remove all construction lines and smudges. | P | F |
| 7. Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| FM 5-553 | Appendix B (25M) |
| | Appendix C (25M) |
| | Appendix D (25M) |
| | Appendix J (25M) |

# CREATE AN ILLUSTRATION
## 113-579-4015

**Conditions:**  In a tactical or garrison environment, given a completed DA Form 3903-R, burnisher, pastels, pencils, pens, oil paints, watercolors, tempera or acrylics, erasers, various brushes, drawing surface, poster board or paper, and subject.

**Standards:**  The standards are met when the finished project is accepted by the requester. The subject must be in the appropriate perspective view, as specified in DA Form 3903-R, true to form, proportion, contour, and shading.  Effective use of the principles of color, balance, and harmony must be applied.  Drawing must be free of smudges and extraneous marks.

| Performance Measures | Results | |
|---|---|---|
| 1.  Check DA Form 3903-R. | P | F |
|    a.  Purpose. | P | F |
|    b.  Time restraints. | P | F |
| 2.  If not stated, choose media (medium). | P | F |
| 3.  Sketch thumbnail. | P | F |
| 4.  Lay out the rough. | P | F |
| 5.  Have client approve rough if requested. | P | F |
| 6.  Complete the comprehensive. | P | F |
|    a. Lightly sketch the basic forms. | P | F |
|    b. Establish proportions. | P | F |
|    c. Verify proportions. | P | F |
|    d. Use foreshortening techniques. | P | F |
| 7.  Refine and draw in the contours. | P | F |
| 8.  Apply shading. | P | F |
| 9.  Erase extraneous marks. | P | F |
| 10.  Correct any flaws (as needed). | P | F |
| 11.  Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any steps, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
| Required | Related |
|---|---|
| | Appendix B (25M) |
| | Appendix C (25M) |
| | Appendix D (25M) |
| | Appendix J (25M) |

## PREPARE TACTICAL GRAPHIC OVERLAYS
## 113-579-5060

**Conditions:**  In a tactical or garrison environment, given acetate or overlay materials, map, technical pens and/or markers, FM 21-31, FM 101-5-1, and flat drawing surface or light table.

**Standards:**  The standards are met when overlays are registered, free of extraneous marks, and display all information legibly.

**Performance Steps**

1. Place and temporarily tape overlay material over the map area to be annotated.

2. Trace the grid register marks nearest the two opposite corners of the overlay.  Label each mark with the proper grid coordinates.

3. Plot overlay information using pen, pencil, or colored markers.  Take care not to tear overlay material.

4. Add standard military and topographical symbols.

5. Add marginal information.


| **Performance Measures** | **Results** | |
|---|---|---|
| 1. Register overlay to map using grid intersections in opposite corners, labeling each with the grid coordinates. | P | F |
| 2. Plot data from information sheet using appropriate symbols and colors. | P | F |
| 3. Print marginal information. | P | F |


**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| FM 101-5-1 | Appendix D (25M) |
| FM 21-31 | |

**PREPARE ILLUSTRATIONS FOR DISPLAY**
**113-579-5065**

**Conditions:**  In a tactical or garrison environment, given DA Form 3903-R, illustration, drawing board, matting materials, mounting tissue, plain poster board or foam core, brown paper, squeegee, protective paper, tacking iron, metal straightedge, ruler, pencil, T-square, mat cutters, paper trimmer, rubber cement, dry mount press, and frame.

**Standards:**  The standards are met when the illustration is mounted with no ripples, bubbles, tears, or blemishes; the mat opening is neat, is the correct size and shape, has a uniform bevel, and is without extraneous cuts, marks or blemishes.

**Performance Steps**

1. General.  A well-mounted and matted illustration or photograph adds a professional appearance to completed artwork and displays.  Appearance often makes a major first impression of a display of any type, graphics facility, or headquarters.  You should cut your mats to standard frame sizes (8 x 10, 10 x 12, 12 x 16, 16 x 20 inches, and so forth), if possible.  This allows for easy framing.  Methods of mounting illustrations and cutting mats of different types and the tools used are discussed below.

2. Dry mount press.  This is sometimes called a hot press.  It offers clean, fast, and permanent mounting.  The following tells how to use this method.
    a. Pencil mark on the mount the locations for placing the illustration or print edge.
    b. Once marked, place a sheet of translucent mounting tissue on the back of the illustration.  With a heated electric tracking iron, fasten the adhesive sheet and attach temporarily (task) at its center.
      (1) Dry mounting tissue is thin paper coated on both sides with a shellac or gum adhesive.  The tissue is dry, not sticky, and very easy to handle.  The tissue is odorless and chemically inert so that it will not stain artwork.  Being moisture-proof, it will not wrinkle an illustration or print.  It is well suited for a broad range of paperweights and gives a strong, flexible, permanent bond between artwork and mount.
      (2) Experiment with the press to find the best temperatures for mounting different papers.  When using more than one sheet of adhesive, DO NOT OVERLAP them!  At the overlap point, there will be a visible, undesirable ridge on the photo or illustration.
    c. Trim the adhesive sheets evenly with the artwork, because tissue extending beyond the artwork edge sticks to the press.  Place the artwork, with adhesive sheet attached, to the previously marked mount and tack with the tacking iron.  While holding the artwork in place, lift one corner and tack the adhesive sheet to the mount, being careful not to drag the iron.
**CAUTION:**  Original artwork that uses a heat sensitive media (crayon, colored or grease pencil, Zip-a-Tone, and so forth) should not be mounted with a dry-mount (hot) press.  Because of the heat involved, artwork may be damaged or destroyed!  Use a print if possible.
    d. Place tacked artwork, adhesive tissue, and mount face up in the press.  Cover artwork with a sheet of kraft paper for protection.  Apply heat and pressure according to manufacturer's recommendations.  Any bubbles in the mounted print may be punctured with a pin and repressed.

**Performance Steps**

3. Rubber cement mounting.  Rubber cement should be about the consistency of honey if it is to flow properly and hold permanently.  Rubber cement dries quickly when exposed to air.  Rubber cement manufacturers offer a thinner that can be mixed into thickened cement until achieving the desired consistency.  If thinned too much, the cement will not hold as well.

**CAUTION:**  Rubber cement and thinner are highly flammable and toxic!  Do not use near open flames or in unventilated areas.  DO NOT breathe fumes for an extended period of time.

    a. Though some pieces previously mounted using this process were successfully removed, it is strongly discouraged.  Removal is not only tedious and time-consuming, but it usually damages the artwork and makes the mounting board useless.

    b. A rubber cement pickup (made of crepe latex) is very useful in removing excess cement.  It is rubbed gently over the dry cement, easily picking up the cement in hard-to-get-at areas.  If a pickup is not available, rub the dry cement off with a clean finger or a dry ball of rubber cement.

    c. The wet mount and dry mount methods are the two ways of using rubber cement in mounting.  The latter should not be confused with the dry mount press.

     (1) The wet mount method lets you move the artwork while positioning it on the mounting board.

      (a) Apply rubber cement evenly to the underside of the piece being mounted.  Place the wet piece directly on the mounting board and adjust its location.

      (b) After you have accurately located the piece, cover with a piece of nonadhesive tissue.  Using a triangle as a squeegee, start at one corner and press the print into place, squeezing out the excess cement.  Remove the tissue paper.

      (c) After the excess cement dries, remove it with the rubber cement pickup.

     (2) Dry mounting, though not completely permanent, holds extremely well.  This method of mounting requires positioning of the artwork exactly in place before attaching it to the mounting board.  With this method both surfaces are covered evenly with rubber cement and allowed to dry.  When dry, the two surfaces instantly stick to each other upon contact.

      (a) Trim the artwork being mounted to the desired size and mark the required position exactly on the mounting board.  Apply rubber cement to both surfaces and allow them to dry.

**NOTE:  Often bubbles can be removed by puncturing with a pin and adding pressure or heat, depending on the original method used.**

      (b) When the rubber cement is dry, place a sheet of tracing paper over the cemented mounting board, leaving about one quarter of an inch exposed at the top.  This sheet keeps the two cemented pieces from sticking.

      (c) Next, position the piece being mounted and carefully, but firmly, press it to the exposed area on the mounting board.  Slowly withdraw the tracing paper and gently smooth the piece against the mounting board, working from the center outward until the piece is firmly attached.  Remove any excess cement with the pickup.

      (d) For mounting large pieces of art or drawings made on flimsy paper, a two slip-sheet method divides the work area and makes handling easier.

**Performance Steps**

4. Matting for artwork and prints.  Mats usually have opening edges that are beveled to a 45-degree angle and are usually permanent.  The bevel edges add a professional look and improves the overall appearance of the display.  Try to cut the mats to a standard frame size (8 x 10, 10 x 12, 11 x 14, 12 x 16, 16 x 20, 20 x 24, and so forth) if sizing is a possibility.

   a. Standard mats are used when illustrations are to stand on their own and can be framed and covered with glass for display.  Borders are even on opposite sides of the opening, with no extra space for a caption.  A mat for an illustration and a long narrative caption should be planned as one unit for matting.  The caption should be placed close to the illustration, but should not touch or overlap.

**CAUTION:**  Be extremely careful using the blades for this task.  The blades are very sharp and will cut you as easily as the mat board.

   b. Optically-centered mat.  This type mat prevents the illusion of the photo or illustration from falling through the bottom of the mat.  Use these for subject renderings and portraits or photographs.  They can add a more professional appearance to your labeled display work.

   (1) Place artwork measurements on the mat, starting from upper left corner of the mat as shown by the dotted line in Figure 3-25.
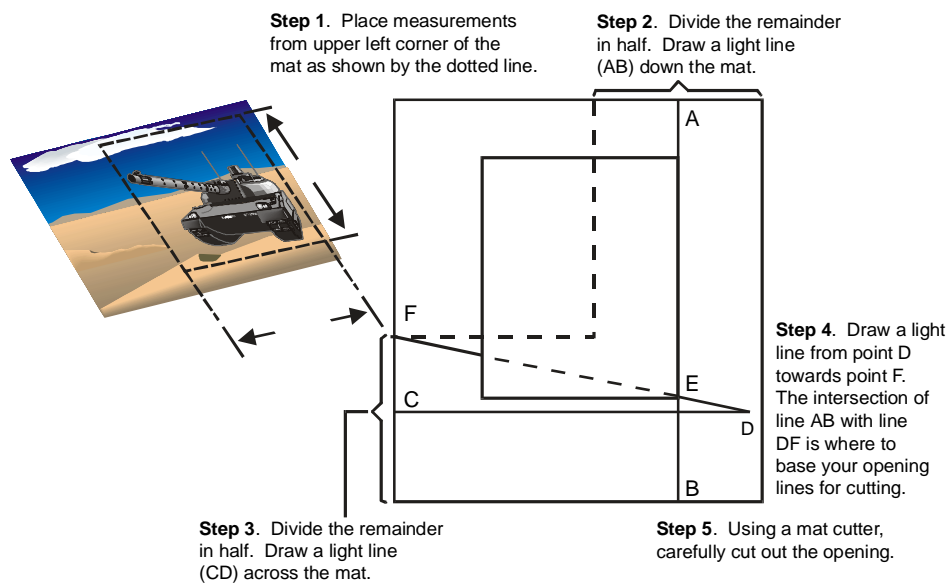


*Figure 3-25.  Optically centered mat.*

   (2) Divide the remainder of the mat width in half.  Draw a light line (AB) down the mat.
   (3) Divide the remainder of the mat height in half.  Draw a light line (CD) across the mat.
   (4) Draw a light line from point D towards point F.  The intersection of line AB with line DF is where to base your opening lines for cutting the opening.
   (5) Using a mat cutter and straightedge carefully cut out the opening.

   c. Oval mat.  This type of mat is usually reserved for special displays of artwork or portraits, and for giving an antique flavor to a display.  An oval mat's center must be laid out carefully.  See Figure 3-26.
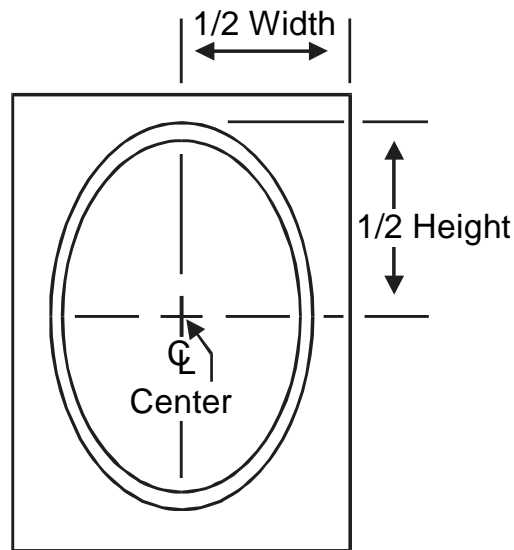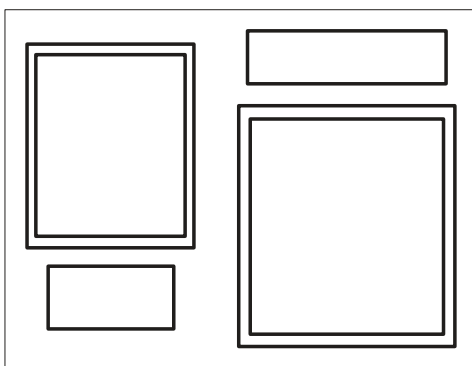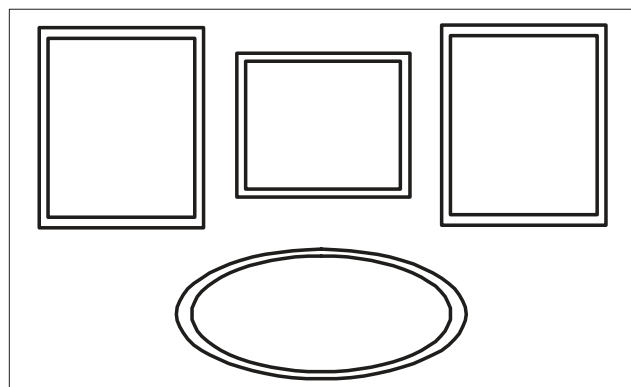
**Performance Steps**



*Figure 3-26. Oval opening mat.*

     (1) Calculate the opening height, width, and distance for the border edge.
     (2) One-half the mat board's height and width equals the mat's center point. Subtract the border thickness and you will have the opening measurements for adjusting the oval mat cutter.
     (3) Set the oval mat cutter according to the manufacturer's instructions and cut the opening.
  d. Multiple opening mat. This type has any combination of openings requiring you pay close attention to the layout. Multiple opening mats are usually used for displays with multiple illustrations grouped together for ease and simplicity of viewing. You may choose a formal or informal layout depending on the occasion or display. See Figure 3-27.



Formal layout.                        Informal layout.

*Figure 3-27. Multiple opening mats.*

**Performance Steps**

5. Mat cutting tools.  All mat cutting requires specific tools for a professional-appearing end product.  All mats should have an evenly beveled edge which requires the use of a mat cutter.  There are many cutters you may use for a specific purpose.  Each has its own uses and instructions.
    a. Before removing the opening, view the rear of the mat to ensure all cuts are complete.  If any are not, carefully use a small craft knife (X-Acto) to complete the cut.
    b. After the opening is removed, erase all guidelines.

6. Mounting illustrations.  Once the mat and opening are cut to correct specifications, the illustration may be mounted.  There are many methods to mount an illustration; we will discuss two.  The first is a temporary one, and the second is more permanent.  Each uses a mat, a backing sheet, and a final sheet of backing material which is usually corrugated cardboard; each has its own positive and negative points; and each is suitable for framing as needed.  The following applies to unmounted artwork.
    a. The temporary method is the easiest.  With the mat and illustration face down, the illustration is mounted with tape directly to the back of the mat.
        (1) A transparent tape such as Magic Transparent Tape by 3M does an excellent job.  Masking tape is easy to obtain but dries out causing a shift of the art within the mat.  Some masking tape adhesives stain and are undesirable.
        (2) Once attached, place a white backing sheet and a sheet of plain mat board or corrugated cardboard on the back.  The white backing allows the illustration to be seen better, and the cardboard gives additional strength to the entire unit.
    b. More permanent methods use the same number of sheets plus the illustration, but in a different manner.  After positioning the illustration accurately on the white backing sheet, the corners of the artwork are traced for adhering.
        (1) The illustration is removed, and the center area of the backing sheet is sprayed with an aerosol adhesive.  Using the previous corner marks, carefully reattach the illustration.  Once completed, the package is assembled.
        (2) Another method uses mounting tapes (rolls) or sheets.  These tapes and sheets are sticky on both sides.  Depending on the brand, sometimes you need to peel the backing from the tape or sheet.  Follow the instructions for temporary mounting; with the mat and illustration face down, apply the double-stick tape and mount the illustration directly to the back of the mat.

**Performance Measures**                                                                 **Results**

1. Review DA Form 3903-R for requirement.                                                 P     F

2. Dry mount or hot press method.                                                         P     F
    a. Mark the location for artwork placement on the mount.                              P     F
    b. Tack center of mounting tissue to back of artwork with tacking iron.              P     F
    c. Trim off excess mounting tissue to fit artwork with one corner in place.          P     F
    d. Align artwork with adhesive sheet to previously marked mount and tack             P     F
       one corner of adhesive sheet to mount.
    e. Place tacked artwork, adhesive sheet, and mount face up in the preheated          P     F
       hot press.
    f. Apply heat and pressure according to press manufacturer's                         P     F
       recommendations.

3. Wet mount and dry mount methods using rubber cement.                                   P     F

| **Performance Measures** | **Results** | |
|---|---|---|
| a. Wet mount. | P | F |
| (1) Apply rubber cement to the back of the artwork. | P | F |
| (2) Place artwork on previously marked mount and adjust the position if necessary. | P | F |
| b. Dry mount (should not be confused with the dry-mount press). | P | F |
| (1) Apply rubber cement to both artwork and mount allowing the surface to dry. | P | F |
| (2) When dry, carefully place the two surfaces together. | P | F |
| (3) Remove excess cement with a rubber cement pickup. | P | F |
| 4. Mat artwork and prints. | P | F |
| a. Determine the correct size of mat to be cut. | P | F |
| b. Determine the size of opening. | P | F |
| c. Lay out cutting guidelines. | P | F |
| d. Using a mat cutter and straightedge carefully cut out the opening. | P | F |
| e. Before removing the opening, view the rear of the mat to ensure all cuts are complete.  If not, carefully use a X-Acto knife to complete the cut. | P | F |
| f. After the opening is removed, erase all guidelines. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                              **Related**
                                                        Appendix B (25M)
                                                        Appendix C (25M)
                                                        Appendix D (25M)
                                                        Appendix J (25M)

**DESIGN AN ELECTRONIC PAGE LAYOUT**
**113-579-8005**

**Conditions:**  In a tactical or garrison environment, given a completed DA Form 3903-R and a computer system with desktop publishing software, such as PageMaker.

**Standards:**  The standards are met when the final product satisfies the requester's needs.

**Performance Steps**

1. General.  A disorganized page easily disrupts readers, such as bold headlines that clash, distracting borders, odd-shaped and poorly positioned photos, and a lack of consistency. The intent of a well-designed page is to make finding and understanding the message as easy as possible for the reader.  While there is no one layout for all situations, there are a few basic concepts and several guidelines that can be applied to all layouts.  Most, if not all, design problems can be solved by applying the basic guidelines and a creative imagination.

2. Basic concepts.
   a. Appropriateness relates to proportion, audience, and overall design.  The success of a layout is rooted in choosing the appropriate elements to include in the design.  The appropriateness of proportion must be considered.  The size of a graphic must relate to the page and the elements that surround it.  The amount of emphasis wanted is also a factor in choosing correct proportions.
   b. Consistency is necessary not only within the page, but page to page as well as issue to issue.  The basic elements, margin, alley, typeface, and type size should remain the same throughout the layout, unless there is a need to emphasize an element. Inconsistency will be noticed and will probably annoy the reader, causing them to focus on the layout not the message.
   c. Balance/unity.  Balancing a layout does not mean each element is equal in size and emphasis, just the opposite.  A layout with all elements being equal is static and boring and is without a focal point.  A dominant element unifies the layout by providing that focal point.  The placement of graphics and white space is important.  They are used to lead the reader's eyes and help to keep their interest.

3. Guidelines.
   a. Type readability.
      (1) Serif type is more readable than sans serif when used in large blocks, such as the text of a story.
      (2) The larger the x-height, the larger the type appears to be, making the text easier to read.
      (3) The leading, or ledding, is the white space between the lines of type.  The general rule is the larger the x-height and type size, the more leading is needed for ease of reading.  One or two points more of leading than text is a good ratio, such as 10-point type with 11-point leading or 10-point type and 12-point leading.
      (4) Font style affects readability.  Vertical (Roman) type is considered to be more readable than italic or boldface type for large bodies of text.  Italics or boldface should only be used to emphasize a word as short phrases; and sparingly at that.
   b. Optimum line length is based on the size of the font.  Line length or column width is equal to one and a half to two times the point size.
   c. Body type.

**Performance Steps**
        (1) Use serif type.
        (2) Use 9- to 11-point type size.
        (3) Use a font with large x-height.
        (4) Keep paragraphs short.
        (5) Use either justified or ragged, do not mix.
        (6) Stay within the optimum line length.
        (7) Keep alleys 1 to 1 1/2-pica wide.
        (8) Avoid italics and boldface.

| **Performance Measures** | **Results** | |
| --- | --- | --- |
| 1. Used a serif type face. | P | F |
| 2. Body of text is 9- to 11-point type. | P | F |
| 3. There is one dominant element per page. | P | F |
| 4. Alleys are 1 to 1 1/2-pica wide. | P | F |
| 5. Margins are consistent.  Columns are optimum lengths for chosen type. | P | F |
| 6. Justification is consistent. | P | F |
| 7. Leading is one to two points more than type size. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                              **Related**
                                                 Appendix A (25M)
                                               Appendix E (25M)
                                             Appendix J (25M)

**CREATE AN ELECTRONIC ILLUSTRATION**
**113-579-8006**

**Conditions:**  In a tactical or garrison environment, given a completed DA Form 3903-R and a computer system with graphic software, such as PowerPoint or Premiere.

**Standards:**  The standards are met when the final product satisfies the requester's needs.

| Performance Measures | Results | |
|---|---|---|
| 1. Check DA Form 3903-R. | P | F |
|    a. Purpose. | P | F |
|    b. Project suspense. | P | F |
|    c. Presentation time restraints. | P | F |
|    d. Desire medium, film, slides, paper, or screen. | P | F |
| 2. Create thumbnail sketches and have requester approve if necessary. | P | F |
| 3. Choose appropriate software package. | P | F |
| 4. Create computer rough from thumbnail. | P | F |
| 5. Have requester approve rough if necessary. | P | F |
| 6. Make any necessary changes. | P | F |
| 7. Complete the illustration. | P | F |
| 8. Do quality control checks. | P | F |
|    a. Check data accuracy. | P | F |
|    b. Check spelling. | P | F |
| 9. Output final to requested medium. | P | F |
| 10. Make corrections as necessary. | P | F |
| 11. Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
  **Required**                    **Related**
                                   Appendix A (25M)
                                   Appendix E (25M)
                                   Appendix J (25M)

## CREATE AN ELECTRONIC MULTIMEDIA VISUAL
## 113-579-8007

**Conditions:**  In a tactical or garrison environment, given a completed DA Form 3903-R; computer system with necessary hardware, such as scanner or digital camera; graphic software, such as PhotoShop, Premiere, Illustrator, or CorelDraw; and any artwork, photographs, video or audio to be included in the visual.

**Standards:**  The standards are met when the final product satisfies DA Form 3903-R requirements and is approved by the requester.

| Performance Measures | Results | |
|---|---|---|
| 1.  Check DA Form 3903-R. | P | F |
|     a.  Purpose. | P | F |
|     b.  Project suspense. | P | F |
|     c.  Presentation time restraints. | P | F |
|     d.  Request final medium. | P | F |
| 2.  Create thumbnail sketches and have requester approve if necessary. | P | F |
| 3.  Choose appropriate software package. | P | F |
| 4.  Create computer rough from thumbnail. | P | F |
| 5.  Have requester approve rough if necessary. | P | F |
| 6.  Ensure all imported files are compatible with intended system. | P | F |
| 7.  Make any necessary changes. | P | F |
| 8.  Complete multimedia visual. | P | F |
| 9.  Do quality control checks. | P | F |
|     a.  Check data accuracy. | P | F |
|     b.  Check spelling. | P | F |
|     c.  Check visuals on intended computer system for possible discrepancies. | P | F |
| 10.  Make corrections as necessary. | P | F |
| 11.  Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| Required | Related |
|---|---|
| | Appendix A (25M) |
| | Appendix E (25M) |
| | Appendix J (25M) |

# Skill Level 2

# Subject Area 3:  Facility Administrator

**TRANSMIT A DIGITAL IMAGE VIA SATELLITE IN SUPPORT OF A COMBAT MISSION**
**113-578-4005**

**Conditions:**  In a tactical or garrison environment, given a receiving station with operator; computer with modems; graphic imaging software, such as Adobe PhotoShop; communication software, such as Timbuktu or White Night that is compatible with sender's communication software; Magnaphone MX 2020P portable satellite or equivalent; compass; azimuth and elevation angle charts; hardware and software manuals; telex and telephone country codes; a telephone; all cables and connectors required by hardware manufacturer; and a compatible power source.

**Standards:**  The standards are met when an uncorrupted copy of the image file is received.

| Performance Measures | Results | |
|---|---|---|
| 1.  Assemble magnaphone. | P | F |
|     a.  Assemble antenna following manufacturer's instructions. | P | F |
|     b.  Choose correct azimuth and elevation angle. | P | F |
|     c.  Power up magnaphone.  Terminal responds with a menu when system is warmed up. | P | F |
|     d.  Choose proper land earth station for satellite being used. | P | F |
|     e.  Ensure strong signal with signal strength meter. | P | F |
|     f.  Call international operator to test signal strength. | P | F |
| 2.  Connect computer to the magnaphone using computer's modem and cables. | P | F |
| 3.  Open Timbuktu/remote communication software. | P | F |
| 4.  Set proper baud rate and script settings. | P | F |
|     a.  Go to communication settings. | P | F |
|     b.  Set proper baud rate to match customer's settings (9600 bps recommended for satellite transmission). | P | F |
|     c.  Click on CONNECT VIA button. | P | F |
|     d.  Set proper script for satellite transmission. | P | F |
| 5.  Dial customer by inputting phone number and clicking on the DIAL button. | P | F |
| 6.  When connection is made, click on the EXCHANGE FILES button. | P | F |
| 7.  Choose file to be sent and click on COPY button. | P | F |
| 8.  When transfer of files is complete, click on DONE button. | P | F |
| 9.  Click on HANG UP button in the CONNECTED TO menu. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
  **Required**             **Related**
                       Appendix A (25M)

## TRANSMIT A DIGITAL IMAGE VIA LANDLINE IN SUPPORT OF A COMBAT MISSION
## 113-578-4006

**Conditions:**  In a tactical or garrison environment, given a receiving station with operator; computer with modem; graphic imaging software, such as Adobe PhotoShop; communication software, such as Timbuktu or White Night that is compatible with sender's communication software; hardware and software manuals; telex and telephone country codes; a telephone, class A access to local telephone company; all cables and connectors required by hardware manufacturer; and a compatible power source.

**Standards:**  The standards are met when an uncorrupted copy of the image file is received.

| Performance Measures | Results | |
|---|---|---|
| 1. Connect computer to local telephone line using computer's modem and cables. | P | F |
| 2. Open Timbuktu/remote communication software. | P | F |
| 3. Set proper baud rate and script settings. | P | F |
| 4. Dial customer by inputting phone number and clicking on the DIAL button. | P | F |
| 5. When connection is made, click on the EXCHANGE FILES button. | P | F |
| 6. Choose file to be sent and click on COPY button. | P | F |
| 7. When transfer of files is complete, click on DONE button. | P | F |
| 8. Click on HANG UP button in the CONNECTED TO menu. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
> **Required**                                                  **Related**
>                                                                                Appendix A (25M)

## PERFORM UPDATE OF A DIGITAL ARCHIVE
## 113-578-4007

**Conditions:**  Given an established digital archive; images and/or digital files to be added to archive; computer system with removable data storage capability, such as a Syquest drive, Bernoulli drive, or a CD-ROM writer; and graphic/compression software, such as PhotoShop.

**Standards:**  The standards are met when files are added to the archive, cataloged, and are retrievable from the archive.

| Performance Measures | Results | |
|---|---|---|
| 1.  If scanning in an image. | P | F |
|      a.  Determine area to be scanned. | P | F |
|      b.  Decide scanning resolution. | P | F |
|      c.  Acquire image. | P | F |
|      d.  Save file in the same format as other archived files. | P | F |
| 2.  All files. | P | F |
|      a.  Check file size of the file being added to archive. | P | F |
|      b.  Check diskette to verify there is enough space for new file, leaving at least 10 percent of diskette free. | P | F |
|      c.  Save file to diskette in established format. | P | F |
| 3.  Check copied file for corruption. | P | F |
| 4.  Catalog new file. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                         **Related**
                                               Appendix A (25M)

**PREPARE COLOR SEPARATIONS FOR REPRODUCTION**
**113-578-4008**

**Conditions:** Given a digital image; computer with color printer (if final is printed out); and graphic software, such as Adobe PhotoShop or equivalent, with manuals.

**Standards:** The standards are met when the image printed from the color separations creates a product that satisfies the requester's needs and requirements.

**Performance Steps**

1. A color separation is an image that was converted from RGB color to process or printing colors CMYK. Although it is possible to manually convert an image into the four different color separations, it is highly recommended that a graphic package, such as Adobe PhotoShop, be used to create the separations. The process is much quicker and much more accurate and depending on the printing shop doing the printing, it may be required. The following information is based on Adobe PhotoShop 3.0. If using another graphic software package, follow the instructions outlined in the user's manual.

2. In order for the printout to match the display on the screen, the monitor needs to be calibrated. To prevent the monitor from introducing a color cast to images, the monitor must be adjusted to make the grays as neutral as possible. Follow the instructions in the user's manual for calibrating the monitor.

3. Separating an image.
   a. Open the image.
   b. Choose CMYK Color from the Mode menu. This converts the image from RGB to CMYK.
   c. Save the image with a different file name to indicate that it is the CMYK version of the image.
   d. Compare the two images. Reopen the RGB version of the image and place it next to the CMYK image. There shouldn't be much difference between the two images. If the image has colors outside the CMYK gamut, then the RGB colors were converted to their nearest CMYK equivalents.

4. Identifying out-of-gamut colors.
   a. Ensure the Info palette is in view.
   b. Position the cursor in the bright blue at the top of the right window. In the Info palette, the CMYK numbers display exclamation points that indicate the out-of-gamut color.
   c. Choose Gamut Warning from the Mode menu. Adobe PhotoShop builds a color conversion table and identifies the out-of-gamut colors by displaying a neutral gray color. The new gradient turns gray. This warning color can be changed to make it stand out more from the image.
      (1) Choose Preferences from the File menu, then choose Gamut Warning from the submenu.
      (2) Click the medium-gray color swatch, then choose a bright green from the Color Picker and click OK.
      (3) Leave the opacity at 100 percent, then click OK. All of the out-of-gamut areas turn bright green.

**Performance Steps**

5. Correcting out-of-gamut colors.  Once out-of-gamut colors are identified, they can be corrected using different techniques.  Adobe PhotoShop can make the conversions automatically by converting to CMYK mode.  If the conversion isn't close enough, try one of the following.
    a. For a small area, use the sponge tool.
        (1) Double-click the dodge tool in the toolbox, then choose Sponge from the Tool menu in the Toning Tools Options palette.
        (2) Make sure Desaturate is selected in the palette mode menu and change the opacity to 80 percent.
        (3) Click the Brushes palette tab, then choose a large, soft-edged brush.
        (4) Drag the sponge through the bright green area.  Watch both windows.  As the colors become less saturated, they come into the CMYK gamut and the bright green warning color disappears.  In the RGB window, the out-of-gamut color changes to a less saturated color.  Be careful not to desaturate too much or the color may become muddy.
    b. For a distinct area, use the Color Range command.
        (1) Choose Revert from the File menu and click Revert.  The file reverts back to the last-saved version.
        (2) Choose Color Range from the Select menu.  The Color Range dialog box appears.
        (3) Choose Out Of Gamut from the Select pop-up menu in the Color Range dialog box.  The out-of-gamut areas in the preview box turn white.
        (4) Click OK to close the Color Range dialog box.  All the out-of-gamut pixels are selected.
        (5) Choose Adjust from the Image menu and Hue/Saturate from the submenu.
        (6) Drag the dialog box out of the way of the image.
        (7) Drag the Lightness slider to the left to -33.
        (8) Drag the Saturation slider to the left until the bright green gamut warning goes away.  Click OK.
        (9) Choose None from the Select menu.  This process brings the image into the range of printable colors.
        (10) Save the changes.

6. Customizing separation options.  The separation of an image is controlled by the settings in the Monitor Setup.  Printing Inks Setup, Separation Setup, and Separation Tables dialog boxes.  These options DO NOT affect the RGB images.  These setting affect image data only when the file is converted from RGB to CMYK.  Changes made to any of these settings after the image is converted to CMYK will not show.  The image must be reconverted to CMYK for the changes to take effect.
    a. Adjusting for printing inks and paper.
        (1) Choose Preferences from the File menu and Printing Inks Setup from the submenu.
        (2) Ensure SWOP (Coated) is selected in the Inks Colors pop-up menu in the Printing Inks Setup dialog box.  SWOP (stand web offset proofing) ink is the default setting.  This is the same setting used when separating an image.  By choosing the same ink, the difference caused by changing the dot gain is clearly visible.  Check with the print shop to obtain the ink type and the dot-gain information.

**Performance Steps**

      (3) Enter the dot gain and click OK.  Dot gain is a printing characteristic that causes dots to be printed larger than they should be, producing darker tones or color than expected.  Different printers and papers have different dot gains.

   b. Creating trap.  Trap is the overlap needed to ensure that a sight misalignment or movement of the plates during printing does not affect the final appearance of the printed image.  Overprinting colors slightly to prevent tiny gaps from appearing in the printed image is known as adding traps.  Adobe PhotoShop traps by spreading.  A spread trap overlaps a lighter color onto a darker color.

      (1) Zoom in on an area in which the colors blend too much.  This happens with thin light areas on darker backgrounds, as yellow letters on a dark blue background.

      (2) Choose Trap from the Image menu, enter a value, and click OK.

      (3) If the affect is too great or not enough, choose UNDO to return to the original image.  Choose another value and check the effect it has.  The effect can sometimes be too subtle to see on a composite view of the image, but it shows up very clearly on the yellow channel.

      (4) Once a value is chosen, save the file.

7. Printing a separated image.

   a. Open the image to be printed.

   b. Choose Print from the File menu.

   c. Ensure that the Print Color/Grayscale option is selected.

   d. Select the Print Separations option to print the file as four separations, then click Print. The image prints on four separate pieces of paper or film.

   e. Close the file without saving changes.

| **Performance Measures** | **Results** | |
|---|---|---|
| 1. Convert image from RGB to CMYK. | P | F |
| 2. Save image with a different file name, indicating it is the CMYK version. | P | F |
| 3. Identify out-of-gamut colors. | P | F |
| 4. Correct any out-of-gamut colors. | P | F |
| 5. Set ink type and dot gain settings. | P | F |
| 6. Create traps if necessary. | P | F |
| 7. Save file to diskette in established format. | P | F |
| 8. Print image. | P | F |
|    a. Open file. | P | F |
|    b. Choose Print from File menu. | P | F |
|    c. Select the Print Color/Grayscale option. | P | F |
|    d. Select the Print Separation option. | P | F |
|    e. Click Print. | P | F |
|    f. Close file without saving changes. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
| **Required** | **Related** |
| --- | --- |
| | Appendix A (25M) |
| | Appendix J (25M) |

## MAINTAIN A TECHNICAL REFERENCE LIBRARY
## 113-578-6017

**Conditions:** Given publications request; TOE or TDA listing; section SOP; DA Pams 25-30, 25-33, and 25-40; DA Forms 17 and 17-1; an established technical library; a publications checklist and any recently received publications or updates; and a place to store the reference material that allows for control of the material, such as a locking cabinet or storage room.

**Standards:** The standards are met when control procedures for checking out reference materials are in place, reference materials are organized by category, and reference materials/updates not on hand were ordered, either through the military publications system or from the equipment/software manufacturer.

| Performance Measures | Results | |
|---|---|---|
| 1. Inventory and list the technical publications on hand or on order. | P | F |
| 2. Determine which publications required by the section are not on hand or on order. | P | F |
| 3. Prepare DA Form 17 and DA Form 17-1 if needed, listing all required publications identified in performance measure 2. | P | F |
| 4. Post newly received publication updates in the appropriate publications. | P | F |
| 5. Place new publications in the library, using established filing system. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
| Required | Related |
|---|---|
| DA Pam 25-30 | AR 25-400-2 |
| DA Pam 25-33 | AR 380-19 |
| DA Pam 25-40 | |

## ASSIGN GRAPHICS PROJECTS
## 113-579-6003

**Conditions:** Given multiple DA Form 3903-R with varying complexities and priorities regarding the work, such as suspense dates and security classifications.

**Standards:** The standards are met when projects are scheduled to ensure that project suspense dates are met by the most cost-effective use of personnel, materials, time, and equipment. Classified documents are handled IAW to AR 380-5.

| Performance Measures | Results | |
|---|---|---|
| 1. Review DA Form 3903-R. | P | F |
|    a. Job description. | P | F |
|    b. Purpose and use of job. | P | F |
|    c. Time constraints (deadline). | P | F |
|    d. Size requirement. | P | F |
|    e. Security classification. | P | F |
| 2. Determine if more information is needed. | P | F |
| 3. Check availability of materials and equipment. | P | F |
| 4. Check security requirements (if needed). | P | F |
| 5. Determine subordinate's experience level. | P | F |
| 6. Assign work order. | P | F |
| 7. Record new projects on job board. | P | F |
| 8. Periodically check project, assuring the requirements are understood. | P | F |
| 9. Perform a final review of the project for accuracy and completeness. | P | F |
| 10. Have corrections made as necessary. | P | F |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any steps, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**
| Required | Related |
|---|---|
| | Appendix G (25M) |
| | AR 190-13 |
| | AR 25-1 |
| | AR 25-400-2 |
| | AR 380-19 |
| | AR 380-5 |
| | DA Pam 25-91 |

**INVENTORY GRAPHICS SUPPLIES AND EQUIPMENT**
**113-579-6005**

**Conditions:**  Given hand receipt(s) for the graphics facility equipment, listing of durable and expendable supplies to be inventoried, applicable supply catalog, suspense dates for completion, AR 710-2, and AR 735-5.

**Standards:**  The standards are met when inventories accounting for all equipment and supplies are completed IAW AR 710-2 and AR 735-5.

**Performance Steps**

1. Conduct a physical count of supplies and equipment on hand to ensure that all government property is accounted for, being properly used, and maintained.  Establish and maintain accounts for material in storage, on hand, in transit, or on consignment.  AR 710-2 and AR 735-5 contain the guidelines for accountability of equipment and supplies.

2. There are various inspections and inventories that can be made to verify equipment and materials.
    a. Receipt and issue of property inventory is conducted when receiving property from a supply support activity (SSA).
    b. Annual inventories are conducted once a year or every 12 months.
    c. Joint inventories are conducted when the hand-receipt holder is replaced.  All property listed on hand receipts is inventoried by the incoming and outgoing primary hand-receipt holder.  Thirty days is allotted to conduct the joint inventory.  When the inventory cannot be completed in the allotted time, request extension in writing to the commander/supervisor.
    d. Cyclic inventories can be conducted monthly, quarterly, or semiannually.  Inventory 10 percent of the property book items monthly, 25 percent quarterly, or 50 percent semiannually.

3. When a receipt, turn-in, and/or issue of property is made, perform the following:
    a. Check the document number and unit name on the receipt document.
    b. Check the item to ensure it matches the description on the receipt document.
    c. Count all items.
    d. Check end items for completeness.
    e. Ensure serial numbers on equipment match the serial numbers on documents.
    f. Make a visual check of the condition of the items.
    g. If serviceability of an item is questionable, notify the property book officer (PBO).

4. Various inventories are made by comparing the status of items on the property books and hand receipts.  Use a replenish expendable items as necessary.  Accountable items, however, must be accountable by stock number and quantity.

5. Equipment and materials can vary from expendable items, such as pencils, erasers, paper, and viewgraph material, to nonexpendable items like chairs, tables, computers, and projectors.  Without these inventories, there would be no way to account for the contents of the facility.
    a. Expendable and durable items are usually consumed during normal usage and require no formal accountability after issue.
    b. Nonexpendable items require property book accountability after issue.

## Performance Steps

6. Once the inventory is made, correctly annotate the appropriate forms and take any corrective actions as needed.  To efficiently operate a graphics facility, it is important to know what material and equipment is on hand, what may be needed, and how it may be ordered.

7. When an item on order is no longer needed, a cancellation request will be sent immediately to the SSA.

8. The Self-Service Supply Center (SSSC) is designed to improve supply and financial operations by reducing the workload.  The SSSC uses summary dollar accounting for selected supplies issued to customers on a self-service basis.  Only one SSSC is authorized at an installation. Local purchases, as a source of supply, may be employed at the direct support agency (SA)/general support agency (GSA) and the SSA level to satisfy requests submitted by supported units/maintenance activities.

9. On-hand property book items within allowances are turned in only if found to be unserviceable and determined to be nonrepairable by the supporting maintenance facility personnel.
   a. Turn in excess serviceable repair parts immediately.
   b. Turn in unserviceable repairables with a turn-in document and a request document.

10. Once the inventory is made, correctly annotate the appropriate forms and take any corrective actions as needed according to AR 735-5.

11. When property becomes lost, damaged, or destroyed, immediately report all discrepancies to supervisor or commander.  If an item cannot be accounted for, the person who signed for the item may be held accountable for its cost.  The report states in writing, the circumstances of the loss or damage, and a listing and description of the property involved. Use adjustment methods by processing:
    a. Department of the Army Report of Survey, DA Form 4697.
    b. Statement of Charges/Cash Collection Voucher, DD Form 362.
    c. Inventory adjustment report, DA Form 444.

12. The senior 25M is usually the responsible NCO in the graphics facility and should be fully aware of all regulations pertaining to the supply and accountability of graphic materials. Local SOP may dictate additional requirements.


## Performance Measures

| | Results | |
|---|---|---|
| 1. Compare document numbers to the receipt document. | P | F |
| 2. Confirm item description matches description on the receipt document. | P | F |
| 3. Physically count all items. | P | F |
| 4. Check serial numbers on items with serial numbers of the items.  Make a visual check of the condition of the items. | P | F |
| 5. If serviceability of an item is questionable, contact PBO. | P | F |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                        **Related**
    AR 710-2
    AR 735-5

## ESTABLISH DRAWING RESEARCH FILE (MORGUE FILE)
## 113-579-6006

**Conditions:**  Given illustrations, photos, graphics, and so forth, file folders and labels, containers in which to file folders, and an area for storing the containers.

**Standards:**  The standards are met when files are labeled with general headings; a consistent, understandable classification system is in place; and all artwork is laid flat (not folded or creased) and labeled.

| Performance Measures | Results | |
|---|---|---|
| 1.  Collect applicable illustrations and/or photographs. | P | F |
| 2.  Establish classification system. | P | F |
| 3.  Label pictures IAW classification system. | P | F |
| 4.  File material IAW classification system. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
   **Required**                                        **Related**
                                                        Appendix A (25M)

## EVALUATE A GRAPHICS PROJECT
## 113-579-7002

**Conditions:**  Given a graphic project under development, the illustrator(s) involved with the project, graphics section SOP with established standards, and DA Form 3903-R with project requirements.

**Standards:**  The standards are met when the finished product meets the requirements of the DA Form 3903-R, basic principles of color theory, layout, design, and composition.

| Performance Measures | Results | |
|---|---|---|
| 1.  Review DA Form 3903-R for project requirements. | P | F |
| 2.  Evaluate project against the graphics checklist, using all sections that apply. | P | F |
|     a. Design. | P | F |
|         (1) Unity. | P | F |
|         (2) Balance. | P | F |
|         (3) Rhythm. | P | F |
|         (4) Dominance. | P | F |
|     b. Text. | P | F |
|         (1) Proofing. | P | F |
|         (2) Hierarchy. | P | F |
|         (3) Legibility. | P | F |
|         (4) Readability. | P | F |
|     c. Graphics. | P | F |
|         (1) Color. | P | F |
|         (2) Quality. | P | F |
|         (3) Size. | P | F |
|         (4) Appropriateness. | P | F |
|         (5) Following instructions. | P | F |
|         (6) Overall effect. | P | F |
|         (7) Neatness. | P | F |
| 3.  In the event the project does not meet the standard: | P | F |
|     a. Indicate any area that fails to meet established standards. | P | F |
|     b. Explain how to bring the project up to established standards. | P | F |
|     c. Review project again. | P | F |
|     d. Repeat until project meets established standards. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                                **Related**
                                            Appendix H (25M)
                                            Appendix J (25M)

**COMBINE VISUALS FOR A MULTIMEDIA PRESENTATION**
**113-579-8008**

**Conditions:**  Given completed DA Form 3903-R; computer system with necessary hardware, such as a scanner or digital camera; graphic software, such as PowerPoint or Premiere; and any artwork, photographs, video, or audio to be included in the visual.

**Standards:**  The standards are met when the final product satisfies DA Form 3903-R requirements and is approved by the requester.

**Performance Steps**
**NOTE:  Although PowerPoint 4.0 is used, the principals should apply to any presentation package.**

1. When PowerPoint opens, it presents you with a "Creating a New Presentation..." dialog box.
    a. Select Template to use one of the built-in templates.  Select Blank Presentation if there is an established format that must be followed.  Click OK.
    b. Choose the slide layout from the AutoLayout dialog box.
        (1) If there isn't a layout that fits your needs, choose a blank slide.  This will not lock in the slide layout for the entire presentation.  You are presented this same dialog box every time you add a new slide.
    c. Click OK.

2. Master slides.
    a. Color schemes, graphics, and text set on the Master Slide are present throughout the entire presentation.
    b. The Master Slide can be accessed by holding down the shift key while clicking on the SLIDE button in the lower left of the screen.  Do not hold down the shift key when clicking on the button to return to Slide.
    c. The options under the Format menu changes, depending on which slide view is chosen.

3. Text slides.
    a. To create an Outline, click on the OUTLINE VIEW button in the lower left corner of the screen (next to the SLIDE button).
    b. Outlines can be imported into a PowerPoint presentation.  PowerPoint recognizes Microsoft Word files as well as other word processors.
    c. Using Builds allows you to control just how the text is presented to the audience.
        (1) Click the SLIDE SORTER button, next to the OUTLINE button in the lower left.
        (2) Click the slide, a black outline appears, confirming which slide was selected.
        (3) Choose the effects desired from the Build menu.  Choose to simply build the body of text a line at a time or to have the previous line dim with each subsequent new line.
        (4) Click OK.

4. Graphic slides.
    a. AutoShapes.  PowerPoint has a collection of shapes that can easily be added to a slide.
        (1) Click on the AUTOSHAPES button on the left side toolbar.  A submenu appears with 24 different shapes.
        (2) Click on a shape.  The pointer becomes a cross.

**Performance Steps**

        (3) Click where you want the shape to start.  Hold down the mouse and draw out the shape.  Release the mouse where you want the shape to end.

    b. FreeForm drawing.

        (1) Click on the FREEFORM drawing button, left side toolbar.  The pointer becomes a cross when over the slide.

        (2) Place the cursor where you want to begin the drawing.

        (3) Hold down the mouse.  The cross becomes a pencil.

        (4) As long as the mouse is held down, you can use the pencil.  When the mouse is release, the cross appears.  This allows a straight line to be created from the point the mouse was released.

        (5) To create a closed form, bring the pencil near the start position and release the mouse and then click.

        (6) To create an open form, double click where you want the drawing to end.

5.  Editing objects.

    a. To change an object's color.

        (1) Select the item.

        (2) Select Colors and Lines menu from the Format menu.  This menu allows you to choose the fill color, the line color, and/or the line style.

        (3) Make selections and click OK.

    b. Change the size of an object.

        (1) Click on the object to be edited.

        (2) Click on and drag any of the control handles (small squares that surround the object) to resize the object.

        (3) To keep the original proportions, hold down the shift key while dragging a corner.

    c. An object's position can be changed by simply clicking on the object and dragging it to a new position.

    d. Orientation.

        (1) An object can be flipped or rotated in 90-degree increments using the Rotate/Flip option under the Draw menu.

        (2) The Free Rotate Tool, located under the Rotate/Flip option, allows the object to be freely moved in 360 degrees around its center.

6.  Inserting Items.

    a. PowerPoint allows you to import art from either Microsoft Clip Art collection or from other art sources.  Images in the following formats can be added:  *.wmf, *.hgl, *.cgm, *.eps, *.tif, *.pcx, *.adi, *.dxf, *.gif, *.cdr, *.wpg, *.plt, *.pcd, *.pic, *.pct, *.drw, *.tga, *.dib, *.bmp.

      (1) Clip art.

         (a) Choose Clip Art from under the Insert menu.

         (b) Scroll through the art and make a selection.  Click OK.

         (c) Position and size the clip art in the same manner as any other object.

      (2) Photos or other types of art work.

         (a) Choose Picture from under the Insert menu.

         (b) Navigate to the disk or directory (folder) and select the file to be added.  Click OK.

         (c) Position and size the clip art in the same manner as any other object.

      (3) Charts/graphs.

         (a) When adding a new slide, you can opt for the type of slide that you need and then double click on the slide to launch the appropriate software package.

**Performance Steps**

        (b) If you are inserting a chart or graph into an existing slide, click on the CHART or GRAPH button on the formatting toolbar. The appropriate package launches.

        (c) Graphs. Choose the type of graph needed. Fill in the data and verify the data. Edit as necessary. Under File, choose Exit and Return to Presentation.

        (d) Choose the chart style from the Style menu. Create the chart and verify the data. Edit as necessary. Under File, choose Exit and Return to Presentation.

    (4) Video clips.

        (a) From the Insert menu, choose either Movie or Object.

        (b) Choose either Create New or Create from File. Navigate to the file location.

        (c) Select file and click OK.

7. Arranging slides, transitions, and builds.

   a. The easiest way to arrange your slides is in the Slide Sorter view.

    (1) Switch to the Slide Sorter view (button is in the bottom left corner).

    (2) Click on the slide to be moved. It is highlighted with a black frame.

    (3) Drag the slide to its new position. Release the mouse.

   b. Transitions are the effects used to go from one slide to the next.

    (1) It is best to pick one and use it throughout the presentation to avoid distracting the audience. Depending upon the presentation system, some effects can be very time-consuming. Choose one that will not keep the presenter or the audience waiting.

    (2) If the presentation is to be set to a recorded sound track, the timing option may be used to synchronize the slide's screen time with the audio track.

    (3) Switch to the Slide Sorter view and select a slide or a group of slides. You can also set the transition from the Slide view. Choose Transitions from the Tools menu. This only affects the slide in view.

    (4) Choose the transition effect desired from the Transition Effect menu. No Transition Effect is the default.

    (5) If you choose Transition from the Tools menu, you will find more options, to include the Advance options. Make selections and click OK.

    (6) A small slide with an arrow appears under the slide or slides to indicate that a transition was selected.

    (7) Switch to Slide Show to view the transition effects and to check the timing if the Auto Advance option is used.

    (8) Make any necessary adjustments.

   c. Builds are essentially transitions within a slide. They are used to display one line of text at a time and/or to dim a previous line of text.

    (1) Build options can be set the same way transitions are set, either one slide at a time or a group at a time.

    (2) The same cautions apply to builds as to transitions; keep it consistent and keep it moving.

    (3) Switch to the Slide Sorter view and select a slide or a group of slides. You can also set the build from the Slide view. Choose Build from the Tools menu. This only affects the slide in view.

    (4) Choose the effect desired from the Build menu.

    (5) The Build icon (three small butted lines) appears under the slide or slides to indicate that a build effect was selected.

    (6) Switch to Slide Show to view the build effects.

    (7) Make any necessary adjustments.

**Performance Steps**

8. Output.
   a. Computer screen is the easiest method of giving a PowerPoint presentation. If more than one or two people will be viewing the presentation, a large monitor or a projection system connected to the computer is necessary. To display to screen, open the saved presentation and click on the Slide Show button (bottom left). The presentation begins. Depending on the transitions selected, it either advances automatically or the presenter clicks the mouse.
   b. Printed presentations are created by choosing Print from the File menu. A print dialog box appears. There are several options, such as builds. If there are slides with builds, the presentation may be printed with or without the builds. Make selections and click OK.
   c. Film. Depending on your system's capabilities, a presentation may be saved to 35mm slide film or to video tape. Follow the manufacturer's instructions.

| **Performance Measures** | **Results** | |
|---|---|---|
| 1. Check DA Form 3903-R. | P | F |
|    a. Purpose. | P | F |
|    b. Project suspense. | P | F |
|    c. Presentation location. | P | F |
|    d. Request final medium. | P | F |
| 2. Create thumbnail sketches and have requester approve if necessary. | P | F |
| 3. Create computer rough from thumbnail. | P | F |
| 4. Have requester approve rough if necessary. | P | F |
| 5. Ensure all imported files are compatible with presentation system. | P | F |
| 6. Make any necessary changes. | P | F |
| 7. Complete multimedia visuals. | P | F |
| 8. Perform quality control check. | P | F |
|    a. Check for data accuracy. | P | F |
|    b. Check spelling. | P | F |
|    c. Check visuals on intended computer system for possible discrepancies. | P | F |
| 9. Make necessary corrections. | P | F |
| 10. Complete DA Form 3903-R. | P | F |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**
| Required | Related |
|---|---|
| | Appendix A (25M) |
| | Appendix J (25M) |

# Skill Level 3

# Subject Area 4: Facility Manager

**WRITE A GRAPHICS FACILITY STANDING OPERATING PROCEDURE (SOP)**
**113-579-7003**

**Conditions:**  Given unit's TDA/TOE, list of available personnel and equipment, DA Pam 25-91, FM 101-5, and higher headquarters' SOP.

**Standards:**  The standards are met when the unit commander approves the SOP.

| Performance Measures | Results | |
|---|---|---|
| 1.  Determine which important activities or procedures recur. | P | F |
|    a. Observe subordinates when they perform selected procedures. | P | F |
|    b. Research and take notes on all current SOPs, publications, and directives that pertain to the procedures. | P | F |
|    c. Compare notes in previous steps. | P | F |
|    d. Ensure all steps are included in the procedures and meet all requirements of existing publications and directives. | P | F |
|    e. Select the one procedure that prevails. | P | F |
| 2.  Modify procedures as necessary to make it efficient. | P | F |
| 3.  Write all the following sections required for an SOP. | P | F |
|    a. Purpose.  Statement of the general coverage and uses, including applicability and special contingency. | P | F |
|    b. Scope.   A section/paragraph explaining to whom the SOP applies. | P | F |
|    c. Definition.  Explains terms and acronyms. | P | F |
|    d. Responsibilities.  Explains the major functions of the supervisor and any subordinates involved in the procedure. | P | F |
|    e. Procedures.  A step-by-step explanation of how the process is done.  Also included in this section are performance standards and quality assurance information.  (Express performance and quality standards in measurable terms, such as quantity, quality, cost, timelessness, and effort.) | P | F |
|    f. Files (if any).  State what files will be set up, how they will be maintained, and where they will be located. | P | F |
|    g. References (if needed).  List all of the publications that govern, guide, or pertain to the procedure. | P | F |
|    h. Annex.  Include examples, records, and formats.  They should be labeled alphabetically, in sequence. | P | F |
|    i. Appendix.  Use for frequently referenced publications or extracts of publications that are used during the procedure.  An appendix is labeled alphabetically, in sequence. | P | F |
| 4.  Compare your draft SOP to all steps and modify the draft.  References make it necessary to conform to all current policies. | P | F |
| 5.  Submit the draft SOP for approval and revise if necessary. | P | F |

| **Performance Measures** | **Results** | |
|---|---|---|
| 6. Prepare a final SOP.  Include a signature block of the person who authorized the SOP. | P | F |
| 7. Determine the number of copies needed and reproduce the SOP. | P | F |
| 8. Distribute copies of the SOP and file a copy. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| DA Pam 25-91 | Appendix A (25M) |
| FM 101-5 | |

**ESTABLISH A WEBSITE**
**113-579-8009**

**Conditions:** Given a computer with scanner; a text editor, such as Notepad in Windows or BBEdit on a Macintosh; web page designing or HTML software, such as FrontPage, PageMill, or HomePage; file server with web server software; graphic image software, such as Adobe PhotoShop; and a web browser, such as Netscape or Internet Explorer.

