10

Description

Description is widely used in technical writing. Many reports require that you describe something — a machine, process, or system. Sometimes you will describe in intricate detail, other times in broad outline. Regardless of the topic or depth of detail, all descriptions share several elements. This chapter explains those elements and shows you how to apply them when you describe a mechanism, an operation, and a process focused on a person.

THE COMMON ELEMENTS OF DESCRIPTION

Regardless of the audience or purpose, all the descriptions you write should follow the same general pattern: start with an overview, then add necessary details (Jordan). For most descriptions, you should

- Define the mechanism or process.
- Explain its function or end goal.

- Name its subparts or steps.
- Give relevant details: for mechanisms — size, shape, weight, material, method of attachment; for processes — quality or quantity of action and effect of action.
- Explain the significance of the mechanism or process, if necessary.

Read the following description of a part (of a computer printer) and the accompanying annotations to see how the author explains this part. Note that the author starts with a definition and then adds details.

The paper advancement panel is a row of three buttons in a plastic rectangle. It allows the user to advance the paper out of the printer and to align the paper before printing. The panel is 3 inches long by 2 inches wide. It contains three ½-inch by ½-inch square buttons that control the paper advancement. These paper advancement buttons are the on-line, line feed, and form feed buttons. The on-line button controls the power to the form feed and line feed buttons. When the on-line button is on, the printer can print. When the on-line button is off, the user can activate the form feed and the line feed buttons. The form feed advances the paper one full page; the line feed advances it only one line at a time.	Definition Functions Size, shape, subparts Definition and function

A description of a process works the same way. In the following example, the writer starts with a definition of the end goal of the process and then explains the steps and the significance.

The quality check determines whether the drawing is good enough to use. The quality control (QC) person inspects the drawing for proper standard drafting techniques and for adherence to company standards. He or she also determines whether the drawing has all the information the manufacturer will need to produce the part. If no errors are found, the QC person signs off on the drawing and sends it to manufacturing.	End goal Quality of action Effect of action

PLANNING THE MECHANISM DESCRIPTION

The goal of a mechanism description is to give readers all the information they need to know about the mechanism. Obviously, you can't describe every part in minute detail, so you select various key parts and their functions. Most importantly, you must plan the description before writing it.

When you plan a description of a mechanism, you must consider the audience, select an organizational principle, choose visual aids, and follow the usual form for writing descriptions.

Consider the Audience

Consider the audience's knowledge level and why they need the information. Both will affect how much detail you include. In the following mechanism description, the writer uses very specific details to show an expert reader that the part exactly fulfills the specifications and then explains the significance of these details.

The IRU contains an Inertial Sensor Assembly (ISA), power supply, eight electronic boards, and a chassis containing a motherboard. Its form and dimensions (7.60 in. high × 12.69 in. wide × 12.76 in. long) meet the requirements of ARINC 600 10 MCU. With the implementation of second-generation electronics (14 boards reduced down to 8 boards), six empty electronic card slots are left for future growth. (Honeywell 3–10)	Overview Size Significance Significance

But in the following description, which is from a different document, the writer does not include any specific details, aiming instead at a reader who needs only a general understanding of the part.

The pump creates fluid flow within the system. The system has a gear-type pump made of two components: a drive gear and a driven gear, both in a closely fitted housing. The drive gear, which is powered by an electric motor, turns the driven gear in the opposite direction. As the gears turn, they mesh at a point in the housing between the inlet port and outlet port. The fluid trapped between the teeth and the housing is pushed through the outlet port by atmospheric pressure as a result of the low pressure created by the rotation of the gears. This creates fluid flow.	Definition Subparts Function of part Effect of action

Select an Organizational Principle

You can choose from a number of organizational principles. For instance, you can describe an object from

- top to bottom (or bottom to top)
- outside to inside (or inside to outside)
- most important to least important (or least important to most important)

If you were going to describe a secretarial chair from top to bottom, you might start with the backrest, go on to the seat, and then move down to the casters. Or you could do the reverse. If you wished to describe it from most important to least important, you might start with the seat, then discuss the backrest, and finally describe the casters.

To choose an appropriate organizational principle, consider the audience's potential use of your document. If the audience needs a general introduction, then a simple sequence (such as from top to bottom) is best. If your audience needs to know special details for secretaries' safety and comfort, you might choose most to least important.

An easy way to check the effectiveness of your principle of organization is to look for *backtracking*. Your description should move steadily forward, starting with basic definitions or concepts that the audience needs in order to understand later statements. If your description is full of sections in which you have to stop and backtrack to define terms or concepts, then your sequence is probably inappropriate.

Choose Visual Aids

Use visual aids to enhance your description of a complex mechanism. The type of visual you select depends on the mechanism and the reader. If your readers need an overview of a secretarial chair so that they can see how each part is constructed, then you should use a drawing or photograph of the entire unit. (See Figure 10.1, page 218.) If, however, they need to know how the backrest can be adjusted to a comfortable height, the overall drawing is useless. Provide instead a drawing or photograph of the adjusting assembly behind the backrest. (See Figure 10.2, page 219.)

Follow the Usual Form for Descriptions

Generally, descriptions exhibit a standard form: an introduction or overview followed by a body in which each part is described in turn (see pp. 219–221). Physical descriptions generally require no conclusion, because a good description leaves nothing to conclude. Sometimes, however, you can use a conclusion to add material that needs clarification but does not fit elsewhere. If the operating principle of the mechanism is complicated, for instance, you might explain it at the end of the description.

WRITING THE MECHANISM DESCRIPTION

The following outline presents the usual form for writing a mechanism description. This basic approach, with slight variations, will work in most instances.

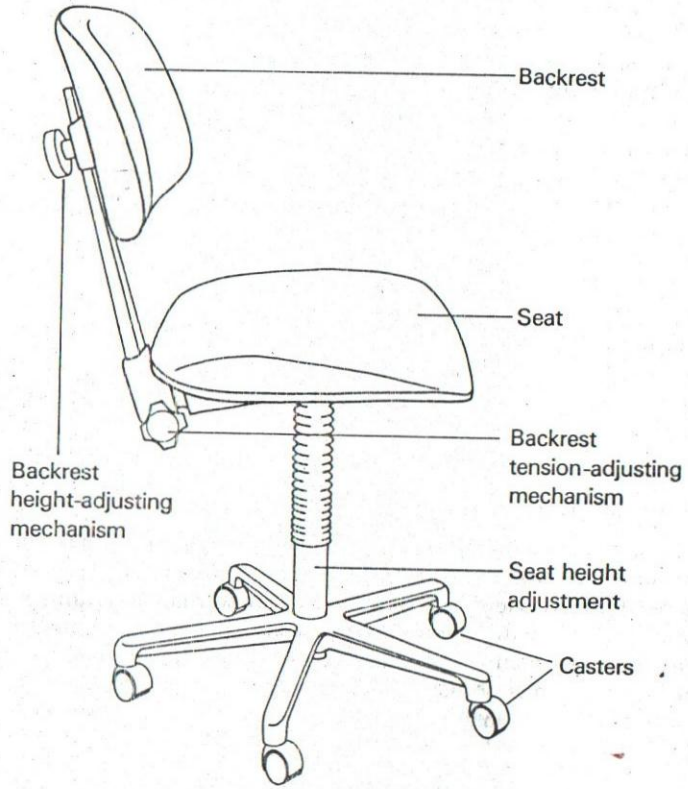

FIGURE 10.1
Secretarial Chair

Basic approach with slight variations

I. Introduction
   A. Definition and purpose
   B. Overall description (size, weight, shape, material)
   C. Main parts
II. Body: Description of Mechanism
   A. Main part A (definition followed by detailed description of size, shape, material, location, and method of attachment)
   B. Main part B (definition followed by overall description, then identification of subparts)

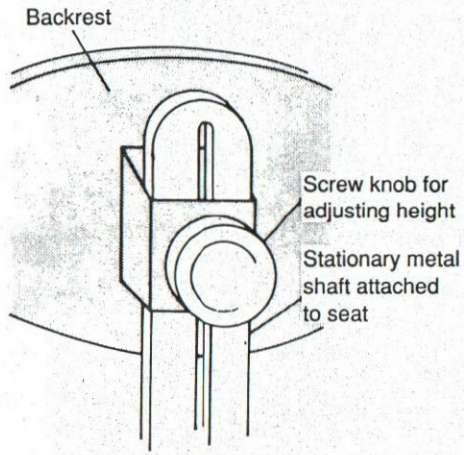

FIGURE 10.2
Detailed Drawing of Height-Adjusting Mechanism

   1. Subpart X (definition followed by detailed description of size, shape, material, location, and method of attachment)
   2. Subpart Y (same as for subpart X)
III. Conclusion (optional)

Introduction

The introduction gives the reader a framework for understanding the mechanism. In the introduction you should define the mechanism, state its purpose, present an overall description, and preview the main parts. In the following introduction, the writer does all of these.

