UNIVERSAL
LIBRARY

OU_160023

UNIVERSAL
LIBRARY

OUP—902—26-3-70—5,000

OSMANIA UNIVERSITY LIBRARY

Call No. 657/B58F Accession No. Ph.27341

Title Financial and Managerial Accounting

Author: Bierman.

This book should be returned on or before the date last marked below

Financial and Managerial Accounting

AN INTRODUCTION

Financial and Managerial Accounting

AN INTRODUCTION

Harold Bierman, Jr., Ph.D.

Professor of Accounting
Graduate School of Business and Public Administration
Cornell University

The Macmillan Company, *New York*
Collier-Macmillan Limited, *London*

© *Copyright, Harold Bierman, Jr. 1963*

All rights reserved. No part of this book may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without permission in writing from the Publisher.

100 S985T

Third Printing 1965

Earlier edition, entitled Managerial Accounting: An Introduction, © *Copyright 1959 by The Macmillan Company*

Library of Congress catalog card number: 63-9587

THE MACMILLAN COMPANY, NEW YORK
COLLIER-MACMILLAN CANADA, LTD., TORONTO, ONTARIO

Printed in the United States of America

Preface

THE TITLE OF the first version of this book was *Managerial Accounting, An Introduction.* This carried an implication that the book was written for a special course in beginning accounting. The author intends for the material in this book to form the basis of an one- or two-semester course in beginning accounting without reference to the career objectives of the student. Where possible, decisions using the accounting information are introduced, but we are concerned with the recording, reporting, analysis, and use of financial information; thus, there are some sections where we will be more interested in recording information than in using it.

There is probably no "one correct" method of teaching or studying accounting. Each teacher has his own ideas on how the student ought to be introduced to the accounting process, and each student has different objectives for studying accounting. The theory behind this text is that the principles of accounting and managerial uses of accounting are the two areas of the greatest interest to the beginning student. Students are often frightened away from accounting courses because of the large amount of "busy" work and because the significant controversies of accounting theory are hidden in a maze of detail or are postponed to a more advanced course. This text attempts to solve these difficulties. The reader will find that this text has little excess fat. In some areas the instructor may desire to supplement the text, but in general, the areas that receive reduced attention are materials which the average beginning accounting student does not learn and in which he has little interest. The subjects that have been de-emphasized in this text are bookkeeping techniques, accounting systems and procedures for handling paper, and auditing. These are admittedly important, but they should not be stressed in a beginning course in accounting. There are many students who are not interested in accounting as a career but as a tool of management. These students will benefit more by devoting their attention to the basic problems and theo-

ries of accounting. Students who desire to major in accounting will take courses in accounting systems and auditing, and the loss of the smattering of information they receive in a beginning course on these subjects should not harm them.

In an effort to develop an understanding of the basic theory of recording financial transactions, the author has included some material which many readers would consider to be of little or no managerial significance. Taken item by item, the material is not very significant (for example, petty cash transactions, recording sales, recording purchases, etc.). Any one of these topics could have been eliminated without harming the student's basic understanding. The problem is to decide which items should be eliminated. The student needs practice in translating financial transactions into debits and credits. He has to record a variety of situations, especially situations where there are both reasonable and unreasonable alternatives. While one or more of these seemingly petty problem areas could have been dispensed with, enough must be retained in order for the student to acquire a basic understanding of accounting. If the individual instructor feels that certain topics serve no purpose, he can teach around them. On the other hand, they are here for those instructors who find the topics helpful.

This book is divided into two parts. The division is designed to emphasize a slight shift in attention. In the first half of the book, attention is focused on financial accounting; in the second half, on managerial accounting. To be able to understand managerial problems of accounting, the reader must have a firm understanding of the theories of accounting, preparation of statements, and various accounting techniques. The study of these techniques is classified under financial accounting, not because it is any less important to a business manager, but because the subject is treated from a point of view of general financial significance rather than of business decision-making. While the second half of the book is designed primarily for the business manager, by necessity some general accounting subjects have also found their way into this section. This, combined with the fact that many of the problems of managerial accounting also have implication for general financial reporting, means that both halves of the book are necessary for a well-rounded study of accounting.

If the teacher is responsible for teaching a one-semester course, he may omit certain chapters. It is suggested that the following chapters be considered seriously for retention: 2 through 7, 9, 12, 13, 14, 16, 17, 19, 21, 22, 23, 24, 25, 32, 33.

Acknowledgment

In the first version of this book, I listed eight persons who had either helped educate me or assisted me in eliminating errors. A comparable list now would be much longer. Rather than attempting to thank all those who have in some manner assisted me, I express my appreciation to William A. Paton.

Harold Bierman, Jr.

Contents

I. FINANCIAL ACCOUNTING

Chapter		*Page*
1	Introduction to Accounting	3
2	The Position Statement	17
3	Recording Transactions Directly to the Position Statement	30
4	Recording Transactions: Debits and Credits	39
5	Recording Transactions: Expense and Revenue Accounts	48
6	Adjusting and Closing Entries	57
7	The Income Statement	68
8	The Accounting Cycle and Accounting Records	81
9	The Flow of Costs: A Manufacturing Firm	99
10	Liquid Assets	111
11	Current Liabilities and Purchases	138
12	Depreciation	151
13	Noncurrent Assets	166
14	Inventories	179
15	Notes and Interest	203
16	Stockholders' Equity	215
17	Compound Interest, Annuities, and Related Accounting Problems	236
18	Consolidated Statements	257
19	Preparation and Analysis of Income and Position Statements	277
20	Preparation of the Funds Statement	309

II. MANAGERIAL ACCOUNTING

21	Organization for Cost Control and Recording of Costs	331
22	Manufacturing Overhead	361
23	Systems of Cost Accounting	384

24	Analysis of Cost Variances	401
25	Administration of the Budget Program	417
26	Capital Budgeting	439
27	Control of Inventory	465
28	Variable Costing, or "Direct Costing"	487
29	Break-Even Analysis	501
30	Measuring and Reporting Performance	521
31	Procedures for Recording Costs: Internal Control	548
32	Inventories and a Changing Price Level	562
33	Depreciation and the Measuring of Income with a Changing Price Level	578
34	Common Dollar Accounting	593
35	Income Taxes and Decisions	606
	Appendix	625
	Index	641

I

FINANCIAL ACCOUNTING

1

Introduction to Accounting

WHY SHOULD ACCOUNTING be studied by anyone but those who intend to make it a career? The majority who study accounting will not practice it, but there are valid reasons why this subject is important to them and worthy of being included in the curriculum for non-accounting majors.

Accounting is a language of business and the primary means of measuring and communicating business data. A person entering upon a business career, or many other careers using business data, should have a good grasp of accounting terminology and theory so that he may be better equipped to communicate with his fellow workers or to interpret reports containing accounting data.

Accounting may also be useful for developing a person's logic. This is difficult to prove, but at its best, accounting will help teach that problems may be solved in a logical, systematic manner. If this skill in problem-solving can be transferred to other areas, the study of accounting will have value as a training device, as well as the inherent value it has as a means of communication.

The student of accounting should question each accounting procedure and ask, "Is this logical?" There will be cases where the procedure will seem not to be, but the fault will be not in the basic framework of accounting theory but rather in the fuzzy thinking of those who have failed to develop fully the potential of accounting.

WHAT IS ACCOUNTING?

Accounting is a term used to describe a wide range of techniques and fields of study. The tasks of an accountant cover such diverse areas as:

Recording of Financial Transactions
Reporting the Results of Financial Transactions
Preparing Reports for Management for Control Purposes

Preparing Reports for Government (including the income tax form)
Checking the Recording and Reporting of Financial Data (auditing)
Interpreting Financial and Managerial Reports
Setting Up Systems for Recording Financial Transactions
Determining and Controlling the Cost of Products and Processes

There are few persons who are not exposed to the accountant's work in one form or another. The following examples illustrates some of the typical uses:

Investors—annual and quarterly reports of income and financial position help determine investment decisions.
Lawyers—numerous cases hinge on accounting theory, especially in the fields of public utilities, mergers, liquidations, etc.
Economists (and other scholars)—the information pertaining to the income of the corporate sector of the economy is based on accounting reports.
Government Administrators—this group is similar in function to business managers. They must use accounting reports to determine financial position, control costs, etc.

The preceding list is by no means all-inclusive (in one way or another we are all affected by the work of the accountant), but the group which is most interested in the accountant's reports is that of the business manager. Management relies on the accountant to keep it informed. The more complex the business enterprise, the more management must rely on accounting reports. It is difficult for a person, no matter how skilled, to judge how well a large enterprise is doing unless he examines the reports of the accountant. These reports are based on the summary of the financial transactions recorded according to generally accepted accounting principles or adjusted as necessary for managerial purposes. These summaries tell management:

The results of the operations (the income or the loss)
The financial position of the enterprise
The areas of inefficiency and efficiency
The sources and uses of funds
The projected results of the operations of future periods

General Financial Statements

The three primary financial statements are the position statement (also called balance sheet), income statement, and the funds statement. The func-

tion of the position statement is to present the financial position of the enterprise *as of* a moment in time. It accomplishes this goal by presenting resources owned by the firm (the assets), the amount of debts (the liabilities), and the rights of the stockholders (the stockholders' equity). The success with which the accountant succeeds in presenting the financial position of the firm is, of course, limited by the information available to him. The position statement is prepared from the accounting records, and any limitations of the general accounting framework affect the financial reports. Thus the position statement of a firm, rather than showing the financial position of the firm from an economic or a liquidation point of view, is a reflection of what has been recorded by the accountant. This fact is equally true of the other accounting reports.

The income statement shows the results of operations for a period of time by measuring the difference between the dollar value of resources received by the firm (the measure of this amount is called *revenue*) and the recorded cost of the assets given up in earning the revenues (the measure of this amount is called *expense*).

The funds statement is a presentation of the sources and uses of funds for a period of time. The term *funds* has a technical accounting meaning, but the reader at this point may interpret funds to mean assets of a liquid nature (meaning that it is relatively easy to turn them into cash). The funds statement is a useful report which in recent years has increased in importance. One reason for its growth in popularity is that it bypasses several problems of measurement which would affect the income statement but which will not affect the funds statement (for example, several expenses of using a long-lived asset will affect the income of the period but will not affect the funds statement, since they do not use funds in the period in which the revenues are earned).

It is common for a large corporation partially or completely to own other corporations. If the percentage of ownership of these subsidiary corporations is large, the financial data of the parent corporation are frequently combined with those of the subsidiary corporations; *consolidated financial statements* are then prepared. Thus we shall encounter statements titled "Consolidated Statement of Financial Position" or "Balance Sheet for XYZ Corporation and Subsidiaries."

Financial statements frequently will show data for more than one year. These are called *comparative* statements and are extremely valuable to a person making use of the information, because the changes from period to period may be noted.

GENERAL MOTORS

Consolidated
December 31,

Assets

	Dec. 31, 1961	Dec. 31, 1960
CURRENT ASSETS:		
Cash	$ 404,759,560	$ 419,526,374
United States and foreign government and other marketable securities—short term—at cost	1,291,290,584	1,217,928,343
Accounts and notes receivable (less allowance for doubtful accounts: 1961—$3,082,622; 1960—$3,067,392)	987,295,501	608,567,262
Inventories	1,800,142,041	1,810,997,290
TOTAL CURRENT ASSETS	4,483,487,686	4,057,019,269
INVESTMENTS AND MISCELLANEOUS ASSETS		
Investments in subsidiary companies not consolidated	432,553,918	456,481,559
Other investments	17,584,278	17,585,078
Miscellaneous assets	79,734,649	77,361,273
TOTAL INVESTMENTS AND MISCELLANEOUS ASSETS	529,872,845	551,427,910
COMMON STOCK IN TREASURY—Available for purposes of the Bonus Plan and Stock Option Plan (1961—1,986,539 shares; 1960—1,960,129 shares)	94,199,367	89,949,671
REAL ESTATE, PLANTS, AND EQUIPMENT	7,004,849,133	6,666,634,695
Less accumulated depreciation and obsolescence	3,975,982,756	3,656,212,608
NET REAL ESTATE, PLANTS, AND EQUIPMENT	3,028,866,377	3,010,422,087
PREPAID EXPENSES AND DEFERRED CHARGES	72,727,439	65,404,592
GOODWILL, PATENTS, ETC.	63,442,466	63,442,466
Total assets	$8,272,596,180	$7,837,665,995

* Courtesy the General Motors Corporation.

CORPORATION *

Balance Sheet
1961 and 1960

Liabilities, Reserves, and Capital

	Dec. 31, 1961	Dec. 31, 1960
CURRENT LIABILITIES:		
United States and foreign income taxes	$ 663,668,510	$ 787,207,766
Less United States and foreign government securities	575,284,823	715,418,649
Net liability	88,383,687	71,789,117
Accounts payable	564,145,920	506,583,399
Taxes, payrolls, and sundry accrued items	769,148,942	676,099,120
Dividends payable on preferred stocks	3,232,073	3,232,073
TOTAL CURRENT LIABILITIES	1,424,910,622	1,257,703,709
OTHER LIABILITIES	241,132,704	246,581,142
3¼% DEBENTURES DUE 1979 (less reacquired debentures in treasury)	221,322,000	237,462,000
DEBT OF FOREIGN SUBSIDIARIES DUE 1963–1977	144,000,000	67,905,000
RESERVES:		
Employes benefit plans	26,206,824	26,658,346
Contingent credits under Stock Option Plan	22,500,000	18,900,000
General reserve applicable to foreign operations	141,667,396	141,667,396
Miscellaneous	25,201,617	26,127,613
TOTAL RESERVES	215,575,837	213,353,355
CAPITAL:		
Capital stock:		
Preferred, without par value (authorized, 6,000,000 shares):		
$5.00 series, stated value $100 per share (issued, 1,875,366 shares; in treasury, 39,722 shares; outstanding, 1,835,644 shares)	183,564,400	183,564,400
$3.75 series, stated value $100 per share (issued and outstanding, 1,000,000 shares)	100,000,000	100,000,000
Common, $1⅔ par value (authorized, 500,000,000 shares; issued, 285,563,322 shares at December 31, 1961 and 284,733,815 shares at December 31, 1960)	475,938,870	474,556,358
Total capital stock	759,503,270	758,120,758
Capital surplus	649,833,879	612,732,302
Net income retained for use in the business (earned surplus)	4,616,317,868	4,443,807,729
TOTAL CAPITAL	6,025,655,017	5,814,660,789
Total liabilities, reserves, and capital	$8,272,596,180	$7,837,665,995

GENERAL MOTORS CORPORATION *

Statement of Consolidated Income
for the years ended December 31, 1961 and 1960

	Year 1961	Year 1960
NET SALES	$11,395,916,826	$12,735,999,681
Equity in earnings of subsidiary companies not consolidated (dividends and interest received amounted to $32,940,896 in 1961 and $53,119,373 in 1960)	58,143,795	56,018,505
Other income less sundry income deductions	59,008,919	78,460,963
TOTAL	11,513,069,540	12,870,479,149
LESS:		
Cost of sales and other operating charges, exclusive of items listed below	8,593,215,464	9,665,508,365
Selling, general, and administrative expenses	656,367,277	679,465,650
Interest and discount on 3¼% debentures	5,940,791	6,452,899
Depreciation and obsolescence of real estate, plants, and equipment	408,547,704	388,470,865
Provision for Bonus Plan and Stock Option Plan	80,976,860	93,038,881
Provision for United States and foreign income taxes	875,200,000	1,078,500,000
TOTAL	10,620,248,096	11,911,436,660
NET INCOME for the year	892,821,444	959,042,489
Dividends on preferred stocks	12,928,292	12,928,293
AMOUNT EARNED ON COMMON STOCK	$ 879,893,152	$ 946,114,196
Average number of shares of common stock outstanding during the year	282,920,050	282,078,948
AMOUNT EARNED PER SHARE OF COMMON STOCK	$3.11	$3.35

* Courtesy the General Motors Corporation.

Accounting as a Profession

The practice of accounting is broken up into two general fields:

Private Accounting
Public Accounting

The private accountant is hired by a firm engaged in manufacturing, merchandising, etc., and is actually in the employ of the firm for which he is rendering the service. The controller of a large corporation is a private accountant (in a broader sense he is a manager).

The public accounting profession includes certified public accountant firms primarily interested in auditing, but these firms are also capable of offering a variety of other services. They are "independent," since the firms are hired on a fee basis and are not in the regular employ of the enterprise making use of their services. (True independence, of course, is a matter of integrity, not of the method of payment for services rendered.)

The public accounting profession has created a system of certifying those who possess a proven amount of professional skill. Thus we have the Certified Public Accountant, a title that is earned by passing an examination and by satisfying certain requirements of education and experience. Each state has different requirements; therefore, a prospective candidate should check the requirements for the state in which he is interested. Business school libraries will usually have this information.

Business Enterprises

The work of the accountant is not limited to business enterprises; many thousands of accountants work in governmental units, educational and charitable institutions, etc. But it is in the business area where the majority of the accounting work is performed. There are three primary forms of organization which may be utilized to run a business. These are:

Proprietorship
Partnership
Corporation

The single proprietorship form of organization is the most numerous and includes most retailers, farmers, doctors, etc. However, in terms of importance (sales and assets), the corporate form outstrips all others. The advantages of the corporate form (limited liability, continuity of existence, ease of raising money, organizational advantages, etc.) are such that practically every large business enterprise is organized as a corporation. For this reason the author will use corporations and their problems as the foundation for

this text. The specialized problems of partnerships are considered to be outside the scope of this book, but the majority of accounting techniques and theories are uniform for all business, regardless of type of organization.

Accounting Conventions and Theories

Accounting conventions and theories are constantly evolving, and though the conventions and theories are in general agreement, in some areas accounting conventions may differ somewhat from accounting theory.

The accounting conventions have been built up through the years and have been given semi-official status by the society of professional accountants (The American Institute of Certified Public Accountants). The Institute publishes a series of Accounting Research Bulletins, which are sound references for current accounting conventions, and a series of research studies which explore theory.

There is no one source of accounting theories, although textbooks, journal articles, speeches, and pronouncements of professional organizations are all foundations of accounting theory. Good accounting theory will be both reasonable and useful. Usefulness includes the practicality of incorporating the theory into the accounting system. Some theories must await the passage of time before they are "proven" and can then become acceptable conventions. The study of both accounting convention and theory is important, since it is necessary to know what the accountant is currently doing and what he may do in the future.

One of the most important by-products resulting from the study of accounting is an appreciation of its limitations as well as its uses. Some accountants claim the status of science for accounting, but whether accounting is a science or an art is relatively unimportant compared with the more important question of whether the accounting procedure under consideration is "scientific" in the best sense of the word. A person using accounting information should know and recognize those areas where the accounting techniques are something less than scientific and where the results are less than "absolutely" correct. A logical place to start is with the framework of accounting.

FRAMEWORK OF ACCOUNTING

When an accounting entry is made or a report prepared, the accountant is operating within a framework. This framework of accounting consists of items that have been variously described as postulates, concepts, principles, or standards. No matter what they are called, they are the basis of accounting practice. Many of the terms will mean little at this point, but they will increase in

significance as the reader becomes more conversant with the techniques of accounting.

The importance of an understanding of the framework of accounting cannot be overstressed. Why is a transaction recorded in a certain manner? Why is a financial statement prepared in a certain form? These questions may frequently be answered by reference to the framework of accounting.

The generally accepted framework of accounting for corporations comprises:

1. Accounting reports the financial position and results of operations of the business entity, not the owners (this is referred to as the entity theory).
2. Accounting records and reports the stewardship (supervision) of management and the board of directors.
3. The corporate entity possesses a continuity of existence.
4. Costs are matched with appropriate revenues.
5. Objective evidence is the basis of recording transactions.
6. There is a stable measuring unit, the dollar.
7. Conservatism is desirable.
8. Consistency is desirable.
9. The accounting treatment of an item depends on whether the item is *material* in size.
10. Revenues or special gains are recognized only when realized.
11. It is possible to determine income for different calendar periods and financial position as of different moments of time.

The remainder of this chapter will attempt to introduce the reader to the items listed, but to be digested fully, this section should be re-read after the entire text has been studied. This section is both an introduction and review.

Entity Theory—Stewardship Function—Going-Concern Concept

The first three items will be discussed as a group, since they are all related to the entity theory. The corporation is a separate entity, and the accounting framework takes this into consideration. The corporation itself is a being, an entity that exists by virtue of its charter and the laws of the land. The accountant focuses attention on this entity and generally records business transactions as they affect the corporation. However, the entity concept is not strictly adhered to, and the alert student of accounting will find places where the entity concept is not used.

The stewardship function of accounting has at times prevented other uses of accounting from becoming established. It is generally argued that the

stockholders of a corporation hire the board of directors and management as "stewards" to administer the corporate assets, and the primary function of accounting is to record the results of this stewardship. Certainly this is one function of accounting, but it is unfortunate when this one function tends to become the sole function of accounting.

The going-concern concept of accounting is related to the fact that the corporation usually has a charter with no terminable date. Thus the life of the corporation seems to extend into perpetuity. This assumption of perpetuity is the basis of the accounting treatment of many transactions. For example, the accountant generally ignores liquidation values of assets because the firm presumably is not going to be liquidated.

Matching Principle

Costs should be matched with the revenue which they help earn. The matching of costs and revenue is one of the more thought-provoking areas of accounting. The longer the life of the asset, the more difficult it is to match the cost of the asset with revenues which it helps earn. Thus the costs of buildings and equipment will be written off as expenses against the revenues earned throughout their useful life, but at the time of purchase it is frequently impossible to forecast the number of years of use. Even if the number of years of use is know with certainty, how much of the cost of the asset should be an expense of any one year? A faulty matching of revenues and the expenses of earning those revenues will result in a misstatement of income; thus it is important that this principle be applied with honest and considered judgment.

Objective Evidence—Stable Monetary Unit

It is generally accepted that objective evidence should be the accounting basis for recording transactions. There is less agreement as to what is meant by the statement "objective evidence." For example, in the immediate post-World War II period, the price inflation (decrease in the value of a dollar) tended to cause the accounting presentation of long-lived assets (such as buildings and equipment) to be unreliable, because the cost of the assets was reported in dollars of the year of purchase and not adjusted to reflect the inflation. The advocates of the accepted procedure argued that objective evidence with which to make adjustments was lacking.

The demand for objective evidence before making adjustments for the change in the price level has caused accountants to follow an implicit assumption that there is a stable monetary unit (that the dollar does not change in purchasing power). Accountants as individuals realize that the value of the dollar does fluctuate. As a group, they have decided at the present time not to take action toward incorporating this fact into the accounting records.

The desire for objective evidence goes beyond the accounting problems of changes in the price level. It explains the recording of many transactions. For example, the acquisition of patents requires evidence of economic value before they can be recorded as assets. If the corporation gives up cash, or other assets of readily determinable value in exchange for the patents, the cost of the patents will be accepted as evidence that the patents have value. Lacking objective evidence of value (if the cost cannot be determined), the accountant would be reluctant to record the patents as an asset.

Conservatism

Conservatism is often substituted for the more praiseworthy goal of accuracy. "Conservatism is good." If the accounting treatment of a situation is conservative, is it necessarily good? Conservatism usually means recording assets owned at as low a value as possible. While this may seem to be conservative, the end result may be anything except conservative. The next period's income may be overstated, or worse yet, the return on investment (income divided by the total assets) may be greatly overstated because of the low recorded dollar value of assets.

Conservatism in its place is desirable, but its place in accounting should be ranked behind intelligent and sensible recording of business transactions.

Consistency

The accountant seeks consistency when reporting in successive periods, and this is generally desirable. Corporations cannot be allowed at will to change accounting procedures from one period to the next, thus manipulating the end result. On the other hand, if a mistake has been made, it may be better to correct it than to continue the mistake for the sake of consistency.

Materiality

Whether an item is material or not will to some extent affect its accounting treatment. Thus, long-lived assets, such as buildings, are treated as assets throughout their useful life. Should a pencil sharpener be treated in the same manner? The building may cost $1,000,000; the pencil sharpener $1.98. Obviously, a line has to be drawn. An item below a certain cost will be charged as an expense in the period of purchase, even though it may have a life in excess of one year. The justification for the treatment is the criterion of materiality.

Realization Principle

Revenues or special gains should not be recognized in the accounting records unless they are realized. When is a gain realized? There is no simple answer to this question, but, generally speaking, gains are not realized (or

recognized) until the entire series of events has occurred which caused the gain to come into being. This requirement is also *conservative*, since it prevents the recognition of gains before they are completely earned.

Frequently the accountant will recognize losses even though they have not been realized. For example, if a pound of flour (in stock) had cost \$1, but the price dropped and it could now be bought for 60¢, it would be permissible to recognize the loss of 40¢. However, if the flour increased in price and the purchase price became \$1.20, it would not be permissible to recognize the gain of 20¢, because the gain had not been realized by selling the flour. This procedure is justified as being *conservative* (recognize all losses, but do not recognize gains until they are realized).

Most corporate accounting systems make use of the accrual basis for revenue recognition. This means that revenue is recognized when the product is legally sold, not when it is produced, the order received, or the cash collected. The accrual basis of revenue recognition assumes the income is realized when the receivable (i.e., the claim against the customer) is created. It is more conservative than recording revenue as the product is manufactured, but less conservative than waiting until the cash is actually collected from the customer.

Accounting Periods

The accountant attempts to determine income for calendar periods of time and to determine financial position at specific calendar dates. This is at best a difficult task, and the accountant is not always successful. Some problems have already been illustrated in the sections on matching, conservatism, materiality, and realization. The longer the time period, the more reliable is the accountant's work likely to be. If the time period becomes too short, the report of income tends to lose significance.

SUMMARY

The reader has probably found much in this section which he does not completely understand. He would do well to return to this chapter as he reads through the text, since the methods used by the accountant to record business transactions are based on the framework described in the preceding pages.

The student of accounting should question each item considered to be part of the generally accepted framework of accounting and attempt to substitute an alternative assumption which would be as useful or more useful in certain situations. For example, an alternative framework might discard:

(a) The entity theory and substitute the point of view of the residual owners,
(b) Matching of costs and revenues and the accrual basis of revenue recognition (as individuals, we are primarily interested in what happens to our bank account, not to more esoteric accounting measures),
(c) Objective evidence (many economic events, for example, the discovery of oil, are not accompanied by what the accountant would consider objective evidence),
(d) Conservatism (instead of conservatism, we could have reasonableness or the considered judgment of expert unbiased third parties).

Few accountants would agree with all of the above changes. However, they are feasible and worthy of consideration. It is incorrect to think that there is only one possible framework of accounting or that there is only one possible accounting system. Of the eleven items listed previously, there is none that could not be discarded (though there are several that we would like very much to retain).

The student of accounting should question the generally accepted methods of accounting for transactions and presenting finished information and ask if there is a better approach. Throughout this book, the author will attempt to justify a best approach. However, of necessity, the best approach will be a compromise attempting to provide the most generally useful information consistent with the fact that the accountant is operating in a world of uncertainty.

QUESTIONS AND PROBLEMS

1-1 What form of business organization would you expect the following "industries" to take? Why?
(a) Steel industry
(b) Law
(c) Retailing
(d) Farming

1-2 What types of report does an accountant prepare?

1-3 What groups of people would be interested in the reports of the accountant? How would they use the reports?

1-4 In what ways may a business manager use accounting information?

1–5 The two general areas of accounting are public accounting and private accounting. Describe what is meant by each term.

1–6 What are the CPA requirements in the state where you live? In the state where you are going to school?

1–7 The term *accounting conventions* is often used to describe the generally accepted accounting practices. These conventions are not always theoretically sound or logical. Name some conventions, in areas other than accounting, which are not logical or at least have no theoretical justification. (For example, "A gentleman should walk on the outside if he is escorting a lady.")

1–8 The XYZ Company has listed on one of its financial reports (statement of financial position), "Buildings, $451,000." Refer to the list of items making up the framework of accounting and state whether you would accept this as a significant figure. Explain.

1–9 The XYZ Company has listed on one of its financial reports (statement of operating income), "Depreciation, $50,000." A note explains that depreciation expense measures the cost of using the long-lived assets during the accounting period. State whether you would accept the $50,000 as a significant figure. Explain.

1–10 Accounting is one type of information system. Name several other systems supplying information to business managers.

1–11 Eleven items were listed in Chapter 1 as comprising the generally accepted framework of corporation accounting. Discuss the reasonableness of requiring objective evidence, conservatism, and consistency.

1–12 What are some of the uncertainties associated with business operations?

2

The Position Statement

UNTIL RECENTLY THE financial statement referred to in this book as the *position statement* was generally known as the *balance sheet*. The two terms refer to the same report and are now used interchangeably. It should be noted that the position statement will not reflect the present financial position of an enterprise but rather the status of the accounting records. The reasons why accounting records may not be in agreement with present values will be investigated in this and later chapters. These reasons are related to the framework of accounting presented in the first chapter.

(The reader should be alert to the fact that many words used by accountants have meanings different from everyday usage. Such words as *surplus*, *reserve*, *debit*, and *credit* all have special meaning to the accountant. Another difficulty may arise because several terms may have the same meaning. An example of this are the terms *position statement* and *balance sheet*; both terms refer to the same type of report.)

The use of the term "position statement" places a burden on the accountant which the term "balance sheet" does not. A balance sheet is a report which has two sides which are equal, and this is the prime requirement placed on the report to justify the use of the title; a position statement is an identical report, but the term implies that the accountant is presenting an accurate picture of the financial position of the firm. To the extent the accountant is not presenting such a picture, he is at fault. Thus the term "position statement" sets a higher standard of performance for the accountant than the term "balance sheet." Since the standard is attainable, the former is a somewhat more desirable term. In a sense, the accounting profession must earn the right to use the term "position statement," while they can use the term "balance sheet" merely by having a set of records which is mathematically correct.

DEFINITION OF "POSITION STATEMENT"

A position statement is a statement of the financial status of the firm *as recorded by the accountant.* It gives a *picture* of the firm at a particular moment in time. It tells nothing of how the firm arrived at this situation, but it does tell where the firm is as of the date of the statement (within the limitations of the accounting records).

To accomplish its function, the position statement must show the assets of the firm, the debts owed, and the rights of the owners. The total rights to the assets must, by definition, be equal to the assets. The claims of the owners are a residual, equal to the difference of the sum of the assets and the total liabilities.

$$\text{Claims of owners} = \text{assets} - \text{liabilities}$$

This equation may be transposed so that the total claims of creditors and owners are equal to the total assets.

$$\text{Claims of owners} + \text{liabilities} = \text{assets}$$

or

$$\text{Assets} = \text{claims of owners} + \text{liabilities}$$

The term *equity* is often substituted for *claim.* Thus we speak of "owners' equity" and "creditors' equity." The total "equities" are equal to the total assets. Thus we have one basic equation and three expressions of it.

I Assets = Equities
II Assets = owners' equity + creditors' equity
III Owners' equity = assets − creditors' equity

The terms *liabilities* and *creditors' equity* may be used interchangeably. Unfortunately, the term "equities" is frequently used by non-accountants to refer to the owners' equity. Thus we have the word "equity" used in several ways. Instead of speaking of equities, we could speak of "Sources of Assets." All assets coming into a firm must have some source. The use of the term "Sources of Assets" would be consistent with the fact that we are accounting for an operating entity.

Assets = Sources of Assets
Sources of Assets = owners' equity + liabilities.

While it is convenient to write these relationships with equality signs, it is important to note that actually they are all identities, i.e., the equality

holds for all values of assets and sources of assets. It is impossible for a firm to have an asset for which there is not a source.

Form of Position Statement

The position statement is an elaboration of equations I, II, and III. Since there is equality between assets and equities, they may be arranged in a balanced array presentation. This is the origin of the term *balance sheet.*

ILLUSTRATION

A firm has cash of $5,000, owns material that cost $6,000, and owes $3,000. The position statement in its simplest form would appear as follows:

COMPANY X

Position Statement
as of December 31, 19—

Assets		Equities	
Cash	$ 5,000	Liabilities	$ 3,000
Material	6,000	Owners' Equity	8,000
Total Assets	$11,000	Total Equities	$11,000

The position statement has a heading containing three items: first the name of the company, then the name of the report, and finally the date for which this statement is applicable. Note that this statement is "*As of* December 31, 19—." This is important, since it stresses the fact that the statement is for a particular moment in time.

The body of the statement has two main sections, the "Asset" and the "Equity" sections. The total assets must equal the total equities. In the preceding example, the equality was assured by the procedure used in computing the owners' equity. The owners' equity was computed by subtracting the total liabilities from the total assets. In actual accounting practice, the owners' equity would not be computed in this manner, although the relationships are valid. The equality is actually used as a check rather than as a means of obtaining the amounts.

The equity section of the position statement is sometimes labeled "Liabilities and Owners' Equities." This is equally correct: it is somewhat longer than the term "Equities," but it is also more descriptive. Unfortunately, the equity side is also labeled "Liabilities" by some accountants. This is incorrect, because the rights of the owners should not be classified as liabilities. The right-hand side of the position statement consists of two basic types of

claims, the claims (or rights) of the owners and the claims of the creditors. Instead of claims, we can describe the right-hand side as asset sources.

Equality of Assets and Equities

The fact that assets must *always equal* equities (the rights of the creditors and owners) is sometimes difficult to realize. If a firm owns an asset, that asset is balanced by equal claims against the asset. Thus, if a stockholder contributes $100, the assets of the firm are increased by $100, as are the claims of the stockholders.

Each asset coming into a firm has a source. The source of the asset is recorded as an equity, and the sources of the assets must be equal to the assets owned by the firm. If material is purchased on account (the purchase price is still owed), the source of the asset is the trade creditor to whom the money is owed, and the rights of this party are recorded as an equity item, a current liability. The sources of assets, or rights to the assets of the various parties with claims, cannot be less than, or more than, the total assets. This equality of assets and claims to the assets (equities) can never be upset.

DEFINITION OF THE TERM "ASSETS"

Trying to define the term *assets* is a difficult task. The problem is to reconcile the definition with usage and not to get too far removed from good accounting theory. The following definition is offered as a working rule for accountants:

> Assets are the resources owned by the business entity, both intangible and tangible, the value of which can be objectively determined. Included are cost factors which have been incurred but which benefit future periods and thus are applicable as deductions against the revenues of future periods.

Examples of assets are:

Tangible Resources: land, buildings, equipment, inventories, cash, receivables from customers

Intangible Resources: patents, goodwill

Cost Factors Applicable to Future Periods: stock issue costs, bond issue costs, advertising costs which have been incurred and which are expected to benefit the next period of sales

For certain purposes, the preceding definition of assets will have to be adjusted. For example, it may be desirable to think in terms of the present value of future services if you are attempting to determine the over-all value

of an enterprise's assets. Costs incurred which are applicable to future periods would not be relevant unless they would influence the determination of future revenues. And, although the accountant usually records financial information using the available objective evidence (the basis of recording assets is generally their cost, since the cost of an asset is an objective measure), in the type of situation described, other evidence may be more useful (for example, the cost of a plot of land may be $24, but its economic value may far exceed $24). High-quality employees of the firm may have a large dollar value, since they will greatly affect future earnings. The accountant does not place a value on intangibles of this nature unless there is a measurable dollar outlay connected with the acquisition of the employees. For example, the accountant of a professional football team might record the $100,000 purchase cost of a star quarterback as an asset, but an equally fine quarterback obtained without cost (except for a year's wages) from a college campus would not appear in the accounting records as an asset.

The practices of our football team accountant highlights the need for flexibility in working with accounting data. The definition chosen by the accountant may have to be adjusted to fit the specific need for information.

Economic and Accounting Assets

It is important for the reader to understand the distinction between assets which are recorded and those which are not. The definition of assets introduced above includes the clause, "the value of which can be objectively determined." We may have economic assets whose value we cannot objectively determine, for example, the value of our employees or our customer goodwill. But even if we could determine their value (for example, if there were a purchase offer), the accounting convention would be not to record the asset, since there was not an explicit purchase of these items. The accountant applies a strict definition to the term "objective" as it applies to the recording of assets. It might be reasonable for the accountant to accept objective evidence of value other than an actual transaction. The profession has chosen the stricter, more easily applied interpretation, at some loss of usefulness, in those situations where the purchase cost bears little relation to the value of the asset acquired (for example, the costs of drilling an oil well compared to the value of the well as measured by the amount of oil in it). On the other hand, with the rules currently being used, the information is less subject to manipulation.

Applying the definition of assets introduced above, all accounting assets are economic assets (not all economic assets are accounting assets: accounting assets are a subset of economic assets). The fact that current practice sometimes allows items to be classified as assets which are not properly assets does

not change the validity of this statement. These non-assets should be reclassified. Unless an item is a resource which has value, it is not an economic asset, thus not an accounting asset.

When the term "asset" is used in this book, we will be referring to accounting assets. When an asset is acquired, an attempt will be made to record its present economic value as evidenced by the amount actually paid for the asset. Thus, a list price of $3,000 for an automobile would not be relevant if the purchaser paid $2,500 for the car. The asset would be recorded at $2,500.

Classification of Assets

The basic division of the asset section of the position statement is in two sections, "Current Assets" and "Fixed Assets." Current assets are cash, items than can be readily turned into cash, or assets which will be used in a year or in the operating cycle of the firm, if the operating cycle is somewhat more than a year. *Operating cycle* refers to the average time it takes to convert raw material into a finished product, sell it, and collect the cash. Many companies prefer to use a year as the determining factor rather than attempt to compute (or define) the operating cycle applicable to their operations.

Current assets include such things as the cash on hand or in the bank, receivables from customers (accounts receivable), materials, supplies or goods on hand (inventories), readily marketable securities (marketable securities), and advance payments of insurance, rent, and the like (called *prepaid expenses*).

The listing of prepaid expenses as a current asset is justified, since the advance payment will be used in earning revenues during the next operating period. Because the expenses are prepaid, they do not require the outlay of cash resources they might otherwise require.

Long-lived, or fixed, assets have a life greater than a year and cannot readily be turned into cash without disrupting the normal business operations. This means that a building, even though it could be sold, is not a current asset if it cannot be sold without disrupting the normal course of business. On the other hand, an investment in common stock of an uncontrolled corporation would not be considered a fixed asset, because it could be sold without disrupting operations.

Fixed assets include land, buildings, and equipment, when these items are used in operations. Their common characteristic is one of long life. In certain industries, equipment will be considered inventory (for example, the inventory of a machine tool dealer).

Some assets do not fit neatly into either of the two classifications given. These items are either placed between current and fixed assets (investments

are treated in this manner) or placed below the fixed assets (patents, trademarks, goodwill, and other intangible assets are treated in this manner).

The distinction between marketable securities and investments should be noted. Marketable securities are investments for which there is a ready market and which are *not* being held for control purposes. Investments refer to securities being held for control purposes and therefore not likely to be sold. A corporation may have control of a second corporation in order to insure a steady and reliable source of supply of raw material, to round out its product line in an industry, or to increase its diversification and make it less vulnerable to changing business conditions. It is possible for an asset held as an investment to become a marketable security if the corporation intends to dispose of its holdings.

Tangible and Intangible Assets

The distinction between tangible and intangible assets is not always clear; thus it is difficult to define the two terms exactly. Generally, tangible assets may be seen or touched (for example, equipment, inventories, and plant); however, an accounts receivable cannot be touched, and it is considered to be a tangible asset (it can be readily sold or collected and turned into cash). Intangible assets cannot generally be touched, though here, too, there are exceptions. A patent is considered to be intangible, but the patent papers are of physical substance.

We should distinguish between the concept of intangible assets for decision purposes and for accounting purposes. For decision purposes, an intangible asset results from the willingness of some party to have paid an amount for an asset (or more generally, a collection of assets) in excess of the value of the tangible assets associated with the exchange. This excess may be called an intangible asset. For accounting purposes, an intangible asset may come into being by a purchase as just described or by an expenditure of resources to accomplish some objective, where this objective will benefit future periods, even though the object purchased is not of a physical nature. Thus, intangible assets may come into being in connection with the issue of stock or bonds (issue costs), organizing a new corporation (organization costs), or developing a new process (research and development costs). These cost factors may properly be considered assets, since we consider the firm to be a going concern, and we are not interested in liquidation values. A decision maker would consider these costs not to be relevant factors in a purchase of the enterprise, though he would consider the benefits resulting from the expenditures in making his decision. These intangible costs should be charged as expenses in the periods which are benefited by the expenditures.

CLASSIFICATION OF EQUITIES

The equity side of the position statement has two main divisions and several subdivisions. The basic division is into "Liability" and "Stockholders' Equity" sections. The liabilities are divided into current and long-term liabilities. The stockholders' equity section has several subdivisions, but essentially it is divided into "Capital Received from Stockholders" (capital contributed by stockholders) and "Retained Earnings" (earnings retained for use in the enterprise).

The term "liability" refers to the amount owed to a party, who is called a creditor. The amount may be due sometime in the future and still be a liability today, i.e., there is an obligation of known amount, even though the amount does not have to be paid for some period of time. Because money has value through time, the amount indicated as a liability today may not be the same amount which will be paid sometime in the future. We may have an obligation to pay $100 one year from today and indicate $90.91 as the liability today, assuming $100 due one year from today is only worth $90.91 today ($90.91 plus 10 per cent interest for a year is equal to $100). The liability will increase gradually to $100 as the maturity date approaches.

In some cases the exact amount to be paid is not known. We can estimate our income tax liability and show it as such even though the amount is not certain and will not be certain until detailed computations are made (and reviewed by several parties, including the internal revenue service).

Current liabilities include amounts owed to trade creditors (accounts payable), workers (wages payable), government (taxes payable), investors (interest or dividends payable), and customers (advances by customers). All are liabilities due within a year (or within the operating cycle of the firm).

Long-term liabilities include amounts which are owed but do not have to be paid within a year. The most common long-term liabilities are bonds, mortgages, and notes. If part of these items is due within 12 months, that amount should be classified as a current liability. The facts relative to the due date determine the classification, not the title.

The retained earnings balance (sometimes called "Earned Surplus" or "Surplus") is equal to the sum of the past earnings of the enterprise minus any dividends which may have been paid. The capital received from stockholders is equal to the amount contributed by the stockholders and is usually divided into several accounts. This technicality will be ignored for a few chapters, and the entire amount will appear as "Capital Received from Stockholders."

SAMPLE POSITION STATEMENT

The position statement illustrated here is not complete in all details, but it does show the basic arrangement for a position statement. This statement will be expanded in later chapters, but it will not be basically changed.

Note that the current assets are listed in order of liquidity, the most "current" or liquid assets listed first. The long-lived or "fixed" assets are listed

SAMPLE COMPANY

Position Statement
as of December 31, 19—

Assets

Current Assets			
Cash on Hand		$ 2,000	
Cash in Bank		30,000	
Marketable Securities		8,000	
Accounts Receivable		60,000	
Inventories		50,000	
Prepaid Expenses		2,000	
Total Current Assets			$152,000
Investments (Stock of Controlled Corporations)			40,000
Long-Lived Assets			
Land		$15,000	
Buildings		53,000	
Equipment		20,000	
Total Long-Lived Assets			88,000
Total Assets			$280,000

Equities

Current Liabilities			
Accounts Payable	$30,000		
Taxes Payable	70,000		
Total Current Liabilities		$100,000	
Long-Term Liabilities			
Bonds Payable		80,000	
Total Liabilities			$180,000
Stockholders' Equity			
Capital Received from Stockholders		$90,000	
Retained Earnings		10,000	
Total Stockholders' Equity			100,000
Total Equities			$280,000

with the longest lived of the assets listed first, that is, land is followed by buildings and equipment. Current liabilities may be listed in any order. In preparing a position statement, the arrangement of the items and the appearance of the statement are important. The reader will expect to find items in specific locations, and the person preparing the report should either conform to current practice or warn the reader of differences in presentation.

MANAGERIAL USES OF THE POSITION STATEMENT

The primary function of a position statement is to indicate the financial position of the organizational unit. A bank considering a loan to a corporation obviously would want to know the financial position of the corporation as of the date of the loan (or as close to that date as possible). The primary internal use of a position statement is very similar. Management uses the position statement as a means of measuring the soundness of the financial position of the firm. If the raising of more capital is being considered, the position statement will help management to make a rational decision as to the type of capital (debt or stock equity) which should be sought.

By looking at the statements for successive periods, management can observe changes in specific items. If the direction and the amount of the change are undesirable, management can often take action to correct the situation. For example, an increase in accounts receivable (the amounts owed by the customers to the company) may indicate inefficiency in the operation of the collection department. While individual items such as accounts receivable will be the subject of separate reports, it is helpful when all assets and equities are collected in one display so that the various items may be readily compared with each other.

Position statements prepared for management should be designed especially for the executives to whom they are being sent. Top management has no need for statements showing pennies; in fact, very large companies round off the dollars to the nearest hundred thousand or million dollars. Reports may also be simplified by combining similar items. Thus, prepaid expenses may include prepaid rent, insurance, taxes, etc. The aim of these simplifications is to save time when executives review the statement and to avoid overwhelming them with too extensive an array of numbers.

The most important thing to remember in preparing position statements for managerial use is that a report prepared in accordance with generally accepted accounting techniques may not be useful for decision-making. This means that the conventional position statement may have to be adjusted before it can be helpful to management.

QUESTIONS AND PROBLEMS

2–1 The assets of a corporation total $10,000; the liabilities, $4,000. The claims of the owners are _____.

2–2 The assets of a corporation total $10,000; the claims of the owners are $7,000. The total liabilities are _____.

2–3 The liabilities of a corporation are $3,000; the claims of the owners are $6,000. The total assets are _____. Total equities are _____.

2–4 Give the relationship of assets, liabilities, and owners' equity in three different equations (solve for each of the above items).

2–5 The Abbey Corporation

From the following information, presented as of December 31, 1964, prepare a position statement in good form:

Liabilities	$6,000
Cash	5,000
Materials	4,000
Buildings	9,000

2–6 The Abelard Corporation

From the following information, presented as of December 31, 1964, prepare a position statement in good form.