**Standards:** The standards are met when the web page meets all DA web information service guidelines, can be properly viewed with a web browser, and is approved by the requester.

**Performance Steps**
**NOTE: It is not possible to address all of the different web authoring software packages available today. This is a very basic approach to producing a web page. You are encouraged to use a commercial package and to experiment. For the sake of instruction, Netscape is used as the example of a web browser.**

1. Review HQDA web guidance, "Guidance for the Management of Army Websites," which is available on the U.S. Army homepage. Check periodically for changes or updates to the policy.

2. Provide the following information or hyperlinks to the following information:
   a. Organization missions and functions.
   b. Organizational structure, listing, or hyperlinking to parent and subordinate command or organization websites.
   c. Provide electronic mail address, phone number, or mail address for the website's point of contact.
   d. Provide a hyperlink to the U.S. Army homepage (http://www.army.mil).

3. Security.
   a. Ensure that privacy and security issues have been addressed before posting organizational charts containing individuals names and other personal information.
   b. No classified, sensitive, For Official Use Only (FOUO), Freedom of Information Act (FOIA)-exempt information, or information that cannot be released under the Privacy Act will be made available to the public through WWW.

4. Webmaster responsibilities.
   a. Institute a review process to ensure that information provided on the website is current, timely, and cleared for public release.
   b. The homepage is registered with the U.S. Army homepage webmaster.
   c. Ensure that websites do not have hyperlinks to commercial sites or personal homepages or websites. Use of commercial logos or trademarks is prohibited.
   d. Ensure that information published represents the official Army position and is properly cleared for public dissemination.
   e. Provide the highest possible level of assurance that information made available to or received from the public does not contain malicious software code such as viruses, trojan horses, logic bombs, bacteria, and worms; and if it does, to sufficiently notify the user before the download begins.
   f. Respond to user email and direct queries or requests for information to the responsible party within the organization.

| **Performance Measures** | **Results** | |
|---|---|---|
| 1. Review the Guidance for the Management of Army Websites at www.army.mil/DA _web_guidance.htm for changes to the policy. | P | F |
| 2. Ensure all information is: | P | F |
|    a. Accurate. | P | F |
|    b. Represents the official Army position. | P | F |
|    c. Properly cleared for public dissemination. | P | F |
| 3. Ensure appropriate security and access controls are in place. | P | F |
| 4. Provide a hyperlink to the U.S. Army homepage. | P | F |
| 5. Register homepage with the U.S. Army homepage webmaster. | P | F |
| 6. Provide email, phone number, or mail address of the point of contact responsible for the website content. | P | F |
| 7. Ensure that commercial logos or trademarks are not used. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| Website Guidance | Appendix A (25M) |
| | Appendix F (25M) |
| | Appendix J (25M) |

## MAINTAIN A WEBSITE
## 113-579-8010

**Conditions:** Given a computer; web page designing or HTML software, such as FrontPage, PageMill, or HomePage; and a file server with web server software.

**Standards:** The standards are met when the web page meets all DA web information service guidelines and all information is correct, current, and can be properly viewed with a web browser.

| Performance Measures | Results | |
|---|---|---|
| 1. Ensure all information is: | P | F |
|    a. Accurate. | P | F |
|    b. Timely. | P | F |
|    c. Represents the official Army position. | P | F |
|    d. Properly cleared for public dissemination. | P | F |
| 2. Ensure appropriate security and access controls are in place. | P | F |
| 3. Provide a hyperlink to the U.S. Army homepage. | P | F |
| 4. Provide email, phone number, or mail address of the point of contact responsible for the website content. | P | F |
| 5. Ensure that commercial logos or trademarks are not used. | P | F |
| 6. Respond to user emails and direct queries or requests for information to the appropriate individual. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
| Required | Related |
|---|---|
| Website Guidance | Appendix E (25M) |
| | Appendix F (25M) |

## ESTABLISH A DIGITAL ARCHIVE FILE
## 113-579-8011

**Conditions:**  Given a computer with a mass storage device, such as Bernoulli or Syquest, with compatible diskettes, digital images, graphic and/or compression software, and containers to store diskettes.

**Standards:**  The standards are met when images are saved in JPEG format and a filing system is created that will store, catalog, and retrieve files with a given computer system.

| Performance Measures | Results | |
|---|---|---|
| 1.  Collect applicable graphic image files. | P | F |
| 2.  Establish cataloging system. | P | F |
| 3.  File images using cataloging system. | P | F |
| 4.  Label diskettes IAW cataloging system. | P | F |
| 5.  Store diskettes. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**
    **Required**                                            **Related**
                                                                   Appendix A (25M)

## PREPARE STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS) FOR TACTICAL DEPLOYMENT
### 113-626-2003

**Conditions:**  Given an operations order (OPORD); a SPEPS; a portable satellite; a graphic system, to include but not limited to an automated data processor with CD ROM, zip drive, or Bernoulli; video monitor; flatbed scanner; 35mm slide scanner; modem; communications interface; color printer; writable compact disk; selected software and accessories; and an S-250 shelter mount or crush-proof shipping containers with security devices; TC 11-6; TM 9-2320-280-10; TM 9-6115-642-10; TM 9-6115-660-13&P; all reference materials related to each piece of equipment, such as manufacturers' manuals; and graphic shop's SOP.

**Standards:**  The standards are met when equipment is packed and secured in crush-proof shipping containers or an S-250 shelter mount.

| Performance Measures | Results | |
|---|---|---|
| 1. Inventory all equipment and required manuals prior to packing. | P | F |
| 2. Perform an operation and serviceability check on each item. | P | F |
| 3. Check serviceability and continuity of all cables, to include spares. | P | F |
| 4. Inventory and inspect spare boards, accessories, and components. | P | F |
| 5. Inspect the grounding rod and wire. | P | F |
| 6. Inventory and inspect all tools. | P | F |
| 7. Pack and secure equipment in shipping containers with standard military tie-down and security locking devices or mount in the S-250 shelter to prevent damage. | P | F |

**Evaluation Guidance:**  Score the soldier GO if all steps are passed (P).  Score the soldier NO-GO if any step is failed (F).  If the soldier fails any step, show what was done wrong and how to do it correctly.  Have the soldier practice until he can correctly perform the task.

**References**

| Required | Related |
|---|---|
| Manufacturers' Manuals | Appendix A (25M) |
| TC 11-6 | Appendix I (25M) |
| TM 9-2320-280-10 | |
| TM 9-6115-642-10 | |
| TM 9-6115-660-13&P | |

# APPENDIX A

**(Excerpt From)**

# ELECTRONIC IMAGING COURSE

## A-1.  INTRODUCTION TO COMPUTERS

   a. **History of desktop publishing.**

   (1)  No one knows exactly when humans first started communicating using the written word, but we do know that the Phoenicians started using some form of a written alphabet at about 2000 BC.  There were no printing presses or even paper (the Chinese invented paper at about 100 AD), so the Phoenicians wrote on clay tablets or on animal skins.

   (2)  All books were handwritten before the printing press was invented.  They were either orally transcribed or copied word for word out of other books.  These books, called illuminated manuscripts, were extremely detailed and ornate, and were very rare and costly.  This all changed in the 1440s.

   (3)  Johannes Gutenberg, a goldsmith from Mainz, Germany, invented the first moveable type press.  Gutenberg's press used individual cast lead pieces with raised letters that could be arranged into words and sentences.  This new invention made books much easier and faster to produce and opened up the world to literature.  Using movable type was much faster than hand illuminating, but required skilled labor.  Typesetters, the people who picked the individual letters out and arranged them to print correctly, were only so fast, making this method time-consuming.

   (4)  In the 1800s printing presses became much faster by replacing much of the manual labor with horse, waterwheel and steam power.  In the early 1800s the invention of roll paper (called a web) made it much easier to print; thus widely distributed newspapers were born.

   (5)  The line-casting machine of the late 1880s was the next major change in publishing.  This machine allowed an operator to type the lines into a keyboard, and the machine then set the type by pouring hot metal into the mold.  This created an entire metal line of type called a slug.  This process is known as hot type.

   (6)  It also became easier to print photographs by using a process called half-toning.  Half toning is a process where the grays in a photo are reproduced by variable sized dots of black ink.  The larger the black dot, the darker the area will appear on the printed page.  In the 1920s this process was combined with color photography dyes and the four-color printing process was born.  In four-color printing, each page is printed four times.  Each time it is printed, a different ink color is used.  There are only four inks used, and all colors can be reproduced by combining these colors. The colors are cyan, magenta, yellow, and black and are called CMYK colors.

   (7)  Cold type is the next step in printing.  In this process, different letters are stored on transparency films and are projected onto a light sensitive emulsion.  By using different projection lenses, type printed at different sizes.  This process quickly replaced hot type in the 1950s.
   (8)  Digital typesetting began to replace this cold type process in the 1970s.  Type can be quickly written, set, and printed by using computers and digital technology.

b. **Traditional publishing process.**

(1)  Traditionally, creating a document involved several distinct steps.  These steps were usually accomplished by different people working separately to complete the project.  Creating a document usually involves bringing words, graphics, and photos together into one cohesive, easy to look at layout.

(2)  First, the words.  A writer writes the story, usually using a computer as a word processor.  A hard copy or printed copy of the story is given to the editor, who checks it for accuracy and completeness.  The editor returns it to the writer, who makes any necessary changes.

(3)  At the same time the writer is working on the story, a photographer and a graphic artist are also at work.  The photographer is taking pictures, developing film, and making prints to accompany the story.  A graphic artist is creating any graphics or illustrations that is needed to go with the text and photographs.

(4)  A designer is hard at work deciding how all of these elements will be combined onto the page.  The designer decides where each element, such as pictures, words, or illustrations will go and decides what type of headlines, columns, graphic elements, and other design elements to use.

(5)  After each respective person has completed his or her part, all the work is sent to the paste-up artist, who literally cuts and pastes the elements into one layout to be printed.

(6)  After the pasted layout is approved, it goes to the copy camera where films are made.  The films then go to the printing press where the final pages are printed.

c. **Desktop publishing process.**

(1)  Although the final product is similar, the process for creating a document electronically is different, as well as much easier and faster.  The writer still creates the story, but instead of printing a copy for the editor, the writer electronically transmits the story to the editor.  The editor can then edit and make changes immediately.  When the story is completed, it is again electronically transmitted; this time to the designer.

(2)  The photographer and graphic artist also use computers.  The photographer takes pictures using a digital camera, and the images are instantly available for editing and enhancement.  There is no need to make prints.  The final pictures are electronically transmitted to the designer.  The graphic artist uses his or her computer to create the illustrations.  The artist uses many of the traditional tools, but the tools are all electronic rather than manual.  When the illustrations are complete, they too are sent to the designer electronically.  Nothing has been printed thus far.

(3)  You will note that we keep saying that each element of the story is sent to the designer.  In electronic publishing, there is no paste-up artist.  The designer does the layout on the computer and integrates all the elements without the need for hard copies, cutting, or gluing.

(4)  Once the design is completed, films are made on a special high-resolution printer called an imagesetter.  These films are then sent to the printer who prints the final pages.

d. **Desktop publishing tools.**

(1)  To create documents on a computer we must first have a computer!  When buying a computer with the intent to use it for desktop publishing, there are several things to consider.  First is speed.  Different computers work at different speeds.  For electronic publishing we need a computer that is as

fast as we can afford.  We will be using files that are very large and a slow computer may take quite a long time to accomplish normal tasks.  Second, we should consider memory.  Electronic publishing files do get large, and more memory will make even a slow computer seem as if it is running faster.  Get as much as you can!  To do any serious electronic publishing you should consider 24 megabytes (MB) of memory to be a minimum.

(2)  A computer monitor is a high-resolution television that displays your work.  A monitor may be one of the most important pieces of hardware that you use, because you spend all day looking at it.  When considering a monitor, one of the most important considerations is size.  A larger monitor makes it easy to see the entire page or layout at one view.  A smaller monitor forces you to scroll around to see the entire document which does not allow you to get the feel of how all the elements of the page work together.  Consider a 17-inch monitor to be the minimum for electronic publishing, but most professionals use a 21-inch.

(3)  A scanner is a device to let you get photos, art, or text into the computer.  Much like a copier, a scanner copies whatever you put into it and presents it on the screen.  The two types of scanners are the flatbed and film.

(a)  A flatbed scanner scans flat objects such as pages, photos, and flat artwork.  These are extremely useful for placing existing art or pictures into a new layout.

(b)  Drum and transparency are two types of film scanners.  Transparency scanners are usually smaller and faster than drum scanners.  Drum scanners are more expensive, but much higher quality.  Both types are used to take negatives or slides and scan them for use in the computer.

(4)  As we have said, electronic publishing files can get large.  We also regularly move these files from one computer to another, usually in different locations.  What we use to accomplish this are large, removable, portable storage devices.  These can be external hard disks that can be moved or removable cartridge systems.  Removable cartridge systems are good for backing up information for future reference, as well as for storing files while moving from computer to computer.

(5)  Printers are used to produce proof prints and tests before outputting films in the imagesetter.  Any high quality printer can be used, although the best use PostScript, which is a type of printing language that most electronic publishing software use.  You would also want a fast printer.  Who wants to wait all day to see how a layout looks?

(6)  Software is what makes the computer do all of its neat tricks.  There are many different types and brands of software, but only a few such as word processing, page layout, illustration, and image editing are really needed.

(a)  Word processing is software that lets the computer act as an expensive fancy typewriter.  It allows you to enter words and then rearrange them.  You can also do spell and grammar checks and most have a built-in dictionary and thesaurus.  You can also do advanced functions like finding a certain word or group of words and replacing them with something else.

(b)  Page layout software is the heart of an electronic publishing system.  You can create document layouts and import words, graphics, and pictures from other programs.  You can add headlines, boxes, colors, and many other graphic devices.  These applications make it very easy to try new ideas and different layouts with just a push of a button.

(c)  Graphics/Illustration software turns the computer into a powerful artist's canvas.  You can use many tools to draw shapes and lines and create complex illustrations.  There are many options for filling and colors.  Images can be combined, altered, and saved.

(d)  Image Editing software is used to integrate photographs into the computer.  Using image editing software, you can easily get a picture from a digital camera or scanner and do all the traditional darkroom effects.  You can lighten, darken, crop, enlarge, dodge, burn, and color correct.  Image editing software also allows the user to create composite photos by combining two or more images into one new photo illustration.

e.  **Computer basics.**

(1)  A computer translates keyboard punches and mouse movements into commands and actions by using the binary system.  The binary system is a system of codes that allows all computers to speak the same language, the language of 1s and 0s.  The binary system is a collection of 1s and 0s arranged in a code to represent other information.  Each 1 or 0 is called a bit, and it is the smallest part of information that a computer uses.  A 1 represents an on bit signal to the computer, and a 0 is an off bit.  These 1s and 0s act as switches that tell the computer to do something.

(2)  A 1 or a 0 cannot represent all the letters, numbers, and symbols that we use.  Each bit is always part of a larger group called a byte.  A byte is a grouping of eight bits, and looks something like 01101001.  There are 256 different possible combinations of these 1s and 0s ($2^8$= 256).  It is in this format of eight bits that all the letters, numbers, punctuation, and special characters of the English language can be created.  Other languages (Japanese for instance) require more bits in a byte, because they have more characters.  Japanese binary code is based on bytes with 16 bits.

(3)  We also speak about memory size and disk capacity in terms of bytes.  It would be extremely inconvenient to say, "I have 32,000,000 bytes of memory."  So abbreviations were formulated.  First, 1,000 bytes is abbreviated as 1 Kilobyte or 1 K.  Next, 1,000,000 bytes is called 1 Megabyte or 1 Meg.  Finally, 1,000,000,000 bytes is called 1 Gigabyte or 1 Gig.  There are higher levels, but these three are enough most of the time.  So in the example of 32,000,000 bytes, it would be much easier to say, "I have 32 Meg of memory."

(4)  Temporary and permanent storage are two ways the computer records and stores information for use in the future.

(a)  Temporary storage is memory that the computer uses to store information while the power is on.  Sometimes called volatile memory because it is not permanent.  Random access memory (RAM) is one type of temporary memory.  RAM is where the computer stores applications and files that are currently being used.  RAM is extremely fast for the computer to access, this causes the computer to run much faster than it has to when using other types of storage.  RAM chips come on little cards called single in-line memory modules (SIMMs).  Users can buy and install new SIMMs, which will make all of your computing faster.  Remember, anything stored in RAM is destroyed when the computer is shut down.

(b)  Video random access memory (VRAM) is special RAM memory that is dedicated to running the video output.  Adding more VRAM makes the screen redraw faster and allows a higher color bit depth to be displayed.

(c)  Permanent storage is used to store things that you want to use again.  Permanent storage allows you to keep documents and files and to move them from one computer to another.  Floppy disks are one type of permanent storage.  New disks hold about 1.4 MB of data, but older disks with capacities of 800 K or 400 K are still around.  New disks are called high density (HD) and can be identified by the

HD letters on the top. They also have an extra hole on the top left of the disk as you are facing it. Floppy disks are relatively slow, so it is not practical to work from a floppy. Floppies are very convenient for moving and storing small files, because they are small, cheap, and reliable.

(d) Hard disks are another type of permanent storage. Hard disks are usually internally installed in a computer, although external and portable units are available. While floppies are designed mainly to store files and documents, hard disks are also used to store applications that will be used regularly. Hard disks come in many different capacities; from 80 MB up to many gigabytes (GB), but the most common is in the 250 to 750 MB range. Hard disks are much faster than floppies, but not nearly as fast as RAM.

(e) Removable media are similar to floppies in that they can be removed from the drive and taken to a different computer for use, although they have much higher storage capacity. There are many different types and brands of removable media, and capacities from 44 MB up to 500 MB are not uncommon. Common types of removable media are magneto optical that uses lasers and magnetic coding to store data; Syquest that uses magnets and platters similar to normal hard disks; digital tape that uses magnetic tape similar to that of audio tape; and many others. Most removable disks are not as fast as hard disks but are much faster than floppies. These are all ideal for moving and storing large files and for transporting large files to other computers. Additionally, removable disks are good for backing up important information and archiving, especially digital tape, which can hold very large amounts of data. Some hold more than 8 GB, but they are somewhat slow.

(f) Read only memory (ROM) is permanent memory installed in the computer. This memory is similar to RAM, except RAM is erased when the computer is turned off. ROM usually holds operating instructions and codes that tell the computer to act a certain way. Although very important for the computer, the user does not have to think much about ROM because we cannot really affect it.

(g) Compact disk-read only memory (CD-ROM) uses a system of lasers and binary information stored on a thin metal and plastic disk that holds about 650 MB of data. Much like a record player needle, the laser tracks around the disk reading the small pits and lands that represent the 1s and 0s of the binary code. Although hardware is now available to write your own CDs, most people do not have it so they rely on disks made by others. CDs hold lots of information and are excellent for storing large databases and images. Once recordable CDs are more economical, they will be ideal for storing huge amounts of information.

f. **Central processing unit (CPU).**

(1) The CPU is essentially the brain of the computer. Millions of tiny switches, resistors, and wires are microscopically etched on a small piece of silicon that replaces the vacuum tubes and wires of the first computers. All information that a computer handles travels through the CPU. When you push a button on the keyboard, a small chip in the keyboard converts the letter into the binary code. The code then goes to the CPU, which decides what to do with the information. The CPU decides whether it should display a letter on the screen or execute a command.

(2) Intel or Motorola makes the two main types of current CPUs. Typically, Intel chips are used in IBM PCs and compatible clones. Intel chips are identified by a code name, the most recent being the Pentium and before that the 486, 386, and others. The higher the number, the newer or faster the chip.

(3) Motorola makes chips that are used in Macintosh computers. These too are identified by code numbers. The 68040 is the most recent with 68030 and 68020 being older models.

(4)  Both of these chips were originally based on a system called Complex Instruction Set Computing (CISC).  This technology has been around for a while and is on the verge of being replaced by a newer technology called Reduced Instruction Set Computing (RISC).  Motorola was the first to switch to the newer, faster CPUs.  RISC processors are much faster at certain operations, although they generally require more RAM and hard disk space.  A new chip that uses this RISC technology is the PowerPC chip, made by a joint venture between IBM, Apple, and Motorola.  Currently Apple uses it in their Power Macintosh line of computers, although IBM has recently introduced their version of the RISC processor.  These new chips will eventually replace the Intel and Motorola designs.

g.  **Monitors.**

(1)  A monitor is a high-resolution television that the computer uses to display work.  Both televisions and monitors work by displaying picture elements or pixels.  A pixel is the smallest individual unit of an image.  Pixels are a combination of three primary colors–red, green, and blue.  Depending on how bright each dot of red, green, and blue is determines what color appears on the screen.  Depending on how the pixels are arranged determines what the screen looks like.

(2)  Pixels are formed by three cathode ray emitters, in a cathode ray tube, one for each color.  These emitters are at the back of the monitor and point toward you as you face the screen.  As the emitters shoot beams of electrons toward you, they strike a phosphor coating on the back of the glass picture tube.  The charged energy causes the phosphor to glow briefly, and this glow forms the image you see.

(3)  One concern with monitors is resolution.  Resolution is the measurement of the number of pixels on a screen at any one time.  The more pixels on the screen at one time, the more detail the image will have.  Some monitor and computer configurations are able to change resolutions.  These monitors are called multisynch and are useful because you can have one resolution set to allow you to see an entire image and then change resolution to see just a single part of an image.

(4)  A second monitor concern is bit depth.  Bit depth is the number of colors that the monitor is capable of displaying at any one time.  For example, 1-bit color has only two colors, black or white; 4-bit color is 16 colors (or shades of gray).  Common bit depths are 16 bit (32,768 colors or shades) and 24 bit (16,777,210 colors or shades).  It is important to have a higher bit depth because the higher the bit depth, the more detail that will be visible.  This is especially useful in image editing and illustration software.

(5)  A concern with bit depth is that it is dependent on the VRAM the computer has, so you may be limited to lower bit depth if you do not have enough VRAM.  Also, the higher the bit depth you have set, the more computations the computer takes to redraw the screen, so everything may run slower.  It is a good idea to set the bit depth as low as possible so as not to waste speed.

(6)  The third concern with monitors is the scanning frequency.  The cathode ray tube draws the screen starting at the top left (as you look at it) working to the right.  When they get to the end of the first line, they move back to the beginning of the second line (just as we read).  The beams scan each line of the screen, one pixel at a time.  The phosphor glows long enough to make it seem as if the screen is lit continuously.  When the entire screen has been drawn, the beam moves back to the top and starts over.  The screen is redrawn in this manner 60 to 75 times per second!  This is called scanning frequency.  If it redraws any slower than this, you would see the screen flicker.  Scanning frequencies are represented by a number of hertz or cycles per second.  So a monitor with a scanning frequency of 65 Hz redraws the screen 65 times per second.

h. **Input devices.**

(1)  A keyboard is probably the most common type of input device.  A keyboard is a collection of switches and a small microchip that converts the keypunches into binary code.  Every time you push a key a circuit is completed, which sends a signal to the CPU and either causes an action or displays a character on the screen.  The keyboard that is most common today is called the QWERTY keyboard, named for the keys in the top left row (Q, W, E, R, T and Y).  The keyboard is laid out as it was in the early 1800s to slow typists down by forcing the fingers to move a long distance between keystrokes.  Early typists got to be faster than their typewriters, causing many jams, so designers figured out this layout to slow them down.  There are other key layouts, most notably the Dvorak keypad, which put the most common letters under the fingers.  Although the Dvorak layout has proven to be a much faster way to type, old habits die slow and it has not caught on yet.

(2)  A mouse is a device that an operator uses to control the pointer.  It is much easier using a mouse than using arrow buttons to move to a specific spot on the screen.  A mouse also allows the user to point at specific areas of the screen to do an action without having to remember specific commands or codes.  A mouse has at least one button on it that can be used to select objects or perform a task.  Some mice have buttons that can be programmed to perform other functions.  The only hard thing about a mouse is to remember that the cord points away from the user.  A mouse works by being moved; as the user moves the mouse, a ball in the base of the mouse moves.  This ball turns two spindles that rotate two small shutters and a beam of light passes through the shutters.  As the mouse moves, the light pulses on and off and the computer translates this into a movement.

(3)  A graphics tablet resembles a large clipboard or notebook with a nonwriting pen called a stylus.  The user moves the pointer around on the screen using the stylus.  Once a person gets used to a graphics tablet, he or she can work much more accurately than when drawing with a mouse.  Some tablets have a clear covering for placing artwork under while tracing.  Tablets work by detecting disruptions in a magnetic field created by the stylus.  Stylus can be corded or cordless; however, most have batteries.

(4)  There are many other input devices available.  The three listed above are the most common for our purposes.  Other common devices include trackballs, touch-screens, and joysticks.

(a)  Trackballs resemble a large, upside down mouse.  Instead of pushing the mouse around, which rolls the ball, the user of a trackball actually moves the ball.  Like mice, trackballs have buttons, some of which can be programmed.  Trackballs are generally not as accurate as a mouse for fine detailed work, but require less motion for general everyday use.

(b)  Touch screens are simple monitors that can sense where you touch them.  These are useful for demonstrations or displays where an entire keyboard would be distracting or impractical.

(c)  Joysticks are exactly like the controls that many video games use.  While great to use if you are pretending to fly a fighter jet, these are not very convenient for work.

i.  **Operating systems.**  An operating system is a piece of computer software that tells the CPU how to act.  All computers must have some type of operating system.  There are many types of operating systems on the market.

(1)  Microsoft-Disk Operating System (MS-DOS) is the operating system that most IBM PC and compatible computers use.  MS-DOS, usually referred to as DOS, is a command line interface, meaning when you use it; all you see is the screen prompt C:\.  At this prompt you must enter coded commands to execute functions.  Needless to say this is not a very user-friendly interface, so Microsoft developed an application called Windows.

(2)  Windows, which is a copy of the Macintosh interface, is called a Graphical User Interface (GUI. pronounced gooey).  Windows provides the user with graphical buttons and menus and converts the operator's input into the appropriate DOS commands.  Although Windows is much easier to use than DOS, it has several problems.  First, having to run both DOS and Windows uses lots of RAM and hard disk space that is not available to other applications.  Second, Windows is not as intuitive or easy to learn and use as a Macintosh.

(3)  While using Windows, you must have DOS also running.  With the Macintosh Operating System, all you have is a graphical interface.  The operating system is designed from the ground up to be both graphical and easy to use.  This type of system runs faster and is much easier to use because there is not that underlying DOS that can cause problems.  Additionally, there is currently only one manufacturer of Macintosh system hardware.  This assures continuity from machine to machine.  Although most computer experts agree that Macs are faster and easier to use, due to different marketing schemes, most companies, including the Federal Government, use DOS-based computers.

(4)  UNIX is an operating system similar to MS-DOS.  Although rare on personal computers, UNIX is common on high-end graphics workstations (Sun and Silicon graphics) as well as on mainframe computers.

(5)  The Commodore PET was one of the first home computers, but it was discontinued and replaced by the Amiga line.  While the Amiga never became generally successful, it does have a large following of dedicated users that are attracted to its powerful video and graphics capabilities.  The Amiga runs on a proprietary operating system similar to DOS, with a graphical interface.

## A-2. MACINTOSH FUNDAMENTALS

a. **Macintosh setup.** A Macintosh is one of the easiest computers to set up and operate. Macintosh hardware is based on a plug and play theory, which means all you should have to do is plug in a piece of equipment for it to work.  Other computers require you to change the system software configuration to use a new device. This is unnecessary with the Macintosh.  There are some basic rules and guidelines that must be followed step by step to set up the Macintosh.

(1) **Unpack the equipment**.  Be careful not to damage the box or any of the packing material.  If it is necessary to return a computer, you must do it in the original packing; therefore, keep all original packing material for at least a week to assure that the equipment is working properly.  If space allows, you should keep the packing material forever, because this is the best way to ship equipment.  While unpacking the boxes, look for an inventory sheet in each box, which tells you what should be in the box. Check to ensure that you have all of the proper cords, manuals, and warranty cards.  Once you are sure that you have all of the inventory items, clean up the work area and remove all of the packing material and boxes.

(2) **Connect the equipment**.  Look in the owner's manual for exact instructions on connections, but follow these general guidelines.

(a)  The first step that Apple recommends is to plug the computer's power cord into the computer and then into a three-prong grounded power supply.  This assures that the computer is grounded and no static electricity damage will occur during the rest of the setup.

(b)  Plug the monitor's power cord into the monitor first and then the computer's power outlet or another grounded outlet, depending on what type of power cord your monitor has.

(c)  Attach the monitor's cable to the monitor and the computer's monitor port.  The type of monitor you have and which Macintosh you use will determine which of the two monitor ports you use, the standard or the Audiovision.

(d)  Attach the mouse and keyboard. First, attach the Apple Desktop Bus (ADB) cable to the ADB port on the back of the computer and then plug the other end into the keyboard.  The mouse attaches to the extra ADB port on the keyboard.  You can customize this configuration if you have other ADB devices (trackballs, graphics tablets, and so forth) as long as one device is plugged into the Mac and the others are chained together.  You must never have the Mac turned on when you plug or unplug ADB devices.

(e)  Attach any external devices.  Modems and printers attach to the icons marked for these devices. Small Computer System Interface (SCSI, pronounced scuzzy) devices get attached through a chain of cables.

- A SCSI chain is several devices linked together that all connect to one port of the computer. SCSI connections are the hardest part of setting up a Macintosh, but remembering several rules makes things much easier.  The first rule for chaining SCSI devices is that each device must have a unique number, called a SCSI ID.  You can have a total of seven devices attached to a Macintosh in a SCSI chain.  The CPU is assigned SCSI ID 0 and the internal hard disk is usually SCSI ID 7.  As long as every other device has a different number, everything should work.  ID numbers are set on each device with a wheel, DIP switch or other mechanism.  Consult the

owner's manual of the specific piece of equipment for instruction on how to set the SCSI ID number.

- The second concern with a SCSI chain is called termination.  SCSI works by sending a small electrical current down the chain of devices, which then lets the Mac know what devices are attached.  Terminators act as bumpers at the beginning and end of the chain, absorbing extra electrical signals and preventing data error.  The first and last device of a SCSI chain must be terminated.  There are two ways to terminate a device.  The first is external termination, which utilizes a small electrical device attached to the empty plug on the last device.  The second method is called internal termination, which utilizes a built in switch to turn the built in terminator on or off.  When creating a SCSI chain, you should try to use the shortest cables possible.  If unnecessarily long cables are used errors may occur.  More about SCSI chains will be discussed in the Troubleshooting section.

(3)  **Turn the power on**.  Turn the power to the power strip or surge suppresser on, and then turn the monitor on.  If you plugged the monitor into the computer, this will be the only time you have to turn the monitor on.  From now on, it will come on when the computer is turned on.  Turn on each external device.  Once all external devices are on, push the Power On key on the Mac's keyboard.  If everything works correctly, you should here a chord tone and eventually you will see the desktop.

b.  **Desktop components.**  When you first start up a Macintosh, the first screen you come to is called the Desktop or Finder.  Finder and Desktop are interchangeable.  The Finder or Desktop is the heart of the Macintosh system software.  What makes a Mac so easy to use is that all there is to the user interface is the Finder.  From here you can do just about anything that the Mac is capable of.

(1)  Across the top of the Desktop screen is the Menu Bar.  Each item here has functions that can be accessed by pulling down menus.  The Menu Bar provides access to all of the commands and functions of the Finder.

(2)  At the right side of the Menu Bar is a balloon shaped icon with a question mark in it.  This is the Help Menu.  By pulling down on this icon with the pointer you can turn on Balloon Help.  If Balloon Help is turned on when you use the mouse to point to things on the screen, the Mac displays a balloon with information.  This is helpful when using the Mac for the first time or when using a new piece of software.  However, be aware that not all software applications are programmed with Balloon Help; so if nothing appears, it is because the software is not programmed for Balloon Help.

(3)  At the top, far right of the Finder window is the Application Menu.  The Application Menu icon looks like a small Macintosh computer.  This is where you can change from application to application.  For example, if you had both Microsoft Word and Adobe PageMaker running, only one of them would be active at any one time.  To switch from one to the other, you would pull down on the Application Menu to the one that you wanted to use.  Notice that the application that is currently active has a check mark beside it.  This menu is extremely useful when you have several applications open and are switching back and forth often.  Also in the Application Menu are options to Hide (current application) and Hide Others.  These options allow you to clean up the screen by hiding any of the applications.

(4)  On the Desktop itself are several icons.  The Startup Disk is at the top right corner, beneath the Application Menu.  This icon represents the disk that contains the system software that started up the computer.  If you have other disks attached to the computer, icons representing them should appear beneath the Startup Disk icon.

(5)  Just as the name implies, the Trash Can is where you put files and applications to be thrown away or deleted.  One nice thing about a Mac is that it does not automatically remove these files.  When you put files into the Trash Can, they stay in until you choose Empty Trash from the Special Menu.  This is good when you accidentally put a file into the trash that you do not want to delete.  It is good to get in the habit of emptying the trash at regular intervals, so that the trash file does not get too large.

(6)  The pointer is the little arrow that you control with the mouse.

c.  **Mouse techniques.**    Using a mouse is relatively easy.  Just push the thing around and push the button.  However, there are several special things to learn.

(1)  Pointing is a basic mouse operation.  Put the mouse on a flat surface; a mouse pad or special surface works best.  Ensure that the cord faces away from you and move it around.  Notice that the on-screen pointer moves in conjunction with the mouse.  The pointer only moves when the mouse is touching the surface.  This is handy for when you get to the end of the mouse pad because all you have to do is pick the mouse up and move it back to the center of the pad.  The pointer will not move until you place the mouse back down and roll it.

(2)  Clicking is used to select an object.  First, move the mouse so that the pointer is on what you want to select and push the mouse button in a rapid click.  Do not hold the button in.  If you have done this properly, what you pointed at is now selected.

(3)  Double clicking is used to open a folder or disk or to launch an application.  To double click, point at the desired folder, disk, or application and push the mouse button two times in quick succession (click-click).  If done correctly, the folder or disk opens or the application launches (starts running).

(4)  Click and hold when you want to see the contents of a pull down menu.  First you use the mouse to point to the menu, and then you click and hold the mouse button in.  The menu should appear and stay until you release the mouse button.

(5)  Dragging is used to reposition icons or to move things around on the screen.  To drag, you first select the object by single clicking on it.  Next, you click and hold on the object, keeping the mouse button pressed in, you move the mouse around to place the object.  When you have placed the object where you want it, release the mouse button to drop it.

(6)  Modified clicking is a technique where you use regular clicking in conjunction with pressing a keyboard button.  For example, to select more than one icon, you can use shift-click.  To accomplish this you first single click on the first icon.  Next you point to the second icon; press and hold the Shift key and click on the second icon.  Both icons are now selected and you can release the Shift key.  There are many different combinations of modified clicks that we will learn.

d.  **Pull down menus.**  Across the top of the Desktop is a Menu Bar that allows you to perform many functions and actions.  The first menu is on the far left and is called the Apple Menu.

(1)  The Apple Menu is a list of available applications and desk accessories (DAs).  Users can customize their Macintosh by adding things to the Apple Menu.  To add an item you place an alias

(something like a bookmark) of the item in the Apple Menu Items folder in the System Folder.  By having an alias of commonly used applications or folders in the Apple Menu, you can easily open a folder or application by pulling down the Apple Menu, instead of having to open many folders and disks and finally double clicking on the desired object.

(2)  DAs are miniature programs that help the user, such as a calculator, map, puzzle, CD remote, and many others.

(3)  To the right of the Apple Menu is the File Menu.  The File Menu has many different functions, but only several are commonly used.

(a)  First, it allows you to create new folders (use the New Folder option) to file documents in.

(b)  Second, it allows you to create aliases (use Make Alias) of folders, applications, or files.  Aliases are bookmarks that can be placed anywhere to make it easy to locate deeply hidden or often used items.

(c)  Next, the File Menu has a Find command.  As it sounds, Find is used to search a disk for a particular file name.  Select Find and enter what you want to search for in the field.  To narrow the search, click More Choices to add more variables.  This feature is extremely useful when you remember the file name (or part of it) but forgot where on the disk the item is located.  If the first search does not locate the right file, choose Find Again to look for the next item that matches the search data.  Continue this until you locate the correct file.

(4)  As you can see, there are other options in the File Menu, but those listed above are the most important ones.  Read in your owner's manual or other reference about the other options.  Also, notice the keyboard shortcuts beside most of the commands under the File Menu.  These are shortcuts that you can use instead of pulling down the menu and dragging to the desired command.  These commands all use a modifier key in conjunction with a regular key.  For example, to create a new folder you could select New Folder from the File Menu or use the keyboard shortcut: Command-N.  The Apple key represents the Command or Apple key.  The Mac uses many different keyboard shortcuts and most are universal from application to application, so try to get in the habit of using them for repetitive tasks.  Keyboard shortcuts can save time.

(5)  To the right of the File Menu is the Edit Menu.  The Edit Menu contains basic editing functions, such as Undo, Cut, Copy, Paste, Clear, Select All, and Show Clipboard.

(a)  The Undo command reverses the last action done.  If you make a mistake, you can use the Undo command to return you to where you were before you made the mistake.  Some applications have multiple layers of undo. Which means that you can undo many things a layer at a time until you get back to your work at a previous point.  This is useful when you want to try out several different versions of a document or file.  If an application only has a single Undo, you must select Undo immediately after making a mistake because you cannot go back and undo the mistake later.  The keyboard shortcut is Command-Z.

(b)  The Cut command removes the selected object.  If used in a word processor application, Cut removes whatever text is selected.  The Cut information is stored in the Clipboard until something else is cut.  The keyboard shortcut is Command-X.

(c)  The Copy command copies selected objects.  Whatever is selected is copied to the Clipboard, without affecting the original.  The keyboard shortcut is Command-C.

(d)  The Paste command pastes whatever is in the Clipboard to where the insertion point is located. Paste is used in conjunction with Cut and Copy to remove or copy information from one area and place or paste it somewhere else.  The keyboard shortcut is Command-V.

(e)  The Clear command is much like the Cut command, in that it removes selected items.  Unlike Cut, the Clear command removes the selection without pasting it to the Clipboard.  If you clear something, it is gone.  There is no keyboard shortcut.

(f)  Select All selects everything in a window.  When used in the Finder, it selects all of the folders, files, or applications in a window.  When used in an application, it selects all of the text, graphics, or images in the document.  The keyboard shortcut is Command-A.

(g)  The Clipboard is where items that were cut or copied are stored until needed.  As we have learned, only one item can reside in the Clipboard at any one time.  Whenever you Cut or Copy something, it deletes the item currently in the Clipboard and replaces it with what you cut.  To see what is in the Clipboard, select Show Clipboard from the Edit Menu.  There is no keyboard shortcut for this command.

(h)  These are all of the commands that are in the Edit Menu in the Finder.  As you learn more applications, there will be more commands added to this menu, but the above commands are common to most programs.

(6)  The View Menu controls how items are displayed in the Finder.  You may want to control how the contents of windows are displayed, and you would use this menu to do that.

(a)  By Small Icon and By Icon are similar options.  By Icon is the standard Macintosh view.  This displays all of the contents of a disk or folder by normal, large icons.  By Small Icon uses the same icons but reduces them to approximately one-half the size.  This is convenient when you want to display many icons in one small window.

(b)  By Name, By Size, By Kind, By Label, and By Date are all options used to list contents of folders or disks in the corresponding order.  Depending on which option you have selected, it rearranges the order.  These lists use a small icon to represent folders and files.  If an item is a folder, it will have an arrow beside it.  You can click on this arrow to collapse or expand the list.  Expand means to show the contents of the folder and collapse means to hide the contents.

(7)  The Label Menu color-codes files, folders, or disks.  This is extremely useful when working on a project with many different files.  You can assign one color to all of the files and quickly locate or identify related files.  To assign a label, you first select the item or items and then pull down the Label Menu and drag to the color that you want.  To change the colors on the menu or to change the captions that go with these colors, use the Label Control Panel found in the Control Panel Folder.

(8)  The Special Menu contains several miscellaneous but important commands.

(a)  The Clean Up Window reorganizes all of the icons in a window.  After you've been moving icons around, the window may appear cluttered or messy.  Use the Clean Up command to rearrange all of the icons according to the settings found in the Views Control Panel.  There are many different combinations available in the Views Control Panel.  You can choose to stagger icons or not or to always snap to grid, along with many other options for the List View Menu option.

(b)  Empty Trash permanently removes items that were put in the Trash Can.  Remember, once you choose Empty Trash, these items are gone.

(c)  Eject Disk removes a disk.  First select the disk and then choose Eject Disk from the Special Menu, or use the keyboard shortcut Command-E.  Another way to eject a disk is to drag its icon to the Trash Can.  This does NOT affect any of the files on the disk; all it does is cause the disk to eject.

(d)  Erase Disk totally removes all of the contents of a disk and should be used with extreme caution.

(e)  Restart restarts the computer if needed.  Remember that restarting erases any files not saved so save all files before doing this.

(f)  Shut Down turns off the computer.  Never turn a computer off by turning the power off or using the emergency switch on the back.  By properly using the Shut Down command, you let the computer clear its memory and save system files for the next time you use it.

e.  **Macintosh windows.**  The Macintosh uses windows to display information.  A window is simply a box that information appears in.  To fully understand a Mac, you must be able to identify parts of a window and tell how to use them.

(1)  Across the top of the window is the Title Bar.  In this area you will see the title of the window displayed.  If the window represents a disk or folder you will see the name of the disk or folder.  If it is a file, you will see the filename.

(2)  At the upper left corner of the Title Bar is a small box called the Close button, and the only thing it does is close the window.  When you are done using a window, you should click on this box to get rid of the window.

(3)  Just below the Title Bar is the Information Bar.  In this bar on the far left is the number of items in the disk or folder.  In the middle is how much information is stored on the disk that contains the window.  On the right is how much space is left on the disk.

(4)  In the upper right corner of the window of the Title Bar is the Zoom button.  When clicked, this button can shrink the window to as small as it can get while still displaying all of the files.  If the monitor is not big enough to show all of the files, it will fill the screen.  If clicked again, it will either expand or collapse the window to the last size set by the user.

(5)  Vertically across the right side of the window is the Vertical Slider.  If there are more files than the window can display, this area will be medium gray and will have a Slider Bar button in it.  Scroll Arrows at the top and bottom allow the user to scroll up or down to view more items.  You can also drag the Slider Bar button up or down to quickly reposition the contents.  Additionally, you can click in the gray area, either above or below the button, to quickly move up or down one page at a time.

(6)  The Resize button is in the lower right corner of the window.  This button can be dragged around to change the size of the window.  Whatever size is set with this button will be the default size for the window, when the Zoom button is clicked.

(7)  Horizontally across the bottom of the window is the Horizontal Slider.  It is just like the Vertical Slider, except this slider works side to side, repositioning the contents of a window.

f.  **Selection techniques.**  No matter what type of application you are using, you need to know how to select objects. Clicking, Shift-Clicking, using Marquees and Select All are four basic techniques to select objects.

(1)  Clicking is done to select a single item.   You just point at it and click once.  Sometimes, when you click on the name of an item, it will become selected.  This is used to rename an object.  Just point at the name, click and after a moment the name will be selected and you can type a new name.

(2)  To select more than one item, click on the first item and then shift-click on other items to add to the selection.  If you do not use the Shift key, the first item will become deselected so remember to use this key.

(3)  To select a group of items that are close together, position the pointer outside the group and drag a box or marquee around the group.  Watch out not to select other unintended objects when using this method.

(4)  The Select All command selects all of the items in a window.

g.  **Dialog boxes.**

(1)  A Dialog Box is another type of window.  Sometimes the Macintosh needs more information to complete a command, so it presents a Dialog Box.  Dialog boxes come in many different shapes and sizes, but there are common contents to all.  Dialog Boxes that appear when you are saving a file usually have an area where you can enter the name you wish to save the file as.

(2)  Disk and Directory indicators are either icons or windows that show where the specified file is located.  These usually have pull down menus that allow you to change the current disk or directory.

(3)  Radio buttons are round buttons that allow you to make only one selection.  If there are several options to choose from but you are only allowed to choose one, you will be presented with radio buttons.

(4)  Check boxes are often used to allow the user to select options.  You can check as many of these small, square boxes as you wish.

(5)  Buttons are oval and have text in them and are used to execute commands.  Examples of buttons are Save, Print, and Open.  Usually one of the buttons in a Dialog Box will have a thick double oval around it.  This is the default button, and you do not need to click the mouse on it.  With a default button, you can just push Return/Enter key to execute this command.

h.  **Alert boxes.**  Occasionally the Mac will warn you that what you are about to do may be irreversible or the computer may display an error message.  These boxes are called Alert Boxes.  One typical Alert Box is displayed when you select Empty Trash.  The Mac warns you how many items are in the trash and asks you if you are sure you want to permanently remove these items.  You will encounter many other Alert Boxes.  Typical Alert Boxes are System Crashes, System Errors, Out of Memory, and many others.

i.  **System folder.**  Located on the disk that the Macintosh started up from is a folder called the System Folder.  This folder contains all of the Macintosh system software that makes a Mac a Mac.  Without this folder and its contents, the computer would not start up or operate.  Depending on which model Macintosh you use and what other software you have, you may have more or less in your System Folder.  Some common items found in the System Folder are listed below.

(1)  The Apple Menu Items folder stores items that you wish to appear in the Apple Menu.  Common items placed here are aliases to often-used folders, files, or applications.  DAs are also placed in the Apple Menu for quick access.

(2)  Control Panels are mini programs that allow you to set options and functions of the Macintosh.  Control Panels must be in the Control Panels folder to be active.

(3)  Extensions are small programs that add features or functions to the Macintosh.  When you start up the Mac, you see the Extensions appear across the bottom of the screen as they load.  For an Extension to work, it must be loaded at start up.  To be loaded at start up, an Extension must in the Extensions Folder in the System Folder.

(4)  Preferences are small files that are created by applications, control panels, and extensions.  When you personalize an application or use a control panel or extension to set up how the Mac will work, a Preferences file is created to save these settings.  All of these Preferences files are stored in the Preferences Folder in the System Folder.

(5)  The Finder file in the System Folder is the actual program that creates the desktop and makes the Mac work.  This file must be in the System Folder.

(6)  Items placed in the Start up Items Folder will automatically open when the computer is turned on.  This is useful if you use the same applications everyday.  You can simply place an alias of these applications in the Start up Items Folder and when the Mac starts up, the files, folders, or applications open.

(7)  The Clipboard is where items that were cut or copied are stored until they are needed.  Remember, only one item can be stored in the Clipboard at a time.  An item can be a single word, groups of words, a graphic, a picture, or whatever.

(8)  The Scrapbook File is similar to the Clipboard except it can hold more than one item.  You can open this file and scroll through the contents.  If you use a graphic, letterhead, or group of text (name, address, and so forth) often, it may save time to copy these items to the Scrapbook.  When the item is needed, all you have to do is copy and then paste the item.

(9)  The Notepad is just that, a notepad.  It can be used just like a paper pad to store short notes and messages.  You can cut, copy and paste to and from the notepad.

(10)  The System File is a folder that is used to store system resources.  Resources can be sounds, keyboard layouts, or other small bits of information that help the Mac work properly.  You must have this file for the Mac to work properly.

(11)  Fonts are different styles of letters and characters.  All fonts must be stored in the Fonts Folder in order to be used.  Once new fonts are added, you must restart the Mac to access them.

(12)  Simple Text is a rudimentary word processing program.  It is usually found in the System Folder.  It can be used to open and view Read Me files, graphics, sounds, animation's and Quick Time videos.  While it's not necessary, it is a good idea to keep Simple Text around to use to view these files.

j.  **Basic control panels.**  As you have learned, control panels are small programs that allow you to adjust system-related settings, such as the time and date settings of the Mac's internal clock.  There are many control panels available to you, but these are the basic ones that come with the Mac system software.  Remember that control panels must be in the Control Panels Folder in the System Folder to be used.

(1)  The General Controls control panel sets basic Finder options.  You can change the color and pattern of the desktop work area, the rate of insertion point blinking, the rate of menu blinking, and the date and time.

(2)  The Date/Time control panel also sets the date and time of the Mac's internal clock.  Additionally you can change the date and time format.  You can decide if you would rather use a 24-hour clock or use the names of months instead of numbers.

(3)  The Keyboard control panel sets the keyboard layout if you have more than one installed.  You can also set the key repeat and delay rate.  These are the rates that characters appear at if you hold a key down.

(4)  The Mouse control panel customizes the actions of the mouse.  You can change the speed of the mouse, as well as the double-click speed.

(5)  The Color control panel customizes the color of windows and highlighted text.

(6)  The Labels control panel sets the color and captions that go with the labels in the Labels Pull Down menu.

(7)  The Sound control panel controls all of the Mac's sound functions and contains a pull down menu with several options.

(a)  The first is Alert Sound.  This is where you can set the sound and volume that will be used as an alert.  An alert is a sound that is played when the Mac wants to get your attention or inform you of an error.  You can use the Add and Remove commands to add or delete alert sounds.

(b)  The second option is Sound In.  This is where you designate where sound input will come from. Use the Options button to select either Microphone, AV connector, or Internal CD.

(c)  Next is the Sound Out option that is used to select how sound will be played back.  You can choose the speed (in kHz) for sound playback as well as sound bit depth and stereo or mono sound.

(d)  The last option is Volumes.  This is where you set the volumes for the Mac's sound.  You have two sliders–one controls the volume of the built-in speaker, while the other sets the volume of the headphone jack on the back of the Mac.

(8)  The Numbers control panel controls how the Mac handles numbers.  You can set what character to use as the decimal separator (usually a ".”), as well as what to use to separate the thousands place (usually a ",").  Additionally, you can decide what symbol to use with currency and where it will be placed.

(9)  The Views control panel sets how information in windows is displayed.  We have discussed the use of the Views Pull Down Menu, the Views control panel is where you set the preferences.  You can select font and size of title information, as well as options for list and icon views.

(10)  The Start Up Disk control panel is used to select which disk to start from at the next restart. The disk you select must have system software on it.

(11)  The PC Exchange control panel is used when accessing files from an IBM PC system.  PC files have a code attached to the end of the file name, which is called a suffix.  Different suffixes represent different types of files.  For example, .txt means that it is a text file.  Using this control panel, you can set which application on the Mac will be used to open files with different suffixes.  You may have the control panel set so that MS Word opens all files with the .txt suffix, while PhotoShop opens all files with the .gif suffix.

(12)  The Chooser is a desk accessory found in the Apple Menu that allows the user to select which external device to use.  When it is opened, the Chooser will show icons of all of the printers that are installed in the Mac.  There will also be icons for faxing and file sharing if these items were installed.  The user then clicks on the icon that he wants to use.  For example, to print to the Laser printer, you would open the Chooser and select the LaserWriter icon.  To use the Color Printer you would select that icon.

k.  **Memory control.**  To set how the Mac uses memory, you use several different tools that are part of the Mac's system software.

(1)  First, there is the Memory Control Panel, which is broken down into four items.

(a)  The first is the control of the cache.  A cache is a portion of RAM that is set aside for often-used instructions.  You can purchase separate cache cards that add more memory to be totally devoted to this purpose, or you can allot some of the internal RAM as a cache.  This makes the computer run faster, because common instructions and functions are stored here instead of on the relatively slow hard disk.

(b)  The Modern Memory Manager is the portion of the Memory Control Panel used to control whether or not the Mac uses the modern memory functions.  This should always be ON unless you are using old system software (System 6.0) on a new Mac.

(c)  Virtual Memory (VM) is when the computer uses a portion of the hard disk as RAM.  It stores things that it would normally put in RAM on the hard disk, if it needs the space.  While using this may allow you to open more applications, it is much slower than real RAM; it should not be used as primary memory.

(d)  Using VM, you use the disk as RAM.  With a RAM disk, you use RAM as a disk.  You create a RAM disk and it put files or applications in it just like another disk.  It is extremely fast, but it uses up a large part of critical RAM.

(e)  To find memory information about a Mac you use the About This Mac item under the Apple Menu.  This window provides you with the total amount of RAM installed in the Mac.  It also shows you other information about the Mac, such as the system software version number and how much RAM each application is allocated and how much it is currently using.

(2)  When you first turn the computer on, the system software is the first to use RAM.  As you open applications, they too use RAM.  As you close applications, not all RAMs go back to the available pool.  Eventually, there is not enough RAM in one continuous block to open anything, which is called memory fragmentation.  Memory fragmentation is graphed in what is called the System Heap.  This is an imaginary graph of how the computer's memory is handled.  To monitor memory usage, use the About this Macintosh window, which list all of the open applications and how much RAM each one is using.  The Largest Unused Block section shows the largest block of RAM that is free.  If the total amount of RAM in use plus the Largest Unused Block is less than the Total Memory, then you have memory fragmentation.  The only way to recover fragmented memory is to restart the computer.  The best way to avoid memory fragmentation is to launch often-used applications first.  If you use a word processor off and on throughout the day, it is best to launch it at startup and leave it on in the background.  Open other applications as needed but try to close the last opened application first.  This will keep the Largest Unused Block as big as possible.

(3)  Each application is allotted a certain amount of memory to work with.  The user can change this allocation to his needs.  To find out how much memory an application is allotted, first make sure it is not running, then select it (single click) and choose Get Info from the File Menu.  A window appears that has information about the selected item.  At the top of this window is the name, icon, type of item, where it is located, when it was created and modified, and the version numbers.  Then there is a comment box that you can type in.  At the bottom is the Memory Requirements information, which has three amounts in it.

(a)  Suggested Size is the first amount that the author of the application thinks is the best for general-purpose use.  This is just a suggestion, so we do not have to go by this.

(b)  Minimum Size is the second amount.  This is the size that you set to define the minimum amount of memory an application is given.  Generally, you do not want to set this much lower than the recommended amount.  If you are having problems with an application and keep getting a warning of a Type 1 Error or an Out of Memory Error, then you have the minimum set too low and should increase it.

(c)  Preferred Size is the last amount.  This is the amount of memory that you set as the preferred amount.  The computer will allocate this amount to the application (if this much is available!).  Usually at installation the software is set to amounts that work best; but if you have problems, try setting the minimum to the recommended amount and the preferred to twice the minimum.

l.  **Network control panels.**

(1)  One of the benefits of a Macintosh over a DOS-based computer is networking.  Networking, or connecting two or more computers, is built in on the Macs; while on a DOS machine, it is purchased separately.  The Macintosh comes with a built-in network connection called Localtalk or AppleTalk.  The printer or modem port is the connector for this and you can easily connect two (or more) Macs together using this connection.

(2)  Another type of network is Ethernet.  Most new Macs come with a built-in Ethernet connection, or they can be purchased separately.  Ethernet is MUCH faster than Localtalk and is used for high-speed networks.

(3)  To set up a Mac Localtalk network just connect two computers at the printer or modem ports.  An Ethernet connection requires a Hub, which is a box that fits between the two computers, and then wires go from the hub to the computers.  Once you have physically connected the computers, you must use the system software to tell them that they are connected.  To do this, there are four control panels.

(a)  The Network control panel is pretty much straightforward.  All you have to do is select which type of network you have connected.  There will be icons for several different network types; all you do is select which one you have set up.

(b)  The Sharing Setup control panel is where you set the identity of the Macintosh you are using and where you assign an owner and a password for that owner.  You should ensure that every computer has a unique, easy to remember name, such as David's Mac.  This makes it easy to see what computer you are connected to.  When making up passwords, choose unique but easy to remember passwords.  Do not use names or other easy to guess passwords.  Try using two unrelated words separated by punctuation, such as star!dog.  This type is hard to guess, but easy to remember if you are supposed to know it.  There are two sections of this control panel called File Sharing and Program Linking.  These sections are used to allow others to access files or applications or both.

(c)  Once you have the Sharing Setup control panel configured, you use the Users and Groups control panel to give access to individual users.  You create a user folder for each person that you are going to allow access to your computer.  You can set different amounts of access to each user.  You can also allow Guest access, which allows users access to use your computer.