To: Emily Brown
Date: July 18, 1994
From: Steve Vande Walle
Subject: Tabletop Paper Micrometer

This memo provides the information you requested at our July 17 meeting dealing with my department's paper micrometer. A paper micrometer is a small measuring instrument used to measure the thickness of a piece of paper. The micrometer, roughly twice as large as a regular stapler (see Figure 1), has four main parts: the frame, the dial, the hand lever, and the piston.

Definition and purpose

Overall description

Main parts

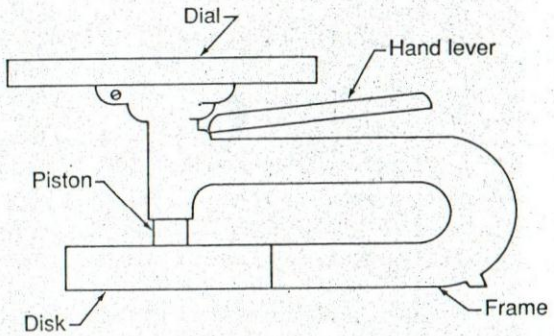

FIGURE 1
Paper Micrometer

Body: Description of Mechanism

The *body* of the paper contains the detailed description. Usually you identify each main part with a heading and then describe it in a single paragraph. Each paragraph should follow the outline explained earlier on pages 218–219. Note that in the following example, each section describes only one item. If necessary, you can divide a section into subsections.

The Frame

The frame of the paper micrometer is a cast piece of steel that provides a surface to which all the other parts are attached. The frame, painted gray, looks like the letter *C* with a large flat disk on the bottom and a round calibrated dial on top. The disk is 4½ inches in diameter and resembles a flat hockey puck. The frame is 5⅛ inches high and 7½ inches long. Excluding the bottom disk, the frame is approximately 1¼ inches wide. The micrometer weighs 8 pounds.

Definition
Color
Analogy
Size and analogy
Weight

The Dial

The dial shows the thickness of the paper. The dial looks like a watch dial except that it has only one moving hand. The frame around the dial is made of chrome-plated metal. A piece of glass protects the face of the dial in the same way that the glass crystal on a watch protects the face and hands. The dial, 6 inches in diameter and ⅞ inches thick, is calibrated in .001-inch marks, and the face of the dial is numbered every .010 inch. The hand is made from a thin, stiff metal rod, pointed on the end.

Definition and analogy
Analogy
Size
Appearance

The Hand Lever

The hand lever, shaped like a handle on a pair of pliers, raises and lowers the piston. It is made of chrome-plated steel and attaches to the frame near the base of the dial. The hand lever is 4 inches long, ½ inch wide, and ¼ inch thick. When the hand lever is depressed, the piston moves up, and the hand on the dial rotates. When the hand lever is released and a piece of paper is positioned under the piston, the dial shows the thickness of the paper.

Analogy and definition
Relationship to other parts
Effect

The Piston

The piston moves up and down when the operator depresses and releases the hand lever. This action causes the paper's thickness to register on the dial. The piston is ⅜ inch in diameter, flat on the bottom, and made of metal without a finish. The piston slides in a hole in the frame. The piston can measure the thickness of paper up to .300 inch.

Definition
Function
Size
Relationship to other parts
Function

Other Patterns for Mechanism Descriptions

Two other patterns are useful for describing mechanisms: the function method and the generalized method.

The Function Method One common way to describe a machine is to name its main parts and then give only a brief discussion of the function of each part. The *function method* is used extensively in manuals. The following paragraph is an example of a function paragraph.

FUNCTION BUTTONS

The four function buttons, located under the liquid crystal display, work in conjunction with the function switches. The four switches are hertz (Hz), decibels (dB), continuity (c), and relative (REL). You select the hertz function to measure the frequency of the input signal. Press the button a second time to disable. The decibel function allows you to measure the intensity of the input signal, which is valuable for measuring audio signals. It functions the same way as the hertz button. The continuity function allows you to turn on a visible bar on the display, turn on an audible continuity signal, or disable both of them. The relative function enables you to store a value as a reference value. For example, say you have a value of 1.00 volt stored; every signal that you measure with this value will have 1.00 volt subtracted from it.

List subparts
Function and size of subpart 1
Function and size of subpart 2
Function and size of subpart 3
Function and size of subpart 4

The Generalized Method The *generalized method* does not focus on a part-by-part description; instead the writer conveys many facts about the

machine. This method of describing is commonly found in technical journals and technical reports. With the generalized method, writers use the following outline (Jordan).

1. General detail
2. Physical description
3. Details of function
4. Other details

General detail consists of a definition and a basic statement of the operational principle. *Physical description* explains such items as shape, size, appearance, and characteristics (weight, hardness, chemical properties, methods of assembly or construction). *Details of function* explain these features of the mechanism:

- how it works, or its operational principle
- its applications
- how well and how efficiently it works
- special constraints, such as conditions in the environment
- how it is controlled
- how long it performs before it needs service

Other details include information about background, information about marketing, and general information, such as who makes it.

The article on anti-static foam in Chapter 6 (p. 126) and the EVA hot melt model at the end of this chapter are examples of this kind of description.

PLANNING THE PROCESS DESCRIPTION

Technical writers often describe processes such as methods of testing or evaluating, methods of installing, flow of material through a plant, the schedule for implementing a proposal, and the method for calculating depreciation. Manuals and reports contain many examples of process descriptions.

Processes are usually one of two types: the operations of a mechanism or system that do not involve human activity, and the operations that do involve human activity. As with a mechanism description, the writer must consider the audience, select an organizational principle, choose visual aids, and follow the usual form for writing descriptions.

Consider the Audience

The knowledge level of audiences and their potential use of the document will vary. Their knowledge level can range from advanced to beginner. Often their use of the description is to make a decision. The process description is, in effect, vital background information for the decision. For instance, a plant engineer might propose a change in material flow in a plant because a certain step is inefficient, causing a bottleneck. To get the change approved, he or she would have to describe the old and new processes to a manager, who would use that description to make a decision about whether to implement the new process.

Process descriptions are also used to explain in detail the implementation of a project. When a company plans to install a complicated piece of machinery in a plant, a careful schedule is written so that all affected parties understand what actions will occur at each step.

Select an Organizational Principle

The organizational principle for processes is *chronological*: the writer starts with the first action or step and continues in order until the last. Many processes have obvious sequences of steps, but others require careful examination in order to determine the most logical sequence. If you were describing the fashion cycle, you could easily determine its four parts (introduction, rise, peak, and decline). If you had to describe the complex flow of material through a plant, however, you would want to base your sequence of steps on your audience's knowledge level and intended use of the description. You might treat "receiving" as just one step, or you might break it into "unloading," "sampling," and "accepting." Your decision depends on how much your audience needs to know.

Choose Visual Aids

If your subject is a machine in operation, visuals of the machine in different positions will clarify the process. If you are describing a process that involves people, a flow chart can quickly clarify a sequence. For example, you might use the following flow chart to explain a hospital's nutritional assessment program (see p. 224).