Accounts Payable	$ 30,000	Wages Payable	$60,000
Cash on Hand	2,000	Marketable Securities	10,000
Cash in Brank	125,000	Accounts Receivable	40,000
Inventories	80,000	Buildings	60,000
Land	20,000	Prepaid Expenses	1,000
Bonds Payable	150,000	Capital Received from Stockholders	50,000
Retained Earnings	?		

2–7 The Acton Corporation

From the following information prepared as of December 31, 1964, prepare a position statement in good form.

Bonds Payable	$ 50,000	Wages Payable	$ 3,000
Land	10,000	Capital Received from Stockholders	40,000
Inventories	40,000	Prepaid Expenses	2,000
Cash in Bank	105,000	Building	60,000
Cash on Hand	1,000	Accounts Receivable	10,000
Accounts Payable	30,000	Marketable Securities	30,000
Taxes Payable	20,000		
		Retained Earnings	?

2–8 The Addison Corporation

The Addison Corporation has been operating for a period of years. In October, 1964, the accountant of the company disappeared, and with him disappeared the records of the company.

You are hired to reconstruct accounting records, and with this in mind you make an inventory of all assets which the company owns. By checking with banks, counting materials on hand, investigating ownership of buildings, equipment, etc. you find the following information:

	Balance or Market Value as of November 30, 1964
Cash on Hand	$ 3,000
Cash in Bank	53,000
Inventories	14,000
Accounts Receivable	10,000
Marketable Securities	5,000
Land	15,000
Buildings	20,000
Equipment	25,000

Bills received from creditors and invoices found in the office indicate that $40,000 is owed to trade creditors. There is a $10,000 long-term mortgage (20 years) outstanding.

Interviews with the board of directors and a check of the common stock record book indicate that there are 1,000 shares of common stock outstanding and that the stockholders have contributed $30,000 to the corporation for the shares of the stock. There is no record available as to the history of past earnings or dividend payments.

Prepare a position statement for the Addison Corporation as of November 30, 1964.

2–9 The Adler Corporation

From the following information, obtained as of December 31, 1964, prepare a position statement in good form.

Accounts Payable	$ 10,000	Land	$10,000
Dividends Payable	4,000	Equipment	60,000
Cash	20,000	Accounts Receivable	15,000
Marketable Securities	10,000	Interest Payable	1,000
Investments	40,000	Merchandise	18,000
Bonds Payable	50,000	Supplies	2,000
Capital Received from Stockholders	100,000	Buildings	50,000
		Retained Earnings	?

2–10 It is sometimes stated that the asset side of a position statement should include the rights in property, both tangible and intangible, of a business enterprise. Accepting this statement, discuss whether the following items should be included among the assets:

(a) Investment in government bonds
(b) Investment in corporate bonds
(c) Prepaid expenses
(d) Costs of drilling for oil (assuming oil was found)
(e) Advertising costs connected with selling a new product (not yet offered for sale)
(f) Costs of organizing a new corporation
(g) Costs connected with issuing bonds
(h) Costs of installing a piece of equipment
(i) Costs of drilling for oil (assuming oil was not found)

2–11 Indicate which of the following items might be expected to be found on a position statement prepared in accordance with generally accepted accounting principles (the basic framework of accounting).

(a) The value of the managerial organization which had been developed through the years
(b) The cost incurred at the time of the organization of the firm in organizing the firm
(c) The value of oil which had been discovered under a corporate parking lot
(d) The value of the goodwill of customers toward the firm (the goodwill had been built up through the years by good service)
(e) The excess of the cost of an enterprise which had been purchased over the value of the tangible assets acquired (consider tangible assets to refer to the value of inventories, plant, and equipment)

2–12 A large number of corporations enter into long-term lease contracts. These may be for land, buildings, or equipment; for example, automobiles or lift trucks may be obtained on lease, as may electronic computers and lathes. Assume a company enters a contract to lease an electronic computer for five years at a cost of $480,000 a year. The payments are $40,000 per month. The lease can be broken only with a significant penalty payment.

(a) Does the company have an asset after the computer is installed? If yes, what value is appropriate?
(b) Does the company have a liability after the computer is installed? What is the amount? Assume a zero rate of interest (this makes adjustment for time of payment unnecessary).
(c) If the company purchased the computer using a bank loan, would the company have an asset? What would be the approximate cost of the computer?

3

Recording Transactions Directly to the Position Statement

THE STATEMENT THAT each financial transaction is recorded twice has resulted in the name "double entry bookkeeping." The basis of accounting is not the recording of transactions twice, but rather the recording of each transaction completely. Accounting theory recognizes that each transaction has two sides; thus at least two items are affected by each transaction. If you buy a suit and pay cash, your cash is decreased and the investment in suits increases. If a debt is paid by a firm, the cash decreases and the liability decreases. There is no financial transaction that does not affect at least two items.

Corporations are formed to provide a service or product, and when this service or product is sold, assets come into the firm. The measurement of those assets is called *revenue*, and the entire transaction is called a *revenue transaction*. A part of the revenue transaction is the recognition that some asset values expired in the earning of the revenues. The decrease in assets is called *expense*. The difference between the revenues and the expenses of a period is the *income* of the period.

SAMPLE TRANSACTIONS

In this chapter, each financial transaction will be recorded directly to the position statement. After each transaction, a new position statement will be prepared. Thus the financial position of the firm will be known at all times.

Transaction 1 illustrates a situation where both assets and equities increase. The cash increases by $10,000, as does the capital received from stockholders (representing the investment of the stockholders).

Transaction 2 also illustrates a situation where both assets and equities increase, but here the equity is a current liability. The asset (merchandise) is increased by $5,000, as is the liability, accounts payable (the amount owed to a trade creditor).

Transaction 3 is a slightly more complex entry. There is an increase in one asset, a decrease in another, and an increase in long-term liabilities. Building costs increase by $20,000, and this is balanced by a decrease in cash of $4,000 and an increase in bonds payable of $16,000 (bonds payable is a long-term liability).

Transaction 4 illustrates a decrease in an asset and a decrease in liabilities. Cash is decreased by $5,000, and accounts payable is decreased by a like amount.

After the recording of each transaction, the equality of assets and equities is still maintained. The statement can never be out of balance if the transactions have been correctly recorded.

Transaction 1. Stockholders invest $10,000 in the Sample Company.

Assets		Equities	
Cash	$10,000	Capital Received from Stockholders	$10,000

Transaction 2. The company buys $5,000 of merchandise; the payment must be made in 30 days.

Assets		Equities	
Cash	$10,000	Accounts Payable	$ 5,000
Merchandise	5,000	Capital Received from Stockholders	10,000
	$15,000		$15,000

Transaction 3. The company buys a building for $20,000, pays $4,000 cash, and issues bonds for the balance ($16,000).

Assets		Equities	
Cash	$ 6,000	Accounts Payable	$ 5,000
Merchandise	5,000	Bonds Payable	16,000
Building	20,000	Capital Received from Stockholders	10,000
	$31,000		$31,000

Transaction 4. The merchandise (see Transaction 2) is paid for.

Assets		Equities	
Cash	$ 1,000	Accounts Payable	$ ——
Merchandise	5,000	Bonds Payable	16,000
Building	20,000	Capital Received from Stockholders	10,000
	$26,000		$26,000

The Revenue Transaction

What happens if the merchandise is sold at a price which is different from the amounts paid for it? The sale of the merchandise is called a *revenue transaction* and is commonly characterized by a decrease in an asset (the asset sold), a decrease in other assets to recognize the expenses of obtaining the sales, an increase in assets to recognize the receipt of assets from the customer, and an increase in retained earnings (decrease if not a profitable transaction). The revenue transaction is not always accompanied by all these events. Thus, if the revenue arises from the performance of a service, there may not be a decrease of an asset arising from the sale of a product.

To illustrate a revenue transaction, continue the above example and assume that $3,000 of the merchandise on hand is sold for $5,000. The only other expense is the cost of using the building. It is estimated that one-fortieth of the cost of the building has expired during the period in which the sales were made.

Assets		Equities	
Cash	$ 6,000	Bonds Payable	$16,000
Merchandise	2,000	Capital Received from Stockholders	10,000
Building	19,500	Retained Earnings	1,500
	$27,500		$27,500

This position statement results from a complex transaction which requires explanation. The cash is increased by $5,000, the amount received from the customers. The building is decreased by $500, one-fortieth of its cost; merchandise is decreased by $3,000; and the retained earnings is increased by $1,500. The reason why the two sides of the position statement are still in balance may be found by examining the following table:

Increases in Assets		Increases in Equities and Decreases in Assets	
Cash	$5,000	Merchandise	$3,000
		Building	500
		Retained Earnings	1,500
	$5,000		$5,000

If the results of the operations of the period had not been profitable, the procedure would have been exactly the same except that the retained earnings would have been *negative*, thus causing the title to change to *deficit*. The difference between the revenues of a transaction and the expenses connected with gaining of those revenues is called *income*, if the amount is positive, or *loss*, if negative. In the above example, the income is $1,500.

Distributions of Income

If dividends are paid to stockholders and interest to bondholders, the effect is to decrease the amount of earnings retained for use in the enterprise. Continuing the above example, assume that $300 is paid to the stockholders as dividends and $200 is paid to the bondholders. The effect of these transactions is to decrease cash by $500 and to decrease retained earnings by an equal amount.

Assets		Equities	
Cash	$ 5,500	Bonds Payable	$16,000
Merchandise	2,000	Capital Received from Stockholders	10,000
Building	19,500	Retained Earnings	1,000
	$27,000		$27,000

Other Costs

If there are other costs incurred in making the sales (for example, sales salaries), these costs may be temporarily set up as assets until the revenue transaction is recognized, and then their expiration may be recorded. The justification for recognizing various costs as assets is easier to explain and justify where a product is being made. For instance, if a worker is cutting firewood, the cost of the firewood set up as an asset should include the labor cost of the worker engaged in the cutting of it.

If $1,000 of wage costs were incurred in making $5,000 of sales in the preceding example, the $1,000 would be recognized as an asset (selling labor cost), and when the revenue transaction was recognized, the cost would be decreased to zero. The additional cost would affect the amount of income and the increase in retained earnings. The income would then be $500 instead of $1,500, since the income for the period had been reduced by the $1,000 of selling labor expense. A statement of revenues and expenses (income statement) would show the following:

THE SAMPLE COMPANY

Income Statement

Sales Revenues		$5,000
Less Expenses:		
Cost of Merchandise Sold	$3,000	
Expense of Using Building	500	
Selling Labor Expense	1,000	4,500
Net Income		$ 500

When Do Costs (Assets) Become Expenses?

The problem of when to recognize a cost factor as an expense is one of the most perplexing problems the accountant faces. It is easier to describe what should *not* be done than to describe what should be done. For example, whether or not the cost has been paid for with a disbursement of cash has nothing to do with the determination of whether or not it should be recognized as an expense. Thus the electricity consumed in lighting a store is an expense of the revenues earned, even though the electric bill has not yet been paid. If the electricity is used to run a machine, then the cost of the electricity is not considered an expense until the product being made is sold.

Labor costs in a manufacturing situation are considered to be an asset (or cost factor) until the product being made is sold. They become part of the work in process inventory and then the finished goods inventory, but they do not become an expense until the product is sold. For the sake of simplicity, it is not unusual for labor costs of a merchandising firm to be considered as expenses of the revenues earned, and the technically correct step of first recognizing them as assets is bypassed. This is not harmful, because the labor costs of a merchandising firm would only rarely be considered unexpired at the end of the period.

The guiding rule is that costs should be matched with the revenues which they help earn and that the cost factors become expenses when the revenues have been earned.

ACCOUNTING AND ECONOMIC TRANSACTIONS

In Chapter 2, we distinguished between accounting and economic assets. The accounting conventions which gave cause for the necessity of that distinction also require that we distinguish between accounting and economic transactions.

For a transaction to be classified as an accounting transaction, some form of economic exchange must have taken place. For example, a purchase is an accounting transaction, as is the payment of a debt. But there may be events where there is economic change which does not meet the accounting convention requirements. A production worker may turn the wrong valve, resulting in the discovery of a new plastic. From the point of view of the corporation, this is an economic event, but there is no accounting entry made. The dollars exchanged are zero; thus the transaction is not recorded. From an economic standpoint, fortuitous circumstances have resulted in the corporation acquiring know-how with a large value, but the accountant chooses not to

record this change until the value is realized by the sale of the product through the years. This is an application of the realization convention (the practice is also conservative).

Economic events for which there has not been an explicit exchange of resources (i.e., acquisition or disbursement of assets) are not generally considered to be the basis of accounting transactions. This type of transaction occurs most frequently where there has been an accretion in value which has not been realized by an explicit sale. The accountant does not record the transactions, since he claims there is no objective evidence of the increase in value nor has there been realization. Thus, if a paper company plants seedling and these seedlings grow, the increase in value arising from the increased value of the seedlings as they turn into trees would generally not be entered on the accounting records. In like manner, an investment (say in land) may have increased in value because of economic changes, but again the accountant might not record the change. Also, changes in customer attitudes toward the corporation or its products would not be recorded, though these changes may drastically affect the firm's financial position (here again, objective measures would be considered to be lacking).

There is a broad area of transactions which the accountant does not attempt to record because of the lack of objective evidence or because it would not be conservative. The user of financial information must be aware that the accountant has drawn a line dividing economic changes into two classifications: those subject to recording and those whose recording is postponed until another transaction takes place, namely one which gives cause for the accountant to define the increment as being realized. There will be many situations where an analyst will choose to consider economic transactions which do not qualify as accounting transactions (with the current definitions) in order to gain a more complete picture of the financial affairs of the corporation.

QUESTIONS AND PROBLEMS

3–1 The Armstrong Corporation

Record the following transactions directly to the position statement. After each transaction, prepare a new position statement. The answer to this problem will consist of four position statements.

1964	
Jan. 5	Stockholders invest $12,000 in the Armstrong Corporation.
Jan. 7	The company buys $7,000 of merchandise on account.
Jan. 8	The company buys $1,000 of supplies and pays cash.
Jan. 15	The company pays $2,000 to the creditors.

3–2 The Arnold Corporation

The financial position of the Arnold Corporation as of January 15, 1964 was as follows:

Assets		Equities	
Cash	$ 6,000	Accounts Payable	$ 4,000
Merchandise	5,000	Capital Received from Stockholders	5,000
Supplies	1,000	Retained Earnings	6,000
Prepaid Rent	3,000		
	$15,000		$15,000

For the day of January 16, the following information was accumulated:

Sales (all for cash)	$8,000
Cost of Merchandise Sold	4,000
Rent Applicable to January 16	100
Supplies Used	400

Prepare a position statement as of January 16, after taking note of the foregoing information.

3–3 The Asta Corporation

Record the following transactions directly to the position statement of the Asta Corporation. The answer to this problem will consist of five position statements.

1964

Jan. 15 Stockholders invest $100,000 in the Asta Corporation.

Jan. 20 The following purchases are made (and cash paid):

Merchandise	$10,000
Building	40,000
Equipment	15,000

Jan. 24 Additional merchandise is purchased on account, $20,000.

Jan. 26 The company issues $40,000 of bonds and receives that amount of cash from the investors.

Jan. 31 The following summary of January's sales and costs is prepared:

Sales (all for cash)	$12,000
Cost of Merchandise Sold	7,000
Wages (all paid for in cash)	2,000
Cost of Using Building (decrease building) *	600
Cost of Using Equipment (decrease equipment) *	400

3–4 The Atkins Corporation

The financial position of the Atkins Corporation as of January 31, 1964, was as follows:

* Costs of this nature are frequently referred to as "depreciation."

Assets		Equities	
Cash	$12,000	Accounts Payable	$18,000
Accounts Receivable	20,000	Capital Received from Stockholders	13,000
Merchandise	18,000	Retained Earnings	20,000
Prepaid Rent	1,000		
	$51,000		$51,000

For the first week in February, the following information was accumulated:

Sales for Cash	$2,000
Sales on Account	3,000
Cost of Merchandise Sold	2,600
Wages Paid (and earned)	1,300
Expiration of Rent	100
Collections of Accounts Receivable	4,000

Prepare a position statement as of the end of the first week in February (February 7), after taking note of the foregoing information.

3-5 The Adams Manufacturing Corporation

The financial position of the Adams Manufacturing Corporation as of January 15, 1964, was as follows:

Equities		Assets	
Cash	$10,000	Accounts Payable	$20,000
Inventories	20,000	Capital Received from Stockholders	15,000
Plant and Equipment	30,000	Retained Earnings	25,000
	$60,000		$60,000

For the day of January 16, the following information was accumulated:

Sales (all for cash)	$9,000
Manufacturing cost of goods sold	4,000
Cost of using plant and equipment (decrease plant and equipment)	1,000
Wages earned by factory workers during the day	2,000

Manufacturing cost of goods sold is an expense classification which includes all costs connected with manufacturing the goods which are sold. There were no cash disbursements during the day. Prepare a position statement after taking note of the foregoing information.

3-6 Indicate which of the following economic events would give rise to an accounting entry recording the change in value.

(a) An oil well which had been thought to be uneconomic becomes a valuable property because of a new process which enables the oil to be extracted from the ground.

(b) Land owned by a corporation doubles in value because of a new plant being built in the same area.

(c) An oil well which had been thought to be very valuable suddenly is lost because of political events.
(d) A highly respected vice-president leaves the firm to become the president of a competing firm.
(e) Timber land which was bought last year with mature timber suffers a bad fire.
(f) The seedlings on timber land owned by the company become one year older and grow accordingly.

4

Recording Transactions: Debits and Credits

In the previous chapters, the transactions were recorded directly to the position statement. Obviously, this would become extremely cumbersome in practice because of the heavy volume of transactions. In addition, information relative to specific items and transactions could be lost as successive transactions were recorded. By inspecting the entire series of position statements, the various transactions could be reconstructed, but this type of analysis would be exceedingly time-consuming.

To provide a history of each item and to dispose efficiently of the large amount of clerical effort required when the entries are recorded directly to the position statement, the accountant records transactions in *accounts.*

NATURE OF AN ACCOUNT

A separate account is provided for each item in the position statement. In order to be able to record transactions, we must be able to record additions and subtractions. This is solved by drawing a vertical line and deciding that additions will be recorded on one side and substractions on the other. The one requirement of the system is that *if assets* are increased by entries on the *left-hand* side of the account, *equities* must be increased by entries to the *right* side of the equity account. Thus the reader has the very simple task of memorizing one convention. *Assets* are *increased* by entries to the *left-hand* side of the account. This is the convention employed by accountants in the United States.

If assets are increased by entries to the left-hand side of the account, then all other rules follow automatically:

Assets are decreased by entries to the right side.
Equities are increased by entries to the right side.
Equities are decreased by entries to the left side.

Any Asset Account	
Increases	Decreases

Any Equity Account	
Decreases	Increases

All the reader has to memorize is the following account. Increases for equities are the opposite of increases for assets. Thus, equity accounts are increased by entries to the right-hand side.

Any Asset Account
Increases

The account form illustrated above is commonly called a "T" account. The formal account may differ in detail, but its use is the same. To illustrate the use of accounts, the same transactions which were recorded directly to the position statement in the preceding chapter will be recorded here in accounts.

TRANSACTIONS

1. Stockholders invest $10,000.
2. The company buys $5,000 of merchandise on account.
3. The company buys a building for $20,000, pays $4,000 cash, and issues $16,000 of bonds.
4. The merchandise (see Transaction 2) is paid for.
5. Revenue of $5,000 is received for merchandise which cost $3,000. One-fortieth of the cost of the building has expired.
6. Dividends of $300 are paid.
7. Interest of $200 is paid.

The identifying number of the transaction appears in the "T" account near the dollar amount. This facilitates cross-reference. The procedure is called *keying* the transaction.

Cash	
(1) $10,000	(3) $4,000
(5) 5,000	(4) 5,000
	(6) 300
	(7) 200

Capital Received from Stockholders	
	(1) $10,000

Accounts Payable	
(4) $5,000	(2) $5,000

Merchandise		Bonds Payable	
(2) $5,000	(5) $3,000		(3) $16,000

Building		Retained Earnings	
(3) $20,000	(5) $500	(6) $300 (7) 200	(5) $1,500

Equality of Entries

For each *transaction* the amounts recorded on the left side of the accounts are equal to the amounts recorded on the right side of other accounts. This equality must always exist. For each transaction the left- and right-hand amounts must always be equal. This is true because we record both sides of the transaction.

The assets and equities started out equal. The fact that each entry is balanced (the left-hand and right-hand amounts are equal) ensures that the equality is not altered by additional entries.

Debits and Credits

By now the reader will probably have noted the awkwardness of speaking of entries "to the left side of an account" and entries "to the right side of the account." This difficulty is eliminated by the use of specialized terminology. Thus, instead of entries to the left side of an account, the accountant speaks of *debits* (abbreviated Dr.); instead of entries to the right side of an account, the accountant speaks of *credits* (abbreviated Cr.). These are the primary definitions of debits and credits. The reader is likely to run into confusion if he attempts to use such words as debtor or creditor as an assistance to understand what the accountant means by debit and credit. The only definition that must be known is that *a debit is an entry to the left-hand side of an account.* It follows that a credit is an entry to the right-hand side of an account.

It has previously been shown that an entry to the left-hand side of an asset account increases that account (thus a debit increases an asset account) and that a credit will have the opposite effect. In like manner, a credit will increase an equity account, and a debit will decrease it.

Any Asset Account		Any Equity Account	
Debit (increase)	Credit (decrease)	Debit (decrease)	Credit (increase)

The term *charge* is often used interchangeably with debit. Thus a charge to a customer's account is a debit.

Accounting Transactions

In any accounting entry, the debits must equal the credits. This is synonymous with the statement that entries to the left-hand side of accounts must equal entries to the right-hand side. Entries may take many forms, for there are a variety of transactions which will cause debits and credits.

Some basic possibilities are listed in the following illustration. It is not possible to make an entry that increases one asset and to make another entry that also increases an asset (two debits and no credits). Nor is it possible to make an entry that increases liabilities and stockholders' equity but does not affect another account (two credits and no debits). There *must be* a debit as well as a credit for making up a complete financial transaction.

Illustrations of basic possibilities of entries are:

1. Increase in an asset and increase in a liability.
   Borrowing $500 on a note from the bank (Dr. Cash and Cr. Notes Payable).
2. Increase in an asset and an increase in stockholders' equity.
   Investment of $400 by stockholders (Dr. Cash and Cr. Capital Received from Stockholders).
3. Increase in an asset and decrease in an asset.
   Buy a piece of equipment for $300 (Dr. Equipment and Cr. Cash).
4. Increase in the stockholders' equity and decrease in a liability.
   Bonds are converted into capital stock (Dr. Bonds Payable and Cr. Capital Stock).
5. Increase in a liability and decrease in the stockholders' equity.
   Dividends are declared (Dr. Retained Earnings and Cr. Dividends Payable).
6. Decrease in an asset and decrease in a liability.
   Dividends are paid (Dr. Dividends Payable and Cr. Cash).
7. Decrease in an asset and decrease in the stockholders' equity.
   Capital stock is retired by the company (Dr. Capital Received from Stockholders and Cr. Cash).

The procedure for deciding on the entries to be made in recording a financial transaction actually consists of three steps:

1. Deciding what accounts are affected.
2. Deciding whether to debit or credit the accounts.
3. Deciding on the amounts to be debited or credited.

Assume that $500 of accounts payable are paid. What accounts are affected? "Cash" and "Accounts Payable" are the two accounts affected. Cash

is decreased and accounts payable is decreased. To decrease an asset, it is necessary to credit it, and to decrease a liability, it is necessary to debit it. Thus the transaction is recorded by debiting accounts payable and crediting cash for $500. This type of systematic analysis is invaluable in recording transactions.

There may be combinations of the various types of entries illustrated. Assume that a building is purchased for $30,000 and that $10,000 cash is paid, while the remainder of the purchase price is satisfied by the issuance of common stock to the seller of the building. There are three accounts affected: "Building" is increased by $30,000 (debited), "Cash" is decreased by $10,000 (credited), and "Capital Received from Stockholders" is increased by $20,000 (credited).

Account Balances

For many purposes, it is necessary to determine the balance in an account. This is accomplished by adding the debits, adding the credits, and determining the difference between the two. In the problem illustrated earlier in this chapter the cash account was as follows:

Cash

(1)	$10,000	(3)	$4,000
(5)	5,000	(4)	5,000
		(6)	300
		(7)	200

The debits total $15,000, and the credits total $9,500; the difference is a debit *balance* of $5,500. This may be solved by using a formal process called *ruling and balancing*. The accountant determines the amount necessary to balance the two accounts, inserts it in the proper column so that the two columns have equal totals, checks the balancing figure by actually totaling the numbers on the debit and credit sides, and then carries forward the balance so that each account shows the opening balance. The account will then appear as follows:

Cash

(1)	$10,000	(3)	$4,000
(5)	5,000	(4)	5,000
		(6)	300
		(7)	200
		Balance √	5,500
	$15,000		$15,000
Balance √	$5,500		

Revenue Transactions

In this chapter, revenue transactions are recorded in one complex entry. There is generally an increase in an asset (cash or accounts receivable) and a decrease in several asset accounts. The decrease results from two causes. First, an inventory item may have been sold, and the decrease in the value of the inventory must be recorded. Secondly, the expiration in value of cost factors, such as prepaid rent, is associated with the earning of the revenue. There may also be an increase in liabilities, as when wages earned but not paid are being recorded. If the result of the revenue transaction is favorable, the balancing entry to retained earnings will result in an increase to the account; otherwise there will be a decrease in retained earnings.

EXAMPLE

Assume the following account balances:

Cash	$15,000	Current Liabilities	$ 4,000
Merchandise	19,000	Capital Received from Stockholders	20,000
Prepaid Rent	1,000	Retained Earnings	11,000
	$35,000		$35,000

During the accounting period, cash sales of $20,000 are made. The cost of merchandise sold is $12,000. Wages of $3,000 are earned, and $2,600 of this amount is paid (the remainder is owed). The entire prepaid rent applies to this time period.

The revenue transaction would be as follows:

Debits:		
Cash	$20,000	
Credits:		
Merchandise inventory		$12,000
Cash (for wages)		2,600
Prepaid rent		1,000
Wages payable		400
Retained earnings		4,000

The asset accounts (merchandise, cash, and prepaid rent) are being decreased by the credits, while the two equity accounts (wages payable and retained earnings) are being increased. The credit to retained earnings reflects the fact that the operation was profitable.

Following chapters will present procedures which will facilitate the recording of revenues and expenses by the use of additional accounts. The advantage of the above procedure is that it breaks down the transaction into

its basic components. It also helps illustrate the fact that all transactions can be recorded using only asset and equity accounts, and the accounts to be added later are refinements.

SUMMARY

The convention is to *increase* an asset account with a debit and *decrease* an equity account with a debit. The procedure which increases one basic classification of accounts with a debit with the opposite effect to the other basic classification has the distinct advantage of resulting in a system where, for each entry, the debits must equal the credits (thus for the total of all entries, the sum of the debits must equal the sum of the credits). If we defined a debit as being an increase to all accounts, we would lose the useful check feature which results from the present procedure.

It is not important that we define a debit to increase assets; we could just as reasonably define it as a decrease. It is important that, having defined a debit as an increase to an asset account, it have the opposite effect on sources of assets. Since the changes in assets must equal the changes in sources of assets, this means that the debits must equal the credits for each transaction.

QUESTIONS AND PROBLEMS

4–1 (a) Certain accounts are increased by entries to the left side of the account, others by entries to the right side of the account. For each of the following items, indicate whether the amount should be entered on the right or left side of the account:

Increase Cash
Increase Wages Payable
Decrease Bonds Payable
Increase Retained Earnings
Decrease Cash in Bank
Increase in Capital Received from Stockholders

(b) For each of the above items, give an illustrative transaction and identify the resulting accounting entry.

4–2 (a) For each of the following transactions, indicate the two (or more) accounts which are affected and how they are affected (increase or decrease):

1. Cash is invested by the stockholders.
2. Merchandise is purchased on account.
3. The merchandise is paid for.

4. Insurance is purchased and paid for.
5. Merchandise is sold on account.
6. Dividends are paid to the stockholders.

(b) Indicate whether the accounts are debited or credited.

4–3 Set up "T" accounts and record the following transactions of the Babbitt Corporation:

1. Stockholders invest $100,000.
2. The company buys $9,000 of merchandise on account.
3. The company pays $4,000 of the amount owed for the merchandise.
4. One year's rent is paid, $1,200. The rent applies to the year beginning March 1.
5. Revenue for March, the first month of operations, is $9,900. All sales were for cash. The merchandise sold cost $5,800. Salaries paid to employees during the month were $1,000, and the firm owes $200 of wages as of the end of the month.
6. Dividends of $500 were paid to stockholders.

4–4 **(continuing problem 4–3)**
Prepare a statement of financial position as of March 31.

4–5 Taking the same situations described in problem 4–1, indicate whether the accounts should be debited or credited.

4–6 Give a one-sentence definition of a "debit."

4–7 The statement is often made that such and such is a debit to the community. Explain why this type of statement is meaningless from an accounting point of view.

4–8 Explain briefly how debits and credits affect the various types of position statement accounts.

4–9 Rule and balance the following accounts:

Cash in Bank		Accounts Payable	
Balance √ $20,000	$15,000	$15,000	Balance √ $24,000
25,000	12,000		13,000
5,000			

4–10 (a) Set up "T" accounts and record the following transactions; key all transactions:

1. Stockholders invest $100,000.
2. The company buys $12,000 of merchandise on account.
3. The company buys a building, paying $2,000 cash and assuming a $28,000 mortgage for the remainder of the purchase price of $30,000.

4. The merchandise (see Transaction 2) is paid for.
5. Sales of $9,000 are made. Of these sales, $7,000 are for cash and the remainder on acount. The cost of the merchandise sold is $6,000. One-thirtieth of the life of the building has expired during the period in which the sales were made. Wages earned and paid during this period were $1,200.
6. An amount of $800 is paid to the mortgagee. Of this amount, $560 is interest and the remainder is amortization of the principal.
7. Dividends of $400 are paid to the stockholders.

(b) Prepare a position statement as of December 31, 1964 (taking note of all the given transactions).

4–11 For each of the following transactions, indicate what accounts are likely to be affected and whether the accounts are likely to be debited or credited.

1. Money is received from stockholders.
2. Merchandise is purchased on account.
3. A building is purchased. Payment is made by cash and by taking out a mortgage.
4. A piece of equipment is sold for cash.
5. Dividends to stockholders are declared.
6. Dividends are paid to stockholders.
7. Bonds are issued and the cash received.
8. Bonds are converted into common stock.
9. Merchandise is sold for cash.
10. Interest is earned by the bondholders (owed by the company).

4–12 It is sometimes said that accounting is double-entry bookkeeping and is a waste of time because everything is recorded twice. Attempt to describe a financial transaction that affects only one account, or one in which the debits do not equal the credits.

4–13 (a) Set up "T" accounts and record the following transactions; key all transactions:

1. Stockholders invest $200,000, and stock is issued to the stockholders. The company starts operations on July 1.
2. The company rents a store. The rent is $12,000 a year. On July 1, the rent for six months is paid.
3. The company buys $20,000 of merchandise on account.
4. Sales of $15,000 are made during July. Of these, $10,000 are for cash and $5,000 on account. The cost of merchandise sold is $7,000.
5. The company pays $4,000 of the accounts payable.
6. Dividends of $1,000 are declared. They are payable as of August 15.

(b) Prepare a position statement for the X Company as of July 31.

5

Recording Transactions: Expense and Revenue Accounts

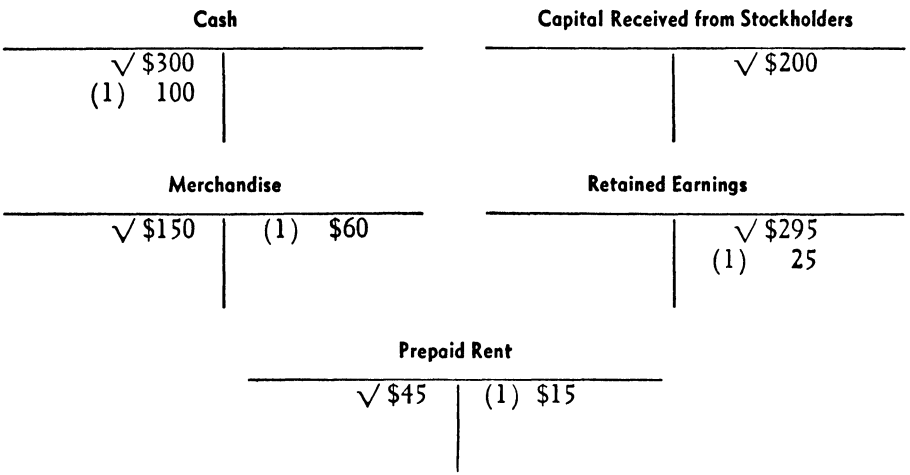
IN THE PREVIOUS chapters, the revenues and expenses were recorded in one complex transaction, and only asset and equity accounts were used. In this chapter, temporary accounts are introduced in which the revenues and expenses are recorded and accumulated separately. Revenue and expense accounts come into being not because of theoretical reasons but rather because of practical considerations. Imagine the difficulty of computing the expenses connected with the sale of one automobile, one can of soup, one gallon of gasoline, etc., just to be able to record the sale of each of those items. The difficulty is avoided by using temporary accounts to record the revenues and expenses, and by not computing the income of each sale. Management is interested in the results of the operations, but it does not need to know the profit of each individual sale. Sales may be grouped together and the results of the operations of a time period (month, quarter, year, etc.) determined. In special situations where the sales consist of items with a large dollar value per unit, the profit of the individual sale may well be determined.

Expense accounts are also useful in analyzing efficiency and controlling costs. They perform the function of itemizing the expenditure of resources in gaining the revenues. It should be remembered that an expense is recognized because an asset has expired. This may or may not be accompanied by an expenditure of cash. The sales effort connected with making a sale becomes an expense even though the salesman has not yet been paid. The same is true with electricity, rent, supplies, etc.

ILLUSTRATION OF REVENUE TRANSACTION, USING ONLY ASSET AND EQUITY ACCOUNTS

Assume that the opening balances of the below "T" accounts reflect the financial position of the Sample Company (the balances are indicated by checks

√). The transaction numbered 1 records the sale of $60 of merchandise for $100. The only other expense is the expiration of $15 of prepaid rent.



In order to record the sale, all the expenses and the income connected with the sale must be computed. This procedure is too expensive and unwieldy, and therefore the following system is employed in practice.

ILLUSTRATION OF REVENUE TRANSACTION, USING TEMPORARY ACCOUNTS

Henceforward, revenues and expenses will be recorded by using temporary accounts. Use the preceding illustration and add the following accounts:

Sales
Merchandise Cost of Goods Sold
Rent Expense

Instead of one entry, four entries will be required.

1. To record the receipt of the cash and the sale. An asset account (Cash) is debited and a revenue account (Sales) is credited for the amount of the sale.
2. To record the Merchandise Cost of goods sold.
3. To record the Rent Expense.
4. To close all temporary accounts, to compare expenses and revenues, and to record the income (increase in retained earnings).

Cash

√ $300	
(1) 100	

Merchandise

√ $150	(2) $60

Prepaid Rent

√ $45	(3) $15

Sales

(4) $100	(1) $100

Merchandise Cost of Goods Sold

(2) $60	(4) $60

Rent Expense

(3) $15	(4) $15

Capital Received from Stockholders

	√ $200

Retained Earnings

	√ $295
	(4) 25

The costs are first accumulated in asset accounts (Merchandise and Prepaid Rent) and are recognized as expenses (Merchandise Cost of Goods Sold and Rent Expense) only after the goods are sold or as the value of the asset decreases with the passage of time (for example, Prepaid Rent).

Only entry 1 (debit Cash and credit Sales) has to be made at the time of the sale. The other entries can be postponed until the end of the accounting period and then made in summary fashion. By being able to recognize the asset and the revenue increases without recognizing the expenses associated with each specific sale, a large amount of clerical work is eliminated. By multiplying the number of sales transactions by a million, you multiply the number of entries by a million under the procedure which does not use revenue and expense accounts. This is not true if revenue and expense accounts are used, since the entries to record expenses will be made periodically. Also, under the latter procedure, the information is classified in a useful manner. It is important that management knows the amount of the various expenses for the period; therefore, the use of expense accounts is desirable.

The characteristics of the revenue and expense accounts should be noted. The expense accounts are increased by debits, because they tend to decrease the stockholders' equity. Similarly, the revenue accounts are increased by credits, since revenues tend to increase the stockholders' equity. It is also connected with the fact that the $100 credit to revenue is analogous to the three credits (merchandise credit, $60; prepaid rent credit, $15; and retained earnings credit, $25) made under the first system. The revenue account is a

suspense account for these three credits until the expenses for the total revenues can be computed and subtracted, thus deriving the income.

Students frequently will incorrectly debit revenue accounts in an attempt to increase them. This arises from the following incorrect reasoning: "Assets are increased by debits (correct); revenues are assets and therefore they should be increased by debits (incorrect)." The assets that are received and which help measure the revenues are *debited*; the revenue account is *credited*. The revenue account, in a very strict accounting sense, is not an asset account, but rather it is a suspense account of decreases in assets and increases in stockholders' equities. The revenues are measured by assets but in themselves are not assets, but *sources* of assets. Just as accounts payable is credited to record an asset source, revenue is credited to record the source of assets arising from sale of products or services.

BOOKS OF RECORD: JOURNAL ENTRIES

To this point, all entries have been made in "T" accounts. The "T" account is a very useful device for recording accounting entries and is very closely related to the general ledger. The general ledger is the backbone of any accounting system because it is the group of accounts. It may take the form of a bound book (each page being an account), a loose-leaf notebook, or a collection of cards (each card being an account). The accounts which make up the ledger are very much similar to the "T" accounts. The prime difference is that there are additional columns for information, such as the date, explanations, and the reference for the entry. The usual reference is the journal page number.

The journal may take many forms, but by definition the journal is the book of original entry. The entry is first recorded in the journal and then transferred to the ledger. The most common form of journal entry is as follows:

Date		Account	LF	Debit		Credit	
19—							
Dec.	10	Cash		$100,000	00		
		Capital Received from Stockholders				$100,000	00
		To record the investment of $100,000 by the stockholders					

The debits are listed first. The credits are listed secondly and are indented to the right. An explanation is not necessary, although it is usually desirable, especially with unusual entries. The LF column is used to note the general ledger accounts (sometimes referred to as ledger folios; thus LF), in which the amounts are finally recorded. *After* the amounts are recorded in the ledger, the ledger account number is recorded in the LF column of the journal.

Recording Sales and Cost of Goods Sold

Assume that merchandise which cost $75 is sold for $100. The sale would be recorded as follows:

Cash	$100	
Sales		$100
To record the sale		

If the cost of merchandise sold is known, as in the preceding example, the following entry can be made:

Merchandise Cost of Goods Sold	$75	
Merchandise		$75
To record the cost of goods sold		

The foregoing procedure is illustrative of a *perpetual* inventory procedure. When the sale is recorded, the cost of goods sold is recorded as an expense.

In many cases, the cost of the merchandise sold is *not* known. In situations of this nature, only the first entry would be made. The second entry of recording the cost of goods sold would *not* be made at the time of the sale. At the end of the accounting period, an inventory would be taken, and the cost of goods sold would be computed, using the following formula:

$$\text{Cost of goods sold} = \text{goods available for sale} - \text{ending inventory}$$

or:

$$\text{Cost of goods sold} = \text{opening inventory} + \text{purchases} - \text{ending inventory}$$

The entry to record cost of goods sold would then be made "periodically," based on the results of the ending inventory and the given formulas. Thus, in practice, there may be a considerable time lag between the recording of the revenue entry and the recognition of the expenses connected with the gaining of those revenues. But all expenses will be recognized by the end of the time period for which the income is being determined. Since income is

generally measured at least once a year, expenses will be recognized and recorded at least yearly.

The Matching Concept—Timing of Expense Recognition

When should a cost factor (an asset) be recognized as an expense and be charged against the revenues of the period? An attempt is made to match the expenses with the revenues with which they are associated. Thus the cost of a building is charged to expense over its useful life. The revenues of each period of use bear some of the expense because of the facts than an asset is being used and the value of that asset (the building) is expiring.

It is important to note that the charging of a cost factor to expense is *not* connected to the actual disbursement of cash. The expense may appear in the accounting period even though the cash disbursement may have occurred in a period long since past (as in the case of a building) or in a future period (as is frequently true with merchandise or labor). The objective is to charge the revenues with the expenses associated with the earning of those revenues.

It frequently happens that an asset factor expires without having produced any revenue. An example of this type of transaction is the burning of a building or the theft of cash. Situations of this nature are described as "losses." A loss occurs when an asset is either partially or wholly depleted without equitable replacement by other assets.

Frequently, the accountant will not take note of the fact that an item is an asset (or cost) before recognizing that it is an expense. Where the cost factor expires and becomes an expense in the same period in which the firm acquires it, no material error results and it does save some bookkeeping effort.

QUESTIONS AND PROBLEMS

5-1 The Burns Company

The management of the Burns Company does not use expense and revenue accounts. The company follows the policy of computing the expenses associated with each individual sale. The following expenses are incurred and recognized for each sale:

Cost of merchandise sold.
Labor. (It is assumed that labor cost is equal to $0.10 per dollar of sales.)
Rent. (It is assumed that the rent expense is equal to $0.05 per dollar of sales.)
Insurance. (It is assumed that the insurance expense is equal to $0.01 per dollar of sales.)
Supplies. (It is assumed that supplies expense is $0.03 per dollar of sales.)

Assume that one sale is for $100. The merchandise that was sold cost $60.

Make the entries for the sale, using "T" accounts. The account balances before the transaction were as follows:

	Debits	Credits
Capital Received from Stockholders	$20,000	$20,000
Cash	$20,000	
Merchandise	10,000	
Labor Costs	2,000	
Prepaid Rent	800	
Prepaid Insurance	500	
Supplies	700	
Capital Received from Stockholders		$20,000
Retained Earnings		14,000
	$34,000	$34,000

5-2 The Burnside Company

(a) Record the following transactions for 1964, using "T" accounts (open any accounts you may need). The Burnside Company uses the periodic inventory procedure and does not relieve inventory at the time of sale.

1. Sales of $150,000 are made, of which $90,000 were made on account.
2. Collections during the period from customers were $95,000.
3. Merchandise purchased on account during the period was $80,000.
4. The merchandise inventory on December 31, 1964, was $45,000.
5. Payments to trade creditors for merchandise and supplies purchased were $85,000.
6. Supplies purchased on account during the period were $5,500.
7. On December 15, 1964, the rent for 1965 was paid, $5,000. The rent for the year 1964 was $4,000.
8. As of December 31, 1964, the company owed its employees $5,000 of wages.
9. Supplies on hand as of December 31, 1964, were $900.

The account balances before the transactions were as follows:

	December 31, 1963	
	Debit	Credit
Cash	$ 60,000	
Accounts Receivable	25,500	
Merchandise	60,000	
Supplies	500	
Rent (Prepaid)	4,000	
Labor Costs	65,000	
Merchandise Cost of Goods Sold	———	
Supplies Expense	———	
Rent Expense	———	
Accounts Payable		$ 40,000

	Debit	Credit
Wages Payable		———
Sales		———
Capital Received from Stockholders		100,000
Retained Earnings		75,000
	$215,000	$215,000

(b) Prepare a position statement for the Burnside Company as of December 31, 1964.

5-3 Explain why revenues are increased by credits and expenses are increased by debits.

5-4 Record the following transactions, using journal entries. When is the merchandise recognized as an expense?

1. Merchandise costing $19,000 is purchased on account.
2. Merchandise that cost $2,100 is sold for $4,500 cash.
3. Of the amount owed to trade creditors, $12,000 is paid.

5-5 The Burt Company

The accountant of the Burt Company makes use of expense and revenue accounts. He uses a periodic inventory procedure (does not record cost of goods sold at time of sale). All sales are for cash.

1. Stockholders invest $100,000 on January 1, 1964.
2. Rent of $4,800 is paid. This is rent for a 12-month period beginning February 1.
3. Merchandise which cost $25,000 is purchased on account.
4. Fixtures with an estimated life of five years are purchased for $6,000 cash.
5. The Burt Company starts operations on February 1. Sales for the first week are $5,000.
6. Wages for the first week are $400. They are not paid at this time.
7. Accounts Payable (see 3) is paid.
8. Sales for the second week are $6,000.
9. Merchandise which cost $20,000 is purchased on account.
10. Wages for the second week are $500. They are not paid at this time.
11. The wages for the first two weeks are paid.
12. Sales for the third week are $10,000.
13. Wages for the third week are $600. They are not paid at this time.
14. Sales for the fourth week are $11,000.
15. Wages for the fourth week are $650. They are not paid at this time.
16. Bill for electricity for February is $100. Not paid in February.
17. Bill for telephone for February is $60. Not paid in February.
18. A physical inventory of merchandise discloses that there is $21,300 of merchandise on hand as of February 28.

Required

(a) Record the transactions 1–18 in "T" accounts, including the recognition of expenses arising from decreases in assets, not explicitly described in the transactions (for example, the decrease in prepaid rent).
(b) Close out all revenue and expense accounts.
(c) Prepare a position statement as of February 28.
(d) Prepare a statement of revenues and expenses.

5–6 When a purchase is made, would you expect the item purchased to be recorded in an asset account or an expense account? Explain.

5–7 At what step should the cost of the oil be considered an expense?

(a) Oil is ordered.
(b) The oil is received.
(c) The oil is paid for by check.
(d) The oil is burned in a boiler to make steam which is used to run a generator which produces electricity which powers a machine which manufactures gadgets.
(e) A gadget is shipped to a wholesaler, and the wholesaler is billed.
(f) The cash is received from the wholesaler.

5–8 Goods which cost $800 are sold for $1,000 cash. Record the sale using:

(a) a perpetual inventory procedure
(b) a periodic inventory procedure

5–9 Some cost factors are conventionally expensed immediately upon acquisition. Which of the following items could be expensed immediately on acquisition without adversely affecting the information provided by the accounting system?