(d)  The File Sharing Monitor is a control panel used to monitor who is connected to your computer. On the left side of the control panel is an area that shows who is connected.  On the left are icons representing the shared items.  On the bottom is a bar graph that represents the file sharing activity.  To kick a person off of your machine, double click on the icon of the person that is connected and choose disconnect.

m.  **Monitor control panel.**

(1)  The Monitor control panel sets the options that deal with the video output.  When you first open this control panel, you can choose either color or grayscale.  You also can change the bit depth (number of colors displayed) of the monitor.  Depending on how much video RAM your computer has, you may have options all the way up to 24 bit or millions of colors.

(2)  At the bottom of this control panel you have a window with an icon of your monitor in it.  If you have more than one monitor attached, you will have more than one icon.  You can drag these icons around on the Virtual Desktop to position how information will flow across multiple monitors.  There is also a button labeled Identify that will display a number on each monitor, making it easier to identify which monitor is which.

(3)  In a multiple monitor setup, one of the monitors is always the Startup monitor.  In the control panel one of the icons will have a small menu bar in it.  The monitor with the menu bar is the startup monitor.  To change startup monitors, simply drag the mini menu bar to the desired monitor icon.
(4)  There is a button labeled Options which allows you to set the monitor resolution (number of pixels on the screen), as well as allowing you to send the image to a TV if you have the proper equipment.

n.  **Software.**  For a computer to be truly productive, you must have other software applications that instruct the computer how to do tasks.  There are many different types of software and brand names, but most falls into the general categories below.

(1)  Word Processing software is used to write letters, memos, and anything else that you would need.  A word processor turns the computer into a fancy typewriter, allowing you to enter text and then easily edit and move entire sections around.  Most good word processors have spelling and grammar checkers and a thesaurus built in.  Many also allow you to automatically create outlines, glossaries and indexes.  Microsoft Word and Word Perfect from Novell are typical word processors.

(2)  Database software is used to keep track of large amounts of information.  You can track anything from recipes to parts inventories.  You establish fields of data to track (ingredients, part number, and area code) and then enter data for each item to track.  The database software can then cross-reference, sort, and create reports about the information you have entered.  Foxpro and Filemaker Pro are typical data programs.

(3)  Page layout software is designed to make it easy to incorporate text, pictures, and graphics into a single document.  This software is used to design and layout anything, from simple newsletters to complete books.  Page layout software allows you to create text boxes that flow around graphics and have images and illustrations that compliment the design.  Quark Xpress and Adobe PageMaker are common page layout applications.

(4)  Image editing software is used to enhance photographs with the computer.  Images can be acquired with a digital camera or scanned into this software.  After images are in the application, all

normal photographic enhancements (dodging, burning, and cropping) can be done, as well as special effects. Adobe Photoshop and HSC Live Picture are image-editing applications.

(5) Illustration software is used to create art on the computer. These software applications have all of the functions of painting, drawing, and other normal art techniques. They can also create layers and color gradients, as well as other special effects. Adobe Illustrator and Macromedia Freehand are illustration programs.

(6) Like Illustration software, 3D-Drawing software is used to draw images. However, 3D-Drawing programs allow the user to set up illustrations in three dimensions. Users can draw two-dimensional illustrations and the computer can add the third dimension. Users can create shadows, textures, and lighting effects. Stratavision 3D is one example of a 3D-Drawing program.

(7) Fonts are different styles of letters and characters. Clip art is professionally drawn pictures of every imaginable style. You can get clip art borders, people, signs, backgrounds, and so forth. Fonts and clip art can be purchased for use with all of the other types of software. The Image Club is a catalog sales company specializing in fonts and clip art.

(8) Video editing software is used to edit digital video. Users first digitize the video and then rearrange the sequences, add fades, dissolves, and other special effects and create titles. Once the editing is done, the computer reorganizes all of the video into one continuous sequence. Adobe Premiere is used for desktop video editing, while the Avid system is used for professional broadcast quality video editing.

(9) Multimedia is combining text, graphics, video, animation, and sound into one presentation. Many multimedia presentations include user interaction, which means that users control how the presentation flows by clicking on screen buttons or by typing commands. Macromedia Director and Macromedia Authorware are multimedia production software applications.

(10) Communications software is a broad category of applications that allow one computer to interact with other computers. Generally a terminal program turns the Mac into a terminal to control or access other computers. There are also applications that allow a computer to access the Internet, the global network of computers. White Knight, Apple Remote Access, and Timbuktu Remote are just a few examples of communications software applications.

(11) Optical character recognition (OCR) software is used to convert scanned pages of text into editable text. When a document is scanned, it is basically just a picture of the document. With OCR software you can convert the picture into text that you can edit in a word processor. While very useful, OCR software is not 100 percent accurate and must be carefully edited.

(12) Utility software is general software that adds functions and accessories to the Mac. There are many different types of utilities. Diagnostic software is used to diagnose and repair software and hardware problems. Virus detection utilities are used to scan for computer viruses and repair them if any are found.

## A-3. TROUBLESHOOTING

a. Troubleshooting is the process that is used when trying to determine the cause of a problem and what to do to fix it. It is important to understand the basics of how things work in order to be able to efficiently repair a problem.

b.  One of the most important aspects of troubleshooting is to know what to do to prevent a problem from arising.  It is always better to avoid a problem, than to wait for something to happen and then be forced to try and figure out what to do.  With computers and other electronic equipment there are a few things that you can do to prolong the life of the equipment and prevent malfunctions.

(1) **Preventive maintenance.**

(a)  Most electronic equipment comes with grounded plugs.  It is important to never bypass this ground and to always have a properly grounded outlet.  Computers are extremely sensitive to electrical impulses, and properly grounded plugs and outlets can prevent serious damage to the computer hardware.  It is absolutely necessary to be grounded when you are doing any activity inside the opened case of a computer (such as installing RAM, removing cards, and so forth).

(b)  One of the most important pieces of electronic equipment to use is the surge suppresser.  Electrical voltage can vary widely and often you will have surges of high voltage or fluctuations.  This is especially common with deployed units and ships where power is being provided by portable generators.  A surge suppresser is an inexpensive device that filters the electricity before it goes into the computer.  Suppressers control the actual outgoing voltage and only let regulated amounts into your equipment.  Additionally, they can convert one outlet into several.  This allows you to plug all of your equipment into one receptacle, providing the receptacle has enough amperage.  Most surge suppressers can only protect against minor power surges and spikes.  Only uninteruptable power supplies (UPS) can provide against serious electrical problems, as well as provide short-battery backup.  UPS are strongly recommended to prevent damage to expensive EI equipment.

(c)  Computer equipment is extremely susceptible to shocks and vibrations, especially hard disk drives.  You must be extremely careful to never bump or jostle computers or external hard drives while they are turned on.  Bumping a hard drive can cause the read-write heads to gouge the surface of the disk, ruining the drive and the data stored on it.  If you must move equipment, it is best to shut it down and give it a minute to cool down before moving.

(d)  When plugging in or unplugging equipment, the computer must always be shut down.  Never unplug a computer that is turned on.  Also, ensure that the power switch is in the OFF position before plugging equipment back in.  Damaging power surges often occur when equipment is plugged in while turned on.

(e)  It should seem obvious that you should never eat or drink around computers.  Liquid or crumbs spilled in a keyboard or on removable media can destroy the hardware or data.  Also, there is a danger of electric shock if liquid is spilled on an energized piece of equipment.

(f)  It is a very good idea to purchase and use a utility program such as Norton Utilities or MacTools Pro.  These programs scan your disks and hardware for potential problems and can fix them before they do any damage.  They also provide other utilities to recover deleted data, schedule backups, and optimize the disk speed.

(2)  **Start-up problems.**  One of the most common times for a problem to occur is at start up.  When you first switch the computer on, it runs through several self-tests and reports problems in a variety of ways.  A very common start-up error is the flashing question mark icon.  This indicates a Small Computer Serial Interface (SCSI) error, usually with a hard disk drive.  A SCSI is the system used to connect devices, such as disk drives, scanners, and printers to the computer.  SCSI connections are both fast and reliable, but can sometimes be problematic.  There are several things to be concerned with when attaching SCSI devices or troubleshooting SCSI problems.

(a)  Each device connected to a SCSI chain must have its own unique ID number.  These numbers are usually set with a dial or pushbutton on the unit.  There can be a total of seven devices attached, but ID number 0 is reserved for the internal start-up disk and number 7 represents the CPU of the computer itself.

(b)  SCSI chains work by sending a small electrical signal through all of the devices attached to the chain.  Each device receives the signal and sends a reply back to the computer.  When the signal gets to the last device on the SCSI chain, this signal needs to stop.  If it does not stop, it will reflect back down the chain toward the computer, causing errors or malfunctions.  To stop this signal, we use a small device called a SCSI terminator.  This is attached to the empty plug on the last device and absorbs the signal.  Some devices have what is called internal termination, which means they have a terminator built in.  If your devices are internally terminated, you must turn the terminator off (usually there is a switch on the device to do this) on all of the devices except the last one.

(c)  When purchasing cables to use with SCSI equipment you should buy the slightly more expensive shielded cables.  These cables have electrical shielding in the insulation to prevent interference from other equipment.  You must also be sure that you use the proper cables and that all plugs are securely attached and locked in place.  All equipment (including the computer) must be turned off when attaching or removing SCSI cables.  You should also use the shortest cables possible for the best performance.

(d)  When starting up a computer with external SCSI devices, it is necessary to power up the external devices before starting up the computer.  Failure to do this prevents the computer from recognizing the devices, forcing you to restart to use the devices.

(3)  **Periodic software maintenance.**  Periodic maintenance should be done to prevent problems from happening.

(a)  Rebuild the desktop at least monthly.

(b)  Keep only one copy of system software on the start-up disk.  Having more than one system folder will cause crashes and hangs.

(c)  Organize files into folders and hierarchies.  Have one folder for applications and keep all programs there.  Have another folder for documents, pictures, and so on.  Do not have many files just floating around in the system folder or loose in the disk's main or root directory.  The better organized your files are, the faster the computer can access them and the less likely it is to crash.

(d)  Use a disk utility to periodically defragment (optimize) the drive and run a background diagnostic program that always watches for potential problems.

(e)  Do not keep unnecessary System Extensions or Control Panels in the System Folder.  They have the potential to cause conflicts, as well as slow down computer operation.

(4)  Hardware maintenance.  While there is no real maintenance to do on the CPU portion of the computer, there are a few things that can be done to prolong the life of the equipment.

(a)  First, ensure air vents are clean and clear.  This means do not stack books or papers on top of or closely beside the computer.  You must allow air to flow in and around any vents.  This allows the internal fan to cool the circuits.  Occasionally vacuum the area around the vents to remove any dust that may have collected.

(b)  Second, ensure cables or connectors have plenty of room.  One of the leading causes of computer malfunctions is a faulty cable.  Cables can be damaged by being bent or crimped, so allow them to attach to the computer and naturally curve away, without forcing them into a small area.  This is especially true with monitors that tilt and swivel.  Allow the monitor cable plenty of slack for free movement.  Never place cables near heaters or radiators.

(c)  Due to the static electricity nature of monitors, it is important to keep monitors free from dust.  Again, periodically vacuum any dust from the top and side vents.  To clean the screen, spray a small amount of a mild glass cleaner onto a soft cloth and wipe the screen.  Never spray the cleaner directly onto the screen, as it will drip down into the electronics.

(d)  It should go without saying to never spill anything into the keyboard.  If, however, a liquid is spilled into a keyboard, immediately turn the computer off and turn the keyboard upside down to try to drain any excess liquid.  Next, spray the keyboard off with plain water, a bathtub and showerhead is the best method.  Lastly, dry the keyboard with a hairdryer set to medium/low heat.  You may be able to salvage the keyboard, but do not bet on it.  You should also occasionally vacuum the keyboard to remove any dust or crumbs that have accumulated.

(5)  **Manufacturer assistance.**

(a)  Most manufacturers have technical support or help lines that can prove to be infinitely helpful when troubleshooting any problems; however, you should not immediately call them.  If you are experiencing problems, first use the owner's manual to try to diagnose the problem.  Always start at the beginning and ensure that all setup and start-up procedures were properly accomplished.  Operator error is usually the biggest cause of computer problems.

(b)  If you have established that you do indeed need technical help, first prepare yourself.  Help lines are usually very busy and the representatives do not have time to wait for you.  Before calling you will need to know make/model of all equipment being used, serial numbers of any software/hardware, and all technical information about your computer, such as the amount of RAM, hard disk size, additional

boards or devices installed, system software and version number, list of extra extensions or control panels.  Also have an emergency floppy or CD-ROM with system software to start up from.  Once you call, quickly describe the problem with as much detail as possible.

(c)  Usually the representative will try to walk you through several steps while on the phone.  For this reason, try to be at the computer when calling.  When they tell you to do something, remember that they cannot see your screen.  Be sure to tell them what to expect each step of the way.

# A-4.  DIGITAL CAMERAS

a.  **Cameras.**  While it is common to scan regular film images and prints into the computer for digital handling, the real advantages come when using a digital camera.  The full potential of digital photography (including the speed, manipulation advantages and minimum of waste) apply when creating images with a fully digital system.  While digital cameras can be expensive for high quality systems, the savings earned pay for the start-up costs in the long run.

b.  **Digital versus traditional photography.**

(1)  Traditional photography starts with a regular camera and silver or dye based film.  After the film is exposed, it is removed from the camera and processed in up to seven (for slides) different chemical baths, washing, and then drying.  Once the film is dry, projecting the negatives or slides onto photographic paper and again processing using chemicals makes prints.

(2)  This traditional process has several distinct disadvantages.  First is the amount of waste.  If only one image is needed when shooting roll film, an entire roll must be used.  This can become costly.  Second, is the amount of time.  The processing and printmaking steps take a minimum of about 15 minutes, using expensive automated processing equipment.  Slides take at least an hour.  Third are the hazardous chemicals involved in the process.  While not extremely dangerous, most photo chemicals are at least mildly caustic, and some are rather hazardous.  Last is storage of the chemicals.  Not only do the bulky, unused chemicals require storage, but the hazardous chemical waste also needs to be properly disposed of.

(3)  Digital technology does away with many of these problems.  Images are taken with a standard camera that has a Charge Coupled Device (CCD) where the film normally would be located.  After images are taken, they can be immediately previewed on the computer.  To transfer an image to the computer, just double click on the image.  To print the image, just click on the "Print" button.  There is no waste when only a few images are needed.  There are no chemicals to store or dispose of.  (Some digital printers use toner cartridges that are meant to be mailed back to the manufacturer, but the storage and handling of these is negligible compared to traditional chemicals).  Not only are these disadvantages eliminated, but also the entire process is much faster and you have the benefits of being able to electronically edit the photos before printing.

(4)  There are, of course, advantages to silver-based images.  While digital cameras and associated equipment can produce outstanding images, they do not have anywhere near the quality of medium and large format film.  A second advantage to traditional cameras is durability.  Electronic cameras have yet to be developed that can handle extreme weather and exposure conditions such as rain forests and arctic conditions.

c.  **Electronic cameras.**

(1)  A still-video camera is like a video camera without the tape storage drive.  Still-video cameras take analog images in two passes, first the even rows, then the odd ones.  This process is called interlacing and can result in fuzzy images with fringing on high contrast scenes.  To accommodate this interlacing, the still-video camera has smaller light sensitive cells rather than full-frame CCDs used in digital cameras.

(2)  Digital cameras are designed to provide a digital image from the group up.  Since digital cameras do not require the extra circuitry needed to interlace the image, the light-sensitive cells can be larger and closer together, thus providing a higher quality image.

d.  **Charge coupled devices.**

(1)  Digital photography (as well as video technology) is based on CCDs.  A CCD is a multi-layered silicon chip.  In one layer a grid of electrodes divides the surface into pixels.  Each electrode is connected to a lead that carries voltage.  A color filter layer determines which primary color (red, green, or blue) each pixel senses.  The image is electronically formed on a layer of silicon substrate.

(2)  As a CCD is exposed to light, an electromagnetic reaction occurs.  Light particles pass through the CCD, freeing electrons in the silicon substrate.  A voltage applied to the electrode draws the freed electrons to gather in special areas (called photo sites) in the substrate.  The stronger the light, the greater the number of electrons drawn together at that site.  The CCD transfers captured electrons one by one to an analog-to-digital converter, which assigns each site a digital value corresponding to the number of electrons that site holds.  In this way the image is saved to the disk.  The number of electrons in a photo site determines how light or dark each pixel is in the image.

(3)  One consideration with CCDs is size.  Since most CCDs are smaller than the normal size of film, the effective focal length of the lens is increased.  For example, the Kodak Digital Cameras DCS 200 and DCS 420 have a CCD that is 9 x 14 mm.  This is less than the normal film size of the 35mm camera (24 x 36 mm) that the camera is based on.  Because of this, the effective focal length is increased by 2.5 times.  So, a 50mm normal lens becomes the equivalent of a 125mm telephoto lens.  In the telephoto range this has advantages because a normal 200mm telephoto becomes a long 500mm super telephoto.  But a 20mm wide angle also becomes a 50mm normal lens.

(4)  Many photographers use a wide angle often, which is a disadvantage of a digital camera system.  This disadvantage can be overcome by using a digital camera with a larger CCD, such as the Kodak DCS 460.  However, these large CCDs are more expensive to manufacture, so the cameras are very expensive.

e.  **Image storage.**

(1)  Another difference between a traditional film-based camera and a digital camera is how the image is stored once the photo is taken.  With a film-based camera, the image is stored on the film in the form of a latent image.  Each roll can only hold a limited number of images; and when they are all filled, a new roll is inserted.  Digital cameras work on a slightly different principle.  After the image is exposed, the digital image is written to built-in memory devices.

(2)  There are several different types of storage devices.  The DCS 200 has a built-in hard disk drive that can store about 50 images.  The drawback to a built-in drive is that when the drive is full, you must connect the camera to a computer to download or delete images to be able to take more photos.  The DC50 has a 1MB hard drive that will store 7 to 22 images, depending on the quality of the image.  This camera can also use a PCMCIA card, similar to the DCS 420.  The DCS 420 uses a removable PCMCIA

(or PC) card.  This card is about the size of a small stack of credit cards and has a mini hard disk inside. This hard disk can be various sizes up to about 230 MB, capable of taking about 60 images per disk. The benefit of using a removable PC card is that once one card is full, another can be immediately inserted.

(3)  Some of the less expensive digital cameras store images in battery-powered internal memory chips called Erasable Programmable Read Only Memory (EPROM).  The disadvantage to this memory option is that you must download the images when the memory is full.  Also if the batteries die, you will lose the images.

## A-5.  OUTPUT FUNDAMENTALS

a.  **Printers.**

(1)  While creating documents and images on the computer is fun and challenging, the real reward comes from having printed output; which is called a hardcopy–a paper or film print of your work that can easily be displayed or reproduced.  While it may sound easy to make a print, there are many different facets to the outputting process.  Color management, resolution, and line screen are just a few of the complex aspects of printing.

(2)  Basically printers consist of a paper transport system, a marking engine, and a controller.  Paper transport is normally belt or roller driven.  The marking engine creates the marks on the page and is driven by a print controller.

(3)  To create an image, most printers break the image down into small dots called halftones.  The dots in this halftone screen control how much ink is deposited at a specific location.  Varying the size of the dot creates the optical illusion of variations of gray or continuous color in the image.  In the case of a color printout, four halftone screens are used, which are cyan, magenta, yellow, and black (CMYK); one for each of the four process colors.

b.  **Types of output.**

(1)  Line art is illustrations or pictures made from solid lines and shapes.  Line art is black and white only, with no grays, shadings, or colors.  Sometimes line art is printed as a single color, such as red or blue, but the art source is always black and white (or a single color on white) lines only.  The text you are reading is line art because it's fully black with no shades of gray or color.

(2)  When you take a photo, the resulting image is continuous tone.  To your eye, the picture contains even transitions of color across its surface.  Curved elements are smooth in their transition from light to dark.  In the case of a close-up photo of a young girl's face, there is no noticeable jump in color

between the top and bottom of her cheeks. This natural appearing graduation is called continuous tone because the color transitions are even and smooth. Photographs are actually made up of dots like a computer image, but these tiny particles are so numerous, random, and small that they are undetectable without a strong magnifying glass.

(3) Unfortunately, the most popular printing technology today, the lithographic press, can only print a solid ink dot or no ink at all. To print a continuous tone photograph, a solution was devised that would allow continuous tones to print as a series of dots. The solution is to produce a gray, print only part of a dot and leave part of it white. That way the paper shows through next to each dot. To the eye, this mix of white paper and a black dot appears as a gray. To create a darker gray, larger black dots let less white show through. To make a lighter gray, smaller dots let more paper show through. This is called halftoning, a term you will hear frequently in publishing.

c. **Printer types.**

(1) A dot matrix printer uses a set of pins or tiny wires that impact on an inked ribbon. Dot matrix printers have as many as 25 to 30 pins. The number of pins a printer has, and the number of passes the pin set makes for each line of type, determines the quality of the output. A second type of impact printer is the daisy wheel printer. These printers have high quality (up to 700 dots per inch (dpi)), but don't offer graphics printing because each character is on a separate wheel or ball and must be loaded onto the print mechanism, whereas dot matrix printers can create any pattern of dots.

(2) Ink jet printers are low-cost, moderate-quality printers that can print either black and white or color output with medium resolution. They operate by squirting ink under pressure through small holes in the print head. Ink jet printers are quite, reliable, and a good low-cost solution for desktop publishing and graphics. Using Adobe Type Manager's ability to scale fonts, its print quality can be nearly indistinguishable from a laser printer. Ink used on ink jet printers dries fast but not instantly, and care should be taken in handling fresh copy to avoid smudges. A related technology called bubble jet printing uses heated bubbles to force ink through the nozzles.

(3) Laser printers are based on the xerographic process developed for photocopy machines. The printer gets its name from the computer-guided laser that writes the latent image on a photosensitive drum. Electrostatic toner is then attracted by static attraction created by a transfer corona, an electric field created by a very hot wire. Laser printers are graphics page printers, meaning that whole pages are composed in RAM either in the printer itself or in the computer and then printed. Most laser printers are built with a CPU to speed up the processing and come with 1 to 2 MB of RAM, often upgradeable. As driving the laser requires considerable data, the instructions must be stored in the laser printer prior to the actual printing. At 300 dpi, 8 million bits of data occupies about 1 MB of RAM. Most laser printers can print from 5 to 10 pages per minute. Although they are a complex technology, laser printers have excellent reliability and can print several hundred thousand pages or more before failure.

(4) Some of the most common types of color printers are called thermal transfer printers. Most of the high-priced color printers in the $5,000 to $12,000 ranges are based on this technology. These printers use dye, dyed ribbons, colored plastic or wax, or some other material that can be melted onto the page. Often the transfer mechanism in the print head is a set of heated elements similar to those in impact printers. The paper makes three or four passes through the printer to transfer the process colors. This may result in registration problems, where the colors do not all line up properly. Most high quality thermal transfer printers lay down all of the colors in a single pass.

(5)  The second kind of color printing is called continuous tone or contone.  These have near photographic quality because the colors are blended together in a single pixel.  One class of thermal transfer printers, dye-sublimation printers, uses nearly the same mechanism as thermal transfer printers to achieve high quality contone printing.  These types of printers have resolutions up to about 400 dpi.

(6)  An imagesetter is a precision printer that uses a laser to expose photosensitive paper or film.  Imagesetters can produce either a piece of lithographic film that is used to make a printing plate, or some newer imagesetters can print directly onto a printing plate.

(7)  A film recorder prints directly to a piece of film (from 35mm up to 8x10).  Because film is a continuous tone medium, a film recorder offers some of the best resolution output you can achieve from computers.  Low-cost film recorders in the $1,000 to $7,000 range employ miniature monochrome CRTs inside a sealed light box; less expensive analog recorders use color CRTs inside a box but have the limitation of poor resolution.

(8)  A Raster Image Processor (RIP) is a computer, which converts the code from a desktop publishing system into a format acceptable to the imager.  It takes the lines and curves that make up graphics, plus the bitmaps that make up halftones, and renders them as a series of pixels matched to the resolution of the specific imager being used.  The RIP begins by breaking the file into individual objects, which it processes one by one until it has built a complete high-resolution bitmap.  The RIP then passes the bitmap to the printer, where the actual spots are placed onto the paper.  A major concern with RIPs is the speed of the processor.  Because the overall speed of the RIP is dependent on the amount of RAM it contains, most new RIPs have increased memory so that it doesn't hold back the rest of the system.

d.  **Resolution and dpi.**

(1)  The main difference between an inexpensive ink jet printer and an expensive imagesetter is resolution.  Low quality dot matrix printers can create a dot size of around 7 mm (around 150 dpi), which is referred to as letter or near-letter quality printers.  Laser printers commonly have dot resolutions of 3.3 mm or 300 dpi. This moderate quality permits sharp type down to around 6-point size and mediocre digital images.  Some newer laser printers can print at higher quality, around 600 dpi.

(2)  Imagesetters have dot resolutions of 0.4 mm or 2450 dpi!  This is high quality that results in sharp type to around 3 point and medium quality digital images.  Put another way, desktop printers produce ragged dots; imagesetters produce clean dots.

(3)  An understanding of resolution is central to effective printing and scanning.  The standard measurement of resolution is dpi.  This number specifies the number of dots scanned, displayed, or printed within one square inch.  A Macintosh screen has a resolution of 72 ppi (pixels per inch), which means that each square inch is composed of 72 by 72 dots (when discussing monitors, these dots are called pixels).

(a)  When scanning, the input resolution is the precision at which an image is captured.  This resolution is set before the scan is made, although the resolution can be changed from within image editing programs.

(b)  The Mac's screen resolution is always 72 ppi.  So, if you are looking at a color image scanned at 300 dpi on screen and displayed at actual size, you aren't really seeing all of the information because the computer monitor can't display it.

(c)  The output resolution is specified when the image is output to film on an imagesetter.  This resolution is specified in dpi.  Different models of imaging equipment are capable of different levels of resolution, starting at 1270 dpi and going beyond 3000 dpi.  You can output a scan at a higher resolution than it was scanned with, but the result looks flat because the additional dots are created through interpolation, a mathematical guessing process.

e.  **Service bureaus.**  Service bureaus are companies that provide computer output in a variety of forms as film separations, slides, transparencies, and color proofs.  They can take Postscript files created on the desktop computer and generate high-resolution film ready to be reproduced by an offset press.  Service bureaus can provide high quality film and imagesetter output because they have many customers and invest in expensive printers.  It is not economical for a small organization to purchase an imagesetter for only a few prints, when a service bureau may already have the equipment.

f.  **Fonts/typefaces.**

(1)  When type was crafted out of lead, a printer's type collection could literally weigh a ton.  Each size and style of a typeface was a new font, and a type family consisted of many fonts in different sizes and styles.  Transporting a large type library from place to place was unthinkable.  Phototype, which succeeded metal type, was produced in only three sizes; small for captions, medium for text, and large for displays.  Intermediate sizes were obtained by varying the focal length of the projection lens, but many shops used just one size to produce all other type sizes.

(2)  Phototype is fragile and, like metal type, can wear out with constant use.  Today's digital type is easily stored on floppy disks that are easily transported.  Digital technology redefined the term font.  Now a single design is scaled to generate all type sizes.

(3)  Most current digital fonts use one of two core technologies–PostScript, developed by Adobe and TrueType, developed jointly by Apple Computer and Microsoft Corporation.  To understand these technologies, you need to know how monitors and printers display pictures.

(a)  Computer displays are made up of a grid of tiny dots called pixels.  Computers display type and other images on the screen by turning pixels on or off.  This display method is called a bitmap; a bit (short for binary digit) is the smallest unit of information the computer can use, representing one of two values on or off.

(b)  Instead of describing letters as a collection of dots, PostScript and TrueType fonts describe each character as a set of mathematical outlines.  A special piece of software called a rasterizer uses this single outline description to create many different sizes of bitmaps at the right resolution for the output device.

(c)  The rasterizer may be built into a printer, as with PostScript printers, or it may be a program that runs on the computer itself.  Adobe Type Manager (ATM) is a program that rasterizes PostScript fonts both for on-screen use and for printing to non-PostScript printers.  The TrueType rasterizer is built into the computer's operating systems and is also included in some recent PostScript printers.  PostScript fonts consist of a bitmap (screen) font and an outline (printer) font.

(4)  All computer platforms use a character set based on the American Standard Code for Information Interchange (ASCII), which allows 256 characters.  The upper and lowercase alphabet, numerals, and standard punctuation take up the first 128 characters.  These characters are defined the same way on all computer platforms.  Each platform handles the remaining 128 extended characters

differently (accented characters, ligatures, special punctuation, etc.) so translation between platforms can be problematic when using documents with extended characters.

g. **Printing software.**

(1) **PostScript language.**

(a) PostScript provides a consistent format for handling files on different computers.  PostScript is actually a programming language for defining pages.

(b) The power of PostScript is that it can accommodate a wide variety of images and is device independent.  This means that once a file is created in this format, it can be output on any device with a PostScript interpreter, and the file will print correctly.  The same Postscript file that produces a page at 300 dpi on a laser printer can be produced on an imagesetter at 2400 dpi.

(c) Adobe has created a standard (called Type I) for describing PostScript fonts.  PostScript optimizes the placement and arrangement of the dots on the page so that each character looks good printed or displayed at any size.

(2) **QuickDraw.**  QuickDraw is the Macintosh's internal screen drawing language, developed by Apple and used for representing type and graphics on Macintosh monitors.  QuickDraw's primary purpose is to represent information on screen, but it can also output images to printers and other devices.  QuickDraw translates this information into representations compatible with a video display.  QuickDraw can represent complicated images on the screen, but is not as powerful or accurate for printing documents as PostScript.  QuickDraw does not create files that can be manipulated like PostScript files.

(3) **Adobe Type Manager.**

(a) ATM accurately renders PostScript typefaces on a Macintosh monitor the same way they will print.  QuickDraw without ATM cannot render most typefaces smoothly or accurately.  ATM is a system extension that replaces QuickDraw type rendering commands with its own.  Without ATM, 12-point type may look fine inside word processing software, but larger sizes, italic faces, and characters with swirls and flourishes may be barely readable.  With ATM installed, all Type 1 fonts will become fully readable in all sizes and formats.

(b) ATM is also important for printing on non-PostScript devices, because it can be used to replace QuickDraw font routines and produce smooth output for Adobe Type 1 fonts.

(4) **Font handling software.**

(a) When using a Macintosh, all of your fonts must go in a special folder in the system folder.  When you turn the computer on or launch a program, the system software scans this font folder and loads the fonts into the application.  The more fonts you have installed, the more system memory is used to manage them.  While an average user probably does not have the need for more than a dozen fonts, printing professionals may have hundreds of fonts.

(b) To free valued RAM space we may use font management software, such as Suitcase II or Master Juggler.  These programs allow you to store your fonts anywhere you like.  You create sets of fonts to load with each program or document.  This is useful because only needed fonts are loaded, but

all are accessible.  Without these utilities, you have to manually move fonts in and out of the font folder and then restart the computer, which is a time-consuming process.

(c)  Menu Fonts is another handy font utility that displays font listings in the actual typeface of the font.  Without this software, you must either print out sample sheets or change some text to see the actual style of a font.

h.  **Quality control/color management.**

(1)  **Color calibration.**  As digital technology becomes more popular, it is even more important to be sure that you are producing the best possible results.  One of the most challenging aspects of digital photography and graphic design is to ensure that your final output looks as good as it does on the computer screen.  There are several things that we can do to help in this process.

(a)  **Keeping the light constant.**  An important aspect of the calibration process is to maintain consistent lighting throughout your workspace.  For example, working in a dimly lit room with neutral colored walls minimizes interference from changing daylight and from color reflections from clothing, both of which can interfere with perception of color on-screen.

(b)  **Accounting for the artist's eye.**  Another aspect is calibrating for perception.  Each person sees color and tone differently.  What may look good to one person looks bad to another.  The operator can compare an image file to several color proof prints of the same file.  With the proof in hand and the image on the calibrated monitor screen, you can choose the printed version that most closely matches the on-screen image.

(2)  **Device calibration.**

(a)  The first step in calibration is to display and output a test target, including a neutral gray wedge, flesh tones, and RGB/CMYK color wedges.  Output to as many devices as you have (printers, film recorders, copiers, and so forth).  Next, using the screen gamma software supplied with your monitor calibrator, adjust the display to match the printed material as closely as possible.

(b)  If you are using a Macintosh, your monitor should be calibrated with a luminance-measuring device, like the ones available from display manufacturers.  This helps to adjust the monitor's CRT guns so that they reproduce the correct intensity relative to the input they receive from the video card.

(c)  Several adjustment tools found in Adobe Photoshop can be used to control the color, brightness, and contrast of scanned images before they are turned into custom prints, halftones, and color separations.  These tools are Levels, Curves, Brightness/Contrast, Color Balance, and Hue/Saturation commands that are primarily found under the Image menu and the Adjust sub-menu.

# A-6. IMAGE ACQUISITION WITH SCANNERS

a. **Scanners.**

(1)  Digital photography has many possibilities and uses.  We can store images for years with no image loss.  We can quickly and easily file, edit, and print these images.  Special effects are now easily within reach.  But what about all of the images taken before the advent of the computer?  What about the images that we are still taking with our current film-based cameras?

(2)  By learning to use scanners, we can transfer the negatives, prints, and slides that we already have into the computer and then have all of the digital benefits described above.  Scanners also allow us to use any art, image, or text that we already have in our digital documents.

b. **Scanning basics.**

(1)  A scanner converts the analog images that we already have (negatives, slides, flat art, etc.) into digital signals that the computer can handle.  The film scanner and flatbed scanner are two basic types of scanners.

(a)  A film scanner can either be a small desktop accessory or a large professional pre-press (called a drum scanner) model.  Film scanners transmit a high intensity light through the (positive or negative, B&W or color) film.  The light then passes through a series of color filters and a lens onto a light detector, where electronics convert the analog image information to digital data.  Slide scanners are typically of a higher resolution and have better detail and focus than flatbed scanners.  These types of scanners come in many sizes and prices, and can handle film from 35mm up to 4x5 or larger.

(b)  A flatbed scanner resembles a photocopier.  The lid is lifted and the original image is placed, face down, on the glass.  Beneath the glass, a motorized scanhead travels the length of the page on tiny rails, illuminating the original and measuring the intensity of the reflected light.  Many flatbed scanners now accept an optional transparency adapter for scanning slides and transparencies.  These scanners can be used to scan any type of flat art, such as text, illustrations, paintings, and so forth

(2)  There are other types of scanners, those based on video camera chips that are generally low-end and do not provide high quality images.

c. **CCDs.**  A CCD is an electronic chip that reads and measures light and converts it to digital signals for the computer.  Linear and array are two types of CCDs used in scanning devices.

(1) **Linear CCD scanners.**

(a) Scanners employ a linear CCD array, which consists of several thousand CCD elements arranged in a row on a single silicon chip.  Reflective originals are lit by a fluorescent or halogen light source.  The light source moves the length of the original and then a mirror directs consecutive lines of image data onto the stationary CCD array.

(b)  The full width of an image is read line by line as the sensor and light moves the length of the scanning area.  Light of a specific color and intensity falling on each CCD element creates a proportional electrical charge within it.  An analog-to-digital converter turns the voltages from the CCD array into digital values that correspond to image pixels.

(c)  Grayscale scanners take a single set of light intensity readings from originals.  Color scanners capture three sets of readings from color originals by using red, green, and blue filters.  Scanners that incorporate a single linear CCD array sometimes rotate an RGB color filter wheel in the len's unit before each of the three separate passes of the original are made.  Single-pass scanners may use three linear CCD arrays, which are individually coated to filter red, green, and blue.  The same image data is focused onto each array simultaneously.

(2)  **Array CCDs.**  Where a linear CCD moves the length of the image area, an array CCD is larger and physically covers the entire image.  Most scanners use linear CCDs.   Arrays CCDs are usually found in digital cameras.  Array chips are more expensive to manufacture, because instead of being a few thousand pixels long and one pixel wide, they must be the same dimensions as the image to be recorded.  They are usually a few thousand pixels in length and width.

d.  **Scanning terms.**  To most people the world of scanning is completely foreign, with many new terms and concepts.  Most of us have worked with computers and traditional photography, so these areas are not totally foreign, but scanning is almost completely new to us.  There are several key terms that we must first understand to be able to effectively use a scanner.

(1)  **Final resolution.**

(a)  When we are preparing to scan, the first concern we have is how the image is going to print or display.  It is important to scan with enough detail to get a good output.  It is also important to conserve disk space and image processing speed by not scanning too much information into a file.  If we scan at the maximum resolution and we are only going to display the image on a screen, we are wasting space and time.  This is called overscanning.

(b)  If we scan a 4x5-inch image at 72 dpi, our file size is about 365 KB; if however, we scan the same image at 300 dpi, the file is about 6 MB; requiring about 20 times more storage space and processing time.  You can see how important it is to determine the proper scan resolution.

(c)  Desktop printers have resolutions measured in dpi.  By knowing the dpi of our intended output device, we can tailor the scanner settings to only provide enough information to give us a good output.  The general rule for determining scanning resolution is two times the final output resolution.  For example, if our images are printed to a 400 dpi color laser copier, we should set the final resolution to 800 dpi (400 x 2 = 800) before we scan.

(d)  Printer resolution depends on the type and brand of printer you are using.  Consult your owner's manual for your printer's maximum dpi.  However, most B&W laser printers have an output of 300 or 600 dpi, while color laser copiers are around 400 dpi.  The Kodak XLS-8600 PS dye sublimation printer has a 300 dpi output capability.

(e)  You may also hear the term ppi.  This number is sometimes used interchangeably with DPI; however, they are not exactly the same.  PPI is the numbers of pixels per inch and should be used when referring to a monitor.  Macintosh monitors have a display resolution of 72 ppi, although most people just say 72 dpi.

(f)  Scanners are classified by their maximum resolution; for example one scanner may be a 300-dpi scanner while another is a 1200 dpi model.  These numbers mean that the scanner can scan up to the maximum indicated dpi value.  Some scanners (as well as some printers) use software technology to increase the stated maximums, which is called interpolation.  By analyzing the picture elements of an image, scanning software may increase the resolution by adding pixels between other pixels by guessing at what color the software thinks the new pixel should be based on the surrounding pixels.  This technology helps get better results, but an interpolated 600 dpi scanner will not give as good results as a true 600 dpi device.  Some laser printers do the same thing, guess at intermediate pixels, to help increase resolution.  Interpolation doesn't add detail to a scan, it just helps smooth information that is there and reduces jaggies often seen in computer output.

(2)  **Line screen.**  High end outputting devices (imagesetters) produce images on four different plates or pieces of film.  Each plate represents the information of one of the CMYK colors.  To create the image, pictures are printed as a series of dots that is called a halftone screen.  The larger the dot, the darker the color appears; if you are preparing scans that will be printed by this process, you need to know the halftone screen frequency, expressed in lines-per-inch (LPI).  This number expressed as 135-line screen is similar to the dpi value above.

e.  **Types of images to scan.**  We may come across many different types of images that we want to scan color, B&W, line art, and so forth.  Knowing how the scanner handles each type of image, we can be assured of getting the best quality with the smallest file size.

(1)  **Line art.**  Line art, drawings, or illustrations that only contain black and white lines and no gray tones are easy to scan.  Set your scanner to the Line mode or Black and White.  The only quality issue is proper density.  Be sure that once scanned, the desired white areas are white.

(2)  **Grayscale.**  Black and white photos and shaded art can be scanned as grayscale images.  Select the proper DPI of your printer and choose how many gray levels you desire.  You again must be sure that you have a true white.  You can control this in either your scanning software or image enhancement software, but remember it is always better to fix problems in the pre-scan.

(3)  **Continuous tone color.**

(a)  The most complicated images (and most often scanned) are color images that have many different tones.  We need to be sure that we scan correctly to preserve all of the detail of the original.  Most scanning software has preset values for different film or image types, but we must not rely on these automatic features.

(b)  It is best to perform a pre-scan and then judge the quality.  Use the scanning controls to perfect the image before the actual scan.  Although it is possible to correct a bad scan, it is best to get it right the first time.  Much like traditional photography, we can make an acceptable print from a poorly exposed negative, but we will never get super quality.

(c)  When scanning images that have previously been halftone printed (art or photos from books and magazines), you will sometimes get an odd pattern called a moir pattern.  This is caused by the overlap of the halftone screen that the scanner uses and the halftone screen in the printed material.  To reduce

this, you must unsharpen the image after scanning.  Some scanners attempt to reduce the moir pattern during the scanning process.  Be aware of copyright regulations, when scanning preprinted materials.

f.  **OCR.**

(1)  OCR is software that can read typed pages.  When we type a page of text into a computer, we enter the actual letters that we want displayed.  These letters are converted to a binary code that the computer can understand.  We can go back at any time to change parts of the document.  When we scan a page of text, all we have is a picture of the page.  The computer sees light and dark areas on a blank background, not words and sentences.  We are not able to change this text.  If we use OCR software, we may be able to get some editable text.

(2) OCR software works by comparing the patterns of light and dark areas of the scan to known shapes of letters.  The software is programmed to identify lines and curves and compare them to the shapes of letters in the alphabet.  Generally, OCR is accurate, but we must always proofread the result. There are several things that we can do to increase the accuracy of OCR software.

(a)  First, we should use a mono-spaced font when we plan to OCR a scanned document.  These fonts keep each letter the same space from their neighboring letters.  This helps the OCR software determine where one letter stops and another starts.

(b)  Second, use a larger point size.  The larger the letters, the more accurate the OCR.

(c)  Last, ensure that you have a clean copy to scan.  You may get better results if you photocopy a fax before scanning in for OCR.  Adjusting the density and contrast may also produce better results.  And remember, ALWAYS carefully proofread and spell check text that has come from an OCR program.

g.  **Scanning with different scanners.**

(1)  **Nikon Coolscan Film scanner.**

(a)  The Coolscan is a small, desktop scanner that is designed to scan 35mm slides or negatives. The Coolscan has a Photoshop plug-in that we will use to acquire images.  The Coolscan is a SCSI device that plugs directly into the Macintosh.

(b)  Film is inserted into the Coolscan emulsion up, either in a slide mount or in the provided film strip holder.  Gently push the film in as far as it will go without forcing it.  Now, use the Photoshop Acquire option found under the File menu to choose Nikon Scanner.  You will get the Nikon Scanner plug-in dialog box.

(c)  This dialog box provides many options for image type, resolution, cropping, and so forth. Consult the Coolscan User's Guide for detailed instructions and Coolscan usage tips.

(2) **Apple ColorOne, Microtec 600 ZS, Umax UC1260 scanners.** These scanners are all high-resolution flatbed scanners that can scan in full color. They accept material up to 8.5 x 14 inches. They too are SCSI devices that can be chained to other devices attached to the Macintosh. Like all flatbed scanners (and copiers), material to be scanned is placed face down, flush with one corner on the glass beneath the cover. Operation of each of these scanners is similar, but consult the appropriate user's manual or software instructions for detailed guidance.

(3) **Color calibration.**

(a) As we have learned, getting consistent color from the original to the scanned image in the computer and then out of the printer is the most challenging part of electronic imaging.

(b) Each device has a different procedure for calibration. Usually, you scan a calibration target or image and then print it to your normal output devices. You next use a monitor calibration program to visually change the output of your monitor to make it compare to the original and to the print. You can either visually compare the two samples or use a densitometer to check the actual color values. Some output devices (film recorders and high-end printers) allow you to calibrate their output as well. Check the operator's manuals for your outputting devices (as well as your scanners) for procedures on calibration and consistency.

# A-7. PRESENTATIONS WITH MICROSOFT POWERPOINT

a. **Presentations.** A computer and presentation software together can help you make convincing presentations or speeches. The power of the computer to combine graphic images, text, sound, and video is unmatched. By following basic rules and guidelines, you can make electronic presentations that will convey your point in a professional manner. Presentation software also speeds up the process of preparing for a presentation. On the other hand, improperly used presentation software will make your work hard to understand and unwieldy. There is a fine line between an effective presentation and a confusing display.

b. **Preparation.** The key to producing an effective presentation is organization. It is a good idea to sit down and think about a few things before beginning to work:

(1) **Why am I giving this presentation?**

(a) This is perhaps the most important question to ask before creating a presentation. Without a firm grasp of what the ultimate goal of the presentation is, the entire show will appear unorganized and ineffective. You need to decide not only what the topic is, but also what you want the audience to leave with. Try to create a firm concise statement that will be your goal, for instance—

> *At the end of my presentation, my audience will have a working knowledge of how a black and white laser printer works. Including how the image is placed on the paper and made permanent, how the toner is handled in the printer, and how paper is transported through the printer.*

(b) As you can see by the example, we now have a clear goal for our presentation. We are able to refer back to this goal whenever we need to clarify our direction. Also, we will look at this goal after we have finished creating the presentation to see if we did indeed obtain our goal.

(2) **How much time do I have to give the show?** We need to know our time limitations before we start. It would be silly to try to produce an effective presentation using the above goal if we knew that we only had 15 minutes to give our showing. We may need to go back and change our goal if we realize that we are restricted by time.

(3) **What is my audience's knowledge level?** It is important to know whom you will be presenting to before creating anything. We must have an idea what our audience's knowledge level is and then try to tailor our goal. Our presentation must be challenging, but not too hard. We do not want our presentation to be too simple either, or the audience may feel as if we are condescending to them.

(4) **What will the presentation media be?** The last thing we need to look at is how we will be giving the presentation. Although a good presentation can be presented in a variety of ways, it is best if we know what media will be used. If we are using a screen, videotape, or video projector, we are able to use more video and sound. If it is going to be printed and handed out, then we will not use color because color printing is probably cost prohibitive.

c. **Arrangement.** Once we have a basic knowledge of what our presentation goal is, it is time to begin arranging and gathering information. It is important to gather a wide variety of important related materials.

(1) **Information.** The type of information that we use depends on the topic of our presentation. We can use equipment owner's manuals, magazine/newspaper articles, library books, reports, and factual statistics. The more material and research we have, the more professional our presentation is. Also, if we present facts, data, numbers and figures, our presentations will have more credibility than if we just give opinions or statements. It is also important to find graphics, illustrations, and charts to incorporate into the show. These types of information are easier to understand than long text descriptions or rows and columns of numbers. Remember, the easier it is to understand a presentation, the more information the audience will retain.

(2) **Outline.** Now that we know the types of information that we have available to use, we need to create an outline. We should do this in a standard outline format; even better, we should do it in Microsoft Word. Our PowerPoint presentation software allows us to import Word outlines directly into a slide show for very easy presentation setup.

(a) The outline should begin with some sort of introduction and end with a closing where you restate your main points. Do not put too much information into the outline at this point; concentrate on getting a logical smooth flow. Try to include an entry for every major point that you want to make, and then put more and more information into logical sequence under the appropriate headings.

(b) Go through all of your references and data and make notes as to where you feel the information fits best in the outline. Do not create any graphs or charts or anything, just get an idea as to where information should be placed.

(c) Now that we are reasonably well organized, it is time to start creating the presentation using Microsoft PowerPoint. (Although we will learn PowerPoint, the same principles apply to any presentation application.)

d.  **Microsoft PowerPoint.**  PowerPoint is an extremely easy to use and effective presentation application.  It is part of the Microsoft Office suite of applications that all work together to blend text, graphs, and illustrations into one seamless show.  The first step in creating a presentation with PowerPoint is to choose a slide background (PowerPoint calls each screen of information a slide). PowerPoint has an option called Wizards that automates presentation production; we will not cover this option because you have more control if you create the show manually.

(1)  When you first launch PowerPoint, you are presented with the Start-up dialog box.  From this box, we will choose Template to create a new presentation and choose the background template. PowerPoint has many built-in colorful backgrounds and templates to choose from.  These templates not only are professionally colored and designed; they also have formats for many different types of slides. Templates are helpful for creating both beginner and advanced presentations.

(2)  When you choose Template, you are presented with a dialog box to locate the templates.  They are in a folder called Templates.  Inside this folder there are several folders of templates, depending on which type of presentation you are doing.  Choose the appropriate type of template (slide, screen, and overhead) for the presentation you want to create.

(3)  Once you have selected the presentation style, you next choose the slide layout for the first slide.  Using the preconfigured templates makes presentation production easy.  There are many different slide layouts to choose from.  These layouts use different color schemes, design elements, and organization to provide you with different feels for your presentations.  All you do is scroll through the layouts and double click on the one that you want to use for the first slide.  Generally a title slide is best for the first slide, usually the name of the presentation or something similar.  To add this text, simply click on the area that is labeled Click to Add Title.

(4)  You now have a title slide!  Let's take a look at the parts of the PowerPoint presentation window. This is the window that we will use to create our presentations.

e.  **PowerPoint presentation window.**

(1)  On the left edge of the screen is the Drawing Toolbar that provides you with tools you can use to create illustrations on your slides.  Most of these tools are self-explanatory and the best way to learn them is to just try them out.

(2)  Like all Macintosh programs, there is a menu bar across the top of the screen.  This contains all of the normal commands found in a menu bar, such as options for saving, printing, viewing, and so on. We will not explain every feature of the menu bar, but will refer to commands as needed.

(3)  Beneath the menu bar is the Standard Toolbar.  As we have said, PowerPoint is part of the Microsoft Office, so the Standard Toolbar is similar to other Office applications.  We find icons here to save, print, cut, copy, paste, and so forth.  There are also icons that represent importing Excel graphs and Word tables.  A zoom box also allows you to quickly change the size of the on-screen image.

(4)  Next is the Formatting Toolbar.  This is located directly under the Standard Toolbar and contains all of the standard text formatting options.  There is a font and size window, as well as other normal text handling functions.

(5)  The main part of the screen is the presentation window.  This is where the actual slides are shown while you are creating them.  In addition to scroll bars, there are five buttons in the lower left corner.  These buttons control the on-screen view of the presentation.

(a)  The button on the far left is the Slide View button.  This button is used to view individual slides. You also have editing controls to add/change text or graphics in this viewing mode.

(b)  To the right of the Slide View button is the Outline View button.  This is used to view the presentation in outline mode.  From here you can work on the title and body text of each slide.  You can also easily import outlines from Word into a presentation.

(c)  The center button is used to view the presentation in slide sorter mode.  This would be similar to viewing a group of slides on a light table.  You can move individual or groups of slides around.  This is a convenient way to polish a presentation after the text and graphics were entered.

(d)  PowerPoint allows you to create and print a lecture notes page.  This is a page that has the actual slide printed on it, as well as an area for you to enter any notes that you might want to add.

(e)  The last button on the right is the Slide Show View.  This button is used to view the slide as it will appear on the computer screen during an electronic presentation.  By clicking on this screen, the slide is enlarged to fill the screen and all menus and toolbars are removed.  Clicking the mouse button will switch to the next slide in the show.  This is a convenient way to preview the actual presentation.

i.  **Creating a PowerPoint presentation.**  Now that we are familiar with the PowerPoint interface and we have decided on the basics of the presentation setup, it is time to add information to the body of the presentation.  Perhaps the easiest and fastest way to get started is to either import or create an outline in the Outline view.  This will give you a basic list of slides that you can then add information to.

(1)  To create the outline, first click on the Outline View button.  The information you entered onto the first slide will be on the first line.  This represents slide number one.  To add a new slide, simply press the Return/Enter key; you can now add information to the title of the second slide.

(2)  When presenting material, it is best to use bullet statements rather than long text blocks.  It is hard for an audience to read long passages on a screen.  Ideally, you should have simple bullets only a few words long that get your point across.  When you give the presentation, you will be able to expand on any points that need to be discussed.  Remember that the slides are designed to enhance your presentation, not replace the presentation.

(3)  To create bullet statements, simply click on the Arrow button on the far right side of the Formatting toolbar.  This button demotes the text on the line to the next lower level.  To add a bullet character on the line of text, click on the bullet icon, which is also on the Formatting toolbar.  You can handle text in all normal ways in the outline mode.  You can change font, size, formatting, and so forth.

(4)  Now that you have all of your information entered into the outline format, it is best to switch to the Slide View mode to look through the slides.  From this view of each slide, you can judge the basic flow of the presentation.  You are also ready to format any of the text in any special ways.  Just use the Arrow pointer to click and select the text.  You can now change the text size, color, or justification. Once you have created enough slides to cover all of your material, you are ready to add graphics and illustrations.

j.  **Creating/adding graphics and illustrations.**

(1)   PowerPoint makes it easy to draw simple shapes and other objects that you can use in your presentation.  Perhaps the easiest way to draw is to use the AutoShapes Toolbar.  Click on the icon in the Drawing Toolbar, to get the AutoShapes Toolbar.  This box will give you a selection of 24 commonly

used shapes.  Click on the desired shape and then simply drag on the slide window to place and resize the shape.

(2)   To draw freehand objects, simply use the Freeform Tool.  With this tool you can click in different spots to draw straight lines or drag to draw free curved lines.  Once you have completed your drawing, you can handle your drawing in the same manner as any of the AutoShapes.

(3)   Once we have the shape placed, we can then edit its color, size, and position.

(a)  To change its color, use the arrow icon from the Drawing Toolbar to select the items.  (Click near the border of the shape to select it.)  Next, click on the Fill (on/off) button also on the Drawing Toolbar.  This will fill the item with the default color.  To change the default color or to add a pattern to the color, choose Colors and Lines from the Format menu.

(b)  It is easy to change the size or dimensions of an object. Simply select the object (as above) and then drag on any of the control handles (small dots that surround the selected object).  In this manner you can resize the object or change it proportionally.  If you hold down the Shift key while dragging a corner, the dimensions will stay proportional.

(c)  Position and rotation are the two ways to change the location of an object.  To reposition the object on the slide, select it and then move the cursor into the middle of the object.  Now just drag it around on the screen.

(d)  To rotate the object, again select it and then click on the Free Rotate Tool in the Drawing Toolbar.  Dragging from any of the selected corner points will freely rotate the object to any desired angle.  You could also select the object and choose Rotate/Flip from the Draw Menu.  This option allows you to flip or rotate in 90-degree increments.

(4)  Professionally drawn clip art can make any presentation look better.  PowerPoint allows you to import art from either the Microsoft clip art collection or from other art sources.  To add Microsoft art, choose Clip Art from the Insert menu.  Just scroll through the art and choose the art to add.  To add other art (or photographs) choose Picture from the Insert menu.  Navigate to the appropriate disk or folder and select the item to add.  Images in PICT, TIFF, EPS or MacPaint format can be added.  Once clip art or photographs are added, they can be resized, moved, or rotated just as other graphics.

h.  **Creating graphs and charts.**

(1)  Graphs and charts are used to present data in easy to understand formats.  PowerPoint can create graphs using the accompanying Microsoft Chart application.

(2)  To add a graph/chart, create a new slide and click on the Chart button on the Formatting toolbar.  The application Microsoft Chart will launch.

(3)  You will then be presented with a standard example data sheet.  The easiest way to create a graph is to change the information in this data sheet to reflect your own needs.  You will need to change the actual data, along with the headings and labels.  Clicking in the data field allows you to change each entry.  If you are importing information done in Microsoft Excel, you will use the Import Excel Information button.

(4)  There are many different types of charts available.  Depending on your type of information, you can create pie graphs, bar graphs (horizontal or vertical), scatter diagrams, and several others.  You can

also create either two or three-dimensional charts of each type.  To change the graph type, pull down on the Chart Type drop down menu and drag to the desired chart type to preview your data in different chart types.

(5)  You can add legends and labels to the chart using the Add Legend button on the Standard Toolbar.  You can also adjust the rotation, elevation, and perspective of 3D graphs by using the 3D View option under the Format menu.

(6)  PowerPoint picks the default color for graphs.  If you desire to change these colors, click on the graph color you want to change and then just pick a new color or pattern from the Graph Toolbar.

(7)  As you can see, PowerPoint has many options for charts and graphs.  We have only briefly covered the beginning options.  As we have said before, the best way to learn all of the functions is to just experiment.

i.  **Adding Quicktime videos.**  Quicktime is Apple computer's standard digitized video format.  PowerPoint allows you to place these digital videos into a presentation.  Adding video and sound to a presentation greatly enhances the impact of a presentation.  To add a Quicktime video to a presentation, open a new slide and choose Movie from the Insert menu.  You set the play option in the Play Settings dialog box found under the Tools menu.

j.  **Adding organizational charts.**

(1)  Organizational charts are used to graphically represent the flow or chain of command within an organization.  These types of charts are easy to understand and provide a graphical view of complex management or production flows.