A *decision tree* can also explain a sequence effectively. This type of graphic illustrates each point at which a person must make a decision. See Chapter 8 (p. 191) for a sample decision tree.

Follow the Usual Form for Writing Descriptions

The process description takes the same form as the mechanism description: an introduction, which provides an overview, and the body, which treats

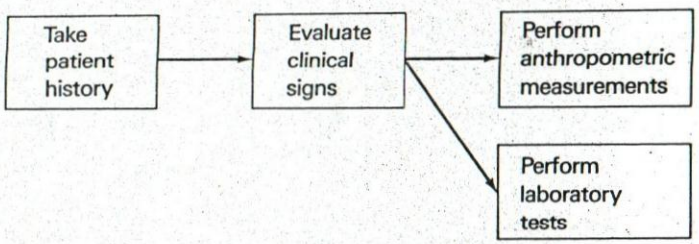

FIGURE 10.3
Flow Chart

each step in detail, usually one step to a paragraph. In each paragraph you first define the step (often in terms of its goal or end product), and then describe it.

WRITING THE PROCESS DESCRIPTION

The following outline shows the usual form for a description of a process that does not involve a person. This approach will work for all such descriptions. A process description, analyzed in some detail, appears after the outline.

I. Introduction
   A. Definition of operation
   B. Principle(s) of operation
   C. Major sequences of operation
II. Body: Description of operation
   A. Sequence A
      1. End goal of sequence
      2. Detailed description of action
   B. Sequence B (same as A)
III. Conclusion (optional)

Introduction

The introduction to a process description contains general information that prepares the reader for the specific details that will follow. In the introduction you define the process, explain its principles of operation (if necessary), and preview the major sequences. The following introduction performs all three tasks.

TO: Roger Tibbar
DATE: October 12,1995
FROM: Brian Schmitz
SUBJECT: Conversion of AC to DC

The following is the information you requested at our last meeting. It should help give you a basic understanding of the process of converting alternating current (AC) to direct current (DC). Before reading this explanation of the conversion process, you must understand the difference between AC and DC. *AC* is an electrical current that continually reverses in direction at regular cycles. Its waveform is sinusoidal (see Figure 1). A typical household uses 110 volts AC. *DC* is an electrical current that flows in only one direction. A car battery produces about 12 volts DC (see Figure 1). — Background — Common examples

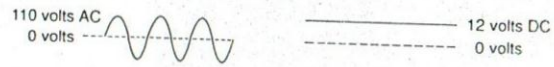

FIGURE 1
Comparison of AC and DC

This memo describes the process of converting 110 volts AC into 12 volts DC — a very common conversion in many electronic devices today. The conversion requires three basic steps: transformation, rectification, and filtration (see Figure 2). — Preview of major sequences

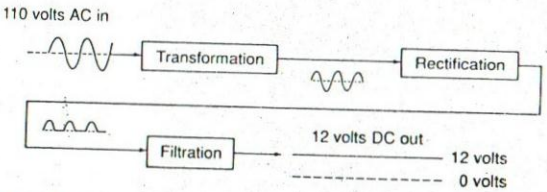

FIGURE 2
The Conversion of AC to DC

Body: Description of the Operation

In the body of the paper, write one paragraph for each step of the process. Each paragraph should begin with a general statement about the end goal or main activity. Then the remainder of the paragraph explains in more

detail the action necessary to achieve that goal. Note in the following example that each paragraph starts with an overview — a statement of purpose or end goal — and that all the paragraphs are constructed in the same pattern.

Transformation

Transformation is the step in which the relatively large AC voltage (110 volts AC) is converted into a smaller DC voltage (12 volts DC). This conversion is done with a transformer, an electrical device with two parts: a primary coil and a secondary coil. The primary coil is basically several loops of fine wire. The secondary coil is similar to the primary coil, but it is thicker and has fewer loops. The large AC voltage (110 AC) flows into the primary coil of the transformer. When the AC passes through this coil, a magnetic field is produced, a phenomenon known as Faraday's law. The magnetic field then passes through the secondary coil, producing a voltage (see Figure 3). The voltage produced in the secondary coil depends on the ratio between the number of loops of wire in the primary coil and the number in the secondary coil. With the correct number of loops in both the primary and secondary coils, the 110 volt AC is converted into 12 volts DC.

End goal

Tool used for activity

Common term

Action

Action

Theory of operation

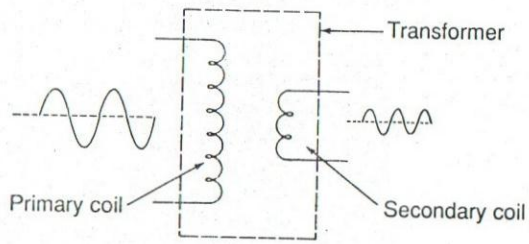

FIGURE 3
The Transformation Step

Rectification

Rectification is the step in which the small AC from the secondary coil of the transformer is converted into DC. This conversion is done with an electronic component known as a diode (see Figure 4). A diode is like an electronic check valve; it allows current to flow through it in only one direction. When the AC (which by definition continually reverses in direction) is passed through a diode, only the top (positive) half of

End goal

Tool used for activity

Analogy

Common terms

the sinusoidal waveform is allowed to pass through. The bottom (negative) half is absorbed by the diode (see Figure 4). The current leaving the diode is traveling in only one direction and therefore fits the definition of DC. However, as you can see in Figure 4, the DC leaving the diode is quite "lumpy." As a result, it is not very useful.

Action

Common term

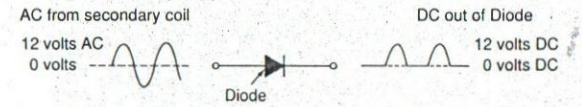

FIGURE 4
The Rectification Step

Filtration

Filtration smooths out the "lumpy" DC by means of a capacitor (see Figure 5). A capacitor is a component that stores an electrical current to be released later. When the DC from the diode is at the top of one of the lumps, the capacitor stores some of the current. When the DC is at the bottom of the lump, it releases that stored current, thereby filling in the lump (see Figure 5). The DC leaving the capacitor has no lumps and is able to perform useful work.

End goal

Tool used for action

Action

Action

Common term

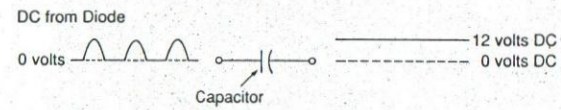

FIGURE 5
The Filtration Step

Conclusion

Conclusions to brief descriptions of operation are optional. At times, writers follow the description with a discussion of the advantages and disadvantages of the process or with a brief summary. If you have written a relatively brief, well-constructed description, you do not need a summary.

PLANNING THE DESCRIPTION OF A PERSON IN ACTION

Describing a person going through a series of steps is a common writing task. For instance, managers might describe the steps they take as they review a job application or evaluate personnel. Sometimes such a description includes visual aids showing certain forms that are essential to certain steps. A personnel manager, for example, might illustrate various forms used in the evaluation process.

The usual form is similar to that of the process description shown earlier (pp. 222–227). It contains an introduction, which defines the process and its major sequences, followed by the body, which describes the process in detail.

WRITING THE DESCRIPTION OF A PERSON IN ACTION

The following outline shows the usual form for writing a description of a person in action. This approach will work for all such descriptions. A description of a person in action, analyzed in some detail, appears after the outline.

I. Introduction
   A. Definition of process
   B. Equipment needed
   C. Major sequences of process
II. Body: Sequence of person's activities (same as description of operation, p. 224)

Introduction

In the introduction, orient the reader to the process. Note that the following introduction states the purpose of the memo, defines the process, explains why the reader needs the information, and lists the major steps in the process. In some situations, writers might also detail material or mechanisms necessary for performing the process.