(a) Automobile salesman's wages
(b) Automobile assembly line worker's wages
(c) Cost of heating department store
(d) Cost of heating factory building
(e) Cost of financing the purchase of merchandise

6

Adjusting and Closing Entries

THE FIRST FIVE chapters contained adjusting and closing entries, although they were not specifically defined as such. This chapter will attempt to make clear the nature of adjusting and closing entries and an acceptable convention for recording these entries. Many situations that require adjusting entries will be introduced later in the text as the reader is exposed to additional accounting problems.

NEED FOR ADJUSTING ENTRIES

At the end of an accounting period, it is necessary to appraise the asset and equity accounts and to determine whether any additional entries have to be made to them. These entries, which have to be made to bring the asset and equity accounts into agreement with the facts of the situation as of the date of the prospective accounting reports, are called *adjusting entries.* Adjusting entries may take various forms. The following are merely a few illustrations:

1. Asset and revenues not previously recognized:

Interest Received	$100	
Interest Revenue		$100

To record interest on investments which has not been previously recognized

2. Asset and liability not previously recognized:

Material (Inventory)	$300	
Accounts Payable		$300

To record material received on Dec. 31, 19—, but not yet recorded

3. Liability and expense not yet recorded:

Travel Expense	$100	
Accounts Payable		$100
To record an expense incurred, but not recorded or paid		

4. Expense and decrease in an asset not yet recorded:

Rent Expense	$200	
Prepaid Rent		$200
To record or "accrue" the rent expense for the period		

5. To record the declaration of a dividend to stockholders:

Dividends	$500	
Dividends Payable		$500
To record a dividend to stockholders, declared but not previously recorded		

6. To record the liability to bondholders not yet recorded:

Interest Charges	$100	
Interest Payable		$100
To record the interest charge and the interest liability not previously recorded		

Wages, taxes, and other items are often spoken of as being "accrued." This means that they have come into being over a period of time and should be recognized in the accounts. To *accrue* taxes means that tax expense should be debited and taxes payable should be credited. Instead of taxes payable, the account used to record the liability is sometimes called "Taxes Accrued," and even worse, "Reserve for Taxes." Titles of this nature tend to add to the confusion associated with accounting.

There is nothing mysterious about adjusting entries. They bring the accounts up to date, correcting errors and omissions.

CLOSING ENTRIES

Since temporary accounts are being used to record revenues and expenses during the period, they must be disposed of at the end of the accounting period. The procedure of eliminating revenue and expense accounts is known as *closing*, and the entries are called *closing entries*.

There are various techniques for closing expense and revenue accounts. The procedure illustrated here makes use of two summary accounts, an "Expense and Revenue Summary" and an "Income Summary." It is also possible to "close," using one summary account or none at all. In fact, it is possible to

prepare accounting reports without formally preparing closing entries. The entries are implicit in the system, but they are not actually made. Only the position statement accounts are carried forward to the next period.

Expense and Revenue Summary

The Expense and Revenue Summary account is used to compare all revenues and expenses of the period. Thus all revenue and related accounts are closed into this summary account; also, all expense, tax, and loss accounts. The revenue items will appear on the credit side of the account (tending to increase the stockholders' equity). The expense, taxes, and losses will appear on the debit side (tending to decrease the stockholders' equity). If the credits (revenues) are greater than the debits (expenses, losses, and taxes), then the firm has been profitable and there is a net income. This income is transferred to the "Income Summary" by debiting the "Expense and Revenue Summary" and crediting the "Income Summary." If the debits (expenses, losses, and taxes) are greater than the revenues, then the firm has a net loss rather than an income. The closing entry is a credit to the expense and revenue summary (to equate the debits and credits) and a debit to the income summary (tending to decrease the stockholders' equity).

At the conclusion of these entries, all revenue and expense accounts, including the expense and revenue summary, will have zero balances.

Income Summary

The income summary compares the income of the period with the distribution of the income to the owners, determines the addition to the earnings retained for use in the business, and transfers that amount to the retained earnings account.

The expense and revenue summary is closed into the income summary. If the operations have been profitable, the transfer will be found on the credit side of the income summary; if the firm has not been profitable, the transfer will be found on the debit side of the account.

The dividend distribution and interest charge accounts are also closed into the income summary. Both items will be considered as distributions of income, although there is some dispute about interest charges; these transfers will be found on the debit side of the income summary.

The balance in the income summary is transferred to the retained earnings account. If the balance is a credit, the transfer will increase the retained earnings, since the income was greater than the distributions of income. If the balance is a debit, then the transfer will decrease retained earnings, since the income was less than the distributions of income.

Although *interest charges* are considered as distributions of the income

of the corporation, the return on investments, *interest revenue,* is properly considered to be of the same general nature as the other revenue and is closed to the expense and revenue summary.

After all closing entries have been made, the only accounts with balances will be asset and equity accounts. All temporary or summary accounts will have been closed and will have zero balances.

It should be realized that there is nothing sacrosanct about the use of summary accounts in general, and the use of the income summary specifically. It is merely a technique and not an integral part of accounting theory. For example, the interest charge and dividend accounts could be closed directly to "Retained Earnings," since they are distributions of earnings.

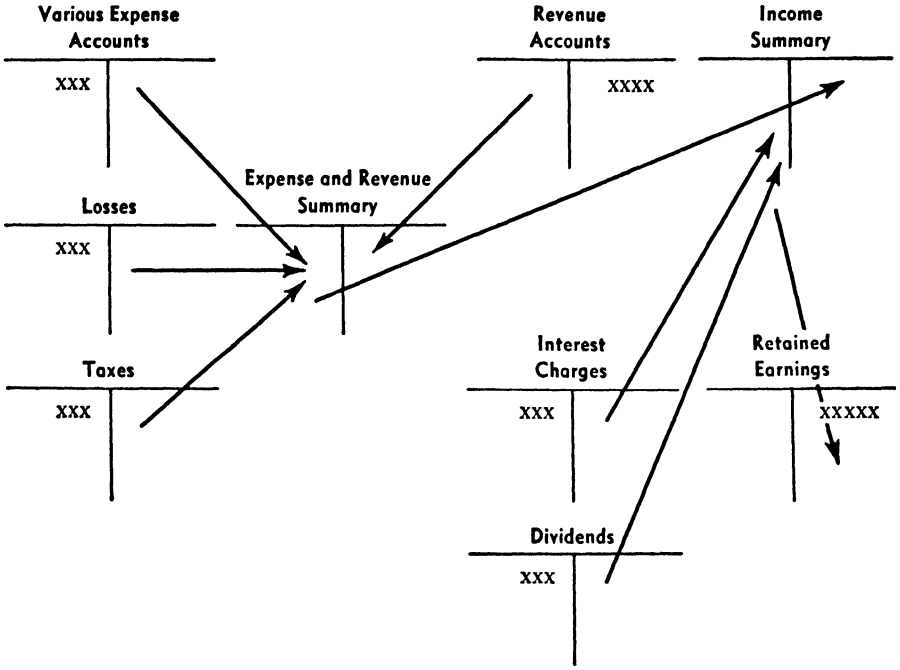
Even more controversial is the question whether interest is an income distribution or an expense. Conventional treatment considers interest to be an expense. In a sense, it is an expense because it decreases the earnings of the stockholders. But from the point of view of the entity, following a strict interpretation of the entity theory (that accounting practice records entries for the corporation and not for the owners), interest charges are a distribution of income of the corporate entity. Does this difference in treatment create any material disparity? In most cases, classification of interest as an expense or as an income distribution does not matter greatly. The suggestion made in this text, that interest may be treated as an income distribution, is based on the premise that situations exist in which the treatment does make a difference (for example, a study of the utilization of resources). These are marginal cases, however, and do not negate the usefulness of treating interest as an expense for general reporting purposes.

FLOW OF CLOSING ENTRIES

The accompanying diagram illustrates the flow of closing entries for a profitable operation where the distributions of income were less than the income of the period. The *xxx*'s indicate that the account had a balance before the closing entries were made. Retained earnings is the only account shown which will not have a zero balance after the closing entries are made.

Explanation of Entries

1. To close the sales revenue account to the expense and revenue summary.
2, 3, and 4. To close the expense and tax accounts to the expense revenue summary.
5. To close the dividend distribution account to the income summary.



Illustrative Example: Flow of Closing Entries

Merchandise Cost of Goods Sold

$1,000	(2) $1,000

Expense and Revenue Summary

(2) $1,000	(1) $2,000
(3) 500	
(4) 250	
(6) 250	

Rent and Other Expenses

$500	(3) $500

Income Summary

(5) $100	(6) $250
(7) 150	

Taxes

$250	(4) $250

Retained Earnings

	√ $50,000
	(7) 150

Dividends

$100	(5) $100

Sales Revenues

(1) $2,000	$2,000

6. To transfer *the income for the period,* $250, to the income summary.
7. To transfer the increase in retained earnings, $150, to the retained earnings account.

The only one of the foregoing accounts with a balance after the closing entries is the retained earnings account. Note that the way to close an account with a debit balance is to credit it. This sometimes confuses beginning students who fail to realize that the debit balance is merely being transferred.

SIMPLIFIED CLOSING PROCEDURES

The two closing summary accounts (expense and revenue, and income) are useful as a learning and teaching device, but the reader should remember that there are many different procedures for preparing closing entries. Other procedures are not incorrect but are merely different. One possible procedure in the closing process is to bypass the use of summary accounts entirely. Instead of using an expense and revenue or income account to close the accounts in the preceding example, the following journal entry could be prepared:

Sales Revenue	$2,000	
Merchandise Cost of Goods Sold		$1,000
Rent and Other Expenses		500
Taxes		250
Dividends		100
Retained Earnings		150

To close all revenue, expense, and income distribution accounts, and to record the increase in retained earnings

The foregoing journal entry contains all the information previously presented in the summary accounts, and this closing procedure is certainly acceptable.

Another possible procedure frequently found in practice is to carry forward the balances of all asset and equity accounts from the preceding period. The journal entry shown here would not be explicitly made, but all revenue and revenue deduction accounts would start the new accounting period with zero balances; thus, in effect, the closing entries would be made. This procedure is especially applicable to machine accounting systems but is not limited to them.

EXAMPLE

Assume the trial balance of the XYZ Company, after adjusting entries, is as follows:

	Debits	Credits
Assets	69,900	
Liabilities		27,400
Stockholders' Equity		12,000
Revenues		70,000
Expenses	39,500	
	109,400	109,400

Instead of preparing formal closing entries, the accountant could compute the increase in Retained Earnings, $30,500 (i.e., $70,000 minus $39,500), and add this amount to the Stockholders' Equity balance. The opening balances for the next period would be:

	Debits	Credits
Assets	69,900	
Liabilities		27,400
Stockholders' Equity		42,500
	69,900	69,900

The above procedure eliminates the balances of the temporary accounts (revenue and expense accounts), but financial reports may be prepared without closing out the temporary accounts. For example, if monthly reports are being prepared, it is not necessary to close out the temporary accounts. We can compare the ending balance of each temporary account with the opening balance and assume the difference is the total of the changes during the period. This may be accomplished using a worksheet approach.

EXAMPLE

Balances After Adjusting Entries

	Dec. 1 Balances		*Dec. 31 Balances*		*Income Statement for December*		*Position Statement*	
Assets	60,000		69,900				69,900	
Liabilities		21,000		27,400				27,400
Stockholders' Equity		12,000		12,000				12,000
Revenues		62,000		70,000		8,000		
Expenses	35,000		39,500		4,500			
	95,000	95,000	109,400	109,400	4,500	8,000		39,400

Balances After Adjusting Entries (continued)

	Dec. 1 Balances	*Dec. 31 Balances*	*Income Statement for December*	*Position Statement*
Increase in Retained Earnings-Month			3,500	
Increase in Retained Earnings-Year to date				30,500
				69,900 69,900

An advantage of the above procedure is that it eliminates the entries associated with closing out the temporary accounts.

QUESTIONS AND PROBLEMS

6-1 The Cable Company

THE CABLE COMPANY

Trial Balance
as of December 31, 1964

Account	*Debits*	*Credits*
Cash in Bank	$ 27,000	
Merchandise	40,000	
Supplies	500	
Prepaid Rent	2,400	
Accounts Payable		$ 7,400
Wages Payable		
Taxes Payable		
Bonds Payable		20,000
Capital Received from Stockholders		10,000
Retained Earnings		2,000
Revenue from Sales		70,000
Labor Expense	33,000	
Supplies Expense	6,500	
	$109,400	$109,400

Additional Information

1. An inventory of merchandise on December 31, 1964, disclosed that there was $15,000 of merchandise on hand.
2. Supplies on hand, $2,500. The bookkeeper has debited supplies expense when supplies were received.
3. The monthly rent is $100. The rent for 1965 was paid on December 15. The payment has been recorded.

4. Supplies costing $1,000 were received on December 30. They were included in the physical inventory, but the bookkeeper has not recorded the acquisition as yet.
5. As of December 31, the firm owed its employees $200.
6. The bonds have a coupon rate of five per cent. The interest for the period July 1–December 31 is payable as of January 1. The bonds were issued July 1, 1964.
7. Dividends of $1,000 were declared (not paid) on December 30, 1964.
8. Income tax expense for the year 1964 is computed to be $2,500.

Required

(a) Set up "T" accounts for all accounts given and any accounts required.
(b) Record all adjusting entries. Number (key) these entries.
(c) Record all closing entries. Key these entries with letters.
(d) Prepare a position statement for the Cable Company as of December 31, 1964.

6–2 The Cabot Corporation

THE CABOT CORPORATION

Trial Balance
as of December 31, 1964

Accounts	*Debits*	*Credits*
Cash in Bank	$ 40,000	
Merchandise	70,000	
Supplies	1,000	
Prepaid Rent	2,400	
Accounts Payable		$ 8,000
Wages Payable		———
Interest Payable		———
Taxes Payable		———
Bonds Payable		20,000
Capital Received from Stockholders		30,000
Retained Earnings	9,500	
Sales Revenues		90,000
Supplies Expense	4,600	
Labor Expense	20,000	
Interest Charges	500	
	$148,000	$148,000

Additional Information

1. An analysis of wages and salaries indicates that $200 is owed to employees as of December 31, 1964, for work performed from December 27 to December 31.
2. During the year, purchased supplies were debited to supplies expense

as they were purchased. An inventory of supplies indicates that there are $1,300 of supplies on hand on December 31.

3. The rent is $200 per month. No entry has been made to record rent expense during the period.
4. Interest on the bonds is payable on July 1 and January 1. The interest rate is five per cent.
5. An inventory of merchandise on December 31, 1964, indicated that there was $12,000 of merchandise on hand.
6. An analysis of purchases indicated that $4,000 of merchandise received on December 31 had not been recorded by the accounting department. This merchandise was included in the inventory taken on December 31, 1964.
7. Income taxes for the year are $500. No payments have been made.

Required

(a) Set up "T" accounts for all accounts given or required.
(b) Record all adjustments. Key these entries with numbers.
(c) Record all closing entries. Key these entries with letters.
(d) Prepare a position statement for the Cabot Company as of December 31, 1964.

6–3 For each of the following situations, give the adjusting entry required:

1. The supplies account has a balance of $6,000. An inventory indicates there are $500 of supplies on hand.
2. There are $700 of wages not yet recorded. This is for labor incurred the last three days of the month.
3. The prepaid insurance account has a balance of $800. An analysis of the insurance contracts indicates that the amount of insurance prepaid as of the end of the month is $500.
4. Six months' interest on $100,000 of four per cent bonds outstanding (a liability) has not yet been recognized.
5. Six months' interest of $80,000 on government securities held as an investment has not yet been recognized.
6. The declaration of a $5,000 dividend on outstanding stock has not yet been recorded.

6–4 The Corn Company

THE CORN COMPANY

Trial Balance
(after adjusting entries)

	December 1		*December 31*	
Account	*dr*	*cr*	*dr*	*cr*
Cash in Bank	27,000		30,000	
Merchandise	40,000		35,000	
Accounts Payable		7,000		9,000

	December 1		*December 31*	
Account	*dr*	*cr*	*dr*	*cr*
Capital Received		10,000		10,000
Retained Earnings		40,000		40,000
Revenues		35,000		46,000
Expenses	25,000		40,000	
	92,000	92,000	105,000	105,000

Required

(a) Compute the firm's income for the year.
(b) Compute the firm's income for December.
(c) Prepare a position statement as of December 31.

7

The Income Statement

THE POSITION STATEMENT shows the recorded financial position of an enterprise at *a moment* in time. The income statement shows the results of operations for *a period* of time. While the position statement is "As of" a particular moment, the income statement is "For the Month Ending —." The period of time may be a year or any fraction of a year, but it is a period of time rather than a moment of time.

The income statement compares the revenues of the period with the expenses which were incurred to gain those revenues. The difference between the revenues and expenses, losses, and taxes is the income of the period.

Revenues − (expenses + losses + taxes) = income

ILLUSTRATION

During the month of January, 19—, the X Service Company recorded $10,000 of revenues, $3,000 of wage expenses, $1,000 rent, and $200 for utilities. It also had a fire loss of $800 and income taxes of $2,000. The income statement would appear as follows:

X SERVICE COMPANY

Income Statement
for Month Ending January 31, 19—

Revenues			$10,000
Less Expenses, Losses, and Taxes:			
Expenses:			
Wages	$3,000		
Rent	1,000		
Utilities	200		
Total Expenses		$4,200	
Fire Loss		800	
Income Taxes		2,000	
Total Expenses, Losses, and Taxes			7,000
Net Income			$3,000

The expense and revenue summary would appear as follows:

Expense and Revenue Summary		Retained Earnings
Revenue deductions:	Revenues:	Increase in retained earnings:
$3,000	$10,000	(1) $3,000
1,000		
200		
800		
2,000		
Net income:		
(1) 3,000		

The income statement can actually be made directly from the expense and revenue summary. All revenues and revenue deductions are summarized in that account. If there are also distributions of income, then the income summary will also be used to construct the income statement. The relationship between the income statement and the two summary accounts is important because it brings into focus the use of these accounts.

CHARACTERISTICS OF INCOME STATEMENT ILLUSTRATED

As in many areas of accounting, there is no uniform agreement among accountants on the subject of the form or content of an income statement. The form and theory presented in this text are the *single-step, all-inclusive* income statement. The *single-step* part of the title refers to the fact that there are no income subtotals above the net income figure (this is the net income of the corporation). Some accountants prefer to take various subtotals, such as "Gross Profit," "Net Income before Depreciation," and "Net Income before Taxes." The single-step form is simpler and avoids the confusion arising from presenting half a dozen income figures. Which is the significant income figure? The average reader of a financial report is likely to be puzzled by the numerous subtotals rather than be assisted by them.

An all-inclusive income statement has the characteristic that no entries are made directly to the retained earnings account; rather, they must all pass through the expense and revenue summary and the income statement. There are many accountants who feel that certain adjustments should be made directly to the retained earnings account, thus not affecting the income of any year. Thus, if it is found that an asset is worthless and should be written off, the credit is recorded to the asset account, but the debit can be recorded

to either a loss account (to be run through the expense and revenue summary) or directly to the retained earnings (bypassing the expense and revenue summary *and* the income statement). The disadvantage of running unusual losses through the income statement is that they tend to distort the measurement of the current year's income. The advantage is that the possibility of manipulation of the accounting is reduced. Since the all-inclusive income statement is used in this text, no entries will be made directly to retained earnings, except the transfer from the income summary or items not of an income nature (for example, capital transactions).

Interest and Dividends

In the illustration, there were no interest charges or dividends. If there had been interest charges, they would have been subtracted from the net income to compute the earnings of the stockholders. Dividends are then subtracted to obtain the addition to retained earnings.

Most companies subtract the interest charges before they compute an income figure. This is definitely acceptable, but it should be realized that they are computing the earnings of the *stockholders* and showing that as the first income computation.[1] If interest charges are not subtracted, then the figure being shown is the income of the *corporate entity*. Both forms of income statement are illustrated here.

ABC COMPANY
Income Statement
for Year Ending
December 31, 19—

Revenues		xxxxx
Less:		
Expenses	xxx	
Losses	xxx	
Taxes	xxx	
Total Deductions		xxxx
Net income		xxxx
Interest Charges		xxx
Earnings of Stockholders		xxxx
Dividends		xxx
Addition to Retained Earnings		xxxx

XYZ COMPANY
Income Statement
for Year Ending
December 31, 19—

Revenues		xxxxx
Less:		
Expenses	xxx	
Losses	xxx	
Taxes	xxx	
Interest Charges	xxx	
Total Deductions		xxxx
Earnings of Stockholders		xxxx
Dividends		xxx
Addition to Retained Earnings		xxxx

[1] The term "Earnings of the Stockholders" is not exact. Following a strict entity interpretation, the stockholders do not realize earnings until they receive dividends or sell their stock.

If the XYZ Company's type of statement is used, then interest charges are properly closed to the expense and revenue summary rather than the income summary. Income will then be the earnings of the stockholders and not the income of the corporation.

THE MULTI-STEP INCOME STATEMENT

The single-step income statement previously illustrated has increased in popularity in recent years, but many corporations prefer to use some variant of the multi-step income statement. Used with moderation, subtotals are desirable, but a large number of subtotals tends to detract from the more important figures. The multi-step income statement illustrated here has several desirable features. For example, it isolates factors that are extraordinary and nonrecurring in nature, and it computes a gross profit figure (sometimes called gross margin), which for certain purposes is useful. Although the multi-step income statement is sound, a valid objection to it is that it tends to become more complicated and cluttered than the single-step statement, thus adding to the complexity of financial reports.

THE MULTI-STEP CORPORATION

Income Statement
for Year Ending December 31, 19—

Sales		$100,000
Less:		
Sales Discounts		4,000
Net Sales		$ 96,000
Deduct Cost of Goods Sold:		
Beginning Inventory	$10,000	
Purchases	50,000	
Freight-in	1,000	
	$61,000	
Less Ending Inventory	11,000	
Cost of Goods Sold		50,000
Gross Profits on Sales		$ 46,000
Deduct:		
Selling Expenses	$18,000	
Administrative Expenses	12,000	30,000
Net Operating Income		$ 16,000
Add Other Income:		
Interest Revenue		4,000
Net Operating Income plus Other Income		$ 20,000

THE MULTI-STEP CORPORATION (continued)

Income Statement
for Year Ending December 31, 19—

Other Deductions:	
Interest Charges	1,000
Net Income Adjusted for Other Items	$ 19,000
Adjustments of Prior Periods:	
Adjustment of Taxes	11,000
Net Income before Income Tax	$ 8,000
Income Tax	5,000
Net Income	$ 3,000

REVENUES AND INCOME

Frequently there is confusion concerning the terms *revenue* and *income*. *Revenue is a gross concept* and is measured by the assets received (or reduction in liabilities) in return for goods and services which are sold. The equities of the owners are not increased by the total revenues but are increased only by the amount left over after deducting the expenses, losses, and taxes incurred while gaining the revenues. This *residual* is called *income*. The terms *revenue* and *income* cannot be used interchangeably.

REVENUE RECOGNITION—CASH OR ACCRUAL BASIS

When should revenue be recognized? When the sale order is taken, the goods are shipped, the cash is received, or when? That the mere taking of an order is not justification for recording revenue is generally agreed. The order may be canceled in many situations in which the party who received the order will not be able to enforce it or to collect damages (there not being any). The receipt of cash may not be the moment for recording revenues, especially if the service has not been performed or the goods shipped. Following the *cash basis* for recognition of revenues, the receipt of cash is the moment for recording revenues if the service has been performed or the goods shipped.

The majority of corporations are not on the cash basis. The receipt of cash is *not* the signal for the recognition of revenue. Rather they are on the *sales accrual basis*. Revenues are recognized as the sales are made, even though cash has not been received. Thus the sale of merchandise on account to a customer is recognized as revenue even though the cash has not been received (the debit is to accounts receivable, the credit to sales). Interest on

investments held is recorded as it is earned, not as it is received (the debit is to interest receivable, the credit to interest revenue). The general rule is that the revenue should be recognized when the service is performed or the goods shipped.

It may be assumed that the sales accrual system is being used in this text, except where it is specifically stated that another system is being used.

In addition to the cash and sales accrual bases of revenue recognition, there are other methods available to the accountant. These include:

Production basis—recognize revenue as the product is produced.
Billable cost basis—recognize revenue as the product is produced, to the extent that the customer is billed on a progress-to-date basis.
Accretion basis—recognize revenue as an asset increases in value.

Production Basis

If there is a certain market for the product being produced, the production basis is reasonable. For example, if we are producing gold, then it would be reasonable to recognize revenue as the gold is produced, since the price is set and there is a buyer waiting to take the completed product.

There are also situations where the production basis is used, though the information is not as certain. For example, if the production process takes a long period of time (as in building a ship, dam, or certain buildings), the accountant could recognize revenue as the construction takes place. Unfortunately, in such a situation, to match the revenue estimate and the expense associated with the revenue is extremely difficult; thus the resulting income figure is unreliable. If we are building a ship, exactly when is the ship half completed? Also, can we assign in a reasonable manner the costs associated with building half the ship? We get a much more accurate measure of income if we wait for the completion of the ship, even though this may distort the measures of revenue and income of the different time periods during which the ship was being built.

Billable Cost

Many contracts for products which require long periods of time for production specify progress payments during the production period. The accountant may recognize as revenue the amount of the progress billing during the period. This eliminates one area of judgment present in the production basis, namely, the estimate of the percentage of completion of the product, since the contract generally indicates at what stage of completion the payments should be made. However, the problem of matching the appropriate expenses against these revenues still remains. There is little reason for believing that

the measure of income which results from this procedure is better than the measure which results from the production basis.

Accretion Basis

The accretion basis of revenue recognition is not generally used in preparing accounting reports. The accountant prefers to wait for a completed sale before recognizing revenue (this is also a partial explanation of why the production and billable cost bases are not more widely used).

The term accretion is commonly used to refer to the increase in value of such commodities as cattle or timber. The term is used here more broadly to include any increase in economic value not accompanied by an explicit sale. Thus it would include increases in the market value of marketable securities or other types of investments. Should these changes be recognized by the accountant and incorporated in the financial reports? While this question is difficult to answer, a financial analyst must take this type of information into consideration in making his analysis; thus, someone must prepare reports incorporating this information.

The accountant generally recognizes revenue only if the realization of the gain has become highly probable (even after a sale, the gain is not certain, since the cash has not yet been collected). The question remains as to whether economic events other than a sale can also lead to an effective realization of a gain. If there is a high probability of converting the asset whose value has changed (accretion has taken place) into cash, then there is some justification for the accountant to record the change. Here, the reader must be aware that generally accepted accounting practice requires a sale before realizing revenues; it may be necessary for the analyst to modify the accounting information to a more useful form.

The question of when revenue (or income) should be recognized is one of the prime unresolved questions in accounting. Remember, too, that the method of revenue recognition affects the determination of the expenses of the period, since we attempt to match against the revenues of the period the expenses of earning those revenues. Thus, two of the most important and difficult accounting problems are:

(a) Determination of revenues.
(b) Matching of the expenses with the revenues.

THE GOING CONCERN AND ENTITY CONVENTIONS

Two accounting conventions that figure prominently in the measurement and presentation of the results of operations are the going concern and entity conventions.

For what does the accountant account? It may be assumed that the accountant is accounting for the *corporate entity*. The corporation has been declared by the courts to be a separate entity, and the corporation itself has legal rights and responsibilities separate from those of the stockholders. Since the corporation is a *separate entity*, the accountant attempts to distinguish between the corporation itself and the rights of the residual owners, the stockholders. The entity theory is one of the foundations of accounting for corporations, although there are occasions when a strict separate entity approach is ignored in favor of expediency. Earlier in this chapter, two possibilities for presenting income statements were illustrated. One follows a strict entity approach and subtracts the earning of one group of capital contributors (the interest paid to creditors) *after* the computation of the corporate income. The second procedure focuses attention on that portion of the corporate earnings which increases the equity of the stockholders; it does not present the earnings of the corporate entity as such. The interest charges are subtracted before computing income; thus the income reported is the income of the stockholders.

The *going concern* convention is the justification behind the accounting treatment of many financial transactions. The accountant assumes, lacking information to the contrary, that the corporation has an infinite life and that assets will *be used* in the normal course of operations and *not sold* at liquidation value. Thus the costs of organizing a corporation will often be treated as an asset of infinite life (organization costs) rather than as an expense. A long-lived asset, such as a building, is amortized and written off systematically to expense instead of being shown on the position statement at the amount of proceeds it would earn if sold as a piece of second-hand real estate.

MANAGERIAL USES OF THE INCOME STATEMENT

The income statement is a report of the results of the operations of the period and is probably the most important report prepared by the accountant.

Top management uses the income statement to judge the efficiency of operating personnel. This is especially true for income statements prepared to show not only the income of the corporation but also the income of components of the corporation (such as divisions or plants).

The income statement is one of the first indicators that managerial action is required. A decrease in income for a period may be caused by decreased sales, increased costs, changes in prices of items bought or sold, or many other factors. Whatever the cause, the decrease will be brought out by the income statement of the period, and it will be a signal for managerial action.

The frequency of preparation of income statements will vary, but it is not uncommon for firms to report income monthly. It is important that the reports be prepared frequently enough for management to take corrective action before a significant portion of the firm's assets are dissipated because of management's ignorance that losses are being incurred.

Earlier in this chapter, it was suggested that the all-inclusive income statement had certain advantages over a procedure which allowed certain extraordinary items to bypass the income statement. For decision-making purposes, management is primarily interested in reports that show the results of the current period operations undistorted by special adjustments. The reports should be prepared with this in mind.

Some managerial decisions are made based on projected income statements showing what is expected to happen in the future. By using the projected statements, losses can sometimes be avoided altogether rather than merely stopped once they are started. The usefulness of a forecasted statement is, of course, dependent on the accuracy of the forecasts. Because of the tendency of crystal balls to be cloudy at best, the forecasted income statement may be expected to supplement, rather than replace, the income statement reporting the actual events which have occurred.

QUESTIONS AND PROBLEMS

7–1 The Cable Company (*see* Prob. 6–1)

Prepare an income statement for the year 1964. In this income statement, distinguish between the income of the corporation and the earnings of the stockholders.

7–2 The Crane Company

THE CRANE COMPANY

Selected Account Balances for the Year 1964

Sales Revenues	$100,000
Interest Revenue	5,000
Interest Charges	3,000
Interest Receivable	2,500
Interest Payable	1,500
Dividend Charges	4,000
Manufacturing Cost of Sales	60,000
Administrative Expense	12,000
Selling Expense	8,000
Income Taxes	6,000
Fire Loss	4,000
Dividends Payable	1,000

Required

(a) Set up an expense and revenue summary and an income summary as they would appear after closing entries.
(b) Prepare an income statement for the year 1964.

7-3 The Crawford Company

For each of the following transactions, indicate whether it is the signal for recognition of revenue. Explain your conclusions. Assume that you are on the accrual basis of recognizing revenue.

1. An order is received from the X Company.
2. The goods ordered by the X Company are manufactured.
3. The goods ordered by the X Company are shipped (terms FOB shipping point).
4. The goods are received by the X Company.
5. Payment is received from the X Company.
6. The Crawford Company has held bonds for six months. The books are being closed today, but interest is to be paid tomorrow.
7. The Crawford Company bought some common stock on December 29; on December 30 a dividend was declared payable on January 15.
8. The dividend [see 7] is collected.
9. The interest [see 6] is collected.

7-4 The Culver Corporation

The following transactions occurred in the year 1964:

1. On January 1, 1964, stockholders paid $100,000 to the corporation for 10,000 shares of common stock.
2. The following items were purchased on account:

Merchandise	$65,000
Supplies	4,000

3. An amount of $3,900 was paid to the landlord. This included January, 1965, rent of $300.
4. Sales of $93,000 were made.

Cash Sales	$43,000
Sales on Account	50,000

5. Collection of accounts receivable, $39,000.
6. Payment of accounts payable, $60,000.
7. Wages paid during the year were $20,000. Wages payable as of December 31, 1964, were $300.
8. Insurance premiums paid during the year were $1,000. Prepaid insurance as of December 31, 1964, was $400.
9. Supplies used during the period, $3,100.
10. The merchandise inventory as of December 31, 1964, was $5,000.
11. Bonds were issued on July 1, 1964. The par value of the bonds is $10,000, and this amount was received from the investors. The bonds have a 6% rate of interest.
12. Income taxes for the year are $4,000. No income taxes were paid in 1964.

Required

(a) Record the above transactions, including adjusting entries, in "T" accounts.
(b) Prepare necessary closing entries.
(c) Prepare a position statement as of December 31, 1964.
(d) Prepare an income statement for the year ending December 31, 1964.

7-5 On December 1, 1964, the ABC Company began operations. During the month of December, the total sales were as follows:

Cash Sales	$100,000
Sales on Account	50,000

A review of the record of cash disbursements indicates that the following funds were disbursed during the month of December.

Purpose of Expenditure	*Amount*
Merchandise	$ 60,000
Supplies	2,000
Wages and Salaries	30,000
Rent	7,900
Utilities (electricity for the first 15 days of the month)	100
	$100,000

An analysis of the payroll summary, receiving reports, and purchase invoices indicates the following amounts were owed as of December 31, 1964:

For Purchase of Merchandise	$70,000
For Purchase of Supplies	3,000
Wages and Salaries	7,000
Utilities	500
	$80,500

As of December 31 there were $40,000 of merchandise and $1,500 of supplies in inventory. The company owned no assets except cash and had no debts prior to December 1.

Required

(a) Prepare an income statement using the accrual procedure of revenue recognition.
(b) Determine the revenues if they are recognized on a cash basis. Prepare an income statement.

7-6 Indicate the basis of revenue recognition which is most reasonable for the following industries or activities:

(a) Automobile
(b) Steel
(c) Textile
(d) Furniture store, retail

(e) Mining gold
(f) Hospital
(g) Airplane company working on a space vehicle for the federal government
(h) Whiskey distiller producing aged scotch

7–7 North American Aviation, Inc.

The 1961 annual report of the North American Aviation Company contained the following statement:

NATURE OF CONTRACTS. Government cost-type contracts that provided for the reimbursement of allowable costs and for specified fees accounted for approximately 65 per cent of the company's 1961 sales. Almost all the company's other contracts were under Government incentive-type contracts, wherein target costs and sales prices are set by negotiation on the basis of related cost experience. After final establishment of incentive targets, the Government and the company participate within the limits provided in the contract in the savings or additional costs experienced. Under these contracts, sales are recorded at cost together with the estimated profit as deliveries are made. Profit is estimated as a proportion of the profit expected to be realized on the contract.

RENEGOTIATION. Substantially all of the company's 1961 sales are subject to the Renegotiation Act of 1951, as extended and amended, which provides for recovery by the United States Government of any profits it considers excessive.

The Renegotiation Board has determined that no excessive profits were realized by the company during the 1956 and 1957 fiscal years. Determinations with respect to the 1959 and 1960 fiscal years are pending. The Board has claimed that excessive profits were realized in the 1953, 1954, 1955, and 1958 fiscal years. If sustained, these claims would require refunds to the Government, after adjustments for taxes, of approximately $1,300,000, $5,500,000, $3,500,000, and $1,000,000, respectively. The company has not accepted these findings and has filed petitions with the Tax Court of the United States for redeterminations thereof, as provided in the Renegotiation Act. The Tax Court is currently hearing the company's petition for the 1953 and 1954 fiscal years.

Since the company believes that no excessive profits have been realized, no provisions for any refunds have been made for any year.

TAXES. Taxes applicable to the company's operations during the fiscal year totaled $54,054,050, including income, franchise, property, employment, sales, excise, and certain other taxes. United States income tax returns for the three fiscal years ended September 30, 1961, have not yet been examined by the Treasury Department. During the year ended September 30, 1961, the Treasury Department completed its review of returns for the five years ended September 30, 1958, and all taxes assessed for this period have been paid. While the period within which additional tax may be assessed for these and subsequent fiscal years has not expired, it is believed, in the light of present information, that adequate provision has been made for all taxes through September 30, 1961.

Required

(a) What method of revenue recognition is being used?
(b) Is the accounting treatment of the profit renegotiation and income taxes reasonable?

7–8 Newport News Shipbuilding and Dry Dock Company

The 1961 annual report of the Newport News Shipbuilding and Dry Dock Company contained the following note:

The Company records profits on its long-term shipbuilding contracts through estimates on the percentage-of-completion basis, and on its other long-term contracts as billings are made thereon. The profits so estimated and recorded are subject to the provision of such allowances as may be considered advisable, taking into account the stage of completion of each contract, possible increases in costs not included in the estimates, guarantee liabilities, unsettled contract adjustments and other factors. The performance of such contracts may extend over periods as long as several years, and revisions in the contract estimates and allowance requirements during performance and upon final contract settlements have the effect of including in subsequent accounting periods adjustments necessary to reflect the results indicated by the revised estimates and allowances. The amounts reserved as allowances reflect the reductions in Federal and state income taxes which would result if the matters covered by the allowances materialize, and aggregated $3,725,000 at December 31, 1961, and $4,000,000 at December 31, 1960.

Required

Interpret the basic nature of the $3,725,000, i.e. where would you place it on the position statement.

8

The Accounting Cycle and Accounting Records

BUSINESS TRANSACTIONS OCCUR continuously and are recorded continuously. Periodically, they are summarized and reported. The sequence of accounting procedures to accomplish the recording and reporting of the transactions is often spoken of as being the *accounting cycle*. The accounting cycle consists of the following steps:

Obtaining Source Documents
Journalizing the Entries
Posting to the General Ledger
Obtaining Balances of Accounts
Preparing a Trial Balance
Adjusting Entries
Closing Entries
Preparation of Financial Statements

OBTAINING SOURCE DOCUMENTS

In order to record financial transactions, it is necessary to establish a system which ensures that the accounting department will receive all relevant information. This information will usually take the form of reports or business paper of one type or another. The following are examples of some of the source documents:

Type of Entry	Source Documents
Recording Purchases	Purchase Invoices, Receiving Reports
Recording Sales	Sales Invoices, Shipping Reports
Merchandise Cost of Sales	Summary of Requisitions, Shipping Reports
Payment of Accounts Payable	Summary of Checks Written, Vouchers Au-

Type of Entry	Source Documents
	thorizing Payment (a voucher is evidence which supports an entry; it may be only an invoice or a packet containing invoice, purchase order, receiving report, check number, etc.)

JOURNALIZING THE ENTRIES

The journal is the book of original entry and focuses attention on the transactions. If there is a large volume of transactions taking place each month, it is more efficient for the information to be recorded in the ledger in summary, rather than recording each individual entry in the ledger. The journal accomplishes this summary. In the past, when bookkeeping was done manually, the journalizing process referred to a specific stylized procedure. Now a journal, instead of being in the traditional form, is frequently only a schedule. The entry for the week's payroll may be made from a machine listing of the workers' names, hourly wages, hours worked, payroll deductions, and take-home pay. Thus, while the nature of the journal changes, its function continues. The explanation of journals which follows is not directly applicable to all firms, but the general functions will be performed in all firms, although not following exactly the same procedures as illustrated.

The general journal commonly consists of a column to record the date, the account titles, the general ledger account numbers, and the amounts. Explanations are usually provided to support the journal entries.

ILLUSTRATION

Date		Account	LF	Dr.		Cr.	
19—							
Jan.	15	Cash		$1,500	00		
		Accounts Receivable				$1,500	00
		To record the collection of cash from customers					

Instead of having one journal, it is often found to be more efficient to have several journals, one to record sales, another to record cash receipts, etc. These special journals allow more than one person to be engaged in recording transactions at the same time. They also lend themselves to a columnar arrangement which saves considerable time in journalizing and in posting.

ILLUSTRATION OF COLUMNAR JOURNALS

Cash Receipts Journal (CR–1)

Date	Explanation	Bank Dr.	Accounts Receivable Cr.	Sales Cr.	Unclassified		
					Cr.	LF	Account
19— Jan. 15	Cash Collections	$1,500	$1,500				

Cash Disbursements Journal (Check Register) (CD–1)

Date	Explanation	Check No.	LF	Accounts Payable Dr.	Bank Cr.	Unclassified		
						Dr.	LF	Account
19— Jan. 15	Jones Co.	46		$34.67	$34.67			

Sales Journal (S–1)

Date	Explanation	LF		Accounts Receivable Dr.		Sales Cr.
19— Jan. 15				$403.32		$403.32

Purchases Journal (P–1)

Date	Explanation	LF	Merchandise Dr.	Supplies Dr.	Unclassified			Accounts Payable Cr.
					Dr.	LF	Account	
19— Jan. 15	May Co.		$561.34					$561.34

The preceding journals assume that sales are made for cash and on account, purchases are recorded as payables before payment, cash payments are made using checks, and all cash receipts are deposited intact in the bank.

The above journals are called special journals, since each has a specialized function. They make use of columns to record entries; thus they may be called columnar special journals.

The Cash Receipts Journal is used to record all receipts of cash. To determine the columns which are needed in setting up a journal, the question may be asked, "What accounts will receive frequent entries?" With a cash

receipts journal, we will need a Bank debit column, since the cash will be immediately deposited. We need credit columns for the various frequent sources of cash, such as Accounts Receivable and Sales. An Unclassified credit column is useful for recording miscellaneous sources of cash.

The Sale Journal has an Accounts Receivable debit column and Sales credit column. If Sales are made on a cash basis, they are recorded in the Cash Receipts Journal (this is an arbitrary decision; they could as easily be recorded in the Sales Journal).

The use of any special journal can be broadened by the addition of unclassified columns. If debit and credit unclassified columns are added, the journal can then be used to record any conceivable transactions. Generally, unusual transactions are recorded in the general journal, and the special journals are allowed to keep their specialized nature.

Following different accounting procedures than those described above, a transaction may be recorded in more than one journal. For example, we could record cash sales in both the Cash Receipts and the Sales Journal. If this were done, the cash column would be posted to the cash account from only one of the journals. If posted from the Cash Receipts Journal, a procedure would be established to prevent the posting of cash from the Sales Journal. Posting from both journals would result in a double counting of the cash receipts. One possible procedure would be to place checks under the cash column in the Sales Journal and under the sales column in the Cash Receipts Journal indicating that these columns are not to be posted to the general ledger.

Before journals are posted, they should be proved, i.e., the columns should be totaled and checked to see that the totals of the debit columns equal the total of the credit columns. If there has been an error made in recording the transactions, it is better to find it at this point than to try to find it after the incorrect entries have been posted to the general ledger accounts. The reader should recognize that the mechanical accuracy of the recording, and not the theoretical accuracy, is being checked.

POSTING TO THE GENERAL LEDGER

From the journal the entries are transferred to the appropriate general ledger accounts. This process is called posting. The mechanical steps are:

1. Finding the proper account in the ledger.
2. Writing the amount in the correct column (debit or credit), the journal page which was the source, and the date.

3. Indicating in the journal the general ledger account to which the amount has been posted.

ILLUSTRATION

Journal p. 2

Date	Account	LF	Dr.	Cr.
19—				
Jan. 15	Cash	1	$1,500	
	Accounts Receivable	4		$1,500

General Ledger

Cash (1)

Date	Explanation		Dr.	Date	Explanation			Cr.
19—								
Jan. 1	Balance	√	$10,000					
15		2	1,500					

Accounts Receivable (4)

Date	Explanation		Dr.	Date	Explanation			Cr.
19—				19—				
Jan. 1	Balance	√	$8,000	Jan. 15		2		$1,500

After recording the $1,500 on the debit side of the cash account, the journal page number (page 2) is recorded adjacent to it and the date may be recorded, if desired. When the posting to the ledger is completed, the ledger folio (i.e., the ledger page number) is written adjacent to the entry in the journal. The same procedure is followed with the recording of the $1,500 credit to Accounts Receivable, though one additional step is added. Not only must the $1,500 credit be recorded in the general ledger, but it must also be recorded in the subsidiary ledger which indicates how much each individual customer owes the firm.

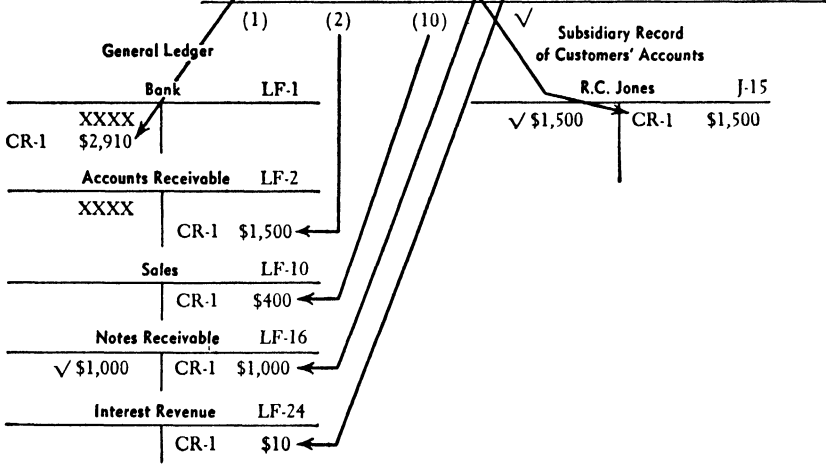
If the columnar journals are used instead of the two-column form of journal, the number of postings to the general ledger is considerably reduced. The columns headed with account titles should be posted in *total* to the general ledger or not posted at all. Certain of these columns would also be posted in detail to records of a subsidiary nature. For example, the accounts receivable column would be posted in total to the general ledger account, but it would

be posted in detail to subsidiary records, indicating how much each individual customer owed. The unclassified column would be posted in detail to the general ledger to the specific ledger account identified in the account title column.