(2)  To add an organizational chart in PowerPoint, create a blank slide and click on the Insert Org Chart button on the Standard Toolbar.  The application Microsoft Organization Chart will launch and you will have a basic template of an organization chart.

(3)  Fill in the boxes with the names and titles of people in the organization.  To remove an unneeded box, click on it and then hit delete.  To add levels, choose what type of box you wish to add and click on it in the Menu Bar.  Then click on the box that you want to attach the new box to.

(4)  The types of new boxes to add are relatively self-explanatory.  Adding a Subordinate attaches a box under the box you select.  CO-Worker adds one to the same level; Manager adds one above; and Assistant adds an assistant box to the level you click on.

(5)  The Menu Bar provides options for colors, line styles, chart types, and other formatting and display options.

k.  **Adding tables.**  Creating a table in PowerPoint is exactly like creating one in Word.  As a matter of fact, when you choose the Insert Table button from the Standard Toolbar, Microsoft Word will launch and you create the table in this application.  You can use all of the AutoFormats as well as any other Word functions.  When you are satisfied with the look of the table, simply close the window and you will return to PowerPoint.  Now you can reposition and resize the table.  Also you can add a shadow or change the line color.

l.  **Arranging slides, transitions, and builds.**

(1)  Once you have created the bulk of your slides, it is time to rearrange them if necessary.  The best way to do this is to first change to Slide Sorter mode.  In this mode you can see the overall view of the slides.  Look through them to see if there are any that obviously needs moving.  To move a slide (or group of slides), select the slide(s) to be moved and drag until the large marker is where you want the slides placed.  It is then a good idea to change to Slide Show mode and watch the entire presentation to judge the flow and content.  Go back and add, remove or change any slides that are not easy to understand.  When you are satisfied with the flow of the presentation, you should add transitions and builds to polish it off.

(2)  Transition effects are used to change from one slide to the next.  PowerPoint offers many different transition effects.  To choose which effect to use, select the slide (or group of slides) and then use the Transition pull down menu to select from the list.  There are many different dissolves, fades, checkerboards, window shades, and the like.  There is also an option for random choice, where PowerPoint randomly picks a transition effect.  When using transitions, it is best to pick one and use it throughout the entire show to add continuity.  Some of the options require a long time to change from slide to slide, so pick one that is fast enough and does not keep you waiting.  There is a timing option that you can use to rehearse your show and record the times that you manually leave each slide on screen.  PowerPoint will record these times into your presentation and can automatically advance slides at the correct time, if you desire.  To use this option, select the Rehearse Timing button on the Slide Sorter Toolbar.  To play back using these times, select Slide Show from the View menu and then check the Use Slide Timings option.

(3)  Builds are similar to transitions, except builds are used to complete a transition between lines of type on an individual slide.  For example, you can have the slide title appear as soon as the slide is on the screen, and then you can have the first line of text fly in when you click the mouse button (or at a preset time).  The next line will then fly onto the slide when you are ready for it.  Builds are effective when used with bullet text.  They keep the audience interested and anticipating the next bit of information that you can feed them.  There are several ways to set up a build.

(a)  The first method is to select Build from the Tools menu, while in Slide View mode.  You will be presented with a dialog box with several options.  The first line, Build Body Text turns the build on or off.  Check this box to activate the build.  The second line, Dim Previous Points is used to change the color of previous lines of text.  Again, this is helpful in keeping the audience on the correct point.  The last line allows you to choose how the text will appear.  Like transitions, there are many options to choose from, but it is best to pick a simple one and stay with it.

(b)  The second way to specify builds is to select the slide or group of slides in the Sorter mode and use the pull down menu to select the type of build.  This is used to set a build for a group of slides or an individual slide.

m.  **Lecture notes and handouts**.  Once you have completed the presentation, you may want to make handouts for the audience to use during the presentation.  Additionally, you may desire lecture notes which can be used by you (or whoever is giving the presentation) during your speech.  PowerPoint makes it easy to create both.

(1)  **Lecture notes.**

(a)  Lecture notes are simply sheets of paper that have the slide on the top and space for presenter notes on the bottom.  To add notes or comments to the slides, click on the Notes Page view button in the lower left of the slide window.  You can now enter any information into the Lecture Notes area.  You can change the size, font, and style of this text.

(b)  To change the layout of the Lecture Notes page, choose Notes Master from the Master pull out menu under the View menu.  Using this function allows you to change the size, shape, and position of the slide picture.  You can also add text to the master that will appear on every slide.  You can add or change text boxes or text attributes using this function.

(c)  Lecture notes are often overlooked when creating a presentation.  Properly prepared lecture notes will greatly aid in the presentation.  Notes help to keep the presenter on track and focused.  They remind you of important things to say or stories to tell.  It is important to have some sort of notes to give a professional presentation.

(2)  **Handouts.**

(a)  Handouts can be used to give the audience something to take with them.  When you choose Handouts from the print dialog box, PowerPoint prints multiple slides on one piece of paper.  You can choose from 2, 3, or 6 slides per page.  Handouts are recommended if you use a lot of charts or graphs.  It is best to give the handouts after the presentation, so that the audience will focus on you during the show instead of digging around in the handout.

(b)  To print handouts, choose Print from the File menu and then select the number of slides to print per page in the Print What pull down menu.  To change the format of the handout or to add text to all of the pages, choose Handout Master from the Master pull out menu under the View menu.  Now you can add or change things, just as in the lecture notes.

n.  **Output.**  The last step in creating a presentation is output.  As we have discussed, there are several different ways to give a presentation.  PowerPoint provides you with options for outputting to practically any display type you desire.  The most practical and easiest way to output is to give a presentation on a computer monitor.

(1)  Using a computer monitor is easy when only one or two people will see the presentation at a time, but a large monitor or projection screen is required for a large class.  To display to a screen, go to the first slide and click on the Slide Show button in the lower left corner of the slide window.  The presentation will play, using the builds and transitions you have specified.  You can decide whether to have the show self-running or to change slides or builds at the click of the mouse button by choosing Slide Show from the View menu.

(2)  To print a presentation, select Print from the File menu.  You are presented with a dialog box asking what you want to print. You have many choices, such as Slides with builds, without builds, notes, outlines, and so forth.  You also have other print options, depending on what type of printer you are using.  This is how you would make overhead transparencies if your printer is capable of it.

(3)  To create 35mm slides you must have a film recorder.  The method for recording to film depends on the type of recorder used.  Some film recorders are used exactly like a printer, here you select the recorder from the Chooser, and then just Print.  Other brands require special software and may connect to the SCSI port of the computer.

(4)  By putting a presentation on videotape, you can easily and inexpensively transfer the show to many others.  To record to video, you must connect a VCR to the computer.  Some Macintoshes (the "AV" models) allow you to directly connect the VCR, while non-AV models require a hardware adapter. To record to videotape, set up the hardware, press Record on the VCR, and show the presentation.  If you connect a microphone, you can add narration and sound.  Be sure to use high quality videotape to get the best possible image.

# A-8.  COMPRESSION AND ARCHIVING

a.  As we have learned throughout this course, there are many different file formats and types, each with their own uses and benefits.  In this section, we will explore the need for standardized file formats that can compress the data.  We need to compress these files to conserve space on our storage devices and to reduce transmission and copy times.  It is also important to understand the best way to store images into image archives for quick and easy access.  An image or file that is stored but cannot be located is useless.

b.  Lossy and loss-less are two different types of compression.  As their names indicate, you may lose image quality with one and there will be no loss with the other.  There are benefits and disadvantages of each type.

(1)  **Lossy compression.**

(a)  Lossy compression schemes, such as JPEG, squeeze the image data into a much smaller space, but may result in less image quality.  As we have said, the JPEG compression algorithm analyzes the color values of each pixel in the image and performs an average on them.  To compress an image JPEG divides the image into many 8 pixel x 8 pixel blocks.  It then analyzes each of the pixels in the block and if there are similarly colored pixels, it will average them into one color.  This averaging process results in a final image that has less detail than the original.

(b)  JPEG compression format has a variable compression rate, meaning that you set the amount of compression that you want.  When you choose "Save As..." in Photoshop and then select the JPEG option, you will get a dialog box that asks for the quality level you need, from Low Quality to Max Quality. These options change the amount of compression as well as the final image quality.  For example, a 400k TIFF image with maximum JPEG compression is reduced to a 34k file size.  The same image with minimum compression (for maximum quality) compresses to about 85k.

(c)  When you are using JPEG compression, you must be willing to sacrifice a loss of image quality.  Usually this loss is unnoticeable; but if you are printing a JPEG image on a high-resolution printer, you will notice the decrease in quality.  Areas of the image that have a gradation of color, such as the sky, will usually show banding.  This is where there is not an even, gradual color transition, but rather rows of colors that abruptly change to the next color.  JPEG should be avoided on these types of images.  Whenever you use a lossy compression, you must decide on the trade-off of quality versus transmission speed.

(2)  **Loss-less compression.**

(a)  There are other options that allow you to compress an image with no loss of image quality.  These compression algorithms, called loss-less, cannot compress the files as much as a lossy method, but they do not lose any image quality either.

(b)  Huffman encoding is a variable word length encoder.  This means that redundant data is identified and grouped together as one code.  For example, binary data such as a string of fifteen 0s can be grouped together into one code that represents the number 15, "101."  This saves 12 bits of storage or transmission.  When the image is decoded, the "101" is converted back into the long string of fifteen 0s.  Huffman encoding is primarily used to compress binary data, such as a Postscript file.  Some programs do not recognize this type of file; PageMaker is one of them.  Usually Huffman encoding is transparent, meaning the user does not know that it is even happening.  There are no options or settings pertaining to the use of Huffman encoding.  Programs that use Huffman will compress and decompress at the appropriate time and you will not even know it.

(c)  Limpel-Ziv-Welch (LZW) compression (named for the people who invented it) is very similar to the Huffman method, except instead of substituting individual characters, LZW searches and substitutes strings of similar data.  Again, this is a loss-less compression so there is no loss of data.  LZW compression is most commonly associated with the TIFF file format.  When you save an image in TIFF using PhotoShop, you can choose with a check box whether or not to use LZW compression.  The only reason not to use LZW is that your file will take slightly longer to open and save, since the computer must do the compression and decompression.

c.  File compression programs such as Alladin's StuffIt Deluxe use run-length encoding algorithms such as LZW and Huffman encoding to compress files.  These programs are mainly used to compress files that will be sent via modem, or for storing files not often used.  These programs are mainly used to compress documents such as word processors and presentations or binary files for programs that will be transferred.  Since images are usually already compressed with either JPEG or one of the loss-less algorithms, using StuffIt will not further reduce the file size.

(1)  While not actually a way to compress a file, BinHexing a file allows it to be transmitted through the Internet as a text file.  Macintosh files contain two parts, the resource fork and the data fork.  If you try to send a Mac file through an email program, it may not transmit properly.  By BinHexing the file, you convert both parts into plain text that can be easily sent through email.  Most email programs actually do all of the conversion for you so you do not need to worry about it.

(2)  Much like BinHex, Uuencode converts binary files into text files that can be sent through email.  Uuencoded files are much more common among non-Mac computers, but some Mac programs and files come this way if they are stored on other types of machines.  Again, most email programs automatically decode these files, or StuffIt Expander can decode them for you.

d.  There are applications such as Disk Doubler and Stacker that work on loss-less compression schemes but are designed to compress and decompress the entire hard disk that you use.  These

programs usually double your hard drive capacity but slow down performance because of the transparent compression.  Usually these programs work fine; but if your drive crashes, all information is lost because disk recovery programs like Norton Utilities are incompatible and cannot recover driver-level compressed files.

        e.  When you first take a picture, you usually have a use planned for it.  It may be newsworthy or perhaps it is simply a photo of a reenlistment or cake cutting.  We usually take these pictures and print them to give out or publish.  After the immediate uses are over, what then do we do with the pictures?  Sometimes they are thrown away or the negatives are filed away (archived) for later use.  When we use digital pictures, we can easily store many images in a very small space and have instant access to them.  Access is the key to archived images.  If we cannot easily locate and get to a picture, what good is even keeping it?

        (1)  Archived images must be easy to find, and they must also be high quality.  Kodak has developed the PhotoCD format that is ideal for long-term image storing.  PhotoCD format saves each image in several different resolutions on one CD-ROM that will last practically forever.  When creating PhotoCDs, the user can decide which resolutions to save as.  This determines the number of images that can fit on each CD disk.  The different resolution settings are called the ImagePac format.  This format allows the CD author to store in up to five different resolution levels, from small low-resolution "thumbnail" reference images to huge high-resolution pictures that can be used for printing.  Generally, you should store each image in both a low resolution for fast cataloging and at least one high-resolution file for actual use.

        (2)  When cataloging with a program such as Adobe Fetch, you attach keywords, captions, photographer data, or other information to the image.  This attached data is all automatically cross-referenced and can be used to search for images based on any known information.  These search functions are the key to archiving images because unless it is easy to retrieve, an image is useless.

        f.  Adobe Fetch is a cataloging application that is used to catalog, search, and retrieve all types of files.  Using Fetch you can catalog images, sounds, digital videos, text, presentation files, and practically any other file.  Fetch creates a catalog of files that has a thumbnail image or icon of each cataloged item.  A user can create an unlimited number of separate catalogs, with up to 100,000 images per catalog.  Each cataloged item can have an unlimited number of keywords attached to it for fast searching and cross-referencing, as well as a 32,000-character caption or description.

        (1)  A feature of Fetch that is invaluable for cataloging images from CD-ROM is that the images in the catalog do not have to be on the computer that maintains the catalog.  For example, you catalog all of the images from a disk and then remove the disk.  Fetch keeps small file thumbnails on the hard disk, allowing you to search and view the contents of the removed CD.  When you try to open a higher resolution copy of an image, Fetch will prompt you to insert the needed CD.  This allows you to keep all of your images on separate disks, safely stored away, but still searchable and accessible.

        (2)  Fetch is one of the easiest programs to learn and use.  To catalog a disk or folder of files, just drag the folder onto the Fetch icon.  The program will launch, scan the disk for files that can be cataloged, create thumbnails of them, and then save them all automatically.  You can now remove the disk of images.

        (3)  When first using Fetch, you will have to create a catalog for images.  It is a good idea to decide on a cataloging scheme before starting.  You should decide on how many or what type of catalogs to use.  Perhaps having one catalog for each year, or perhaps one for each type of job (portraits or presentations) would be good; however, do not make too many catalogs.  This defeats the purpose of

being able to quickly search for documents.  The type and amount of work that you do will control your cataloging, but a yearly catalog is a good starter.

(4)  Once Fetch has cataloged each item, you can view the thumbnails by choosing "Find..." from the Search menu.  Click Find All to display all of the items in the catalog.  You will notice icons for the items with the file type and location printed below.  Some items such as sounds and text files will just have a document icon, not a thumbnail.

(5)  Key wording is the most time-consuming part of using Fetch and also the most important.  In order to effectively search for a file or image, it must be logically keyworded.  This means you must enter in words that Fetch will associate with the cataloged item.  When Fetch adds items to a catalog, it creates keywords reflecting the item's file type, creation date, size, and so forth.  But this is not enough information to efficiently search.  You must select the item and then choose Keywords from the Edit menu.  Fetch displays a dialog box that shows the keywords already attached to the item; these cannot be edited.  At the top of this dialog box is a line for you to enter words.  Once you enter a keyword, click Add to add it to the list of searchable keywords.

(a)  When adding keywords, it is important to be consistent and thorough.  The catalog is only as good as its keywords.  If more than one person is entering keywords, be sure that some rules are made.  For example, have everyone use the word airplane for a picture of an airplane.  If one person uses aircraft and another uses plane, the catalog is hard to use.  However, you can attach more than one word to an item so that a search for plane will also find airplane and aircraft, as well as helicopter, jet, F-16, and A-6 if plane was included with each of these other terms as it should be.  Remember that the more keywords used, the better the search is.  See the Adobe Fetch User Guide for in-depth information on key-wording strategies.

(b)  You do not need to enter the same information over and over.  You can select many items (by shift clicking) and then choose Keywords to add the same keywords to all selected items.  This is useful when you have several shots of the same subject from different angles or at different exposures.

(6)  There are two methods for searching a Fetch catalog (other than manually browsing through all of the images).  You can either do a simple search or a complex search.

(a)  Selecting Find from the Search menu does a simple search.  Click on the box below the Find Items Whose Text to make the search area active and then enter a keyword in the field.  You can use the two pull down menus to alternate between searching options.  When you are satisfied with the searching setup, click Find.  Fetch searches through all of the images in the catalog and opens a window displaying every image that meets the search criteria.

(b)  A complex search is done the same way as the simple method, but you click the More Choices button to enter more than one-search criteria.  This allows you to refine the search for a specific image.  This is useful if you have a very specific image or desired image in mind.  The simple search finds images that match general criteria, while the complex search can narrow this down to a few specific images.

g.  Being able to quickly search through large catalogs to find specific images is useful, but integrating Fetch with other programs allows you to also directly copy Fetch images into page layout, image editing, or any other application.  This is useful when you are creating documents and do not want to manually search disk after disk of images.  Fetch may be used with some of the applications listed below.

(1) **PageMaker 5.0.**

(a) To transfer images from Fetch into PageMaker, first select the desired images in Fetch. Then choose Copy Reference from the Edit menu in Fetch. Be sure to choose the Include Thumbnails option. Next, switch to PageMaker.

(b) In PageMaker, open the Library Palette from the Window menu. In the Library palette Options menu choose Import Fetch Items. There's now a thumbnail image of the placed item in the Library palette. To place the item into a document, click on it in the Library and then click where you would like to place the object.

(2) **PhotoShop 3.0.** To include a thumbnail image and to preview a PhotoShop 3.0 file, choose the Preferences option in PhotoShop's File menu. Choose General preferences and then click the More button. Move to the Image Preview section and click the Always Save option.

(3) **Illustrator 5.5.** To include a thumbnail image and preview an Illustrator file, choose "Save As..." from Illustrator's File menu. Save the image as an EPS file.

(4) **Microsoft Word.** To preview and catalog Word documents they must be saved as either Text Only, Text Only With Line Breaks, or Text With Layout. Fetch will then include these items in catalogs and will allow you to preview the first 32,000 characters. Word documents will have a generic file icon in a Fetch catalog.

# A-9. COMMUNICATIONS

a. **History.**

(1) **Telegraph.** The first time two machines talked to each other was in 1844 when Samuel Morse sent a message from the US Capitol building in Washington, DC to Baltimore, MD, 37 miles away. This was the first use of the telegraph, and it was the beginning of the modern area of communication. With the invention of the telegraph, people hundreds of miles away could now send and receive messages in very little time. Telegraphs allowed users to send a code (Morse code) of information back and forth across a single wire. While not a computer, a telegraph was the precursor to modern communications, as we now know it.

(2) **Telephone.** The telegraph, which required the user to know Morse code and to have special training, was certainly fast, but it did not bring communications to the individual. The telephone brought communications to the people. The telephone opened up mass communications. Introduced in 1876 by Alexander Graham Bell, the telephone immediately became a success and is still a favored means of communication.

(3) **Teletypewriter.** Around the turn of the century, the teletypewriter became widely used for the communication of non-voice messages. The teletypewriter was ideal to disseminate large amounts of information to multiple stations. A user in New York could type in the information (usually news stories) and at the press of a button, automated machines all along the network would begin printing out the same story. Teletypewriters use the Baudot code instead of Morse. This code is faster than Morse and allows the machine to print out a maximum of 62 different characters. Teletypewriters are still in use to some extent today, but have been widely replaced by fax machines and modems.

b. **Modern day communications.**

(1) **Modem.**

(a)  A modem is a device that allows computers to communicate across telephone lines.  Modem stands for modulator/demodulator, and what a modem does is modulate or change the computer's binary codes into tones that can travel across the phone lines.  When these tones get to the other computer, another modem demodulates these tones back into the computer's binary language.

(b)  Invented in the late 1950s, the Bell 103 was the first modem.  This modem allowed two computers to talk to each other at a rate of 300 bits per second (bps).  Modern modems now talk at more than 28,800 bps!  While slow by today's standards, the Bell 103 was an important invention because even 300 bps are faster than using the post office.

(c)  As we have learned, a modem converts the digital 1s and 0s (on and off) into tones or pulses.  These pulses are then converted back into ones and zeros.  An inherent problem with this type of communication is the actual telephone lines.  While voices may sound fine, even the slightest static will disrupt data communication.

(d)  Another problem is speed.  Although 28,800 bps is much faster than 300 bps, it is still relatively slow.  At 28,800 bps it will take about 5 minutes to transfer 1 MB of data (at 300 bps it would take 8.6 hours to transfer the same 1 MB!).  While this is a relatively short amount of time, it can quickly become longer with large (more than 50 MB) files.  Also, the longer it takes to transfer a file, the higher the chance of static error.  In the future we will have to switch to digital or fiber optic phone lines to increase speed.  These types of lines are already available, but still relatively expensive.

(2)  **Speed standardization.**

(a)  When any new technology develops, everyone wants to jump on the bandwagon.  This happened when modems first began developing.  Everyone was developing and making their own modems, but problems started developing.  Different modem makers were each making their modems slightly different and these differences caused problems.  Finally the CCITT, a standards organization, got together and created some industry wide standards.

(b)  V.22bis (bis means second in French) was the first standard.  The V.22bis standard was the standard for 2400 bps communication.  All modems that used this standard could finally communicate.

(c)  The next standard was the V.32 standard for 9600 bps communication.  V.32bis standard for 14,400 bps (sometimes called 14.4 pronounced fourteen dot four) and V.34 standard for 28,800 bps (28.8 or just twenty-eight eight) followed this.  Each of these standards assures that modems from

different manufacturers can properly work with each other.  You may see a modem labeled V.fast; these were produced before the V.34 standard was instituted and may not properly communicate at 28,800 bps.

(3)  **Compression/error control standardization.**  In addition to creating standards that control the rate of data transmission, the CCITT also created some standards for other telecommunications issues.

(4)  **Error control/correction.**

(a)  Error control or error correction is a way to assure that the receiver properly receives the information that the sending modem sends.  Modems that use error correction incorporate a code into the transmission.  When the receiving modem decodes the message, it will know if any data was lost in transmission.  If it discovers missing data, it sends a message to the sender and asks for a rebroadcast of the missing area.

(b)  The two modern CCITT standards for error control/correction are MNP 5 and V.42.  Modems that are designed to use these standards will properly communicate with other modems of these standards.

(5)  **Data compression.**  The CCITT also created a standard for data compression.  Compression is a way that the modems squash the data before sending it.  They expand the data when it is received. This helps to speed up the transfer of information.  However, modems must be able to use the same compression formulas.  To assure compatibility, the CCITT created the V.42bis standard for compression.  Any two modems that conform to this standard can compress and decompress information properly.

c.  **Communication terms.**  Whenever you learn about a new technology or subject, you must learn a new vocabulary.  Communications is certainly no different.  Although it may sound complicated, there are not that many new terms.

(1)  **Handshaking.**  When two modems first connect with each other, they know nothing about each other.  They must go through a procedure called handshaking.  When this is happening, they exchange information such as their speed standard, compression, or error control.  This process of negotiations and familiarization is called handshaking.

(2)  **Data bit.**  When configuring your communication software, one of the settings you adjust is the number of data bits.  When computers send information across telephone lines, they break the data down into bits, making it easier for the computers to manage the information.  Different modems use different numbers of data bits usually either eight or nine.  To properly communicate, both computers must be set at the same number of data bits.

(3)  **Stop bit.**  While transferring these bits of data, the computer adds a bit called a stop bit on the end of the data bit.  The stop bit tells the receiving computer that all of the information in that bit was received.

(4)  **Networks.**  A network is simply more than one computer connected together.  It can be both economical and time saving to network computers together.  First, when you have a network of computers, you can keep one central printer and connect it to the network.  Whenever anyone prints

something, it comes out at the central printer, eliminating the need to have a printer at every station.  A network can also save time, because you have one central database or file area and everyone on the network can instantly access it without leaving their desk.  There are several different types of networks.

(a)  **Local area networks (LANs).**  A LAN is the most common type of network.  This is where all of the computers in one office or building are linked together.  The computers can all share a printer and databases, and the operators can even access information directly from their coworkers' computers.  There are different types of LANs and each type has its pros and cons.

* LocalTalk or AppleTalk is the built-in networking that the Macintosh comes with.  In a LocalTalk network, individual computers directly link to each other.  Although extremely easy to set up and convenient when only two or three computers are networked, LocalTalk networks are relatively slow (only about 28 Kbps) and unreasonable for large networks.

* Ethernet is a common type of high-speed network.  With an Ethernet network, each computer is connected to a central hub that contains a microprocessor.  This hub allows extremely fast connections (up to about 10 Mbps).  Ethernet networks are the most common types used in LANs.

* Token-Ring is another common network.  A Token-Ring network is similar to Ethernet, but the language is slightly different.

* Transmission Control Protocol-Internet Protocol (TCP-IP) is the type of network that the Internet uses.  Ethernet and Token-Ring are hardware and software networks, meaning that you must have the correct hardware (connectors, wiring, circuit boards) and software language.  TCP-IP is a language that is common to all computers connected to the Internet.  TCP-IP can be used over Ethernet and Token-Ring, but it is usually just used on the Internet.

(b)  **Wide area networks (WANs).**  A WAN is nothing more than LANs connected together.  For example, a business that has offices in New York and Boston can be connected in a WAN.  Both of these offices will have LANs so that coworkers can share printers and data.  If the company decides to connect these two separate LANs using fiber optics, special telephone lines, or microwaves, then they create a WAN.  While you would not necessarily use a WAN to share a printer, you certainly could set up one database so that offices all over the world could have access.

(c)  **Commercial networks.**  A commercial network is one that individuals or companies pay to access.  These networks are setup to make money and offer many different resources.  Users with access to a commercial network may be able to use on-line encyclopedias, databases, mailing lists, software files, and many other types of resources.  The largest group of users of commercial on-line networks is home users.  Several common commercial networks are America Online, Compuserve, Delphi, and Genie.  The Bulletin Board System (BBS) is another type of commercial network.  A BBS is usually local to one city or area.  A system operator (Sysop) runs a BBS.  The BBS offers services similar to the larger commercial services, but on a much smaller scale.

(5)  **Internet.**

(a)  The Internet is a vast, mostly unorganized, global network of computers.  In the 1950s the US Government wanted a way to link all of its computers together so that in the event of a nuclear war, the military would always have access to data stored across the country.  This network became known as the Advanced Research Projects Agency Network (ARPANET).  Well, the nuclear war never came so the ARPANET dissolved into what is the current Internet.

(b)  In the 1980s the National Science Foundation (NSF) took over the ARPANET and began linking college and university computers to the existing network, thus allowing students and staff all over the world to access vast databases and resources.

(c)  In the late 1980s and early 1990s many commercial networks and BBS began providing Internet access to home users.  The Internet is now estimated to have about 2.5 million computers permanently connected.  In addition to these 2.5 million permanent computers, it is estimated that another 18 million computers are connected by either dial-up accounts or through terminals at businesses and colleges.

(d)  Presently the Internet is going through some dramatic changes that may seriously affect its future.  The NSF is turning their high-speed data backbone and supercomputers over to private industry. This will allow increasing commercialization and profit making on the global network.  It is still unclear how these changes will affect the end user, but the general consensus is that services will generally stay the same.  There will most likely be an ever-increasing amount of data available and the Internet will continue to grow.

(e)  Another major concern with the Internet today is censorship.  Since its conception the Internet has been unregulated and self controlling.  With all of the current advances and increased popularity, there are concerns that there should be more control over what is on the Internet.  Because there are all types of explicit material on the global network, censorship would effectively shut down the Internet. There are many questions that have no answers when it comes to the censorship issue.  Who would be in charge of deciding what material is deemed offensive?  Who would police the Internet?  How do you handle a network of computers that spans the globe and many different cultures?  How would you locate and prosecute offenders?  When a society begins to pass laws that are unenforceable, as any Internet censorship law would be, this only breeds contempt for other laws.  The Internet should remain a free forum for the open exchange of thoughts, ideas, and information.

(f)  Unlike the commercial on-line services, the Internet is not set up as one organized unit.  There are several key areas of the Internet, and software was developed to make the functions easier.  You will need several different applications to accomplish all of the functions available.

(6)  **File transfer protocol (FTP).**

(a)  FTP is one of the most used Internet services to transfer files from one computer to another.  A file can be anything that is on the computer.  Application programs, photographic images, books, documents, video clips, and sounds are all examples of files that can be transferred from one computer to another.

(b)  Various universities and organizations have set up computer sites that offer huge archives of files to download.  These sites are usually referred to as anonymous FTP sites.  What this means is that anyone can log into these computers and access the files that are stored there.  When you attempt to log into these computers, you are asked for a user ID and a password.  Most computer systems that allow public access will accept "anonymous" as a user ID and your email address as a password.  When you remotely connect to a computer and control its actions like this, it is called a Telnet session.  So, a

typical Internet conversation may sound like this:  "Why don't you Telnet to my computer and FTP that file."  What this means in plain English is "Why don't you connect your computer to mine through the Internet and copy that file."  Telnet and FTP work two ways.

- Not only can you log onto other user's computers, but also they may be able to attach to yours.

- Additionally, not only can you get files using FTP, but you can also send files to others using FTP.

(7)  **Gopher, Veronica, and Archie.**  These weirdly named Internet functions are used to search for information.  To use these, you use a program designed for these functions, log onto a server computer, and enter what you are searching for.  The computer then searches through its databases and reports what information matches the search query.  The program you use will provide a report listing the number of matches, as well as how close of a match it is.  For example, if you search for Apple Macintosh Computers, the search program looks for all occurrences of these words.  Therefore, anything with any of these words is reported.  An item with all three words is listed first because it is a 100 percent match.

(8)  **Wide Area Information Servers (WAISs).**  The WAIS is similar to Gopher and Veronica, but much more powerful.  The WAIS allows you to ask specific questions in plain English and then searches vast indexes and reports any matches.  These servers are useful for searching the global network for documents on specific topics.  To do research on using a Mac as a graphics workstation for example, you would enter "Tell me everything about using a Macintosh computer as a graphics workstation."  The WAIS would then search all of its databases and give you a list of items.  You would read one or two of the items, and then you could modify the search by telling the WAIS to "Search for more like this one or Search again, but ignore items that are similar to this."  This makes the search more precise and helps you find better information.

(9)  **World Wide Web (WWW).**

(a)  The WWW or just the Web is the newest and perhaps the most functional Internet feature.  The WWW uses a graphical interface to present screens of pictures, text, sounds, and video.  Using the WWW you can connect to remote machines and access information.  Many companies, libraries, and organizations have created homepages on the WWW.  A homepage is simply a table of contents for the information on the WWW.  Each screen or document on the WWW is linked together with hypertext, which means that specific keywords, called links, are all joined together.  When you come across a link, you can click on it with the mouse to automatically move to another location for more information.  For example, if you are at the Apple Computer homepage (located on a computer in Cupertino California), and there is a link to monitor resolution (for example), you can click on the text link and automatically move to the new computer.  This new link may be on the same computer in California or across the globe in Europe, and you would never know it.

(b)  This hypertext technology makes it quick and easy to find information and related material.  You may also find links to FTP sites and searchable databases.  The WWW incorporates most of the functions of the Internet into one easy to use format and interface.  The future of global computer networks will probably be something like the Web.

(10) **Electronic mail.**

(a)  Electronic mail or simply email allows you to instantly send notes to anyone that has an email address.  Much like regular letter mail (called snail mail by the techno-savvy), email is used for anything from personal letters to business mail.

(b)  Email is basically instant.  The time it takes to send a letter and for it to be received can be as little as a few seconds to as much as an hour or two.  This makes business run much faster.  Unlike regular mail, you can send more than just letters through email.  You can attach any file that you would like to an email.  You can send pictures, programs, or other documents without having to mess with sending disks or removable media through the mail.  Because email is much faster and easier then snail mail, people have a tendency to be short and to the point.  You must be careful not to mistake this for rudeness.

(c)  Another concern with email is quoting.  Since it is extremely easy and quick to send and reply to email, people quote messages in replies.  Quoting helps to refresh the memory of the person who you send email to.  It is easy to forget what you say, but if you selectively quote parts of the message in a reply, it can jog a memory.

(11) **Newsgroups.**

(a)  Newsgroups, or Usenet News or Internet News as they are sometimes called, are similar to electronic bulletin boards.  There are thousands of different newsgroups; each one devoted to a different topic.  You subscribe to groups that interest you and when you read the news, you read all new messages.  After the first time, every time you log onto the news server, you only see messages that are new or you haven't read.  You can post reply to messages or just read other people's postings.

(b)  Newsgroups are moderated or unmoderated.  One person controls moderated newsgroups.  When you post something to a moderated group, the moderator first reviews the posting and decides if the entire group should see it.  Unmoderated groups have no control and everything that is posted is sent to everyone.  This can lead to problems of having the same questions or information posted over and over.

(c)  Newsgroups are sorted using a hierarchy system.  One typical newsgroup is comp.mac.sys, which the first part (comp) means that this group is under that computer topic; it is next broken down into the Macintosh (Mac) subdivision; and finally the system (sys) subtopic.  There are many different major topics, but Computers (comp), Alternate (alt), Social (soc), Science (sci), Recreation (rec), and News (news) are the major topics.  Each one of these is broken down into many different very specific individual newsgroups.

(12) **Mailing lists.**  Mailing lists are similar to newsgroups, but instead of logging onto a central repository to read new messages, mailing lists are delivered through email.  Mailing lists work much like traditional snail mail mailing lists.  You sign up (or automatically get signed up) on a list and every time someone sends something to the mailing list, it goes to everyone on the list.  There are many topics similar to those on the Internet News.

(13) **Internet relay chat (IRC).**

(a)  The IRC is similar to a CB radio.  You log onto an IRC computer server, and you can automatically "talk" back and forth to anyone else logged onto the IRC around the world.

(b)  When you log on, you are presented with a list of several hundred channels, each one with a different topic.  You can join a channel (or more than one) and see in real-time what people are typing back and forth.  There are channels devoted to every imaginable topic, from debates over which computer are best (Mac or Windows) to cybersex channels where people from around the world discuss explicit sexual matters!  (Not for the faint hearted!)

(c)  The IRC can be lots of fun to use to meet people from around the world, but it can also be used to get quick advice to problems.  For example, you can sign onto a channel devoted to graphic arts and ask professionals how to accomplish certain tasks.

d.  **Internet concerns.**

(1)  **Addresses.**

(a)  The Internet is new to most people, so there are lots of new terms and information to learn.  The first thing we must understand is Internet addressing.

(b)  Every computer or user on the Internet has a unique address to identify it.  There are several different types of addresses, and they must not be confused.  The most common type of address is an email address, which looks something like this:  bob_jones@one.af.mil.  The part before the @ is the name of the specific user, Bob Jones in this example.  Notice that there is no capitalization or spaces.  The _ (underline) is commonly used instead of a space.  Additionally, most users choose something easy like bjones or bobj.  The @ symbol (shift 2) means at and separates the user name from the machine name.

(c)  After the @ comes the domain name.  This is the name of the machine that the user is using.  The first part is the name of the computer at the location.  Some places, usually schools, have more than one server computer, so the first name is the specific computer.  Next, separated by a period ( . ), is the name of the institution, in this case af for Air Force.  Finally is mil meaning that this computer is in the military domain.  Other domains are edu for education, gov for government, com for commercial, net for network, and org for organization.  These domains only apply to US computers; other countries use slightly different systems.  Most computers outside of the US have a two-digit code at the end, such as fi for Finland.  You can identify where the computer is located by the code.

(d)  Another example, maryjane@blue.ut.edu.ca would be said "Mary Jane at blue dot UT (say "U" "T") dot EDU (rhymes with "met you") dot CA ("C" "A")."  So, the address is for Mary Jane at the University of Toronto (ut) in Canada (ca) on the computer named Blue.  In the domain of education that sounds pretty complicated, but it really isn't.

(e)  The Universal Resource Locator (URL) is another type of address.  URLs are common when referring to the location of a file and not a specific person.  A common URL looks something like this: http://www.apple.com/pub/PowerMac/power.mov.  This URL points to a file called "power.mov" located on the Web.

(f)  The http:// part means that the document is part of a hypertext link; www means World Wide Web; next is the machine name, which in this case is Apple in the commercial domain; and next is the

specific directory where the file is located.  In the UNIX world, files are stored in directories instead of folders.  These directories can be nested inside each other just like folders.  So in our example, the file power.mov is located in the PowerMac (/PowerMac) directory, which is inside the public (/pub) directory.

(g)  Again this may seem complicated, but it is a standard used by all computers on the Internet so you only need to learn one standard.

(h)  You may also see URL that look like ftp:// .  These are like http:// addresses, but they point to files that can be downloaded, and not hypertext documents.

(2)  **Internet etiquette.**

(a)  As we have discussed, the Internet is a new place for most people so there are new sets of common courtesies to learn.  We have already discussed email, and the fact that since email does not involve as much forethought as snail mail, we may have a tendency to be less than cordial.  Since you cannot see the writer or hear the tone of voice, it's easy to misconstrue the meaning of things.  Internet users have developed smileys to help convey emotions.  Smileys are simple pictures drawn with characters on the keyboard.  When viewed from the side, they look like little faces.

- This is a regular smiley:  :-)      There are many variations of this smiley.

- Here is a winkey or a winking smiley:  ;-)

- Now a smiley sticking his tongue out:  :-p

- Here is an unhappy smiley:  :-(

(b)  Smileys are used in email, newsgroups, and on the IRC.  They allow you to add a bit of feeling to an otherwise unemotional medium.  A well placed smiley can make the difference between making someone happy or making an enemy.

(c)  Another etiquette concern is flaming.  Flaming is sending hate email or posting derogatory messages on newsgroups.  Flaming usually results when two people disagree or when someone posts something that angers people.  While flaming (sometimes called Flame Wars) can be fun to watch, it really wastes a lot of time and space on other people's computers and should be avoided.  If you do accidentally upset someone and find yourself being flamed, it is best to either ignore it or send a nice apology.

(d)  Next we have frequently asked questions (FAQ), which is a list questions.  FAQs are posted throughout the Internet, usually on newsgroups.  When you are using a new part of the Internet for the first time, it is best to look for the FAQ, before asking questions.  It can be time-consuming and tiring for everyone involved having to answer the same questions over and over to every new user.  This brings us to lurking.

(e)  Lurking is watching and reading before jumping into an on-line conversation.  Whether it be a newsgroup discussion or a channel on the IRC, it is best to read what others are saying before jumping in with your comments.  This allows you to see exactly what is being discussed and at what level the discussion is on.  Although lurking is good for beginners, remember the Internet is all about people and to use the full potential, you must participate.

(3)  **File transfer.**

(a)  As we have already learned, file transfer (or FTP) is used to move files from one computer to another.  Of all the different uses of a computer with a modem, file transfer is probably used the most.  We will want to quickly send and receive photos and other types of images from distant locations to our home bases.  There are two principal ways to transfer files.

(b)  The first way involves using the Internet.  To use this method, both parties must have Internet access and must agree on an FTP site.  There are many FTP sites that allow users to store files on their computers, and most Internet access providers allow users to do this.  So the originator would log onto the Internet, telnet to the agreed upon computer, and FTP the files to it.  Then, at their convenience, the receivers can telnet to the computer and FTP the file to their own computer.  This method is convenient because either party can do it at their leisure.  The only problem with this method is security.  When the files are on a public computer, they are available to anyone with Internet access.  There are two ways to work around this.

- First the file can be encrypted.  There are many commercially available encryption programs that will encrypt up to DES standards.  This allows the sender to encrypt the file, and only the receiver, who has the key code, can decode and use the file.

- Another way to ensure secure communications is to have a secure Internet computer to FTP the file.  Most large companies and government agencies have computers attached to the Internet.  If the receiver has access to a computer permanently attached to the Internet, they can set up a password and user name for the sender.  Then the sender simply telnets to the secure computer and FTPs the file.

(c)  The second way to transfer files through telephone lines is to set up a direct connection.  This method involves the sender calling the receiver's computer directly (or the other way around, it really doesn't matter who calls who).  You can use regular terminal software to do this, but then there has to be someone at the receiver's computer to initiate the receipt of the file.  Most people who transfer files this way use special software that allows them to control the remote computer.  When using this software, you can see a window of the remote computer's desktop, and you can control it as if you were sitting in front of it.  To transfer the files, you simply drag them from your computer to the remote window.  Apple Remote Access and Timbuktu Remote are two programs for the Macintosh that allows you to remotely control a computer.

(4)  **Compression.**

(a)  Many files, especially photographic images, can be rather large.  Imagine a picture that is 8 MB in size; at 28.8 Kbps, it would take almost 50 minutes to transfer the picture.  This can get rather expensive if you pay by the hour, not to mention tying up phone lines.  Compression programs were developed to squash the file to a much smaller size.  This smaller size obviously takes less time to transfer and saves money.  Compression programs compress images by analyzing the binary information that makes up the colors or tones.  Since there may be large areas of the same color in a picture, the computer can bunch all of this information together and save space.

(b)  Compression programs are defined by their compression ratio—how much they can squash a file.  The higher the ratio, the more compression and the smaller the compressed file.  Lossy and Loss-Less are two types of compression programs.  Lossy yields the best compression ratio, but may lose image quality.

(c)  Lossy compression involves a loss of quality, meaning that the decompressed image will not look as good as the original.  A common lossy compression is called JPEG.  JPEG stands for Joint Photographic Experts Group, which is a group of professionals in the photo field who created the compression type.

(d)  When using JPEG, you are presented with several quality options.  The options correspond to the image quality.  For example, if you choose the Best Quality option, you will not loose as much quality as if you had chosen the Fair Quality, but the file is not as small either.

(e)  JPEG compression works by sampling a small area of an image (usually a 64 x 64 pixel square) and analyzing the contents of the area.  JPEG uses mathematical formulas to average the color in the sampled area.  It then deletes the original color and replaces it with the average.  By doing this on the entire image, it can greatly reduce the size of the file; but as we have said, JPEG is a Lossy compression so the uncompressed file may not be as good a quality as the original.

(f)  Loss-less compression does not degrade the image quality.  Stuffit Deluxe is a program that does loss-less compression.  This application, and many similar programs, can be used for any file, not just images.  This is useful for transferring any file from computer to computer.

(g)  While using the Internet and other on-line services, you may encounter many different file types.  Most files have a three-letter extension on the end of the file that represents the type of compression.  Stuffit Deluxe is capable of expanding almost any of these files, so it or the shareware program Stuffit Expander is a must for anyone who regularly uses on-line services.

# A-10.  ETHICS

a.  **Today's electronic technology**.

(1)  The ethical and legal issues surrounding photography, retouching, and digital imaging are issues of great debate.  Being military photographers, you will have access to an abundance of images and footage not available to the civilian media.  It is the responsibility of the military to make guidelines and rules for policy of manipulating military images.

(2)  The importance of ethics in electronic imaging will grow extensively as computer image processing technology expands.  Already, desktop scanners and software packages are common in the electronic media world.  Soon, so will digital cameras.  Anyone with a properly configured personal computer can extend the limits of a traditional camera.

b.  **The accompanying dilemma.**

(1)  It's apparent that digital photography has reached the masses at all levels of the civilian and military sectors, which has created a dilemma—to retouch or not to retouch.  As more people edit photographs on computers, photographers are finding it difficult to maintain control over their work.  When the photographer's point of view as an eyewitness is lost, variance between fact and fiction is easily misinterpreted.  Possibilities are almost endless as to what enhancements and manipulations can be made on the computer.

(2)  Many photographers have reacted negatively to computer technology after years of seeing their works reproduced without permission.  Many of today's photographers are hesitant to allow electronic copies of their images into a publishing world that has become unconcerned about photographic copyrights and the ethics of retouching.  Yet computer imaging also offers great promise—new markets,

wider and easier distribution of photographs, the ease of transferring an image, and more effective storytelling through multimedia publishing on CD-ROMs.

c. **The ethics of retouching.**  It used to be said that the camera never lies.  That was before digital photography.  Now, we are in a new age of picture-perfect image processing.  With this new breed of computer imaging comes the tempting power of electronic retouching.  Some have called it disturbing and corrupt.  Others argue that it is merely a more powerful extension of the creative darkroom.

d. **Photographs as accurate historical records.**

(1)  In the past, documentary photographs were proclaimed as authentic, factual pieces of information.  Digital Imaging technology changed that understanding; however, the basis for a believable documentary photograph still remains.

(2)  Photojournalists were considered reporters with cameras, recording events as eyewitness observers.  They document powerful and unusual events capable of invoking strong emotions.  Regardless of branch of service, documentary photography will depict a factual account, and in no way can these images or footage be altered.

f. **The ethics of digital manipulation.**

(1)  As photographers we have the responsibility to document society and to preserve its images as a matter of historical record.  It is clear that the emerging electronic technologies provide new challenges to the integrity of photographic images.  This technology enables the manipulation of the content of an image in such a way that the change is virtually undetectable.  The National Press Photographers Association, a respected civilian news organization, has released the following statement:

> *"We believe photojournalist guidelines that are currently in use should be the criteria for judging what may be done electronically to a photograph.  Altering the content of a photograph, in any degree, is a breach of the ethical standards recognized by the NPPA."*

(2)  Although, military photographers do not necessarily belong to organizations such as this, the policies that they adhere to are good for us as well.

f. **Photographs are not reality.**

(1)  A photograph is a three-dimensional object that is placed on a two-dimensional plane that is made up of bits of silver or dyes that communicate information about a moment in time.  There are properties used in photographing and printing these two-dimensional objects which, with common use

and agreement, have come to be accepted as reality.  There are some extent patterns of grain, light, cropping, of dodging and burning, and so forth, which have come to be associated with the intention of truth and accuracy.

(2)  These principles are not yet accepted as a whole by the media, television broadcasters, or magazines.  Tastes, ethical standards, social expectations, and perception of nature of truth evolve.  TV Guide can juxtapose various images to ridicule a point with minimum complaint, but when a magazine with the stature of National Geographic alters an image, it damages its creditability.

(3)  There have been numerous instances of editors choosing to spruce up a certain image, like an image of the Challenger space shuttle mishap.  The San Jose Register was mocked when they inserted clouds into a photo of the Challenger explosion that they felt was not dramatic enough.  To sum it up, there can be no one set of standards applicable to all users of photography at all times.  Any set standards must be site specific.

(4)  What is needed is a set standard that can be utilized worldwide.  It has been suggested that the use of a symbol (M) for electronically manipulated photos be used to identify the images that have been altered in any way.  But that can also be considered as prejudicial by only identifying the electronically altered photographs and illustrations.

(5)  There are several degrees of change.  Major or essential changes are those that change the nature of the image.  Minor changes are usually just technical changes, such as spotting out dust and scan lines.  Most technical changes are considered ethical, while major changes are considered unethical.

(6)  To put George Bush into a picture from Yalta would be a major change.  Whereas moving the pyramids a little closer together, though massive in reality, is only a minor change since it does not change the basic information of the picture.  The pyramids picture is no longer an accurate photograph but the essential information has not changed.

g.  **Electronically manipulation functions.**  The following is a list of specific electronic manipulation functions and a discussion of each in terms of electronic versus digital manipulation.  Photo labs, schools, newspapers, and magazines wishing to set ethical standards for their publications need to look at these seven areas where abuse can occur and then decide what is the appropriate response for their circumstances.

(1)  **Contrast control.**  We are use to controlling contrast and photographers know that they can give an apparent sharpness by increasing contrast.  Contrast control is a basic, traditionally accepted form of darkroom manipulation.  You will find it hard to dispute contrast control, which is widely accepted in both traditional and electronic darkrooms.

(2)  **Dodging and burning-in.**  These are two of the most basic printing skills of a good photographer.  Too much burning-in is today considered unacceptable in the traditional darkroom and will also be unacceptable in an electronic darkroom.  One of the fears of photographers is that untrained eyes in the production department will dodge and burn for them and take the interpretive function from the photographer.  This is a valid fear, but it only becomes an ethical fear when the dodging and burning change the meaning of the photograph or misrepresents reality.

(3)  **Cropping.**  Cropping is considered by most to be ethical.  By convention, we allow the photographer or editor to define the area we are allowed to view with four sides of his or her choosing.  These sides become the limits of the image and nothing else can be added or eliminated from the

defined scene.  However, cropping can become unethical in both types of darkrooms if important parts of an image are removed and distort the actual events.

    (4)  **Cut and paste.**

    (a)  Cut and paste, or cloning, is one of the greatest fears.  For some reason, the concept of a "Decisive Moment" does not seem to apply to computers.  One of the most basic tenants held by news photographers is the inviolate nature of the moment.  If you miss the picture, you miss the picture.  You do not add a ball to a picture from a football game or move the ball around in the frame.  Some might say, National Geographic used this logic on the pyramids, "just a few feet to the right and the photographer would have had the shot".  We are not in the business of making photographs from spare parts.  To destroy the precise relationships within an image at one certain point in time is to change the truth of a picture, or at least its accuracy.  To move a pyramid or to add a football or remove a Coke can is to change the nature of photojournalism.  The reading public expects photojournalists to adhere to this principle.

    (b)  Cutting and pasting images has always been with us, but is far easier to accomplish using electronic means.  The ethical concerns are the same, but the seamlessness of the changes makes them more tempting.  We need to remember that just because we have a new tool does not make the act of cutting and pasting any more ethical than before.

    (c)  The cloning function has its use in allowing us to remove dust spots and scan lines.  It is considered ethical to use Spottone or a pencil to manually remove this sort of technical imperfection and it should be allowed electronically.  The key word being technical.

    (5)  **Color correction.**  Color correction done on a global scale is considered a correct procedure in all color printing.  The eye adjusts to color temperature changes, but film does not.  However, it is usually considered unethical to change one color or one part of the picture all by itself since the eye does not work that way.

    (6)  **Sharpen.**  Sharpening causes a new dilemma as it is the only electronic manipulation that has not been seen before.  Sharpening does not bring into focus an out of focus picture.  Rather, it gives the appearance of sharpness by increasing the contrast between pixel groups.  To decide if it is ethical to sharpen, we have to ask does the sharpening change the accuracy of the information in the image and does the sharpening change the integrity of the moment.

    (7)  **Flopping.**

    (a)  It has always been possible to put a negative in the enlarger backwards, but it is considered unethical to do this in the darkroom by most papers and will continue to be unethical at the electronic picture desk.

    (b)  This particular case leads to another vexing problem.  Photographers generally will not flop a negative.  If someone without a photographer's background is given the ability to flop an image, he or she might not have the background needed to know why it is wrong.  Photographers have developed an interest in ethics now because people outside their world are gaining access to their work and they are afraid of the consequences.  It is necessary for photographers to learn all there is to learn about electronic photography and keep as much of the creative function in their own hands as they can.  To do this they must follow the process from camera to print, thinking of the printed final product and not the photographic print itself.

(c)  In the final analysis, credibility is the bottom line.  If we try to deceive the public, whatever we do electronically to the photograph is wrong.  If we attempt to bring the most accurate representation of reality as we can create to the reader or observer, we have acted ethically on behalf of our profession.  If we produce accurate information, we have succeeded.

## A-11.  DEPARTMENT OF DEFENSE POLICY ON MANIPULATION OF PHOTOGRAPHS

a.  **DoD Policy.**  On December 9, 1994 the Deputy Secretary of Defense signed a memorandum which provides DoD policy on the alteration of official photographic and video images.  Photographic and video imagery has become an essential tool of decision-makers at every level of command and in every theater of military operations.  Mission success and ultimately the lives of our men and women in uniform depends on this imagery being complete, timely and above all, highly accurate.  Anything that weakens or casts doubt on the credibility of this imagery within or outside the DoD will not be tolerated.  The emergence of digital technology has significantly increased the capability of Defense imagery.  Since current federal regulations and DoD directives do not specifically address the deliberate alteration of official photographic records, I believe guidance is required.  I am providing the guidance by establishing the following as DoD policy on the alteration of official photographic and video imagery.

(1)  The alteration of official defense imagery by persons acting for or on behalf of the DoD is prohibited except as outlined below:

(a)  Photographic techniques common to traditional darkrooms and digital imaging stations such as dodging, burning, color balancing, spotting, and contrast adjustment that are used to achieve the accurate recording of an event or object are not considered alterations.

(b)  Photographic and video image enhancement, exploitation and simulation techniques used in support of unique cartography, geodesy, intelligence, medical, RDT&E (Research, Development, Test, and Evaluation), scientific, and training requirements are authorized if they do not misrepresent the subject of the original image.

(c)  The obvious masking of portions of a photographic image in support of specific security and criminal investigation requirements is authorized.

(d)  The use of cropping, editing, or enlargement to selectively isolate, link, or display a portion of a photographic or video image is not considered alteration.  However, cropping, editing, or image enlargement which has the effect of misrepresenting the facts or circumstances of the event or object as originally recorded constitutes a prohibited alteration.

(e) The digital conversion and compression of photographic and video imagery is authorized.

(f) Photographic and video post-production enhancement, including animation, digital simulation, graphics, and special effects, used for dramatic or narrative effect in education, recruiting, safety and training illustrations, publications, or productions is authorized under either of the following conditions:

- The enhancement does not misrepresent the subject of the original image.

- It is clearly and readily apparent from the context or from the content of the image or accompanying text that the enhanced image is not intended to be an accurate representation of any actual event.

(2) Official Defense imagery includes all photographic and video images, regardless of the medium in which they are acquired, stored or displayed, that are recorded or produced by persons acting for or on behalf of DoD activities, functions, or missions.

b. **Copyright law.**

(1) Laws seldom keep pace with changes in society. Those laws that govern the ethics of enhancement and manipulation of images are no different.

(2) Copyright is a form of legal protection for original works of authorship fixed in any tangible medium of expression. The courts have interpreted the law to include computer software, photographic, artistic, literary, dramatic, musical, and other intellectual works.

(3) Copyright law gives the owner of a copyright the exclusive right to reproduce the image, arrange derivative (not original) works, distribute copies, or perform and display the work in public. While there are legal exceptions such as fair use and compulsory license clauses, original authors are extended considerable protection. The US Copyright Office, part of the Library of Congress, oversees copyright law.

c. **Protected works.** Copyright protects original works of authorship that are fixed in a tangible form of expression. Copyrightable works include—

- Literary works.

- Musical works.

- Dramatic works, including any accompanying words.

- Pantomimes and choreographic works.

- Pictorial, graphic, and sculptural works.

- Motion pictures, and other audiovisual works.

- Sound recordings.

- Architectural works.

d. **The law for works created in 1978 or later.**  A work created on or after January 1, 1978, is automatically protected from the moment of its creation and is ordinarily given a term enduring for the author's life, plus 50 years after the author's death.  In the case of a "joint work prepared by two or more authors who did not work for hire," the term lasts for 50 years after the death of the last surviving author's death.

e. **Key elements of the laws.**  Fixation, originality, and expression are the three basic factors that must be present for US copyright law to protect a new work.  All three must be considered when determining copyright ownership.

(1)  Fixation is the creation of a work in a tangible, lasting form and occurs at the moment of creation.

(2)  Originality is the conception in the author's mind; this is also essential.

(2)  Expression is the final key.  Expression of ideas can be copyrighted, but ideas themselves cannot.

f. **Permissible copying.**

(1)  The Copyright Act also defines permissible copying.  A work can be copied for limited private use in the quest for knowledge if it is not distributed or displayed and if the owner is not harmed.  Works can be copied for fair use if the commercial value of the original is not exploited or if the reproduction is necessary for scholarly discussion or analysis of the work.

(2)  A teacher also may make copies of short published works or periodicals for educational use if specific criteria are met.  In other instances, multiple copies can be made for handouts in a classroom.

g. **How to copyright a work.**  Whenever a work is created, these copyright laws automatically cover it.  However, if you feel that you may need to go to court over a possible infringement of your copyright, you must register the copyright with the Copyright Office in Washington, DC.  This is simply a matter of filling in the appropriate forms and sending copies of the work for their records.  The only time you must do this is when you feel that there may be illegal copying of your work.  The courts have awarded higher damage payments to people who have actually registered their works.  The bottom line is that you do not need to do anything to copyright a work; it is automatically protected when you create the work.

h. **How does copyright affects DoD personnel?**

(1)  As a member of the Armed Forces or an employee of the Federal Government, any images or works that you create on the job are property of the government.  This means that you have no rights to these images.  Also, any work that you do on your own time using either government film or equipment belongs to the government.  You must be very careful to only use personally owned equipment and supplies when freelancing or shooting images that you may want to keep or eventually sell.