This memo describes the waterfall software design process (shown in Figure 1) used by this department. Because you have worked in a department that uses an object-oriented process exclusively and are not familiar with our process, I will try to make the descriptions complete but not elementary. The four major phases of the waterfall software design process are writing software requirements, designing, implementing, and testing.	Purpose Reader need Preview of major steps

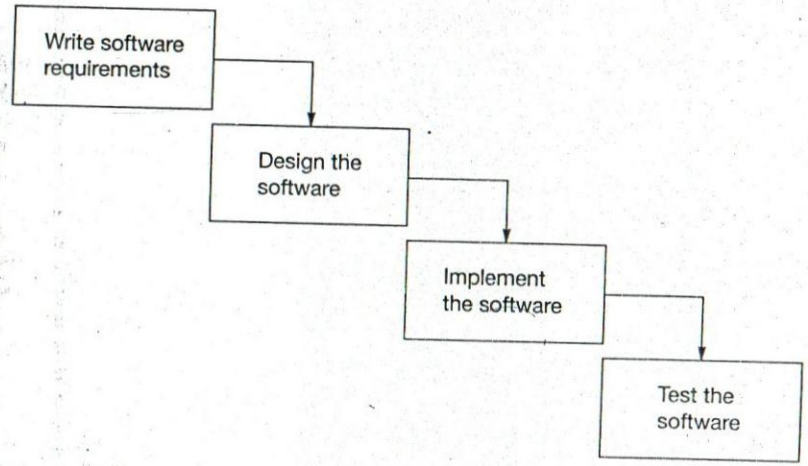

FIGURE 6
The Waterfall Design Process

Body: Sequence of a Person's Activities

In the body, the writer describes the person's actions in order, using one paragraph per step. Two notes on style seem appropriate. First, when you write a process description, do not overdo the use of the imperative (command) voice. You are trying to describe, not dictate. So in this type of writing, "We determine . . ." is preferable to "Determine. . . ." Second, try to give the steps precise names. Note that step 1 in the example is named "Writing Software Requirements," a phrase that accurately describes the step. Do not give a step too vague a title, such as "The Requirements."

Writing Software Requirements

During the requirements phase, a software specification document is written. This formal statement of the system requirements serves as a contract between the developers and the customers. The requirements phase has two major stages: analysis and specification. During the analysis stage the specification writer — generally a systems engineer — gathers requirements and information from the customer and also determines what is attainable. Agreements are made on system functionality to ensure that the customer is happy and that we don't promise something we can't deliver. Therefore, contact with the customer is essential. Once the writer completes the analysis process, he or she writes a software specification. This document must state exactly what the software system will do, but it should not specify how it will be done. The customer reviews

this document and may request changes. After any changes are made, the customer approves the document.

Designing the Software

In the design phase, the developer designs a software system based on the requirement specifications and produces a software design document. This phase consists of three major steps: defining data flow, decomposing the system, and constructing an algorithm description. To define data flow, the developer identifies and defines data elements in the system. The developer constructs data flow diagrams to document the way the system handles these elements. To decompose the system, the developer divides it into separate executable units called programs, which are further broken down into functional units. The developer then constructs a structure chart that describes the units and shows the system's hierarchy. To construct an alogrithm description, the developer uses PDL/Ada, a design language that specifies a formal structure for algorithms but also allows plain English descriptions. After all these substeps the developer produces the software design document by combining the data flow diagrams, the structure charts, and the PDL/Ada.

Implementing the Software

The implementation phase is the actual writing of the software. The developer translates the software design into the programming language in which the system will be written. In this department we use Ada, which is closely related to PDL/Ada. The software is then compiled and is ready for testing.

Testing the Software

The testing phase verifies that each functional unit works properly and that the system meets all requirements. The tests are either functional or system. For both types of testing, the tester writes test plans describing what is to be tested, test data values, and pass/fail criteria. In this department, functional testing is done by the developer who implemented the unit. The developer tests each functional unit separately to make sure it performs as stated in its design. When the developer has tested all functional units, he or she combines them into a system. At this point a separate department, Independent Verification and Validation, performs the system test. The members of this department check the combined program against each requirement in the specification. When they certify that the program meets all requirements, we arrange a meeting to present the software to the customer.

Conclusion (Optional)

A conclusion is optional. If you choose to include one, you might discuss a number of topics, depending on the audience's needs, including the advantages and disadvantages of the process.

SUMMARY

Description is an essential technique for technical writers. In all descriptions, the writer should define the process or mechanism, explain its function or end goal, name its subparts, give relevant details, and explain its significance. Three common types of descriptions are those of mechanisms, of operations, and of people in action. For each type of description the writer must consider the audience, select an organizational principle, choose visual aids, and follow the usual form. Most descriptions begin with an introduction, which defines the topic and previews the sections to follow. In the body of the description, each section defines a step or part by explaining it in detail, including its function or significance. To decide how much detail to include, writers consider their audience's knowledge level and how the audience will use the document. In most descriptions, a conclusion is optional.

WORKSHEET FOR DESCRIPTION

☐ *Name the audience for this description.*

☐ *Estimate the level of their knowledge about the concepts on which this description is based and about the topic itself.*

☐ *Name your goal for your readers.*

Should readers know the parts or steps in detail or in broad outline?

Should they focus on the components of each step or part, or on the effect or significance of each step or part?

Should they focus just on the machine or process, or grasp the broader context of the topic (such as who uses it, where and how it is regulated, who makes it, and its applications and advantages)?

☐ *Select an approach.*

What will you do first in each paragraph?

Will you use one example running through the entire paper, or will you use a different example for each paragraph?

☐ *Plan a visual aid.*

What is your goal with the visual aid? To provide a realistic introduction? To give an overview? To be the focus of the text? To supplement the text?

Will you have one visual for each step or part, or will you use just one visual and refer to it often?

- ☐ *Choose the type of visual aid. Use a visual that will help your reader grasp the topic.*
- ☐ *Construct a rough visual now. Finish it later.*
- ☐ *Decide on the visual aid's size (not too large or too small) and placement (for example, after the introduction).*
- ☐ *Devise a style sheet. Decide how you will handle heads, margins, paragraphing, and visual aid captions.*
- ☐ *To write a description of mechanisms*
  - Name each part.
  - Name each subpart.
  - Define each part and subpart.
  - List details of size, weight, method of attachment, and so forth.
  - Tell its function.
- ☐ *To write a description of processes*
  - Name each step.
  - Name each substep.
  - Tell its end goal.
  - List details of quality and quantity of the action.
  - Tell significance of action.

MODELS

The models that follow describe mechanisms and processes. On the basis of what you know, review them carefully to discover their strengths and weaknesses. Note that the caliper example is really an informal memo report (see Chapter 11), so the introduction contains material that differs from the usual form.

To: Nathan O'Timothy
Date: September 22, 1995
From: Louise Esaian
Subject: Skinfold Calipers

You have expressed an interest in the skinfold caliper that our dietary department has recently purchased. The following information should be helpful to you in understanding the skinfold caliper and its individual parts. The skinfold caliper (see Figure 1) is an instrument used to measure a double layer of skin and subcutaneous fat (fat below the skin) at a specific body site. The measurement that results is an indirect estimate of body fatness or calorie stores. The instrument is approximately 10 inches long, is made of stainless steel, and is easily held in one hand. The skinfold caliper consists of the following parts: caliper jaws, press and handle, and gauge.

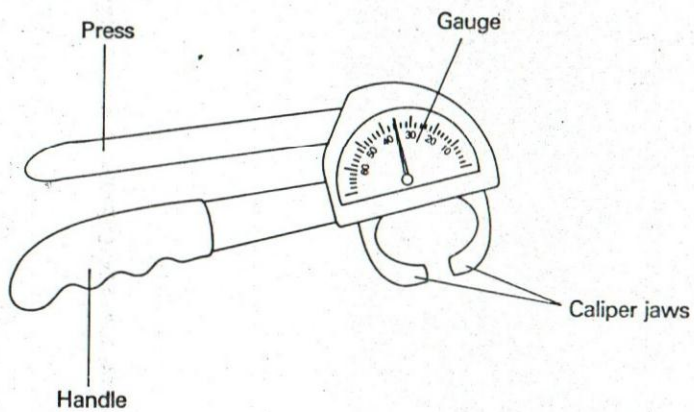

FIGURE 1
Skinfold Caliper

Caliper Jaws

The caliper jaws consist of two curved prongs. Each prong is approximately ¼ inch long. The prongs project out from the half-moon-shaped gauge housing. They are placed over the skinfold when the measurement is taken. They clasp the portion of the skinfold to be measured.