ILLUSTRATION—POSTING OF A COLUMNAR CASH RECEIPTS JOURNAL

CR-1

Date	Explanation	Bank Dr.	Accounts Receivable Cr.	Sales Cr.	Unclassified Cr.	L.F.	Account Title
19–							
Jan. 15	Collection	$1,500	$1,500			J-15	Jones
16	Cash Sales	400		$400			
21	Collection of Note and Interest	1,010			$1,000	16	Notes Receivable
					10	24	Interest Revenue
		$2,910	$1,500	$400	$1,010		
		(1)	(2)	(10)	√		



NOTE: The check mark under the unclassified column indicates that the total of this column is not posted to the general ledger. The sales column is posted, since the entry to the sales account is made from the cash receipts journal rather than from the sales journal. The unclassified column is not posted in total because there is no account in the general ledger called "Unclassified." Instead, this column is posted in detail to appropriate accounts such as notes receivable and interest revenue. When the amounts are posted, this fact is noted by writing the ledger account numbers in the LF column.

The $1,500 credit to accounts receivable is posted to the general ledger account "Accounts Receivable," and it is also posted in detail to the subsidiary record of customers' accounts (Accountable J–15).

It is possible to take advantage of the columnar form by having one journal in which the majority of repetitive transactions are recorded. Special entries may be recorded in the columnar journal by the simple expedient of having two special columns, an unclassified debit column and an unclassified

credit column. With these two columns, any transaction may be recorded in the columnar type of journal. A typical columnar general journal for a firm making only cash sales would have the following columns:

Unclassified—debit	posted in detail to general ledger
Unclassified—credit	posted in detail to general ledger
Bank—debit	posted in total to general ledger
Bank—credit	same
Sales—credit	same
—— Expense—debit	same
—— Asset—debit	same

The expense items which received frequent entries would have their own columns, otherwise the expense debits would be recorded in the unclassified column. There might also be a merchandise debit column if frequent purchases of merchandise were made. In the above example the debit to the asset or expense is made at the time of payment. This eliminates recording the liability to accounts payable at time of purchase and then the debit to accounts payable at the time of payment. While this procedure is not an exact recording of events as they occur, it does reduce the amount of bookkeeping. As long as the proper adjusting entries are made at the end of the accounting period to record the bills still outstanding, it is a correct procedure.

SUMMARY OF PROCEDURE

The entries are recorded initially in a journal which may take one of several basic forms. For example:

(a) The two-column journal
(b) The columnar journal (one journal with many columns, the use of headed columns helping to reduce posting time)
(c) The columnar special journals

We shall assume that special columnar journals are being used. The column headings of each journal could include every account in the ledger, but this would be a waste of paper and would result in very long and awkward pages. Thus the column headings are restricted to those accounts to which many transactions are recorded each period, plus unclassified columns for miscellaneous transactions.

Each entry is recorded completely in one journal. The journal used is determined by the nature of the entry. A receipt of cash is recorded in the

cash receipts journal, a sale (other than a cash sale) in the sales journal. For each transaction the debits must equal the credits, just as they must in an entry recorded in a general journal or recorded directly to T accounts.

After the entries for the period have been recorded, the columns of the journals are totaled and each of the journals proved. In the above example, we would have:

Proof of Cash Receipts Journal

Debit columns:	
Bank	$2,910
Credit columns:	
Accounts Receivable	$1,500
Sales	400
Unclassified	1,010
	$2,910

After the journals have been proved, they are posted to the general and subsidiary ledgers. All columns, except "Unclassified" columns, are posted in total to the appropriate accounts in the general ledger. There is no account in the general ledger called unclassified; however, the entries are recorded to the specific accounts in the unclassified column. We say that the unclassified account is recorded in detail. Some symbol, such as a check mark, is used to indicate the column is not posted in total. Account numbers under the other columns indicate that the posting has been completed for those columns posted in total.

In addition to the columns being posted to the general ledger, some columns must be posted in detail to the subsidiary ledgers. For example, we want to know the total of the accounts receivable which were collected, but we also want to know the individual firms which made their payments; thus the information in the accounts receivable columns must also be posted in detail to the accounts receivable subsidiary ledger. The same is true of accounts payable and several other columns (for example, there may be subsidiary ledgers for plant and equipment).

After the posting to the general ledger has been completed, we again have to check to see that no mechanical errors have been made. The balance of each account in the general ledger is computed, and an unadjusted trial balance is prepared. All accounts with balances are listed. If no mechanical errors have been made, the debit column will be equal to the credit column. If they are not equal, then we check our posting procedure and the obtaining of the account balances. Since we proved the journals prior to posting, the error is not likely to be in the original recording of the transactions.

If the debits of the trial balance equal the credits, then we are ready for the adjusting entries and the closing procedures, including the preparation of the financial reports.

OBTAINING BALANCES OF GENERAL LEDGER ACCOUNTS—UNADJUSTED TRIAL BALANCE

At the end of the accounting period, the balance of each account in the general ledger should be computed. All accounts with balances should be listed. This list is called an *unadjusted trial balance.* If the debit column is equal to the credit column, this indicates that the arithmetic has probably been correct and that there has been an equality of debits and credits for each entry. If they are not equal, then the trial balance acts as an aid in preventing further entries which would only complicate the inevitable task of finding the errors.

ILLUSTRATION

Unadjusted Trial Balance
as of December 31, 19—

Account	Dr.	Cr.
Cash	$ 5,000	
Merchandise	4,000	
Accounts Payable		$ 6,000
Capital Received from Stockholders		2,000
Retained Earnings		500
Sales Revenues		7,500
Merchandise Cost of Goods Sold	6,000	
Other Expenses	1,000	
	$16,000	$16,000

ADJUSTING AND CLOSING ENTRIES: POST-CLOSING TRIAL BALANCE

The adjusting and closing entries are then journalized and posted to the general ledger. The balances of the accounts are determined, and a post-closing trial balance is sometimes prepared. The post-closing trial balance should contain only position statement accounts.

ILLUSTRATION

Post-Closing Trial Balance
as of December 31, 19—

Account	Dr.	Cr.
Cash	$5,000	
Merchandise	4,000	
Accounts Payable		$6,000
Capital Received from Stockholders		2,000
Retained Earnings		1,000
	$9,000	$9,000

PREPARATION OF STATEMENTS

The position statement may be obtained from the post-closing trial balance, since all relevant accounts appear on that schedule. The income statement cannot be obtained from the post-closing trial balance, because all temporary accounts have been closed; however, it may be obtained by inspecting the expense and revenue summary. This has been explained in detail in Chapter 7.

Rather than make separate schedules for the various trial balances and statements, a worksheet is frequently prepared. This worksheet usually contains all information necessary for preparation of the financial statements. The use of a worksheet can eliminate much clerical effort.

Columns are needed to record the pre-adjusting entry trial balance, the adjusting entries, the adjusted trial balance, the income statement, and the position statement. The account balances are obtained by adding horizontally, taking into consideration whether the amounts are positive or negative (debits or credits).

The $4,000 balance in the merchandise account is obtained by subtracting the credit entry of $6,000 from the $10,000 debit balance. A zero balance arises in the prepaid rent account because there was an opening debit balance of $1,000, and a $1,000 credit entry was made to the account.

When a formal position statement is prepared, the retained earnings shown should be $900 (the opening balance of $400 plus the $500 income of the period).

CONTROL AND SUBSIDIARY ACCOUNTS

The amount that customers owe is actually recorded in two places. One is the control account in the general ledger, which shows the total amount owed

ILLUSTRATION OF A WORK SHEET

Account	Unadjusted Trial Balance		Adjusting Entries		Adjusted Trial Balance		Income Statement		Position Statement	
Cash	$ 5,000	$	$	$	$ 5,000	$	$	$	$5,000	$
Merchandise	10,000			(1) 6,000	4,000				4,000	
Prepaid Rent	1,000			(2) 1,000						
Accounts Payable		6,000				6,000				6,000
Capital Received from Stockholders		2,100				2,100				2,100
Retained Earnings		400				400				400
Sales Revenue		7,500				7,500		7,500		
Merchandise Cost of Sales			(1) 6,000		6,000		6,000			
Other Expenses			(2) 1,000		1,000		1,000			
Income (Increase in Retained Earnings)							$7,000 500	$7,500	$9,000	$8,500 500
Total	$16,000	$16,000	$7,000	$7,000	$16,000	$16,000	$7,500	$7,500	$9,000	$9,000

Explanation of entries:

(1) To record the cost of the merchandise sold during the period.

(2) To record the expiration of the prepaid rent, and to record the rent expense of $1,000 (recorded as other expense).

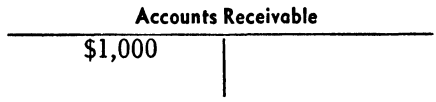
to the company by its customers. For every entry made in the control account, there is a similar entry made in an account in the subsidiary ledger. This subsidiary ledger is not part of the general ledger, and entries in it are not made so that debits equal credits, but rather the subsidiary ledger is kept in balance with the general ledger control account. The total of the account balances in the accounts receivable subsidiary ledger will equal the balance in the accounts receivable account in the general ledger. This statement is merely stating the truism that the whole is equal to the sum of its parts. The total owed to the company by its customers (general ledger) must be equal to the sum of all amounts owed by the individual customers (subsidiary ledger). The equality is maintained because no entries are made to the control account without also making entries to accounts in the subsidiary ledger. Thus, if Mr. Jones pays $100, the cash account is debited, the accounts receivable account in the general ledger is credited for $100, and Mr. Jones' account in the subsidiary ledger is credited. This second credit is not made in the general ledger, and therefore the general ledger debits equal the general ledger credits of the entry.

A problem arises when one or more of the accounts in the accounts receivable subsidiary ledger have credit balances. This may occur because of sales returns or allowances and advances by customers. In this situation the accounts receivable balance will not show the amount customers owe, but it will show the net of what customers owe and what the firm owes customers. This requires adjustment for position statement presentation.

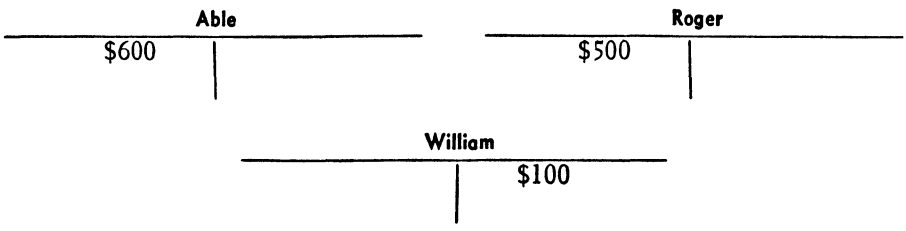
EXAMPLE

Assuming the following information, what amount should be shown as accounts receivable? As advances by customer?

General Ledger



Accounts Receivable (Subsidiary Ledger)



The subsidiary ledger and the general ledger are in agreement. The three subsidiary accounts have a net debit balance of $1,000. However, the total amount owed to the company is $1,100, and the company owes William $100. Thus the accounts receivable should be shown as $1,100, and the advances by customers should be shown as $100 (a liability).

Subsidiary ledgers are used with other accounts in addition to accounts receivable. Some of the other accounts that will have subsidiary ledgers are accounts payable, inventories, fixed assets, and investments.

QUESTIONS AND PROBLEMS

8–1 The Cable Company (see Prob. 6–1).

Prepare a worksheet for the Cable Company, using the following columns:

Trial Balance (pre-adjusting entries)
Adjusting Entries
Trial Balance (pre-closing entries)
Income Statement
Position Statement

8–2 The Cabot Corporation (see Prob. 6–2).

Prepare a ten-column worksheet for the Cabot Corporation, using the following columns:

Trial Balance (pre-adjusting entries)
Adjusting Entries
Trial Balance (pre-closing entries)
Income Statement
Position Statement

8–3 The Culver Corporation (see Prob. 7–4).

Prepare an eight-column worksheet, using the following columns:

Adjusting Entries and Transactions
Trial Balance (pre-closing entries)
Income Statement
Position

8–4 The Corner Drug Store

The accountant of the Corner Drug Store is currently recording transactions in a two-column journal and then posting the transactions to the general ledger.

The store makes sales on account and for cash. Sales are classified into three categories: Food, Drugs, and General. The cost of goods sold is computed following a periodic procedure (an inventory is taken monthly). Purchases are made as the goods are needed. This results in deliveries being received daily. There are six employees, and they are paid weekly. All disbursements of cash are by check. All cash receipts are deposited intact daily. Rent is paid monthly.

Required

Design a columnar journal that can be used to record all transactions but which will reduce the amount of posting to the general ledger. You are limited

to 12 money columns (columns in which dollar amounts are recorded). Use one column to record merchandise and three sales columns.

8-5 The Corner Drug Store (continued)

Assume that instead of one columnar journal, it is decided to use special journals. The following journals are decided upon:

General Journal (two-column journal)
Cash Receipts Journal
Cash Disbursements Journal
Sales Journal
Purchases Journal

Required

(a) Set up the required journals, indicating the money columns required (also as to whether they are debit or credit columns) and the information columns required. Record cash sales in both the cash receipts and sales journals.

(b) For each journal, indicate whether the columns would or would not be posted to the general ledger. In total or detail?

8-6 The Corner Drug Store (continued)

The following transactions occurred during the first week of January 1964.

Jan. 2 Sales on Account (all drug sales), $215.05. Sales for Cash, $155.90, (Drugs, $70.55; Food, $30.35; General, $55.00).
Collections, Accounts Receivable, $120.50.
Payments of Accounts Payable, $230.56.
Merchandise Received, $450.53.
January's Rent, $200 paid.

Jan. 3 Sales on Account (all drug sales), $203.20. Sales for Cash, $130.65, (Drugs, $30.05; Food, $40.60; General, $60.00).
Collections of Accounts Receivable, $204.58.
Payments of Accounts Payable, $395.09.
Merchandise Received, $348.53.
Supplies Purchased, $35.65.

Jan. 4 Sales on Account (all drug sales), $230.43. Sales for Cash, $364.00, (Drugs, $244.02; Food, $49.48; General, $70.50).
Collection of Accounts Receivable, $304.54.
Payment of Accounts Payable, $204.32.
Merchandise Received, $238.43.

Jan. 5 Sales on Account (all drug sales), $329.43. Sales for Cash, $200.00, (Drugs, $100.00; Food, $40.00; General, $60.00).
Collections of Accounts Receivable, $300.43.
Payment of Accounts Payable, $81.32.
Merchandise Received, $740.32.
Wages (for the week) Paid, $610.98.
Equipment Purchased on Account, $650.00.

Interest (on a loan paid to the bank), $43.00. (The interest had been accrued as a liability in the previous year.)

Required

Record the given transactions in special journals (see Prob. 8–5) and post to the general ledger.

8–7 The Chapman Company

Columnar Cash Receipts Journal (CR-1)

Date	Explanation	Cash Dr.		Accounts Receivable Cr.		Sales Cr.		Unclassified Cr.		L.F.	Account
19—											
Jan. 19	Cash Sales	$1,435	85			$1,435	85				
	Collections	604	08	$304	08						Parks
				300	00						Ott
	Proceeds of Note	1,010	00					$1,000	00		Notes Receivable
								10	00		Interest Revenue
Totals		$3,049	93	$604	08	$1,435	85	$1,010	00		

General Ledger (Selected Accounts)

Cash (1)

19—													
Jan.	18	Balance	✓	$40,540	43								

Accounts Receivable (4)

19—													
Jan.	18	Balance	✓	$30,439	76								

Notes Receivable (10)

19—													
Jan.	1	Balance	✓	$1,000	00								

Sales (32)

					19— Jan.	18		√	$32,045		54

Interest Revenue (33)

Subsidiary Record of Customers Accounts

I.C. Parks (P–45)

19— Jan.	1	Balance	√	$304	08						

M.Y. Ott (O–23)

19— Jan.	1	Balance	√	$560	00						

Required

Describe how the cash receipts journal should be posted to the general ledger and the subsidiary ledger.

8–8 The Triangle Television Shop

The Triangle Television Shop sells and services television sets. Sales are made on account and for cash. Sales are classified into two categories, "Sales-Merchandise" and "Service Revenue." The cost of goods sold is computed following a periodic inventory procedure. An inventory is taken monthly. Purchases are made as merchandise and supplies are needed. This occurs four or five times a week. There are ten employees, and they are paid weekly. All disbursments of cash are by check. All cash receipts are deposited intact daily. Rent is paid monthly. The company uses the following journals:

General Journal (two columns)
Cash Disbursement Journal (three money columns)
Cash Receipts Journal (four money columns)
Purchases Journal (four money columns)
Sales Journal (four money columns)

The January 1 trial balance was as follows:

Bank	$ 1,000
Accounts Receivable	3,000
Merchandise	6,000

Supplies	1,200	
Prepaid Rent	300	
Accounts Payable		$ 400
Wages Payable		600
Capital Received from Stockholders		10,000
Retained Earnings		500
	$11,500	$11,500

Transactions for the first week of January were as follows:

Jan. 2 Sales, Merchandise, $500 (all on account)
Service Revenue, $200 (all for cash)
Merchandise Received, $1,000

Jan. 3 Sales, Merchandise, $700 (all on account)
Service Revenue, $250 (all for cash)
Supplies Received, $200
Collection of Accounts Receivable, $500

Jan. 4 Service Revenue, $350 (all for cash)
Collection of Accounts Receivable, $400
Payment of Accounts Payable, $400

Jan. 5 Sales, Merchandise, $500 ($400 for cash, the remainder on account)
Service Revenue, $150 (all for cash)
Merchandise Received, $2,000
Supplies Received, $100
Collection of Accounts Receivable, $300
Payment of Account Payable, $1,000
Payment of Week's Wages, $900 (plus wages of $600 owed as of January 1)

Summary of transactions for the remainder of the month were as follows:

Jan. 6–31 Sales, Merchandise, $8,000 ($7,000 on account)
Service Revenue, $4,000 (all for cash)
Merchandise Received, $9,000
Supplies Received, $1,500
Collection of Accounts Receivable, $6,500
Payment of Accounts Payable, $8,600
Payment of Wages, $2,600 (as of January 31, wages of $300 are owed to the workers)
Rent Paid for February, $300

An inventory of merchandise and supplies as of January 31 indicates that there is $10,000 of merchandise and $700 of supplies on hand.

Required

(a) Set up general ledger accounts with the beginning balances obtained from the January 1 trial balance.
(b) Record the transactions for the period Jan. 1–31 in the journals.

(c) Total and prove each journal (see that the debits equal the credits for each journal).
(d) Post to the general ledger. Cross reference.
(e) Prepare a worksheet. Include columns for the income and position statement.
(f) Prepare an income statement for January and a position statement as of January 31.

8–9 The subsidiary record of accounts receivable showed the following balances:

Alison	$15,000	
Bates	22,000	
Carnes	13,000	
Williams	10,000	(credit balance)

The control account, accounts receivable, had a balance of $40,000.

Required

Explain how accounts receivable should be presented on the position statement.

9

The Flow of Costs: A Manufacturing Firm

IF A FIRM is engaged in a manufacturing process, there arises a need for several accounts which are not required for a merchandising firm. The management is interested not only in the material purchased and sold but also in the value of the raw materials, the goods in process, and the finished goods. These items are affected not only by purchased materials but also by various *costs* which are connected with the manufacturing process. Examples of the manufacturing costs generally assigned to inventory are factory labor, depreciation of factory, manufacturing supplies, materials, and the costs of various service departments. The major problem which the accountant must solve is the tracing of these costs as they flow through the manufacturing process. The problem will be solved in general terms in this chapter; later chapters will develop more complex cost accounting techniques.

RECORDING OF COSTS AND THE TRANSFER TO WORK IN PROCESS

Costs are first recorded in accounts which clearly indicate the basic nature of the item. Thus we find such cost accounts as:

Factory Labor, Direct
Material, Direct
Supplies, Manufacturing
Factory Labor, Indirect
Power Cost
Depreciation Cost

The first two items of the list are *direct* costs, since they can be identified with the end product. The other items are *indirect* costs or *overhead* costs, since they cannot be readily and directly identified with the product.

The direct material and direct labor may be transferred from labor or inventory accounts to a work-in-process account. The overhead items are first transferred to a manufacturing overhead account and then transferred to the work-in-process account. The process is called *absorption of overhead by product.* The absorption is accomplished by various means, but for purposes of this discussion it is assumed that overhead is applied on the basis of direct labor dollars, i.e., for each dollar of direct labor, a certain predetermined amount of overhead is applied to work in process. The debit for this entry is to work-in-process; the credit is to the manufacturing overhead account.

Thus we have transferred three items to work in process:

Direct Material
Direct Labor
Manufacturing Overhead

Note that the costs are first recorded in cost accounts and then transferred to a work-in-process account. All these cost accounts are "asset" accounts. The costs associated with the manufacture of the goods are not recognized as expenses until the goods are sold. In this way, all the expenses of earning the sales revenues are matched against the revenues in order to compute the income of the period.

The manufacturing overhead (sometimes called *burden* or *indirect manufacturing costs*) is transferred to work in process, based on the overhead absorption rate. The direct labor is transferred to work in process as the necessary information is obtained from labor reports. The information which has to be known is: the department, the job order number, the process or product being worked on, the number of hours and type of work performed, the hours of overtime, and the hourly rate. The transfer of material to work in process is accomplished through a summary of material requisitions. This summary tells the type of material, physical units, unit price, dollar value, and the department, job, process, or product which received the material.

MANUFACTURING OVERHEAD

The determination of the amount of manufacturing overhead to be applied to each unit of product is one of the prime unresolved problems of accounting for manufacturing costs. Assume a situation where a plant is shut down by a strike and only produces one unit (normally it produces 1,000) and incurs overhead costs of $10,000. Should all the $10,000 be considered a cost of the one unit which was produced, or is part of the $10,000 a cost of the strike? There are many accountants who would argue strongly in favor of considering

a large percentage of the $10,000 as being a cost of the strike, and thus an expense of the period, rather than burying this cost in inventory.

One approach to absorbing overhead to product is to use a predetermined overhead rate. There are many possibilities, but we shall define the overhead rate to be equal to the budgeted manufacturing overhead divided by budgeted direct labor hours, both budgeted amounts being set for normal activity.

$$\text{Overhead Rate} = \frac{\text{Budgeted manufacturing overhead}}{\text{Budgeted direct labor hours}}$$

The manufacturing overhead absorbed to product is determined by multiplying the overhead rate by the amount of direct labor hours worked during the period. The difference between the manufacturing overhead incurred and that amount absorbed to product (i.e., transferred to work in process) is called a cost variance.

EXAMPLE

The X Company has budgeted $20,000 of manufacturing overhead for 5,000 direct labor hours (1,000 units of product) for the month of May. During May the plant activity was reduced by a strike, and only 5 hours of direct labor work were performed (one unit of product). The actual manufacturing overhead incurred was $10,000.

The manufacturing overhead rate is $4 per direct labor hour.

$$\text{Overhead rate} = \frac{20{,}000}{5{,}000} = \$4$$

The overhead absorbed to product (transferred to work in process) is $20.

$$\text{Overhead absorbed} = \$4 \times 5 \text{ hours} = \$20$$

After transferring the $20 to work in process, the manufacturing overhead account would have a balance of $9,980. This is a cost variance which would be identified (probably as an expense of the strike).

The Transfer to Finished Goods

As the goods are completed and come off the production line, they should be either mechanically or physically counted. This gives a count of goods finished during the day. At the end of the day, this information is summarized, sent to accounting, and becomes the basis of the entry transferring work in process to finished goods. It should be noted that the accounting entries follow the physical flow of materials and other costs through the production process.

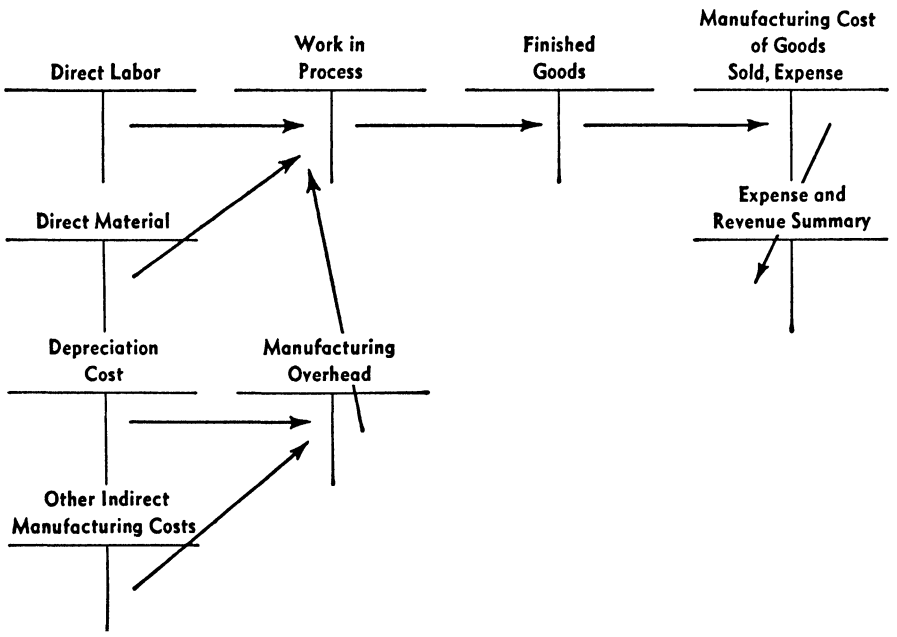
The Transfer to Manufacturing Cost of Goods Sold

When the goods are shipped to customers, they are transferred from finished goods to manufacturing cost of goods sold. The basis of this entry is a summary prepared at the end of the day by the shipping department. The relevant information for this entry consists of the units of product shipped, classified by type of product, and the cost of each type of product.

There is a temptation for a person first studying accounting to consider all costs incurred in the manufacturing process as expenses. As the costs are incurred, they are not generally expenses of the period but rather are costs of making the product. Since the goods are physically in inventory, the costs factors are also considered to be inventoriable from an accounting point of view. When the product is completed, the cost factors are then transferred from one account (work in process) to another inventory account (finished goods). It is not until the product is shipped in connection with a sale that the costs become expenses. Only then does the firm have a decrease in its resources (this decrease may be more than balanced by the resources acquired in exchange). The entry debiting manufacturing expense and crediting finished goods is made to record the expense and the decrease in inventory.

The Flow of Manufacturing Costs

The information contained in the preceding sections may be simply illustrated by using the accompanying flow chart.



The arrow from direct labor to work in process represents the following journal entry:

Work in Process	xxxx	
Direct Labor		xxxx
To transfer the direct labor to work in process		

In like manner each arrowhead represents a *debit*; and each *tail* of an arrow, a *credit* entry.

EXAMPLE

The Sample Company produces only one type of product and uses a single work in process account.

The following operating and cost data apply to the month of December.

1. Material purchased on account	$21,000
2. Materials used in production	15,000
3. Direct-labor costs incurred	10,000
4. Indirect-labor incurred	3,000
5. Supplies used in production	600
6. Power cost incurred on account	400
7. Rent expense incurred on account for the manufacturing plant	1,200

The beginning inventory in work in process is $50,000. The ending inventory in work in process is $45,000.

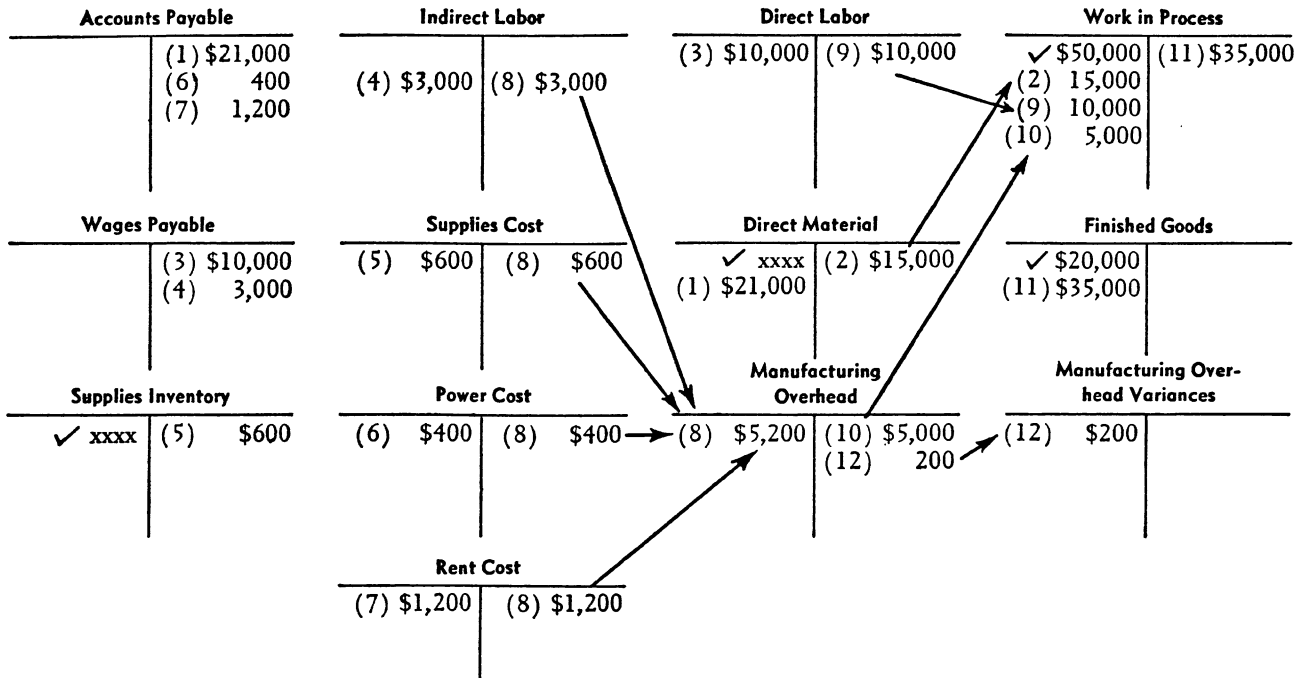
Manufacturing overhead is applied to product (to work in process) at the rate of $0.50 per direct-labor dollar. Any balance in the manufacturing overhead account, after the application of overhead, is closed to a manufacturing overhead variance account.

Required: Record the foregoing information.

Solution: The information is recorded in the following "T" accounts.

EXPLANATION OF ENTRIES

1. Debit material and credit accounts payable to increase the inventory account and increase a current liability.
2. Debit work in process and credit material to transfer the material used in production from one inventory account to another inventory account.
3. Debit direct labor and credit wages payable to record the incurrence of a cost (direct labor) and the increase in a current liability. We could call the account debited "direct labor in process."
4. Debit indirect labor and credit wages payable to record the incurrence of a cost (indirect labor) and the increase in a current liability.


Accounts Payable
(1) $21,000
(6) 400
(7) 1,200
Indirect Labor
(4) $3,000
(8) $3,000
Direct Labor
(3) $10,000
(9) $10,000
Work in Process
✓ $50,000
(2) 15,000
(9) 10,000
(10) 5,000
(11) $35,000
Wages Payable
(3) $10,000
(4) 3,000
Supplies Cost
(5) $600
(8) $600
Direct Material
✓ xxxx
(1) $21,000
(2) $15,000
Finished Goods
✓ $20,000
(11) $35,000
Supplies Inventory
✓ xxxx
(5) $600
Power Cost
(6) $400
(8) $400
Manufacturing Overhead
(8) $5,200
(10) $5,000
(12) 200
Manufacturing Overhead Variances
(12) $200
Rent Cost
(7) $1,200
(8) $1,200

5. Debit supplies cost and credit supplies inventory to record the transfer of the supplies used in production from one inventory account to another inventory account (supplies cost is an inventory account which accumulates costs for further disposition). Instead of debiting supplies cost, manufacturing overhead could be debited.
6. Debit power cost and credit accounts payable to record the incurrence of a cost (power cost) and the increase in a current liability. An alternative procedure would be to debit manufacturing overhead.
7. Debit rent cost and credit accounts payable to record the incurrence of a cost (rent cost) and the increase in a current liability.
8. Debit manufacturing overhead and credit the four indirect cost accounts (indirect labor, supplies cost, power cost, and rent cost) to transfer the indirect manufacturing costs to the manufacturing overhead account.
9. Debit work in process and credit direct labor to transfer the direct labor costs to an in-process account. Entry 2 recorded the transfer of material and entry 10 records the transfer of manufacturing overhead to the work in process account. Work in process accumulates the direct labor, material, and overhead costs incurred in manufacturing the product.
10. Debit work in process and credit manufacturing overhead to record the absorption of overhead by the product. The amount absorbed is equal to $.50 times the amount of direct labor dollars incurred.
11. Debit finished goods and credit work in process to transfer the costs of the goods finished during the period. The amount transferred is equal to the difference between the sum of the opening inventory and costs incurred during the period ($80,000) and the amount in process at the end of the period ($45,000). The next step would be to compute the cost of the units which were sold, so that this amount could be transferred from finished goods to the expense account manufacturing cost of goods sold.
12. Debit manufacturing overhead variances and credit manufacturing overhead to close out the balance in the manufacturing overhead account to a variance account.

Balances in Manufacturing Overhead

If a predetermined rate is used to transfer overhead to work in process, there will invariably be a balance in the manufacturing overhead account at the end of the accounting period. Some accountants suggest that this balance be carried forward from month to month and then closed out at the end of the

year. Others advocate closing this account monthly. There is also the problem of how to interpret a balance in the account. It is possible to view it as a loss (if a debit balance) or a gain (if a credit balance), close it to a "variance" account, and then close the variance account to the expense and revenue summary. Another possible interpretation is to view a balance as an adjustment to both inventory and cost of goods sold. This interpretation assumes that the original estimates upon which the overhead rates were set were faulty and corrects the amount of overhead charged to the product.

There is no clear-cut answer to the question as to which of the above options is "correct," and this is not the place for a development of all the pros and cons. Thus we shall ignore valid objections to the procedure, and for the present we shall close the balance in the overhead account at the end of each period to the expense and revenue summary, unless the unabsorbed overhead clearly arises from improperly set overhead rates.

OTHER EXPENSES

A manufacturing firm will incur other costs in addition to the costs arising from the manufacturing process. These expenses are classified as to whether they are "administrative" or "selling" expenses. Unlike the manufacturing costs, which are considered "inventoriable" (i.e., are run through work in process and do affect the amount shown in inventory), administrative and selling costs are commonly considered "period" costs and are charged to expense in the period in which they are incurred. If a portion of the administrative costs can logically be associated with the manufacturing process, then there is justification for considering at least a percentage of the administrative costs as manufacturing overhead and recording it in that account.

Administrative and selling expenses are first recorded in "natural" expense accounts and then closed to the "functional" expense accounts in the same manner as manufacturing costs.

EXAMPLES OF NATURAL ACCOUNTS FOR SELLING EXPENSES

Depreciation of Office Equipment
Travel Expense
Salesman Salaries
Office Rent
Office Supplies
Secretarial Services

EXAMPLES OF FUNCTIONAL EXPENSE ACCOUNTS FOR A MANUFACTURING CORPORATION

Manufacturing Cost of Sales
Selling Expense
Administrative Expense

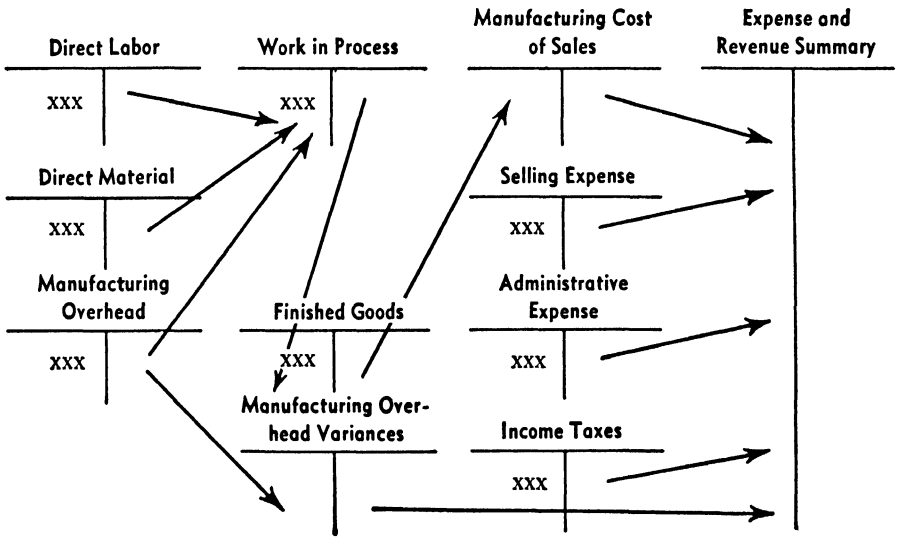
Some accounting systems are so set up that the information as to the natural and functional classification of costs is accomplished by just one recording of the cost. Accounts (or codes) are established for the three functional classifications; for example:

	Code
Manufacturing Cost of Sales	10
Selling Expense	20
Administrative Expense	30

Codes are also established for each of the natural classifications:

Office Supplies	11
Secretarial Services	21

Office supplies used by the selling force are coded 20–11. Office supplies used by the administrative force are 30–11.



QUESTIONS AND PROBLEMS

9–1 The Welk Company produces only one type of product and uses a single work in process account.

The following operating and cost data apply to the month of December.

1. Materials purchased on account	$14,000
2. Materials used in production	$12,000
3. Wages, direct labor	$6,000
4. Wages, indirect labor	$2,000
5. Supplies purchased on account	$1,500
6. Supplies used in production	$1,000
7. Taxes on plant and machinery	$900
8. Power purchased on account and consumed in manufacturing	$600
Units of product completed in December	10,000
Units of product sold in December	8,000

There were no beginning inventories of work in process or finished goods and no ending inventory of work in process. The actual overhead incurred is applied to product (transfer all manufacturing overhead to work in process).

Required

Set up the following accounts in "T" account form and in proper flow sequence, and record the operating data for December.

Material
Accrued Payroll
Direct Labor
Indirect Labor
Taxes Payable
Cost of Sales
Supplies Inventory
Work in Process
Power
Finished Goods
Accounts Payable
Taxes
Supplies Used
Manufacturing Overhead

9–2 The Williams Company produces only one type of product and uses a single work in process account.

The following operating and cost data apply to the month of January.

1. Materials purchased on account	$13,000
2. Materials used in production	$11,000
3. Wages for direct labor	$9,000
4. Wages for indirect labor	$4,000
5. Production supplies purchased on account	$1,000

6. Production supplies used	$1,000
7. Income taxes	$2,000
8. Salaries, selling	$5,000
9. Salaries, administrative	$3,000
Units of product completed in January	10,000
Units of product sold in January (at a price of $5 per unit)	5,000

There were no beginning inventories and no ending inventory of work in process. Manufacturing overhead is applied to product (to work in process) at the rate of $0.40 per direct-labor dollar. There is no beginning inventory of finished goods.

Required

(a) Set up the following accounts in "T" account form and in proper flow sequence, and record the operating data for January.

Material
Accrued Payroll
Direct Labor
Indirect Labor
Taxes Payable
Cost of Sales
Supplies Inventory
Work in Process
Sales
Finished Goods
Accounts Payable
Taxes, Income
Supplies Used
Manufacturing Overhead
Selling Expense
Administrative Expense
Accounts Receivable
Retained Earnings
Manufacturing Overhead, Variance

(b) Record the closing entries.

9–3 The Wilson Company manufactures one product. The company closes its books on December 31 of each year. You accumulate the following information applicable to the year:

The company has incurred the following costs as a result of its manufacturing operations:

Materials	$20,000
Direct Labor	18,000
Other Factory Costs	9,000

The Wilson Company rents its factory building at a cost of $12,000 a year. The company's administrative offices occupy one-sixth of the building's floor space,

and it has been decided to treat one-sixth of the rent as administrative expense. The remainder is regarded as a cost of manufacturing. All other administrative expenses total $15,000 for the year.

Selling expenses for this period, the salaries of salesmen in the field, totaled $14,000.

The company utilizes only one work in process and one finished goods account. The work in process beginning inventory was $4,000; the ending inventory, $5,000. The finished goods beginning inventory was $10,000; the ending inventory, $8,000.

During the past year the company had sales of $70,000. All manufacturing overhead is applied to product.

Required

Set up "T" accounts showing the flow of costs and closing entries.

9-4 The Flow Corporation produces only one product and uses a single work in process account. On January 31 the following account balances existed:

Work in Process	$12,000
Finished Goods	6,000

The following information applies to the month of February:

Manufacturing supplies purchased on account	$ 2,000
Materials purchased on account	30,000
Material requisitioned and used	35,000
Manufacturing supplies used	1,800
Direct labor	40,000
Indirect labor	25,000
Administrative salaries	15,000
Selling, salaries	20,000
Administrative expenses (cr. Accounts Payable)	3,000
Selling expenses (cr. Accounts Payable)	2,500
Depreciation, factory building	1,000
Depreciation, equipment (manufacturing)	400
Power (amount metered during the month)	200
Inventory work in process, February 28	10,000
Inventory finished goods, February 28	8,000

Overhead is applied to product at a rate of $0.80 per dollar of direct labor. Twenty per cent of the total administrative costs are assigned to the manufacturing process. Power is allocated 90% to manufacturing and 10% to administrative costs. Five per cent of the depreciation of the factory building is to be allocated to administrative costs.

Required

Set up the necessary "T" accounts and record the given information for February. Assume that materials and supplies both had opening inventories. Close any balance in the manufacturing overhead account to "Overhead Variance." Show the manufacturing cost of sales.

10

Liquid Assets

THE CLASSIFICATION "liquid assets" includes the following items:

Cash on hand
Cash in bank
Marketable securities
Accounts receivable

The four items listed all have the characteristic of either being in the form of cash or being relatively easily turned into cash. Marketable securities can be sold and accounts receivable can be factored (i.e., sold to a third party who makes the collection).

CASH

The accounting for cash and near-cash items is complicated by the fact that these items are especially susceptible to theft. Thus the job tasks and the accounting routines are designed to minimize the likelihood of such loss. It is not always possible to employ all the safeguards, usually referred to as *internal controls*, but the following are among the most important:

1. Deposit each day's receipts intact.
2. Disburse all significant amounts of cash by check.
3. Divide the job tasks so that the person receiving the cash does not record entries in the ledger or have access to customer accounts, etc.
4. Bank accounts should be reconciled by an employee who does not write checks or have access to cash.
5. Checks should be signed only by authorized personnel.

This list is by no means all-inclusive, but it does give an indication of the type of controls necessary to safeguard cash. The American Institute of Certified Public Accountants has published booklets on internal control

which give more complete lists of internal control procedures. Standard textbooks on auditing or accounting systems are also good source books.

Petty Cash

All significant disbursements of cash should be by check, but there are occasions where the amount to be disbursed is so small that it is not worth the trouble of writing a check and preparing the necessary paper which accompanies any check. Thus firms will usually set up a petty cash fund of a stipulated amount. The fund is established by writing a check for the total amount of the fund. Cash is disbursed from the fund for various small purchases, such as postage, travel advances, paying messengers, etc. When the cash remaining in the fund gets below a predetermined amount, the person handling the petty cash fund turns in a list of disbursements, along with the evidence of the disbursements, so that a check may be written to replenish the fund. The fund is replenished so that it again consists of the authorized amount of cash.

The total of the cash on hand and the itemized disbursements should at all times equal the authorized amount of the fund. If this sum is less than the authorized amount, then there is a cash shortage and this shortage should be investigated. Often there will be unauthorized items in the petty cash fund, such as IOU's or checks of employees. Another dangerous practice is to use the petty cash fund to cover relatively large disbursements. This procedure may bypass "red tape," but it also upsets the system of control designed to prevent theft.

At the end of the accounting period, it may be the practice of the firm to replenish the petty cash fund. If the fund is not replenished, then its stipulated amount should be adjusted so that note is taken of the various expenses of the period.

ILLUSTRATION OF ENTRIES FOR PETTY CASH FUND

Petty Cash Fund	$100	
Bank		$100
To establish the petty cash fund		
Postage Expense	15	
Office Supplies	10	
Entertainment Expense	25	
Bank		50
To replenish the petty cash fund		
Office Supplies	8	
Travel Advances	20	
Entertainment Expense	12	
Bank		40

To replenish the petty cash fund at the end of the accounting period

If the fund is not actually replenished at the end of the accounting period, then the entry to record the status of the fund would be:

Office Supplies	$ 8	
Travel Advances	20	
Entertainment Expense	12	
Petty Cash Fund		$ 40

To reduce the petty cash fund at the end of the accounting period

Assume that at the end of the accounting period the following items were found in the petty cash fund:

Invoices for Office Supplies	$ 8
Receipts for Travel Advances	20
Entertainment Vouchers	12
Cash (in dollars and coins)	56
	$96

The total should be for $100. The petty cash custodian should be asked to explain the difference. If the shortage cannot be explained, then it must be written off as a loss. The entry would be:

Cash Shortage	$ 4	
Office Supplies	8	
Travel Advances	20	
Entertainment Expense	12	
Petty Cash Fund		$44

Bank Reconciliations

Each month it is necessary to reconcile the balance of the general ledger account, "Cash in Bank," with the amount of money which the bank states that the customer has on deposit. Will the balance on the bank statement ever differ from the balance in the general ledger? Why? The following are the more common causes:

1. Checks Outstanding: Recorded by company but not yet cleared by the bank
2. Deposits in Transit: Recorded by company but not received by the bank
3. Service Charges: Deducted by the bank but not yet recorded by the company
4. NSF Checks (not sufficient funds): Deposited by the company, noted by the bank as being bad, but not yet received by the company

5. Errors: Most commonly made by the company, although the bank can also make mistakes

Bank Reconciliation Procedure

Bank reconciliations are simple if they are attacked systematically. There are actually only two questions to be answered. Does the item affect the bank balance or the balance per books? Should it be added or subtracted? Apply this method to the following items:

1. Checks Outstanding: Affect the bank balance (they are already recorded by the company). They should be subtracted because the amount of cash is not available for further disbursement.
2. Deposits in Transit: Affect the bank balance (they are already recorded by the company). They should be added to the balance per bank because the deposits have been made but have not been recorded by the bank.
3. Service Charges: Affect the book balance (they are already recorded by the bank). They should be subtracted because the bank has already decreased the company's balance by the amount.
4. NSF Checks: Affect the book balance (they are already recorded by the bank). They should be subtracted because the bank has already decreased the company's balance by the amount (or has never increased it).