(2)  Just as the copyright laws prevent you from using equipment for your own gain, they also protect you from performing illegal copying.  As we have said, it is against the law to copy another person's work.  For this reason, you cannot be ordered to do this illegal copying.  We must educate our superiors on copyright laws.

(3)  When can we copy copyrighted works?  As we have said, it is appropriate to copy (in limited amounts) works for training purposes and presentations.  It is also acceptable to copy works for the

quest for knowledge or research.  Keep these limitations in mind and use your best judgment when determining whether or not to copy something.

   i.  **Software piracy.**

   (1)  One last ethical consideration is software piracy.  While most people feel that it is wrong to steal a computer or other piece of hardware from their workplace, it is common for employees to copy software taken from work onto their home computers.  We must understand that this is just as wrong.

   (2)  While software is not as tangible as hardware, it is just as valuable.  Many hours of labor, research, and development go into each software application.  We must understand that to copy an application to an unauthorized computer is stealing it from the manufacturer.

   (3)  Additionally, moving disks from computer to computer also increases the risks of transporting computer viruses, which are small, hidden programs than can destroy data.  Viruses are written to hurt computers and are usually copied along with software.  By not illegally copying software, we also are reducing the chances of spreading computer viruses.

   (4)  The government has taken a firm stance on the illegal copying of software.  There are many laws covering the subject, and heavy ($100,000 or more) fines and prison terms are the penalty for software piracy.

   j.  **Ethics policies.**

   (1)  Some newspapers use written policies. While numerous branches of the US government, including The White House, now rely on personal computers to process images, few organizations queried in 1993 had devised formal ethics policies.

   (2)  Are written ethics policies necessary?  Yes.  Should there be room for interpretation?  Of course, but photographs, like words, should be edited with consistency.  Is it necessary to enforce policies?  If necessary.  One prepress employee left the job to "pursue other interests" shortly after retouching a news photograph.

   (3)  Since we all have different perceptions about what is ethical and what isn't, organizations should not allow individual employees to impose varying values on the group.  Consistent policies should be the goal, with individual artists and photographers having pivotal roles in identifying ethical guidelines.

# APPENDIX B

# DRAFTING TOOLS AND TECHNIQUES

## B-1. INTRODUCTION

Computers have radically changed the life of an illustrator in the past several years. Many projects that were very time consuming are now accomplished with greater accuracy and in less time with the aid of a computer. As great as the computer can be, there will still be projects or situations that require the old fashion approach. This appendix gives you insight into the "tricks of the trade."

## B-2. TOOLS

a. **T-squares.** As the name implies, it is a T-shaped instrument that consists of a straightedge (blade) firmly attached to a perpendicular (right angle) end (head). The shaft is placed on top of the head so that the head will fit against the table edge, while the blade rests on the table surface. T-squares vary in length from 15 to 72 inches, with the 36-inch length being the most common. There are T-squares designed with adjustable heads, which allows the blade to be set at different angles. The T-square is used to draw horizontal lines and serves as a base for the triangle when vertical and inclined lines are drawn.

b. **Metal straightedges.** Metal straightedges are used for cutting and drawing long straight lines.

c. **Triangles.** Triangles are used in combination with the T-square to draw vertical and inclined lines.

d. **Rulers or scales.** Rulers or scales may be made of wood, plastic, metal, or a combination of materials. They vary in shape, style of division, and scale graduations. The Architect and the Engineer are the two most common scales.

e. **Protractors.** Protractors are used to measure or lay out angles. They may be circular or semicircular. Protractors most commonly found in graphic shops are graduated in ½- degree increments. Semicircular protractors are generally labeled from 0 to 180 degrees in both directions. Circular protractors may be labeled from 0 to 360 degrees or they may be labeled from 0 to 90 degrees in four quadrants.

f. **Irregular curves.** Irregular curves are also referred to as French curves. They come in a variety of shapes and sizes. They are used to draw noncircular curves such as ellipses, spirals, and parabolas. Curves are drawn by locating points along the intended curve, then using the French curve to draw a series of lines to connect the points in a smooth, flowing line.

g. **Cased instruments.** Drafting tools may be purchased individually, but normally come as a set. The case protects the instruments from abuse as well as from the elements if the lining is treated with an agent to prevent tarnishing or corroding. When tools are not in use, they should be periodically cleaned with a soft cloth and lightly oiled. The joints should NOT be oiled.

(1) Compasses are used for drawing circles and arcs. The large compass in a set is normally 6 inches long. The legs are hinged at the top so that they can be set at any desired position. The leg that has the pencil or pen attached usually has a hinged joint in the middle of the leg, enabling the pen point to be set at an angle perpendicular to the paper for better ink flow. The other leg containing the needlepoint may or may not have a similar joint.

(2) Dividers look like compasses, except there is a needlepoint in both legs. They are used to measure off a series of equal distances or to divide lines into segments of equal parts.

h. **Erasers.**

(1) A rubber eraser (ruby red) is an all-purpose eraser. This eraser should be tested on a scrape of the paper you are working on because it may stain the paper.

(2) A kneaded eraser is gray in color and must be kneaded before using. This eraser is used for pencil, chalk, pastel, and charcoal drawings.

(3) An ink eraser is hard and abrasive. This eraser is aggressive, so exercise care when using.

(4) An art gum is a crumbly eraser that is free of grease. Its main purpose is to remove pencil lines from ink-line work.

(5) A vinyl eraser is also referred to as a plastic or drafting eraser. This eraser is available in a solid block shape or in a pencil-shaped, retractable version.

(6) A paper-wrapped eraser is pencil shaped and may be soft or hard. It is intended for small areas and may be cut to shape.

(7) A dry cleaning pad is no more than a loosely woven bag filled with gum bits. It is used to clean large areas.

(8) A steel eraser is used to remove heavy deposits of ink or paint, by using a gentle hand motion. When most of the ink or paint is removed, you should switch to a more conventional method.

i. **Erasing shields.** An erasing shield is a small plate of thin spring steel that has various shaped holes punched out. These opened holes make it possible to erase unwanted lines, while leaving other work untouched.

j.  **Templates.**  Commercially available templates can be major time savers.  They allow you to accurately reproduce a shape time and again.  Most templates are transparent plastics, which allows for easier aligned.  If the template is used for inking, ensure it is either designed with an inking edge or raise the template with a few pieces of drafting tape on the underside.

k.  **Ink pens.**

(1)  In your drafting tool set you will probably find a ruling pen.  A ruling pen consists of two steel blades (called nibs) attached to a handle.  A setscrew is used to adjust the distance between the nibs, thereby adjusting the line width.  The pen's reservoir must be filled with a dropper.  A ruling pen is used with a straightedge.  It should NOT be used for freehand work.  It is possible to damage the nibs by pulling the pen in the wrong direction, forcing the nibs apart.  Ruling pens may be more "old fashion," but they are not without merit.

(2)  Technical fountain pens or technical pens may be thought of as self-contained ruling pens.  Technical pens are designed to use with a straightedge, like ruling pens.  Unlike ruling pens, technical pens may be used for freehand drawing.  Another major advantage to technical pens is the ink reservoir.  Depending on the style, the reservoir is either built into the barrel of the pen or is a translucent plastic cartridge attached to the body of the pen.  This large ink capacity allows the technical pen to be used for a much longer time before refilling.  Technical pens are not adjustable.  Sizes may range from 0.026 to 0.2 inches, depending on the manufacture.  Complete pen sets may be purchased, as well as individual pens.

l.  **Pencils.**  Pencils are thinking tools, which allow ideas to be quickly translated into images and changed.  Any pencil will do in a pinch, but drawing pencils have several advantages over common, everyday pencils.  The main advantage is the different degrees of lead available.  The degree of hardness or softness affects the value and type of line produced.

(1)  Graphite pencils are labeled according to the hardness or softness of the lead.  There are 14 common grades.  The diameter of the lead is an indication of the hardness or softness of the lead.  Soft lead must be thicker than hard lead to help prevent the lead from crumbling.  Although there is a common grading scale, there is not a standard in place for the different grades.  A HB from one manufacture might be much lighter or darker than a HB from another manufacture.  Although a drawing pencil is a great tool to "think with," it does have properties that you need to keep in mind.  Lines drawn with a graphite pencil may have a shine to them, which is especially true of areas that are overworked.  This must be kept in mind if the image is reproduced on a copier.  This shine will reflect the light, causing the reproduction to be lighter than the original in some areas.

(2)  Charcoal pencils produce a dense, matte black line.  A charcoal drawing provides a truer reproduction and does not have the range that pencils have.  It is limited to about five different grades.

(3)  Colored pencils may be waterproof (wax based) or water soluble (watercolors in a stick).  Each has a different purpose, as well as a different effect.  Experiment with each to find its uses and limits.

(4)  Nonreproducible blue pencils are intended for layout work.  As long as the lines are drawn lightly, the light blue color "disappears" when photographed.  Scanners and copiers may be more sensitive; experiment before using a nonreproducible blue pencil on a project.

**NOTE: It is imperative to keep your tools clean and serviceable. There is nothing more annoying than to get to the end of a project and have it ruined because your tools were not cleaned.**

# B-3.  TIPS, TECHNIQUES, AND TIDBITS

a. **T-squares.**

(1)  Place work on the left side of the drawing board near the head of the T-square (if you are right-handed).  Hold the head of the T-square with your left hand to prevent it from moving while drawing.  Keep work as close to the head of the T-square as possible.  The farther you go down the blade the greater the chance the blade will be out of square.

(2)  Always draw lines along the upper edge of the blade.

(3)  Tip the head down slightly to lift the blade up off the drawing surface before repositioning the T-square.  Do not drag it through the drawing.

(4)  To check a T-square, draw a straight line.  Turn the T-square over and redraw the line with the same edge.  If the blade is warped, the lines will not coincide.  If it is not square, mark the blade so that it is not used as a T-square.  A T-square should be checked before beginning a new project (or after a mishap).

(5)  Hang T-squares by the hole at the end or lay it on a flat surface so that it rest flat and does not warp.  Handle T-squares with care because if dropped even once, it may be knocked out of square and become useless.

b. **Triangles.**  Right angle triangles are used in conjunction with T-squares or straight-edges to draw vertical and/or inclined lines.  The two most common triangles are 45 degrees and 30-60 degrees.  Triangles are treated with the same respect as T-squares.  Although they are less likely to lose their accuracy, they can warp.

c. **Pens.**

(1)  **Ruling pens.**

(a)  Before using a ruling pen, ensure the pen is clean.  The ink will flow improperly if there is any dried ink on the blades.

(b)  Adjust the nibs to the desired width before filling with ink.

(c)  Use a dropper to fill the reservoir to about 3/16 of an inch from the tip.  DO NOT overfill; this could cause a blot or an uneven line.  Never fill a pen over a project.  Murphy's law always kicks in when you can least afford it.

(d)  Before drawing with a freshly filled pen, carefully remove any excess ink from the outside of the nibs and test for line quality on a scrap piece of paper.  Adjust the setscrew if necessary.

(e)  Hold the ruling pen with the setscrew pointed away from you.  Ensure that both nibs are touching the paper (perpendicular to the paper).  Tilt the pen 60 or 70 degrees in the direction you will pull the pen.  You are leaning into the line.

(f)  If the pen handle is tilted toward the guide, the outer nib will lift off the paper.  If the nibs are pressed too hard against the guide, you will force the nibs closer than they were set, changing the line width.  If the pen handle is tilted away from the guide, the nibs will touch the guide and ink may bleed under the guide.

(g)  When inking a line with a T-square, make long lines with a movement of your entire arm by sliding your pen hand along the blade.  Just before reaching the end of the line, slow down and use a hand movement to keep the line precise.

(h)  Draw horizontal lines from left to right if you are right-handed, starting at the top of the drawing and working down.  If you are left-handed, draw from right to left, still working from top to bottom.

(i)  Allow lines to dry before drawing any intersecting lines.  Watch carefully as you draw one line across another.  If the ink starts to run down the dry line under your guide, lift the pen quickly and carefully move the guide.

(j)  Clean pens by dipping the tip in pen cleaning solution or in water mixed with a little ammonia.  Wipe the blades carefully and thoroughly, inside and out, with a soft, lintless cloth.

(k)  Clean the pen if the ink becomes sluggish and line quality is suffering during a project.

(l)  Always put the pen away clean, with the nibs well separated to release the tension on the steel.

(2)  **Technical pens.**

(a)  You must hold the pen perpendicular to the paper at all times.  If you do not, the point will wear unevenly and the pen becomes useless.

(b)  If a pen is in need of a serious cleaning—

- Fill a container with the recommended cleaning solution or warm water and detergent.  The container needs to be deep enough to allow the pen tip to be completely covered without touching the bottom.

- Cut an X in a thin piece of cardboard that is large enough to cover the container of cleaning solution.  Slip the pen through the X until the tip is completely submerged but not touching the bottom of the container.

- The next day you should be able to carefully disassemble the pen.  Wrap the tip with a soft cloth and gently twist the tip to the left and right to work it free.

- Separate the tip elements, taking care not to bend the fine wire on the plunger, and clean them.

- If the tip is still clogged and you are unable to clear the obstruction by gently tapping the tip on a folded soft cloth, as a very last resort, VERY CAREFULLY thread the wire back into the tip.  If you are not careful, you will snap the wire off, making the pen useless.  Do this only as a last resort.

- After ensuring that all parts are clean, completely dry and reassemble the pen.

(3)  **Miscellaneous.**

(a)  Ink a line once.  Never go back and forth over a line.

(b)  Always test a pen on a scrap of the project paper.  Different papers absorb ink differently.

(c)  Gently shake technical pens up and down to get them started.  You should hear the plunger moving inside the pen.  If you do not hear a clicking sound, the pen probably needs cleaning.

(d)  Always put the top back on the ink bottle SECURELY after using.  Never assume "everybody knows it's open."  That is just a disaster waiting to happen when you can least afford it.

(e)  Wash hands frequently or wear thin cotton gloves when working with ink, especially in writing calligraphy.  The oil on your skin will leave spots on the paper, causing the ink to skip and bleed.

(f)  If the paper you are working on is causing markers or pens to bleed, try spraying light coats of fixative on the paper first.  Experiment with the fixative and paper.

(4)  **Compasses.**

(a)  When starting to ink a line with a compass, lean the compass into the direction you are drawing.

(b)  Pencil points should be sharpened to a long, tapering chisel point using a sandpaper sharpening block.

(c)  The pen or pencil point should be slightly shorter than the compass point.  The marking points should just touch the paper when the compass point is set into the paper.

(d)  To use a compass without leaving a hole in the paper, try to—

- Lightly mark where the center of the circle will be on the illustration board.

- Rubber cement a small square of the illustration board over the center of the circle.

- Draw the circle.

- Remove the square and clean up any rubber cement left behind.

# APPENDIX C

# THREE-DIMENSIONAL DRAWING

## C-1.  INTRODUCTION

Geometrically parallel lines are lines that extend in the same direction and are equidistant for their length.  But this is not how we see things in the real world.  If you stand in the middle of railroad tracks that stretch out in front of you and look down their length, the tracks "appear" to get closer and eventually to touch.  This optical illusion is what creates the illusion of three-dimensional depth in a drawing.  The intent of this appendix is to define the terms you will need to know in order to understand linear perspective; to explain the rules and principles which will help you to execute a convincing three-dimensional drawing; and to discuss the three types of perspective.

## C-2.  TERMS

a.  **Plan and elevation.**  In perspective drawing, the top view is called a plan view and the front and side views are called the front and side elevations.

b.  **Horizon line (HL).**  The eye level of the artist and, therefore, of the viewer as well.  This line changes as you raise or lower your viewpoint, which may allow you to see more or less of the horizontal planes that lie between you and the horizon.

c.  **Vanishing point (VP).**  A point on the horizon line at which parallel lines seem to meet. It is also known as the center of vision (CV).  The number of vanishing points constitutes the type of perspective, as their name implies.  That is, one-point perspective has one vanishing point; two-point perspective has two vanishing points; and three-point perspective has three vanishing points.

d.  **Baseline (BL).**  A horizontal line, parallel to the horizon line, that represents the edge of the ground plane on which the object rests.

e.  **Point of sight (PS).**  The point on the horizon line that is directly opposite or in front of the viewer.

f.  **Station Point (SP).**  The fixed position or vantage point of the artist or viewer in relation to the subject.  It is one of the most important items in perspective drawing because it controls the perspective of the drawing.

g.  **Picture plane (PP).**  An imaginary vertical plane placed between the observer and the object, usually at right angles to an observer's line of vision.  Think of this as an imaginary glass wall that is between you and the subject.  On this glass wall you can trace all the visible edges of the object.  Although impractical, it does illustrate some of the principles of perspective.  In reality, your glass wall is made of paper and instead of tracing, you project it onto the paper.

h.  **Visual rays.**  These are the projectors from the points or edges of the object to the vanishing point(s).  These are your construction guides.

## C-3.  ESSENTIAL ELEMENTS OF PERSPECTIVE

a.  All straight lines seen in perspective remain straight, no bowing or curving takes place.

b.  Vertical lines in perspective remain vertical in relation to the picture plane, except when objects are viewed from above or below.  When this is the case, vertical lines appear to slant, converging near the top or bottom; however, they remain straight.

c.  Parallel lines of a plane which inclines or declines have vanishing points above or below the horizon line.

d.  The farther away an object is from the baseline of the picture plane, the closer to the horizon it appears.  The top surface becomes less visible.

e.  Horizontal lines are parallel to an object that is drawn to the same point on the horizon.

f.  The illusion of depth in a drawing can also be created by the relative sizes of the objects, their placement (overlapping), and the value of the lines and tones with which they are drawn. Though visual principles (overlapping and line tone) do not have a direct bearing on linear perspective, they are just as important in making a finished still-life drawing look three-dimensional.

(1)  The most common example of relative size is a series of telephone poles.  They are exactly the same size, yet they appear to get smaller the farther away they are from the viewer. When creating a realistic drawing of a series of identical objects, you need to forget that the objects are the same size and focus on their apparent sizes and positions relative to one another.  Of course the context in which an object is seen also has a bearing on the illusion of depth.  In Figure C-1 the circles appear to be a collection of different sized circles.  Figure C-2 gives more of an illusion of depth.
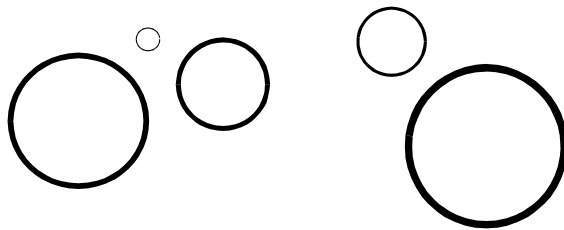


**Figure C-1.  A collection of different circles.**
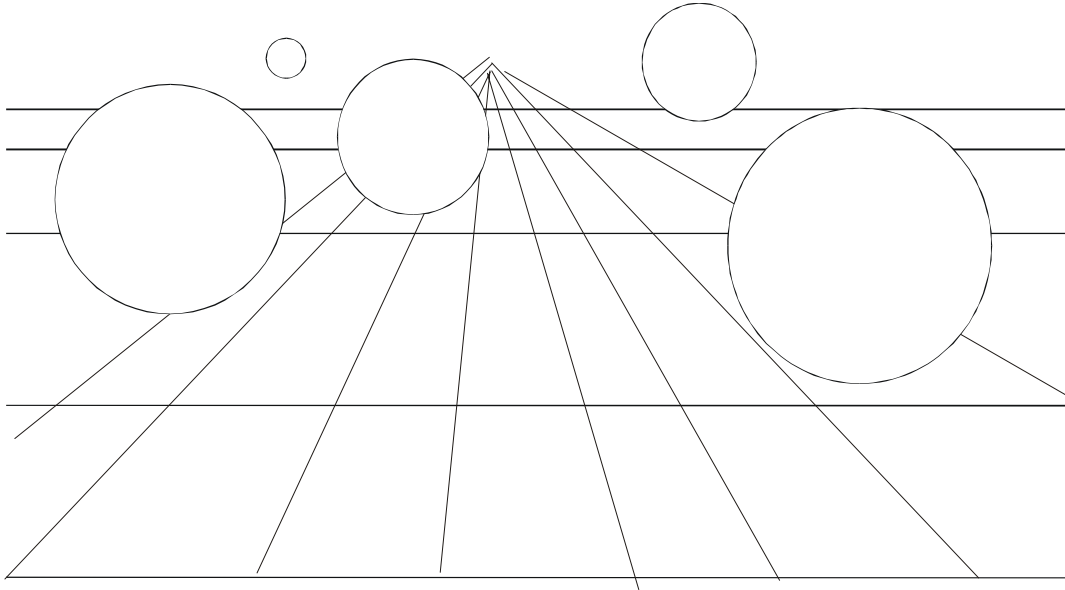
*Figure C-2.  Circles that project an illusion of depth.*

(2)  The placement of objects is yet another means of creating depth in a drawing.  By overlapping one object with part of another, you give the illusion of depth.  If an object is "in front of" another, then the viewer "knows" that it is closer than the one behind it.

(3)  Although linear perspective deals with the relationship of the value of the lines with which an object is drawn can indicate its distance from the viewer.  The eye "reads" a dark line more quickly than a faint one.  An object that is dark in value appears to come forward visually.  See Figure C-3.
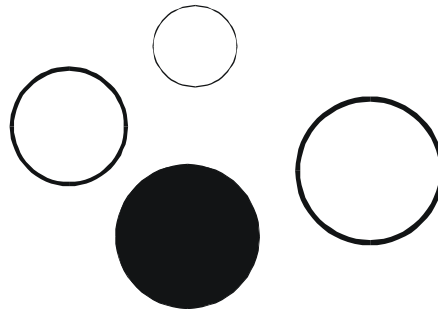


*Figure C-3.  Values of dark objects.*

(4)  Tone as well as line can create a three-dimensional quality in a drawing.  Depending on the overall value of the drawing, either the lights or the darks will pull forward.  In a light rendering, the darks would be noticed first; whereas in a dark rendering, the lights would be noticed.

(5)  These are only a few of the visual principles that will help create illusion of depth in your drawings, in addition to the knowledge of perspective.

g.  Knowledge of the three basic types of perspective will enable you to create a realistic drawing, utilizing from one to three vanishing points.  The important thing to keep in mind is that a fixed position (station point) for the artist's point of view is mandatory, no matter how many vanishing points you use.  A drawing created from more than one station point confuses the viewer and appears to defy commonsense.

## C-4.  ONE-POINT PERSPECTIVE

a.  One-point perspective occurs when all parallel horizontal lines vanish to a single point (point of sight) located on the horizontal.  In one-point perspective, the height and width dimensions of an object are parallel to the picture plane; which is why you might hear one-point perspective referred to occasionally as parallel perspective.  This perspective is used when an object is being viewed straight on, not at an angle.  In this view, only the depth dimension must be put in perspective.  This dimension must have a vanishing point; the height and width do not have vanishing points since they are parallel to the picture plane.  In Figure C-4, you see the undersides of the boxes are above the horizon line and are visible, but when the boxes are below the horizon line, their top planes are visible.  The front planes remain parallel to the picture plane, regardless of whether they are above or below eye level.  One-point perspective is useful when constructing rooms.  The ceilings, walls, and floors always recede to one vanishing point, no matter where you are standing.

b.  The plan-view method to one-point perspective is discussed in steps (1) through (11).

**NOTE:  See Figure C-4 for steps (1) through (3).**

(1)  Establish the horizon line, depending on whether the object is illustrated above or below eye level.

(2)  Locate the picture plane somewhere on the drawing surface so that it will not interfere with the drawing.  The picture plane can be placed off the drawing paper, as long as the picture plane and the drawing paper are secured to the drawing surface and will not shift out of position.  The picture plane can be the same line as the horizon line.  With experience you will quickly recognize where things need placing to get the view that you want.

(3)  Draw the plan view.  Although the plan view can be drawn above or below the picture plane, it is easier to draw it resting on the picture plane.
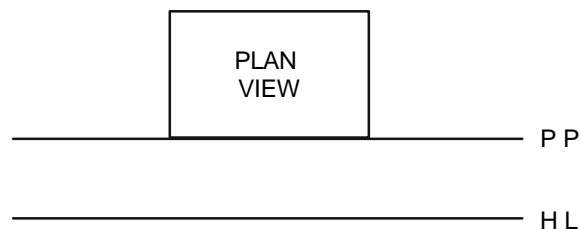


*Figure C-4.  Plan view method to one-point perspective.*

**NOTE:  See Figure C-5 for steps (4) through (6).**

(4)  Draw the baseline, placing it below the picture plane, but parallel to it.

(5)  Locate the station point, placing it at a distance not less than twice the width of the object (obtain this measurement from the plan view).  You can also place it two or three times the object's greatest length from the nearest point of the plan view.  If it is placed any closer, distortion of the perspective drawing will result.  The station point can be located directly in front of or to the side of the plan view.

(6)  Project the width of the plan view to the baseline.
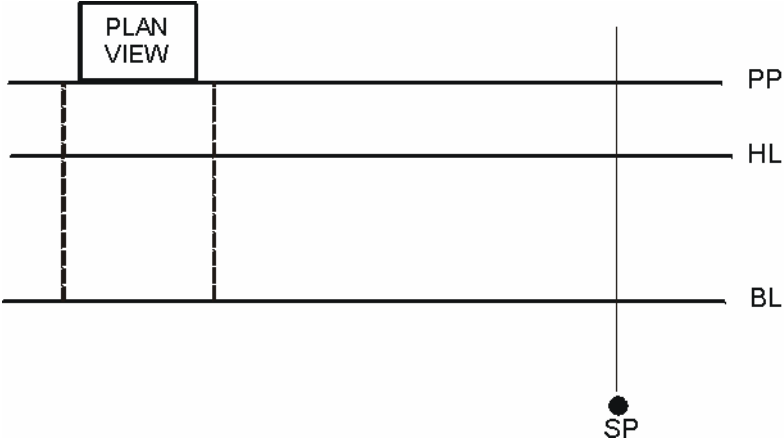


*Figure C-5.  Projecting the width of the plane view to the baseline.*

**NOTE:  See Figure C-6 for steps (7) through (11).**
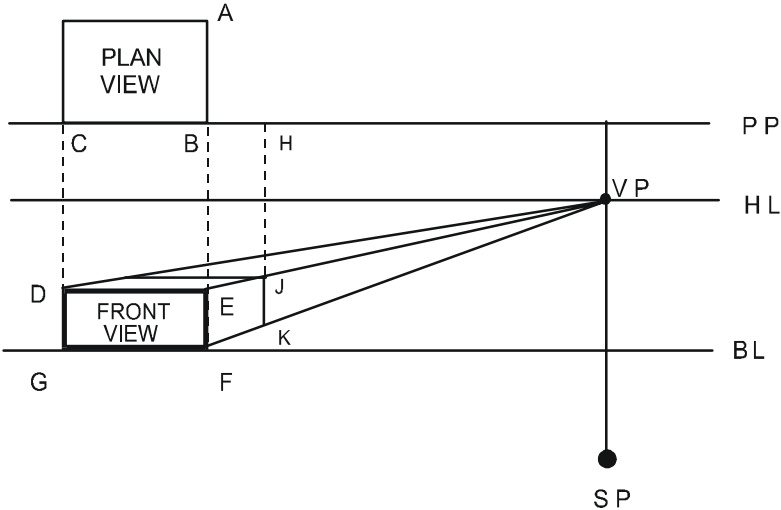


*Figure C-6.  Projecting a line from plan view to station point.*

(7)  Draw the front view of the object on the baseline.  Remember that if the front of the plan view is touching the picture plane, the front view of the object will be true size.  If the plan view

were behind or in front of the picture plane, the front view of the object would be smaller or larger, respectively.

(8)  Project a vertical line from the station point to the horizon line.  This intersection locates the vanishing point.

(9)  From the corners of the front view (D, E, F, and G), draw visual rays to the vanishing point.

(10)  Project a line from point E (the back corner of the object) of the plan view to the station point.  Where this line intersects the picture plane (point H), draw a perpendicular line from point H to intersect the visual rays (points J and K).  This accurately locates the back corners and defines the depth of the object.

(11)  Darken the object outlines and remove construction lines.

## C-5.  TWO-POINT PERSPECTIVE

a.  Two-point perspective is the most common type and exists when the object is sitting at an angle to the picture plane.  In two-point perspective there are two vanishing points, one to the right of the object and one to the left.  When you are constructing objects in a still-life drawing, having a working knowledge of two-point perspective becomes essential.  This is because it is rare that you will find every object placed with its front plane parallel to the picture plane, which is necessary for one-point perspective.

b.  The plan view of two-point perspective is discussed in steps (1) through (15).

**NOTE:  See Figure C-7 for steps (1) and (2).**

(1)  Draw the horizon line and baseline.

(2)  Draw the picture plane line near the top of the paper, so it is not in the way of the perspective drawing.
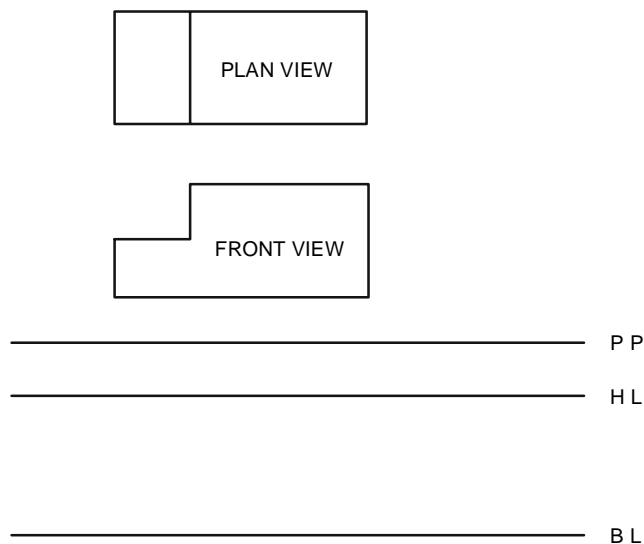
PLAN VIEW

FRONT VIEW

P P

H L

B L

*Figure C-7. Plane view of two-point perspective.*

**NOTE:  See Figure C-8 for steps (3) through (11).**
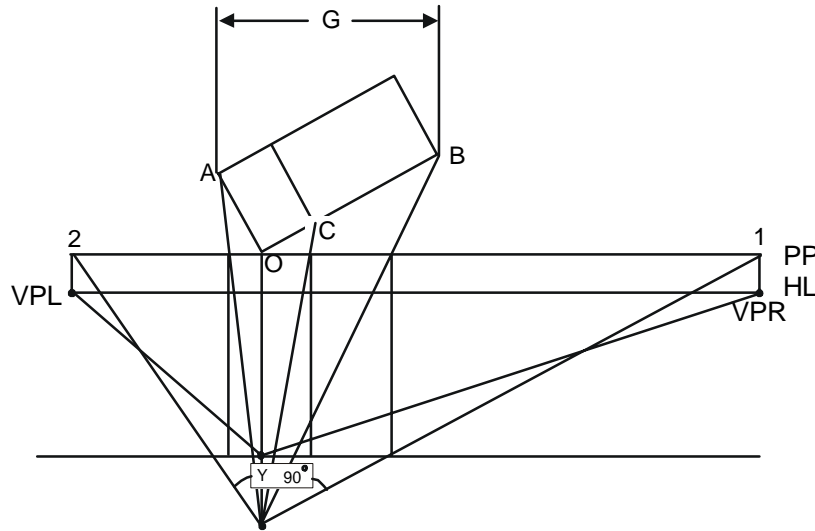


*Figure C-8. Plane view lines drawn in two-point perspective.*

(3)  Draw an arbitrary perpendicular line downward from the picture plane.  Where this line touches the picture plane (point O), locate the nearest corner of the object.  Locate the station point at the other end of the vertical line.

> **NOTE:  Remember to place the station point at a distance not less than twice the total width of the object.  Locate the station point at the other end of the vertical line.  Remember to place the station point at a distance not less than twice the total width of the object from point O.  In this case, the distance is about twice the distance of G.**

(4)  Draw the plan view of the object in the desired position with the nearest corner at point O.  In this case, the object was drawn at an angle of 30 degrees with the horizontal.  Other angles commonly used are 15, 45, and 75 degrees.  Usually you place the side of the object with the most detail along the axis with the smallest angle, because more of the surface can be seen along this axis.

(5)  Draw a line from the station point, parallel to the side (OP) of the plan view to where it intersects the picture plane at 1.

(6)  Draw a perpendicular line from 1 to the horizon line.  This line locates the right vanishing point (VPR).

(7)  Draw a line from the station point, parallel to the side (OR) of the plan view to where it intersects the picture plane at 2.

(8)  Draw a perpendicular line from 2 to the horizon line.  This line locates the left vanishing point (VPL).  The angle formed by the lines drawn from the station point to points 1 and 2 is

equal to 90 degrees.  Remember that lines SP1 and SP2 must be parallel to the sides of the object.

(9)  Draw lines from the corners of the plan view (O, A, B, C) to the station point.

(10)  Where these lines intersect the picture plane, project perpendicular lines downward to the ground line.

(11)  From point Y, the intersection of line OSP and the ground line, extend visual rays to both vanishing points.  These lines define the lower limits (base) of the object.

**NOTE:  See Figure C-9 for steps (12) through (15).**

(12)  Taking dimension from the orthographic views (left-hand corner of the figure), measures the vertical distance along line OY.  As discussed in one-point perspective, measurements can be placed or taken as long as a view, edge, or point is touching the picture plane.  These measurements can only be taken or placed along the edge of the object that touches the picture plane.

(13)  After you make the height measurements along line OY, project these points to the vanishing points.

(14)  The edges and corners of the object outline are defined where the visual rays intersect the perpendicular projectors.
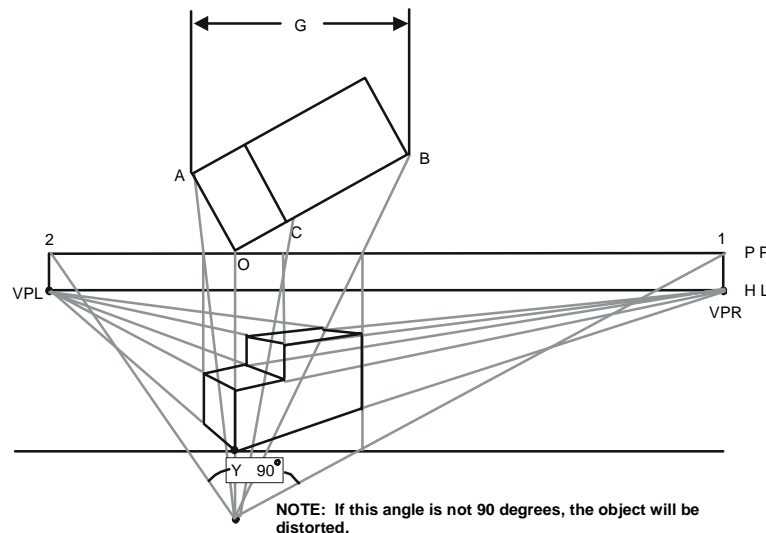
(15)  Darken the object outlines.



*Figure C-9.  Measurements taken from the orthographic views.*

# C-6.  THREE-POINT PERSPECTIVE

In three-point perspective, the object is placed so that none of its principle edges are parallel to the picture plane. This means that each of the three sets of parallel edges (length, height, and width) will have a separate vanishing point. When constructing a three-point perspective drawing, you will need to use your artistic ability to place the vanishing points, particularly the vanishing point for the vertical lines. A good rule to follow is that small objects usually look better if the vanishing points are well separated. However, sharp diagonal lines are important to emphasize the expansion of an object. In this instance, the close proximity of the vanishing points to each other strengthens the "large-size" effect.

## C-7.  CIRCLES

a.  When observed in perspective drawings, circles appear as ellipses. An ellipse can be sized and placed in a perspective drawing by constructing it within a square. The square is essential to an accurate drawing, because a curve has no direct measurements. The vanishing points are easily determined for a square. The curves can be easily determined within the confines of the square.

b.  Although the object's face or surface containing the circular form should be parallel to the picture plane for ease in drawing, many times this cannot be done. Figure C-10 (Views A through E) shows the proper layout of a circle drawn in one-point and two-point perspectives. The following steps will assist you in drawing a circle in one-point perspective.

(1)  Draw a circle with the desired dimensions (View A).

(2)  Draw a square circumscribing the circle. Construct the center lines and diagonals inside the square. The intersections of the circle, the centerlines, and the diagonals will give you eight checkpoints for drawing the circle in perspective. (See View B).

(3)  Draw the square in one-point perspective and include centerlines and diagonals (View C).

(4)  Draw the circle through the checkpoints (View D).

c.  Use the same steps to draw the circle in two-point perspective as in one-point perspective. The only difference is the additional vanishing point. View E shows steps (3) and (4) in one-point perspective in projecting the checkpoints and drawing the circle.
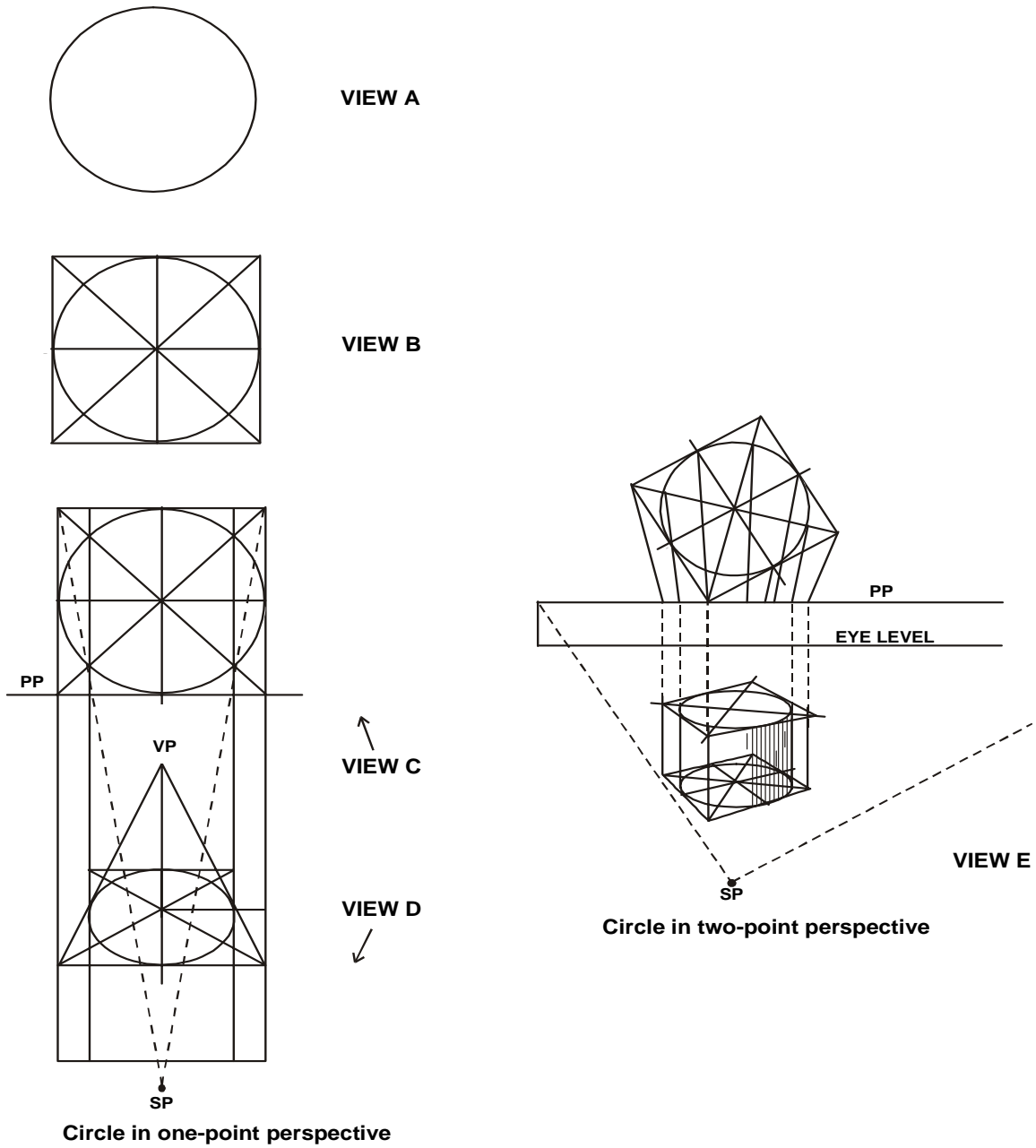
VIEW A

VIEW B

VIEW C

VIEW D

PP

VP

SP

Circle in one-point perspective

PP

EYE LEVEL

VIEW E

SP

Circle in two-point perspective

*Figure C-10.  Proper layout of a circle drawn in one-point and
two-point perspectives.*

# APPENDIX D

# LETTER GRAPHICS PROJECTS

## D-1.  INTRODUCTION

Words are as important to the multimedia illustrator (25M) MOS as the colors we choose in creating illustrations; in some aspects even more important.  Lettering is something that we have been doing for years, but how well you letter is the issue.  You will need to letter charts, graphs, signs, and posters effectively and efficiently.  The graphics in your projects may be beautifully executed; but if the lettering is poor, you can rest assured that is all your audience will remember about your work, not the message.  There are several different ways to produce lettering for a project.  This appendix covers lettering basics and freehand, prepared, and mechanical lettering.

## D-2.  LETTERING BASICS

a.  **Styles.**  Serif and Sans-serif are the two major distinctions in lettering.  These two basic groups have numerous lettering styles.

(1)  **Roman.**  Ancient Romans developed and refined our capital letters when they carved letters in stone.  As a guide, they painted the letters to be carved using a flat brush always held at the same angle.  When they moved the brush vertically, it made a thick stroke.  When they moved it horizontally, it made a thin stroke.  As a result, Roman letters were composed of thick vertical strokes and thin horizontal strokes.  The thin lines have cross-strokes at the end called serifs.  Serifs lend unity to Roman letters, blending them together and making them easy to read.  Roman letters are most commonly used for the text of magazines, newspapers, and books because most people are familiar with them and because they are the easiest to read, particularly in small size and lengthy articles.  Dignity, refinement, and stateliness are some of the qualities attributed to Roman letters.

(2)  **Text.**  Text may be referred to as "old English" and was among the first type styles used.  It is both difficult to read and to construct by nonmechanical methods.  Words consisting of all capital letters in either script or text are virtually illegible.  Their most common application is religious in nature, such as prayer books; another common use is as titles of certificates.  Limit the use of this style to a few lines and avoid works with all capital letters.  Figure D-1 displays some of the variations of text letters in use today.

# Text typeface
# Certificate of Appreciation
# AVOID THIS
## This is Gothic Lettering
## This IS Gothic Lettering
## **Copperplate Gothic**

*Figure D-1.  Variations of text letters used today.*

   (3)  **Script and Cursive.**  Script and cursive are classified together.  Script letters have small connecting links called kerns that link the letters together, giving the lettering an appearance of handwriting.  Cursive letters do not have these kerns.  Cursive type is patterned after old-fashioned hand lettering, while script imitates the old slanting handwriting.  Both script and cursive have the characteristics of elegance and charm.  For these reasons, a common use is to letter invitations and announcements.  You can also use them to lend elegance to display work.

   (4)  **Gothic.**  Compare the Gothic style to the Roman style.  Observe that both the horizontal and vertical strokes are the same thickness on the Gothic style, and that it does not have any serifs.  The Gothic style is plain.  Because of its simplicity, refer to the Gothic letter as the block letter, particularly in the smaller sizes.  See Figure D-1.

   (5)  **Italics.**  Italics is not a style in and of itself, but a variation of Roman, Gothic, Contemporary, and certain other lettering styles.  Italics are slanted versions of letter styles.  Refer to Figure D-2 and compare the Copperplate Gothic italic style to the Copperplate Gothic style shown in Figure D-1.  Italics are used to add contrast and interest to lettering projects.  One common use of italics is to draw interest to that portion of the project lettered in italics.  You also use italics to identify water features on maps.  Italics were originally used for text; however, this variation is difficult to read in lengthy articles and have fallen into disuse for this purpose.

Roman Typeface

Roman Typeface

*Italic*

*Italic Copperplate Gothic*

**Figure D-2.  Variations of Roman, Gothic, Contemporary, and certain other lettering styles in italics.**

(6)  **Swash lettering.**  Another style variation is Swash lettering, which is similar to italics. Swash lettering is embellished with swirls and curves called swashes.  These swashes provide an alternative to italics as a method of adding contrast, emphasis, or inviting attention to certain portions of a lettering project.  See Figure D-3.

S wash

S wash

S wash

S wash

Swirls

**Figure D-3.  Swash lettering.**

   b.  **Terms and definitions.**

   (1)  **Serifs.**  Serifs are thin, short strokes at the top and bottom of letters and are typically part of Roman letters.

   (2)  **Sans-serifs.**  This style refers to any style that does not have serifs.

   (3)  **Stem.**  The stem is the straight, vertical line that forms the basis for most letters of the alphabet.

   (4)  **Fillet.**  A fillet is a thick downward stroke usually made with a broad nibbed pen which is held parallel to the line of lettering.

   (5)  **Hairline.**  A hairline is a thin stroke either horizontal or vertical.  You can produce a hairline with a thin nibbed pen.  You can also produce one by holding a broad nibbed pen parallel to the line of work and moving it horizontally.

   (6)  **Ascender.**  The ascender is the stem of lower-case letters that extend above the body of the letter.

   (7)  **Descender.**  The descender is that portion of lower-case letters that extends below the body.

   (8)  **Bowl.**  The bowl (also referred to as the counter) is the white space inside the curved portions of letters.

   (9)  **Swell.**  The swell (also referred to as the curve) is the curved portion of letters.  Make the swell slightly wider than the stem; otherwise, it will appear thinner.

   (10)  **Cross bar.**  The cross bar is the thin cross stroke on lower-case letters f and t, and the horizontal stroke of some upper-case letters, such as the T and E.

   (11)  **Negative space.**  The space in and around letters.

   (12)  **Void.**  The space inside a letter.

   (13)  **Upper case and lower case.**  These designations were established when all typesetting was performed by hand.  The typesetters divided the letters and put them into two types of cases.  They stored the capital letters in the upper case and the small letters in the lower case.

   c.  **Units of measure.**  Type size has two units of measure called points (for height) and pica (for line length).  Points describe the height of letters.  One point is equal to 1/72 of an inch.  For example, a letter ½-inch high is 36 points, ¼-inch high is the top of a capital letter to the bottom of a small letter.  Pica describes the length of a line of letters.  A pica is 1/6 of an inch; thus, there are six picas to the inch.

   d.  **Lettering weight.**  Letters are also classified based on the relative weight of the lines you use to construct them.  The three weights are light, medium, and bold.  There is no unit of measure for these terms.

e. **Height to width ratio.** Another classification of letters is a function of their height to width. These classifications are condensed and extended.

(1) Condensed letters are narrow compared to their width.

(2) Extended letters are wide compared to their height. Use extended letters as a means of adding prominence.

## D-3. FREEHAND LETTERING

a. Freehand lettering is done by hand using basic strokes and no mechanical aids. It may be done with a pencil, pen, marker, or brush. In order for lettering to be effective, it must be legible. There are a few guidelines that will ensure that your lettering is effective. The first and foremost is practice. It has been said, "You, too, can be a calligrapher if you have perseverance and live long enough." This roughly translates into practice, practice, and more practice. Lettering is more than putting individual characters on a page; it is a mastering of the interaction of the different shapes within words. So practice with words and sentences.

b. Lettering must be uniform. If not, the viewer will be distracted; keying in on what is "wrong" and not the message. The overall project quality is sacrificed if one letter is extended or wide and all others are condensed or thin. The same applies if any of the letters are a different size, style, or height. The easiest way to help ensure uniformity (along with practicing) is to use a lettering guide. A guide can either be penciled directly onto the project or placed underneath the sheet of paper. The latter of the two is most effective when doing flip chart briefings.

**NOTE: Although these guidelines are based on the use of a square-tipped pen (Speedball C), they apply to the other tools as well.**

c. The cap line (top), the waistline (middle), the baseline (bottom), and the drop line (below the baseline) are the four guidelines for lettering (see Figure D-4). A vertical guide may be used in conjunction with a horizontal guide and is only used to keep a vertical slant consistent, not as a spacing guide.
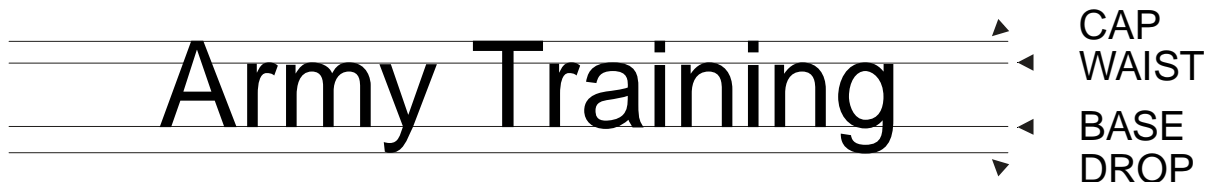


Army Training

CAP
WAIST
BASE
DROP

*Figure D-4. Four guidelines for lettering.*

(1) The space between the lines will differ, depending on the nib width and the style of lettering used. A common setup is 3-5-3; three nib widths from drop line to baseline, five nib widths from baseline to waistline, and three nib widths from waistline to cap line.

(2) Use the checklist in Table D-1 to evaluate your lettering:

***Table D-1.  Evaluation checklist for lettering.***

- Vertical slant is consistent throughout the project.

- The pen or marker is held at a 30-degree angle to the baseline, except for the thick left-hand verticals of v, w, x, and y.  For these verticals, use a 45-degree angle.

- The bodies of letters touch both the baseline and the waistline.

- The cross bars of t and f are drawn either on the waistline or directly below, touching the waistline.

- The two halves of m and w are equal.

- Arches are based on the arc of the letter o.

- Stroke joins occur at the same height in letters of the same formation group, such as letters h, n, m, and r.

- Crossbars for letters A and F are just below the waistline; A more so than F.  Letters E, P, and R have crossbars on the waistline.  Letters B and H are just above the center.

- The vertical for letter G starts below the waistline.

- If the Z's top stroke is not slightly smaller and centered over the bottom stroke, it should be aligned left and right with the bottom stroke.

- Letters K and X intersect just above the waistline.  Letter Y intersects at the waistline.

- The V element of letters A, M, V, W, X, and Y are symmetrical and vertical.

- All curves relate to a circle.

(3)  For any lettering project to appear balanced, the white space, or negative space, must appear equal.  Determining spacing is a matter of taste and feeling.  If letters are set equidistant from each other, the effect is uneven and very undesirable.  Vary the spacing between adjacent letters, depending on whether they have straight sides (H/I/M/N), slanted sides (A/V/W), round

sides (O/Q/C/G), or open sides (L/J). The greatest distance should be left between straight strokes. A curved stroke is placed closer to a straight stroke. Two curved strokes are placed even closer to each other. An open letter (C/L/J/T) is placed as close to another letter as possible without touching. In some cases the letters might need to overlap, such as a capital R placed next to a capital T.

(4) Another issue that impacts legibility is spacing between words. Generally speaking, there must be enough space to separate words from one another, but not so much as to cause us to read one word at a time. Use a small o (the size of the text you are using) as a spacing guide.

(5) Centering lines is an effective means of drawing attention to information. One method to center your work is to letter the line on a piece of scratch paper using the desired size and style. Once written, it is just a matter of measuring the distance from the center to the beginning of the line and transferring that measurement to the project. Figure D-5 provides a comparison between work placed in the optical center (the text on the right) with work placed in the true center (the text on the left). Notice that the work in the true center appears below the center, while the work in the optical center appears balanced.
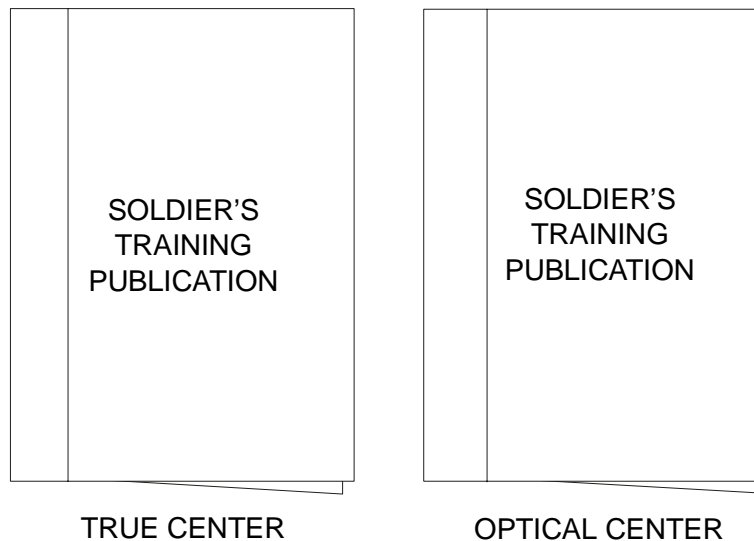


SOLDIER'S
TRAINING
PUBLICATION

SOLDIER'S
TRAINING
PUBLICATION

TRUE CENTER        OPTICAL CENTER

*Figure D-5. A comparison between work placed in the optical center with work placed in the true center.*

d. Pen and ink are widely used for calligraphy and lettering of many types of projects. Pens can be a high-quality technical fountain pen, a standard fountain pen, Speedball lettering pens, or a flexible quill pen. Inks range from low pigment writing ink to a high pigment opaque India or drawing inks to inks of many colors. We will deal with Speedball pens. Speedball pens come in four point or nib styles, designated by a letter. Following the letter designator is a number denoting the size. The lower the number, the larger the pen line weight. Pen sizes range from 0 to 6. See Figure D-6.

STYLE "A" SQUARE

"A" pens have a flat square tip making strokes of uniform width and square ends. This nib is suitable for Square Gothic and Block letters.



STYLE "B" ROUND

"B" pens have a round tip making uniform strokes with round tips. This nib is suitable for Gothic letters and uniform lines.



STYLE "C" OBLONG

"C" pens have a chisel-shaped point which makes thick and thin strokes. This nib is ideally suited to make Roman and Old English text letters.



STYLE "D" OVAL

"D" pens are similar to a "B" but have an oval shaped point which is suitable for thick and medium thin strokes. The lettering most suited for this nib is Bold Roman, texts, and italics.

*Figure D-6. Four point- or nib-style Speedball pens.*

**NOTE: Check the text for correct spelling before lettering with the marker. If a mistake is made, a typing label can cover it, allowing for neat corrections.**

e.  Marker lettering is one of the quickest and easiest methods of lettering.  This type of lettering is used for very short deadlines or informal projects and often used in flip chart presentations.  Standard magic markers are the most common and inexpensive, while artist markers are high quality, available in a wide range of colors, sizes, and point shapes, and cost much more. When using markers, draw guidelines the same as for pen and ink lettering and very lightly draw in the text.

(1)  Standard markers come in small and medium sizes.  The small marker has a fine point and is used for 1/4- to 3/4-inch lettering and for drawing small lines.  The medium marker has a 45-degree angled point and is used to make larger letters (3/4 to 3 inches) and for drawing thicker lines.

(2)  Larger markers MUST be held at a constant angle while lettering to produce uniform letters; if not, lettering effectiveness is lost.  Markers MUST be tightly closed to help prevent drying out.  Once the lettering is completed, erase all guidelines.

f.  Brush lettering is a highly flexible form of lettering used with water or oil media.  Like other skills, it requires time and practice to master.  Brush letter size varies from 1/4 inch to 10 feet and greater, encompassing all lettering styles.  Brush lettering is used for posters, vehicle markings, signs, and training aides.