FIGURE 10.4
Mechanism Description

Will you have one visual for each step or part, or will you use just one visual and refer to it often?

- ☐ *Choose the type of visual aid. Use a visual that will help your reader grasp the topic.*
- ☐ *Construct a rough visual now. Finish it later.*
- ☐ *Decide on the visual aid's size (not too large or too small) and placement (for example, after the introduction).*
- ☐ *Devise a style sheet. Decide how you will handle heads, margins, paragraphing, and visual aid captions.*
- ☐ *To write a description of mechanisms*

  Name each part.
  Name each subpart.
  Define each part and subpart.
  List details of size, weight, method of attachment, and so forth.
  Tell its function.

- ☐ *To write a description of processes*

  Name each step.
  Name each substep.
  Tell its end goal.
  List details of quality and quantity of the action.
  Tell significance of action.

MODELS

The models that follow describe mechanisms and processes. On the basis of what you know, review them carefully to discover their strengths and weaknesses. Note that the caliper example is really an informal memo report (see Chapter 11), so the introduction contains material that differs from the usual form.

To: Nathan O'Timothy
Date: September 22, 1995
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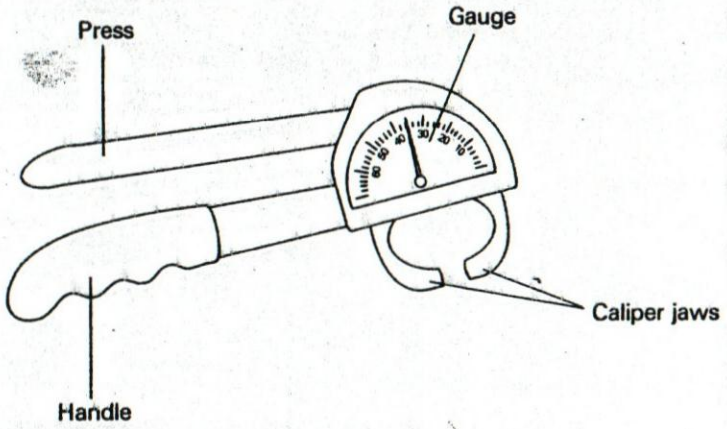


FIGURE 1
Skinfold Caliper

Caliper Jaws

The caliper jaws consist of two curved prongs. Each prong is approximately ¼ inch long. The prongs project out from the half-moon-shaped gauge housing. They are placed over the skinfold when the measurement is taken. They clasp the portion of the skinfold to be measured.

FIGURE 10.4
Mechanism Description

Press and Handle

The press is the lever that controls the caliper jaws. Engaging the press opens the caliper jaws so they can slip over the skinfold. Releasing the press closes the jaws on the skinfold, allowing the actual measurement. The press is 4.5 inches long and .5 inch thick. It is manipulated by the thumb while the fingers grip the caliper handle. The caliper handle is 6 inches long and .5 inch thick. The outside edge of the handle has three indentations, which make the caliper easier to grip.

Gauge

The gauge records the skinfold measurement. It is white, half-moon shaped, with 65 evenly spaced black markings and a pointer. Each marking represents 1 centimeter. The pointer projects from the middle of the straight edge of the half-moon-shaped gauge to the black markings. When the jaws tighten, the pointer swings to the marking that is the skinfold thickness.

FIGURE 10.4 (continued)

EVA HOT MELT

Hot melt is a type of adhesive whose use is rapidly growing in the field of packaging. Here at Wheeler Amalgamated, we use ethylene vinyl acetate (EVA) hot melt in a variety of packages. Because EVA is the hot melt adhesive most commonly used in our packaging, this report will explain it in detail. The sections that follow describe EVA, explain the role of heat, discuss EVA's three components, and review its advantages, disadvantages, and applications for use.

Description of EVA

Ethylene vinyl acetate hot melt adhesives are polymeric thermoplastic compounds that form adhesive bonds upon cooling. Polymeric means that the material is composed of more than one compound; thermoplastic refers to a plastic that can be reheated and reformed. EVA generally comes in the form of white or brown pellets that resemble an average .22-caliber bullet in size and shape.

The Role of Heat

The role of heat is to enhance the flow of the hot melt. In other words, the more heat that is put into the hot melt, the more fluid the hot melt becomes and the easier it is to apply to the intended surface. The heat decreases the viscosity (thickness) of the hot melt, allowing the adhesive to be transferred to other materials more easily. In this way, EVA differs from other adhesives. Many adhesives enhance flow by dissolving or dispersing the adhesive in a volatile vehicle (such as water) that evaporates, leaving a solidified adhesive to form a bond. Hot melts use no volatile solvent. Instead, they are melted prior to their application.

EVA's Three Components

Ethylene vinyl acetate hot melts belong to the class of solidifying, or wax-containing, hot melts. They are generally made of three different types of materials: polymers, wax, and tackifiers.

Each material has specific characteristics that help to create an effective adhesive. EVA polymers contribute to the cohesive strength, viscosity, impact resistance, and (to a lesser extent) heat resistance of the final product. Heat resistance is a measure of the material's ability to hold a satisfactory bond at elevated or extreme temperatures. Wax, the most crystalline component, controls the softening point, heat resistance, open time, and rate of set. Open time and set time are related to the physical changes the adhesive goes through as it cools and forms a bond. Tackifiers promote adhesion and determine the color and odor.

FIGURE 10.5
Generalized Mechanism Description

Different combinations of these materials produce adhesives with different characteristics. As a result, we can use EVA in many applications. For example, EVA hot melt that is used to coat a label would need a glossy appearance. Thus the specifications would call for a lower vinyl acetate content and a lower melt index. For such an application, the hot melt would also need a paraffin and synthetic wax combined with a tackifier made from a terpene phenolic compound.

Advantages of EVA

EVA has several advantages. It is the fastest setting of all adhesives, thus producing higher production speeds and less compression, or holding, time. EVA does not have a liquid solvent, so it has a long storage life — six months to a year — and freeze/thaw stability. As a result, EVA can be shipped or stored for long periods of time without freezing, settling, or decomposing. EVA also offers a safer working environment, less shrinking, and better gap filling.

Disadvantages of EVA

Perhaps the greatest shortcoming of the EVA hot melt adhesive is limited heat resistance. Thermoplastic materials lose a considerable amount of cohesiveness at even slightly elevated temperatures and will eventually remelt. They also have limited use for application on heat-sensitive materials.

Applications of EVA

EVA has many applications. It is used to seal corrugated (cardboard) and paperboard cases and cartons. Many products found on the shelves of stores are packaged in cartons sealed with an EVA hot melt. Examples include cereal boxes, macaroni boxes, and health care items, such as aspirin and deodorant. EVA is also used to apply some types of labeling — the labels on beer bottles, soup cans, and detergent bottles are applied with a hot melt. The beverage industry uses hot melts for base cups (found, for instance, on plastic 1-liter Coke bottles) and cap liners. Other applications include heat sealing and coating for pressure-sensitive labels and paper tape, tray forming, and bag seaming and sealing. New applications include tamper-evident and microwave packaging.

FIGURE 10.5 (continued)

EXERCISES

1. In one paragraph, describe a part of a mechanism. Choose an item drawn from your job or your major or a household object. Your audience is someone who knows little about the mechanism but is curious. Use this plan:

   - Name the part early in the first sentence.
   - Define the part in the first sentence.
   - Present details of the part in several sentences.
   - Use at least one analogy.
   - Draw a picture of the part. Use callouts chosen from the terms in the paragraph.

2. In class, develop a brief mechanism description by brainstorming. Hand in all your work to your instructor. Your instructor may ask you to perform this activity in groups of three or four.