Obviously, journal entries will be required to bring the company's books into correct balance. The information for these journal entries will be found in the section of the bank reconciliation which deals with the balance per books.

ILLUSTRATION

From the following information, prepare a bank reconciliation and the necessary journal entries for the Sample Company.

Balance per Bank Statement, December 31, 19—	$12,250
Balance per Bank Account (General Ledger), December 31, 19—	10,000
Checks Outstanding	3,000
Deposit of December 31, 19— (not recorded by bank)	1,000
Deposit of December 26, 19— (customer collections, not recorded by company)	800
Bank Service Charges per Bank Statement	5
NSF Check (a customer check which was not honored)	545

SAMPLE COMPANY

Bank Reconciliation
as of December 31, 19—

Balance per Books, December 31, 19—		$10,000
Add:		
Deposit of December 26, 19— (customer collections, not recorded)		800
		$10,800
Subtract:		
Bank Service Charges	$ 5	
NSF Check	545	550
Corrected Balance per Books, December 31, 19—		$10,250
Balance per Bank Statement, December 31, 19—		$12,250
Add:		
Deposit of December 31, 19—, in Transit		1,000
		$13,250
Subtract:		
Outstanding Checks (attach list)		3,000
Corrected Balance per Bank Statement, December 31, 19—		10,250

Required Journal Entries

Bank	$800	
Accounts Receivable		$800
To record the deposit of December 26, not previously recorded		
Bank Service Charges	5	
Accounts Receivable	545	
Bank		550
To record the bank service charge and set up the NSF check as a receivable		

Note that all the journal entries are based on information obtained from the "book" section of the bank reconciliation.

Management and Cash

The primary responsibilities of management with respect to cash are:

1. To prevent loss of cash due to fraud or theft.
2. To ensure that there is sufficient cash on hand so that the normal operations of the business are not interrupted because of a shortage of cash.

3. To ensure that cash is not sitting idle during periods in which there is a temporary excess of cash on hand.

The second and third items listed will be discussed jointly, since they represent one goal. The cash balance should be large enough to meet the needs for cash arising during the period, but there should be no excess cash sitting idle. Assuming that money costs 5% per year, then a million dollars idle for a year costs $50,000. If it is idle for a week, it costs over $950, and even a day's idleness costs well over $100.

The handling of cash should be carefully controlled so that idle balances are kept to a minimum. A million dollars may seem like a great deal of money to the average individual, but even medium-sized corporations maintain bank balances of millions of dollars. In recent years corporations have been able to invest temporary excess funds in government securities, and there is reason to suspect that this market will be present in the future.

Disbursement of Cash: The Voucher System

One of the most important controls over cash is that in which all disbursements of material size must be made by check. The canceled check gives objective evidence of the purpose for which the disbursement was made. Another important control is the voucher system.

A voucher is evidence (most probably a serially numbered form) indicating why a payment was made. This evidence may consist of items similar to a purchase invoice, a post office receipt, or a payroll summary. The exact nature of a voucher may vary, but usually there will be a form indicating the number of the voucher, the purpose of the proposed disbursement, the amount to be disbursed, the account to be charged, and the authorization for payment. When the check is written, the voucher which is being paid will be recorded. Thus, to investigate why a check was written, one reviews the voucher for which the check was written. The voucher cover sheet will have attached to it the evidence necessary to justify and explain the writing of the check. Some voucher systems use the same serial number for both the voucher and the check. In fact, the voucher cover is often written automatically as the check is written. This system has the advantage of facilitating the job of the person tracing the reason for the writing of a check, and it also reduces the labor connected with the preparation of a voucher.

If a voucher system is being used, each check written will have an authorized voucher explaining the reason for writing the check. This procedure helps ensure that only authorized checks are written and that any check can be explained by reference to the voucher file.

A voucher system has several bookkeeping implications. The specific

liabilities may be classified as vouchers payable when the voucher is authorized for payment. When payment is made, vouchers payable is debited and bank is credited. A more popular procedure is to record only the disbursement. The specific liabilities (such as accounts payable, payroll, taxes payable) are not accrued except at the end of the accounting period. With this procedure the entries to the liability accounts are bypassed. The entry made to record the disbursement is to debit the various accounts, such as merchandise, wages, supplies, etc., and credit bank. There is an implicit credit and debit to vouchers payable which is not recorded.

ILLUSTRATION

Record Voucher 546, which authorizes payment of a tax liability (already recorded as a liability) of $50,000.

Taxes Payable	$50,000	
Vouchers Payable		$50,000

If a check is written to pay Voucher 546, then the following entry is made:

Vouchers Payable	$50,000	
Bank		$50,000

If the tax liability *had not* been accrued, then the following entry could be substituted for the entries made above (and also the entry originally made to accrue the tax liability).

Income Taxes	$50,000	
Bank		$50,000

To record the payment of the income taxes for the period; reference Voucher 546

Administering Cash

Two techniques have been developed to decrease the cash float of a corporation. These are:

(a) Concentration banking
(b) Lock-box system

A corporation operating in widely scattered geographical areas will use a large number of local banks. With concentration banking, the excess funds in these local banks are wired (or transferred via a bank draft) to a central bank without requiring an additional direction from the central office. Some corporations instruct their local banks to automatically transfer all funds in excess of a given target amount as soon as they are received. Essentially, concentration banking is the application of a formalized and systematized procedure to actions which would be carried out sooner or later with a less systematized system.

With a lock-box system, the selling corporation advises its customers to transmit payments directly to its bank (via a locked post office box). Thus the bank gets the funds directly from the customer, and the time that the funds would otherwise be sitting in the corporate offices or safe is eliminated. This procedure is not without its costs. The bank is offering more services (opening and processing mail) and thus must be compensated. Customers have their checks cashed earlier than otherwise, and this is liable to upset the customer who is tightly controlling his cash and is used to a check float of several days. Also, the corporation making the collection receives notification of collection later than if the mail had gone directly to the corporation.

Kiting

One of the most popular methods of postponing the exposure of the misappropriation of funds has been given the picturesque name "kiting." This procedure makes use of the fact that several days are needed for a check to clear through the banking system.

Assume that Mr. Jones has taken $10,000 of company funds and wishes to conceal this fact. We assume that he has succeeded in having a check written and approved which he was then able to cash. Since the check cannot be supported by legal evidence, he destroys it when it is returned from the bank. If Jones did nothing, the balance indicated by the New York bank would be $10,000 less than the balance indicated on the company's books (since the check was never recorded as a disbursement). To prevent this from occurring, at the end of the month Mr. Jones writes a check for $10,000 on a San Francisco bank payable to the account in the New York bank. Jones does not record this check. The New York bank includes this check as a deposit; thus the balance per New York bank and the balance in the account in the general ledger may be reconciled. The balance of the San Francisco bank may be reconciled, since no entry is made for the $10,000 check payable to the New York bank in the general ledger of the company. The company's balance on the books of the San Francisco bank is unaffected, since the check has not yet cleared.

Mr. Jones has to continue this process of bouncing checks from bank to bank until he has repaid the $10,000. If he stops playing the game, one of the banks will indicate $10,000 less than is indicated on the books of the company.

Mr. Jones' applecart can be upset by the auditor receiving the bank statement directly and noting the unidentified deposit of $10,000. If a further bank statement is requested, say on the tenth of the month, the unrecorded transfer of funds from San Francisco to New York will be caught, since the check for $10,000 payable to the account in the New York bank will be in that

statement. Auditors naturally are suspicious of checks written at the end of the month payable to another bank.

MARKETABLE SECURITIES

Most corporations at some time in the year find themselves with cash in excess of that required by current operations or that required to meet the compensatory balance requirements of their bank. These funds are properly invested in some type of short-term security. The prime objective of the investor in this situation is safety. The treasurer of the corporation wants to be reasonably sure he will be able to sell the security, at any time he needs the funds, for an amount equal to or greater than the price he paid. He wants to earn a positive return on his investment during the period of investment. There are two ways he can attempt to maximize his return: by choice of type of security and by choice of length of maturity of the security.

About 80 per cent of the corporate funds invested in marketable securities are invested in United States Government securities. The most popular of these is the 91-day Treasury Bill, issued by the government at a discount and redeemed at maturity at issue price plus interest. The short maturity, the ready market for issued bills, and the good credit standing of the issuer make this the ideal security from the point of view of risk and earning a reasonable return.

Tax anticipation securities of the Treasury are also popular. Though they mature a few days after the quarterly due date for taxes, they may be used to pay corporate income taxes.

Slightly more risky, since they will have more fluctuation in price, are U.S. Treasury securities with longer maturities than three months. Changes in interest rates will affect the price of the longer-lived securities and thus are more risky from the point of view of the corporate treasurer who has to have ready cash at his disposal. Imagine the position of a corporate treasurer who told his president that he could obtain the needed cash by liquidating the marketable security portfolio but that there would be a market loss of $1,000,000. The treasurer may have acted in a reasonable manner from the point of view of profit maximization, but not from the point of view of corporate goals as seen by the president. This is not to imply that investment in relatively long-term government securities may not be desirable; it is to point out that some risk is attached to such decisions.

Instead of investing in United States Government securities, the corporate treasurer may decide to invest in other types of securities. These include:

Repurchase agreement [1]
Directly placed commercial paper (frequently finance company obligations)
Broker placed commercial paper
Tax exempt securities (issues of state and municipal governments)
United States Agency securities
Foreign government securities
Bank certificates (negotiable short-term securities issued by commercial banks)

All of these securities have somewhat more risk than the securities of the United States Government because of the nature of the issuer. Also, the tax exempt securities and the United States Agency securities are likely to be long-term issues.

If the market price of the securities is lower than the cost, then it is generally accepted practice to write the securities down to market. If the market price of the securities is greater than the cost, the practice is either to do nothing or to show the market value in a footnote. Note that, for managerial decisions (and any other decision being made), the significant figure is not the cost but rather the most recent market value of the securities.

Securities that are being held for investment purposes should not be classified as marketable securities but as investments. Investments are not classified as current assets but are shown in the position statement immediately below the current asset section. It is sometimes difficult to draw a sharp line distinguishing between investments and marketable securities. Investments are usually marketable, and marketable securities are generally thought of as being investments. Where then is the dividing line? Common stock held for *control purposes* should be classified as an investment and not included in the current section of the position statement. Other securities for which there is a market may be classified as current assets (marketable securities).

ACCOUNTS RECEIVABLE

When a sale is made and cash is not actually received at the time of the sale, the sale is said to be made "on account." The entry that is made is a debit to an asset account, to record the fact that a customer owes the firm money, and a credit to a revenue account.

[1] Under a repurchase agreement, a government security dealer sells the security to the corporation but agrees to buy it back in a short period of time (frequently a matter of hours) at a set price. There is risk since the financial health of the dealer is uncertain.

Accounts Receivable	$1,000	
Sales		$1,000
To record a sale on account		

A major difficulty in accounting for this transaction arises because not all the accounts receivable recorded as assets will actually be collected. When a firm does a large amount of credit business, it is practically a certainty that some accounts receivable will "go bad" and not be collected. If the firm did not receive a good asset, then the revenue should not have been recognized. However, neither at the time of recording the sale nor at the end of the accounting period does the accountant know which of the accounts receivable will go bad. Thus, specific receivable accounts cannot be credited, even though the accountant does know that a certain percentage of the accounts receivable arising from the credit sales of this period will go bad. He solves his dilemma by making use of *contra* accounts.

Contra and Adjunct Accounts

Instead of making entries directly to the primary account, the accountant sometimes finds it useful to employ accounts to record subtractions and additions to the primary account. These supplementary accounts are called "Contra Accounts" (subtractions from the primary account) and "Adjunct Accounts" (additions to the primary account).

Up to this point, all accounts used could be placed into one of four general classifications:

1. Asset Account (a *real* account)
2. Equity Account (further split as to whether liability or stock equity; also a *real* account)
3. Revenue Account (a temporary or *nominal* account)
4. Revenue Deduction (further split as to whether expense, loss, or tax, all of which are temporary or *nominal* accounts)

The asset, equity, and revenue accounts may all have contra or adjunct accounts. If the primary account is increased by a *debit* (as are all asset accounts), then the contra account will be increased by a *credit*. If the primary account is increased by a credit (as are all equity and revenue accounts), then the contra account will be increased by a debit. The adjunct accounts will be just the opposite, for they are additions to the primary account.

Contra Asset and Contra Revenue Accounts

Contra asset accounts are increased by credits, since they are *essentially decreases in assets*. All contra asset accounts may be classified as valuation accounts. When will valuation accounts be needed? They are used with ac-

counts receivable to take note of the fact that some of the accounts receivable will not be collected, that is, they will become bad debts. Contra accounts are also used as valuation accounts with fixed assets; this will be taken up in detail in Chapter 12.

In this chapter the following contra accounts to accounts receivable will be studied:

Accounts Receivable: Allowance for Uncollectibles
Accounts Receivable: Allowance for Sales Returns
Accounts Receivable: Allowance for Sales Discounts

Each of the contra accounts to accounts receivable will be increased by credits, since they are essentially decreases to accounts receivable. What accounts are debited? The debit in each case is to a contra revenue account, since we are recording decreases to revenues.

Revenues are increased by credits; thus, the contra revenue accounts are increased by debits. The main revenue account could be decreased directly in all of the following cases, but the use of a contra revenue account is chosen in order to preserve relevant information. Management should know what deductions are being made from gross sales for uncollectible accounts, sales returns, and sales discounts.

Accounts Receivable: Allowance for Uncollectibles

The accounts receivable—allowance for uncollectible accounts is a contra asset account, a subtraction from the main account (accounts receivable). It is established because not all the accounts receivable arising from any period's sales will be collected. Since all the sales did not actually generate assets, the revenues should also be decreased; thus the debit for the transaction is to a contra account to sales. The entry which should be made each period for that amount of sales and accounts receivable not expected to be collected is:

Sales: Adjustment for Uncollectibles	xxxxxxxx	
Accounts Receivable: Allowance for Uncollectibles		xxxxxxxx
To set up an allowance for uncollectibles for this period's sales		

It is possible that over a period of years the allowance may become too large or the bad debts may become so great that the allowance is too small. An adjustment should then be made. For example, suppose that it is found by analyzing the age of the accounts receivable that the allowance account should be $10,000 greater. An entry should be made similar to the following:

Adjustment of Prior Year's Earnings	$10,000	
Accounts Receivable: Allowance for Uncollectibles		$10,000
To adjust the allowance for uncollectibles		

The nature of the allowance account should be noted. There is nothing actually set aside. A valuation of the accounts receivable is being made to take note of the fact that not all the accounts receivable will be collected. Why were sales made if the firm had not expected to collect them? When the sales were made, *it was expected that each account would be good,* but it was known that statistically some of the customers' accounts would become bad. The specific bad accounts were unknown. What is the significance of an overstatement of the allowance account? An overstatement means that incomes have been understated in the past, and thus the assets and retained earnings have been understated. A portion of the allowance is actually *retained earnings!* If the allowance account is understated, the asset accounts receivable is overstated, and retained earnings is overstated (the incomes of the past years have been overstated).

In view of possible confusion resulting from the use of the term "allowance," it may be desirable to find alternative names for the contra accounts associated with accounts receivable. For example, the following could be used:

Accounts Receivable: Estimated Uncollectibles
Accounts Receivable: Estimated Sales Returns
Accounts Receivable: Estimated Sales Discounts

Determining the Year End Adjustment

At the end of the year (or other accounting period), it is necessary to make an entry increasing the allowance for uncollectibles account and decreasing the period's sales by the amount of sales which are not expected to be collected. As explained in the preceding section, the entry is:

Sales: Adjustment for Uncollectibles	xxxx	
Accounts Receivable: Allowance for Uncollectibles		xxxx

How should the dollar amount for this entry be determined? There are several choices:

1. A percentage of total sales
2. A percentage of credit sales
3. An appraisal of the accounts receivable still outstanding at year end, the appraisal being based on the age of the accounts (the age indicating the quality)

The advantages of using a percentage of sales are that it is simpler, cheaper, and quicker than a detailed analysis of the accounts. But even if sales is used as the basis of determining the amount to be accrued for the period, the size of the allowance should be reviewed regularly to ensure that the allowance for uncollectible accounts is reasonable.

The sales should be multiplied by a percentage which past experience indicates to be realistic. If the percentage used is unrealistic, the allowance will become either too large or too small.

Should total sales or just credit sales be used as the basis for the computation? Credit sales is the better figure, because the amount of uncollectible accounts can be expected to bear a better correlation with credit sales than total sales (where cash sales are included).

Aging Accounts Receivable

Even if the sales adjustment is computed by using a percentage of sales, the allowance for uncollectibles must be periodically compared with the accounts receivable outstanding. The most common procedure used is to age the accounts receivable. This means that the length of time the account has been outstanding will be taken into consideration in determining how large an allowance is needed.

The first step in this procedure is to array all accounts according to age and then to multiply the different groups by different percentages which reflect the likelihood of the accounts going bad.

ILLUSTRATION

The Sample Company is reviewing the size of its allowance for uncollectibles. To accomplish this it has aged its accounts receivable and has multiplied each age group by percentages based on past experience.

Age Group	Dollar Amount of Accounts Receivable	Percentage Factor	Required Allowance for Uncollectibles
Up to 6 mos.	$5,000	1%	$ 50
6 mos. to 1 yr.	3,000	5	150
1–2 yr.	1,000	20	200
Over 2 yr.	300	90	270
	$9,300		$670

Assume that the balance of the allowance account is $700. Prepare the required journal entry.

Accounts Receivable: Allowance for Uncollectibles	$30	
Adjustment to Prior Year's Earnings		$30
To adjust the allowance for uncollectible accounts		

If the balance of the allowance account prior to adjusting entries had been $170, then the following entry would be required:

Sales: Adjustment for Uncollectibles	$500	
Accounts Receivable: Allowance for Uncollectibles		$500
To adjust the allowance for uncollectibles to a balance of $670		

There can be troublesome cases where it is questionable whether the entry should be made to the sales adjustment account or to an account adjusting a prior year's earnings. Where possible, an attempt should be made to identify the amount of the adjustment directly associated with the period's revenues. This is consistent with the principle of matching revenues and expenses.

Writing Off Bad Debts

When an account is actually determined to be uncollectible, it should be written off. Now the specific account is known, and accounts receivable may be credited directly. The debit is to the contra account which had been set up just for this happening.

Accounts Receivable: Allowance for Uncollectibles	xxxxxx	
Accounts Receivable		xxxxxx
To write off a bad debt		

If the account is written off prematurely, and it later turns out to be collectible, then the above entry may be reversed.

Accounts Receivable	xxxxxx	
Accounts Receivable: Allowance for Uncollectibles		xxxxxx
To record the fact that an account written off is collectible		
Cash	xxxxxx	
Accounts Receivable		xxxxxx
To record the collection		

The danger of having too large a balance in the allowance must be avoided when the entry made to write off the bad account is reversed. If this is likely to occur, then the credit should be to a "Bad Debts Recovered" account. This account is an adjustment of prior years' earnings and, with the single-step income statement, is added to the revenues of the period.

There are many accountants who prefer not to set up an allowance for uncollectibles but to debit "Bad Debt Expense" when the account actually goes bad. This is an incorrect procedure, because assets are overstated and revenue deductions are not being matched with revenues. The debit to "Bad

Debt Expense" may also be made merely as a substitute for the debit to the sales adjustment for uncollectibles account. This latter procedure is not so harmful as the former, but it does assume that bad debts are an expense instead of a deduction from gross revenues. Assume that $75 worth of merchandise is sold on account for $100. What is the expense of making the transaction? If the $100 is collected, the expenses are $75. If the $100 is not collected, are the expenses $175 ($100 bad debts plus $75)? The total net revenues and total expenses will be dependent on the procedure followed. In one case, revenues are decreased by $100 (debiting a sales contra), and in the second case, expenses are increased by $100. The routes are different, but the end result is the same.

Recording Sales Returns

It is not unusual that, after a sale has been seemingly made, the customer finds that the purchased article is not suitable and returns it to the seller. The fault may rest in the purchased article (the goods were damaged or not as advertised), or there may be just a change of heart on the part of the customer. In any event, if the return is allowed by the seller, a series of accounting entries is required. Essentially, all that is being done is a reversal of the entries made to record the sale and a recognition of any "costs of returns" which were incurred. One difficulty arises because the seller may be using either a periodic or a perpetual inventory procedure. The entries made to record the return will depend on the entries made at the time of sale.

ILLUSTRATION

Goods that cost $80 are sold on account for $100. Two days later the goods are returned, and credit is given to the customer. The returned merchandise has a value of $50.

Assuming the company uses a *periodic* inventory procedure:

Accounts Receivable	$100	
Sales		$100
To record the sale		
Sales Returns	100	
Accounts Receivable		100
To reverse the entry made to record the sale; a contra account is used to reduce sales so that the total sales returns will be known		
Cost of Returns Expense	30	
Merchandise		30
To note the fact that the merchandise has decreased in value from $80 to $50		

Assuming the company uses a *perpetual* inventory procedure:

Accounts Receivable	$100	
Cost of Goods Sold	80	
Sales		$100
Merchandise		80
To record the sale and recognize the cost of goods sold		
Sales Returns	100	
Accounts Receivable		100
To reverse the entry made to record the sale, but using a sales contra account to decrease sales		
Merchandise	50	
Cost of Returns Expense	30	
Cost of Goods Sold		80
To decrease cost of goods sold for the amount charged to it at time of sale; to increase merchandise by the value of the returned merchandise and to recognize the expense of returns		

If the seller uses a periodic inventory procedure, then the entries to record the sales return are made with this in mind. This will usually mean that no entry has to be made concerning cost of goods sold, since at the time of sale no entry was made to record the cost of sales (using the periodic inventory procedure, the cost of sales is recognized at the end of the accounting period after the taking of a physical inventory). If the seller uses a perpetual inventory procedure, then the entry to record cost of sales has been made at the time of sale, and appropriate entries must be made to reverse the cost of sales entry if the merchandise is returned.

Accounts Receivable: Allowance for Sales Returns

At the end of the accounting period, an estimate may be made of the accounts receivable which will not be collected because the merchandise sold will be returned. A whole series of entries will be triggered by this assumption:

Sales: decreased by the amount of the sales price of the expected returned merchandise (debit, sales returns)

Accounts Receivable: decreased by the amount of the receivable expected not to be collected (credit, accounts receivable—allowance for sales returns)

Cost of Goods Sold: decreased by the cost of the merchandise expected to be returned (credit, cost of goods sold)

Merchandise Inventory: increased by the value of the merchandise to be returned (debit, estimated merchandise returns)

Cost of Returns Expense: increased by the amount of the estimated decrease in the value of the merchandise (debit, cost of returns expense)

EXAMPLE

Accounts receivable of $1,000 is expected not to be collected because of sales returns. The cost of goods sold is approximately 80% of sales, and the value of returned merchandise is estimated at 60% of the cost. Record the adjusting entry required to take note of this information:

Sales Returns	$1,000	
Estimated Merchandise Returns	480	
Cost of Returns Expense	320	
Accounts Receivable: Allowance for Sales Returns		$1,000
Cost of Goods Sold		800

This entire procedure requires evaluation. Essentially, the purpose of the procedure is to prevent an overstatement of assets and earnings for the period. In the preceding example, the result of the entry was to reduce accounts receivable by $1,000, increase inventory by $480, and decrease the profits which would have been reported by $520 (decrease in sales $1,000, plus the increase in cost of returns $320, minus the $800 decrease in cost of goods sold). To accomplish these results, a series of assumptions had to be made. It is assumed that sales returns can be predicted and that application of averages for cost of goods sold and value of returned merchandise will give acceptable results. Most business firms avoid the necessity of making these assumptions by ignoring the necessity for the entry. If returns are a small percentage of sales, this is not an objectionable procedure. If returns are a large percentage of sales, then the accountant must decide whether or not the entries illustrated here have to be made to avoid misleading information.

Accounts Receivable: Allowance for Sales Discounts

Frequently discounts are offered for prompt payment of accounts. Thus the terms of a sale may be 2/10, n/30. This reads "two ten, net thirty," and it means that the customer may take a 2% discount if payment is made within 10 days, but in any event, the *total* amount has to be paid within 30 days. If the sales are recorded by using a net price procedure, then the recording is relatively simple.

EXAMPLE

Recording sales using net price procedure: gross price $100; terms, 2/10, n/30; date of sale, July 5.

July 5	Accounts Receivable	$98	
	Sales		$98
	To record sale using the net price of $100—$2		
July 14	Cash	98	
	Accounts Receivable		98
	To record collection within the discount period		

If payment is not made until the discount period has lapsed, and the full $100 has to be paid by the customer, then the entry would be:

July 26	Cash	$100	
	Accounts Receivable		$98
	Lapsed Sales Discount Revenue		2
	To record the collection after the discount period has lapsed		

If the accounting period ends before the payment is received but after the discount has lapsed, then the below entry may be made:

Dec. 31	Accounts Receivable	$2	
	Lapsed Sales Discount Revenue		$2
	To record the lapsed sale discount revenue		

Frequently the above refinement is not made because the lapsing of the discount may be an indication that the account is not good and that further revenues should not be recognized.

Instead of recording sales by using net prices, gross prices are frequently used. With the gross price procedure, the need for the contra asset and contra revenue accounts occurs. The following entries are for the same situations as illustrated in the example, but here the gross price procedure of recording sales is used.

EXAMPLE

Recording Sales, Using the Gross Price Procedure:

July 5	Accounts Receivable	$100	
	Sales		$100
	To record the sale, using the gross price of $100		
14	Cash	98	
	Sales Discounts	2	
	Accounts Receivable		100
	To record collection within the discount period, the reduction of accounts receivable, and the taking of the sales discount		

If payment is not made until the discount period has lapsed:

July 26	Cash	$100	
	Accounts Receivable		$100
	To record the collection of the gross amount; the lapsed sale discount revenue is left buried in the sales account		

If the accounting period ends before the payment is received but *after the discount has lapsed,* then *no* entry has to be made, since the receivable is already at gross and the revenue has been recognized. If the accounting period ends *before the discount period ends,* then an accounting entry must be made. The accounts receivable is overstated (stated at $100; it should be $98), and the revenues are overstated (sales were recorded at $100, but the customer only has to pay $98). An entry should be made for those discounts expected to be taken.

Dec. 31	Sales Discount	$2	
	Accounts Receivable: Allowance for Sales Discounts		$2
	To reduce the accounts receivable by those sales discounts expected to be taken, and to reduce sales by an equal amount, using contra accounts in both cases		

If payment is received within the discount period on January 5, then there are various possible methods of recording the transaction. The easiest procedure is to record the transaction in the normal way and then to adjust the allowance account at the end of the accounting period to conform with the outstanding sales discounts. Another acceptable alternative is to make the following journal entry:

Cash	$98	
Accounts Receivable: Allowance for Sales Discount	2	
Accounts Receivable		$100
To record the collection on January 5		

Management and Accounts Receivable

Accounts receivable are susceptible to theft as they are collected. A common method of theft is for the bookkeeper to fail to record the collection of cash from a customer and to take the cash for personal use. When payments are received from other customers, entries are made to the account of the first customer. Thus there is a lag in recording payments (this procedure is called *lapping*). Another popular method of theft is for the bookkeeper to make the following entry upon the receipt of cash from a customer:

Accounts Receivable: Allowance for Uncollectibles	xxxx	
Accounts Receivable		xxxx

By writing off the account, the customer's account may be credited and thus the accounting records are kept in balance. A variant of this procedure is to debit sales returns or sales allowances. The amount of undiscovered dishonesty can be kept to a minimum by:

1. The use of control and subsidiary accounts kept by different personnel
2. The requirement that write-offs and sales returns must be approved by a high executive
3. Requesting the customer to confirm account balances
4. Various internal control devices

Frequently the control of accounts receivable does not provide for the prevention of dishonesty, and correction of inefficiency is neglected. Just as idle cash balances cost money, excessively large balances of accounts receivable can also cost money, because these accounts must be financed by the company which made the sale. Management should install reporting devices that will indicate whether or not payments of accounts receivable are being promptly received. Among the tools available are aging schedules of accounts receivable, computation of turnover of receivables (credit sales for a year divided by the average receivable balance), and computation of the number of days' receivables on hand (divide the sales for the period by the number of the days in the period to obtain a sales-per-day figure; divide the accounts receivable balance by the sales per day to obtain the number of days' receivables on hand).

Another facet of controlling accounts receivable is the minimization of uncollectible accounts. The first step here is a sensible credit policy. The second step is to encourage prompt payment and to initiate follow-up action when payment is not forthcoming. It is interesting to note that one of the major problems of administering a hospital is the collection of bad accounts. This is related to the fact that, unlike an automobile dealer, the hospital cannot refuse service to a person who needs it; neither can it reclaim the service sold if collection is not forthcoming.

EXAMPLE

Sales on credit during 1966 were $1,000,000. The accounts receivable balances were:

January 1, 1966	$200,000
December 31, 1966	300,000

(a) Computation of turnover of receivables: The average accounts receivable balance was $250,000 i.e., $\frac{200,000 + 300,000}{2}$

$$\text{Turnover} = \frac{1,000,000}{250,000} = 4 \text{ times per year}$$

(b) Receivables on hand:

$$\text{Sales per day} = \frac{1,000,000}{365} = \$2,740$$

$$\text{Days' receivables on hand} = \frac{300{,}000}{2{,}740} = 109.5 \text{ days}$$

An alternative method of computation would be:

$$\text{Days' receivables on hand} = \text{A/R Balance} \times \frac{365}{\text{Sales}}$$

$$= 300{,}000 \times \frac{365}{1{,}000{,}000} = 109.5 \text{ days}$$

Both of the above measures are rough-and-ready control devices. They assume sales are made evenly throughout the year, and this may not be a valid assumption. Also they are affected by factors other than the quality of management. For example, the receivable turnover can be increased by shortening the payment period of receivables (this will also decrease the number of days receivables on hand), but this policy may have an adverse affect on sales and profits. Thus, like much other information prepared by the accountant, the above measures must be administered in a manner that attempts to consider factors in addition to the specific quantitative measures being reviewed.

QUESTIONS AND PROBLEMS

10–1 The Dahlgren Company

Oct. 16 A petty cash fund is established. A check for $500 is written and given to the petty cash cashier.

Nov. 28 A check for $290 is written to replenish the petty cash fund. The vouchers turned in indicate that the funds were disbursed as follows:

Office Supplies	$180
Stamps	15
Delivery Service	25
Travel	50
Entertainment	20

Dec. 31 On December 31, the internal auditor checked the petty cash fund. He found the following items:

Cash (currency and coins)	$315
IOU from employee	12
A check signed by the cashier	100
Vouchers:	
Office Supplies	50
Entertainment	20

Required

Prepare journal entries to record the above transactions. Discuss the items found in the petty cash fund.

10–2 The Day Company

From the following information, prepare a bank reconciliation as of December 31, 1964. Also prepare journal entries necessary to adjust the Day Company's records.

Balance per Bank Statement, December 31, 1964		$12,589
Balance per Account, Bank		9,683
Checks Outstanding:		
No. 346	$3,000	
No. 367	145	
No. 401	238	3,383
Deposit of December 31, 1964 (not recorded by the bank)		674
Bank Service Charges		12
Note Collected by the Bank for the Day Company (includes $15 interest)		2,015
NSF Check returned by the Bank with the Bank Statement		1,806

10–3 The Dayton Company

From the following information, prepare a bank reconciliation as of December 31, 1964. Also prepare journal entries necessary to adjust the Dayton Company's records.

Balance per Bank Statement, December 31, 1964		$4,325.78
Balance per General Ledger		3,564.32
Checks Outstanding:		
No. 240	$ 9.00	
No. 245	25.00	
No. 578	49.00	
No. 579	11.00	
No. 580	15.00	109.00
Deposit of December 31, 1964 (not recorded by the bank)		165.90
Bank Service Charges		4.50
Deposit (recorded by the bank as $2,911.89)		2,191.89
Check No. 560 (recorded by the company as $450)		540.00

Check No. 560 was in payment of Voucher 495.

A note of $192.86 (including $12.86 of interest) was collected by the bank on behalf of the Dayton Company. The collection has not been recorded as yet by the Dayton Company.

10–4 The Deca Company uses a voucher system to authorize cash disbursements. All payments are first "vouched" by the payable section. At this time the liability and the debit explaining the nature of the purchase are recorded. The list of authorized vouchers is then taken to the check disbursement section, where the checks are written.

The following vouchers are authorized on January 15:

Voucher 310: For purchase of $390 of merchandise
Voucher 311: For travel expenses of $230
Voucher 312: For property taxes of $400

On January 16, three checks are written to pay Vouchers 310, 311, 312.

Required

Record the given information, using journal entries.

10–5 The Knight Company

As of November 30 the following checks were outstanding:

Check No. 301	$300
Check No. 534	250

During December, checks Nos. 535–590 were written and sent out in payment of vouchers 535–590. The bank statement for December included all checks from No. 534 to No. 588. Check No. 589 was for $100, and check No. 590 was for $60. Check No. 301 is still outstanding.

Other information:

Balance per Bank Statement, December 31	$4,649
Balance per Accounts, Bank	4,344
Bank Service Charges	5
NSF Check (returned by the bank with the bank statement; check was from a customer)	150

Required

Prepare a bank reconciliation as of December 31. Also prepare journal entries necessary to adjust the Knight Company's books.

10–6 The Knight Company has a petty cash fund with a set amount of $200. When the fund goes below $50, it is replenished by check. The voucher authorizing the check lists the nature of the expenditures made and the accounts to be charged. On December 31, the internal auditor conducted a review of the fund and found the following items:

Cash (currency and coins)		$120
An IOU (signed by the custodian of the fund)		9
Vouchers (signed by authorized personnel) for:		
Office Supplies	$15	
Travel Advances	20	
Entertainment	26	61
Two Theatre Ticket Stubs (cost $5 each)		10
		$200

Required

From the given information, prepare journal entries which may be required.

10–7 The Early Company

The terms of all sales made on account are 2/10, n/30. The Early Company records sales, using the net price procedure. Record the following transactions in the general journal.

1. Sales of $123,458 are made on account (this is the gross figure) during the month of January.
2. Collections during the month were $98,800. This represented collections of $100,000 of accounts, gross.
3. At the end of the month, an analysis of the accounts receivable reveals that, of the accounts still outstanding, discounts have already lapsed on $9,800 of accounts (net). There are $107,800 of accounts (net) which still have discounts outstanding.

10–8 The Eaton Company

Record the same transactions as those in Prob. 10–7, but use the gross price procedure for recording sales.

10–9 The Eddy Company

Record the following transactions, using the gross price procedure; the terms of the sales are 3/15, n/30:

Dec. 1	Sale on account to the Jones Company, $1,000 (gross price)
Dec. 20	The gross amount is received from the Jones Company
Dec. 23	Sale on account to the Smith Company, $500 (gross price)
Dec. 31	Make any adjusting entries which are required.
Jan. 3	The net amount is received from the Smith Company.

10–10 The Eden Company

Record the same transactions as those in Prob. 10–9, but use the net price procedure.

10–11 The Edgeworth Company

The Edgeworth Company matches expected bad debts with the period in which the revenues were recognized. Past experience indicates that the uncollectible accounts are 1% of credit sales. At the beginning of 1964, the accounts receivable has a balance of $125,000, and the allowance for uncollectible accounts has a balance of $2,300.

Record the following transactions:

1. Total sales during the period were $503,000, of which $103,000 were cash sales.
2. Total collections of accounts receivable were $384,000. Of this amount, $300 represented accounts which had been written off in the preceding period.
3. Accounts written off during the period were $2,050.
4. Set up the allowance for uncollectibles at the end of the period.

10–12 The Edward Company

The terms of all sales made on account are 2/10, n/30. Sales are recorded, using the net price procedure. The company uses a procedure which matches

expected bad debts with the period in which the revenues are recognized. Past experience indicates that uncollectible accounts are 1% of credit sales (net price). At the beginning of the period, the allowance for uncollectible accounts has a balance of $3,450. The allowance account is adjusted annually on December 31.

(a) Record the following transactions:

1. Sales on account of $10,000 (gross price).
2. Collection from customers, $500 (the net amount was $490 but the payment was made after the discount period had lapsed).
3. Collection of accounts receivable, $98.
4. It is decided that $4,540 of accounts receivable will not be collected; these accounts are to be written off.
5. The following collections are made of accounts written off:

Written off in this period	$150
Written off in a prior period	45
	$195

6. At the year's end the following summary information is made available:

Gross Sales on Account	$500,000 (already recorded)
Net Sales on Account	490,000 (already recorded)
Sales Discount Revenue	2,000 (already recorded)

Record for entry 6:

Adjustment necessary because of expected uncollectibles.
Adjustment necessary because the discounts have lapsed on $9,849 of receivables (net price).
Adjustments necessary because, as of December 31, there are $49,000 of accounts receivable on which the discounts have not lapsed. It is expected that 80% of these discounts will ultimately be taken.

(b) Record entry 6, assuming sales are recorded at gross.

10–13 The Egbert Corporation

The Egbert Corporation makes an adjustment at the year's end for estimated sales returns. Of the sales made in 1964, it is estimated that $10,000 of merchandise (sales price) will be returned. The merchandise cost of goods sold is approximately 75% of the sales price. Returned merchandise has to be sold to a wholesaler at a greatly reduced price; thus it is estimated that returned merchandise is worth only 60% of its original cost. Assume that cost of goods sold has been recorded for the period.

Required

(a) Record the entries necessary to take note of the above information.
(b) What would be the effect of not noting that some of the sales made in this period will be returned in the next period?

10–14 The Egbert Corporation (continued)

The Egbert Corporation follows a policy of recognizing bad debts in the period in which they occur and of making the following journal entry:

Bad Debt Expense	xxx	
Accounts Receivable		xxx

The controller claims that this procedure avoids the necessity for making subjective estimates of the accounts which are going to become bad in the future. He also states that it is silly to set up an allowance for uncollectibles and tie up assets in this unproductive manner.

Required

Comment on the procedure followed and the arguments of the controller.

10–15 The Eggwhite Company

Compute the allowance for uncollectibles which will be required as of December 31.

Accounts Receivable	*Age of Accounts*	*Probability of Collection, %*
$10,000	1 Mo. or Less	90
4,000	1 Mo. to 6 Mos.	80
2,000	6 Mos. to 2 Yr.	40
500	Over 2 Yr.	10

11

Current Liabilities and Purchases

THE LIABILITY FOR noncash purchases is usually recorded at the time the goods or services are received and before the payment is authorized. If the payment is to be made within a year, the liability is considered a current liability. Among the items most commonly found under the current liability classification are the following:

Accounts Payable
Wages Payable
Taxes Payable
Advances by Customers
Portion of Bonds Payable (due within 12 months)
Notes payable (if due within 12 months)
Interest Payable
Dividends Payable

ACCOUNTS PAYABLE AND PURCHASES

Accounts payable is the account used to record the amount owed to trade creditors. The liability is usually recorded when the invoice is received from the supplier if the service or product purchased has been received (the invoice, receiving report, and purchase order should be compared to see that the order has been properly filled).

One of the most troublesome problems in recording accounts payable and purchases is the treatment of discounts which are offered for prompt payment. This problem has already been investigated from the point of view of the selling company. The purchasing company has an analogous problem. Should the purchases and the liability be recorded using the gross or net price of the product? Companies are fairly well split between the two procedures; properly applied, both procedures give equivalent results. Unfortunately many companies improperly use the gross price procedure, with a resulting loss of significant information and also incorrect reporting.

Net Price Procedure

Since the advantages of the net price procedure of recording purchases are simplicity and efficiency, it will be illustrated first. In appraising the entries, remember that the net price of the merchandise is the real cost, since that is all that has to be paid.

ILLUSTRATION: The Net Price Procedure

Merchandise is purchased on December 15th for $100, terms 2/10, n/30. Make the entries, assuming it is (a) paid for on December 21, (b) paid for on December 30, (c) not paid for prior to December 31.

Dec. 15	Merchandise	$98	
	Accounts Payable		$ 98
	To record the purchase, using the net price procedure; the merchandise is recorded properly at $98		
21	Accounts Payable	98	
	Bank		98
	To record assumption (a), payment within the discount period		
30	Accounts Payable	98	
	Loss on Lapsed Purchase Discount	2	
	Bank		100
	To record assumption (b), payment after the discount has lapsed		
31	Loss on Lapsed Purchase Discount	2	
	Accounts Payable		2
	To record assumption (c), payment not made prior to closing.		

Where the discount had lapsed, it was necessary to recognize the loss and increase the liability at the end of the accounting period. If the period had ended and payment had not been made, but the discount had not lapsed, then no entry would be necessary on December 31, since the accounts payable is correctly stated at $98.

SUMMARY—NET PRICE PROCEDURE

(a) Record the purchase, using the net amount (the minimum amount which has to be paid).

(b) If the payment is made after the discount period has lapsed and the gross amount is paid, record the difference between the net and gross prices in a loss account to highlight the inefficiency associated with the late payment.

(c) If the accounting period ends after the discount has lapsed, record the difference between the net and gross prices in a loss account and

credit accounts payable. No adjusting entry is necessary if the discount period has not lapsed.

Gross Price Procedure

The foregoing situations will be repeated in this section in order to illustrate two different methods of recording purchases by using the gross purchase order price. One method will be complex but correct. The second procedure will be incorrect for several reasons.

		Correct Gross Price Procedure		Incorrect Gross Price Procedure
Dec. 15	Merchandise	$100		Same
	Accounts Payable		$100	
	To record the purchase, using the gross price procedure; the merchandise and accounts payable are temporarily overstated by $2			
21	Accounts Payable	100		Same
	Merchandise-Purchase Discount		2	
	Bank		98	
	To record the payment within the discount period; the purchase discount account is a contra to the merchandise account and reduces the merchandise to the net amount			
30	Accounts Payable	100		Accounts Payable .. $100
	Loss on Lapsed Purchase Discount	2		Bank .. $100
	Bank		100	
	Merchandise-Purchase Discount		2	
	To record the payment after the discount has lapsed; the incorrect procedure fails to record the lapsed discount or to reduce the merchandise to its real cost, $98			
31	Loss on Lapsed Purchase Discount	2		No entry
	Merchandise-Purchase Discount		2	

		Correct Gross Price Procedure		Incorrect Gross Price Procedure
	Assuming the payment is not made prior to closing; to record the lapsing of the discount and the reduction of the merchandise to net price; the second procedure incorrectly makes no entry			

If the purchase had been made on December 28, and the period had ended before payment was made (or discount lapsed), then the following entry would be made:

Dec. 21	Accounts Payable: Allowance for Purchase Discounts	$2		No entry
	Merchandise-Purchase Discount		$2	
	To reduce the accounts payable and merchandise to net price, the true liability, and the true cost of merchandise; the second procedure incorrectly makes no entry			

The account "Merchandise-Purchase Discount" is frequently incorrectly interpreted. It is a contra account to the merchandise or purchases account. *The true cost of the merchandise is $98, the net price, since that is all the purchasing firm has to pay.* If they pay more than the net price, the additional amount is a cost of inefficiency and *not a cost of merchandise.* Actually few firms can afford to lose many purchase discounts, since they are in effect paying approximately 36% for the use of the funds, assuming terms of 2/10, n/30.

The Merchandise-Purchase Discount account should be closed at the end of the accounting period and the amount in the account pro-rated to raw material, work in process, finished goods, and cost of goods sold. Unfortunately, this can be a complex task because of the fact that the inventory items may have been purchased in different time periods. Frequently this complication is avoided by treating the discount account as revenue. This is unfortunate from a theoretical standpoint, since the account is created by the overstatement of an asset (by recording the asset at gross price), and it should be used to reduce the overstated asset.

It is claimed that the gross price procedure is to be preferred over the net price procedure, since it facilitates the recording of inventory. If 70 units are purchased for $66.50, 2/10, n/30, they are recorded at $.95 per unit, using

the gross price method. Under the net price method, the total cost is $65.17, and the cost per unit is $.931. The .95 number is easier to work with than .931. However, this reasoning ignores the fact that the cost was .931; thus this cost should be used. Also, if .95 is used, then the ending inventory should be adjusted for the overstatement, and this adjustment may be more complex than originally recording the purchase at its true cost.

SUMMARY OF CORRECT GROSS PRICE METHOD

(a) Record the purchase, using the gross amount.
(b) If the payment is made within the discount period, a credit is made to a contra account to inventory to reduce it to net price.
(c) If the payment is made after the discount has lapsed, a credit is made to a contra account to inventory to reduce it to net price, and a debit is made to a loss account to take note of the inefficiency.
(d) If the accounting period ends before payment is made, then an adjustment must be made.
    1. If the discount has not lapsed, then accounts payable and merchandise are both overstated and must be reduced to the net price by entries to contra accounts.
    2. If the discount has lapsed, then merchandise is overstated and must be reduced by a credit to a contra account. The debit is to a loss account.

It should be noted that the correct gross price procedure reduces the inventory to net price no matter what sequence of events occurs.

SUMMARY OF INCORRECT GROSS PRICE METHOD

Same as the correct gross procedure except that no entry is made to reduce inventory to net price:

(a) if the payment is made after the discount has lapsed.
(b) if the period has ended and payment has not yet been made.

The incorrect gross price procedure can result in an overstatement of inventory, an overstatement in accounts payable, and a failure to isolate the loss on lapsed purchase discount as an indication of inefficiency.

Computation of Equivalent Rate of Interest

If payment is not made during the first 10 days, the firm has the use of the funds for 20 days more (the total amount has to be paid by 30 days). Thus, 2% is being paid for the use of funds for 20 days, or an annual rate of

interest of $2\% \times {}^{360}/_{20} = 36\%$. The actual interest may be more or less than 36%, depending on the exact date of payment.

The 36% computed here makes it obvious that the firm which fails to take advantage of purchase discounts is actually paying a penalty and not paying interest (except for a small fraction of the total) or paying for merchandise.

The incorrect gross price procedure illustrated is faulty because it only reduces the merchandise to net price (the true cost) when and if the discount is taken. If the discount has lapsed or has not been taken as yet, then no entry is made. The inefficiency causing the discount to lapse is also hidden. Finally, the accounts payable are overstated if the adjusting entry is not made to reduce it to net price for the discounts still outstanding at the end of the accounting period.