(1)  The hairs, ferrule, and handle are the three major parts of brushes.  Round, bright, and flat are the three brush shapes used for lettering (see Figure D-7).
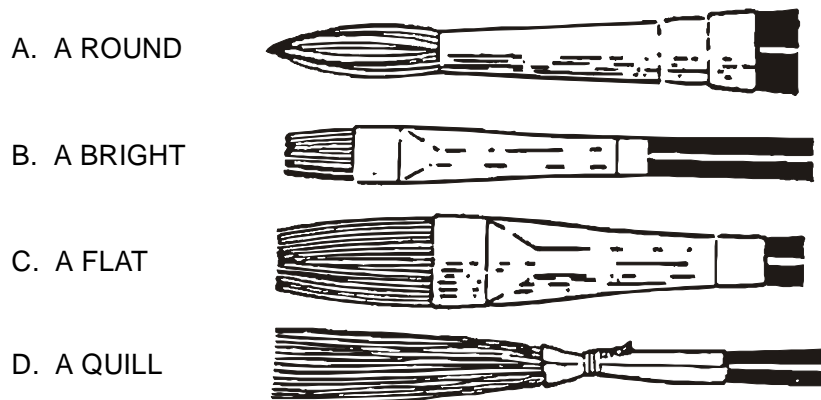


A.  A ROUND

B.  A BRIGHT

C.  A FLAT

D.  A QUILL

*Figure D-7.  Brush shapes.*

(a)  **Round.**  Hairs come to a point, either blunt or sharp.  The blunt rounds are suited for a Gothic style letter when used with even pressure.  The sharp round is suited for a cursive style letter made by varying the pressure on the brush.  If more pressure is added, the brush creates a broader stroke.  If less pressure is used, the brush creates a finer stroke.  A high quality round has a fullness of the hairs when wet, while the hairs of a poor quality round appear concave at the sides.  Poor quality brushes also may appear ragged.

(b)  **Bright.**  The shape is flat with sharp corners, a round ferrule, and hairs are one and one-half times longer than their width.  The bright shape is ideal for lettering show-cards, posters, and small signs.

(c)  **Flat.**  Its shape is flat with square corners, a flat ferrule, and hairs two and one-half times longer than their width.  The flat shape holds more paint than a bright shape, which allows more painting between resupplying the brush with a medium.  A quill brush is a specialized flat lettering brush for sign painting.  Because of its extra long hair design, the brush has tremendous flexibility, holding a comparatively large supply of paint.  The hairs of the quill brush are in a rolled, plastic ferrule held in place by a piece of twisted wire.  The hairs are natural animal hairs for resiliency (not stiff synthetics).  Quill brushes are often used with a tool called a Maul stick.  It is a long, straight dowel with a fat, non-skid end.  Hold the small end of the stick so the fat end rests on the project, while the brush hand rests on the stick.  The stick steadies the painting hand, adds to stroke control, and assists in painting straight lines.

> NOTE: The natural hairs of a quill should never be cut off or trimmed with a razor because the hairs will split.

(2)  Brush lettering media (or paint) is either oil or water-based.  These media consist of pigment, carrier (supports the elements), and binder (holds it all together).  Some media have binders that dry waterproof (latex, enamels, acrylics, and some inks), lending themselves to outdoor or permanent requirements.  Others are not waterproof (for instance, watercolors, washes, and some inks), which limit their use.  All of these media will require compatible thinners to assist with consistency and/or cleanup.

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**CAUTION**

As with most chemical thinners, alcohol is flammable and must be used away from open flames in a well-ventilated area.  Care must be taken not to remove undercoats of latex paint.

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(a)  The paints, brushes, or project may be ruined if the thinners are not properly used.  Chemical thinners are harsh on brushes and hands when used regularly.

(b)  Brushes used in oil paints or lacquers may be filled with linseed oil, shaped, and placed on their side to prolong the life after cleaning.  Brushes should never rest on their hairs.  Motor oil is a temporary but expedient oil to use.  The oil prevents remaining paints and varnishes from hardening, which causes the brushes to become useless.  The oil must be cleaned out of the brush and changed after a month or so of non-use.

(c)  Wash hands thoroughly with soap and water and follow-up with skin cream or moisturizer to prevent damage to your hands from paint thinners.

(3)  When lettering on an enamel or lacquered surface with oil-based or lacquer paints, guidelines can be drawn using a grease pencil.  Once the lettering has dried, the guidelines can be removed with mineral spirits and a soft rag.  Be sure to do a test before attempting the project.

# D-4.  PREPARING TO LETTER

a.  Gather the materials so they are on hand.  Squarely tape the paper to the board using a T-square.  This allows you to accurately and lightly draw in the guidelines.

b.  Adjust the drawing board to a comfortable angle.  The drawing board should not be flat on the table.  This position restricts arm movement and causes you to strain to see what you are doing.  Prop the board against the front table edge and rest the base of the board in your lap, if need be.  The board should be at an angle somewhere between 30 and 45 degrees.  Setting your project up in this manner allows for a constant point of view and provides you with the most comfortable position to work.

c.  Set up the pens and ink and scrap paper on the right side of your board if you are right-handed; use the left side if you are left-handed.  This prevents you from having to cross over the project with a filled pen, lessening the chance of an accident.

d.  Charge the pen with ink with an eyedropper or a brush.  You can dip the pen into the ink, but it is difficult to control the ink.  After refilling the pen reservoir, make trial strokes on a piece of scrap paper.  This is a project saver if too much or not enough ink is in the nib.  This also allows you to see if any foreign items cause any variance in line quality.  When using these pens, you must always PULL the pen.  If you try to push the pen, the tip may dig into the paper or board, possibly ruining the project and/or the pen.

e.  Thoroughly mix the pigment and water with a soft brush until it is the right consistency of ink.  Load the pen with a brush.  Test the paint flow on a piece of scrap paper.  If the paint is too thin, the color is light.  If the paint is too thick, it may not flow from the pen correctly.

f.  Use the same type of scrap paper as the project.  This allows you to see how the surface accepts the ink before you attempt to letter on the actual project.  Unsized or waterleaf paper absorbs ink like a blotter, causing the letters to bleed.  Uneven sizing causes bleeding in patches.  If the paper is slippery, the pen is difficult to control and the ink pools at the bottom of the letters.

g.  Lay out the guidelines.  If necessary, letter on scrap paper.  Take measurements from the scrap and transfer them to the project.  It is better to measure twice and get it right then to rush through the layout process only to realize at the end a mistake was made in the layout.  If time permits, lay out the lettering in pencil.  Have someone check the spelling.

h.  Letter the project.

(1)  If a mistake is made with ink, correct the error when the ink is dry.  You can lightly scrape the error with a steel eraser, reburnish the surface and re-ink, or paint over the error with whiteout and re-ink. Try this on a scrap of the project paper first.  You may need to experiment a little to get the desired result.  The key is to avoid making a mistake.

(2)  Once the project is completely dry, erase all guidelines.  A white vinyl eraser works well.  Again, use the scrap paper first.  This isn't the time for surprises.  Once you are finished with the pen, thoroughly clean it with pen cleaner and pat the nib dry with a paper towel or lint-free cloth.

# D-6.  PREPARED LETTERING

a.  Prepared lettering comes printed on sheets ready to apply or on sheets of adhesive plastic or vinyl.  Vinyl letters only require being punched out and applied correctly.  Because of their ease of use, they were adapted for a wide range of projects.  Their most common use is for vehicle and drive identification on tactical vehicles.

(1)  A lettering sheet is a sheet of waxed acetate with letters printed in reverse on the back.  These sheets come with a protective backing sheet that prevents the letters from getting scratched or coming off on another sheet.  Always store lettering sheets with the backing sheet applied.  Do not leave sheets exposed to the air because this causes them to dry out much quicker.  If need be, place them in a large manila envelope and indicate on the outside the style and sizes.

(2)  Though the letters are of excellent quality, they should only be used for small jobs.  They are time consuming and the number of letters per sheet is limited.

(3)  To use a lettering sheet, determine the type and size of letter to use and the location for placement.  Lightly draw in the guideline, only the baseline is needed.  Place just the sheet with the lettering on the project, facing letters out so that they can be read.  Align one letter at a time evenly against the guideline and burnish into place with a plastic-burnishing rod.  Field expedience may call for any rod-like object with a narrow, rounded end.  The handle on a paintbrush might work.  Pencils should **NOT** be used as a burnisher because they soil the sheets with graphite and may end up soiling your project.  If a letter needs removing, press scotch tape carefully over the letter and lift, and the letter comes with it.  (Magic tape seems to work best.)  Once the lettering is completed, carefully erase the guidelines and use an erasing shield if necessary.

<div style="border:1px solid black; padding:10px;">

**CAUTION**

Be careful not to burnish over an adjacent letter.  When removing the lettering sheet, both letters may stick together or be removed, or they may not align perfectly.

</div>

b.  If camera-ready line art is being done, guidelines can be lightly drawn with a non-photo blue pencil.  This prevents a need to erase unless the original illustration is displayed.  Old lettering sheet letters either fall off or require extreme burnishing.  Pay close attention for this may damage your project.

c.  When lettering is centered, place the center letter on the center of the line of lettering and finish from there outward.

d.  Vinyl letters are adhesive-backed and range in size from 1/4 to 12 inches high.  The larger sizes are available for special uses and are more expensive.  Vinyl letters come in

various thickness, colors, and finishes.  They can be used for signs, charts, automobile markings, and much more.

## D-7.  MECHANICAL LETTERING

a.  Mechanical lettering is done by mechanical means or with machines.

(1)  Leroy is a drafting equipment company trade name that makes a mechanical lettering set.  Because the Leroy set is so popular, it has become the norm when referring to mechanical lettering sets (see Figure D-8).  Wrico and Keufel and Esser are two other high-quality lettering sets on the market.  These sets produce many neat, clean, uniform styles and sizes of lettering, which range from 1/8 to 2 inches.  The sets are easy to master with minimum practice, but are time-consuming when compared to other mechanical methods.  These sets consist of a scriber, pens, and templates with grooved letters; masking tape and a T-square are needed extra items.  The checklist identified in Table D-2 is based on the Leroy mechanical lettering set, though any set can be used by following the manufacturer's manual.
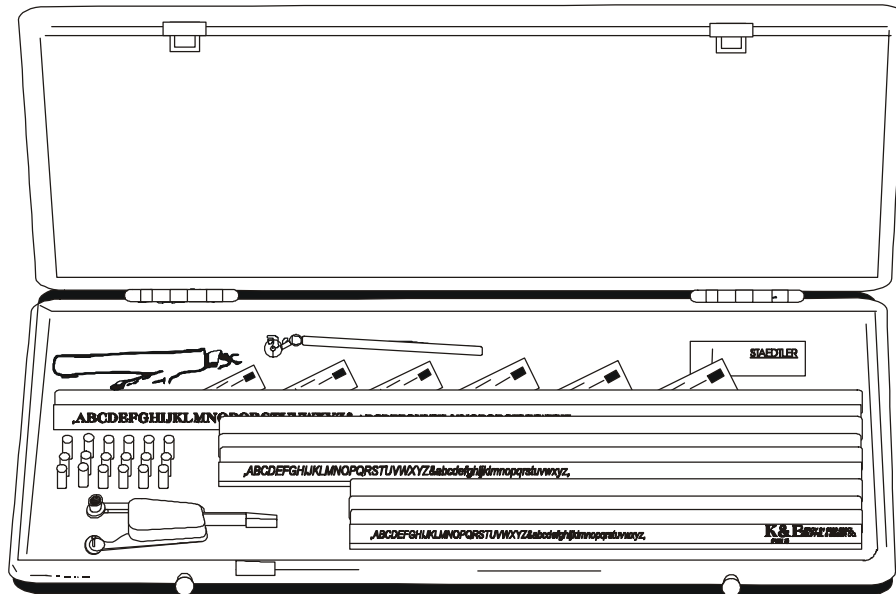


*Figure D-8.  Leroy lettering set.*

*Table D-2.  Leroy checklist.*

- Determine project-lettering requirements.

- Affix project squarely to a drawing surface with masking tape.

- Draw in the guidelines.

- Choose a template and place on the upper edge of the T-square.

- Select and attach the required pen (technical fountain pens may be used).

- Adjust T-square, template, pen, and scriber to properly position the lettering on the guidelines.

- Letter the project.  Erase the guidelines once lettering is completed and ink is dry.

(2)  Kroy or Merlin pressure-lettering machines consist of a lettering font or wheel with various styles and sizes of raised letters and a pressure or dry carbon transfer process machine.  The system imprints character sizes (8 to 36 points) and styles on 1/2-inch paper or plastic strips.  The strips come in various colors or can be clear and have an adhesive back with a protective, peel-off plastic coating.  The machines can be simple, one character at a time, or automatic machines equipped with computer memory, editing functions, and a display screen.

b.  Table D-3 list tips on doing mechanical lettering.

*Table D-3.  Mechanical lettering tips.*

- To prevent a T-square from slipping, apply masking tape to both ends to hold it in place.

- To prevent the project from getting soiled from the template sliding along the T-square, place a sheet of clean paper between the project and the template.

- If clogs occur in tiny pens in the set, lift scriber from project and rotate the cleaning pin.  For technical fountain pens, remove scriber from project, cover pen with a cloth or paper towel, and shake gently.  In either case after checking for good ink flow on scrap paper, continue to letter.

- To correct mistakes made in ink, let the ink dry and remove mistake gently with a steel eraser.  Reburnish the surface before re-inking.

- Typewriters can be used to make labels for charts, graphs, fliers, and viewgraph markers.  Most modem typewriters have changeable typefaces and variations in the small sizes.  Though typewriter use is quick and easy, the small character size limits its use.

# APPENDIX E

# ELECTRONIC PAGE LAYOUT

## E-1.  INTRODUCTION

Ten years ago, research was conducted by reading books and scrolling through microfiche—effective computer hardware and software for electronic page layout were a vision in the future.  Today, however, most companies, researchers, publishing firms, and editors are turning to the electronic medium for information retrieval, archival purposes, print production, and instantaneous communications.  Although there are many software packages available for designing page layouts, this appendix covers PageMaker's applications for creating and producing publications for both print and electronic delivery.

## E-2.  CREATING A PAGE LAYOUT

a.  While there are many templates to choose from, the most common way to create a layout is by using custom page designs.  To start a custom layout, choose New from PageMaker's File menu.  You will be presented with a dialog box asking for page dimension, borders, and other related options.  One of the options is called Facing Pages.  If this box is checked, you will create double-page spreads, with each page the size you specify.  If Facing Pages is not checked, you will get one-sided pages.  Fill in the information and click OK.

b.  Most page layout applications (and illustration programs) work on a principle of master pages.  A master page is the page where you set up all the important information that will dictate overall appearance.  Any information placed on the master page appears on every consecutive page.  Most designers put their columns and guides on the master page.  Headers, footers, page numbers, and graphics that you want on every page are also placed on the master page.

(1)  You can review and edit master pages by clicking on their icon in the lower left corner of the document window.

(2)  To use a master page in a document, choose Display Master Items from the Layout menu.  This allows you to turn the master items on or off on individual pages.

c.  Grids help to keep the layout simple and elegant.  Use the software to automatically create columns and then to manually place horizontal grid lines at even increments; one inch works well.  This gives you a system on nonprinting columns and grids that allow you to align objects.

(1)  It is much easier to read short lines of text in columns than to read lines that are the width of the page.  While setting up the grid, create columns with a small space between them.  These columns are for reference and are not set in stone.  Some situations need to have the text flow across columns to tie a layout together.

(2)  To set up columns in PageMaker, choose Columns Guides from the Layout menu.  A dialog box appears.  Enter the number of columns needed and the space required between the columns.  Do not put too much or too little space between the columns.  PageMaker then draws

the appropriate column guides on the page.  You can manually change the width of the columns by dragging the column guides from side to side.

d.  The second step in creating a grid is setting up horizontal guides.  Horizontal guides are used exactly like column guides, but are horizontal.  To add horizontal guides, ensure the rulers are displayed.  (Choose Rulers from the Guides and Rulers menu, which is under the Layout menu.)  If the rulers are displayed, simply move the cursor into the ruler area and drag out from there.  A guideline will be attached to the cursor that can be dragged up or down into position.  If no guideline appears, make sure that Guides is selected in the Guides and Rulers menu.  Once a guide is placed, it can be moved by moving the cursor to the guide, clicking on it, and dragging it to the new location.  To remove a guide, click and drag it off the document area.

(1)  Guides are not limited to horizontal.  To place a vertical guide, drag out from the ruler on the left side of the document window.  A vertical guide appears and can be manipulated and placed exactly like a horizontal guide.  Vertical guides are useful for aligning objects that are not placed exactly on a column guideline.

(2)  Snap to Guides is another option under the Guides and Rulers menu.  Snap to Guides means that when objects are placed, they will align with the nearest guide and will resist moving from that position.  This is useful whenever you want to align several objects along a particular guide.

(3)  Guides can be locked so they are not accidentally moved or deleted.  To lock a guide, choose Lock Guides from the Guides and Rulers menu.

## E-3.  PLACING OBJECTS

a.  Incorporating different types of objects, text, pictures, hand drawn art, tables, and graphs into one document is what page layout is all about.

(1)  Text can be either written in the application software or imported from a word processor.  To write text in PageMaker, choose the text tool from the Tool Palette and click where you want the text to begin.  Exact positioning is not critical; the text can be freely repositioned.  Type the body of text.  Fonts, size, and style can be changed, as well as kerning, tracking, and leading by using the functions under the Type menu.  PageMaker is better suited for short text (headlines, captions), while a word processor is designed to handle large bodies of text.

(a)  Moving a body of text is as simple as clicking and dragging.  Select the arrow pointer tool and click on the body of text to be moved.  A box outlines the body of text.  As long as the left mouse button is held down, the selected body of text moves with the cursor movements. The line length can be adjusted by clicking on the points on either end of the box, and the handles at the top and bottom of the box can be used to change the vertical size of the block of text.  Also, the entire text box can be rotated to any angle by clicking on the rotate tool and dragging around to the desired position.

(b)  To import text created in another application, select Place from the File menu and navigate to the desired document and click OK.  The cursor icon changes to the text place icon. Move it to where the text is to begin and click.  PageMaker creates a text box on the page to contain the text.  If the text is longer than the length of the page, the bottom handle is red.  To continue the text flow, click on the red handle and the icon again appears as a text placement icon.  Move to where the text is to continue and click again.  Do this as many times as

necessary to place all of the text.  An easier way to place a piece of long text is to select Autoflow from the Layout menu before placing the text onto the document.  With Autoflow selected, PageMaker flows the text across all of the pages, creating new pages as necessary to accommodate all of the text.

(c)  With the text in place, it can be handled exactly like the text created in PageMaker.  Document editing and story editing are two options for editing text.  Document editing is clicking on the text with the text tool and editing.  Story editing is used to edit large stories and acts like a mini word processor.  To use the story editor, choose Edit Story from the Edit menu.  A window with the text appears and you can edit it just like a word processor.  PageMaker also gives the option of editing the original text by choosing Edit Original from the Edit menu.  This option launches the original application the text was created in and allows you to edit there.

(2)  Adding pictures, especially color photos, can make even the most boring layout more exciting.  Adding images is exactly like adding text.  Choose Place from the File menu and navigate to the appropriate file and click OK.  The cursor changes to the imager placement icon.  Move to where the image is to be placed and click.  Images must be in PICT, Photo CD, TIFF, or Postscript format to be placed in PageMaker.

(3)  Hand drawn art created in programs such as Illustrator or Freehand follow the same procedures for placing text and photos.  The art can be moved or resized after placement.

(4)  Professionally drawn clip art is also placed like other types of graphics.  Additionally, you can create a library of art that can be saved and used repeatedly.

(a)  To create a library using art cataloged with Adobe Fetch, first select the art in Fetch and choose Include Thumbnails from the Copy Reference and Edit menus in Fetch.  Next, switch to PageMaker and select Library Palette from the Window menu.  To place the items into the library, select Import Fetch Items from the Options menu in the Library Palette.  The Fetch items now appear.

(b)  To use items from the library, drag the art from the palette to where you want it placed on the page.  PageMaker then copys the original item into the layout.

(c)  The library is not only for clip art.  Any importable item can be copied and placed into the library by clicking on the + icon.  The library is useful when you want to use the same piece of art or graphic more than once throughout a document.  Libraries can be saved and reused, which is helpful when you want to use the same consistent graphics throughout a large publication, such as a book or magazine.

(5)  PageMaker can import tables and graphs created in other applications.  PageMaker cannot, however, edit the data in a table or graph once it is placed, because it imports them as graphics.  The table/graph can be resized and repositioned, but the data cannot be changed.

(a)  To import a table or graph, create the table in Word or Excel.  Go to the Table menu and turn off Gridlines.  Choose Select Table from the Table menu, selecting the entire table.  Press Ctrl + c to copy the selected table.  Switch to PageMaker.  In PageMaker, click on the pointer tool.  Choose Paste Special from the Edit menu.  Choose PICT from the dialog box and press Paste.  The cursor becomes a graphic placement icon.  Click where the table goes.

(b)  Once the table is copied onto the document, it can be enlarged, reduced, stretched, or repositioned.  To change the data, you must change the original graph or table in the application it was created in and then repeat the steps for importing it.

(c)  PageMaker 6.0 comes with its own Table Editor application.  Choose Insert Object from the Edit menu and then choose Adobe Table.  This application works much like Microsoft Graph and can be used to place the tables that can be edited after placement.

b.  PageMaker has four drawing tools.  These tools are not intended to replace a good illustration application or clip art supply, but to create basic graphic shapes.

(1)  The diagonal-line tool is used to draw diagonal lines.  Simply click on the tool and then drag from where you would like the line to start to where the line should end.

(2)  The straight-line tool is used to draw straight lines.  Again, click on the tool and drag in the direction the line should go.  Lines will be confined to a 45-, 90-, or 180-degree angle.

(3)  The rectangle tool is used to draw squares and rectangles.  Choose the tool and then drag the desired sized rectangle on your document.  To draw symmetrical squares, hold down the shift key while dragging.

(4)  The oval/circle tool works just like the rectangle tool, but produces ovals or circles.

c.  PageMaker offers several options to modify the drawn shapes.  These options are found under the Element menu.

(1)  The first option is Line.  This is where you control the thickness and style of lines drawn with PageMaker tools, and affects the lines that make up the edges of circles and squares.  To change the line style of an object, first select the object using the pointer tool.  Once selected, choose the style and width of the lines.  There are many pre-made lines to choose from, or choose Custom to create your own.

(2)  The Fill option is used to fill in objects drawn with PageMaker.  The Fill menu provides options for colors at the top of the menu and fills texture patterns at the bottom.

(a)  The Paper option fills the selected object with the same color as the background paper.  This is useful for covering part of another object with a blank piece of paper.  Choose Define Color under the Element menu to change the color settings.  You can set the color of the paper, as well as the color model (RGB or CMYK) and the color palette under the Define Color option.

(b)  Fill and Lines is another option used to define objects. You can change the fill and line styles by using this command with one dialog box.  The color of the fill can be set by using the pull down menu in the dialog box.

(3) The Rounded Corners option is used to define the shape of the corners of the objects.  When selected, a dialog box of six different corner options appears.  Simply click on one and then click OK.  The new corner style is applied to all selected objects.  The styles range from just slightly dull corners to very rounded curved edges.

## E-4.  TEXT WRAP

Text Wrap is a common design technique.  Text wrap means to have the text flow around an object according to set specifications, instead of having the text flow on top of the object.  Text wrap is used to control the text flow around regular and irregular shaped objects.  To use this function, select the object you would like to wrap text around.  Next, choose Text Wrap from the Element menu.  The dialog box gives the options of no wrap, standard rectangular text wrap, and custom wrap.

(1)  **No text wrap.**  This option is the default setting.  No text wrap is used when you want the text to cover up the graphics or vice versa.  This option is useful when printing a graphic behind text, such as a watermark.

(2)  **Standard text wrap.**  This option wraps the text around a regular-shaped object.  Standard text wrap is used to wrap text around a photo, table, or regular-shaped graphics.  When this option is selected, there are other options available.  There are three Text Flow icons directly below the wrap options.  These icons are used to control how the text flows, either jumping over the object or wrapping the text around the sides.  You also must enter the standoff amount in the bottom of the dialog box.  This is the amount of white space left between the text and the object.

(3)  **Custom wrap.**  This option is used to wrap text around irregular-shaped objects or to produce jagged shaped text blocks.  This function is useful when placing graphics that have irregular shaped edges.  Custom wrap produces interesting designs, but may be harder to read.

(a)  The custom wrap option is always subdued in the Text Wrap dialog box.  To access the custom wrap function, you must first select the Standard text wrap option and then return to the document and create the custom wrap.  When you have selected an object that has the standard text wrap applied, there is an extra dotted box surrounding the object.  This box defines the standoff text wrap borders.

(b)  To create a custom shape, move the control points located at the corners of the standoff box.  Control points can also be added to make the custom box any size or shape.  To add a point, click once at the new handle location.  To move an entire section of the standoff border, drag the section.  To remove a control point handle, drag the unwanted point onto another handle point.  If you now return to the Text Wrap dialog box, you will see that the Custom icon is selected.  The standoff distance can still be changed in the dialog box.

## E-5. LAYERS

PageMaker works on a layering principle.  Each object on the page is a layer that can be sent to the back or brought to the front.  Depending on the attributes of the object, it will either hide objects that it is on top of (in front of) or be hidden by layers in front of it.  To move an object through the layers, select it and then choose either Bring to Front or Send to Back from the Element menu.

# APPENDIX F

# HYPERTEXT MARKUP LANGUAGE (HTML)

## F-1.  INTRODUCTION

a.  It is not possible to address the entire web authoring software packages available today.  This appendix covers a very basic approach to producing a webpage.  You are encouraged to use a commercial package and to experiment.  For the sake of instruction, Netscape is used as the example of a web browser.

b.  Webpages are World Wide Web documents that use HTML to create different effects to the various components of the document.  HTML is a collection of platform independent codes or tags used to set attributes, styles, links, and so on, within the document and was designed to be user friendly.  You do not have to be a programmer to use or understand it.  If you can edit a document, you can create a webpage.

c.  There is a multitude of web authoring software packages available, but they are not necessary.  An HTML document can easily be created in a plain text editor, such as NotePad.  In some cases, it may actually be easier to cut and paste than to launch and use an authoring package.

d.  A webpage may be strictly text or a composite of text, images, sounds, and animation.  In the generic sense, an HTML document is text with tags inserted to specify how the text is displayed by the browser, as well as to identify the various elements of an HTML document; elements being heads, tables, paragraphs, and so on.

## F-2.  HTML TAGS

a.  An HTML tag uses a left angle bracket (<), a tag name, and then the right angle bracket (>).  Between the < character and the > character is the tag name and depending on the tag, the attributes.  Not all tags support attributes.  Some attributes are required and some are optional.

(1)  Tag names and attributes are not case sensitive, but some attribute values are.

(2)  Tags have a simple format.  The tag name must come first and then the attributes.  It does not matter what order the attributes are in, as long as they come after the tag name.

(3)  Normally, tags are paired to indicate the beginning and ending of the tag instruction.  The end tag is an exact copy of the beginning tag, but with a slash (/) before the text within the brackets.

(4)  Not all tags are recognized by all browsers, which is why there is usually a statement somewhere on the webpage to the effect, "this site is best viewed with (Browser X)."  If a browser does not recognize a tag, the browser usually ignores the tag.

b.  At a minimum, a document will contain a section for the head and one for the body.  The head is the title section.  The body is the actual text, paragraphs, tables, photographs, and other

elements.  The required tags for any HTML document are <html>, <head>, <title>, and <body>.  Table F-1 shows an example of a basic HTML document.

*Table F-1.  Basic HTML document.*

```
<html>
<head>
<TITLE>A Basic HTML Document</TITLE>
</head>
<body>
<H1>It Doesn't Take a Rocket Scientist</H1>
<P>This is the new frontier for Illustrators.  We will be able to share our
talents with the world and never leave our desks.  This is the first
paragraph.</P>
<P>This is the second paragraph.</P>
</body>
</html>
```

   c.  HTML tags tell the browser that the file contains HTML-coded information.  All HTML documents must be saved with the .html extension.  If your system only recognizes an 8.3 filename, use .htm as the extension.

   (1)  The HEAD element identifies the first section of the HTML document.  It contains the title element.

   (2)  The title element contains the title of the document.  When drafting a title, bear in mind that the title is what is displayed on someone's hotlist or in a booklist.  Try to create a title that is unique to that page, descriptive, and relatively short.

   (3)  The body element is the second section in a document and also the largest.  The body is where everything else is placed.  There are other elements that are found within the body element.

   (a)  Headings come in sizes 1 to 6, with 1 being the largest and 6 the smallest.  A heading tag is written as <H#>Heading text </H#>; # is any number between 1 and 6.

   (b)  Paragraphs are indicated with a <P> tag.  A web browser ignores any indentations and/or blank lines in the source text (your saved file).  Without the <P> tags, the body becomes one large paragraph.

   (c)  HTML files ignore carriage returns.  The length of a line is not extremely important, though it is better to keep them to fewer than 72 characters.  The browser condenses multiple spaces into a single space.  If there is a line break in the source file, a web browser ignores them and starts a new paragraph only when it finds another <P> tag.

   (d)  The </P> closing tag can be omitted, except for the last paragraph.  A web browser understands that a new <P> tag is the beginning of a new paragraph and the previous paragraph is ended.

(e)  Using the <P> and</P> tags to define a paragraph allows you to center the paragraph, including an attribute statement in the source file.  Table F-2 shows an example of an attribute statement.

**Table F-2.  Attribute statement.**

<P ALIGN=CENTER>
The text for the paragraph that will be centered goes here.

</P>

(f)  To make a source file easier to read and help you edit it, put headings on separate lines, use a blank line or two to help identify the start of a new section, and separate paragraphs with blank lines as well as a <P> tag.  The browser ignores the extra lines.

d.  HTML supports numbered, unnumbered, and definition lists.  Lists can be nested (lists within lists), but this feature can be confusing, so use it sparingly.

(1)  Definition lists are tagged with (normally) <DL>.  The definition term is tagged <DT>. The definition's definition is tagged <DD>.  Table F-3 shows an example of a definition list.

**Table F-3.  Definition list.**

<DL>
<DT> HTML
<DD> hypertext Markup Language is a collection of platform-independent
styles, indicated by tags that define the various elements of a webpage.
<DT> WWW
<DD> World Wide Web
</DL>

Reads as:
HTML
    Hypertext Markup Language is a collection of platform-independent
styles, indicated by tags that define the various elements of a webpage.
WWW
    World Wide Web.

(2)  Numbered lists, also referred to as an ordered list, use the tag <OL>.  The individual items are tagged with <LI>; a closing </LI> tag is not necessary.  Use the tag </OL> to close a numbered list.  Table F-4 shows an example of a numbered or ordered list.

*Table F-4.  Numbered/ordered list.*

```
<OL>
<LI>PLDC
<LI>BNCOC
<LI>ANCOC
</OL>

Reads as:
1.  PLDC
2.  BNCOC
3.  ANCOC
```

(3)  Unnumbered lists are very similar to numbered lists.  They are tagged with <UL> and also use <LI> for the individual items on the list.  Table F-5 is an example of an unnumbered list.

*Table F-5.  Unnumbered list.*

```
<UL>
<LI>Red
<LI>Yellow
<LI>Blue
</UL>

Reads as:
Red
Yellow
Blue
```

(4)  The COMPACT attribute can be used in the event that the definitions are short.  Table F-6 shows an example of a definition list using the COMPACT attribute.

*Table F-6.  Definition list using the COMPACT attribute.*

```
<DL COMPACT>
<DT>URL-
<DD>Uniform Resource Locators
</D>

Reads as:
URL-  Uniform Resource Locators
```

(5)  Nested lists are lists within a list.  Table F-7 shows an example of a nested list.

*Table F-7.  Nested list.*

<UL>
<LI>CONUS SITES
<UL>
<LI>Fort Bragg
<LI>Fort Gordon
<LI>Fort Meade
<LI>Fort Huachuca
<UL>
<LI>OCONUS SITES
<UL>
<LI>Graffenwoeher
<LI>Yongsom
<LI>Fort Shafter

Reads as:

CONUS SITES
    Fort Bragg
    Fort Gordon
    Fort Meade
    Fort Huachuca
OCONUS SITES
    Graffenwoeher
    Yongsom
    Fort Shafter

e.  Links allow a reader to "jump" to another section or to another document.  The tag for a link is <A>, which stands for anchor.  To place a link in an HTML document, perform the steps listed below.

(1)  Begin the anchor with <A (use a space after the A).

(2)  Specify the document (file) linking to by entering the parameter HREF =*"filename"* followed by a closing right angle bracket (>).

(3)  Type in the text that identifies the hyperlink in the current document.

(4)  End the anchor with the ending tag </A>.  There is no space needed before the ending anchor tag.

(5)  Table F-8 shows the source code for a link.

*Table F-8.  Link source code.*

<A HREF="packlist.htm">Packing List</A>

This line brings up the packing list when a viewer clicks on the phrase Packing List.

f.  Address tags provide the viewer with a means of contacting the webmaster via e-mail, as well as provide the document's revision date.  It is normally the last item in a file.  An address line might look like the example shown in Table F-9.

*Table F-9.  Address line.*

<ADDRESS>
Your Web Site Title/Any Higher Headquarters that must be identified/ webmaster@emh2.army.mil / revised Month Year
</ADDRESS>

A Mailto tag allows the reader to send e-mail to a specific person or mail alias.  To create a mailto link, enter
<A HREF="mailto:name@army.mil">Name</A>

g.  Background color can be defined in the same manner as text, links, visited links, and active links by specifying the attributes of the <BODY> tag.

h.  Background graphics also use the <BODY> tag, but stipulate which file to tile.  The tag for a background image includes an attribute statement such as <BODY BACKGROUND="filename.gif">.

i. Table F-10 provides additional HTML tags with a brief description of each.

*Table F-10.  HTML tags.*

**<!-- text -->**
     Comment text out of the HTML code.

**<A ATTRIBUTE> picture/text </A>**;
     Adds an anchor to picture/text. Possible ATTRIBUTEs are:
     HREF="#anchor_name"
       Link this to anchor_name within this document.
     HREF="URL"
       Link this to URL.
     HREF="URL#anchor_name"
       Link this to anchor_name within URL.

*Table F-10.  HTML tags (continued).*

**\<A ATTRIBUTE\> picture/text \</A\> (continued)**;
    HREF="URL?search_string"
     Link this to search for search_string within URL.
    METHODS
    NAME="anchor_name"
     Make an anchor at this spot that is called anchor_name.
    REL
    REV
    TITLE
    URN

**\<ADDRESS\> address \</ADDRESS\>**
   Present address information.

**\<B\> text \</B\>**
   Makes text bold.

**\<BASE\>**
   Specify the name of file in which the current document is stored. This is usually placed in the head of the document.

**\<BLOCKQUOTE\> . . . \</BLOCKQUOTE\>**
   Defines a section as being quoted from another source.

**\<BODY\> . . . \</BODY\>**
   Defines the body of an HTML document.

**\<BR\>**
   Force a line break (use two for a blank line).

**\<CITE\> . . . \</CITE\>**
   Cite some material.

**\<CODE\> . . . \</CODE\>**
   Display this as HTML code.

**\<DD\> definition**
   Display a definition in a definition list or glossary. See \<DL\> and \<DT\>. (Commonly used to make lists without bullets or numbers).

**\<DFN\> definition \</DFN\>**
   Display a definition.

**\<DIR\> . . . \</DIR\>**
   Display a directory of items. (Usually headed by bullets.) See \<LI\>.

**\<DL\> . . . \</DL\>**
   Make a definition list or glossary. See \<DD\> and \<DT\>. (Commonly used to make lists without bullets or numbers).

*Table F-10. HTML tags (continued).*

**\<DT\> term**

Display a term in a definition list or glossary. See <DD> and <DL>.

**<EM> text </EM>**
Make text have emphasis.

**<FORM ATTRIBUTE> . . . </FORM>**
Define an online form. The information is sent to a query server to search for or collect information for a database. See <INPUT>, <OPTION>,
<SELECT>, and <TEXTAREA>. Possible ATTRIBUTEs are:
ACTION="URL"
 The URL of the query server.
METHOD=method
 The method used by form, either get or post.

**<H1> text </H1>**
Make text header style 1. The most prominent header style.

**<H2> text </H2>**
Make text header style 2.

**<H3> text </H3>**
Make text header style 3.

**<H4> text </H4>**
Make text header style 4.

**<H5> text </H5>**
Make text header style 5.

**<H6> text </H6>**
Make text header style 6. The least prominent header style.

**<HEAD> . . . </HEAD>**
Defines the head of an HTML document.

**<HR>**
Place a horizontal rule or separator between sections of text.

**<HTML> . . . </HTML>**
Defines an HTML document.

**<I> text </I>**
Make text italic.

*Table F-10.  HTML tags (continued).*

---

**<IMG ATTRIBUTE>**
 Load an inline image (on browsers that support it). Possible ATTRIBUTEs are:
 ALIGN=alignment
  How to align the picture with the text, possible alignments are top, middle, or bottom.
 ALT="text"
  Alternative text if browser does not support images, or image cannot be loaded.
 ISMAP
 SRC="URL"
  The URL of the image.

**<ISINDEX>**
 Specify index file. This is usually placed in the head of the document.

**<KBD> key </KBD>**
 Display key as a key from the keyboard.

**<LI> item**
 Display item in a list. See <DIR>, <MENU>, <OL>, and <UL>.

**<LINK ATTRIBUTE>**
 Specify relationships to other documents. This is usually placed in the head of the document.
Possible ATTRIBUTEs are:
 REV=relationship
  The relationship of this file to the other one. The relevant relationship is made.
 HREF="URL"
  The URL of the file pointed to by the link.

**<LISTING> . . . </LISTING>**
 Define as a computer listing, embedded tags are ignored.

**<MENU> . . . </MENU>**
 Display a menu of items. (Usually headed by bullets.) See <LI>.

**<NEXTID>**
 Set a variable name. Attribute: variable name. This is usually placed in the head of the document.

**<OL> . . . </OL>**
 Display an ordered list or glossary. (Headed by numbers.) See <LI>.

**<P> . . . </P>**
 Define this area as a paragraph, and format accordingly.

**<PLAINTEXT> . . . </PLAINTEXT>**
 Define this area as plain text.

**<PRE> . . . </PRE>**
 Define this area as preformatted text, and display as is. May include some tags.

---

*Table F-10.  HTML tags (continued).*

---

**<SAMP> . . . </SAMP>**
    Make sample output.

**<STRONG> text </STRONG>**
    Make text have strong emphasis.

**<TITLE> title </TITLE>**
    Define the title of the document. Note this is not a header. This is usually placed in the head of the document.

**<TT> text </TT>**
    Display text in a typewriter text.

**<U> text </U>**
    Display text underlined.

**<UL> . . . </UL>**
    Display an unordered list or glossary. (Usually headed by bullets.) See <LI>.

**&#ascii;**
    Display ASCII character corresponding to ascii.

**&Aacute;**
    Display capital A, acute accent (Á).

**&aacute;**
    Display small a, acute accent (á).

**&Acirc;**
    Display capital A, circumflex accent (Â).

**&acirc;**
    Display small a, circumflex accent (â).

**&AElig;**
    Display capital AE diphthong (ligature) (Æ).

**&aelig;**
    Display small ae diphthong (ligature) (æ).

**&Agrave;**
    Display capital A, grave accent (À).

**&agrave;**
    Display small a, grave accent (à).

**&amp;**
    Display ampersand (&).

---

*Table F-10.  HTML tags (continued).*

**&Aring;**
Display capital A, ring (Å).

**&aring;**
Display small a, ring (å).

**&Atilde;**
Display capital A, tilde (Ã).

**&atilde;**
Display small a, tilde (ã).

**&Auml;**
Display capital A, dieresis or umlaut mark (Ä).

**&auml;**
Display small a, dieresis or umlaut mark (ä).

**&Ccedil;**
Display capital C, cedilla (Ç).

**&ccedil;**
Display capital c, cedilla (ç).

**&Eacute;**
Display capital E, acute accent (É).

**&eacute;**
Display small e, acute accent (é).

**&Ecirc;**
Display capital E, circumflex accent (Ê).

**&ecirc;**
Display small e, circumflex accent (ê).

**&Egrave;**
Display capital E, grave accent (È).

**&egrave;**
Display small e, grave accent (è).

**&ETH;**
Display capital Eth, Icelandic (Ð).

**&eth;**
Display small eth, Icelandic (ð).

*Table F-10.  HTML tags (continued).*

---

**&Euml;**
   Display capital E, dieresis or umlaut mark (Ë).

**&euml;**
   Display small e, dieresis or umlaut mark (ë).

**&gt;**
   Display greater than sign (>).

**&lt;**
   Display less than sign (<).

**&Iacute;**
   Display capital I, acute accent (Í).

**&iacute;**
   Display small i, acute accent (í).

**&Icirc;**
   Display capital I, circumflex accent (Î).

**&icirc;**
   Display small i, circumflex accent (î).

**&Igrave;**
   Display capital I, grave accent (Ì).

**&igrave;**
   Display small i, grave accent (ì).

**&Iuml;**
   Display capital I, dieresis or umlaut mark (Ï).

**&iuml;**
   Display small i, dieresis or umlaut mark (ï).

** **
   Display nonbreaking space ( ).

**&Ntilde;**
   Display capital N, tilde (Ñ).

**&ntilde;**
   Display small n, tilde (ñ).

**&Oacute;**
   Display capital O, acute accent (Ó).

---

*Table F-10.  HTML tags (continued).*

**&oacute;**
   Display small o, acute accent (ó).

**&Ocirc;**
   Display capital O, circumflex accent (Ô).

**&ocirc;**
   Display small o, circumflex accent (ô).

**&Ograve;**
   Display capital O, grave accent (Ò).

**&ograve;**
   Display small o, grave accent (ò).

**&Oslash;**
   Display capital O, slash (Ø).

**&oslash;**
   Display small o, slash (ø).

**&Otilde;**
   Display capital O, tilde (Õ).

**&otilde;**
   Display small o, tilde (õ).

**&Ouml;**
   Display capital O, dieresis or umlaut mark (Ö).

**&ouml;**
   Display small o, dieresis or umlaut mark (ö).

**&quot;**
   Display double quote (").

**&szlig;**
   Display small sharp s, German (sz ligature) (ß).

**&THORN;**
   Display capital THORN, Icelandic (Þ).

**&thorn;**
   Display small thorn, Icelandic (þ).

**&Uacute;**
   Display capital U, acute accent (Ú).

*Table F-10.  HTML tags (continued).*

---

**&uacute;**
   Display small u, acute accent (ú).

**&Ucirc;**
   Display capital U, circumflex accent (Û).

**&ucirc;**
   Display small u, circumflex accent (û).

**&Ugrave;**
   Display capital U, grave accent (Ù).

**&ugrave;**
   Display small u, grave accent (ù).

**&Uuml;**
   Display capital U, dieresis or umlaut mark (Ü).

**&uuml;**
   Display small u, dieresis or umlaut mark (ü).

**&Yacute;**
   Display capital Y, acute accent (Ý).

**&yacute;**
   Display small y, acute accent (ý).

**&yuml;**
   Display small y, dieresis or umlaut mark (ÿ).

---

# F-3.  CONSTRUCTING THE HTML DOCUMENT

   a.  **Creating a directory for the webpage**.

   (1)  Select images for the webpage.

   (a)  Scan in the artwork or photograph(s) using Adobe PhotoShop.

   (b)  Resize the image(s), changing the resolution to 72 dpi.

   (c)  Change the color mode to indexed colors (8 bit, adaptive, diffusion).
   (d)  Name and save the file(s) in the webpage directory.
   (2)  Using a graphic software package (such as Adobe PhotoShop), create a .gif file to be used as the webpage background.  Save the file in the webpage directory.

   (3)  Open a text editor, such as NotePad.

   (4)  Enter all tags and text.
   (5)  Save the file in the web directory using either an .htm or .html extension.

(6)  Open the file in the browser and review it for correctness and compliance with the Guidance for the Management of Army Websites.

(7)  Make any necessary corrections.

(8)  Put the document on the web server and check the formatting and each link.  Files may be sent to an HTML validation service (check with the local Directorate of Information Management (DOIM) to verify the titles conform to accepted HTML standards.

(9)  Update files as necessary.

b.  **Creating the webpage using a browser.**

(1)  Launch Netscape Navigator 3.0 Gold.

(2)  Close the browser window.

(3)  Select FILE from the main menu bar.

(4)  Choose NEW DOCUMENT from the pull-down menu.

(5)  Click on BLANK from the fly-out menu.

c.  **Changing the Netscape webpage editor settings.**

(1)  Select OPTIONS from the main menu bar.

(2)  Select EDITOR PREFERENCES from the drop-down menu.  The EDITOR PREFERENCES dialog box appears.

(3)  Select the PUBLISH tab from the EDITOR PREFERENCES dialog box.

(4)  Uncheck the MAINTAIN LINKS and KEEP IMAGES WITH DOCUMENTS boxes.

d.  **Placing a background image on your webpage.**

(1)  Click the APPEARANCE tab from the EDITOR PREFERENCES dialog box.

(2)  Click on the BACKGROUND IMAGE CHOOSE FILE button.

(3)  Locate the background file from the webpage directory.

(4)  Click OK.

e.  **Creating a table.**

(1)  Click on the TABLE button on the tool bar.  The CREATE TABLE dialog box appears.

(2)  Click OK.

f.  **Placing art, text, or photo in the table.**

(1)  Place the cursor in the upper left corner of the table and click.

(2)  Choose the INSERT IMAGE option from the tool bar.  The FORMAT/IMAGE dialog box appears.

(3)  Click the IMAGE FILE CHOOSE FILE button.

(4)  Locate and select the file to be inserted and click the OPEN button.

(5)  Place the cursor in the lower left corner of the table and click.

g.  **Saving the webpage.**

(1)  Select FILE from the main menu bar.

(2)  Choose the SAVE option.  The SAVE FILE dialog box appears.

(3)  Name the file using the .htm or .html extension.

(4)  Save the file in the webpage directory.

(5)  Open the file in the browser and review it for correctness and compliance with the Guidance for the Management of Army Websites.

(6)  Put the document on the web server and check the formatting and each link.  Files may be sent to an HTML validation service (check with local DOIM) to verify the titles conform to accepted HTML standards.

(7)  Update files as necessary.

# APPENDIX G

# ORGANIZE GRAPHICS WORK FLOW

## G-1.  INTRODUCTION

Providing the very best product possible for a client is usually not a problem when it is the only project in house, but this is rarely the case.  Usually there are several projects of various complexities and deadlines being worked on at the same time.  A graphic shop can quickly become very hectic and chaotic if there isn't a system in place to keep things under control.  As the NCOIC of a graphic shop, you are responsible for the quality and timeliness of the products your shop produces.  You may find it useful to include in the shop's standing operating procedure (SOP) a section for performance standards and quality assurance.  Having measurable performance standards or checks in place will help ensure that all products meet established standards.  The issue of timeliness will require that you are constantly aware of what is going on in your shop.

## G-2.  ESTABLISHING A WORK FLOW SYSTEM

a.  To be successful, the NCOIC must control the work flow, which means controlling the resources necessary to get the job done.  Factors that affect the work flow include—

- Length of time it takes to complete a particular task or job.

- Amount of work already in house.

- Personnel and their respective abilities.

- Equipment.

- Schedule of outside activities, such as training, maintenance, and duties that cannot be rescheduled.

- Priority of incoming jobs.

b.  Incoming priorities can be very disruptive.  To ignore a work schedule is risking loss of production time, work efficiency, and worker morale.  The supervisor's task is to help customers and try to meet deadlines, but not at the expense of other customers or unit efficiency or morale.  Granted, there are jobs that cannot wait, but it is how they are handled that make or break morale.  The shop's overall productivity level is eventually affected when supervisors frequently accept jobs with an extremely short suspense without regard to their workers.

c.  You should not try to keep track of everything in your head.  Besides being a daunting task, you may not always be present.  It is better to establish some sort of work flow system, establishing procedures that everyone is aware of and can follow.

   (1)  For increased effective work flow, write a procedures section in your SOP, detailing step by step how to take in a work order and fit it into the work schedule.

   (2)  If examples of completed procedures or products are needed, prepare an annex section to your SOP.  In the annex include samples with illustrations that show desired standards, providing sufficient information so your shop understands what is expected of them.  Table G-1 shows an example of a procedure.

*Table G-1.  Example of a procedure.*

1.  Check a written work order request (DA Form 3903-R).

   * Security classification.

   * Complete address of requesting unit or activity.

   * Account numbers or fund site numbers (if applicable).

   * Requester and alternate point of contact (POC), as well as their phone numbers.

   * Justification for request.

   * Validation signatures.

2.  Accepting work order.

   * Security classification within the shop's validation.

   * Feasibility of work requested, type of job, and suspense date.

   * Complete explanation of requested work, to include any necessary attachments.

# G-3.  CONTROLLING THE WORK FLOW

   a.  Work flow is the orderly and predictable progression of the customer's request, from filling out DA Form 3903-R to the product completion.  Any shop's workload will vary from taxing to meager.  As the NCOIC, you are challenged to do what you can to even out the highs and lows, so that the shop is not overloaded part of the time and underworked the rest of the time.  Further, you must see that the workload is shared fairly by everyone in the shop.  No one should carry more or less then his or her fair share of the workload.

   b.  Using the following means can control the work flow:

   (1)  Although not a fool proof way to maintain the work flow, the job status board will tell you at a glance what is in house, when it is due, who is working the project, and classification.  The key to a job status board is to keep it current.  Without regular review, it can set you up for failure.  Most supervisors review the status board each morning and again after lunch, making any necessary changes.  Jobs that are lagging behind or were delayed get immediate attention.

(2)  Work is prioritize based on mission/classification (security).

(a)  Too often supervisors leave the priority of work to customers.  This generally means the work orders manage you, rather than you managing the work orders.  The appropriate priority should be supported with sufficient rationale to be manageable.

- **Priority.**  Work that directly supports the accomplishment of a primary mission of the requesting organization as reflected in its mission statement.

- **Urgent.**  Work that directly supports the accomplishment of a secondary mission of the requesting organization as reflected in its mission statement.

- **Routine.**  Work of an official nature required by the requesting organization that is not in direct support of its primary or secondary missions.

(b)  Whether the requester needs the work completed in a few hours, the next day, or next month has no bearing on which priority block is checked.  The only factor used when determining priority is how the work supports the mission of the requesting organization.

(3)  Original visual information (VI) productions, products, and their associated administrative records are controlled throughout their life cycle.  Activity VI managers maintain a system for numbering individual product items in keeping with current regulations (AR 25-1).  There are a number of helpful records to assist the production supervisor.

(a)  The work order log is a record of jobs in house; jobs completed, and jobs holding.  The work order log is used in conjunction with the job status board.  This record may be used to keep track of expenditures, both in man-hours as well as consumables, for reporting at the end of a given period.  A column is left blank to record totals at the end of each month, quarter, or semiannual period.

(b)  DA Form 3903-R is a work request that details the work to be accomplished.  It also serves as the record of authorization or authority to do work of an official nature as certified by the requester or authorized signature.  The back of the form serves as an assignment record, a work flow record, and a "paper trail" of the people handling a particular job.  Finally, it serves as a record of consumables.  This record is used to complete an annual activity report.

(c)  The Annual Visual Information Report (VI Annual Report) is used to report production in a consolidated format to the Army Visual Information Management Office.  All work accomplished during a year is recorded using the feeder form DA Form 3903-R.

(4)  The work order number serves to keep a consecutive numbering system to track job orders in house.  It can serve to locate jobs while in production and once completed and to record the number or jobs accomplished over time.  It can be used to tie the job order log, the job order, and the status board together for a smooth running operation.

# APPENDIX H

# EVALUATING A GRAPHIC PROJECT

## H-1.  INTRODUCTION

Layout and composition denote the selection and arrangement of the appropriate elements within a picture, so as to express the illustrator's idea clearly and effectively.  The success of a picture depends on how well these elements are put together.

## H-2.  LAYOUT AND COMPOSITION

a.  Composition is nothing more than combining basic form and space, arranging the elements of the picture to produce a harmonious whole.  As simple as this may sound, it is not a process that can be taken lightly.  In composing any illustration, you need to ask the same questions before you begin, "What are the elements important to in the illustration and what is the message, idea, or concept that you are trying to get across?"  Good illustrations are the result of careful planning and the sketching of many basic ideas to find the right composition for that particular illustration.

b.  An illustration should begin with thumbnail sketches.  These sketches are small, quickly drawn ideas that give just enough detail to visualize the concept.  They are used to work out general layout details such as composition, balance, movement, and continuity.  If a layout looks awkward as a quick sketch, it isn't going to improve when details are added.  This is the time to stretch your imagination and experiment with different approaches.  After you are done with your thumbnails and you find that they all look basically alike, then you haven't done what you set out to do; brainstorm with your pencil. Take a break and go at it again with a willingness to be open and a bit more bolder.  When you get a good variety of thumbnail sketches, there should be one or two in the group that is a little off the wall (proof that you were not in a rut!).  Though they might be too radical to use, do not immediately abandon them.  Study them to see if there is an element or two that you can salvage.  Above all else do not lock yourself into a format (all thumbnails looking alike) until you know the layout has all the elements needed to make the illustration a success.

c.  After selecting one or two of the most promising thumbnail sketches, the next step is to draw a more detailed sketch or a rough.  The rough should be as close to full size as allowable.  Take a critical look at the roughs to check the layout for unity, balance, and rhythm and to ensure that your focal point has dominance over the other elements.   Step back and look at the illustration's color.  As far as the basics are concerned, this is the time to fine-tune the layout.  Even if all the individual elements work in and of themselves, ensure they work together to give the desired overall effect.  At this point, you might want to bring in the customer.  It is better to deal with changes during the rough stage then after the final is started.

d.  With a pencil layout, check and recheck any measurements and proof the text.  When you are sure that everything is correct, then proceed to ink and color.  Once you have gone over the roughs with the customer and know in which direction you are heading, it is time to begin work on the final illustration.  After the final illustration is completed, check it again to ensure the project is accurate and clean before calling the customer for pickup.

# H-3. TERMS

   a. **Design.**

   (1) **Unity.**   Sense of oneness as whole or blocks of information logically grouped, aligned, and consistently used throughout the illustration.

   (2) **Balance.**  Symmetrical/asymmetrical, a stability produced by even distribution of weight on each side of a vertical axis.

   (3) **Rhythm.**  Repetition or progress that creates and maintains interest and helps establish eye flow.

   (4) **Dominance.**  The main focal point, that element which attracts your attention.

   b. **Text.**

   (1) **Proofing.**  Checking spelling, capitalization, punctuation, double words, and so on.

   (2) **Hierarchy.**   Using size, color, and/or position to determine the most important text/information.

   (3) **Legibility.**  Use font (style), size, color, and spacing to make text characters easy to identify.

   (4) **Readability.**  Use font (style), size, color, and spacing to make blocks of text easy to read.

   c. **Graphics.**

   (1) **Color (tone/value).**  Use of color, consideration of color properties (hue, value, intensity, and temperature), consideration of color harmonies, value (relative lightness or darkness), intensity (brightness of colors), and temperature.

   (2) **Quality (sharpness/clarity).**  Having a clear and distinct form and detail.

   (3) **Size.**  How the final size applies to the design and/or how the image's final content interacts with the design and text.

   (4) **Appropriateness.**  Graphics, fonts, colors, and layout compliment the message.

   (5) **Overall effect.**  How the combination of different elements are used to clearly convey the intended message.

# APPENDIX I

# STILL PHOTOGRAPHY EDITING AND PROCESSING SYSTEM (SPEPS)

## I-1. INTRODUCTION

This appendix covers the description and deployment of the SPEPS.

## I-2. DESCRIPTION

a.  The SPEPS is a state-of-the-art, still image editing and processing system consisting of commercial-off-the-shelf/nondevelopmental items.  (See Figures I-1 and I-2.)
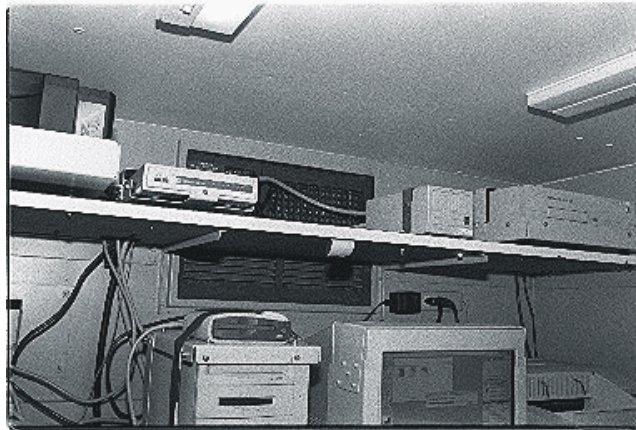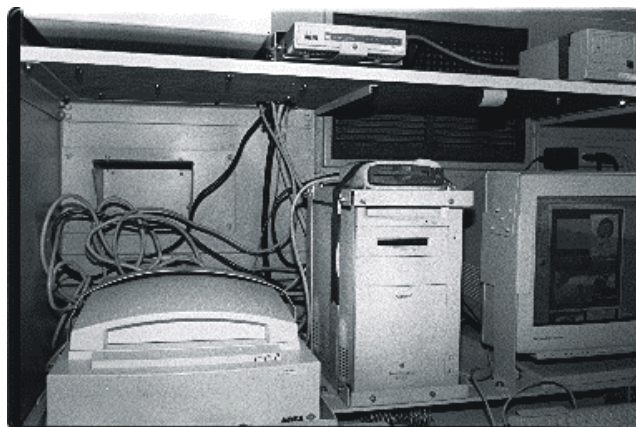


*Figure I-1.  SPEPS.*



*Figure I-2.  SPEPS with commercial-off-the shelf/nondevelopmental equipment.*

b.  The SPEPS is shock-mounted into a climate-controlled S-250 shelter for transportation over unimproved roads and for operation in tactical environments worldwide (see Figure I-3). The system consists of but not limited to the components listed in Table I-1.