   - Brainstorm the names of parts and subparts.
   - Choose the most significant parts.
   - Arrange the parts into an organizational pattern.
   - Define each part in a sentence.
   - Describe each part in a paragraph.

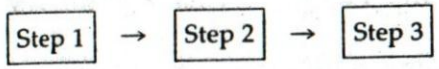
3. In class, develop a mechanism description through a visual aid. Hand in all your work to your instructor. Your instructor may ask you to perform this activity in groups of three or four.

   - Draw a visual aid of your mechanism.
   - Name each part that the audience needs to understand.
   - Select an organizational pattern for discussing the parts.
   - Define each part in a sentence.
   - Describe each part in a paragraph.

4. In class, develop a process description through brainstorming. Hand in all your work to your instructor. Your instructor may ask you to perform this activity in groups of three or four.

   - Brainstorm the names of as many steps and substeps as you can.
   - Arrange the steps into chronological order.
   - Define the end goal of each step in one sentence.

5. In class, develop a brief process description through visual aids. Hand in all your work to your instructor. Your instructor may ask you to perform this activity in groups of three or four.
   a. Draw a flow chart of the process:



   - Use as many boxes as you need.
   - In every box place the name and goal of the step.

   b. If necessary draw further visuals that illustrate the substeps of any step. Use either a flow chart or an appropriate rendering of the substep (e.g., "before" and "after" renditions).
   c. Draw a visual of the complete step 1. Use either a flow chart or an appropriate rendering of the substep.
   d. Write a brief paragraph for each step.
6. Either draw or photocopy a picture of a machine with which you are familiar (consumer manuals are a good source). Label all the parts you think are significant. In class, exchange illustrations with a classmate. Interview your classmate to obtain details of the size, weight, color, and material, as well as the use of your classmate's machine. Spend about 15 minutes writing a short (two or three paragraphs) description of your classmate's mechanism. After you have finished, critique each other's paragraphs for effectiveness.
7. In class (or in small groups if your instructor wishes), compare a paragraph from the memo on the waterfall design process (pp. 229–230) with a paragraph from "Skinfold Calipers" (pp. 233–234). How are the paragraphs organized? What is the function of the first sentence of each? Which paragraph seems more effective in conveying its message to the audience? Be prepared to make a brief presentation of your findings to the class.
8. In one paragraph, describe a person performing a very common action, such as starting a car, putting on a shirt or a blouse, purchasing a ticket for a performance, or doing an exercise routine. Start with a statement of the goal or object of the action; then describe the steps the person must take to complete the action.

WRITING ASSIGNMENTS

1. Assume that you are on the job and that your new supervisor needs detailed knowledge about a mechanism with which you commonly

work. The mechanism could be a mechanical object, such as a machine or a form, or it could be nonmechanical, such as a corporate structure. Your supervisor will use the description as background for a series of meetings she will have with other supervisors. Write a memo of four or five paragraphs. Use the "Skinfold Calipers" memo (pp. 233–234) as a model. Fill out the worksheet in this chapter. Use a visual aid. Use Exercise 2 or 3 to start your work.

2. Assume that you must describe a problem that has arisen with a process at your workplace. Describe the process in detail, then explain the problem and offer a solution. Use a memo format with heads. Use a visual aid. Fill out the worksheet in this chapter. Use Exercise 4 or 5 to start your work.
3. Write an article for a company newsletter, describing a common process on the job. Use a visual aid. Sample topics might include the route a check follows through a bank, the billing procedure for accounts receivable, the company grievance procedure, the route a job takes through a printing plant, or the method for laminating sheets of materials together to form a package. Fill out the worksheet in this chapter. Use a visual aid. Use Exercise 4 or 5 to start your work. Your article should answer the question "Have you ever wondered how we . . .?"
4. Write several paragraphs to convince the audience to purchase a mechanism or implement a process. The mechanism might be a machine or it might be a system, such as the procedure for hiring new personnel. Describe the advantages that this mechanism or process offers over the mechanism or process curretly in use. Fill out the worksheet in this chapter. Use a visual aid. Use Exercise 2 or 3 to start your work. Choose a mechanism you know well, or else choose from this list (for the X, you should substitute an actual name, one used in the field).
   the way brand X sewing machine constructs a stitch
   the lens system of brand X camera
   the action of brand X bike gear shift
   the X theory of product design
   the X theory of handling employee grievances
   the X retort process
   how brand X air conditioner cools air
   how brand X solar furnace heats a room
5. Using the "EVA Hot Melt" report (pp. 235–236) as a model, describe a mechanism in your field. Your goal is to provide general

background to a committee that will eventually make a decision about purchasing one of this kind of thing.

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Jordan, Michael P. *Fundamentals of Technical Description*. Malabar, FL: Robert E. Krieger, 1984.

11

Sets of Instructions

Sets of instructions appear everywhere. Magazines and books explain how to canoe, how to prepare income taxes, how to take effective photographs; consumer manuals explain how to assemble stereo systems, how to program VCRs, how to make purchased items work. On the job you will write instructions for performing many processes and running machines. This chapter explains how to plan and write a set of useful instructions.

PLANNING THE SET OF INSTRUCTIONS

To plan your instructions, you need to determine your goal, consider your audience, analyze the sequence, choose visual aids, and follow the usual form.

Determine Your Goal

Instructions enable readers to complete a project or to learn a process. *To complete a project* means to arrive at a definite end result: the reader can complete a form or assemble a toy or make a garage door open and close on command. *To learn a process* means to become proficient enough to perform the process independently of the set of instructions. The reader can paddle a canoe, log on to the computer, or adjust the camera. In effect,

every set of instructions should become obsolete as the reader either finishes the project or learns to perform the process without them.

Consider the Audience

When you analyze your audience, estimate their knowledge level and any physical or emotional constraints they might have.

Estimate Knowledge Level The audience will be at one of two levels:

- Absolute beginners who know nothing about the process
- Intermediates who understand the process but need a memory jog before they can function effectively

The reader's knowledge level determines how much information you need to include. Think, for instance, about telling someone to turn on a computer. If you tell beginners to "turn it on," they will not be able to do so because they will not know that they should look in the back — the location of the power switch on most computers. Thus, you will also have to tell them where to find the switch. An intermediate, however, knows that the switch is at the back; all you have to say is "turn it on."

Identify Constraints Emotional and physical constraints may impede the audience's attempt to follow instructions. Many people have a good deal of anxiety about performing a task for the first time. They worry that they will make mistakes and that those mistakes will cost them their labor. If they tighten the wrench too hard, will the bolt snap off? If they hit the wrong key, will they lose the entire contents of their disk? To offset this anxiety, you should include tips about what should take place at each step — and about what to do if something else happens instead. Step 8 in the following example explains that something unusual will happen: the password will not appear on the screen. If this action is not explained, users might easily think that something had gone wrong or that they had performed the step incorrectly.

The physical constraints are usually the materials needed to perform the process, but they might also be special environmental considerations. A Phillips screw cannot be tightened with a regular screwdriver; a 3-pound hammer cannot be swung in a restricted space; in a darkroom, only a red light can shine. Physical constraints also include safety concerns. If touching a certain electrical connection can injure the reader, you must make that very clear.

Examples for Different Audiences The following two examples illustrate how the audience affects the set of instructions. The first example explains a process in detail, and the instructions guide the reader through the entire process. The second example does not guide at all; it simply lists the sequence of steps to jog the reader's memory.