The gross price procedure, in one form or another, is a frequently used procedure for recording purchases. The primary justification for using the procedure is that it avoids the clerical effort of computing unit costs for inventory purposes, a necessary operation in the net price procedure if they are only stated at gross prices on the invoice.

WAGES AND WAGES PAYABLE

The primary problem in recording wage costs and wages payable centers around the handling of the fringe benefits that accrue to the worker. If these benefits are taken out of the employees' total wages, the classification problem is relatively simple, since it is merely a question of changing from one liability, "wages payable," to several more specific liabilities, such as: FICA [1] (Social Security) Payable, Income Tax Withholdings Payable, Union Dues Payable, Savings Bonds (of employees) Payable, Health Insurance Payable, Pension Plan Payable. There are other items that are also deducted, but the mentioned items illustrate the need for classification of the liabilities that arise from incurring labor costs.

If any of the fringe benefits are partially or completely paid by the employer, the debit may be made either to a cost account describing the specific nature of the charge (for example, "Pension Plan") or to a labor cost account, so as to show the general nature of the cost (for example, "Manufacturing Labor"). A compromise procedure would first show the costs by their specific nature, and then transfer them to a labor cost account. Some accounting systems can record all this information simultaneously through the use of accounting machines.

[1] FICA refers to Federal Insurance Contributions Act.

EXAMPLE
From the following information record the payroll for May:

Manufacturing Labor Payroll Distribution Summary

	Gross Payroll	Income Tax Withheld	FICA Withheld	Union Dues	Net Payroll
J. Able	$ 500	$ 80	$ 10	$ 5	$ 405
F. Due	200	20	4	5	171
Etal	10,000	2,000	200	100	7,700
Total	$10,700	$2,100	$214	$110	$8,276

ADDITIONAL INFORMATION: The company matches the employees FICA contribution, pays 2.7% of the gross payroll to the state for unemployment taxes and 0.3% in federal unemployment taxes, and contributes an amount equal to 10% of the gross payroll to a pension fund.

Journal Entries

Manufacturing Labor Cost	$10,700.00	
FICA Taxes Payable		$ 214.00
Income Tax Withholding Payable		2,100.00
Union Dues Payable		110.00
Payroll (wages payable)		8,276.00
To record the amount due the workers and the various withholdings		
Employer's FICA Tax	214.00	
Federal Unemployment Tax	32.10	
State Unemployment Tax	288.90	
Pension Costs	1,070.00	
FICA Taxes Payable		214.00
Federal Unemployment Tax Payable		32.10
State Unemployment Tax Payable		288.90
Pension Payable		1,070.00
To record the fringe benefits to be paid for directly by the employer		
Manufacturing Labor Cost	1,605.00	
Employer's FICA Tax		214.00
Federal Unemployment Tax		32.10
State Unemployment Tax		288.90
Pension Costs		1,070.00
To transfer the fringe benefit costs to manufacturing labor cost		

TAXES PAYABLE

In recent years the largest tax liability has generally been federal income taxes payable, a result of high income tax rates and generally profitable operations. At the time the accounting records are closed, the actual income tax to be paid is merely an estimate, since the internal revenue service must first approve the company's report before the tax as computed becomes a definite liability. Despite this complication, it is reasonable to set up the tax liability, using the most likely amount to be paid.

ADVANCES BY CUSTOMERS

When a customer makes a payment in advance of the service to be performed, this creates a liability on the part of the company receiving the payment. The journal entry made at the time of receipt of payment may be:

Cash	xxxx		
Accounts Receivable		xxxx	
To record a payment from a customer in advance of service			

A *credit balance* in the accounts receivable account would signify that the amount was actually a liability. If this type of transaction frequently occurs, then the credit should be made to a definite liability account so that the confusion arising from crediting accounts receivable to increase a liability may be avoided. For example, a magazine company selling 2-year subscriptions would make the following entry:

July	1	Cash	$24	
		Customer Subscriptions		$24
		To record the receipt of $24 to pay for the subscription for the next 24 months; customer subscriptions is a liability account		
Dec.	31	Customer Subscriptions	6	
		Magazine Revenue		6
		To recognize the revenue accruing for 6 months and the corresponding decrease in the liability		

At the time of receipt of cash (July 1), revenue was not recognized, since the service had not yet been performed (preparation and shipment of the magazines). At the end of the accounting period (December 31), it is

recognized that some magazine revenue has been earned and that the liability has decreased.

INTEREST, BONDS, AND NOTES PAYABLE

Interest and interest-bearing debts are treated in detail in Chapter 15; therefore, the discussion will be limited here to the specific problem of determining when these items are considered current liabilities.

Interest is considered a liability as it accrues. Thus, even though the payment of interest is almost a certainty for the coming year, the interest liability would not be recognized at the beginning of the accounting period. It would be recognized when the debt was paid or at the end of the accounting period. This procedure agrees with the handling of other costs and is consistent with the time value of money principle. At the beginning of the period, the interest has not been earned and the debt is properly shown at its value now rather than the amount that will be owed after the passage of time.

Bonds payable are found in the long-term liability section of a position statement; however, if a portion of the bonds comes due in 12 months or less, then this portion should be shown as a short-term liability.

Whether notes payable are short- or long-term liabilities depends entirely on their maturity date. If they come due after 12 months, they should not be classified as current liabilities. Suppose a large note is to come due in 13 months. How should this be treated? This is a matter of judgment, since the 12-month rule is a guide, not a straitjacket.

DIVIDENDS PAYABLE

When dividends on stock are declared, they become a liability of the corporation. The entry to be made at the time of declaration is:

Dividends	$1,000	
Dividends Payable		$1,000
To record the declaration of a dividend; the debit is to a distribution of income account		
Dividends Payable	1,000	
Bank		1,000
To record the *payment* of the dividend		
Income Summary	1,000	
Dividends		1,000
To close the dividends account		

Dividends on stock should be distinguished from *stock dividends.* The dividends on stock are actually accompanied by a disbursement of cash. Stock dividends are dividends which take the form of issuance of more shares of stock instead of disbursements of cash. The declaration of a stock dividend, unlike a dividend on stock, does not give rise to a current liability. All that is being done in the former case is to declare a "capitalization" of retained earnings. This has legal meaning, and thus it has to be recorded by the accountant. The entry would be:

Retained Earnings	xxxxx	
Capital Received from Stockholders		xxxxx
To record a stock dividend		

MATERIALITY AND ACCOUNTING PRACTICE

The first chapter listed "materiality" as one of the guiding rules of accounting practice. In the subsequent chapters, there were situations where the accounting practice did not coincide with accounting theory. Among the transactions were the treatment of credit balances in accounts receivable (the liability was allowed to reduce the asset), direct write-off of bad debts (instead of establishing an allowance for uncollectibles), and using a gross price method of recording purchases (which buries the loss on lapsed purchase discount). In many situations, these treatments are allowable because the variation caused by the practice is not material. The criterion of materiality is a relevant consideration, but it should not be used to justify faulty accounting.

From a managerial point of view, the type of accounting problem discussed here is not generally significant, but there are important exceptions. Thus a gross price procedure for recording purchases may be used to bury the loss on lapsed discounts. The amount of purchase discounts which are allowed to lapse is control information and should not be buried in an inventory account. Items that are not material from a general accounting point of view may be material from the point of view of management's concern for the control of costs.

QUESTIONS AND PROBLEMS

11-1 The Faraday Company

The Faraday Company records purchases by using the net price procedure. Record the following transactions. Amounts stated are gross prices.

Dec. 1	Purchase of $1,000 of merchandise; terms 2/10, n/30.
Dec. 3	Purchase of $500 of merchandise; terms 3/15, n/45.
Dec. 15	Purchase of $200 of merchandise; terms 3/10, 2/20, n/45.
Dec. 16	Payment of $1,000 to pay for merchandise purchased on December 1.
Dec. 17	Payment of net price to pay for merchandise purchased on December 3.
Dec. 18	Purchase of $100 of merchandise; terms 2/10, n/30.
Dec. 28	Payment of $196 to pay for merchandise purchased on December 15.
Dec. 29	Purchase of $600 of merchandise; terms 2/10, n/30.
Dec. 31	The books are closed on this date. Make any adjusting entries required.

11–2 The Farmer Company

Record the transactions of Prob. 11–1, using the *correct* gross price procedure. Repeat, using the incorrect gross price procedure, and point out the differences.

11–3 The Falkner Corporation

The following information applies to December 31.

Accounts Payable per books (net price procedure)	$35,000
Purchase discounts which have lapsed (they have not yet been recorded)	200
Purchase discounts which are still outstanding	300

Required

(a) Record any adjusting entries required on December 31.

(b) Assume that the company had used a gross price procedure to record purchases and that accounts payable were recorded at $35,500, the gross amount. Record any adjusting entries required on December 31.

11–4 The Farrell Corporation and the Ferber Corporation

The Farrell Corporation regularly sells to the Ferber Corporation. The terms of sale are 2/10, n/30. During December, the following three sales are made:

	Gross Price
Dec. 10	$20,000
Dec. 16	10,000
Dec. 28	30,000

On December 19, the Farrell Corporation is paid $19,600. As of the year's end, the other two bills are unpaid. The gross amounts of these two bills are finally paid on January 15 of the next year.

Required

(a) Record the transactions of December and January on the books of the Ferber Corporation, including the adjusting entries required at year's end, assuming the company uses a net price procedure.

(b) Repeat part (a), using a gross price procedure.
(c) Record the transactions of December and January on the books of the Farrell Corporation, including the adjusting entries required at year's end, assuming the company uses a net price procedure.
(d) Repeat part (c), using a gross price procedure.

11-5 The payroll distribution summary sheet of the Field Company has columns which totaled as follows for the week ending May 27.

Gross Payroll	$100,000
Income Tax Withheld	12,000
FICA Withheld	2,500
Union Dues	200
Savings Bonds	7,000
Blue Cross	2,000
Life Insurance	1,300
Net Payroll	75,000

The labor cost distribution showed that the nature of the labor incurred was:

Direct Manufacturing Labor	$60,000
Indirect Manufacturing Labor	40,000

The company matches the employees FICA contribution, pays 2.7% of the gross payroll to the state for unemployment taxes and 0.3% to the federal government for unemployment taxes, and contributes 10% of the gross payroll to a pension fund for employees. These fringe benefits are treated as manufacturing overhead, but they are first recorded so as to identify their specific nature.

Required

Record the labor costs and payroll for the week of May 27.

11-6 Record in journal form the following transactions:

Dec. 15	Declaration of a dividend of $2 per share of common stock (there are 10,000 shares outstanding).
Dec. 31	The accounts are closed.
Jan. 20	The dividend is paid.

11-7 Record in journal form the following transactions:

Jan. 27	Sale of merchandise to the XYZ Company $3,000.
Jan. 30	The XYZ Company makes payment of $3,000.
Feb. 4	The merchandise sold on January 27 to the XYZ Company is returned because it failed to meet specifications. The returned merchandise has decreased $500 in value. The company uses a periodic inventory procedure and closes its books quarterly.

11-8 The Fisk Corporation

Dec. 1	Purchase of $10,000 of merchandise from the ABC Company.

Dec. 15 The merchandise purchased on December 1 is paid for.
Dec. 22 The merchandise purchased on December 1 is returned to the ABC Company. The following entry is made:

Accounts Payable	$10,000	
Merchandise		$10,000

Required

Assuming that the accounts payable has a Dec. 31 balance of $90,000 and that the only creditors account with a debit balance is the ABC Company, how much does the Fisk Company owe to its trade creditors? Explain.

11–9 The Overland Railroad Company

The Overland Railroad Company sells commuters' tickets which are good for 12 months from time of purchase. The entry made at time of the sales of the tickets is as follows:

Cash	xxxxx	
Revenues, Commuters Tickets		xxxxx

At the end of the accounting period the account "Revenues, Commuters Tickets" is closed out to the expense and revenue summary.

Required

(a) Comment on the procedure followed in the recording of the above transactions.
(b) In general, when should revenues be recognized?

11–10 The Overland Railroad Company (continued)

The company has $10,000,000 of 6% bonds outstanding. At the beginning of each year, the following entry is made to accrue interest:

Interest Charges	$600,000	
Interest Payable		$600,000

The company issues quarterly reports as well as an annual report of income and financial position.

Required

Comment on the procedure followed for recording interest.

12

Depreciation

DEPRECIATION ACCOUNTING IS generally defined as a systematic procedure for allocating the cost of a long-lived asset over its useful life. The depreciation cost measures that portion of the original cost of the capital asset which is assigned as either a cost of production or an expense of obtaining the revenues of the period.

There are various points of confusion arising because of the characteristics and treatment of depreciation. The accompanying table attempts to highlight some of the more common errors.

Common Statement Relative to Depreciation	Correct Statement
1. Depreciation fails to consider the factor of obsolescence.	The useful life of the asset takes into consideration the rate of obsolescence as well as the rate of physical deterioration.
2. The reserve (or allowance) for depreciation is a reservoir of cash resources.	The reserve (or allowance) for depreciation is merely an asset valuation account.
3. The primary function of depreciation is to provide for replacement of the asset.	The primary function of depreciation is to spread the cost of the asset over its useful life.
4. Depreciation is a source of funds.	Funds are generated by sales, not by accruing depreciation.

The points of confusion contained in the table by no means exhaust the list. There are many more common misinterpretations. Most of the points of confusion arise because of ignorance of the discussants as to the basic nature and theory of depreciation, particularly the significance of the accounting entries. The subsequent sections attempt to lay a foundation of knowledge which will minimize the possibility of these errors becoming accepted as truths.

ACCOUNTING ENTRIES

The accounting entries for the recognition of depreciation are simple, but they are often misunderstood. In order to understand the entries which are conventionally made, it is necessary to review their purpose. We are attempting to allocate the cost of an asset over its useful life and to measure the cost of using the asset in each accounting period. Thus a cost account must be increased (by debiting it) and an asset account decreased (by crediting it).

EXAMPLE

A building is purchased on January 1 for $10,000. It has an expected useful life of ten years. Assume that depreciation should be charged equally to each year the asset is used.

Jan. 1	Building	$10,000	
	Bank		$10,000
	To record the purchase of the building		
Dec. 31	Depreciation Cost	1,000	
	Building		1,000
	To record the depreciation cost for the year and the decrease in value of the building		

The above entries represent sound treatment of depreciation, but note that the building account will have a balance of $9,000 after the $1,000 has been credited to the account. The original cost of the fixed asset is no longer directly recorded. This procedure overlooks a bit of relevant information. A reader of financial reports may want to know how much was paid for the assets and to what extent they have been depreciated. This information cannot be readily obtained if the foregoing procedure is followed. Thus the accountant does not credit the building account, as was done in the example, but rather credits a contra to the building account (an account which is a subtraction from the building account). This contra account has various titles. Among the most popular are "Allowance for Depreciation," "Accumulated Depreciation," and "Reserve for Depreciation." The entry made on December 31 to accrue the depreciation cost and the decrease in value of the building would then be:

Depreciation Cost	$1,000	
Building, Accumulated Depreciation		$1,000

This is the generally accepted entry for accruing depreciation. The credit is not made directly to the fixed asset account but to a contra asset account.

It should be recognized that the balance in this contra account, no matter what its title, is merely *a subtraction from the fixed asset account. It is a valuation account and nothing more.* There are innumerable instances where the nature of this account has been misinterpreted. Economists have blamed depressions on it, stockholders have accused management of hiding excess cash here, and even supreme court judges have fallen victim to the misunderstandings arising from the failure of the accounting profession to find an expression to describe exactly what this collection of credits represents. Part of the blame must be placed on the use of the title "Reserve for Depreciation." The term *reserve* carries a connotation of cash being actually set aside. This is, of course, misleading. The account title "Accumulated Depreciation" is fine if it is not confused with the depreciation cost account. The titles "Allowance for Depreciation" and "Accumulated Depreciation" will be used in this text, not because they answer all difficulties but because they are currently acceptable by the accounting profession and are somewhat less confusing than other possible terms.

POSITION STATEMENT PRESENTATION

The allowance for depreciation should appear on the position statement as a subtraction from the fixed asset account. Thus after the first year the position statement of the company in the preceding example would contain the following item:

Building	$10,000	
Less:		
Accumulated Depreciation	1,000	
Building Less Depreciation		$9,000

An alternative presentation would be:

Building	$10,000	
Less:		
Allowance for Depreciation	1,000	
Building Less Depreciation		$9,000

Some firms show only the $9,000, with a footnote explaining the detail. Any of these treatments is acceptable. The mistake that should be avoided is the placing of the allowance for depreciation account on the equity side of the position statement merely because it has a credit balance, as do the other items on the equity side. There is no justification for treating the allowance for depreciation in this manner. It is clearly a subtraction from an asset account and should be shown as such on the position statement.

THE DEPRECIATION BASE

The base for the computation of depreciation is the cost of the asset, adjusted for salvage which may be received at the time of retirement. If there are any removal costs that are expected to be incurred at time of retirement, these should also be taken into consideration when computing the annual depreciation.

EXAMPLE

Establish the bases for the computation of depreciation, given the following facts:

(a) A building is purchased for $10,000. The forecasted salvage is $500 and the forecasted removal cost is $200.

(b) Equipment is purchased for $9,000. The forecasted salvage is $400 and the forecasted removal cost is $600.

Answer to (a)

Cost of Building		$10,000
Salvage	$500	
Removal Cost	200	
Net Salvage		− 300
Base for Depreciation Computation		$ 9,700

Answer to (b)

Cost of Equipment		$ 9,000
Removal Cost	$600	
Salvage	400	
Net Removal Cost		200
Base for Depreciation Computation		$ 9,200

In example (b), the depreciation base is greater than the cost of the asset. This would not be allowed for tax purposes, since the tax collector would say that there is no objective evidence that the removal costs will be higher than salvage. It is reasonable that the logic of the situation leads to a depreciable base of $9,200, since this will spread all the costs, including the removal costs, over the periods in which the revenues are earned. It is equally reasonable for the internal revenue service to suggest that the depreciable base cannot exceed the cost of the asset.

METHODS OF COMPUTING DEPRECIATION

The objective of depreciation accounting is to assign systematically to expense the cost of a fixed asset over its useful life. There are, however, many methods

of accomplishing this task. The reader does not have to decide which of these procedures is best, but he should be familiar with the methods of computing the various procedures and should also appreciate some of their limitations and strong points.

Straight-Line Procedure

When using the straight-line procedure for computing depreciation, the annual depreciation charge is obtained by dividing the depreciable base (cost plus removal cost less salvage) by the number of years of useful life forecasted. A *rate of depreciation* may be obtained by dividing the number of years of life into one (thus obtaining the reciprocal of the number of years).

EXAMPLE

A building is purchased for $10,000. The forecasted salvage is $456, and the forecasted removal cost is $200. The expected *useful* life of the building is 4 years. Compute the annual depreciation charge and the rate of depreciation, using the straight-line procedure. (These figures will also be used for other methods discussed in subsequent text).

$$\text{Annual depreciation} = \frac{\$10{,}000 - \$456 + \$200}{4} = \frac{\$9{,}744}{4} = \$2{,}436$$

Alternative Computation:

$$\text{Rate of depreciation} = \frac{1}{4} = .25 \text{ per year}$$

$$\text{Annual depreciation} = \$9{,}744 \times .25 = \$2{,}436$$

The main advantages of the straight-line procedure are its simplicity and the fact that revenues of successive years are charged with equal amounts of depreciation. The main disadvantage is that, given the assumptions of constant revenue and constant maintenance costs, the return on investment of the asset will increase as the asset becomes older and the net book value decreases.

Decreasing Charge Methods

Decreasing charge methods of computing depreciation rise and fall in popularity, depending on the income tax laws. If the tax law allows any of the various decreasing charge methods, then a firm will generally benefit by taking as much depreciation as possible in the early years of the asset. The method of accounting for tax purposes has a tendency also to influence the financial accounting; thus the decreasing charge methods are also found in financial reports.

The one common characteristic of all decreasing charge methods of accruing depreciation is that the depreciation in the beginning years is greater

than the depreciation in the later years. Three methods most commonly used are:

1. Twice Straight-Line, Declining Balance
2. Sum of the Years' Digits
3. Formula, Declining Balance

Each of the three procedures will be illustrated, using the same figures as those used to illustrate the straight-line procedure.

EXAMPLE 1. Twice Straight-Line, Declining Balance

The straight-line depreciation rate was 25%; thus twice this rate is 50%. This rate is not applied to the depreciable base as computed for straight-line but to the cost, $10,000. This procedure is followed because of the "tail" which develops when a constant rate of depreciation is applied to a "declining balance." The depreciation for each of the 4 years will be as follows:

Year	Depreciable Base	Rate	Depreciation Cost	Total Accrued Depreciation
1	$10,000	50%	$5,000	$5,000
2	5,000	50%	2,500	7,500
3	2,500	50%	1,250	8,750
4	1,250	50%	625	9,375

At the end of the 4 years, the total depreciation is $9,375, which is less than the amount accrued when using straight-line depreciation ($9,744).

The 1954 internal revenue code allows a firm to switch from twice straight-line declining balance to a straight-line depreciation. The straight-line depreciation is obtained by dividing the remaining amount to be depreciated by the remaining life. The total amount of depreciation cannot exceed the cost less the expected salvage. In the above example, at the end of the third year, the company could switch to straight-line depreciation and charge $994 to depreciation expense in the fourth year. Since a firm desires to charge as much to expense for tax purposes as it is legally allowed to charge, the switch to the straight-line method may be desirable from an economic standpoint (that is, it may reduce the income taxes of the period).

EXAMPLE 2. Sum of the Years' Digits

This is a mechanical contrived procedure that succeeds in giving a decreasing depreciation charge. First the "number of years" is totaled. For example:

$$\begin{array}{r} 1 \\ 2 \\ 3 \\ 4 \\ \hline 10 \\ = \end{array}$$

The first year's depreciation rate will be the number of the last year divided by the sum of the years. Thus, this depreciation rate will be 40% in the problem being studied. This rate will be applied to the depreciable base, $9,744. The depreciation for each of the 4 years will be as follows:

Year	Depreciable Base	Rate	Depreciation Cost	Total Accrued Depreciation
1	$9,744	40%	$3,897.60	$3,897.60
2	9,744	30%	2,923.20	6,820.80
3	9,744	20%	1,948.80	8,769.60
4	9,744	10%	974.40	9,744.00

EXAMPLE 3. Formula, Decreasing Balance

$$\text{The formula used is } r = 1 - \sqrt[n]{\frac{s}{c}}$$

where n = the number of years.

s = the net salvage (this must be a significant amount or the answers will be absurd, since the depreciation rate approaches *one*).

c = the cost of the asset

r = the rate of depreciation to be applied to the cost and then to a declining balance.

For example:

$$r = 1 - \sqrt[4]{\frac{\$256}{\$10{,}000}} = 1 - \frac{4}{10} = .6 \text{ or } 60\%$$

The depreciation for each of the four years would be as follows:

Year	Depreciable Base	Rate	Depreciation Cost	Total Accrued Depreciation
1	$10,000	60%	$6,000	$6,000
2	4,000	60%	2,400	8,400
3	1,600	60%	960	9,360
4	640	60%	384	9,744

The formula procedure will *not* usually give the same results as the twice straight-line procedure because the depreciation *rate*, using the twice straight-line procedure, fails to take into consideration the net salvage. The formula method does take it into consideration.

The use of the decreasing charge procedures may be justified if the shape of the earning curve of the asset being analyzed is such that the revenues of the first years of life are greater than the later years. If the revenues decrease as the asset ages, it is reasonable to burden the earlier years with more depreciation cost. If the asset does not have these earning characteristics,

then the use of a decreasing charge procedure will result in understated earnings and earning rates in the early years and overstated earnings and overstated returns on investment in the later years.

DEPRECIATION AND ACTIVITY

Up to this point, depreciation has been considered to be a function of time. The depreciation occurred because of the passage of time. There are some types of fixed assets whose lives are more a function of activity (use) than of time. An example of a fixed asset of this type is an airplane engine. The life of the engine may well be a function of flight hours rather than age. The rate of obsolescence tends to determine whether the depreciation accrual should be based on activity or time.

EXAMPLE

An airplane engine which cost $5,000 has a life of 10,000 hours of flying time. What is the first year's depreciation, if the plane is flown a total of 2,000 hours?

Answer: The rate of depreciation is $0.50 per hour of flying time. The depreciation for 2,000 hours would be $1,000.

If the engine were flown only 500 hours, and if the expected useful life were only five years (because of technological change), what would be the depreciation charge for the year?

Answer: On an activity basis the depreciation would be

$$\$0.50 \times 500 = \$250$$

but the useful life of the asset is only five years; thus the minimum depreciation on a straight-line basis would be

$$\frac{\$5,000}{5} = \$1,000$$

The depreciation cost for the year should be $1,000. If there is reason to suspect the usage of the engine in the next 4 years to be more than 2,000 hours per year, there may be justification for considering the depreciation to be $250.

Expected Useful Life

The life of a fixed asset is not only a function of the physical wear and tear to which it is subjected, but also of the technological change going on around it. Thus, if the fixed asset is expected to have a physical life of 10 years, but to become obsolete in 4 years, the depreciation charge per year should be based on a life of 4 years.

Adjustment of Useful Life

After an asset has been depreciated for a period of years, it may become obvious that the original estimate of service life was incorrect. There are two reasonable alternatives: (1) depreciate the remaining book value over the remaining service life; (2) adjust the allowance for depreciation to agree with the revised estimate of the situation, and then depreciate the asset over its remaining life, using the new rate of depreciation. The latter alternative would seem to be the sounder of the two. Any adjustments should, of course, be clearly disclosed. The accountant should be aware of the fact that, although it is wise to adjust past mistakes, it is unwise to allow a situation to develop which will someday in the future require an adjustment. Accounting should be a tool for management, not a means of manipulation.

EXAMPLE OF ADJUSTMENT OF USEFUL LIFE

A building was purchased on January 1, 1946, at a cost of $100,000. It was estimated that the asset would have a life of 40 years. On December 31, 1956, it was decided that, because of changing economic conditions, the life of the building would be 20 years.

Compute the adjustment of depreciation, the new rate of depreciation, and the annual depreciation for 1956. What are the necessary journal entries?

Solution: Based on the original estimate, after 10 years (January 1, 1946, to December 31, 1955) the accumulated depreciation had a balance of $25,000 (one-fourth of the cost), but according to the revised life, the amount should have been $50,000. Thus the adjustment should be $25,000. Since the new rate of depreciation is based on a life of 20 years, the annual rate is 5%, or $5,000 per year. Therefore the annual depreciation for 1956 is $5,000.

Adjustment to Depreciation of Prior Years	$25,000	
Building, Accumulated Depreciation		$25,000
To adjust the accumulated depreciation based on a life of 20 years		
Depreciation Cost	5,000	
Building, Accumulated Depreciation		5,000
To accrue the depreciation of the building for 1956		

The "T" accounts are also of assistance in visualizing this adjustment.

Building		Adjustment to Depreciation of Prior Years	
√ $100,000		(1) $25,000	

Building, Accumulated Depreciation		Depreciation Cost	
	√ $25,000	(2) $5,000	
	(1) 25,000		
	(2) 5,000		

Many accountants prefer an alternative treatment in the above situation. Rather than adjusting the depreciation already accrued, they would adjust the amount of depreciation charged in the future. Instead of a straight-line depreciation, it would be a bent-line schedule, and there would be no adjustment of prior years' depreciation. The depreciation of each year in the future would be:

$$\text{Depreciation Expense} = \frac{\text{Remaining book value}}{\text{Remaining life}} = \frac{75{,}000}{10} = 7{,}500$$

Each year in the future would be charged with an expense of $7,500. In a sense, the $25,000 of adjustment computed above is being allocated over the remaining useful life of the asset. The bent-line procedure has the advantage of not creating a large one-shot adjustment which would be either buried as an adjustment to retained earnings or would distort the measure of income of the period. It has the disadvantage of overstating the asset valuation over its entire life (right up to the moment of retirement) and overstating the expense of using the asset in each year except the present one. Obviously there is no easy or absolutely correct answer relative to the procedure to be followed. On balance, the immediate adjustment seems to be more desirable. It has the advantage of only distorting the income of the one year and resulting in reasonable measures on the position statement immediately.

GROUP OR UNIT DEPRECIATION

When the depreciation is computed for each individual asset, a "unit" procedure is being followed. For some purposes the group procedure of accruing depreciation is easier to apply. When following this procedure, no attempt is made to depreciate the individual assets, but rather an entire group is treated as a unit. This procedure is especially applicable to a large homogeneous mass of long-lived assets purchased at approximately the same time. An average life is the basis for determining the rate of depreciation to be used. The rate of depreciation is the reciprocal of the average life. To compute the depreciation for the year, this rate is commonly applied to the be-

ginning of the year's balance of the fixed asset account. However, other procedures are equally acceptable.

The group procedure differs most drastically from the unit procedure when an asset is retired. When one of the original group is retired, *no loss on retirement is recognized.* The loss on retirement is recognized when the last unit of the group is retired, although it is possible to recognize that the original average life estimate was faulty and then to adjust the allowance for depreciation prior to that time.

EXAMPLE

The Ellis Hollow Telephone Company purchased 2,000 telegraph poles at $20 per pole on December 31, 1965. The average life of a pole is 25 years (the depreciation rate is .04). The following retirement occurred during the first two years of use:

Year	*Retirements*
1	1
2	4

Depreciation is computed based on the equipment in use as of the beginning of the year, using the group method of depreciation. The entries for the first three years would be:

Dec. 31, 1965	Poles	40,000	
	Bank		40,000
	(to record the purchase)		
Dec. 31, 1966	Depreciation Expense	1,600	
	Accumulated Depreciation		1,600
	(.04 × 40,000)		
	Accumulated Depreciation	20	
	Poles		20
	(to write off the one pole which was retired)		
Dec. 31, 1967	Depreciation Expense	1,599.20	
	Accumulated Depreciation		1,599.20
	(.04 × 39,980)		
	Accumulated Depreciation	80	
	Poles		80

In using the group method of depreciation or a composite rate of depreciation, it is necessary to be alert to the possibility of the debits to accumulated depreciation for the write-off of the assets becoming as large as, or almost as large as, the credits resulting from the charges to depreciation expenses. A debit balance (or near debit balance) would indicate that the expected life of the asset was over-stated and that adjustments of the life, the rate of depreciation, and the amount of depreciation accumulated were appropriate.

COMPUTATION OF AVERAGE LIFE

The life used in the group method of depreciation is obtained by weighting each possible duration of life by the number of units expected to be retired with that number of years of use.

EXAMPLE

Expected Life: Years	*Expected Number of Units*	*Product of Columns 1 and 2*
1	1	1
2	4	8
3	4	12
4	1	4
	10	25

The expected life is 2.5 years (that is, 25 divided by 10). The rate of depreciation is $\frac{1}{2.5}$, or .40 per year.

Assume each unit costs $500.

If the expectations are realized, the schedule of depreciation accruals and retirements will be as follows:

Year	*Depreciable Base*	(.40 of Col. 1) *Depreciation for year*	Accumulated *Depreciation*	*Retirements*
1	5,000	2,000	2,000	500
2	4,500	1,800	3,300	2,000
3	2,500	1,000	2,300	2,000
4	500	200	500	500

Some firms use a composite rate to compute the depreciation of their depreciable assets. Rather than applying many different rates to many different assets, one rate is applied to the entire collection. The rate of depreciation is based on a weighted average life, where the weights used are the costs of the depreciable assets.

EXAMPLE

1	*2*	*3*	*4*
Class of Asset	*Dollar Amounts*	*Expected Life*	*Column 2 times Column 3*
A	$ 5,000,000	5	25,000,000
B	10,000,000	6	60,000,000
C	85,000,000	7	595,000,000
	100,000,000		680,000,000

The expected life is 6.8 years, and the rate of depreciation is 1 divided by 6.8, or .147 per year. The first year's depreciation is $14,700,000. An acquisition of depreciable assets would change the composite rate. Retirements are treated in the same manner as with the group method of depreciation. The justification offered for this procedure is that it facilitates the preparation of financial reports. It is used primarily by public utilities with a large amount of long-lived assets.

QUESTIONS AND PROBLEMS

12–1 A building which cost $100,000 is completed on January 1, 1955. It has an estimated useful life of 20 years. The estimated salvage at the time of retirement is $10,000. The company uses a straight-line procedure for computing depreciation.

Required

(a) Prepare journal entries to record the depreciation cost of 1955 and 1956.

(b) What is the book value of the building as of December 31, 1955? 1956?

(c) Show three possible presentations of "building" on the December 31, 1956, position statement.

(d) What factors should be taken into consideration in determining the estimated useful life of the building?

12–2 A piece of equipment which cost $100,000 has an expected life of 5 years and a forecasted net salvage value at retirement of $1,024. It is purchased on January 1. The fifth root of $1,024 is $4, i.e., $\sqrt[5]{1{,}024} = 4$.

Required

(a) Complete the following table, showing the depreciation for each one of the 5 years of the life of the asset and the total depreciation accrued.

	Method of Depreciation		*Sum of the*	
Year	*Straight-Line*	*Twice Straight-Line*	*Years' Digits*	*Formula*
1				
2				
3				
4				
5				
Total				

(b) Under what conditions would a decreasing charge method of computing depreciation be reasonable?

12–3 Adjustment of the accumulated depreciation account will often bring into use an account "Adjustment to Depreciation of Prior Years." This account may

have a debit or credit balance. Where should it appear on the income statement? Explain.

12-4 The Active Machine Company computes depreciation of equipment based on hours of usage of its equipment. A piece of equipment which cost $10,000 is purchased on January 1, 1957. It has an estimated useful life of 20,000 hours. During 1957, the machine was used a total of 2,000 hours.

Required

(a) Compute the depreciation for 1957. Prepare the journal entry.

(b) An analysis of past experience and future expectations indicate that equipment of this type can expect to become obsolete in five years. Does this additional information alter the reasonableness of the computation in part (a)? Explain.

12-5 Equipment was purchased on January 1, 1951 at a cost of $10,000. It was estimated that the asset had a life of 20 years. On December 31, 1956 it was decided that because of changing economic conditions the life of the equipment would be 10 years.

Required

Compute the adjustment of depreciation, the new rate of depreciation, and the annual depreciation for 1956. Give the necessary journal entries to be made on December 31, 1956.

12-6 The president of the Federal Company was somewhat confused by accounting terminology. He recently read in a financial journal that companies were financing their capital expenditures by using depreciation allowances and retained earnings. An inspection of the most recent position statement revealed that depreciation allowances were $20,000,000 and retained earnings were $40,000,000. This information added to his confusion, since his treasurer had recently informed him of the desirability of postponing capital expenditures because of financial considerations.

Required

Prepare a brief report which will clarify the terminology. Explain why financial analysts often speak of capital expenditures being financed from depreciation allowances. Are they correct?

12-7 The Gas Utility Company purchased 1,000 gas meters at a cost of $30 per meter. Rather than compute the depreciation and loss on retirement of individual units, the company has decided to use a group procedure for accruing depreciation and retiring meters. The specific procedure followed by the Gas Utility Company is to compute the depreciation based on the number of units in use as of January 1 of the year in question.

The *average* life of this type of meter has been estimated at 20 years. This means that the depreciation should be $\frac{1}{20}$, or 5% of the cost of the meters in use at the beginning of the year.

Required

(a) Use "T" accounts to record the below information:
1. The purchase of the meters on January 1, 1956
2. The accrual of depreciation for 1956
3. The retirement of two meters on July 15, 1957
4. The accrual of depreciation for 1957
5. The retirement of three meters on October 30, 1958
6. The accrual of depreciation for 1958

(b) Would you expect any of the meters to be in use in the years after 1976? Explain.

(c) Is it possible for the "Allowance for Depreciation" to have a balance greater than $30,000? Explain.

12–8 A building is purchased on July 1, 1956 for $200,000. The building has an estimated life of 20 years. The purchase price of the building includes a combined heating and air conditioning system. The heat conversion units have an expected life of 10 years. It is estimated that the entire heating and air conditioning system cost $50,000, but that $20,000 of the $50,000 could be used for any heating or air conditioning system installed (ducts and registers), i.e. it is part of the building.

Required

(a) Record the purchase of the building.
(b) Record the depreciation for 1956.
(c) Record the depreciation for 1957.

12–9 The 1961 annual report of the Rock Island Lines (a railroad), included the following statement:

Note 3: In accordance with Interstate Commerce Commission track accounting regulations, rails, ties and other track materials are not depreciated. The railroads follow an acceptable alternate practice of "replacement" accounting for rails, ties and other track materials instead of the usual depreciation accounting. Under this method, replacements in kind are charged to expenses and only improvements and additions are capitalized. The amounts capitalized are not depreciated.

Required: Comment on the procedure.

13

Noncurrent Assets

NONCURRENT OR LONG-LIVED assets may be classified as tangible and intangible, and then subclassified as assets with terminable lives and assets with lives which do not have an apparent end.

Tangible Assets: Terminable Life
- Buildings
- Equipment
- Improvements to Property
- Certain Natural Resources

Tangible Assets: Interminable Life
- Land

Intangible Assets: Terminable Life
- Patents, Leaseholds, Copyrights

Intangible Assets: Interminable Life
- Goodwill (may be terminable)
- Organization Costs (sometimes classified as a tangible asset)

TANGIBLE ASSETS: TERMINABLE LIFE

What costs are to be considered as costs of the long-lived asset when it is purchased? One problem is the treatment of purchase discounts. These should be treated in exactly the same manner as when merchandise is purchased. The net price is the significant amount, and if the discount is not taken, the amount paid in excess of net price should be considered a penalty for inefficiency. Considered as a cost of the asset are the freight-in charges associated with the purchase and the installation costs. Suppose machine A is being replaced by machine B; should the cost of removing machine A be considered a cost of installing machine B? If the old machine has been used in operations, the removal cost would be considered as affecting the loss or

gain on retirement of the old machine.[1] If the old machine has not been used (for example, a plant was purchased with the old machine installed), then the removal cost would be considered as a cost of the building, since if the building were new, this cost would not have been incurred. The cost of removing the old machine in this latter case should have been known when the plant was purchased. It was not a cost of past operations, since the company had not previously operated the plant. Thus the cost of preparing the plant for operations should be considered a cost of the plant (building).

All tangible assets of terminable life have the common requirement of a system for amortizing their cost over their useful lives. Thus buildings and equipment are depreciated, natural resources are depleted, and leaseholds are amortized over their useful lives. The credits for depreciation and depletion accruals are usually made to contra asset accounts.

EXAMPLE: Depletion of Natural Resources

The Baker Company has paid $100,000 to purchase and develop coal resources. It is estimated that there are 200,000 tons of coal on the property. In the first period 20,000 tons are mined.

Assume that the $100,000 has been debited to an account called "Coal Resources." Prepare journal entries to record the depletion for the period.

Depletion Cost	$10,000	
Coal, Allowance for Depletion		$10,000
To record the depletion based on $0.50 per ton, i.e., $\frac{\$100,000}{200,000}$ times the 20,000 of tons mined		

Instead of crediting a contra asset account, it would be possible to credit the main account directly.

Depletion Cost	$10,000	
Coal Resources		$10,000
To record the depletion directly to the coal resource account		

The only advantage of using the contra account is to retain the original cost information. This is of limited use because the value of coal resources is related to the amount of coal in the ground, not the cost of the asset.

For income tax purposes, depletion may be computed without reference to the cost of the asset being depleted. This factor should not affect the financial accounting for depletion.

[1] This is general practice, however in a situation where the present equipment is in reasonable physical condition and the replacement takes place because of technological advantages of the new equipment, it can be argued that the removal costs should be associated with the new equipment.

Retiring Depreciable Assets

If a building or equipment is retired, it is helpful to use a "suspense" account to record the various transactions which will affect the ultimate loss or gain. This suspense account is used because the gain or loss cannot always be determined at the moment of retirement. Debit entries to the suspense account tend to decrease the stockholders' equity and are similar to making debit entries to loss accounts. Credit entries have the opposite effect.

When an asset is retired, the first step is to bring the depreciation up to date. This is necessary because depreciation is often computed only when the books are closed, whereas it should be recognized for the use of the asset since the last closing. The next step is to eliminate the asset balances by crediting them and to eliminate the contra asset accounts by debiting them. The difference between the cost and accrued depreciation (net book value) is debited to a loss account if there are no removal costs or salvage, or to a suspense account if further entries are expected.

EXAMPLE: Retirement of Fixed Asset—No Salvage or Removal Cost

Assume that a building is retired on April 1, 1957. The depreciation was last accrued for this asset on December 31, 1956. The annual depreciation is $12,000. The cost of the building as recorded in the general ledger is $200,000, and the accumulated depreciation, as of December 31, 1956, is $120,000. Enter in journal form the items necessary to record the retirement.

Solution

Depreciation Cost	$ 3,000	
Building, Accumulated Depreciation		$ 3,000
To accrue depreciation for the period Jan. 1–April 1, 1957		
Building, Accumulated Depreciation	123,000	
Loss on Retirement	77,000	
Building		200,000

Note: In this case the loss is equal to the book value of the asset, since there are no salvage or removal costs. The book value is the difference between the cost and accrued depreciation.

EXAMPLE: Retirement of Fixed Asset, Assuming Salvage and Removal Cost

Assume the situation to be the same as in the preceding example, except that removal costs are $11,000 and salvage proceeds are $6,000.

Solution

Depreciation Cost	$ 3,000	
Building, Accumulated Depreciation		$ 3,000
To accrue depreciation for the period Jan. 1–April 1		

Solution

Building, Accumulated Depreciation	123,000	
Retirement Suspense	77,000	
Building		200,000
To write off the building cost and the accumulated depreciation		
Retirement Suspense	11,000	
Bank (or Accounts Payable)		11,000
To record the removal costs		
Cash	6,000	
Retirement Suspense		6,000
To record the salvage proceeds		
Loss on Retirement	82,000	
Retirement Suspense		82,000
To close out the retirement suspense account (it is a loss, since it had a debit balance); the loss is also equal to the excess of the removal costs over salvage plus the book value of the asset at time of retirement		

This series of transactions can be recorded by following another procedure. For example, the salvage proceeds may be recorded as follows:

Cash	$6,000	
Salvage Revenues		$6,000

In like manner the removal costs may first be recorded in a cost account called "Removal Costs." The entry to record the removal may be recorded as follows:

Removal Costs	$11,000	
Cash		$11,000

When all salvage revenues and all removal costs have been recorded, the building may be written off the records and the gain or loss computed:

Accumulated Depreciation	$123,000	
Salvage Revenues	6,000	
Loss on Retirement	82,000	
Removal Costs		$ 11,000
Building		200,000

The foregoing entry closes out all revenue and cost accounts connected with the retirement of the building, and the net loss (or gain) on retirement is recorded at this time.

The main advantage of this procedure is that it highlights the importance of accumulating the costs of removal and salvage revenue figures. While part of the loss on retirement may be a result of past depreciation procedures, the cost of removal may be a result of inefficiency in this period.

Exchange of Assets

It is possible to make a book gain or loss from the exchange of assets. Since the transaction is essentially the sale (or retirement) of one asset and the acquisition of a new asset, the transaction may be split into two parts. It is important that the accountant penetrate beyond list price in recording this type of transaction, because the real values of the new asset and the old asset may differ widely from the nominal values being cited by the traders.

EXAMPLE

The Rainy Taxi Company traded in one old cab on January 2. The old cab cost $2,000 and was 70% depreciated. The following facts are uncovered by the accountant:

List price of the new cab	$3,000
Trade-in allowance on old cab	1,100
Amount of cash paid	$1,900

Before trading in the old cab, the Rainy Taxi Company checked new and used car companies to see how much cash they would give for the old taxi. The best cash price offer received was $400. Record the trade-in in journal form.

Accumulated Depreciation	$1,400	
Taxi	2,300	
Loss on Retirement	200	
Taxi		$2,000
Bank		1,900
To record the trade-in		

The new taxi is recorded at $2,300, since that amount is equal to what the Rainy Company gave up, namely, *$1,900 cash and an old taxi which was worth at the most $400.*

The loss on retirement is equal to the difference between the value of the old taxi at the time of retirement ($400) and the book value of the old taxi ($600). It is also the balancing figure for the transaction. The transaction may be separated into two parts:

Accumulated Depreciation	$1,400	
Receivable, Dealer	400	
Loss on Retirement	200	
Taxi		$2,000
To retire the old taxi, record the loss on retirement, and the true value of the receivable against the taxi dealer		
Taxi	2,300	
Bank		1,900
Receivable, Dealer		400
To record the acquisition of the new taxi. Note		

that the new taxi is recorded at its true value rather than its list price.

For income tax purposes, the new taxi would be recorded at $2,500 ($1,900 plus the book value of the old asset, $600), and no gain or loss would be recognized on the trade.

If the income tax method is used to record the transaction on the books of the firm (as it may be for the sake of convenience), the entries would be:

Accumulated Depreciation	1,400	
Taxi	2,500	
Taxi		2,000
Bank		1,900

The basis of the new taxi is $2,500, the book value of the old taxi ($2,000 less 1,400, or $600) plus the cash disbursed, $1,900. No gain or loss is recognized on the transaction. For income tax purposes, this procedure has the advantage of not requiring the use of judgment on the part of either party concerned in the transaction.

TANGIBLE ASSETS: LAND

Generally speaking, land has an interminable life; thus it is not depreciated. The main problem in accounting for land is in deciding what costs are costs of land, cost of buildings, or cost of operations. This problem is particularly troublesome when a firm is first organized or where land is purchased for the construction of a building.

If land is purchased with the intention of constructing a building, then the costs of preparing the land for construction (but not digging the foundation) are costs of the land. This may include costs of draining the land or of removing an existing structure. This situation differs from that in which the firm purchases land with a building and then operates the building for a number of years before replacing it. In this latter case, removal costs may be associated with the loss on retiring the building. But where the land is purchased with the knowledge that there will be additional costs such as removing a structure already on the land, then these removal costs are truly costs of the land and not costs of the building which is going to be constructed.