*Table I-1.  SPEPS components.*

- Automated data processor with CD-ROM.

- Video monitor.

- Flatbed scanner.

- 35mm slide scanner.

- Modem.

- Communications interfaces.

- Color printer.

- Writable compact disk.

- Bernoulli or zip drive.

- Selected software.

- Accessories.



*Figure I-3.  The S-250 shelter.*

c.  The system is compatible with existing joint combat camera (COMCAM) center equipment and with each military department's COMCAM equipment.

d. The SPEPS is utilized to process, manipulate, reproduce, store, and transfer electronic still photographic images before, during, and after combat operations, in support of visual information (VI) missions, training exercises, news coverage, combat operation decision-making processes, and historical documentation.

e.  The SPEPS will transmit and receive high-resolution color images via electronic transfer and magnetic medium compatible with commercial publishing standards in a distribution format acceptable to the American Forces Information Service (AFIS).  SPEPS capabilities are listed in Table I-2.

*Table I-2.  SPEPS capabilities.*

- Creates and imports electronic still images from peripheral devices.

- Electronically edits and manipulates still images.

- Adds text, captions, and graphics to still images.

- Stores images electronically in mass storage devices.

- Produces prints and transparencies (up to 8.5 inches x 11 inches).

- Transmits and receives still images over available landlines and satellite telecommunications systems. (See Figures I-4 and I-5.)

- Scans and imports color images from 35mm slides or negatives and up to 8.5 inches x 11 inches transparencies or documents.

- Is rack- or shelf-mountable in vehicle-mounted shelters.

- Captions and slates image prior to transmission.

- Operates in hot, wet, and cold climates.

*Figure I-4.  Satellite telecommunications system.*



*Figure I-5.  Satellite system in operation.*

## I-3.  DEPLOYMENT

a.  Prior to deployment, SPEPS is provisioned initially with sufficient electromagnetic media, maintenance, and cleaning material (at least 60 days) for full operation.  The SPEPS must—

- Be transportable by aircraft, rail, or marine transport.

- Require no more than a two-man carry for any single travel case when fully loaded.

- Have shipping cases with standard military tie-down and security or locking devices that provide sufficient shock isolation and crush or puncture protection to safeguard equipment during shipment.

- Be mission capable from travel configuration within 30 minutes of arrival.  (See Figures I-6 and I-7.)



*Figure I-6.  Fully loaded travel case.*

*Figure I-7.  Mission capable travel case.*

b.  The SPEPS can interface with available telecommunications systems and satellite systems and complies with the Joint Photographic Expert Group (JPEG) VI standard.

c.  The SPEPS is compatible with the Electronic Still Photography System, Motion Video Acquisition System (MVAS), Motion Video Editing System (MVES), Visual Information Satellite Ground Station (VISGS), and Live Video Satellite Ground Station (LVSGS).

d.  The SPEPS operates from standard power sources (110/220 volts, 50/60 Hz) and must have power conditioning and surge suppression for system components.  (See Figure I-8.)



*Figure I-8.  Standard 110/220 volts power source.*

# APPENDIX J

# PROJECT EVALUATION CHECKLIST

| PROJECT STANDARD | GO | NO-GO |
|---|---|---|
| **COMPOSITION** | | |
| 1. Rule of thirds | ____ | ____ |
| 2. Perspective | | |
|     a. One point (parallel perspective) | ____ | ____ |
|     b. Two point (angular perspective) | ____ | ____ |
|     c. Three point (oblique perspective) | ____ | ____ |
|     d. Linear/nonlinear perspective | ____ | ____ |
|     e. Circle in perspective | ____ | ____ |
|     f. Aerial perspective | ____ | ____ |
|     g. Horizon line-eye level | ____ | ____ |
|     h. Picture plane | ____ | ____ |
|     i. Natural forms | ____ | ____ |
| 3. Distractions | ____ | ____ |
| 4. Size relationship | ____ | ____ |
| 5. Vertical and horizontal formatting (horizontal format for VTGs, TVs, 35mm slides) | ____ | ____ |
| 6. Basic shapes/forms | ____ | ____ |
| 7. Proportion | ____ | ____ |
| 8. Contour | ____ | ____ |
| 9. Shading | ____ | ____ |
| 10. Contrast | ____ | ____ |
| 11. Size | ____ | ____ |
| 12. Visual effectiveness | ____ | ____ |
| 13. Overall effectiveness | ____ | ____ |
| | | |
| **MEDIA** | | |
| 1. Tone media (any combination of two or more colors) | ____ | ____ |
| 2. Line media (any media which uses only black and white to create an image) | ____ | ____ |
| | | |
| **COLOR THEORY** | | |
| 1. Properties of color | | |
|     a. Hue | ____ | ____ |
|     b. Intensity | ____ | ____ |
|     c. Value | ____ | ____ |
|     d. Temperature | ____ | ____ |
| 2. Additive | ____ | ____ |
| 3. Subtractive | ____ | ____ |

| PROJECT STANDARD | GO | NO-GO |
|---|---|---|
| **COLOR THEORY (continued)** | | |
|     4.   Color harmony and discords | | |
|         a.   Achromatic | ____ | ____ |
|         b.   Monochromatic | ____ | ____ |
|         c.   Analogous | ____ | ____ |
|         d.   Complementary | ____ | ____ |
|         e.   Split Complements | ____ | ____ |
|         f.   Triads | ____ | ____ |
| | | |
| **Value** | | |
|     1.   Tint | ____ | ____ |
|     2.   Shade | ____ | ____ |
|     3.   Gradation (tonal graduations) | ____ | ____ |
| | | |
| **Mixture by Juxtaposition** | | |
|     1.   Hue | ____ | ____ |
|     2.   Mixture | ____ | ____ |
|     3.   Neatness | ____ | ____ |
| | | |
| **Simultaneous Contrast** | | |
|     1.   Visual blending | ____ | ____ |
|     2.   Neatness | ____ | ____ |
|     3.   Visual effects | ____ | ____ |
| | | |
| **Color Temperature** | | |
|     1.   Warm | ____ | ____ |
|     2.   Cool | ____ | ____ |
| | | |
| **DESIGN** | | |
| **Principles of Design** | | |
|     1.   Unity | | |
|         a.   Proximity | ____ | ____ |
|         b.   Repetition | ____ | ____ |
|         c.   Continuation | ____ | ____ |
|         d.   Verity | ____ | ____ |
|     2.   Balance | | |
|         a.   Formal (symmetrical) balance | ____ | ____ |
|         b.   Informal (asymmetrical) balance | ____ | ____ |
|         c.   Radial balance | ____ | ____ |
|         d.   Crystallographic balance | ____ | ____ |
|         e.   Static balance | ____ | ____ |

| PROJECT STANDARD | GO | NO-GO |
|---|---|---|
| **Principles of Design (continued)** | | |
| 3. Rhythm | ____ | ____ |
| 4. Proportion | ____ | ____ |
| 5. Movement | ____ | ____ |
| 6. Dominance | ____ | ____ |
| | | |
| **Thumbnails to Develop and Improve Design Quality** | | |
| 1. Eye movement | ____ | ____ |
| 2. Eye path | ____ | ____ |
| 3. Positioning of elements | ____ | ____ |
| | | |
| **Roughs to Improve Original Ideal of Thumbnail Sketches** | | |
| 1. Size of element | ____ | ____ |
| 2. Loose but gives a true feel | ____ | ____ |
| 3. Color/tone suggested | ____ | ____ |
| 4. Typography | ____ | ____ |
| | | |
| **Comprehensive Rendering to Enhance Design and Graphic Accuracy** | | |
| 1. Precision | ____ | ____ |
| 2. Color effect | ____ | ____ |
| 3. Format most effective | ____ | ____ |
| | | |
| **LETTERING** | | |
| 1. Legibility | | |
|    a. Uniformity | | |
|      (1) Height | ____ | ____ |
|      (2) Inclination | ____ | ____ |
|      (3) Spacing (letters, words, lines) | ____ | ____ |
|    b. Proportion | ____ | ____ |
|    c. Stability | ____ | ____ |
|    d. Type style | ____ | ____ |
| | | |
| **PAGE LAYOUT** | | |
| 1. Style | ____ | ____ |
| 2. Appropriateness | ____ | ____ |
| 3. Consistency | ____ | ____ |
| 4. Balance | ____ | ____ |
| 5. Unity | ____ | ____ |
| 6. Spreads | ____ | ____ |

| PROJECT STANDARD | GO | NO-GO |
|---|---|---|
| **PAGE LAYOUT (continued)** | | |
| 7. Format | ____ | ____ |
| 8. Grid | ____ | ____ |
| 9. Margins | ____ | ____ |
| 10. Columns | ____ | ____ |
| 11. Rules (horizontal or vertical) | ____ | ____ |
| 12. Type (size and style) | ____ | ____ |
| 13. Headlines (titles) | ____ | ____ |
| 14. Subheads | ____ | ____ |
| 15. Captions | ____ | ____ |
| 16. Color | ____ | ____ |
| 17. Artwork | ____ | ____ |
| | | |
| **USE OF MATERIALS** | | |
| 1. Fits subject matter/concept | ____ | ____ |
| 2. Fits project needs/requirements | ____ | ____ |
| | | |
| **SHOP PRACTICES** | | |
| 1. Follows directions | ____ | ____ |
| 2. Follows safety precautions | ____ | ____ |
| 3. Maintains clean and safe work area | ____ | ____ |
| 4. Cleans tools and equipment in accordance with manufacture's recommendations and shop SOP | ____ | ____ |
| 5. Proper use of equipment and material | ____ | ____ |

# APPENDIX K

# DRAWING THE HUMAN FORM

## K-1.  INTRODUCTION

In drawing any subject, you must be willing to go through the basic procedures, one step at a time.  Those steps are form, proportion, contour, and shading.  Each portion of the drawing must be given some special consideration as it compares with the rest of the figure.  Learning to draw the human figure is important because 85 percent of all illustrations for posters and drawings contain the human figure.

## K-2.  FIGURE PROPORTIONS

a.  Proportion is defined as the relative size and location of one form to another.  Figure proportions for illustrations should not be measured in inches, feet, meters, and so forth, but how large one form is to another, visually.  The closer something is, the larger; the farther away it is, the smaller.  Though figure proportions vary from person to person, you must start with basic rules and a unit of measurement.  Draw what you see, beginning with the entire form and proportions and worry about details later.  If necessary, start with a bubble or stick figure.

b.  The basic unit of measurement for the human body is the head.  The vertical height of the head from chin to the top of the skull is used for vertical measurements.  The width of the head from cheekbone to cheekbone is used to make all horizontal measurements.  For example, the average human figure is 6-1/2 to 8 heads high and 2-1/2 to 3 heads wide.  Head specifics and portraiture are discussed later.

c.  Proportions of the "ideal" human figure are eight heads high and three heads wide.  These proportions give the figure a taller, more statuesque appearance.  These rations are mainly for learning figure proportions and should be remembered and practiced, but they do not consider the foreshortening technique.

d.  After the height of the standing figure is decided, it should be divided into eight equal parts to make the figure slightly taller and slimmer than the average person.  (See Figure K-1.)  As shown in Figure K-1, the other seven heads are divided as follows:

(1)  One-third of a head for the neck.

(2)  Two and two-thirds heads for the torso (from the bottom of the neck to the crotch).
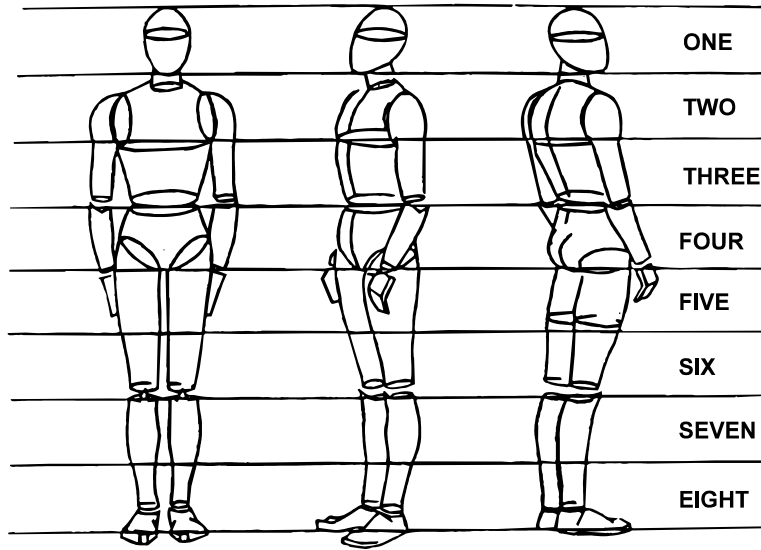
*Figure K-1.  Ideal figure proportion.*

e.  The structural differences between the male and female are more in the bones and muscle tissue than anywhere else.  (See Figure K-2.)  The bones of the female are smaller than the bones of the male.  The female body appears much smoother and less muscular, although the female has the same muscle structure as the male.  This appearance is caused by genetic differences, plus females have a heavier covering of fatty tissue over the entire body.

(1)  Figure K-2 shows the differences between the average male and female figures.  The male's shoulders are about three heads wide, while the females are only two heads wide.
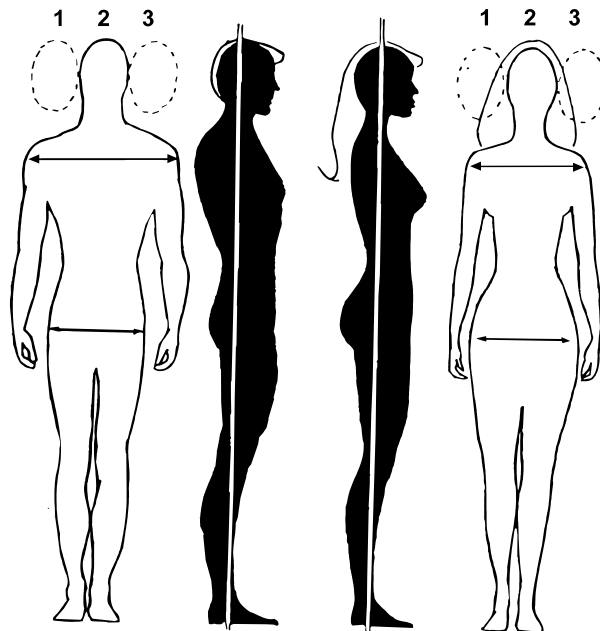


*Figure K-2.  Male and female figure differences.*

(2) The female's hips are proportionally the same as the male, but the female's torso is smaller. (See Figure K-3.) Also, her ankles, wrists, and fingers are proportionally thinner than the male.

(3) The female's lower legs taper to thinner ankles and smaller feet than do the male. In profile, the female figure is narrower than the male. Other differences include her smoother muscles, higher waistline, longer torso (Figure K-3), shorter legs, and shallow pelvis. Note the greater distance between the pelvis and rib cage of the female. The illustrator notices these subtle differences.
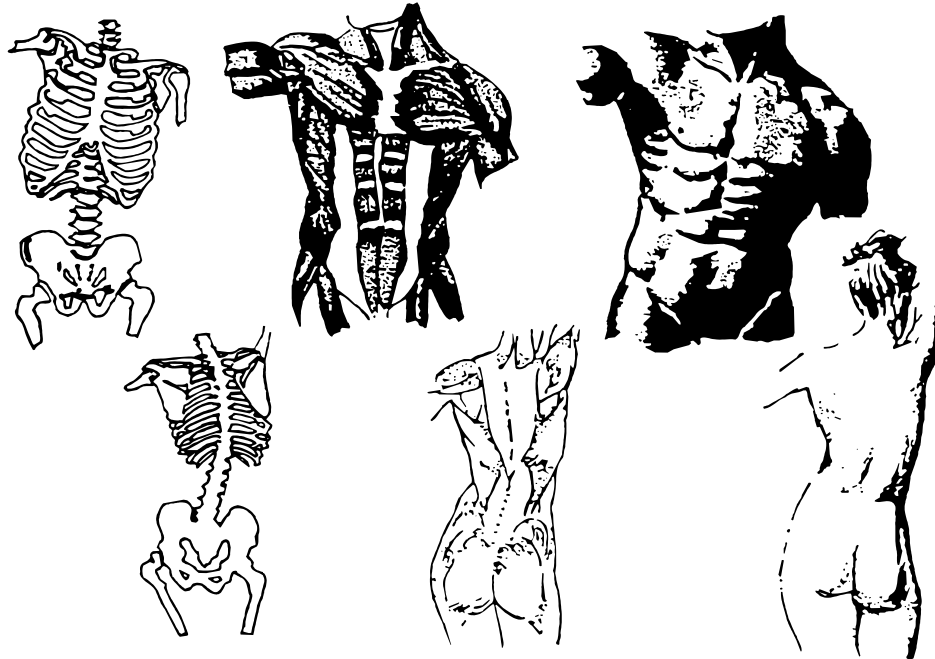


*Figure K-3. The torso.*

f. An easy way to draw the human torso is to reduce it to two cylinders; the upper cylinder is twice the height of the lower cylinder. (See Figure K-4.)

(1) The chest, abdomen, and pelvis are the three central masses of the torso and are connected by the spinal column. (See Figure K-4.). The chest consists of the rib cage, shoulder, and collarbone. The shape of the rib cage is a modified cone-shaped mass. The shoulders hold the arms. Due to the muscles over the shoulder and collarbone, the rib cage appears broader than it actually is. The abdomen is a soft, fleshy, movable part of the upper portion of the torso. The chest and pelvis are stable masses. The pelvis is the lower part of the torso. It serves as a base for the legs.

(2) The study of anatomy (muscles and bones) is a must for a successful illustrator. It gives the illustrator an understanding of the structure or frame around which to build a visually accurate illustration.

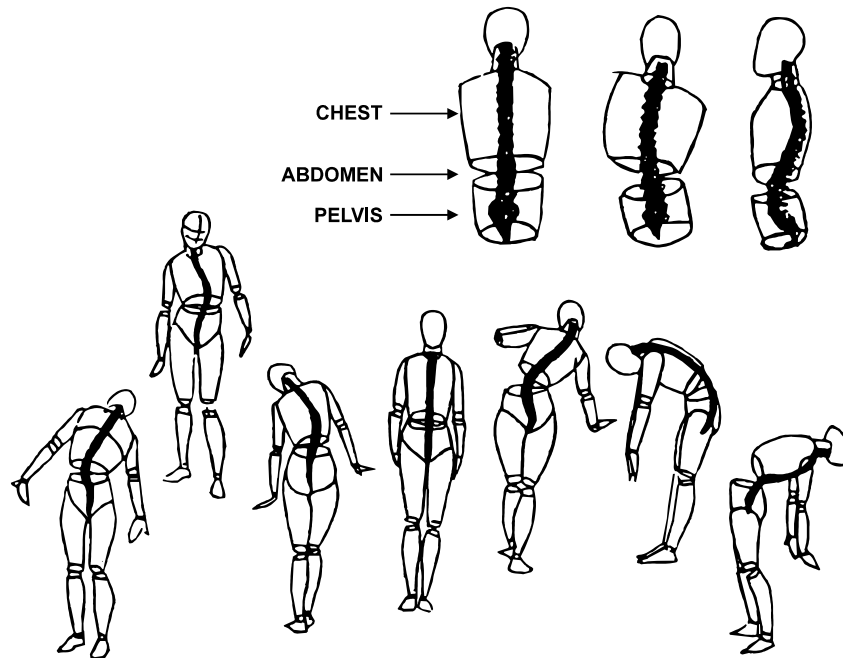g. The arm is based in the shoulder girdle. It has one bone in the upper arm halfway down.

CHEST

ABDOMEN

PELVIS

*Figure K-4.  Body masses connected by the spinal column.*

(1)  From the front, the arm wedges downward and enters the forearm just below the elbows.  When the thumb is turned away from the body, the mass of the forearm is oval in shape, becoming round when the thumb is toward the body because the bones of the forearm cross.  From the back, the mass of the shoulder enters the arm on the side; and at the elbow, the arm and forearm are like a hinge joint.

(2)  The upper and lower arms are modified cylinders of approximately equal length (Figure K-5).  The cylinders for the arms are much like the cylinders used for the construction of the torso, only much narrower.  The cylinders forming the arms may be drawn at greater angles in relation to each other than the cylinders forming the torso, because the arm bends much more than the torso.
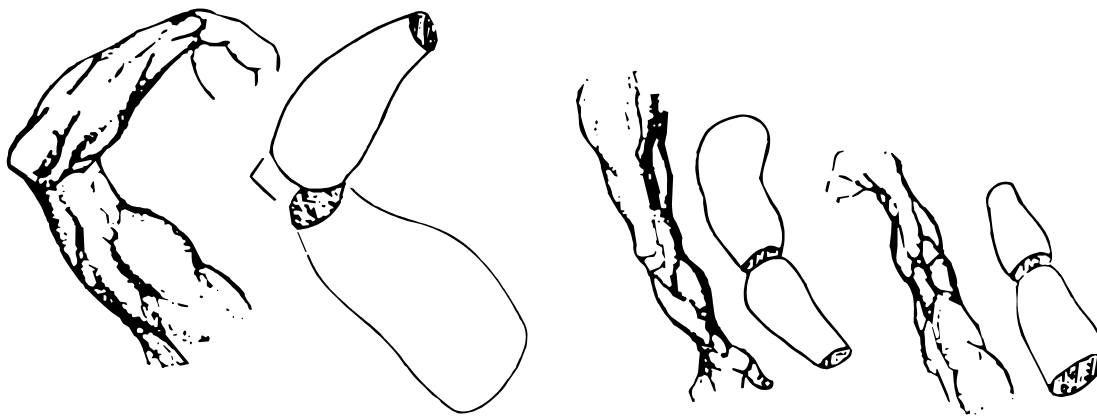


*Figure K-5.  The arm.*

h.  Other than the face, the hands are the most expressive parts of the human body and should receive special attention when being drawn.  The illustrator should be able to make

excellent drawings of hands, using his own as models.  Since there is very little flesh on the hand, except on the palm side, the illustrator should have a good knowledge of the bone structure to draw it well.  Using a form envelope to enclose the many small forms is of great help.  (See Figure K-6.)
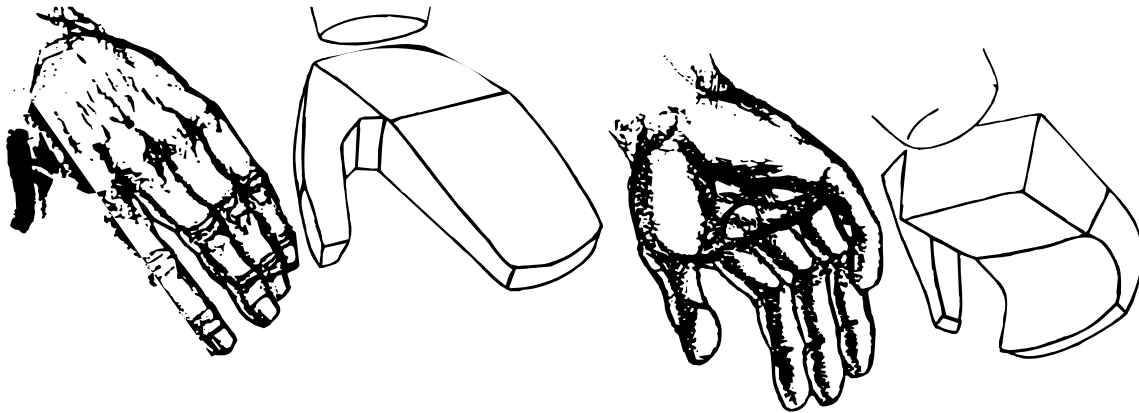


*Figure K-6.  Hand construction using form envelopes.*

(1)  Observe in Figure K-6 that the palm without the fingers is nearly square, and that the fingers are about as long as the palm.  When the fingers are extended, the hand is about three-quarters as long as the forearm or is equal to the distance from the chin to the hairline.  In drawing hands, be sure to draw them large enough.

(2)  The hands are not as easily reduced to basic forms as are the torso, arms, or legs.  However, they can be shown as a form envelope or as a combination of simple forms that represent many smaller forms with reasonable accuracy.  Figure K-7 shows how a combination of a cube and wedge shape represents the hand.  The cubic form symbolizes the palm of the hand, while the tapering wedge represents the fingers.  The finger wedge is about the same size as the cubic area of the palm.
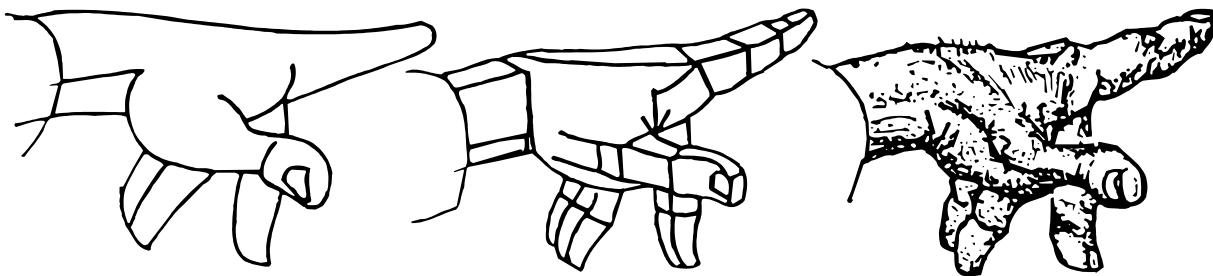


*Figure K-7.  The hand.*

i.  The leg has two parts, the thigh and the shin, which correspond to the upper arm and forearm of the upper body.  The thigh extends from the pelvis to the knee, and the shin from the knee to the foot.  The thighbone is the longest and strongest bone of the body.  The column of the thigh and shin diminish in thickness as it descends to the ankle.  From either side a wedge shape overlaps the rounded form of the thigh, and this again overlaps the form above and below the knee joint.  (See Figure K-8.)
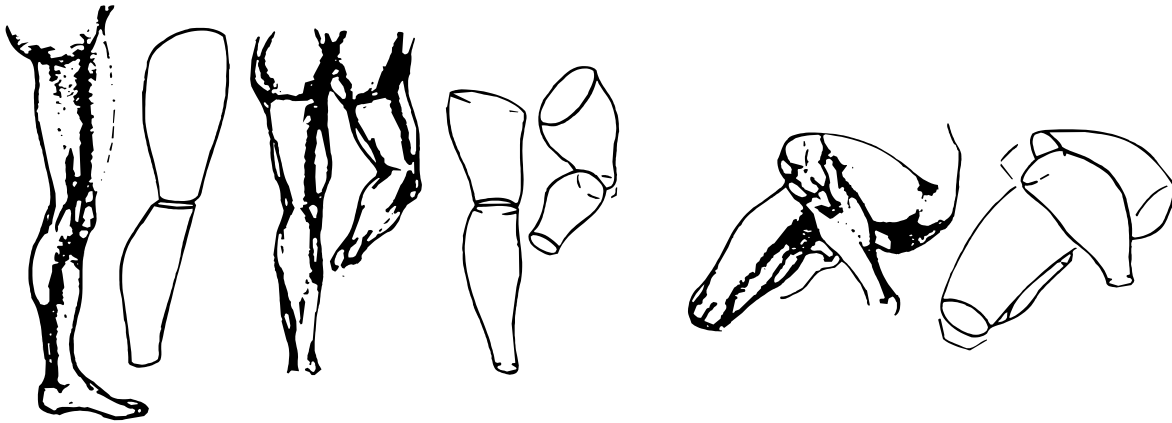
*Figure K-8.  The leg.*

j.  The feet have about the same number of bones as the hands, but the proportions are different.  The feet are as long as one-half the distance from the knees to the bottom of the feet.  Feet can also be constructed using form envelopes.  (See Figure K-9.)



*Figure K-9.  The foot and form envelopes.*

(1)  Notice that the outside anklebones are slightly lower than the inside anklebone.  The high part of the foot is at the inside, between the ankle and the big toe.  As you can see, the foot slopes toward the toes and also toward the outside edge.

(2)  The foot has very little movement.  Most of its action is accomplished through the movement of the anklebones and between the joints of the toes and the foot.

k.  Joints are what hold the arms and legs together.  These are ball and socket joints, and hinged joints.

(1)  The ball and socket joint (Figure K-10, View A) is extremely flexible.  The shoulders and hips have this type of joint, which allow rotation in practically any direction.  The wrist and ankle permit a similar rotary movement, although they are not ball and socket joints.

(2)  The hinge joints at the elbow and knee work like a door hinge.  They allow the forearm and lower leg to bend and straighten.  (See Figure K-10, View B.)
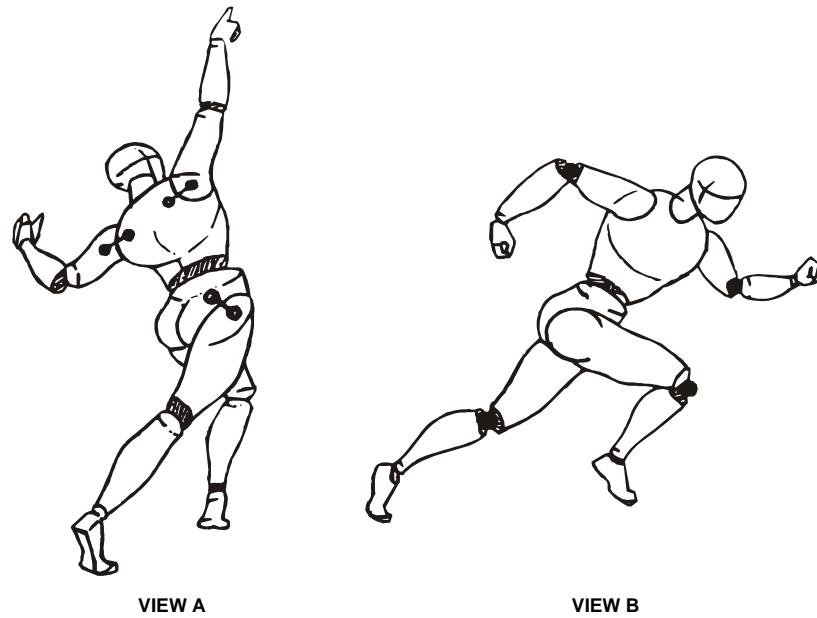
VIEW A                    VIEW B

*Figure K-10.  Joints.*

## K-3.  HEAD FORM

a.  The basic form of the head is a modified sphere, shaped much like an egg.  Horizontal and vertical lines are used in placing the facial features (Figure K-11, View A).  A guideline located at half the distance from the eyes to the chin locates the bottom of the nose (Figure K-11, View B).
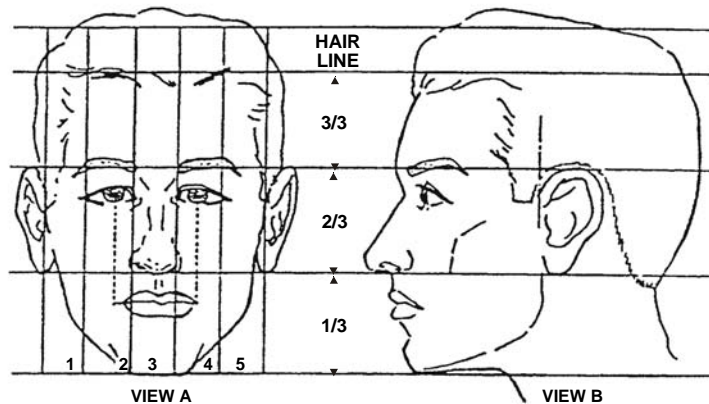


*Figure K-11.  The head.*

(1)  The eyes are located on a horizontal centerline with the eyebrows slightly above the eyes (Figure K-12, View A).  The top of the nose is located on the horizontal centerline (Figure K-12, View C).  The mouth is located on a line drawn two-thirds the distance from the chin to the

bottom of the nose (Figure K-12, View C).  The head rests securely on the neck, lower portion of the head (Figure K-12, View C).
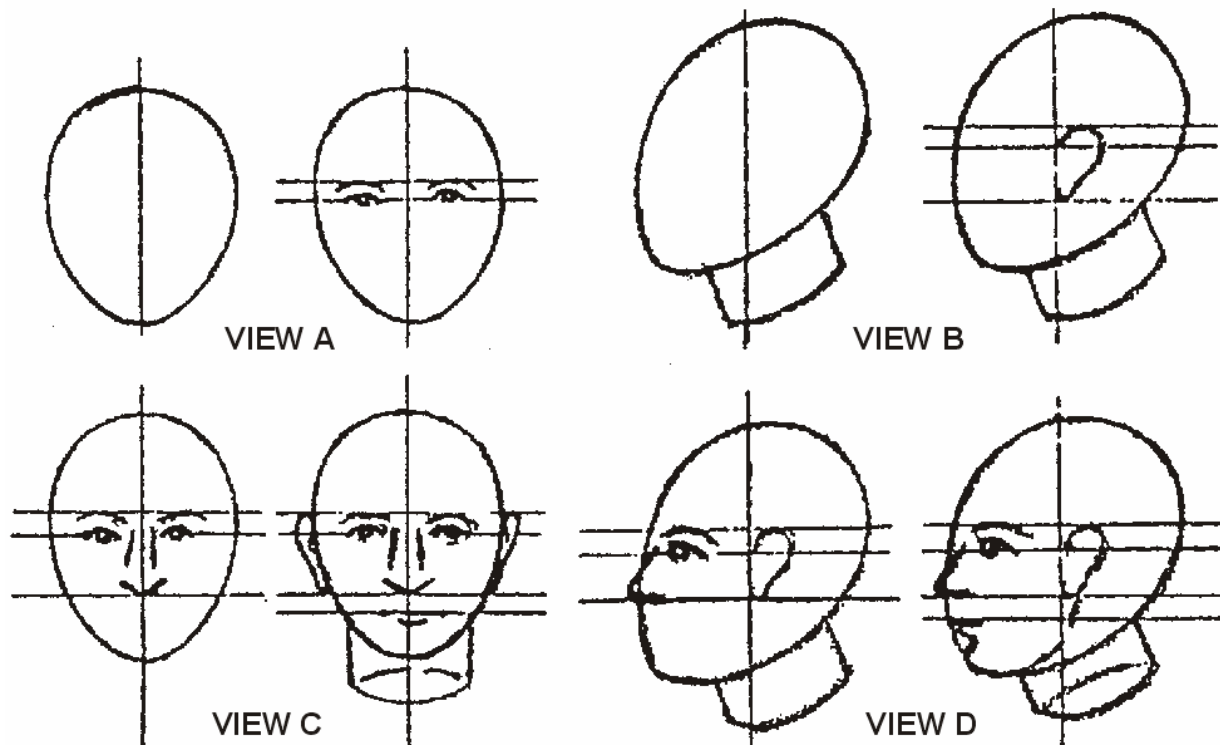


**VIEW A**

**VIEW B**

**VIEW C**

**VIEW D**

*Figure K-12.  Construction views of the head.*

(2)  The side view of the head is slightly different from the front view (Figure K-12, Views B and D).  In a side view, the head can be tilted with the neck toward the rear and slanted.  The ear is just behind the vertical centerline with its top and bottom located on the same guidelines that were used for the front view.  The eye is located in a slightly indented position again on the horizontal centerline.  The nose projects out from the edge of the head's basic form.  The jaw curves down from the ear.

(3)  Consider the following important points when constructing the head and refer again to Figures K-11 and K-12.

(a)  The nose is generally an eye length wide.

(b)  The head at the brow is five eye lengths across.

(c)  The eyes are one eye length apart.  Each eye should be about one-half as high as it is long.

(d)  The bases of the nose, cheekbone, ear lobe, and skull lie on a line drawn across the head (Figure K-12).

(e)  Lines drawn from the inside corners of the eyes to the ends of the nostrils should give

a check on the placement of these two features.  The lines should be parallel.

(f)  The mouth is approximately two eye widths across; its corners should be almost directly beneath the center of the eye.

(g)  The features are developed with careful attention being paid to the ear, since it is now the most pronounced visible feature.  Very little of any forward feature is seen, but that which is seen should be drawn carefully and accurately.

b.  One of the most expressive features of the face, the eye has two lids that curve like short visors over the eyeball.  The upper lid curves wider across the circumference of the eyeball, while the lower lid turns on a shorter arc around the base of the eyeball.  Both lids have lashes.  The inner and outer corners of the eyelids are completely different in design.  At the outer corner, the upper lid overhangs the lower lid.  At the inner corner, the lids do not touch when the eye is open, but are separated by a narrow area of pinkish membrane.  (See Figure K-13.)
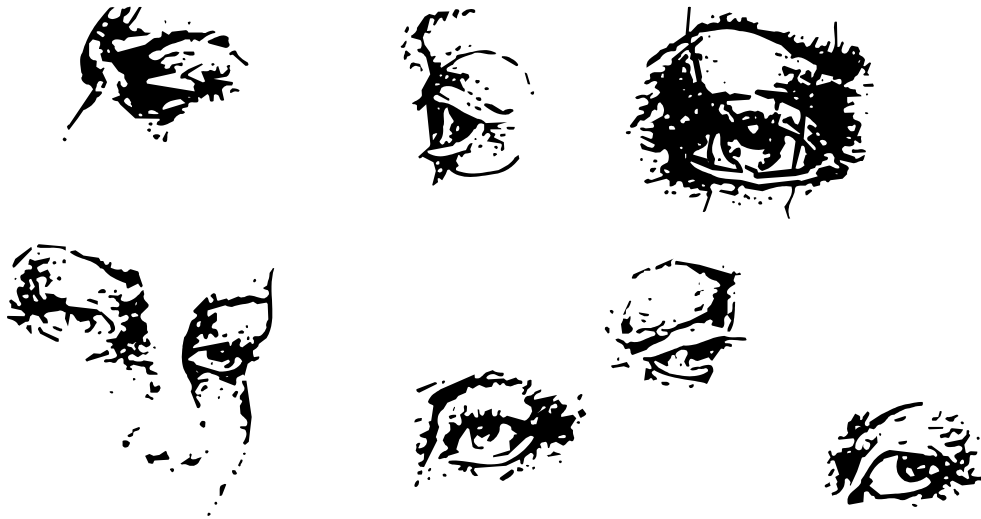


*Figure K-13.  The eye.*

(1)  The profile of the eye is difficult to draw.  The illustrator must remember that the eye is round and the lids fit around it.  The slope of the walls of the eye is downward and inward from the forehead to the cheekbone.

(2)  The exposed part of the eye is always moist.  The moisture reflects light and causes a distinct highlight.  The location of this highlight depends on the direction of the light.  This factor helps to make a drawing appear lifelike.

c.  The nose is thin and narrow at the top and wide at the bottom.  The upper half has a bony structure, while the lower half consists of cartilage (an elastic tissue) which is flexible and responds to the actions of the facial muscles.

(1)  The lower part of the nose consists of five pieces of cartilage (Figure K-14).  Pieces one and two form the tip; three and four form the nostrils.  Piece five forms the hook of the nose to separate the nostrils and descends lower than the nostrils.
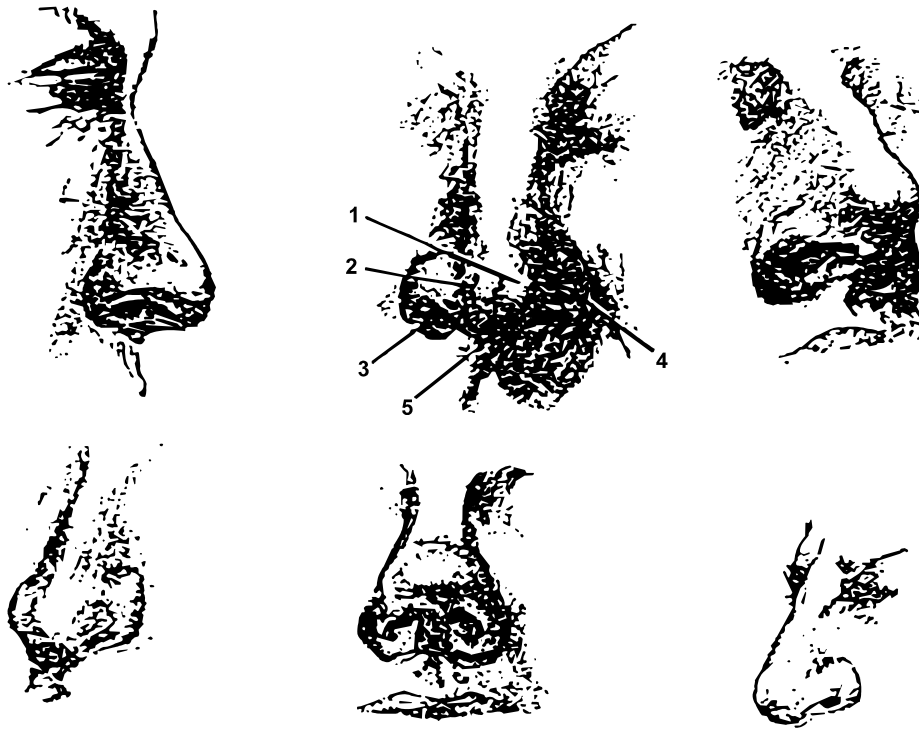
*Figure K-14.  The nose.*

   (2)  The nostril cavities are almost triangular but vary in size and slant outward toward the back of the nose.

   d.  The mouth, like the eyes, is capable of expression and movement.  The upper lip is thickest in the center and thins with a downward curve to the corners, which are depressed.  The upper lip is comparatively flat and angular, while the lower lip is convex and rounded.  The center section of the upper lip thrusts forward and rests in the center of the lower lip when the mouth is closed.

   (1)  The lower lip is recessed beneath the upper lip and when seen in profile, the lips are located on a line sloping backward from near the top of the nose to the furrow at the top of the chin (Figure K-15).



*Figure K-15.  The mouth and chin.*

(2)  Slight depressions or hollows that form where the corners of the mouth meet the lower cheek are usually more pronounced in the male face.

(3)  In a smile or laugh, the corners of the mouth are pulled back and the upper lip appears to be straighter, as the lower lip becomes more curved.  When the mouth is in an open, smiling position, the upper teeth are visible; rarely are the lower teeth seen except in extreme mouth actions.

e.  The chin bulges forward at its center.  From the front, the chin usually appears to be nearly straight across with a depression in the center.  The shape of the chin usually matches the character of the rest of the facial features.

f.  The ear is a mass of cartilage and soft flesh.  It is wider at the top rim and narrower at the bottom.  Most ears have a hanging fleshy portion called a lobe.  In the middle of the ear is a bowl shape that is surrounded by whorls and curves of flesh-covered cartilage.

(1)  The outer wider rim, the inner rim shaped like a bent Y, the bowl area, and the fleshy lobe are the four major shapes the ear.  (See Figure K-16.)
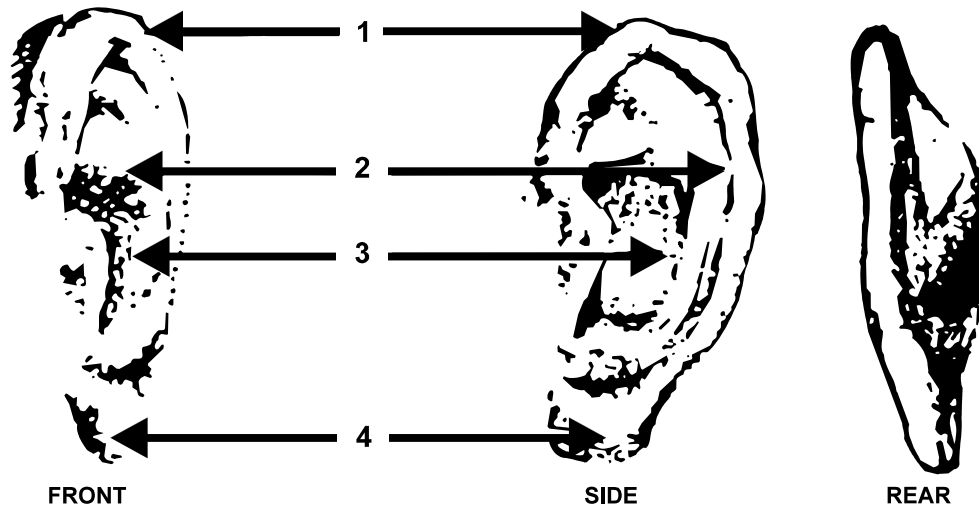


FRONT                                    SIDE                         REAR

*Figure K-16.  The ear.*

(2)  Correct positioning of the ear is one of the most important phases of drawing the ear. When drawing the ear, the construction lines are the same for the ear and nose, because both are the same size.  When seen in profile, the ear is located directly behind the vertical line that divides the head in two.  When seen from the front, the ear slants downward and parallel to the side of the head.  (See Figures K-11 and K-12.)

## K-4.  FIGURES IN MOTION

a.  Drawing the figure in motion requires you to pay strict attention to the principles of drawing (form, proportion, contour, and shading), and specifically, how forms on the figure relate to each other.  You must practice perspective and foreshortening.  This will assist in giving credibility and life to your illustrations.

(1)  Perspective is the artistic study of space.  If your figure will be moving through space, you must understand this movement and how accurately your illustration represents your view of it.  Quite often this is shown using techniques of foreshortening.

(2)  Figures K-17, K-18, and K-19 give you an idea of how foreshortening and figure placement assist in giving the illusion of depth and impression of movement to your illustrations.

(3)  Foreshortening techniques  show forms, objects, or figures at an angle.  (See Figures K-17 and K-18.)  Mastery of this skill helps create the illusion of depth in your illustrations.  If your subject is in a position other than one of attention or if your view is at an angle, proportional measurements will differ.  You must practice to achieve or maintain visual accuracy in your drawings (Figure K-19).
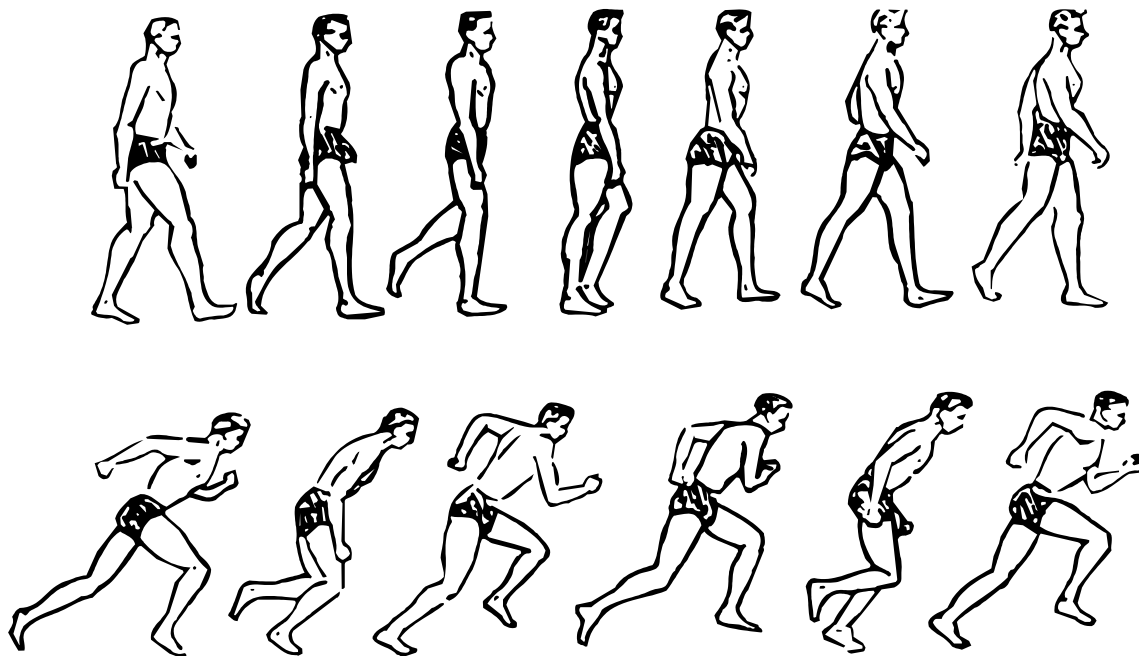


*Figure K-17.  Walking and running.*
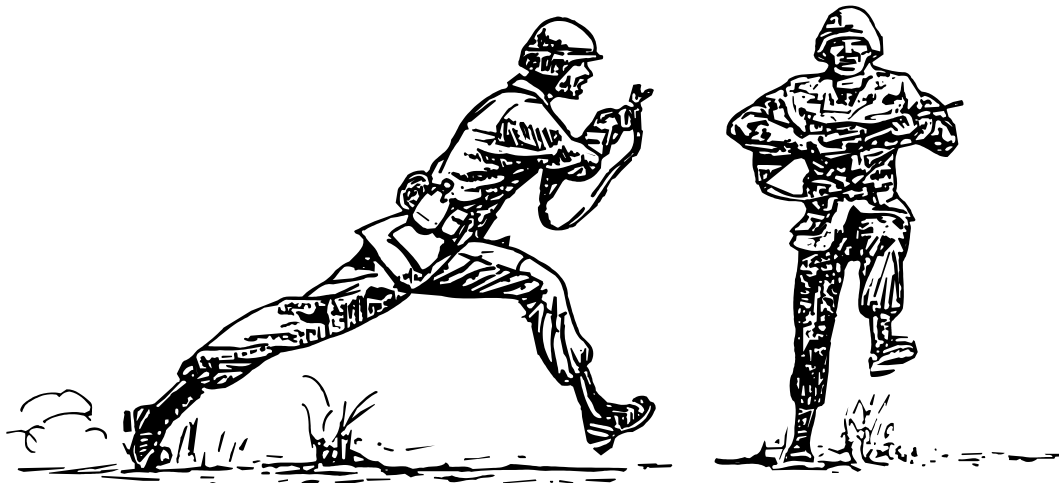
**Figure K-18.  A running figure showing the foreshortening effects encountered in perspective.**
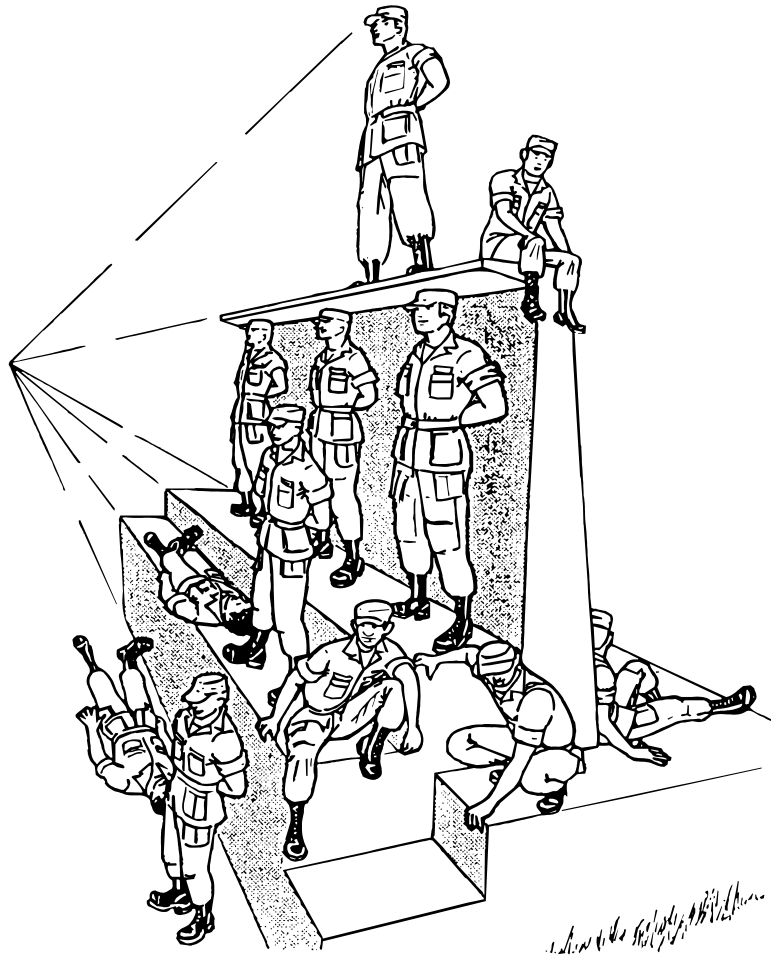


**Figure K-19.  Figures in perspective with foreshortening techniques.**

b.  In most of your documentation illustrations, the figures are clothed.  You can enhance your ability to draw figures by studying clothed figures or photographs and drawing them for practice.  This is called the study of drapery.

(1)  The shape of the figure, the action of the figure, and the cut of the garment control the folds in clothing.

(2)  The crushed and hub are two types of folds.  A crushed fold is found where there is more fabric than space for it, such as the bent inner elbow.  A hub fold radiates from a point of support such as the shoulders or hips.  (See Figure K-20.)

*Figure K-20. Examples of folds.*

# APPENDIX L

# DA FORM 5164-R
# (HANDS-ON EVALUATION)

The DA Form 5164-R allows the trainer to keep a record of the performance measures a soldier passes or fails on each task.  Instructions for using this form follows:

Prior to evaluating—

* Obtain a blank copy of DA Form 5164-R which you may locally reproduce on 8½-inch by 11-inch paper.

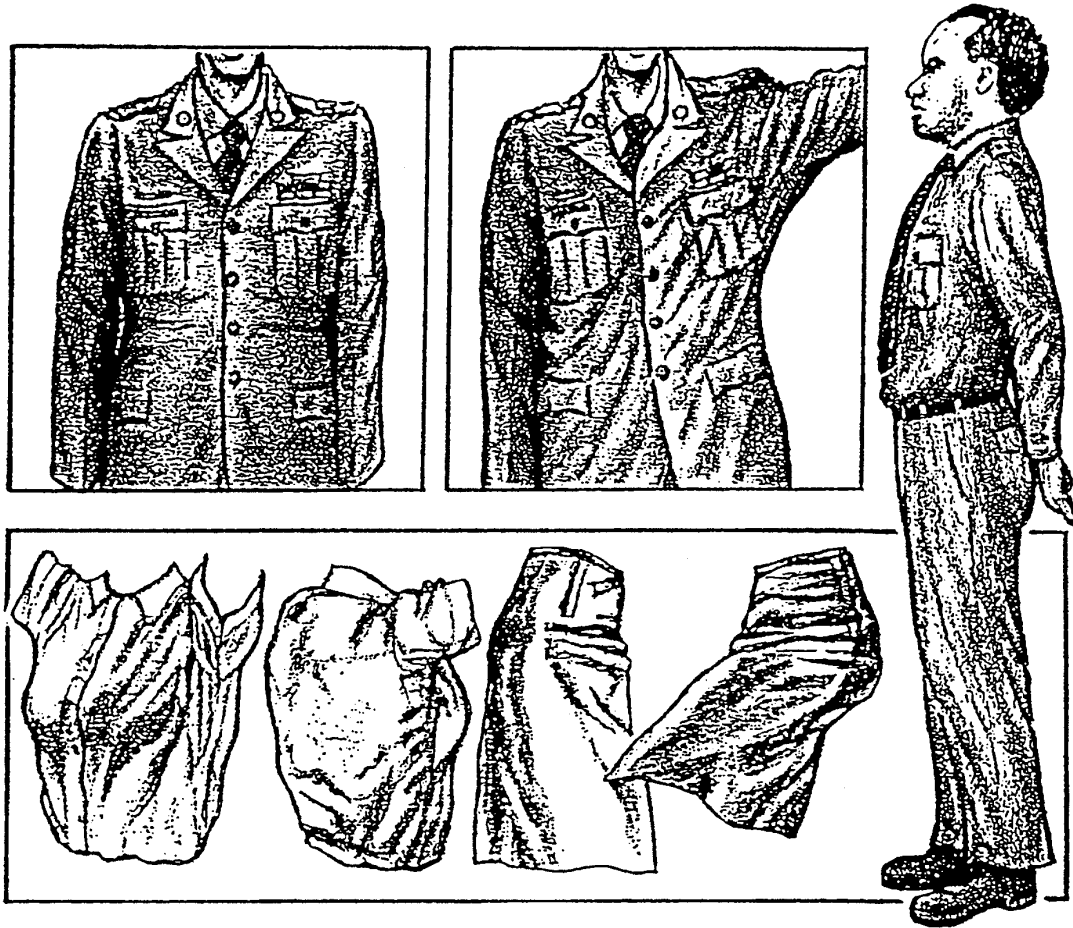* Enter the task title and 10-digit number for the task from the evaluation guide of the SM task summary.