INSTRUCTIONS FOR A BEGINNER

LOGGING ON THE VAX

1. Flip on the power switch. It is on the back of the terminal to the left. — Tell beginners where to find switch
2. Press the return key until ENTER CLASS appears on the screen. — Effect of action
   Note the computer has a 20-second time limit on the 6 instructions that follow, so you must move right along, or you will have to re-start. — Special condition
3. Type in "3." The VAX is a class 3 option. — Explain significance
4. Press the return key. The computer will respond with GO.
5. Press the return key once or twice until the computer displays WELCOME TO THE UW-STOUT VAX 11/80. The computer will then display USERNAME: on the screen.
6. Type in TS 1112220304. This is the training session **user name.** Ordinarily you must be enrolled in a class that uses the VAX to receive a user name; when the user name is matched with the proper password, you gain access to the files. — Significance
7. Press the return key. The word PASSWORD will be displayed on the screen.
8. Type in "ASTUDENT." This is the training session password. The computer will not display the password on the screen as you type. If the password matches the user name — and it will if you typed it correctly — the computer will display WELCOME TO VAX/VMS VERSION V4.2, and a $D+ will appear. The $ is a prompt. D+ signifies that you have successfully entered the system. — Unsual action / Effect / Definition / Significance

INSTRUCTIONS FOR AN INTERMEDIATE

1. Turn the terminal on
2. Type Return
3. Type 3, Return
4. Type Return, Return
5. Insert user name, Return
6. Password

Analyze the Sequence Organize the set of instructions in *chronological* order. Decide which step comes first, which second, and so on; then present them in that order. To decide where in the sequence each step belongs, you must analyze the sequence. That is, you must determine the end goal, name and explain the tasks to be performed, and analyze any special conditions that the user should know. (For an example, refer to Figure 11.1.)

Determine the End Goal The end goal is whatever you want the reader to achieve, the "place" the user will be at the end of the process. The end goal you choose will affect the number of steps in your document. Different end goals will require you to provide different sets of instructions, with different sections. In the above example the end goal is "The user will reach the $D+ prompt," and the document ends at that point. Other end goals, however, are possible. For instance, the goal might be "The user will open a sample document." This goal would require more steps and perhaps several sections.

Analyze the Tasks For every set of instructions you write, you must analyze the sequence of tasks, or steps, that the user takes to get to the end goal. One effective method is to go backwards. If the end goal is to reach the $D+ screen, the question to ask is "What step must the user perform so that the $D+ screen appears?" The answer is type "ASTUDENT." If you continue to go backwards, the next question is "What do I do so that 'Password' appears?" As you answer that question, another will be suggested, and then another — until you are back at the beginning, sitting down at the workstation.

Name and Explain the Tasks Once you have decided on the sequence of tasks, you should name each task and explain any subtask or special information that accompanies it. The example we have examined contains no subtasks, but it does contain detailed information in almost every step. Note, for instance, how step 2 tells the user to respond within 20 seconds. How much you say will depend on the audience's level of knowledge.

Analyze Conditions You must also analyze any special conditions that the user must know about. For instance, step 8 explains the effect of the invisible password. Safety considerations are very important. Although none appears in the VAX instructions, safety warnings are an essential part of many instructions. *If it will hurt them or the machine, tell them.* Warn the user not to touch a hot bulb and to turn off the machine before working on it.

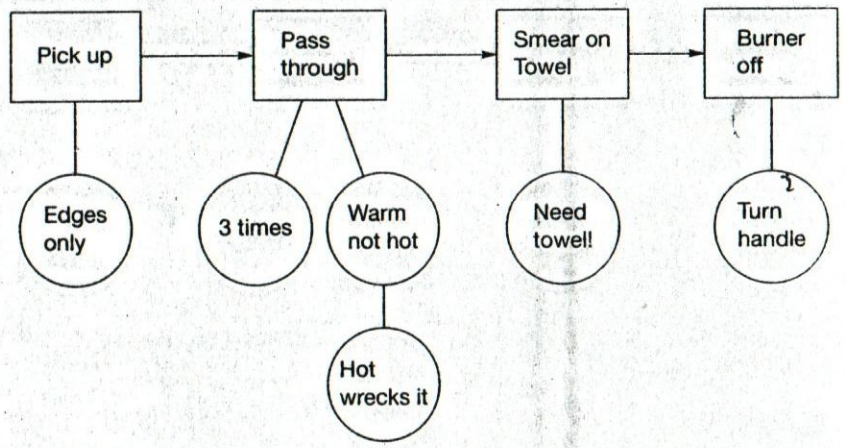

FIGURE 11.1
Sample Process Analysis

Example of Process Analysis The following set of instructions is the result of a careful analysis of the sequence of steps. The writer first developed a flow chart of the process (Figure 11.1). This flow chart contains steps (in the boxes) and conditions (in the circles). The writer then converted the flow chart into text. The writer clearly names the end goal (to heat-fix the smear), clearly states the subtasks (in four steps), and accounts for special conditions (explains why not to heat too long). Note that the section is written for a beginner: the writer outlines the steps and substeps and uses a visual aid. If this section were rewritten for an intermediate, the writer would need only to say, "Heat-fix the smear."

HEAT-FIXING THE SMEAR

After the smear has air-dried, heat-fix it so that the *E. coli* bacterial cells adhere to the glass slide.	Condition and end goal
1. Touching only the right edges, pick up the glass slide.	Special condition placed first
2. In a rapid circular motion, pass the glass slide through the Bunsen burner flame. Repeat this motion three times (see Figure 1). The bottom of the slide should become very warm but not hot. If the cells are heated too much, they will change their normal shape.	Quality of action Mild warning
3. Place the heat-fixed smear on a clean paper towel.	Note use of *a* and *the*
4. Turn the Bunsen burner off by pushing the handle of the gas terminal away from you.	

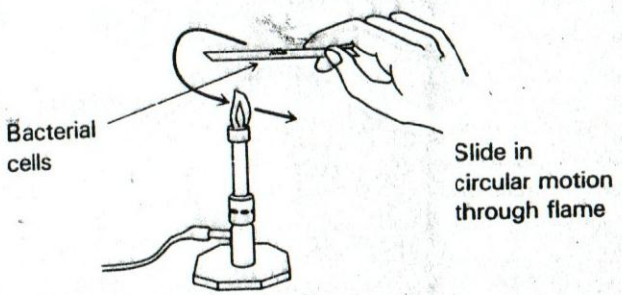

FIGURE 1
Glass Slide over Flame

Choose Visual Aids

Visual aids either clarify or replace the prose explanation. In Figure 1 the hand clarifies the text. In the following example, the visual aid replaces the text.

All Words

Push the Play and Record buttons.
The Play button is the large black button at the right end of the row of controls; it has an arrow pointing to the right.
The Record button is a square orange button to the left of the Play button.

Words and Visual Aid

Push the Play and Record buttons (Figure 1)

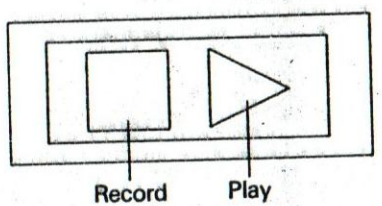

FIGURE 1
Control Panel

Here are a few guidelines for choosing visual aids.

- Use a visual aid to orient the reader. For instance, present a drawing of a keyboard with the return key highlighted.
- Use a visual aid to show the effect of an action. For instance, show what a screen looks like after the user enters a command.
- Decide whether you need one or two visual aids for the entire process or one visual aid per step. Use one per step if each step is complicated. Choose a clear drawing or photograph. (To determine which one to use, see Chapter 8.)
- Place the visual aid as close as possible to the relevant discussion, usually either below the text or to the left.
- Make each visual aid large enough. Do not skimp on size.
- Clearly identify each visual aid. Beneath each one, put a caption: Figure 1 (or Fig. 1) and a title.
- Refer to each visual aid at the appropriate place in the text.
- Use *callouts* — letters or words to indicate key parts. Draw a line or arrow from each callout to the part. Note the words *Play* and *Record* in the figure that accompanied the last example.

Follow the Usual Form for Instructions

The usual form for a set of instructions is an introduction followed by a step-by-step body. The introduction states the purpose of the set of instructions. The steps present all the actions in chronological order. Figure 11.2, at the end of this chapter, illustrates these guidelines.

The usual form requires that you create a style sheet to make your instructions readable. These guidelines will help you.

- Place a highlighted (underlined or boldfaced) head at the beginning of each section.
- Number each step.
- Start the second and following lines of each step under the first letter of the first word in the first line.
- Use margins to indicate "relative weight"; show substeps by indenting to the right in outline style.
- Decide whether you will use one column or two. If you use two, generally the left one is narrow (1.5–2 inches) and the right one is wide. The text occupies the right column.
- Decide where you will place the visual aids. Usually place them to the left or below the text.