The various costs associated with buying the land are also costs of the land. These include lawyer fees, survey costs, title insurance, and the like. If the land is purchased at a period of time prior to its use, then the various carrying costs for that period, such as taxes and interest, are also considered costs of the land. A warning should be injected here: Costs of this nature are not to be capitalized (charged to land) indefinitely. The decision to build must have already been made, and the projected date for starting construction must be only a reasonable distance in the future.

Land is not usually revalued in the accounts when it has appreciated or declined in value either because of changes in the general price level or because of changes in specific economic conditions. This results in a situation where the recording of the land value on the position statement has little or no relationship to the market value of the land.

INTANGIBLE ASSETS: TERMINABLE LIFE

Some intangible assets, such as patents, have a life which is determined by law. In these cases the accountant uses the lawful life as the basis for computing the useful life of the assets, *unless* there is some reason to suspect that the useful life of the asset will be less than the legal life because of economic change.

As these intangible assets are amortized, the main asset account rather than a contra account is usually credited. This treatment is preferred in practice because the original cost of these assets is even further removed from value than fixed depreciable assets of a tangible nature. However, there is no objection to contra valuation accounts as are used with long-lived tangible assets.

What should be done with research or development costs which were not successful but which eliminated blind alleys and thus made possible the development of one valuable patent? As described here, they seem to be costs of the good patent; but what if they were far removed from the final patent? Obviously we reach a point where the judgment of the accountant is required to determine what costs should be capitalized or charged to expense.

INTANGIBLE ASSETS: INTERMINABLE LIFE

Goodwill is classified here as having an interminable life, not because the goodwill of a firm cannot be dissipated and its value reduced to zero, but because the life of this asset is indefinite. Goodwill can be interminable, or it can have a terminable life.

What is goodwill? Goodwill is defined here as representing the present value of future earnings, in excess of what might be expected to be earned on the tangible assets used in the enterprise. Thus goodwill arises because of the expectation of exceptional earnings. Why does a firm have earnings higher than could normally be expected? There are many reasons, including customer acceptance, monopolistic position, innovating management, etc.

If goodwill arises because of the presence of exceptional earnings, does that mean that the accountant should record goodwill whenever earnings are found in excess of normal? Goodwill should be recorded only when it is purchased. This is usually interpreted to mean the purchase of one business entity by another business entity. Thus, if firm A purchases firm B for $1,000,000, and the value of the tangible assets is only $750,000, then firm A has been willing to pay $250,000 for something of an intangible nature. The accountant calls this something "goodwill."

Should goodwill be recorded when purchased and then amortized? It is frequently not amortized, although it probably should be. Whatever gives rise today of the prospect of future earnings must be of terminable life. The life of this advantage should be estimated, and the goodwill should be written off over that life. At the end of this period, the firm may still be making exceptional earnings, but it will be because of new factors, not the old purchased goodwill.

To define goodwill in terms of future earning power is reasonable from the point of view of decision-making, but it is not useful from an everyday financial accounting standpoint. Here the accountant must resort to cost to avoid inserting into the reports an excessive amount of his conjecture. Research and development expenditures are important items in the financial reports of many corporations. The general practice is to expense all costs of this nature except those costs directly associated with developing a specific patent. Two corporations may be exactly identical in all respects, and then one of the two may declare and pay a $10,000,000 dividend to its stockholders and the other spend $10,000,000 on research. The position statements of these two corporations after these transactions might well be exactly the same, if the $10,000,000 is treated as an expense of the period. Actually, the second firm has accumulated knowledge as a result of its expenditure of $10,000,000, and this accumulation should be treated as an asset.

If research and development expenditures are treated as assets, what should be their disposition? They have a limited life, but this life is not known, nor is the timing of the benefits or the extent of the benefits derived from the expenditure possible of determination. Any system of write-off will be arbitrary but is to be preferred over the two extreme possibilities of not considering this type of expenditure as an asset at all or considering them as an asset of perpetual life.

Organization costs are another troublesome item. What should be done with the costs connected with organizing a business? These costs will include lawyer fees, broker fees, and the costs and fees of the developers. Obviously they are not a cost of doing business in the first period of operations. Logically they should be written off over the entire life of the business entity. How

long is the firm going to last? The normal business corporation has a charter which extends indefinitely, and the end of the life of the corporation cannot be predicted with any degree of accuracy. The result is a situation in which the organization costs are frequently considered an asset which is not amortized. The justification for considering organization costs an asset is that the factors of production are more valuable when tied into a corporate entity by the organizers than when scattered over the economy. The objection to this interpretation is that the value of the corporate assets over and above their value as salable tangible assets lies in their earning power. The earning power is indicated by the results of operations past, present, and future, and not the balances in intangible asset accounts.

When the accountant records as assets those items which have no sale value (in the terminology of the economist, their opportunity cost is zero), then the position statement is weakened as a means of presenting the financial position of a business entity. What can be done with items that are not costs of this period but which are also of no value (included in this classification are organization costs, bond issue costs, stock issue cost, goodwill)? Probably the most acceptable solution is to record them at cost, or amortized cost, and to adjust the information presented for the specific purposes at hand.

For purposes of financial accounting, essentially all assets should be considered to have terminable (though possibly unknown) life and thus should be amortized over some finite time period. Even organization costs give an impetus to a corporation which must be renewed periodically. The initial shove must sooner or later expire.

QUESTIONS AND PROBLEMS

13–1 The Haber Uranium Company

The Haber Company purchased land in Arizona on which uranium had been discovered. The cost of the land was $1,000,000. Additional costs necessary to prepare the land for mining operations were $200,000. It is estimated that five million tons of ore containing uranium will be excavated before the mine is fully mined out. During the first period of mining operations, 500,000 tons of uranium-bearing ore were dug and shipped to the refinery. The cost of getting the ore out of the ground into railroad cars was $930,000.

Required

Record the transactions in journal form.

13–2 The Hadley Company

The Hadley Company purchased a new lathe. The old lathe, with a net book value of $2,500 (it had originally cost $6,000), was removed at a cost of $600. It was sold for $200 as scrap. Additional work had to be done on the foundation

before the new lathe could be installed; this cost $1,200. Other installation costs were $900, including $100 of factory overhead which was assigned, based on normal overhead rate.

The invoice cost of the new lathe was $10,000; terms, 2/10, n/30. Freight charges were $800. The discount was not taken, since the firm did not have the ready cash.

Required

Record in journal form the retirement of the old lathe and the acquisition of the new piece of equipment.

13–3 The Halsey Company

The Halsey Company traded in a car for a new model. The old car cost $3,000 and was 90% depreciated. The list price of the new car was $4,000, but the Sharp Car Agency offered to allow $1,100 on the old car. The Halsey Company had tried to sell the old car, and the best cash price they had been offered was $380. The Sharp Car Agency offered to pay $380 cash for the old car if the Halsey Company did not want to trade it in.

Required

(a) Make the journal entries to record the trade-in from the point of view of the Halsey Company.

(b) Make the journal entries to record the trade-in from the point of view of the Sharp Car Agency.

13–4 The Harden Company

The Harden Company desired to build a hotel along the shore. Land of a suitable nature was scarce, so they finally bought the Dryden Hotel with the intention of tearing it down and building a more modern hotel on the site. The purchase was completed in October. Since this was the beginning of the season, the Harden Company continued to operate the Dryden Hotel until April 1, and then it had contractors begin the work of tearing it down. The following information is made available to you:

Total purchase price of land and hotel	$2,000,000 [2]
Lawyer fees, title search, etc.	20,000
Operating profit of Dryden Hotel (October 1–April 1)	300,000
Cost (net of salvage) of removing the Dryden Hotel	350,000
Cost of enlarging foundations	100,000

Required

Prepare a schedule showing the cost of the land.

13–5 The Hardy Company

The Hardy Company ceased operations in its Illinois plant on July 1. On August 1, it was decided to dismantle the equipment and sell the plant. The cost of dismantling the equipment was $7,000. The equipment was sold for scrap and second-hand equipment for $20,000. The plant was sold for $120,000, and

[2] The hotel was appraised for tax purposes at $1,000,000, and the land at $500,000.

there were expenses of $6,000 connected with the sale. Depreciation was last accrued on the plant and equipment on the previous December 31. The January 1 balances in the plant and equipment accounts of the Illinois plant were as follows:

Plant	$2,000,000
Plant, Accumulated Depreciation	1,550,000
Equipment	400,000
Equipment, Accumulated Depreciation	320,000

The building depreciation was $4,000 per month, and the equipment depreciation was $3,000 per month.

Required

Prepare journal entries to record the depreciation for the period and also the retirement of the plant and equipment of the Illinois plant.

13–6 The Harper Automobile Company

The Harper Automobile Company has been negotiating with the Airflight Plane Company on the subject of a merger. The asset side of the position statement of the Harper Company includes the following items:

Goodwill	$50,000,000
Organization Costs	10,000,000
Bond Issue Costs	500,000
Stock Issue Costs	1,000,000
Patents	9,000,000

Required

(a) Explain briefly the origin of these items.

(b) If you were a member of the management of the Airflight Company, how would you treat the items in forming an opinion of the value of the Harper Company?

(c) The accountant adopts a "going-concern point of view." Explain the significance of this convention with reference to the given items.

13–7 The Harrison Company

1. Stockholders invest $1,000,000.
2. The company purchases and pays cash for the following long-lived assets:

Coal Mine	$200,000	(containing an estimated 400,000 tons of coal)
Equipment	300,000	(with an estimated life of 10 years)
Buildings	100,000	(with an estimated life of 20 years)

3. Supplies are purchased on account, $3,000 (terms 2/10, n/30).
4. The company starts operations on July 1. During the first accounting period, 5,000 tons of coal are mined. Costs incurred during this period (July 1–December 31) include the following:

Administrative Salaries (paid)	$ 6,000
Selling Expense—Salaries (paid)	2,000

Direct Labor Mining (paid)	20,000
Mining Supplies used	1,000

5. During the period July 1–December 31, the company sold and shipped 4,000 tons of coal at a price of $15 per ton; terms, 3/15, n/30. All sales were on account.
6. Accounts payable paid during the period were $3,000. This included $60 of discounts which were allowed to lapse (the net price of the payables was $2,940).
7. Accounts receivable collected during the period were $40,000. In addition, $100 was collected from customers because of the lapsing of sales discounts.

Required

(a) Record the given transactions and any other adjusting entries indicated as being necessary.
(b) Record the closing entries required on December 31.
(c) Prepare the position statement as of December 31 and the income statement for the period July 1–December 31.

13–8 The Harlan Corporation acquired at a cost of $20,000,000 the assets and name of another corporation which it intends to operate as a division. The position statement of the acquired corporation showed the following assets:

Cash and other liquid assets	2,000,000
Inventories	3,000,000
Plant and Equipment	4,000,000
Land	1,000,000

An appraisal made by an independent appraisal company listed the current values of the assets as follows:

Cash and other liquid assets	2,100,000
Inventories	2,900,000
Plant and Equipment	8,000,000
Land	3,000,000

Required

(a) At what values should the newly acquired assets be recorded?
(b) If the appraisal value of the plant and equipment had been $15,000,000 instead of $8,000,000, at what values would you record the assets?

13–9 The 1961 Annual Report of Western Union contained the following statement:

Effective January 1, 1961, incident to the plant expansion program, the Company adopted the practice of capitalizing interest on investment in plant under construction. As a result, interest expense was reduced and net income increased by $978,620.

Required

Comment on the procedure.

13–10 The 1961 annual report of the Amerada Petroleum Corporation contained the following statement.

Synopsis of Accounting Practices

All intangible drilling and development costs incurred are charged against income each year through a 100% reserve, except those applicable to productive wells in the United Kingdom of Libya, which will be amortized and charged against income commencing with the first year in which production and income are obtained from such wells.

All geological and geophysical expenses are charged against income as incurred. Lease rentals are charged off in full when paid.

Nearly all the Corporation's production is obtained from properties purchased prior to the discovery of oil or gas thereon. Properties that become productive are still carried in the accounts at cost, less depletion, and consequently the increase in value resulting from the discovery of oil or gas is not reflected in the Balance Sheet. The cost of each producing property is amortized by annual charges for depletion in the proportion which the production for the year bears to the estimated recovery of oil or gas, calculated separately for each property.

Unproductive and undeveloped properties are carried in the accounts at cost, which cost is written off in full when properties are surrendered or otherwise disposed of, but in certain cases, properties are written off prior to formal relinquishment.

The annual depreciation charge applicable to equipment used on productive wells is computed separately for each property, in the same manner as depletion. The depreciation charge on all other equipment is computed on the "straight-line" method, at annual rates commensurate with the estimated useful life of each of the various kinds of equipment in use.

The cost of properties, plant and equipment retired or otherwise disposed of, less depreciation or other reserves accumulated thereon, is charged against income. All expenditures for maintenance and repairs are also charged against income.

These accounting practices are followed with respect to both domestic and foreign operations except with respect to operations in Libya as noted above.

Required

Comment on the accounting practices.

14

Inventories

ACCOUNTING FOR INVENTORIES gives rise to many interesting and important accounting problems. Three of these problems will be introduced in this chapter:

1. What costs are inventoriable?
2. What is the flow of costs?
3. Should cost or market values be used to value inventories?

WHAT COSTS ARE INVENTORIABLE?

What costs should be included in computing inventories? There is general agreement that inbound freight costs are to be included; some accountants argue that purchasing costs, material handling, and storage costs are also properly included as costs of inventory. There does not seem to be a clear-cut line of distinction between inventoriable and noninventoriable costs. The costs absolutely necessary for obtaining the inventory and placing it into storage are reasonable charges into inventory. The costs arising from inefficiency or prolonged storage of the items in inventory are period charges, and to place these items into inventory would be in error.

An example of an item clearly not inventoriable is the demurrage charge arising from holding a railroad car an excessive period of time. There is always the danger of items of this nature being buried with the normal freight charges. This should be avoided, since the demurrage charge arises either from inefficiency or unusual circumstances and should not be considered a cost of the goods purchased. Other examples of charges which should be excluded from inventory are purchase discounts. Whether they are lost or taken, they are not a cost of the purchased material.

From a practical point of view, it would not be unreasonable for a nonmanufacturing firm to place into inventory only the net invoice price, freight, and the handling costs of placing the materials in their storage place. Other costs would be considered expenses of the period.

This procedure would exclude from inventory such costs as purchasing department costs, accounting department costs, and costs of warehousing of the inventory. These costs would be considered to be expenses of the time period. There is no question that some or all of these costs could be identified with (or allocated to) inventory items. However, such an allocation would have little informational value and may actually be misleading because of the fact that any method of assigning the costs to inventory would be arbitrary.

Inventoriable Costs of Manufacturing Firms

What costs are inventoriable if the firm is processing a product, i.e., engaged in a manufacturing process? There is no one answer to this question. A narrow point of view would inventory only the direct variable costs (this would usually include only direct material and direct labor). A somewhat broader viewpoint would include all other variable costs connected with the manufacturing process (indirect variable materials, indirect variable labor, and other variable costs such as power would be included). The generally accepted accounting treatment of manufacturing costs is somewhat broader. All costs connected with the manufacturing process are considered inventoriable. This differs from any of the three preceding procedures by the inclusion of fixed costs in the inventoriable classification.

There still remains the problem of identifying those costs which are connected with the manufacturing process. There are many borderline cases. Which of the following costs should be considered inventoriable: cost accounting department costs, factory supervisors' salaries, quality control department costs, part of the president's salary (consistent with the amount of time spent with manufacturing problems)? While there are problems of assigning the costs to specific products, all the above costs should be considered inventoriable. Examples of costs that are *not* inventoriable are selling expenses, income taxes, advertising expenses, expenses of shipping out, and sales invoice preparation. While costs of this nature are not generally considered inventoriable, since they are usually associated with products no longer in inventory (which have been sold), they should be allocated to different product lines so that the "income" of a product line will be the amount remaining after all costs have been subtracted.

WHAT IS THE FLOW OF COSTS?

It is necessary to distinguish between the *flow of the physical units* of inventory which pass through the plant and are shipped to customers and the

flow of costs. The flow of the physical units may be the result of a material handling arrangement which ensures that the oldest goods are sold or used first. The costs of inventory which are charged to expense may or not be the costs of the oldest goods on hand. This would depend on which of several accounting conventions is adopted by the corporation. There are various assumptions that the accountant may make. The following are the most common, although by no means the complete list:

1. The oldest goods are sold or used first—FIFO (first in first out).
2. The last goods purchased are sold or used first—LIFO (last in first out).
3. The goods are "homogenized," and goods used are of average cost and age—Average Cost.
4. Identify the specific units used.

In actual practice, the *physical flow* of goods will frequently *not* correspond to the method chosen by the accountant to record the *flow of costs.* In fact, it will be an infrequent situation when the flow of costs exactly matches the physical flow of the inventory.

Flow of Costs: FIFO

The FIFO procedure of accounting for inventory charges the costs of the first goods purchased to expense. This means that the cost of the goods appearing in inventory will be the cost of the most recent goods purchased (a reasonable situation).

EXAMPLE

The Sample Company uses a FIFO procedure for accounting for merchandise. The Company has an opening inventory of 100 units which cost $2.00 each.

Purchases during the Month

Jan. 15	200 units @ $2.10 =	$ 420.00
Jan. 24	300 units @ $2.20 =	660.00
Jan. 30	100 units @ $2.25 =	225.00
	600	$1,305.00

During the month of January, the company sold 500 units.

Required

Compute the cost of goods sold and ending inventory.

Cost of Goods Sold:

100 units @ $2.00 =	$ 200.00
200 units @ $2.10 =	420.00
200 units @ $2.20 =	440.00
500	$1,060.00

Ending Inventory:

100 units @ $2.25 =	$225.00
100 units @ $2.20 =	220.00
200	$445.00

The answers may be checked by adding the ending inventory and the cost of goods sold ($1,060 plus $445 = $1,505). This should be equal to the opening inventory plus the cost of the goods purchased during the period ($200 plus $1,305 = $1,505).

Flow of Costs: LIFO

The LIFO procedure of accounting for inventory charges the costs of the last goods purchased to expense. This means that the cost of the goods appearing in ending inventory will be the cost of the oldest goods purchased; this will be the opening inventory plus additions (or less deductions) during the period. If there have been changes in the general price level, or changes in the cost of goods being purchased, this inventory can become far removed from either the actual *cost* of the goods on hand or their present value.

EXAMPLE

Assume that the Sample Company is using a LIFO procedure. Compute the cost of goods sold and the ending inventory. (See the FIFO section.)

Cost of Goods Sold:

100 units @ $2.25 =	$ 225.00
300 units @ $2.20 =	660.00
100 units @ $2.10 =	210.00
500	$1,095.00

Ending Inventory:

100 units @ $2.00 =	$200.00
100 units @ $2.10 =	210.00
200	$410.00

The answers may be checked by adding the ending inventory and the cost of goods sold ($1,095 plus $410 = $1,505). This should be equal to the opening inventory plus the cost of the goods purchased during the period ($200 plus $1,305 = $1,505).

Flow of Costs: Average Cost

The average cost procedure of accounting for inventory charges an average of the costs of the goods purchased during the period and the opening inventory to expense. This should be a weighted average and not just a simple average of the prices. For instance, again referring to the Sample

Company example, it would not be correct to add up the prices and then take an unweighted average as follows:

Prices of Goods Purchased and Opening Inventory

Opening Inventory	$2.00
Jan. 15th purchase	2.10
Jan. 24th purchase	2.20
Jan. 30th purchase	2.25
	$8.55

Dividing by 4 would give $2.14. This is *incorrect*, because it fails to take into consideration the fact that the Jan. 24th purchase is for 300 units, while the Jan. 30th purchase is for 100 units.

EXAMPLE

Assume that the Sample Company is using an average cost procedure. Compute the cost of goods sold and the ending inventory.

Opening Inventory	100 @ $2.00 =	$ 200.00
Jan. 15th purchase	200 @ 2.10 =	420.00
Jan. 24th purchase	300 @ 2.20 =	660.00
Jan. 30th purchase	100 @ 2.25 =	225.00
	700	$1,505.00

$$\frac{\$1,505}{700} = \$2.15 \text{ average cost per unit}$$

Cost of goods sold = $2.15 × 500 = $1,075
Ending inventory = $2.15 × 200 = 430
$1,505

Flow of Costs: Identification of Costs of Specific Units

In some situations accountants will attempt to identify the actual costs of specific units. In most cases, this procedure will be too expensive; in other cases it will be impossible. The benefits at best are doubtful and not worth the cost, except where high-cost items are being sold and the cost of specific items can be easily traced.

COST OR MARKET, WHICHEVER IS LOWER

The FIFO, LIFO, and average cost procedures are all concerned with determining the cost of the ending inventory. If FIFO or average cost is used, it is current practice to compare the cost (as determined by using one of these procedures) to the market price of the item, and take the *lower* amount for

the valuation of the inventory. This procedure results in a conservative inventory, since the inventory is *always* written *down* to market but *never up* to market. The inconsistency may be explained by the rule of thumb, followed by accountants, which recognizes all losses but does not recognize gains until they are realized.

The journal entry to record the write-down to market takes various forms. The debit may be to "Cost of Goods Sold" or to a "Loss" account. The credit may be to the "Inventory" account or to a contra asset account, "Reserve for Market Valuation," which is subtracted from the inventory account for statement purposes. The entry made directly to inventory is to be preferred, because it avoids the use of an unnecessary account which may be confusing.

The cost or market rule has been attacked by accounting theoreticians on the grounds that it is not consistent (inventories are written down to market but never up to market) and that it is not even truly conservative (in the next period, the income may be higher if the inventories are written down in this period). It also suffers from confusion as to what is meant by "market." Despite these valid objections, the cost or market rule is firmly entrenched among practicing accountants.

From the managerial point of view, the write-down to market is desirable to prevent the subsequent year from being charged with unrealistic costs and to prevent the inventory presentation from being overstated on the position statement. Managerial accounting differs from accounting practice in that write-ups to market would also be desirable to be better able to judge managerial performance in the next period and to present more realistic inventory figures on the position statement.

The internal revenue code generally does not attempt to tell corporations how they should treat items from an accounting point of view. The one exception is that the code does prevent the use of LIFO combined with cost or market for tax purposes. Also, if a firm uses LIFO for tax purposes, it must use LIFO in its accounting records. The internal revenue code may be expected to change through the years, but the basic incompatability of LIFO and the lower of cost or market will remain.[1]

EXAMPLE

At the end of the calendar year, the Sample Company's raw material inventory sheet showed the following items. Using "cost or market, whichever is lower," determine the dollar amount of raw material inventory.

[1] Cost or market is not generally used if LIFO is used. If it were used, the inventory would be written down to the lowest market prices encountered after the adoption of LIFO. If some of this old inventory were then used for current sales, the result would be an understatement of current costs (relative to current market prices) and an overstatement of income, assuming the present level of prices is higher than the lowest level ever encountered.

Material	Units	Cost Per Unit	Market Price Per Unit	Cost	Market	Cost or Market—The Lower
A	100	$1.00	$0.80	$ 100	$ 80	$ 80
B	200	2.00	2.10	400	420	400
C	150	3.00	3.00	450	450	450
D	300	2.20	2.00	660	600	600
				$1,610	$1,550	$1,530

There are actually two acceptable answers: $1,550 or $1,530. Determining the lower of cost or market by individual items will always give the *lower* inventory figure.

PERPETUAL AND PERIODIC INVENTORY PROCEDURES

When goods are sold and shipped or placed into production, this may or may not be the signal for an accounting entry. If the company is following a perpetual inventory procedure, entries will be made as follows:

Accounts Receivable	$150	
Sales		$150
To record sales of $150		
Cost of Goods Sold	100	
Merchandise		100
To record the sale of inventory which cost $100		

If the company is following a periodic inventory procedure, only the entry to record the sale is made, and no entry for cost of goods sold will be made at the time of the sale. At the end of the accounting period, an inventory will be taken and the difference between the goods purchased (including the opening inventory) and the physical inventory will be charged to costs of goods sold.

EXAMPLE

January 1 Inventory	$5,000
Purchases	4,000
	$9,000

If the physical ending inventory is $3,000, the cost of goods sold will be $6,000. The journal entry would be:

Cost of Goods Sold	$6,000	
Merchandise		$6,000
To record the cost of goods sold for the period		

When a perpetual inventory procedure is used, any difference between the physical inventory and the book inventory will be considered as an inventory adjustment. It could be treated either as an adjustment to cost of goods sold or as a separate adjustment.

EXAMPLE

Book Inventory, Dec. 31	$3,200
Physical Inventory, Dec. 31	3,000

Adjustment:

Cost of Goods Sold	$200	
Merchandise		$200
To adjust the book inventory to agree with the physical inventory		

An alternative entry would be:

Inventory Adjustment	$200	
Merchandise		$200

This entry differs from the first entry only in that the inventory adjustment is recorded in a separate account and identified as an adjustment rather then buried in costs of goods sold. The reasons for the adjustment should be thoroughly investigated if the amounts are significant. Whenever possible, the burying of this adjustment in cost of goods sold should be avoided, for management should be interested in the size of the adjustment. Large adjustments may indicate faulty costing or inventory control procedures.

The Effect of Perpetual and Periodic Inventory Procedures on the Cost of Inventory

In certain situations, the cost of the ending inventory will be affected by whether or not the company is using a perpetual or periodic costing procedure.

If the FIFO procedure of accounting for inventory is used, then it makes *no difference* whether the periodic or perpetual procedure is used to relieve the inventory account. The oldest goods are charged first, and the charges to cost of goods sold will not be affected by whether the computation is made at the time of sale or at the end of the accounting period.

If the LIFO or average cost procedures of accounting for inventory are used, then it *will* make a difference whether the periodic or perpetual procedure is used in determining cost of goods sold and ending inventory.

EXAMPLE

Assume that the Sample Company uses a LIFO procedure for accounting for merchandise. The Company has an opening inventory of 100 units, which cost $2.00 each.

	Purchases	Sales
Jan. 10	.....	80 units
Jan. 15	200 units @ $2.10	
Jan. 20	.....	220 units
Jan. 24	300 units @ $2.20	
Jan. 29	.....	200 units
Jan. 30	100 units @ $2.25	
	600	500

Required

(a) Determine the cost of goods sold, using LIFO periodic costing procedure.

(b) Determine the cost of goods sold, using LIFO perpetual costing procedure.

Solution

(a) The cost of goods sold is $1,095 and the ending inventory is $410. For the computations, see the section on LIFO.

(b) If a *perpetual* costing procedure is used, the solution is complicated by the fact that the sale is assumed to consist of the last goods on hand *at the time of the sale.* For example, the sale of Jan. 10 must have been made using the opening inventory, which cost $2.00 per unit. The sale of Jan. 20 was made using the 200 units purchased on Jan. 15 and 20 units of the opening inventory. The sale of Jan. 29 was made using the units purchased on Jan. 24.

LIFO: Perpetual
Cost of Goods Sold

Date of Sale	Units	Cost of Last Goods Purchased	Cost of goods Sold
Jan. 10	80	$2.00	$160
Jan. 20	200	2.10	420
	20	2.00	40
Jan. 29	200	2.20	440
	500		$1,060

LIFO: Perpetual
Ending Inventory

Date of Purchase	Units	Cost of Purchase	Inventory Cost
Jan. 24	100	$2.20	$220
Jan. 30	100	2.25	225
	200		$445

It is interesting to note that, in this special case, the LIFO perpetual procedure has given the same results as would be obtained by using FIFO.

A perpetual average cost procedure would require a new computation of the average cost to be used for costing out inventory after each *purchase*. Since a *sale* does *not* disturb the average cost, it would *not* necessitate a computation of a new average cost.

Evaluation of Perpetual and Periodic Procedures

The most forceful argument in favor of the perpetual inventory procedure is the fact that it gives a positive control over the inventory. At any moment in time, management can find out how many units and dollars of inventory are on hand. When a physical inventory is taken, it can be compared with the perpetual inventory record and differences investigated. The periodic inventory procedure loses control by failing to maintain a record of how many units or dollars of inventory should be on hand.

If the perpetual procedure is used with FIFO or LIFO, the bookkeeping procedures are somewhat complex, since the dates of inventory on hand must be maintained so that the oldest (or latest) of the inventory will be costed first. If average cost is used, then the bookkeeping becomes somewhat even more time-consuming, especially if there are frequent receipts of material. At a minimum, a perpetual inventory procedure will require many more postings to inventory cards than the periodic procedure.

It is possible to compromise and obtain many of the advantages of the perpetual inventory procedure without incurring excessive clerical costs. For one thing, it is possible to maintain perpetual records in terms of *physical units* but make the dollar entries only periodically. This eliminates the pricing problem (the problem of determining the cost of the units sold). A second procedure that is frequently used is to make use of a set price (it may be a standard price or the most recent purchase price) to relieve inventory and then to adjust the inventory at the end of the accounting period to conform to one of the conventional costing procedures (FIFO, LIFO, etc.).

Does the periodic or perpetual costing procedure gives better results from a financial accounting point of view? Which gives a more significant cost of goods sold or a better inventory figure? It is impossible to say that one method is "better" than the other. It can be recognized that if FIFO is used, the choice of periodic or perpetual procedures will have *no* effect on inventory or cost of goods sold. If LIFO is used, the choice will have an effect, but a general conclusion as to whether the effect is good or bad is impossible. The problems of accounting for inventory as they affect the financial statements are more related to the choice of the costing procedure for the flow of costs (FIFO, LIFO, etc.) than they are to the application of either the perpetual or periodic procedure.

THE RETAIL INVENTORY METHOD

Retail stores, especially department stores, have inventories of a large number of different types of items which are frequently spread out on shelves in several different locations. The tags on the items on the shelves generally contain the sales price but not the cost of the item (though the cost is sometimes coded on the tag). Because of the large number of items, the non-compact storage of items, the absence of readily accessible cost information, and the large number of transactions, the accounting for inventories for a retail firm is somewhat more complicated than for a manufacturing firm. These complications have in the past prevented the accountant of the retail establishment from identifying the cost of the merchandise sold of each sale, since the identification would be too expensive. Instead there has developed an inventory procedure which fits the needs of retailing firms. It is appropriately called the "retail inventory method."

Using the retail inventory method, the physical inventory is taken, using retail prices, and these prices are then converted to a cost basis, using a cost percentage based on the profit margin of the company.

Let us assume that the company uses a 40% markup (the markup is 40% of sales price). The beginning inventory cost $6,000, the purchases during the period cost $30,000, and the ending inventory at retail was $1,400. The determination of the cost of the ending inventory would be:

	Cost	Retail	Cost Percentage
Beginning Inventory	6,000	10,000	
Purchases	30,000	50,000	
Goods Available for Sale	36,000	60,000	60%
Ending Inventory	840*	1,400	60%

* Equal to the inventory at retail $1,400 times the cost percentage, 60%. The cost percentage is equal to the cost of the goods available for sale divided by the retail value.

The basic principle of the retail method is not complicated. Take an inventory at retail prices and reduce the retail prices to cost by eliminating the profit margin (multiply the retail value by the complement of the profit margin). The first complication is introduced when not all the items sold or in inventory have the same profit margin.

Let us assume that a company uses markups ranging from 20% to 60%. The beginning inventory is $6,000 cost and $9,000 retail. The purchases are $43,000 cost and $61,000 retail. The ending inventory is $2,500 retail. The ending inventory at cost would be:

	Cost	Retail	Cost Percentage
Beginning Inventory	6,000	9,000	
Purchases	43,000	61,000	
	49,000	70,000	70%
Ending Inventory	1,750*	2,500	

* Equal to the inventory at retail, $2,500, times the cost percentage, 70%.

The situation where there are different possible product mixes is solved relatively simply by the above method, but the limitations of the procedure should be noted. It is implicitly assumed that the mix of the items in inventory is the same as the units purchased and the beginning inventory. It is possible for the items remaining in inventory to have a different profit margin (thus a different cost percentage than the purchases and beginning inventory). For example, it is possible that the markup on the items still in inventory was 20%, and the cost of items was $2,000 (80% x $2,500). At the other extreme is the possibility that the markup was 60%, and the cost of the items was $1,000 (40% x $2,500).

EXAMPLE

	Product A			Product B		
	Cost	Retail	Cost Percentage	Cost	Retail	Cost Percentage
Beginning Inventory	800	1,000		8,000	20,000	
Purchases	*5,600*	*7,000*		*28,800*	*72,000*	
Product A	*6,400*	*8,000*	80%	*36,800*	*92,000*	40%
Product B	*36,800*	*92,000*	40%			
Total (A plus B)	*43,200*	*100,000*	43.2%			

The retail method would use the cost percentage for the total goods, 43.2%, and apply it to the ending inventory.

Assume three different situations:

Situation Number	Ending Inventory at Retail	Cost Percentage	Cost of Ending Inventory
1	$2,000	43.2%	$864
2	2,000	43.2	864
3	2,000	43.2	864

The three situations all indicate the same ending inventory. Let us consider the following additional information relative to the product mixes and apply the cost percentages which are consistent with the specific product mixes.

Situation Number	Ending Inventory Product A	Ending Inventory Product B	Cost Percentage	Cost of Ending Inventory
1	2,000	-0-	80%	$1,600
2	-0-	2,000	40	800
3	160	1,840	43.2	864 *

* The $864 is equal to:

$$\begin{aligned} \$160 \times 80\% &= \$128 \\ 1{,}840 \times 40\% &= \underline{\ 736} \\ &\underline{\$864.} \end{aligned}$$

Only when the product mix of the ending inventory is the same as the product mix of the goods available for sale (situation 3) does the retail method give results comparable to the detailed computations. Where the product mix differs, the retail method may result in an overstatement of inventory (situation 2) or an understatement of inventory (situation 1). The overstatement of inventory results in situation 2 because only the high markup goods remain in inventory; thus too high a cost percentage is used. The understatement of inventory in situation 1 results because only the low markup goods remain in inventory and too low a cost percentage is being used to determine the cost of the ending inventory.

Thus the retail method is based on an averaging assumption that may not give reliable results. If the markups of all items being considered are the same, the reliability of the method is greater than where the markups are different. Also, in those situations where the product mix of the inventories is the same as the product mix of the units sold, the retail method will give reasonable results, at least as far as this one complication is concerned.

Markups and Markdowns

The cost percentage which we have used to convert the retail price to a cost basis is a ratio of the cost to the retail values of items available for sale. The next problem is to analyze the reasonableness of the inclusion or exclusions of markups and markdowns.

It is generally agreed that the inclusion of markups in computing the retail value is reasonable. If markups were excluded from the retail value, the cost would be assumed to be equal to the retail value, and this is obviously not a valid assumption. The main arguments center around the inclusion or exclusion of markdowns. In the previous illustration, it was assumed that the retail value was equal to the cost of the item plus the markups from cost. The possibility of there being markdowns was not considered. The practice of the retail store industry is to ignore markdowns in computing the cost percentage, but to apply the cost percentage to the retail value of the items,

which may be after markdowns. The justification offered for this procedure is that it approximates the lower of cost or market. Actually, there are stronger justifications for excluding markdowns than conservatism.

The presence of markdowns may indicate one or more conditions: the end of the season may be approaching and the store may not want to carry items in inventory for an entire year, the wholesale price of the item may have changed, the item may be damaged, the style may be changing, or many other reasons.

Let us first assume that the markdowns were caused by a desire to sell the items even at a loss (seasonal goods, damaged items, or items going out of style) and that the goods have been sold. The use of a cost percentage without inclusion of markdowns is reasonable.

EXAMPLE

	Cost	Retail	Cost Percentage
Beginning Inventory	6,000	10,000	
Purchases	30,000	50,000	
	36,000	60,000	60%
Markdowns	—	15,000	
	36,000	45,000	80%
Ending Inventory	840 *	1,400	

* Assume the ending inventory has been identified as to cost by reference to tags containing cost recorded in a code, and the cost is $840 (all goods on hand were marked up 40%, and there were no markdowns on hand).

The inventory may be computed using the cost percentage of 60%, excluding the markdown, or the cost percentage of 80%, including the markdowns.

$$60\% \times 1{,}400 = \$\ 840$$
$$80\% \times 1{,}400 = \$1{,}120$$

The cost percentage excluding the markdowns gives an inventory equal to cost, and the cost percentage including the markdowns gives an ending inventory in excess of its cost. This occurs because the ending inventory did not include goods which were reduced in price. Now let us assume the same facts except that the ending inventory, which cost $840, was recorded at $1,000, based on retail after markdowns, instead of $1,400. Part of the marked-down merchandise is still in inventory. Applying the cost percentages to the retail price of $1,000 gives:

$$60\% \times \$1{,}000 = \$600$$
$$80\% \times \$1{,}000 = \$800$$

Both of the cost figures computed by reducing the retail price to cost are lower than the cost. Arguments could be presented that either one was the present market value of the inventory. If there is evidence that the company marks goods up higher than they can be sold and then marks them down, the inclusion of the markdowns in computing the cost percentage is reasonable, since the normal retail sale for the company would be after markdowns.

From the above examples, several conclusions may be drawn. The inclusion of markdowns in computing the cost percentage would always result in a higher inventory valuation than the exclusion of markdowns. The exclusion of markdowns is theoretically correct when the items which were marked down no longer appear in inventory. When the items marked down still appear in inventory, the cost percentages are applied to the retail figure after markdowns, and we cannot say whether the inclusion or exclusion of markdowns is more reasonable unless we make a detailed study of each situation. We do know that the exclusion of markdowns in computing the cost percentages will result in a *lower* inventory than if they were included and will approximate the lower of cost or market.

The retail method will give good results in those situations where all goods sold have the same markups, where goods which are marked down are sold in the same period in which they are marked down, and where the cost percentage is applied to a retail inventory figure which is the result of a physical inventory. Where one or more of the factors is not present, the results of the retail method are less good and in some cases could actually be misleading. The retail method is based on averages, and where the situation is not average, the average does not apply. The story of the man who drowned in the river which had an average depth of 3 feet is old but valid.

ESTIMATING ENDING INVENTORY

A firm may have to prepare financial reports without having taken a physical inventory. This may occur when there has been fire which has destroyed the inventory and the amount of the fire loss must be determined. A more frequent situation is where monthly reports of income and financial position are desired but physical inventories are either not possible or convenient.

The procedure in either of these cases is to compute the cost percentage (the ratio of cost to the cost plus markups) and apply this percentage to the amount of inventory which should have been on hand, based on records of beginning inventory, purchases, and sales, with all three items expressed

at their retail values. In the determination of the retail value of the ending inventory, all markups and markdowns should be included.

EXAMPLE

Determination of retail value of the ending inventory.

Opening Inventory (retail)		$10,000
Plus:		
Purchases (cost)	$30,000	
Markups	20,000	
Markdowns	(5,000)	45,000
Retail Value of Goods Available for Sale		$55,000
Less:		
Sales		40,000
Ending Inventory (retail)		$15,000

Assuming a cost percentage of 60% (i.e., 30,000 divided by 30,000 + 20,000), the cost of the ending inventory may be assumed to be $15,000 x 60%, or $9,000. The accuracy of this figure will depend on the amount of marked-down goods still in inventory, the mix of the goods sold and on hand, the accuracy of the opening inventory and the records of purchases and sales, and the possibility of goods being removed from inventory by other means other than sales. When the above information is not available, it is necessary to use a variant of the above procedure to compute the ending inventory.

LIFO DOLLAR VALUE METHOD

Some manufacturing firms have the same types of inventory problems as retail firms, namely a large number of items in stock and a desire to use LIFO for income tax purposes. This has led manufacturing firms to adopt the LIFO dollar value method, which makes use of index numbers. Different price index series may be computed for different firms.

EXAMPLE

Price Index—Base Period	100
Price Index—December 31, 1960	150
Price Index—Average for the Year	125

The beginning inventory of the year was $100,000 on a LIFO basis (assume all the inventory was purchased during the base period). The ending inventory was $300,000, based on identified (or FIFO) cost.

Ending Inventory—Cost	$300,000
Factor to Convert to Base Dollars	$\times \frac{100}{150}$
Ending Inventory—Base Dollars	$200,000
Less: Beginning Inventory	100,000
Increase in Inventory—Base Dollars	$100,000
Factor to Convert to Year End Dollars	$\times \frac{150}{100}$
Increase in Inventory—Year End Dollars	$150,000
Plus: Beginning Inventory	100,000
Ending Inventory—Dollar Value LIFO	$250,000

Instead of converting the increase in inventory to year end dollars, using $\frac{150}{100}$, i.e., the year end price index in the numerator, we might have used $\frac{125}{100}$, i.e., the average index of the year in the numerator. Following this latter procedure, the LIFO inventory would be $225,000.

The prime difficulty with the LIFO procedure, implemented by using an index series, involves the computation of the price index as raw materials and finished products change. A firm may be using plastic as a raw material one year and an entirely new type of plastic the next; the price index may fail to take the change into consideration. An example of the basic method of computing price indexes is as follows:

Computation of Price Indexes

January 1, 1960

	Quantity (Q)	Base Period Unit Price (P)	P x Q
Product A	100	$1	100
Product B	200	$2	400
			500

December 31, 1960

	Quantity	Current Unit Price	P x Q
Product A	100	$2	200
Product B	200	$2	400
			600

Computation of Price Indexes (continued)

December 31, 1961

	Quantity	Current Unit Price	P x Q
Product A	100	$2	200
Product B	200	$3	600
			800

Price Index—January 1, 1960 = 100%

Price Index—December 31, 1960 $= \frac{600}{500} = 120\%$

Price Index—December 31, 1961 $= \frac{800}{500} = 160\%$

SIZE OF INVENTORIES

To buy and hold idle inventories costs money. There are storage costs, handling costs, interest charges, insurance expenses, property taxes, spoilage, obsolescence, etc. It has been estimated that the annual charges average about 25% of the cost of the inventory. The costs will vary with the characteristics of the inventory, but they will always be a significant amount. Thus the size of the inventories should be carefully controlled. There are scientific methods of determining the optimum inventory size, and these will be discussed in Chapter 27. It is important at this point to appreciate the facts that excessive inventories cost money and that inadequate inventories can mean lost sales and customer antagonism.

INVENTORY RESERVES

The term *inventory reserve* often appears in financial reports. This is unfortunate as well as unnecessary. There are no situations that cannot be handled without the use of these confusing accounts.

The "Reserve for Possible Price Decline" account has justly fallen into disrepute. The accepted theory is that price declines of the future cannot be forecasted or reported by the accountant in the present. This item is actually retained earnings and should be clearly indicated as such. Any asset may decrease in value or become worthless, but this is not justification for setting up

"reserves" for these contingencies. These reserves are subdivisions of total retained earnings and serve no useful function.

The "Reserve for Obsolescence" account is not necessary, since there is no reason why the inventory cannot be written down to reflect changing conditions. If, because of change, the inventory has decreased in value, this fact should be recorded by a debit to an expense account and a credit to inventory, not a credit to a nebulous reserve account.

The term *LIFO reserves* is even more cloudy than the other reserve accounts. There is no uniform agreement as to what is meant by the term, though it is occasionally used. It may refer to "secret retained earnings" arising from the understatement of inventory and the accompanying understatement of retained earnings. If there has been a price decline since switching to LIFO, then the LIFO reserve would in effect be a contra to the inventory account, writing it down to the current prices. It would actually be better to write the inventory down rather than use the confusing reserve account, which has a tendency to end up incorrectly on the equity side of the position statement.

QUESTIONS AND PROBLEMS

14-1 The Pond's Company

At the end of the calendar year, the Pond's Company's raw material inventory summary sheet consisted of the following items:

Material	Units	Cost per Unit *	Market Price per Unit
A	1,000	$ 8	$ 7
B	1,200	5	4
C	1,600	10	8
D	800	6	10

* Assuming a FIFO flow.

Required

(a) Using the "Cost or Market, Whichever is Lower" procedure, determine two possible valuations of the inventory.

(b) Assuming the December 31 balance (prior to adjusting entries) in the inventory account to be $34,800 prepare necessary journal entries to record the information obtained in part (a).

(c) Comment briefly on the use of the cost or market procedure.

14-2 The Curry Company

The Curry Company had a beginning inventory of 500 units priced at $10 each. During the week of April 1–7, the following transactions took place:

Date	Units Received	Sale Units	Sale Dollars
April 1	———	100	$2,000
April 2	———	150	3,000
April 3	———	—	—
April 4	600 @ $15	200	4,000
April 5	———	300	6,000
April 6	———	50	1,000
April 7	500 @ $16	400	8,000
		1,200	

Required

(a) Using a LIFO periodic inventory procedure, compute the "Cost of Goods Sold" for the week.
(b) Using a LIFO perpetual inventory procedure, compute the "Cost of Goods Sold" for the week.
(c) Repeat parts (a) and (b), assuming that a FIFO procedure is used.
(d) What journal entry is required if FIFO is used and a physical inventory of April 7 shows that there are 350 units on hand?

14-3 The ABC Company

The ABC Company's activities with regard to one of its products during 1965 were as follows:

Jan. 1	Beginning inventory: 20,000 lb. @ $1.00 per lb.
Jan. 15	Sales: 15,000 lb. @ $2.00 per lb.
Mar. 15	Purchases: 40,000 lb. @ $1.05 per lb.
June 30	Sales: 35,000 lb. @ $2.10 per lb.
Sept. 15	Purchases: 30,000 lb. @ $1.10 per lb.
Dec. 15	Sales: 15,000 lb. @ $2.15 per lb.
Dec. 15	Replacement cost was $1.10 per lb.

During 1966, the Company's activities with regard to the same product were as follows:

Jan. 15	Purchases: 30,000 lb. @ $1.10 per lb.
April 15	Sales: 35,000 lb. @ $2.15 per lb.
Sept. 16	Purchases: 20,000 lb. @ $1.15 per lb.
Dec. 20	Sales: 30,000 lb. @ $2.20 per lb.
Dec. 31	Replacement cost was $1.20 per lb.