* In column (a), enter the number of each performance measure from the evaluation guide.

* In column (b), enter the performance measure corresponding to the performance measure number in column (a).  (You may abbreviate this information if necessary.)

* Enter the feedback statement from the evaluation guide just below the last performance measure.

* Locally reproduce the partially completed form if you are evaluating more than one soldier on the task or the same soldier on more than one task.

During the evaluation—

* Enter the date just before evaluating the soldier's task performance.

* Enter the evaluator's name and the soldier's name and unit.

* For each performance measure in column (b), enter a check in column (c) PASS or column (d) FAIL as appropriate.

* Compare the number of performance measures the soldier passes (and if applicable, which ones) against the task standard shown in the Evaluation Guidance statement.  If the standard is met or exceeded, check the GO block under STATUS; otherwise, check the NO-GO block.

Figure L-1 is a sample of a completed DA Form 5164-R.

| | | | | |
|---|---|---|---|---|
| **HANDS-ON EVALUATION** For use of this form see AR 350-37. The proponent agency is DCSOPS. | | | DATE 01 MAR 96 | |
| TASK TITLE PERFORM ULM ON A DESKTOP IBM OR COMPATIBLE MICROCOMPUTER | | | TASK NUMBER 113-580-3069 | |

| ITEM a | PERFORMANCE STEP b | SCOPE (Check One) | |
|---|---|---|---|
| | | PASS c | FAIL d |
| 1 | COLLECT ALL REQUIRED MATERIAL. | ✔ P | ☐ F |
| 2 | INITIATE MAINTENANCE FORMS. | ✔ P | ☐ F |
| 3 | MAINTAIN PERIPHERAL DEVICES. | ✔ P | ☐ F |
| 4 | MAINTAIN CPU. | ✔ P | ☐ F |
| 5 | MAINTAIN HARD DISK DRIVE. | ☐ P | ✔ F |
| 6 | COMPLETE APPROPRIATE DOCUMENTATION. | ✔ P | ☐ F |

| | |
|---|---|
| EVALUATOR'S NAME SFC WHITMAN | UNIT B CO 369TH |
| SOLDIER'S NAME SP4 ANDERSON | STATUS ☐ GO ✔ NO GO |

DA FORM 5164-R, SEP 85 (EDITION OF 82 TO BE USED)

*Figure L-1.  Sample of a completed DA Form 5164-R.*

# GLOSSARY

# Section I
# Acronyms and Abbreviations

| | |
|---|---|
| **AC** | alternating current/Active Component/assistant commandant |
| **ACCP** | Army Correspondence Course Program |
| **ADB** | Apple Desktop Bus |
| **AFIS** | American Forces Information Service |
| **agate** | 5-1/2 point type |
| **AIT** | Advanced Individual Training |
| **AL** | angle line |
| **ANCOC** | Advanced Noncommissioned Officer Course |
| **AR** | Army Regulation/Army Reserve |
| **ARNG** | Army National Guard |
| **ARPANET** | Advanced Research Project Agency Network |
| **ASA** | American Standards Association |
| **ASCII** | America standard code for information interchange |
| **ATM** | Adobe Type Manager |
| **BBS** | Bulletin Board System |
| **BNCOC** | Basic Noncommissioned Officer Course |
| **BT** | basic training |
| **CCD** | charge coupled device |
| **CD** | compact disk |
| **CD-ROM** | Compact Disk-Read Only Memory |
| **CISC** | Complex Instruction Set Computing |

| | |
|---|---|
| **CMF** | career management field |
| **CMYK** | cyan, magenta, yellow, and black |
| **CP** | control panel |
| **CPU** | central processing unit |
| **CRM** | camera-ready mechanical |
| **CRT** | cathode ray tube |
| **CT** | control terminal |
| **CV** | center of vision |
| **cyan** | blue-green color |
| **DA** | Department of the Army |
| **Dia** | diameter |
| **DINFOS** | Defense Information School |
| **DL** | delay lines/distance learning |
| **DoD** | Department of Defense |
| **EMIC** | Electronic Multimedia Imaging Center |
| **EPMS** | Enlisted Personnel Management System |
| **EPROM** | Erasable Programmable Read Only Memory |
| **F** | fail |
| **FAQ** | frequently asked questions |
| **FM** | field manual/frequency modulation/file maintenance |
| **FORSCOM** | Forces Command |
| **FOUO** | for official use only |
| **FTP** | file transfer protocol |
| **GSA** | General Services Agency/General Support Agency |
| **GUI** | graphical user interface |
| **HR** | hand receipt |

| | |
|---|---|
| **HTML** | Hypertext Markup Language |
| **IAW** | in accordance with |
| **INMARSAT** | International Maritime Satellite |
| **IRC** | Internet Relay Chat |
| **ISO** | International Standards Organization |
| **ITEP** | Individual Training Evaluation Program |
| **LAN** | local area network |
| **LPI** | lines per inch |
| **LTTC** | Lowry Technical Training Center |
| **LVSGS** | Live Video Satellite Ground Station |
| **LZW** | Limpel-Ziv-Welch |
| **MACOM** | Major Army Command |
| **Mac** | Macintosh |
| **METL** | mission essential task list |
| **MHz** | megahertz |
| **MOPP** | mission oriented protection positive |
| **MOS** | military occupational specialty |
| **MOSC** | military occupational specialty code |
| **MS-DOS** | Microsoft Disk Operating System |
| **MTP** | Mission Training Plan |
| **MVAS** | Motion Video Acquisition System |
| **MVES** | Motion Video Editing System |
| **NCO** | noncommissioned officer |
| **NCOIC** | noncommissioned officer in charge |
| **nib** | pen point |
| **NPPA** | National Press Photographers Association |

| | |
|---|---|
| **NSF** | National Science Foundation |
| **NSN** | nonstandard number |
| **OCR** | optical character reader/optical character recognition |
| **OJT** | on-the-job training |
| **OPFOR** | Opposing Forces |
| **OPORD** | operation order |
| **P** | pass |
| **PBO** | property book officer |
| **PCS** | permanent change of station |
| **PLDC** | Primary Leadership Development Course |
| **PMCS** | preventive maintenance checks and services |
| **POC** | point of contact |
| **POI** | program of instruction |
| **PP** | passage point |
| **PS** | packet switch/point of sight |
| **PSYOP** | psychological operations |
| **R** | right/radius |
| **RC** | Reserve Component/remote control |
| **RDT&E** | research, development, test, and evaluation |
| **RIP** | Raster Image Processor |
| **RISC** | Reduced Instruction Set Computing |
| **SA** | semiannually (frequency code) |
| **SC** | Signal Corps/single-channel |
| **SCSI** | small computer system interface |
| **SIMMs** | single in-line memory modules |
| **SM/TG** | soldier's manual/trainer's guide |

| | |
|---|---|
| **SMCT** | Soldier's Manual of Common Tasks |
| **Soc** | social |
| **SOJT** | supervised on-the-job training |
| **SOP** | standing operating procedure |
| **SP** | start point/station point |
| **SPEPS** | Still Photography Editing and Processing System |
| **SQT** | skill qualification test |
| **SSA** | supply support activity |
| **SSSC** | Self-Service Supply Center |
| **STF** | Special Task Force |
| **STP** | soldier training publication |
| **STSL** | sustainment training skill level |
| **SWOP** | stand web offset proofing |
| **TASC** | Training and Audiovisual Support Center |
| **TC** | technical coordinator/training circular |
| **TCP-IP** | Transmission Control Protocol-Internet Protocol |
| **TDA** | table of distribution and allowance |
| **TEC** | Training Extension Course |
| **TM** | technical manual |
| **TOE** | table of organization and equipment |
| **TRADOC** | Training and Doctrine Command |
| **UPS** | universal power supply |
| **URL** | universal resource locator |
| **US** | United States |
| **USAR** | United States Army Reserve |
| **USAREUR** | United States Army, Europe |

| | |
|---|---|
| **USASMA** | United States Army Sergeants Major Academy |
| **USFK** | United States Forces, Korea |
| **VGT** | viewgraph transparency |
| **VI** | visual information |
| **VIRIN** | visual information record identification number |
| **VIS** | visual |
| **VISGS** | Visual Information Satellite Ground Station |
| **VM** | virtual memory |
| **VP** | vanishing point |
| **VPL** | vanishing point left |
| **VPR** | vanishing point right/verbal processing register |
| **VRAM** | Video Random Access Memory |
| **WAIS** | Wide Area Information Server |
| **WAN** | wide area network |
| **WWW** | World Wide Web |

# Section II
# Terms

**acetate**
A tough, transparent, or semitransparent sheet that comes in varying thickness, especially useful as an overlay in color separation. It is also used for friskets in retouching, animated drawings, displays, and so forth. Treated acetate is especially prepared so that it will readily take inks, paint, and the like.

**actinic light**
Rays of light, especially the short waves of the spectrum, such as green, blue, and ultraviolet, which cause chemical changes in light-sensitive photographic emulsions.

**action lines**
In cartooning, extra lines drawn around or following a figure or an object to indicate its motion.

**additive process**
Process by which white light can be produced by starting with darkness and combining colored lights until white is obtained.

**adhesive**
Various types of glues, gelatin, or casein used as a binder in various painting techniques.

**advancing colors**
Colors which appear to come forward, such as red, orange, and yellow. See and compare receding colors.

**aesthetic**
Pertaining to the beautiful, particularly in art.

**Airbrush**
A small spray gun for retouching prints. Uses oil free air at 30 to 40 psi (209 to 276 KPa).

**airbrushing**
Act of using an airbrush to produce art or to improve the appearance of art. It is a graphic arts technique that stands by itself as a specialty. Airbrushing is used extensively in retouching photographs for fine reproduction.

**amberlith**
Amber-colored masking and stripping film coated on a polyester baking sheet. Amberlith is a registered trademark of the Ulano Company.

**analogous colors**
Colors closely related to one another, such as blue, blue-green, and green.

**anatomy**
The study of the bone and muscle structure of humans and the animals with particular regard to its effect on the appearance of structure forms and contours.

**anhydrous ammonia system**
System used in the developing section of some whiteprint machines. Ammonia gas, stored in a high-pressure tank, is fed through a low pressure line into the developing chamber. There it is mixed with water from a separation source and vaporized. The vapor then rises between and through perforated rollers to develop the material. This system makes possible the use of remote and multiple ammonia-supply facilities.

**arc**
To move the camera in a slightly curved dolly or truck.

**area (picture)**
The flat surface within the borders.

**Army Training and Evaluation Program (ARTEP)**
The US Army's collective training program.  ARTEP establishes unit training objectives critical to unit survival and performance in combat.  They combine the training and the evaluation processes into one integrated function.  The ARTEP is a training program and not a test.  The sole purpose of external evaluation under this program is to diagnose unit requirements for future training.

**arrowhead**
Indicator shaped like an arrowhead and used at the end of a line to direct attention to an object or a point of reference in conjunction with callout number, letter, or other symbol.

**art**
In the graphic arts field, any line drawing, photograph, or continuous-tone of halftone illustration. Only two kinds are so considered for reproduction purposes; line and halftone. The term "art" is commonly used to mean any copy or text.

**artgum**
A soft eraser free from grit, used for cleaning drawings.

**artwork**
Illustrations, drawings, photographs, renderings, paintings, sketches, and copy of any kind except text copy that is being prepared or used for reproduction.

**asymmetrical**
Not symmetrical or formal in balance. Also symmetry.

**asynchronous**
In art, recurrences or repeated operations in unrelated patterns, not synchronous.

**attitude**
The mental state of a person that influences behavior, choices, and expressed opinions.

**audio sound**
The part of a television that you hear, as opposed to video, the part you see.

**background art**
Design, texture, or pattern, or other form of artwork used to create a background effect for type and illustrations.

**balance**
A pleasing arrangement of the different parts of the opposing elements. In informal balance these parts or elements are not arranged symmetrically. In formal balance the arrangement is symmetrical.

**ball-and-socket joint**
An extremely flexible joint in the body that can be swung around in all directions; for example, the shoulder and hip joints.

**bar chart**
Graphics representation comparing numerical values by means of rectangles of equal width.

**binary**
A numbering system using only the digits 0 and 1. Also called base 2.

**binary word**
A related group of ones and zeros that has meaning assigned by position, or by numerical value in the binary system of numbers.

**black and white**
The term for a drawing and a painting rendered in black and white only. Also, black and white with intermediate tones of gray.

**bleed**
Printing a picture without leaving any margin between the picture and the page edge. Also, the excess borders on the artwork and printing plate extending beyond the final trimmed edge of printed sheet. And, the capillary action of a liquid medium spreading under a surface when touched.

**blending**
A method of drawing or painting in which one color or tone merges into another. Also, the process of mixing or incorporating one color or tone with another one.

**block diagram**
A schematic drawing.

**block in**
Indicating with preliminary lines the broad outline of the objects or shapes in a picture.

**block out**
The act of eliminating an unwanted section in a picture.

**board**
An electronic term for the fiber-board material on which the printed circuit and electronic components are mounted, most generally inside a cabinet. May control one or several functions.

**board art**
Any artwork, especially original art, mounted on heavy board stock.

**body type**
Type used for the main body of a piece of printed matter.

**boldface**
Type which is darker than light and medium type.

**booklet**
A pamphlet, generally bound within paper covers.

**box**
To enclose a paragraph or heading within borders or rules.

**bridge**
A mechanical aid to keep the hand from touching the picture's surface while working.

**briefing chart**
Also called flip chart. Visual aid that graphically presents a story to an audience.

**bright brush**
A short-haired, very flat, chisel-shaped brush which is shorter-haired and thinner than the flat brush.

**bristol board**
A drawing surface made of fine, tough, flexible cardboard. It is manufactured in several thickness and in a variety of surfaces.

**bristol brush**
A brush made of hog's hair, used for oil painting.

**broadside**
A large, folded advertising piece also called a broadsheet.

**brochure**
A bound pamphlet.

**brushes, art**
Brushes used for fine artwork, as well as for such applications as show cards, are divided by sources into two categories; those manufactured from the red sable, or the less costly grades whose hair is taken from squirrels, goats, polecats, other furred animals, and camels.

**bullet**
Also called meatball. A symbol used to preface-listed items or a phrase, add emphasis, and generally embellish copy.

**burnish**
To secure paste-up or mortised copy to the basic reproduction page or to material prepared for printing.

**burnisher**
An instrument used to smooth, flatten or polish a surface. It may be made of plastic, wood, glass, metal, stone or ivory.

**busy**
Active; for example, in a picture or layout, it generally denotes excessive or competing detail.

**calligraphy**
The art of elegant writing or penmanship.

**call-out**
In technical illustrating, to call attention to a part or item in an illustration by indexing it; for example, by assigning it a number in the illustration.

**cameo paper**
Paper of a dull, smooth finish used frequently for carbon and graphite pencil drawings.

**camera lucida**
An instrument with prism lenses, used for enlarging or reducing artwork. An image of the artwork appears to be projected on the drawing surface and is traced by the artist (see Lucy).

**caption**
In general, any heading or title; more precisely, a descriptive title for an illustration or table.

**carbon pencil**
A pencil whose marking medium is pressed carbon, rather than the usual graphite or lead.

**caricature**
Representation of a person or thing that shows a deliberate exaggeration and distortion of features or mannerisms. Caricatures may be good-humored or bitterly satirical.

**carpenter's pencil**
A pencil having a wide, flat lead. Ideal for chisel-point lettering or laying in broad tones. Also called sketching pencil.

**cartoon**
A comic or satiric drawing. Also, artist's drawing or study made as a model to be transferred and carried out in paint, tapestry, mosaic, stained glass, or mediums.

**casein**
An adhesive prepared from curd or milk and lime, used in the preparation of casein tempera paint. Casein paint can be used in various consistencies-thick, like opaque watercolor, or thin, like transparent watercolor.

**cathode ray tube**
A CRT terminal containing a cathode ray tube that displays user programs and information.

**center of interest**
The part of a picture that attracts the most attention.

**center spread**
Two facing pages formed by one folded sheet of paper; for example, the center spread of a newspaper or pamphlet, or of one signature of a book or magazine.

**character**
Any letter, number, punctuation mark, or space in printing matter. The average number of characters that can be set in 1 pica (approximately 6 picas to 1 inch) is known as "characters per pica."

**charcoal**
Specially prepared charred wooden sticks used for drawing on a "toothed" paper.

**chartpak**
Trade name for preprinted, pressure-sensitive, adhesive-backed tapes and components made by Chartpak. These products are used as paste-ups for charts, graphs, map overlays, newspaper borders, printed-circuitry configurations, and layouts of almost any design.

**chisel point**
A technique of drawing or lettering in which the point of the pencil or other drawing instrument is chisel-shaped, producing thick or thin strokes, according to how the instrument is held.

**clip file**
A collection of photographs and illustrations of various subject matter, arranged categorically and alphabetically.  The file is used by artists and illustrators to assist with an accurate portrayal of subject matter included in a piece of artwork.

**coated paper**
Also called coated stock. Paper coated with a finely ground filler that produces a fine, smooth surface, like the pages of expensive "slick" magazines.

**cold composition**
Composition by machines, such as typewriters and photocomposing machines or in any manner in which no molten metal is used to form the image.

**collage**
The art of arranging and pasting pieces of cloth, newspaper, or other materials on a surface so that they form a composition. Also, work made in this manner.

**collating**
Gathering single sheets or leaves in sequence.

**color**
A sensation caused by light waves of different lengths striking the eye. It includes hue, value, and intensity (chroma). (See Munsell color system.) Also, the overall lightness or darkness of lettering or type. If the lettering or type has a pleasing, even and consistent tone and pattern, it is said to have "good color."

**color chart**
An arrangement of colors according to their hue, value, and intensity relationships. Also, paint manufacturer's illustrated catalog showing color swatches.

**color dimensions**
Hue, value, and intensity; the three ways of measuring any given color. (See Munsell color system.)

**color harmony**
A unified or aesthetically pleasing effect produced by a combination of colors which are similar in one or more aspects.

**color interval**
The degree of visual difference between two colors, measured in steps of hue, value, and intensity.

**color notation**
Notes used on sketches for future reference when painting in color; also, the specification of a color by written symbols and numerals based on a color system such as Munsell.

**color proof**
Engraver's or painter's proof showing the effect of final color in perfect register.

**color scale**
A series of colors that exhibits a regular change or gradation in hue, value, or intensity.

**color scheme**
The particular group of colors that dominates a picture or creates a color unity within it.

**color separation**
Division of colors of a continuous-tone multicolored original or of line copy into basic portions, each of which is to be reproduced by a separate printing plate carrying a color.

**color sketch**
A rough drawing or layout approximating the color of the final picture.

**color symbolism**
The use of color to signify or suggest an emotion, idea, or characteristic.

**color wheel**
A circular color diagram.

**column**
One of the sections of text or other matter, such as display advertisements, that make up a vertically divided page. It is measured horizontally and is usually justified. Each column of a page is established by a line measure for justified copy. The term "column" also refers to a vertical section of a table.

**combination plate**
A plate on which both halftone and linework are combined.

**commercial art**
Artwork of any kind that is prepared for predetermined commercial purposes, such as advertising and general promotion.

**compass**
An instrument for drawing circles, transferring measurements, and so forth.

**complementary colors**
Any two opposite hues on the color wheel, such as red and green.

**composite**
Made up of several parts; for instance, two or more photographs combined to make a single unit. Also, see montage.

**composition**
The arrangement of forms, colors, lines, and other pictorial elements.

**compositor**
One who composes or sets type.

**comprehensive**
Layout of art and type, either in black or in colors, that is used as a presentation for advertising or other purposes.

**comprehensive sketch**
A finished layout (made to show to a client) in which all of the elements, such as type, illustration and spacing, have been carefully delineated.

**computer graphics**
Science of using computers to generate and interpret pictures.

**construction**
The process of drawing objects so that they appear solid or three-dimensional. Also, see drawing through.

**contact screen**
Halftone screen made on a film base with a graduated-dot pattern. The screen is placed in direct contact with the film or plate to obtain a halftone pattern from a continuous-tone original.

**continuous tone art**
Photograph, wash drawing, or oil painting without a halftone-dot screen.

**cool colors**
Such colors as green, blue-green, blue, and violet. See and compare warm colors.

**cooled color**
A color produced by adding a cool color to a warmer color.

**copy**
The process of duplicating a file (data or program) from one storage location to another.

**copyboard**
Frame that holds original copy while the copy is being photographed.

**crop**
To cut off. In preparing art for reproduction, to indicate where the picture edges should be.

**crop mark**
Mark used to define the limit of the reproduction area of an illustration and to establish the portion of the image that is to appear in the reproduction.

**cropping**
Defining the reproduction image area of line and continuous-tone art by drawing crop marks or of continuous-tone art by producing windows in negatives by means of dropout masks.

**crow quill**
Also called quill pen. A fine writing and drawing pen. The name is derived from the quill of the crow's wing, which was formerly cut to a fine point and used for writing with inks.

**cube**
In geometry, a solid form of six equal square sides. In form drawing, this term is used loosely and refers to any object having a cube-like form, such as a boxcar, room, book, and the like.

**cutaway drawing**
A drawing, usually of machinery, where the surface of the object is ostensibly cut away, revealing the internal structure.

**cycle**
A sequence of operations that is repeated regularly. Also, the time it takes for one such sequence to occur.

**data**
The general term used to describe numbers, facts, letters, symbols, names, etc., that can be processed by a computer.

**data points**
Symbols used for plotting events or other information on graphs and charts.

**database**
A collection of files, or group of files, containing related data arranged for easy and speedy retrieval, by a computer.

**deadline**
Final date for delivery of art or copy.

**decision graphic**
A graphic done for commanders on which they can base their decisions.

**delineate**
In the graphic arts, to give depth to line art by making certain outlines heavier. The word also means "to describe in detail."

**depict**
To represent by drawing, painting, or other artistic means.

**depth**
Thickness, measured downward from the surface of an object. The term "depth" is used only with objects having a third dimension, never to describe a plane surface.

**design**
A planned or intended arrangement of the elements in a composition.

**designer's color**
High-quality opaque watercolors.

**detail drawing**
Engineering drawing that gives detailed information on an item.

**detail view**
In engineering drawing, a view that shows part of the principal view of an item, using the same plane and arrangement but in greater detail and on larger scale.

**diazo film**
Film used as a flexible transparent base and coated with emulsions of diazo salts and couplers.

**diazo paper**
Paper treated with a diazo compound and an azo dyestuff component.

**diazochrome projecturals**
Diazo-sensitized films that produce colored-dye images on a transparent plastic base. Diazochrome is a trade name of Scott Graphics, Inc.

**disk drive**
Typical disk drives are highly reliable random access, moving head memory devices, compactly designed for use as peripheral units in large and small, and recently microcomputer systems.

**disk file**
An organized collection of records stored on a magnetic disk.

**disk storage**
A supplementary data storage area.

**disk/diskette**
A round flat plate coated with a magnetic substance on which data for a computer is stored.

**display**
The television-like screen used by the computer to display messages and graphic information to the operator.

**display lettering**
In general commercial art, any prominent lettering. Also, in cartooning, any large or complicated lettering other than balloon lettering.

**display menu**
The list of displays from which the user selects specific information for viewing.

**display type**
Large type used for magazine and newspaper headings, posters, and so forth.

**distortion**
Picturing a subject so that it appears changed or twisted out of its natural shape. Sometimes used in drawing or painting to heighten the emotional effect.

**dividers**
An instrument used for dividing lines into equal segments, transferring measurements, and so forth.

**dominant**
Principal or most important; as the dominant part or motif of a design or composition.

**drafting machine**
Machine that combines the function of a T-square or straightedge, a triangle, scales, and a protractor in one unit.

**drawing**
The art of representing objects, ideas, emotions, and so forth on a surface, using line, tone, or color.

**drawing through**
Sketching in the structural lines of an object as if it were transparent and you could see through it to all sides.

**drier**
A substance used to hasten the drying time of paint or printer's ink.

**driver**
A transistor output circuit which has an emitter follower configuration.

**dropout**
Loss of part of the video signal, which shows up on the screen as white glitches. Caused by uneven videotape iron oxide coating (bad tape quality or over use) or dirty heads.

**dropout halftone**
(Also called highlight halftones). A halftone reproduction in which the screen dots are eliminated in white areas. This is often accomplished by the platemaker photographically, or by re-etching in these areas. There are also several processes, such as fluorographic, Kemart, and Kromolite, which the artist can use, with the cooperation of platemakers, to prepare artwork.

**dry mounting**
Method of mounting photographs without paste or rubber cement.

**dry mounting press**
An electrically-heated press used for mounting pictures, photographs, proofs, and so forth.

**dummy**
Rough draft or proposal of a piece of printing material, pasted or bound together in the exact reproduction size and showing the areas that illustrations and text will occupy.

**earth color**
Pigments, such as ochre, Venetian red, Indian red, the siennas, or umber, all made from earth minerals.

**edge**
The border or outline of a form or shape. If the outline is sharp and distinct, it is called a hard edge. If it is diffused or blurred, it is called a soft edge.

**element**
A display of a program instruction.

**emphasis**
Stress or accent on any part of a design or picture.

**environment**
In a system context, the environment is anything that is not a part of the system itself. Knowledge about the environment is important because of possible interactions between the system and the environment.

**extension line**
In orthographic, engineering and mechanical drawings, a line used to indicate the extent of a dimension.

**eye level**
Also called horizon line. The horizontal plane at the artist's eye level, to which that person relates linear perspective.

**face (type)**
The raised printing surface of type. The term also denotes style of type.

**feather**
In a printed or duplicated image, an undesirable bleeding effect in which microscopic feather-like indications surround the characters.

**felt nib pen**
A drawing pen with a felt nib or tip. The ink soaks through the felt from an inside compartment.

**ferrule**
The metallic part of a brush which holds the hairs or bristles.

**figure**
Line illustration or photograph of any kind used in a publication. A figure may be a graph, a chart, an exploded view, a rendering, a halftone, or any other illustration in which artwork or photography is used to produce the image.

**file**
Generally, file is a collection of information stored as records. Files are stored on peripheral memory devices, such as a disk memory or a tape memory.

**file maintenance**
Adding, deleting, or changing the contents of records in a file. Also, reorganizing the structure of a file to improve access to records or to change the storage space required.

**file management**
A term that defines the function of creation, insertion, deletion, or updating of stored files and records in files. Also, the operations that are performed on files.

**file name**
A means of identifying a file.

**file organization**
A method of ordering data records stored as a file, while also providing a way to access stored records.

**film negative**
Photolithograhic negative produced by a process camera. The negative has a film base and reflects a translucent (white) image on a black background; it may be a line negative or a halftone negative. While it is called a negative, however, the image is right-reading. The term negative is derived from the fact that it is camera-produced.

**finished art**
Any piece of artwork that is ready for reproduction.

**fix**
To spray with fixative.

**fixative**
Any clear solution sprayed or coated on artwork or other material, such as reproduction copy, that "fixes" or stabilizes the image, rendering it more resistant to wear or smudging. A fixative protects and preserves drawings, photographs, documents, and other papers. An example is a spray coating that has the trade name Krylon.

**flash point**
The coldest temperature at which vapors over a volatile substance ignite in air when exposed to open flame.

**flat brush**
A flat oil painting brush, thicker and with longer hairs than the bright brush. Generally made of white hog bristle or sable.

**flat tone**
An area of uniform or even value.

**flip card**
In television, one of a series of photographs or drawings, shown in sequence and used to tell a story or deliver a message.

**flop**
To reverse from right to left, or vice versa.

**flowchart**
A graphic representation of the sequence of a specific activity, operation, or algorithm.

**flush**
Even with the margin or even with the widest line in the column or page.

**focal point**
Center of interest.

**font, phototypesetting**
Number of typeface designs and typeface sizes in points that can be mixed at any one time in a display typesetter machine setup. A photomatrix contains the typeface designs and a lens system has the ability to enlarge or reduce in a given number of sizes measured in points. The number of typeface designs multiplied by the number of sizes determines the number of fonts. For example, a machine setup has a photomatrix drum (or disk) that holds four different type designs and the lens assembly contains eight typeface sizes. The number of fonts in the setup is 32.

**foreshorten**
In illustrating, to depict an object or line in less than its true perspective.

**form**
The three-dimensional shape and structure of an object or figure.

**format**
General form of a book, brochure, direct-mail piece, or other printed matter, with particular reference to composition, layout, size, and general appearance.

**freehand drawing**
Drawing without the use of mechanical aids.

**frisket**
A semitransparent covering placed over part of a drawing or photograph to protect that part while you work on the rest. It is mainly used to shield portions of art while retouching with an airbrush.

**frontispiece**
An illustration preceding and usually facing the title page of a book.

**full-color reproduction**
Printed reproduction approximating all the color of the original art, usually by four-color process printing. The four colors commonly used are red, yellow, blue, and black.

**full measure**
The entire width of a line of type measured in picas. A line of type set full measure is flush with both margins.

**gigabyte (GB)**
A unit of measure equal to 1,024 megabytes of data, or 1,048,576 bytes.

**glaze**
An application of a transparent color or value over another color or value.

**glycerin**
A heavy oil, colorless and odorless, used in preparation of water color pigment.

**gothic**
One of a group of alphabets or typefaces characterized by strokes of equal or almost equal thickness, and usually without serifs.

**gouache**
This is the French word for opaque watercolor. In working with this medium, one can use either prepared opaque watercolors or add opaque white to standard transparent watercolors; sometimes called tempera.

**grayscale**
The range of gray tones between black and white. A grayscale monitor is able to display distinct gray pixels as well as black and white ones, but not color pixels.

**halftone**
Tone pattern of shades from white through black of a continuous-tone image, made by photographing the image through a finely ruled glass screen with crossing opaque lines. The screening reduces the tones to a dot formation for reproduction by printing.

**halftone screen**
Screen placed in front of the negative material in a process camera to break up a continuous-tone image into a dot formation. There are two types of halftone screens; ruled glass screens and contact screens.

**hard copy**
Copy of any kind, except on film, that is produced on paper or any substrate that can be used as an end item for proofing, checking, revising, or redrawing; typed, printed, or copied matter. Also, any form of a printed document such as a ladder diagram program listing, paper tape, or punched cards.

**harmony**
A pleasing arrangement of picture elements, due to similarity of one or more of their qualities, such as shape or size. Also, see color harmony.

**hidden line**
Line used to show a hidden feature of a part or article. As used in orthographic, engineering, and mechanical drawings, it is designated as a "medium" line and consist of evenly spaced short dashes.

**hinge joint**
A joint in the body that is limited to back-and-forth movement; for example, the elbow and knee.

**holding line**
A line, usually drawn in black on a mechanical. It is to be printed unless otherwise indicated. See and compare key line.

**horizon line (HL)**
An imaginary horizontal line representing the height of the observer's vision. Also, see eye level.

**hue**
1. One of the three basic color attributes, hue is the color itself-red, green, blue, yellow, and so on.

2. The attribute of color perception that determines whether the color is red, green, blue, and so forth.

**illustration**
A picture designed to interpret a story or an article. Graphic interpretation of a situation or of an idea.

**illustration board (artist's board)**
Heavy paperboard manufactured especially for artists, for both oil and watercolor application. Standard sizes are, in inches 22 by 30, 22 by 28, 28 by 44, 30 by 40, and 40 by 60. Weights vary from thick to heavy. Thick board is about 8-ply; heavy board, 24-to 30-ply. Colors range from white gray to snow white.

**image area**
Square or rectangular area that encompasses a printed, drawn, or photographed image and the white or dark background space around the image. It is enclosed by imaginary perpendicular and horizontal lines.

**india ink**
Pigment made of lampblack and binding material; also this pigment suspended in water as a fluid ink. For good delineation, India ink should be solid black. Some India inks are gray in comparison with others.

**instruction**
A command that causes a PC to perform one specific operation. The user enters a combination of instructions into PC memory to form a unique application program. Also, an individual function within the Graphic's programming language which initiates action.

**italics**
Script-like letters of type. The italic form has an oblique slant to the right. Used in contrast to the Roman form, which is vertical.

**ivory black**
A fine black pigment used in various paints.

**Joint Photographers Experts Group (JPEG)**
A set of standards developed by this group for compressing and decompressing digitized images with computers.

**justification**
Spacing of lines of type to a predetermined measure so that the margins are aligned.

**juxtaposition**
The placement of colors or forms side by side or close together to accentuate each other.

**key**
1.  Key light: principle source of illumination.

2.  High- or low-key lighting.

3.  An electronic effect; the cutting in of an image (usually lettering) into a background image.

**kid finish**
Medium-textured surface of art paper or illustration board; also referred to as medium finish.

**kilo (k)**
A prefix used with units of measurement to designate quantities of 1000.

**kilobyte (kb)**
Used to denote size of memory and can be expressed in bytes or words.
Example: 2K = 2048 bytes.

**lampblack**
A very fine black pigment used in various black paints. Watercolor lampblack is especially good for transparent wash drawing and in opaque watercolor painting, where it is used together with opaque white and grays. It is often used for line drawing with a brush.

**layout**
Arrangement of a book, magazine, or other publication so that text and illustrations follow a desired format. Layout includes directions for margin data, pagination, margin allowances, center headings and sideheads, placement and size of display and body type, and placement of illustration.

**letterhead**
The printed matter at the head of a sheet of letter paper, usually containing the name and address of the organization or person and other appropriate information. Also, sheet of paper bearing such a letterhead.

**lettering**
Words formed or printed by hand.

**letterspacing**
Placing of additional space between the letters of words to expand the length of a line or to improve and balance typography.

**light box**
A box with a translucent glass top having a light under it, used for tracing.

**lightface**
Lightest and thinnest form of a type series; the opposite of boldface. These words are in lightface, AND THESE IN BOLDFACE.

**limited palette**
A palette with a restricted number of pigments. Also, a palette that lacks one or more of the three primary colors (red, yellow, and blue).

**line**
transmission circuit

**line driver**
A circuit specifically designed to transmit signals over extended distances.

**line of direction**
In picture composition, a line the eye follows when looking at the picture. The arrangement of the objects in the picture can lead the eye in a particular direction.

**line and wash**
A technique combining a black line (usually ink) and transparent wash.

**line weight**
Thickness of pencil, ink, or other lines in artwork or in ruling. Line weights should be consistent within a given group of illustrations regardless of the number of weights used for any one illustration.

**linseed oil**
An oil obtained by pressing the seeds of a plant, which produces linen fiber. Used as a medium in oil painting.

**local color**
The actual color of an object without regard to the effect of changing light and shadow conditions.

**local color value**
The actual lightness or darkness of a color without regard to the effect of changing light and shadow conditions.

**lowercase**
Small letters of the alphabet (a, b, c, d). The term is also applied to small roman numerals. Also, see uppercase.

**lucy**
Abbreviation of camera lucida, an instrument used for enlarging or reducing drawings by means of tracing what appears to be a projected image.

**machine composition**
Type set by machine only.

**mahlstick**
A rod held in the palette hand and used to support or steady the painting hand, particularly while rendering details.

**makeup**
Arrangement of text and illustrations on a page, generally in conformity with standard practices of the industry or with particular publication requirements. In cold composition work, it is known as layout. Also, see layout.

**malfunction**
Any incorrect function within electronic, electrical, or mechanical hardware. Sometimes called fault.

**mars colors**
Artificial earth colors.

**Master**
In validating training materials or tests, refers to an expert at the particular job or task.

**mat (or matte)**
A cardboard or paper frame for a picture. Also, paper-base mold from which a cheap printing plate (stereotype) can be made. And, dull - without luster.

**mechanical**
Page of layout prepared as an original for photomechanical reproduction. It may be a single unit with all the elements of the finished page ready for single-shot photography, or it may have hinged overlays that can be swung into position for making successive exposures of various elements on the same negative.

**mechanical drawing**
A method of drawing using precision tools, such as triangle, T-square, dividers, and ruler to produce mathematically-precise layouts, diagrams, and engineering drawings.

**medium**
A liquid with which a paint may be diluted without damaging its adhesive, binding, or film-forming properties. Also, the mode of expression employed: etching, drawing, painting, and so on. And, the actual instrument or material used by the artist; such as oil paint, watercolor, or pencil.

**memory**
A portion of a computer that is used to store information (either data or programs). The size of a microcomputer is often determined by the amount of user memory (measured in k-bytes) in the system.

**mode**
A selected method of operation.

**montage**
Arranging of a number of pictures or designs in combination, often with some overlapping, so that they form a composite whole. Also, the arrangement or composition so made. See composite.

**mount**
To fasten onto a base, such as mounting a picture, photograph, or type proof onto a firm cardboard.

**mounting and flapping**
Proper protection of line and photographic art requires mounting and flapping. This procedure also makes space available for identifying the art and facilities filing.

**munsell color system**
A system of color analysis and identification in which color is said to have three components or measurable dimensions. They are hue, value, and chroma. Hue is the name of a color; value measures lightness or darkness of a color; while chroma (also referred to as intensity) measures the strength of a color.

**mural**
Any picture painted or fixed on a wall or ceiling.

**mylar**
Tough, highly stable polyester film used as a base for films for engineering drawings, photographic materials, and other applications. Mylar is a registered trade name of DuPont.

**neutral color**
Also, color which lacks hue and intensity; for example, black or the grays. Also, a color to which a complementary color has been added, causing it to become relatively gray or brown. Such a neutralized color may also be referred to as a tertiary color. And, an earth color such as an umber or sienna.

**opaque**
Impermeable to light; not transparent or translucent.

**opaque projector**
A lantern for projecting to the desired size a photograph or other nontransparent copy onto a drawing surface.

**optical center**
Point slightly above the geometric center of a regular plane. Objects placed at the optical center appear to be at the geometric center.

**optical spacing**
Arrangement of spacing between letters for legibility and appearance, as opposed to mechanical spacing, in which the same space is used between all characters. The spacing varies with the shape of the letters to achieve optical equalization.

**organization chart**
Block chart or diagram showing the names, titles, departments, and responsibilities of personnel in an organization.

**output**
On of the main functions of the computer. The processed data or other information that the computer display or printers.

**paint**
Any liquid medium composed of pigment, binder, and vehicle (carrier). Also, to place on a surface to change its color or make an illustration. CAUTION: Care must be taken to prevent mixing of incompatible paints and/or chemicals.

**pastel**
Color matter mixed with gum to form crayons. The word "pastel" also denotes both such a crayon and a picture produced with the crayon.

**picture area**
The flat surface within the borders of the picture.

**picture plane**
An imaginary plane always placed at right angles to an observer's line of vision and upon which the view to be drawn is mentally projected.

**pixel**
1.  Smallest single picture element with which an image is constructed.

2.  The light-sensitive elements on a CCD that contain a charge.

**pixels per inch (PPI)**
A measure of the density of scanned information in an image. The finer the optics of the scanner, the higher the scan resolution.

**point**
A standard unit of measure for letters used by printers - 1/72 of an inch; for example, 72 points equal 6 picas.

**pounce**
Powder-like material for improving the ink-absorbing qualities of reproduction tracing cloths and papers. The powder is sprinkled and rubbed on the surface, and the excess is removed by brushing with a felt pad or brush.

**process**
Continuous and regular production executed in a definite uninterrupted manner. Also, one or more entities threaded together to perform a requested service.

**program**
1.  A specific television show.

2.  A sequence of instructions encoded in a specific computer language to perform specific predetermined tasks.

3.   A set of instructions the system follows in order to carry out certain tasks.

**proportion**
The relative size and location of one form to another, or of one portion of a thing to a whole.

**random access memory (RAM)**
Volatile, (that is, it can be erased or lost when the power is turned off) read-write memory in which data may be written (stored) or read from (retrieved) directly.

**ray**
A line suggesting a beam of light traveling in a given direction.

**receding colors**
Colors which appear to move away, or create the illusion of distance; for example blue, green, and violet. Compare with cool and advancing colors.

**register**
In printing, to align a page so that it exactly backs the page on the reverse side of the sheet; to match the position of successive color impressions; also, the alignment of any corresponding elements of an image or impression.

**register marks**
These marks are used to key an overlay to the mechanical or drawing, as in color separations, and combination plates. They ensure that the various elements will be in register.

**render**
To represent, depict, or portray, as in a drawing or painting; for example, a watercolor rendering, a pen and ink rendering.

**research file**
A collection of photographs and illustrations of various subject matter, arranged categorically and alphabetically. The file is used by artists and illustrators to assist with an accurate portrayal of subject matter included in a piece of artwork.

**read only memory (ROM)**
Memory which is similar to RAM, except that data cannot be written to it. Data can be read from it directly, as in the case of RAM, but ROM is non-volatile; that is, it will retain the information stored in it whether power is applied or not.

**ross board**
An illustration board that comes in a variety of specially-roughened surfaces that provide crayon or brush strokes into broken textures, suitable for line reproduction.

**sable brush**
A brush made from the tail hair of the Kolinsky (Asiatic mink), in a flat or round shape, and used with mediums, such as oil, watercolor, tempera, or ink.

**sandpaper pad**
A pad of sandpaper sheets mounted on a strip of wood. It is used for sharpening pencil lead or pastel stick.

**sans serif**
Without serifs. This is said of a letter that does not have a finishing stroke or line projecting from the end of a main stroke. Modern Gothic faces are typical of typefaces without serifs.

**saturation**
The purity or density of a color.

**scale**
Portions or relative dimensions. Also, to enlarge, "scale up"; or reduce, "scale down"; the size of a picture, layout, and so forth, without changing the original proportions.

**scale drawing**
Drawing such as a map, profile, or plan that shows relative sizes and proportions.

**sepia**
Dark yellowish-brown color of low brilliance.

**sepia intermediate**
Intermediate used in making duplicate transparencies by the whiteprint or diazo process

**serif**
Finishing stroke or line projected from the end of the main stroke of many letters in many type faces. Letters that do not have such terminal strokes are called sans serif.

**shade**
A mixture of pure color and black is a shade of that color.

**shading**
Adjusting picture contrast; controlling color and black-and-white levels.

**shadow**
The pattern of dark projected from an object blocking light.

**shape**
The flat silhouette or two-dimensional form of an object.

**shelf life**
Length of time before sensitive items such as diazo materials, paint, or chemicals deteriorate with age. Many of these materials have limited use because their chemical properties are gradually lost.

**sight line**
An imaginary line from one of the artist's eyes directly to whatever he is looking at. Also, line of sight.

**sketch**
A quick drawing usually made preparatory to a more complete drawing or painting.

**skill level (SL)**
A number which denotes the level of qualification within the total MOS. Levels of qualification are identified by characters 0 through 5 in the position of the MOS code.

**spectrum**
The arrangement of colors side by side as refracted by a prism.

**speedball pens**
Lettering and drawing pens manufactured by the Hunt Manufacturing Company, of which Speedball is a registered trademark.

**speed lines**
Extra lines following a moving figure or object in a cartoon and representing the disturbance the movement causes in the atmosphere.

**sphere**
A form, perfectly round from all points of view.

**split complement**
A hue and both colors on either side of its complement.

**station point (SP)**
The artist's point of observation in making a perspective drawing.

**still life**
An artist's pictorial arrangement of inanimate objects. Also, a picture whose subject does not move. A photograph of a subject can be considered a still life.

**stipple**
A line technique using a series of dots to create the illusion of tone in a line drawing. The closer the dots, the darker the resultant value.

**straightedge**
A bar or instrument of wood, plastics, or metal, with one or more straight, long edges, used in artwork.

**stripping**
Cutting out and placing in position. Also, removing all or part of text copy or an illustration by replacing the material with something else, particularly with reference to production copy.

**stump**
A pencil-shaped roll of paper used to blend pencil, pastel, or crayon tones.

**stylus**
A scraping instrument, usually with a sharp-pointed or chisel edge. It is used on shading sheets, scratchboard, and so forth.

**subtractive color process**
A process of forming colors by mixing pigments which absorb certain colors and reflect others. See additive process.

**symbol**
A graphic device that represents something else; for example, a form, color, sign or emblem used in a picture to represent an idea.

**tasks**
A set of instructions, data, and control information capable of being executed by a soldier in job specific duties, or by a CPU to accomplish a specific purpose.

**technique**
The method of using a tool or medium. Also, the characteristic appearance of a medium, for instance, an " oil technique." And, sometimes used to designate the style of a particular artist.

**tempera**
Although originally this term applied to paint in which dry pigments were mixed with an emulsion, such as egg yolk, it now refers to opaque watercolors in general.

**template**
In testing, the answer key used to grade tests.  It can be a score sheet with correct answers listed or it can be electronic and used with an optical scanner to score tests.

**tertiary color**
Any intermediate hue which contains some part of each of the three primary colors (red, yellow and blue).

**text**
Typewritten or printed matter forming the main body of work, as opposed to front and back matter, illustrative material, tables, extracts, and so forth.

**texture**
Surface texture: in painting or drawing, the suggestions of the feel or appearance of a surface, such as rough, smooth, mat or dull, glossy, hard or soft.

**third dimension**
Effect of depth or bulk achieved by an artist on a flat surface.

**three-dimensional**
Possessing width, height, and depth. This is said of drawn objects that look solid, and illustrations that have the illusion of distance, as opposed to flat.

**thumbnail sketch**
Page layout showing the allocation of space for headings, photographs or line artwork, and text copy.

**tint**
A mixture of pure color and white.

**tone**
A value. Also, the predominating value of a picture, suggesting its key. And, a color mixed with gray.

**tooth**
The texture of a paper allowing it to take ink, pencil, pastel, and so forth.

**topography**
The art or practice of graphic delineation in detail, as on charts or maps, showing relative positions and elevations.

**tracing paper**
A thin, transparent or translucent paper used for transferring drawings from one surface to another by tracing. It is also used for overlays and preliminary drawings.

**translucent**
The property of a material which permits light to pass through it, but does not permit objects to be seen clearly through it.

**transparency**
Any transparent material that bears an image.

**transparent**
The property of a material that permits objects to be seen clearly through it.

**T-square**
A ruling guide with a 90-degree crosspiece at one end. Held against the straight side of the drawing board, it is used in making horizontal lines.

**turnaround time**
The time it takes to complete a project from the time the work request was originally received, through review and any changes, to the time of pickup notification. Also, the time it takes a communications module to receive, interpret, act upon, and reply to an upcoming message.

**turpentine**
A solvent, distilled from the sap of pine or from pine wood, used to thin oil paints and to clean brushes.

**typography**
The art of type selection and arrangement.

**upper case**
The capital letters of the alphabet (A, B, C, and so forth).

**value**
The lightness and darkness of a color. Also, relative lightness and darkness of a picture as represented in tones, shading, line, balance, layout, and so forth.

**value scale**
The complete range of values from white to black.

**vanishing point (VP)**
A point at which receding parallel lines appear to come together in a perspective drawing or photograph.

**varnish**
A solution made of resin in a volatile medium.

**vehicle**
A liquid used as the carrier of pigment in the paint.

**warm colors**
Associated with heat or fire: for example, red-violet, red, and orange. See and compare cool colors.

**wash**
Any medium properly thinned until transparent.

**wash drawing**
Watercolor painting in which the color is applied only in washes

**watercolor**
A dry pigment bound by an adhesive, usually gum arabic, and applied, greatly reduced by water, to a surface (usually white paper) in a transparent fashion. Also, a painting made with watercolor pigment.

**white lead**
The fine opaque white pigment used in flake white and Cremnitz white oil paints. It is poisonous if taken internally.

**word processing**
The ability to enter, manipulate, correct, delete, and format text; an application which is widely used in microcomputers. Word Processors are used to write letters; and to prepare documents such as magazine articles, manuscripts, and books; to name only a few of their applications.

**word spacing**
Adjustment of spacing between words, particularly to extend or shorten a line in order to achieve justification.

**work station**
Location of job equipment grouped together facilitating computer-assisted product implementation and completion. The station may contain: CRT screen, computer, printer(s), and so forth.

**working drawing**
A thorough preliminary drawing usually done on tracing paper and then transferred to the working surface for the finished rendering.

**Zip-a-Tone**
A transparent adhesive sheet covered with various patterns, dots, or lines. Tonal effects can be created by applying this sheet to areas of the drawing. The resultant piece of art can be reproduced in line.

# REFERENCES

# Section I
# Required Publications

Required publications are sources that users must read in order to understand or to comply with this publication.

## Army Regulations

| | |
|---|---|
| AR 25-1 | The Army Information Resources Management Program. 25 March 1997 |
| AR 25-400-2 | The Modern Army Recordkeeping System (MARKS). 26 February 1993 |
| AR 190-13 | The Army Physical Security Program. 30 September 1993 |
| AR 380-5 | Department of the Army Information Security Program. 25 February 1988 |
| AR 380-19 | Information Systems Security. 27 February 1998 |
| AR 710-2 | Inventory Management Supply Policy Below the Wholesale Level. 31 October 1997 |
| AR 735-5 | Policies and Procedures for Property Accountability. 31 January 1998 |

## Department of the Army Pamphlets

| | |
|---|---|
| DA Pam 25-30 | Consolidated Index of Army Publications and Blank Forms (Issued Quarterly). 1 October 1997 |
| DA Pam 25-33 | User's Guide for Army Publications and Forms. 15 September 1996 |
| DA Pam 25-40 | Administrative Publications: Action Officers Guide. 1 October 1997 |
| DA Pam 25-91 | Visual Information Procedures. 30 September 1991 |
| DA Pam 738-750 | Functional Users Manual for the Army Maintenance Management System (TAMMS). 1 August 1994 |

## Field Manuals

| | |
|---|---|
| FM 5-553 | General Drafting. 6 January 1984 |
| FM 21-31 | Topographic Symbols (Reprinted w/Basic Incl C1). 19 June 1961 |
| FM 25-101 | Battle Focused Training. 30 September 1990 |
| FM 101-5 | Staff Organization and Operations. 31 May 1997 |
| FM 101-5-1 | Operational Terms and Graphics. 30 September 1997 |

## Technical Manuals

| | |
|---|---|
| TM 9-2320-280-10 | Operator's Manual for Truck, Utility: Cargo/Troop Carrier, 1-1/4 Ton, 4x4, M998; M998A1; Truck, Utility: Cargo/Troop Carrier, 1-1/4, 4x4, w/Winch, M1038; M1038A1; Truck, Utility: Heavy Variant, 4x4, M1097; M1097A1; M1097A2; Truck, Utility: Tow Carrier, Armored, 1-1/4 Ton, 4x4, M966; M966A1; Truck, Utility: Tow Carrier, Armored, 1-1/4 Ton, 4x4, w/Winch, M1036; Truck, Utility: Tow Carrier, w/Supplemental Armor, 1-1/4 Ton, 4x4, M1045; M1045A1; M1045A2; Truck, Utility: Tow Carrier, w/Supplemental Armor, 1-1/4 Ton, 4x4, w/Winch, M1046; M1046A1; Truck, Utility: Armament Carrier, Armored, 1-1/4 Ton, 4x4, M1025; M1025A1; M1025A2; Truck, Utility: Armament Carrier, Armored, 1-1/4 Ton, 4x4, w/Winch, M1026; M1026A1; Truck, Utility: Armament Carrier, w/Supplemental Armor, 1-1/4 Ton, 4x4, M1043; M1043A1; M1043A2; Truck, Utility: Armament Carrier, w/Supplemental Armor, 1-1/4 Ton, 4x4, w/Winch, M1044; M1044A1; Truck, Utility: S250 Shelter Carrier, 4x4, M1037; Truck, Utility: S250 Shelter Carrier, 4x4, w/Winch, M1042; Truck, Ambulance, 2-Litter, Armored, 4x4, M996; M996A1; Truck, Ambulance, 4-Litter, Armored, 4x4, M997; M997A1; M997A2; Truck, Ambulance, 2-Litter, Soft Top, 4x4, M1035; M1035A1; M1035A2. 31 January 1996 |
| TM 9-6115-642-10 | Operator's Manual for Generator Set Skid Mounted, Tactical Quiet 10 KW, 60 and 400 HZ MEP-803A (60 HZ); MEP-813A (400 HZ). 30 December 1992 |
| TM 9-6115-660-13&P | Operator, Unit, and Direct Support Maintenance Manual (Including Repair Parts and Special Tools List) For Power Unit, Diesel Engine Driven, 1 Ton Trailer Mounted, 10 KW, 60 HZ, PU-789A Power Unit, Diesel Engine Driven, 1 Ton Trailer Mounted, 10 KW, 400 HZ, PU-799 Power Unit, Diesel Engine Driven, High Mobility Trailer Mounted, 10 KW, 400 HZ, PU-700A Power Plant, Diesel Engine Driven, 1 1/2 Ton Trailer Mounted, 10 KW, 60 HZ, AN/MJQ-37 Power Plant, Diesel Engine Driven, 1 1/2 Ton Trailer Mounted, 10 KW, 400 HZ, AN/MJQ-38 (Reprinted w/Basic Incl C1). 15 October 1993 |

## Training Circulars

| | |
|---|---|
| TC 11-6 | Grounding Techniques. 3 March 1989 |

### Other Military Publications

| | |
|---|---|
| Appendix A (25M) | Excerpt from the Electronic Imaging Course |
| Appendix B (25M) | Drafting Tools and Techniques |
| Appendix C (25M) | Three Dimensional Drawing |
| Appendix D (25M) | Letter Graphics Projects |
| Appendix E (25M) | Electronic Page Layout |
| Appendix F (25M) | Hypertext Markup Language (HTML) |
| Appendix G (25M) | Organize Graphics Work Flow |
| Appendix H (25M) | Evaluating a Graphics Project |
| Appendix I (25M) | Still Photography Editing and Processing System (SPEPS) |
| Appendix J (25M) | Project Evaluation Checklist |
| Appendix K (25M) | Drawing the Human Form |
| MSG 0206010833Z | Message 0206010833Z, dated December 1995 |
| Unit SOP | |
| Website Guidance | Guidance for the Management of Army Websites. 30 October 1996 |

### Nonmilitary Publications

Appropriate computer manual (ACM)
Appropriate software manual (ASM)
DOS (or other system) manual
Manufacturers' manuals (Mfg Man), issued with initial issue of equipment

## Required Forms

### Department of the Army Forms

| | |
|---|---|
| DA Form 17 | Requisition for Publications and Blank Forms.  1 October 1979 |
| DA Form 17-1 | Requisition for Publications and Blank Forms (Continuation Sheet).  1 October 1979 |
| DA Form 444 | Inventory Adjustment Report (IAR).  January 1982 |
| DA Form 2028 | Recommended Changes to Publications and Blank Forms. 1 February 1974 |
| DA Form 2404 | Equipment Inspection and Maintenance Worksheet.  1 April 1979 |
| DA Form 2407 | Maintenance Request.  July 1994 |
| DA Form 3903-R | Visual Information (VI) Work Order (LRA).  February 1996 |
| DA Form 4697 | Department of the Army Report of Survey.  September 1981 |
| DA Form 5164-R | Hands-On Evaluation (LRA).  September 1985 |

<u>**Department of Defense Forms**</u>

DD Form 314     Preventive Maintenance Schedule and Record.  1 December 1953
DD Form 362     Statement of Charges/Cash Collection Voucher.  July 1993
DD Form 2537    Visual Information Caption Sheet.  February 1994

# Section II
# Related Publications

Related publications are sources of additional information.  They are not required in order to understand this publication.

<u>**Army Regulations**</u>

AR 310-50     Authorized Abbreviations and Brevity Codes.  15 November 1985

<u>**Soldier's Training Publications**</u>

STP 21-1-SMCT   Soldier's Manual of Common Tasks Skill Level 1.  1 October 1994
STP 21-24-SMCT   Soldier's Manual of Common Tasks (SMCT) Skill Level 2-4.
          1 October 1992

<u>**Technical Manuals**</u>

TM 11-401-2    Army Pictorial Techniques, Equipments and Systems: Still
          Photography.  16 September 1969

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