- Use white space above and below each step. Do not cramp the text.
Select a caption style. The possibilities are Fig. 1. Title, Figure 1. Title, and merely Title.

WRITING THE SET OF INSTRUCTIONS

A clear set of instructions has an introduction and a body. After you have drafted them, you will be more confident that your instructions are clear if you field-test them.

Write an Effective Introduction

Although short introductions are the norm, you may want to include many different bits of information, depending on your analysis of the audience's knowledge level and of the demands of the process. You should always

- State the objective of the instructions for the reader.

Depending on the audience, you may also

- Define the process.
- Define important terms.
- List any necessary tools, materials, or conditions.
- Explain who needs to use the process.
- Explain where and/or when to perform the process.

A SAMPLE INTRODUCTION TO A SET OF INSTRUCTIONS

In the following introduction, note that the writer states the purpose ("these instructions will guide you . . ."), gives the location, explains when the activity occurs, and lists materials

Introduction

This set of instructions will guide you through the process of lowering and raising the baskets in the fieldhouse. The baskets are lowered from ten feet to nine feet during the elementary basketball season (December–February). Games are played on all four courts Saturday mornings. On Friday night all eight baskets are lowered, and after the games on Saturday they are raised back up to ten feet.

Using your PF8 key, remove the following pieces of equipment from the fieldhouse storeroom: step ladder, hydraulic jack, and ¾-inch socket and wrench.

Purpose
Location
Background
Time of activity
Materials list

Write an Effective Body

The body consists of numbered steps arranged in chronological order. The numbered steps are the tasks that the reader must perform. To make each step clear, construct the steps carefully, place the information in the correct order, use imperative verbs, and do not omit articles (*a*, *an*, and *the*) or prepositions.

Construct Steps To make each step clear, follow these guidelines:

- Number each step.
- State only one action per number (although the effect of the action is often included in the step).
- Explain unusual effects.
- Give important rationales.
- Refer to visual aids.
- Make suggestions for avoiding or correcting mistakes.
- Place safety cautions before the instructions.

Review previous examples (on pages 243 and 245) to see how the writers incorporated these guidelines. An example of how to write the body follows.

Place Information in Useful Order If you have to present both the instruction and an explanatory comment, you must decide in which order to place them. In general, put the instruction first and then the explanation. If the explanation is a safety warning, however, place it first.

1. CAUTION: DO NOT LIGHT THE MATCH DIRECTLY OVER THE BUNSEN BURNER. — Safety warning

Light the match and slowly bring it toward the top of the Bunsen burner. — Instruction

Use Imperative Verbs The appropriate style for instructions is the *imperative*, or order-giving, form of the verb. Give the orders clearly so that there is no mistaking what you mean. Consider the difference between these two sentences:

Precise 1. Turn the power switch to OFF.

Less precise 2. You should turn the power switch OFF.

The first is a clear imperative statement; the second is not. The difference is the word *should*, which sends an ambiguous message — you "should"

do it this way, but if you're close, you'll still be all right. To avoid this possible misunderstanding, use the imperative form.

Retain the Short Words How to handle the "short" words (the articles — *the*, *a*, and *an* — and prepositions, especially *of*) is an issue in writing sets of instructions. Because many people think their instructions will be clearer if they use as few words as possible, they delete the short words, making the instructions sound like a telegram. Eliminating these words often makes the sentences harder to grasp because it blurs the distinction among verbs, nouns, and adjectives.

Unclear Sentence If paid, give patron envelope containing tickets.

SAMPLE BODY

Here is the body of the set of instructions, which follows the introduction that appears on p. 248.

Lowering the Baskets

	Head for sequence
1. Position the step ladder beneath the basket. You will be working on the back side of the backboard, so place the ladder accordingly.	Action Purpose
2. Stand the hydraulic jack under the basket and carefully ascend the ladder.	
3. Place the flat plate of the hydraulic jack under the crossbar as indicated in Figure 1.	
4. Tighten the valve on the hydraulic jack and pump the handle only enough to stabilize the jack.	Special condition
5. Remove the safety pin from the end of the steel rod. This rod is inserted through a hole in the support frame as shown in Figure 1.	
6. Pull out the steel rod.	
7. Use the ¾-inch socket wrench to loosen (counterclockwise) the two nuts, as shown in Figure 1.	Special condition
8. Slowly loosen the valve on the hydraulic jack. The basket will drop one foot. Don't worry about it falling off; it will be stopped by a crossbar.	Action Effect
9. Reinsert the steel rod through the hole in the support frame at this lower height at the end of the steel rod.	
10. Replace the safety pin at the end of the steel rod.	
11. Tighten (clockwise) the two nuts with the ¾-inch socket wrench.	
12. Slowly descend the ladder and move your equipment to the next basket. You only have seven more to go!	

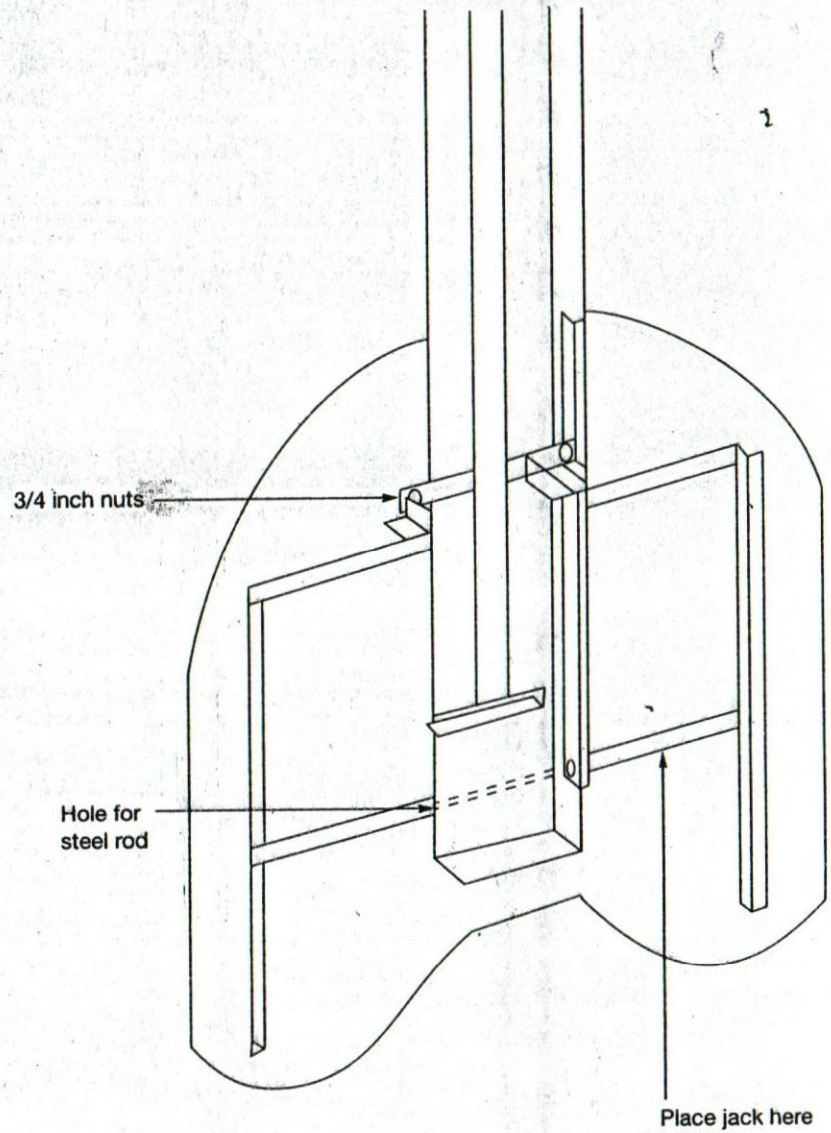

FIGURE 1
Back Side of the Backboard