Required

(a) The 1965 gross margin figure if FIFO has been applied on a periodic (or physical inventory) basis: [1] $_____
(b) The 1965 gross margin figure if LIFO has been applied on a periodic (or physical inventory) basis: $_____
(c) The 1965 cost of goods sold figure if LIFO has been applied on a continuous (or perpetual inventory) basis: $_____
(d) The 1965 cost of goods sold figure if the average cost procedure has been used: $_____

[1] Gross margin is the difference between sales and cost of goods sold.

(e) Will the ABC Company's cost of goods sold for the year 1966 be lower or higher under LIFO (periodic inventory) than it would have been under FIFO? Assume that the same method was used in both years.
1. How much higher or lower?
2. Explain why such relationship exists for the ABC Company in 1966.

14-4 The Rusty Steel Company

The Rusty Steel Company shifted to the LIFO method of accounting for inventory in 1929. At that time, the inventory of Type A-1 steel plate was 1,000 tons, with a cost of $100 per ton.

In 1932 the Company decided to continue using LIFO, but it also incorporated the "Cost or Market, Whichever is Lower" criterion. Cost was computed by using a LIFO assumption as to flow. At that time the inventory of Type A-1 steel plate was 2,000 tons, and the market value was $40 per ton (cost ranged from $50–$100 per ton). The following entry was made to write the inventory down to market:

Loss on Inventory Price Decline	$80,000	
Inventories		$80,000

From 1932 to 1964, inventories of Type A-1 steel plate increased each year, and the market value was never lower than $40 per ton. In 1964 the finished goods inventory of A-1 steel plate decreased to 500 tons. In 1964 a ton of steel plate of this type cost $200 per ton to produce (the market value was greater than $200).

Required

(a) Comment on the write-down of inventory in 1932 and the procedure used since then (LIFO plus Cost or Market).

(b) How would the income for 1964 be affected by the fact that inventory was decreased by at least 1,500 tons?

14-5 The Tompkins Manufacturing Company

The Tompkins Manufacturing Company's manufacturing overhead account was debited for $680,000 during the month of March. A review of the entries to the account disclosed the composition of the debits to be as follows:

Indirect Manufacturing Labor	$200,000
Indirect Manufacturing Supplies	100,000
Selling Expense (an allocation)	50,000
Cost Accounting Department Costs	40,000
Income Taxes (an allocation)	110,000
Factory Supervision	70,000
Advertising Expense	10,000
President's Salary (an allocation)	14,000
Shipping Expense	16,000
Material Handling Costs	20,000
Packing Costs	50,000
	$680,000

Required

(a) Analyze and adjust the manufacturing overhead cost account as necessary.

(b) Describe briefly a general rule for determining what costs of a manufacturing firm are inventoriable.

14-6 The James Manufacturing Company

During the month of January, the James Manufacturing Company's raw material account was debited for $450,000. A review of the entries to the account disclosed the composition of the debits to be as follows:

Material Purchased (gross price)	$400,000
Freight-in (including demurrage charges of $3,000)	12,000
Receiving Department Costs	20,000
Material Handling and Storage Costs	8,000
Allocation of Selling Department Costs	7,000
Shipping Department Costs	3,000
	$450,000

The Company follows a procedure of crediting a "Purchase Discount Revenue" account when purchase discounts are taken or lost. Terms of purchase are 2/10, n/30.

Required

(a) Analyze and adjust the raw material account as necessary.

(b) Describe briefly a general rule for determining what costs are to be considered as cost of material purchases.

14-7 The D. Jones Ship Company

The D. Jones Ship Company has received an order on July 1, 1964, to build a 110,000-ton tanker. The costs connected with obtaining the sale were $20,000, and these were all incurred in 1964. It is estimated that the tanker will take 24 months to build.

Required

How should the selling costs be treated? How should the costs connected with constructing the ship be treated? When should the revenue from the sale of the ship be recognized?

14-8 The D. Jones Ship Company (continued)

In 1945 the D. Jones Ship Company built a new type of tanker on speculation. The tanker was of a different type of construction, making use of cement rather than steel plate. The Company is carrying the cost of the ship in an inventory account (the ship is in dry dock), but as of 1964 it has been unable to sell the ship and has not built any further models. The inventory account for this ship includes the following items:

Cost of Construction	$2,000,000
Cost of Plans, etc.	200,000
Cost of Dry Dock and Maintenance	1,000,000
	$3,200,000

Required

Comment on the accounting treatment of the cost of the cement tanker.

14–9 The Ithaca Gas Company

The Ithaca Gas Company has a problem arising from the seasonal nature of its product. People use more gas in the winter to heat their homes and for cooking. This creates the problem of peak loads. The problem is made even more difficult by the fact that there are five or six exceptionally cold days each winter during which time the demand for gas increases tremendously. Rather than build pipe lines for the peak loads, the daily fluctuations are handled by the use of gas tanks. The peak loads created by seasonal demands have been somewhat solved by the use of underground storage. Gas is pumped underground under pressure during the summer and then used in the winter. Of the $10,000,000 worth of gas pumped underground during the first year of operating the underground storage, it is estimated that $7,000,000 will never be recovered (this amount of gas is required to build up the pressure so that gas may be taken out).

Required

Should the $7,000,000 be treated as inventory? Does a manufacturing firm have a similar problem?

14–10 From the following information, compute the cost of the ending inventory, using the retail method of computation.

	Retail Values
Beginning Inventory	$30,000
Purchases	70,000
Ending Inventory	20,000

The company has had no markdowns during the period and uses normal markup of 35% (the markup is computed as a percentage of the sales price).

14–11 From the following information, compute the cost of the ending inventory, using the retail method of computation.

	Cost	*Retail Values*
Beginning Inventory	20,000	$30,000
Purchases	50,000	80,000
Ending Inventory		20,000

The indicated retail values for purchases exclude markdowns of $10,000. The ending inventory of $20,000 is based on the retail price indicated on the sales tags and its after markdowns of $200.

14–12 From the following information, compute the ending inventory, using the conventional retail method of valuation.

Beginning Inventory (cost)	10,000
Beginning Inventory (retail)	15,000
Purchases (cost)	80,000
Markups to Purchases	55,000
Markdowns to Purchases	20,000
Ending Inventory (retail)	30,000

The ending inventory is indicated at retail. This is after markdowns of $500.

15

Notes and Interest

THE PROBLEMS OF recording interest-bearing debts due in less than one year are treated in this chapter. It is assumed that the interest is computed using an annual rate of interest and that it is not compounded during the year.

NOTES RECEIVABLE AND PAYABLE

The term *note* is used here in a generic sense to represent a written promise to pay made by the *maker* to the holder of the note, the *payee*. The amount is to be paid at some definite date in the future. To the maker of the note, the promise to pay is a "Notes Payable," and to the payee a "Notes Receivable."

Notes may come into being for various reasons. It may be that money is lent, that a note is accepted instead of an open account (accounts receivable), or that a note is accepted at the time of sale.

EXAMPLE: Issuance and Receipt of Notes

Maker			Payee		
Cash	$500		Notes Receivable	$500	
Notes Payable		$500	Bank		$500
To record the borrowing of $500			To record the lending of $500		
Accounts Payable	300		Notes Receivable	300	
Notes Payable		300	Accounts Receivable		300
A note is issued in payment of an open account			A note is accepted as payment of an open account		
Merchandise	200		Notes Receivable	200	
Notes Payable		200	Sales		200
Purchase of merchandise			A note accepted for the sale of the merchandise		

Computation of Interest

Notes usually indicate the rate of interest and a due date. If a due date is not specifically stated, then the life of the note is indicated (60-day note, one-month note, etc.). It is necessary to compute interest on the principal of the note in order to find the total amount to be paid at maturity.

The method of computing interest to be illustrated here makes use of the formula:

$$\text{Interest} = \text{principal} \times \text{interest rate} \times \frac{\text{number of days}}{\text{number of days in year}}$$

The interpretation of the formula is as follows:

(a) Multiply the principal by the interest rate to obtain the total interest for a year.
(b) Multiply the interest for a year by the fraction of a year with which we are dealing to obtain the amount of interest.

EXAMPLE

Compute the interest on \$1,000, assuming a 6% interest rate for half a year.

Amount of Interest for a year = \$1,000 × .06 = \$60
Amount of Interest for half a year = \$60 × ½ = \$30.

Problems arise in computing the fraction of a year. There are two choices:

Exact number of days divided by 365 days
Exact number of days divided by 360 days

The second procedure is frequently used because (1) it is simpler, and (2) it results in earning more interest for the payee of the loan. Because of the first reason, it will be used to illustrate computations in this chapter.

If a note is a two-month note, it will be due on the anniversary date two months hence. Thus a two-month note dated January 15 will be due March 15 (March 16 if March 15 is a Sunday or a holiday). A two-month note dated December 30 will be due March 1, since there is no February 30.

If the number of days are specified (such as a 60-day note), then the due date may be found by adding 60 days to the date of the note. Either the first or last day of the note is not counted in counting the number of days. Thus a 30-day note dated December 1 would be due December 31. The answer may be checked by subtracting 1 from 31. If the note dated December 1 were a 60-day note, it would be due January 30.

When a note is for a complete year, the amount of interest is the principal times the interest rate (the principal is *not* multiplied by $^{365}/_{360}$).

Entries for Interest

If the accounting period ends before the note has been collected or paid, then the accountant must accrue an appropriate amount of interest.

EXAMPLE

The ABC Company is the maker of a 90-day, 6%, $1,000 note dated December 1. Accrue interest on December 31 and record the payment on the due date to the payee of the note, the XYZ Company.

ABC COMPANY (Maker)			XYZ COMPANY (Payee)		
Dec. 1					
Merchandise	$1,000		Notes Receivable	$1,000	
Notes Payable		$1,000	Sales		$1,000
To record the issuance of the note			To record the sale and the receipt of the note		
Dec. 31					
Interest Charges	5		Interest Receivable	5	
Interest Payable		5	Interest Revenue		5
To accrue interest charges for 30 days			To accrue interest revenue for 30 days		
$\$1{,}000 \times 6\% \times \frac{30}{360} = \$5$					
Mar. 1					
Interest Charges	10		Cash	1,015	
Interest Payable	5		Interest Receivable		5
Notes Payable	1,000		Interest Revenue		10
Bank		1,015	Notes Receivable		1,000
To record the interest for 60 days and the payment of the interest and maturity value			To record the collection of interest and principal		

The preceding interest computation could have made use of the 6% rule. Six per cent (annual rate) is equal to *1% for 60 days*. Thus, to find the interest for 30 days, take 1% of $1,000 and divide by 2. To find the interest for 60 days, take 1% of $1,000. The 6% rule may also be used even if the interest rate is different from 6%, or if the number of days differ from 30 or 60. For example, if the interest rate is 3% and it is desired to compute the interest for 60 days, take 1% of the principal and divide by 2 (since the 3% interest rate is one-half of 6%). With a little practice, the 6% rule can be developed into a valuable tool. It is, of course, useful only when the assump-

tion has been made and accepted that there are 360 days in the year for purposes of computing interest.

Other paths may be followed to arrive at the same accounting objective of accruing interest. Therefore, it is probable that the reader may wish to make entries for interest in a different manner. This is not only allowable but even desirable, as long as they are made correctly. The check is to test alternative procedures against the interest charges (and revenues) accrued on December 31 and March 1 in the foregoing example. These should be the same, no matter what procedure is followed.

Some accountants follow a procedure of making "reversing entries" on January 1 for the interest accrual made on December 31. On March 1, an entry is made to interest charges for $15 (since there is a $5 credit resulting from the reversing entry, the net charge is $10). This procedure is correct and even has certain advantages from a bookkeeping point of view. The bookkeeper can be told to record the debit for all payments of interest to interest charges.

EXAMPLE: Reversing Entries (using data of preceding example)

	ABC COMPANY		XYZ COMPANY	
Dec. 31				
Interest Charges	$ 5		Interest Receivable	$ 5
Interest Payable		$ 5	Interest Revenue	$ 5
To accrue 30 days' interest; the interest charges would be closed to the income summary				
Jan. 1				
Interest Payable	5		Interest Revenue	5
Interest Charges		5	Interest Receivable	5
To reverse the entry made on December 31				
Mar. 1				
Interest Charges	15		Cash	1,015
Notes Payable	1,000		Interest Revenue	15
Bank		1,015	Notes Receivable	1,000
To record the payment of $15 interest and $1,000 of principal				

The interest charges for the second year are $10 (the sum of a debit of $15 and a credit of $5), which is logical, since $10 is 60 days' interest on $1,000 principal.

The computation of the maturity date was as follows:

Period	*Number of Days*
Dec. 1–31	30 *
Jan. 1–31	31
Feb. 1–28	28
Mar. 1	1 †
	90

* Not counting the first day.
† Counting the last day.

Noninterest-Bearing Note

Frequently a note will not bear an explicit rate of interest but will merely indicate the amount due at maturity. For example, a note dated December 1 may promise to pay $1,000 on March 1 of the next year. A mistake is frequently made by recording the note on receipt (or issuance) at its maturity value. This procedure ignores the fact that a $1,000 note due in 90 days is not worth $1,000 now. To properly record the transaction involving this type of note, it is necessary to determine the effective implicit rate of interest and to compute the present value of the maturity amount.

EXAMPLE

Assuming that the effective rate of interest for short term loans is 6%, what is the present value of $1,000 due in 60 days?

Let:

$$A = \text{present value of \$1,000 due in 60 days}$$

Then $1,000 is equal to A plus the interest on A dollars for 60 days. This may be expressed as follows:

$$\$1{,}000 = A + A\left(0.06 \times \frac{60}{360}\right) = A + A\,(0.01)$$

If A is factored out of the right-hand side,

$$\$1{,}000 = A\,(1 + 0.01) = 1.01A$$

Solving for A:

$$A = \frac{\$1{,}000}{1.01} = \$990.10$$

This amount of $990.10 is the present value of $1,000, assuming a 6% rate of interest. This may be checked by taking 1% of the $990.10 and adding it to $990.10 to see if $1,000 is obtained.

1% × $990.10 = $	9.90	Interest for 60 days
	990.10	Present Value
	$1,000.00	Maturity Value

Note that the amount of interest is 1% of $990.10 and not 1% of $1,000.

The general formula which is used in computations involving simple interest is:

$S = A + A\,(r \times t)$ or
$S = A\,[1 + (r \times t)]$.
S is the amount to be paid at maturity.
A is the present value of the amount to be paid at maturity; it is the amount borrowed.
r is the annual rate of interest.
t is the duration of the loan expressed as a fraction of a year.

Assuming the accrued rate of interest is 4%, and $30,000 is borrowed, how much will have to be repaid in 30 days?

$$A = \$30{,}000$$
$$r = .04$$
$$t = \frac{30}{360} = \frac{1}{12}$$
$$S = A\,[1 + (r \times t)]$$
$$= \$30{,}000\,[1 + (.04 \times \tfrac{1}{12})]$$
$$= \$30{,}000\,(1.00333) = \$30{,}100$$

Instead of a rate of "interest," banks frequently use a rate of "discount." This discount rate is applied to the maturity amount to compute the amount of discount or interest to be paid. If the bank discount rate is 6%, then the amount of interest will be $10 (which is 1% of $1,000) instead of $9.90, which is 1% of $990.10.

It would be an error to record the debt (or asset) as $1,000 at the time of the receipt of the note, since it is worth only $990.10 today (assuming a 6% rate of interest). With the passage of time, the value of the note will increase until it is worth $1,000 at maturity, but today it is worth less than $1,000. This assumes that a dollar today is more valuable than a dollar in the future. This is certainly a valid assumption as long as there is a positive rate of interest.

EXAMPLE

Assume that a note of the same characteristics as the note in the preceding example is issued for merchandise. Record the receipt of the note and payment at maturity.

ABC COMPANY

Merchandise	$ 990.10	
Notes Payable		$ 990.10
To record issuance of a $1,000 noninterest-bearing 60-day note		
Notes Payable	990.10	
Interest Charges	9.90	
Bank		1,000.00
To record payment of the note and interest		

XYZ COMPANY

Notes Receivable	$ 990.10	
Sales		$ 990.10
To record the receipt of a $1,000 noninterest-bearing note		
Cash	1,000.00	
Notes Receivable		990.10
Interest Revenue		9.90

It would also be possible to record the note and show the maturity value of the note as well as the present value. This procedure makes use of contra accounts.

ABC COMPANY

Merchandise	$ 990.10	
Notes Payable, Discount	9.90	
Notes Payable		$1,000.00
Notes Payable	1,000.00	
Interest Charges	9.90	
Notes Payable, Discount		9.90
Bank		1,000.00

XYZ COMPANY

Notes Receivable	$1,000.00	
Notes Receivable, Discount		$ 9.90
Sales		990.10
Notes Receivable, Discount	9.90	
Cash	1,000.00	
Notes Receivable		1,000.00
Interest Revenue		9.90

This second procedure does not have any real advantage over the first procedure, although it also is correct.

The use of the term "discount rate" to refer to the rate applied to the maturity amount by the bank is unfortunate. This is not a discounting procedure in the normal usage of the term. Normally the terms "rate of interest" and "discount rate" are used interchangeably, but when speaking of bank practices, the terms have different meanings. An interest rate is applied to the present balance, and a discount rate is applied to the maturity amount.

EXAMPLE

Assume \$100 is payable one year hence. Compute the present value of the \$100, assuming first a 6% discount rate (applied as a bank would apply it); then a 6% interest rate.

(a) 6% Discount rate
Amount of interest = $100 \times .06 = \$6$
Present value = $100 - 6 = \$94$

(b) 6% Interest rate
Let A equal the present value, then
$100 = A + .06\,A$

$$A = \frac{100}{1.06} = 94.34$$

To check the present value, \$94.34, we can compute the interest:

$$\text{Interest} = .06 \times 94.34 = 5.66$$

The initial amount plus the interest is equal to the maturity amount of \$100.

Notes Discounted

Company A may take its own note to the bank and have it discounted, or it may take a note for which it is payee (Company X, the maker) and discount it at the bank. The objective in both cases would be the raising of cash by Company A.

The bank computes the amount to be given to Company A, discounting the note by multiplying the maturity value of the note by the rate of interest (technically a discount rate) times the fraction of the year for which the note is being discounted.

EXAMPLE

Compute the amount of discount for a 60-day note with a maturity amount of \$1,500, if the *rate of discount* is 6%.

The bank will compute the amount of discount as follows:

$$\$1{,}500 \times 0.06 \times \frac{60}{360} = \$1{,}500 \times 0.01 = \$15$$

The company receiving the loan will receive \$1,500 minus \$15, or \$1,485. It should be noted that paying \$15 for the use of \$1,485 for 60 days is paying a higher rate of *interest* than 6%.

The company borrowing the money may record the transaction in either of two ways:

Bank	$1,485	
Notes Payable		$1,485

or

Bank	$1,485	
Discount, Notes Payable	15	
Notes Payable		$1,500

Either procedure is correct, for the "Discount, Notes Payable" is a contra liability account. Unfortunately this account is in practice usually mislabeled "Prepaid Interest," and it finds its way over to the asset side of the position statement. This is unfortunate and incorrect reasoning. Nothing has been paid by the borrowing company and will not be paid until the note is due.

If the company is not discounting its own note but the note of another company, then the series of entries is somewhat different. The simplest procedure is to consider the collection from the bank as being equivalent to the collection from the maker and therefore crediting notes receivable. Usually there is interest revenue to be accrued from the moment of receiving the note to the time of discount. The bank discount may be greater than the interest revenue which would have been earned if the note had been held to maturity, in which case it is necessary to debit a "Discount Cost" account.

EXAMPLE

Company A discounts a $1,000, 3%, 90-day note receivable of the XYZ Company dated October 1 at the bank on October 31. The bank discounts the note, using a discount rate of 6%. Make the entries on the books of Company A.

Oct.	1	Notes Receivable, XYZ Company	$1,000.00	
		Sales		$1,000.00
		To record the receipt of a note receivable and the sale		
	31	Interest Receivable	2.50	
		Interest Revenue		2.50
		To accrue interest for 30 days at 3%		
	31	Bank	997.42	
		Bank Discount Cost	5.08	
		Interest Receivable		2.50
		Notes Receivable, XYZ Company		1,000.00
		To record the discounting of the note at the bank		

The series of entries made to record the discounting of the note at the bank failed to note the fact that Company A is contingently liable to the bank until the note has been paid by the XYZ Company. This endorsement may be recorded in a footnote. An alternative procedure is to credit a "Notes Receivable, Discounted"

account when the note is discounted. When the XYZ Company pays the bank, Company A will make the following entry:

Notes Receivable, Discounted	$1,000	
Notes Receivable, XYZ Company		$1,000
To remove the asset and the contingent liability		

The proceeds of the discounting (the debit to bank) are obtained by multiplying the maturity value of the note ($1,007.50) by ($6\% \times {}^{60}\!/_{360}$), and subtracting this product from the amount of the note ($1,007.50).[1] The bank discount cost is the difference between what was received from the bank ($997.42) and what was given up ($1,002.50). The bank discount cost is probably overstated, and this overstatement arises because the asset "Notes Receivable" was overstated. If the note had an interest rate of 3% and the best rate of discount which the bank would give was 6%, then probably the note at time of receipt would not be worth $1,000. However, at the time of receipt, its worth was equal to its maturity value ($1,007.50) discounted back 90 days, using the effective rate of interest for this type of loan. If the effective rate of interest at that time had been actually 6%, then both the receivable and the sales would have been overstated when they were recorded at $1,000. This type of problem is analogous to the problem encountered when the note did not have an explicit rate of interest.

Calculation of the present value of the note, assuming a 6% rate of interest:

$$S = A + A(r \times t)$$
$$= A(1 + rt)$$
$$1{,}007.50 = A\left[1 + \left(.06 \times \frac{90}{360}\right)\right]$$
$$1{,}007.50 = A(1.015)$$
$$A = \frac{1{,}007.50}{1.015} = \$992.61$$

The entries on the books of Company A would be:

Oct. 1	Notes Receivable, XYZ Company	$1,000.00	
	Notes Receivable, Discount		7.39
	Sales		992.61
31	Interest Receivable	2.50	
	Notes Receivable, Discount	2.46	
	Interest Revenue		4.96
	($2.46 is one-third of $7.39)		
31	Bank	997.42	
	Notes Receivable Discount	4.93	
	Bank Discount Cost	.15	
	Interest Receivable		2.50
	Notes Receivable		1,000.00

[1] The note has 60 more days to maturity; thus the rate of discount (6%) is multiplied by ${}^{60}\!/_{360}$.

(the $.15 arises because the 6% is applied by the bank as a bank discount rate rather than an interest rate).

QUESTIONS AND PROBLEMS

15–1 The Jackson Company

On October 15 the Jackson Company received a 6%, 90-day, $1,000 note, dated October 15, from the Johnson Company as "payment" for a piece of equipment the Johnson Company had purchased. The note was paid when due.

The Jackson Company closes its books annually.

Required

Record the transactions in journal form.

15–2 The Johnson Company

Record the information given in Prob. 15–1 on the books of the Johnson Company.

15–3 The Judd Company

On December 16 the Judd Company sold a piece of equipment with a list price of $10,000 to the Jackson Company and accepted a noninterest-bearing note due in 90 days with a face amount of $10,000. The note was paid at maturity. Use 6% as the appropriate rate of *discount* (i.e., as if a bank discounted the note).

Required

(a) Record the transactions from the point of view of the Judd Company, including the year-end adjustments.

(b) Record the transaction from the point of view of the Jackson Company.

15–4 The Judd Company (See Problem 15–3)

Assume that the Judd Company immediately discounted the note of December 16 at the bank. The bank used a 6% rate of *discount*.

Required

Record the transactions from the point of view of the Judd Company.

15–5 The Jameson Company

Oct. 1	Borrows $1,000 from the bank on a 60-day 6% note.
Oct. 16	Gives a note to the Jansen Company in exchange for an open account. The note matures in 30 days, bears a 4% rate of interest, and is for $500 plus interest.
Nov. 15	The note issued to the Jansen Company is paid.
Nov. 30	The note issued to the bank is paid.
Dec. 1	Merchandise is purchased, and a note given for the invoice amount of $1,500. The note has a 6% rate of interest and is due in 90 days.

Dec. 16 A note is accepted from a customer in exchange for an open account of $5,000. The note is a 6% note and is due in 30 days.

Dec. 31 A $1,000, noninterest-bearing, 90-day note is accepted from a customer for a sale made on December 31.

Required

Record the above transactions, including adjusting entries required on December 31.

15–6 The Johnson Company

On December 1 the Johnson Company borrowed $5,000 from the bank on a 60-day, 6% note. It made the following entry:

Dec. 1	Bank	$5,000	
	Notes Payable		$5,000

On December 31 the company closed its books and made the following entry:

Dec. 31	Interest Charges	$25	
	Interest Payable		$25

On January 1 of the next year the accountant made the following entry:

Jan. 1	Interest Payable	$25	
	Interest Charges		$25
	To reverse the entry made on December 31		

Required

What entry should be made by the Johnson Company when the note is paid?

15–7 The Jevons Company

The Jevons Company received a loan from the City National Bank. The maturity amount of the loan is $1,000, but the bank discounts the maturity amount, using a rate of discount of 6%. The note is dated March 31, and it is due in 120 days.

Required

(a) Record on the books of the Jevons Company the issurance of the note and the payment at maturity. The Jevons Company closes its books on June 30.

(b) Record on the bank's books the issuance of the note and payment at maturity. The bank closes its books on June 30.

16

Stockholders' Equity

UP TO THIS POINT, the stockholders' equity section of the position statement has consisted of two accounts. In this chapter the number of accounts and divisions will be increased, but there will remain a basic subdivision between contributed capital and capital arising through the retention of earnings. Many of the subdivisions of accounts in this chapter serve no managerial function but are an outgrowth of legal requirements and accounting conventions.

PREFERRED STOCK

In an attempt to facilitate the raising of capital, a corporation will often issue preferred stock as well as common stock. The name "preferred stock" is used to describe stock of widely different characteristics but which have several basic differences from common stock. These are:

No voting privileges (though there are exceptions)
A fixed rate of return (the return is usually fixed in terms of the dollars per share to be paid; however, the corporation may decide not to pay any dividends)
In case of liquidation, the claims of preferred stockholders take precedence over those of common stockholders but are subordinate to the claims of all creditors

The preferred stock may also be "cumulative," that is, if the dividend is passed over, then the accumulated preferred dividends have to be paid prior to the declaration of a common stock dividend. It may be "participating," that is, after the common stock has received a certain amount of dividends, the preferred stockholders are again eligible for dividends. To determine the exact characteristics of preferred stock, it is necessary to review the specific contract of the issue being considered.

The equity of the preferred stockholders is classified in the stockholders' equity section of the position statement, although it should be separated from

the common stock equity. The preferred stock will generally have a par value which will determine the credit to the preferred stock account. If the amount contributed by the preferred stockholders is greater or less than par, then the difference should be recorded in a contra account or adjunct account.

EXAMPLE

Record the journal entries for the following situations:

(a) One thousand shares of preferred stock, par $100, is issued for $100 per share.

Cash	$100,000	
Preferred Stock		$100,000

(b) Same situation, but issued for $110 per share.

Cash	$110,000	
Preferred Stock		$100,000
Preferred Stock (amount paid in excess of par)		10,000

The "Preferred Stock, amount paid in excess of par" account is an adjunct account to preferred stock; in the position statement it should be added to "Preferred Stock."

(c) Same situation, but issued for $92 per share.

Cash	$92,000	
Preferred Stock, Discount	8,000	
Preferred Stock		$100,000

The discount account is a contra to the "Preferred Stock"; in the position statement it should be subtracted from "Preferred Stock."

(d) A dividend of $5 per share is declared.

Preferred Stock Dividends	$5,000	
Dividends Payable		$5,000

The debit is to an income distribution account and the credit to a current liability.

ISSUE OF COMMON STOCK

The issue of common stock and preferred stock is usually preceded by the subscription of the stock by the prospective stockholders. This transaction may be recorded, or the corporation may wait until the cash is actually received before recording entries relative to the issuance of the stock. If the subscriptions are recorded, the following series of entries will be made for the subscription and issue of common stock:

Subscriptions Receivable	$100,000	
Common Stock, Subscribed		$100,000
To record the subscriptions for 10,000 shares at a price of $10 per share		

Subscriptions receivable may be treated as an asset, but because of the large risk of uncollectibility, it should not be classified as a current asset.

Cash	$100,000	
Subscriptions Receivable		$100,000
To record the collection of the subscriptions		
Common Stock, Subscribed	100,000	
Common Stock, Outstanding		100,000
To record the issuance of the common stock		

Common stock may or may not have a par or stated value. The reasons why common stock should have a par value are related to the legal requirements of the various states, and the par value is the basis of taxing the issuance and exchange of stock. The accounting entries to record the issuance of common stock are more likely to be dictated by the legal requirements than by good accounting theory. Thus, instead of using one account to record the contribution of stockholders, we must use two accounts, one to record the par or stated value, and the other to record the difference between issue price and par, or stated value, of the stock. The danger in recording this transaction is that the amount paid in excess of par has a tendency to appear on financial statements as "surplus." This is misleading, since it may indicate to some that a firm is operating profitably even though it may be just beginning operations.

EXAMPLE

Record the journal entries for the following situations:

(a) One thousand shares of common stock, par $10, are issued for $11 per share.

Cash	$11,000	
Common Stock, Par		$10,000
Common Stock, Amount Paid in Excess of Par		1,000

(b) One thousand shares of common stock, par $10, are issued for $9 per share.

Cash	$9,000	
Common Stock, Discount	1,000	
Common Stock, Par		$10,000

"Common Stock, Discount" is a contra account to "Common Stock, Par."

(c) One thousand shares of common stock, *no par*, are issued for $9 per share.

Cash	$9,000	
Common Stock		$9,000

Acquisition of Assets

Common stock may be issued for assets other than cash; for example, land, buildings, and patents. It is the task of the accountant to ensure that the asset is correctly valued, that the entry recording the stockholders' contribution to the corporation is based on a realistic valuation of the assets contributed, and that the entry is *not* based on the par value of the stock. If the assets are given to the corporation without there being an issuance of stock, then the credit should be recorded as donated capital and should be actually part of the stockholders' equity. Here again, the main problem is to determine the real value of the assets contributed.

Building	$10,000	
Land	4,000	
Donated Capital		$14,000
To record the gift of land and building to the firm by the city of Able; both land and building are recorded at current values		

It is important to distinguish donated capital from retained earnings. The retained earnings account should only be used to record the past earnings which have been retained for use in the enterprise. For this same reason, capital arising from the adjusting of fixed assets to conform to current appraisal values should not be recorded to retained earnings. This situation is treated in greater detail in Chapter 33.

TREASURY STOCK

When a corporation purchases its own stock, the transaction is often recorded in the following manner:

Treasury Stock	$10,000	
Bank		$10,000
To record the purchase of 500 shares of common stock for $10,000		

The treasury stock account is then treated as a subtraction from the total of the other stock equity accounts (or is improperly treated as an asset). When a company purchases its own stock, from an economic point of view, it is retiring that stock, even though from a legal point of view, a share of stock once issued has different characteristics than a share of stock not previously issued (for example, it may be issued at a price less than par without the

purchaser being assessable for the difference between par and the purchase price). The foregoing entry to record the purchase of stock is not incorrect if the treasury stock account is treated as a contra stock equity account, but it may easily lead to faulty entries if the stock is reissued. Assume that the stock in the example is reissued for $15,000.

Cash	$15,000	
Treasury Stock		$10,000
Gain from Sale of Treasury Stock		5,000

This accounting procedure leads to the conclusion that there is a gain resulting from the issuance of shares of common stock. This may be misleading, especially if the gain is allowed to affect the operating income of the period. To avoid this series of entries, the following procedure should be followed when shares of the company's own stock are purchased:

1. Credit bank or cash.
2. Debit the common stock account for the par or stated value (or a proportionate amount of the account; for example, 1% of the balance if 1% of the stock is purchased).
3. Debit the "Amount Paid in Excess of Par Value" for a proportionate amount. If 1% of the stock is purchased, then this account should be debited for 1% of its balance *unless* a lesser amount is needed to balance the entry.
4. Debit the retained earnings account for the amount necessary to balance the entry.
5. If the stock is reissued, then record the transaction as if it were the issuance of stock which had never been issued.

EXAMPLE

The corporation purchases 500 shares of its own common stock (par $10) for $10,000. There are 50,000 shares outstanding. Relevant account balances before the recording of the transaction were:

Common Stock: $500,000
Common Stock: Amount paid in excess of par, $50,000
Retained Earnings: $120,000

Record the purchase of the stock for $20 per share and the subsequent issuance of the stock for $30 per share.

Common Stock	$ 5,000	
Common Stock, Amount Paid in Excess of Par	500	
Retained Earnings	4,500	
Bank		$10,000
To record the purchase of 1% of the outstanding shares, 500 shares of common stock, for		

\$10,000; the common stock is debited for \$5,000, or \$10 × 500; the amount in excess of par is debited for \$500, or \$1 per share

Cash	15,000	
Common Stock		5,000
Common Stock, Amount Paid in Excess of Par		10,000
To record the issuance of 500 shares of stock for \$30 per share; common stock is credited for par value, \$10, times the number of shares, 500		

There is a temptation to say that the corporation made a gain of \$5,000 speculating in its own stock. Would there have been a gain if the company had issued 500 shares of stock which had not previously been issued? In this case there would be no question but that a gain was *not* made. The question does arise, however, when the company purchases its own stock, since it is difficult to realize that if Company A purchases its own common stock, it is a transaction of a different nature than if it had purchased the stock of another company.

Treasury Stock—Legal Complications

In many states, corporations must restrict an amount of retained earnings when they purchase shares of their own stock. The following entries are used:

Treasury Stock	\$10,000	
Bank		\$10,000
To record the purchase of treasury stock		
Retained Earnings	10,000	
Retained Earnings, Restricted because of Purchase of Treasury Stock		10,000
To restrict a portion of retained earnings in conformance with legal requirements		

The second entry is designed to limit dividend or other distributions. It may or may not accomplish this end, its success depending on whether dividends are currently being determined by the amount of cash on hand or by the level of retained earnings. From a strict accounting point of view, the above entries can be improved. The purchase by a corporation of its own shares should be viewed as a reduction of common stock outstanding, a reduction in the account "Amount Paid in Excess of Par," and in some cases, a reduction in retained earnings. This procedure eliminates to some extent the necessity for an entry restricting retained earnings, since the appropriate stock equity accounts have already been reduced. On the other hand the rights of the creditors are safeguarded somewhat by the restricting of the retained

earnings, since the amount of capital which may be distributed to the stockholders is limited by the reduction of retained earnings.

DIVIDENDS

Dividends on stock are accompanied by a disbursement of corporation assets and are correctly interpreted as distributions of income. Stock dividends arise when the company, instead of distributing company assets, merely issues more shares of stock. Thus, if you held 100 shares of common stock and a 10% stock dividend was declared, you would have 110 shares after the dividend had been delivered. However, if you owned 1% of the company (1% of the stock) before the stock dividend, you would own 1% of the company (1% of the stock) after the dividend. It is true that you could sell 10 shares and still own 100 shares, but you would have sold a portion of your equity. You could have accomplished the same end before the dividend by selling a portion of your holdings.

There are two apparent reasons why corporations use stock dividends. If, in the opinion of the board of directors, the price of the stock is too high and is limiting the extent of distribution of the stock (a lower-priced stock would have a broader market), a stock dividend may be used to reduce the price of the stock. The larger number of shares outstanding will tend to reduce the price per share and may increase the number of people likely to buy it. A device called a stock split is also used to attain the same objective. With a stock split, the shareholders are given some multiple of the number of shares they presently hold. There is no economic difference between a stock split and stock dividend, although there is an accounting difference. A stock dividend is accompanied by a capitalization of retained earnings (some retained earnings is transferred to the account common stock and thus is not available for future dividends).

Stock dividends are also used to substitute for cash dividends. Where cash is short because results of operations have not been profitable enough for cash dividends, a stock dividend may act as a pacifier to the uninformed stockholder until cash dividends may be resumed. Actually, the retention of earnings and conserving of cash may be reasonable objectives. It is the confusion associated with and fostered by stock dividends which is undesirable.

The conclusion must be that a stock dividend has little significance, but that it can be recorded to conform to legal requirements by making the following journal entry:

Retained Earnings	xxxx	
Common Stock		xxxx

There is a problem in deciding the amount of retained earnings which should be capitalized (taken out of retained earnings and placed into capital stock). The general practice is to use the market value. Thus, if a stock dividend of 1,000 shares is declared and the market price of the stock is $6 per share, the following entry will be made:

Retained Earnings	$6,000	
Comomn Stock		$6,000

If the common stock has a par value, it will be necessary to credit the amount of the market price in excess of par to the account "Common Stock, Amount Paid in Excess of Par."

Some accountants prefer to capitalize an amount equal to the par value of the stock, and there has been considerable discussion as to whether par value or market value should be used. The amount selected will effectively limit the amount of retained earnings which may be distributed as cash dividends, and therefore the question may be of some importance.

RETAINED EARNINGS—RESERVES

It is not unusual to find that the retained earnings account has been debited and various reserve accounts credited. The result of this procedure is to scatter retained earnings throughout the equity side of the position statement and to hide retained earnings under various titles. This procedure should be avoided, for it accomplishes nothing more than creating confusion. It serves no function to identify a portion of retained earnings with a specific purpose, since such identification tends to imply that the remainder is not being used profitably. The simplest procedure is to eliminate all retained earnings reserves and to indicate somewhere in the annual report how the assets financed through retained earnings and other sources are being used.

Among the retained earnings reserves found in position statements are:

Reserve for Contingencies (the event has not occurred)
Reserve for Self-Insurance
Reserve for Possible Price Decline of Inventory
Reserve for Replacement of Plant
Reserve for Bond Sinking Fund

There are also "secret reserves" which directly understate retained earnings. Most commonly these are found in overstatements of asset valuation accounts (for example, excessive allowances for depreciation or allowances for uncollectible accounts). They are also found in the overstatement of a liability

account or an understatement of an asset account. When the secret reserves are discovered, they should be eliminated. The function of accounting is to act as a means of communicating, not of hiding information.

STOCKHOLDERS' EQUITY SECTION OF THE POSITION STATEMENT

The stockholders' equity section of the position statement generally leads off with preferred stock, then the explicit contribution of the common stockholders, and finally the retained earnings. Any contra or adjunct accounts should be placed immediately under the primary account which they adjust. For example, discount on preferred stock should be a subtraction immediately below the preferred stock par amount.

Special items, such as donated capital or reserves which are truly retained earnings, may be placed toward the bottom of the section.

ILLUSTRATION

Arrange the following items as they might appear on a position statement:

Common Stock, Par Value $10 (10,000 shares outstanding)	$100,000
Common Stock, Amount Paid in Excess of Par	7,000
Preferred Stock, Par $50 (1,000 shares outstanding)	50,000
Preferred Stock, Discount	(4,000)
Retained Earnings	39,000
Donated Capital	10,000

The following represents the stockholders' equity section of a position statement:

Stockholders' Equity

Preferred Stock, 1,000 shares of par $50 stock outstanding		$ 50,000	
Less Discount on Preferred Stock		4,000	
Preferred Stock Equity			$ 46,000
Common Stock, 10,000 shares of par $10 stock outstanding	$100,000		
Common Stock, Amount Paid in Excess of Par	7,000	$107,000	
Retained Earnings		39,000	
Donated Capital		10,000	
Common Stock Equity			156,000
Total Stockholders' Equity			$202,000

REORGANIZATIONS

If a corporation is reorganized, there is the problem of whether to carry forward the balance in the retained earnings account. This is particularly relevant if there is a debit balance in the account, indicating operations had been unprofitable. If the company has been completely reorganized, the management changed, and new shares of stock issued, then there will be little objection to the new company starting out without the burden of a recorded deficit. The deficit should be eliminated by entries first to the account "Amount Paid in Excess of Par Value" and then to the common stock account. This may be accompanied by a reduction in the par value of the stock. In no case should retained earnings be created by the reduction of the par value of the stock. The creation of retained earnings in this manner should not be allowed even if there has been a true reorganization and not just an attempt to eliminate a deficit.

EXAMPLE

The ABC Company is being reorganized. The account balances are as follows:

Common Stock	$100,000
Common Stock, Amount Paid in Excess of Par	20,000
Retained Earnings (debit balance)	15,000

It is decided to issue no par stock to the present stockholders and to eliminate the deficit. Record the journal entries.

Common Stock, Par	$100,000	
Common Stock, Amount Paid in Excess of Par	20,000	
Retained Earnings (deficit)		$ 15,000
Common Stock, No Par		105,000

POOLING OF INTERESTS AND PURCHASES

If Company A acquires Company Z, then the retained earnings of Company Z may or may not be recorded on the books of Company A. There are three possible interpretations of the transaction:

1. Pooling of interests
2. Purchase
3. New corporation

If the shareholders of both corporations become shareholders of the new corporation, then the transaction may be treated as a pooling of interests. The accounts of the two corporations are merged, and the retained earnings of both corporations are carried forward. Specific asset or equity accounts may be adjusted to place them on a uniform or reasonable basis.

The merger may be treated as a purchase if all or most of the ownership interests of the acquired corporation are diminished. The acquiring corporation may become liable for the liabilities of the other corporation and acquires the assets. If the purchase price is different than the sum of the value of the tangible assets less the liabilities, there will be reason to record goodwill. Only the retained earnings of the surviving corporation is carried forward.

An alternative treatment would be to consider that the two old corporations cease to exist and that a new corporate entity is created; thus the retained earnings balance of the new corporation is zero. This latter treatment is theoretically sound, but it is less likely to be found than the treatment which continues to record the retained earnings of one or both corporations.

EXAMPLE

COMPANY A		COMPANY X	
Assets	$10,000	Assets	$5,000
Common Stock	$ 4,000	Common Stock	$3,000
Retained Earnings	6,000	Retained Earnings	2,000
	$10,000		$5,000

Record the acquisition of Company X by Company A, assuming that it is treated as:

(a) An acquisition of assets.
(b) A pooling of interests, with the retained earnings of both companies shown.
(c) A merger, with the new company considered as a new corporate entity.

Company A gave Company X stockholders 100 shares of no par stock for the assets of Company X. The stock has a market value of $50 per share.

(a)	Misc. Asset Accounts	$ 5,000	
	Common Stock		$ 5,000
	This entry assumes that the assets are worth $5,000; recorded on the books of Company A.		
(b)	Misc. Asset Accounts	5,000	
	Common Stock		3,000
	Retained Earnings		2,000
	This entry also assumes that the assets are worth $5,000; recorded on the books of Company A.		

(c)	Misc. Asset Accounts	15,000	
	Common Stock		15,000
	To set up the accounts of the new corporate entity; no retained earnings are recorded because the company is considered to be without previous operating experience.		

Which of the given procedures is the best? The answer must depend on the facts of the individual situation. Recording the retained earnings of the acquired corporation on the books of the surviving corporation is inconsistent with the "entity" convention.

RETAINED EARNINGS

The presence of retained earnings does not mean that there is an equal amount of cash on the asset side of the position statement. Retained earnings represent a portion of the stockholders' share in the total assets. There may or may not be a penny of cash. The retained earnings cannot be identified with a specific asset or group of assets.

EXAMPLE

ABZ COMPANY

Position Statement
as of December 31, 19—

Cash	$10,000	Capital Stock	$ 6,000
		Retained Earnings	4,000
	$10,000		$10,000

In the foregoing position statement, the cash is actually greater than the retained earnings. If the company then buys $10,000 of fixed assets, the position statement becomes:

Cash	$_____	Capital Stock	$ 6,000
Fixed Assets	10,000	Retained Earnings	4,000
	$10,000		$10,000

The retained earnings are unchanged, but they are $4,000 greater than the cash balance, which is now zero.

RECORDING THE STOCKHOLDERS' EQUITY—DECISION-MAKING

Historically, accountants have attempted to distinguish between the stockholders' explicitly contributed capital (where there has been an issue of stock) and capital generated from retained earnings (contributed capital that does not require an explicit decision by the individual stockholders). This distinction serves several purposes. It indicates to some extent the past profitability of the corporation, although this indication is confused by cash dividends, stock dividends, reorganizations (real and quasi), secret reserves, disclosed reserves, mergers, and spin-offs (the opposite of mergers). The second purpose behind the distinction is somewhat easier to accomplish. It is the fulfillment of legal requirements requiring a separation of contributed capital and retained earnings. The main functions of this latter requirement are to safeguard the rights of the creditors and to prevent the declaration of dividends when the declaration will endanger the ability of the creditors to collect.

As stated before, we must know the amount of retained earnings in order to know if a dividend can be legally declared (though in special cases dividends can be declared even though the retained earnings are zero or negative; for example, liquidating dividends). Somewhat analogous to the legal requirement are the requirements written into bond contracts which specify that a certain balance of retained earnings cannot be available for dividends. This is tackling the problem through the back door (since dividends are paid and debts are retired with cash), but in certain cases these restrictions may effectively limit the amount of dividends which can be paid.

Are there other managerial decisions which rely on the classification of accounts in the common stockholders' equity section? The answer is "no." From a managerial point of view, the various distinctions between "Common Stock," "Amount Paid in Excess of Par," "Retained Earnings," etc., are of little value; in fact, they may be harmful, because they add to the confusion concerning accounting.

QUESTIONS AND PROBLEMS

16-1 The Liberty Company

The Liberty Company was organized on January 2, 1966, with stock authorized as follows:

	Number of Shares	*Par*
4% Preferred Stock (cumulative, nonparticipating)	100,000	$100
Common Stock	1,000,000	20

The following transactions took place during the years 1956 and 1957.

1966

Feb. 1 Issued 500,000 shares of common stock at a price of $22 per share.

Apr. 1 Issued 40,000 shares of preferred stock at a price of $105 per share, the shares to bear dividends starting April 1.

July 1 Dividend of $1 per share declared and paid to holders of the preferred stock.

Aug. 15 Issued 100,000 shares of common stock at a price of $25 per share.

Aug. 16 Issued 10,000 shares of common stock for land, building, and equipment owned by a Mr. R. F. Jones. Mr. Jones also received $50,000 cash. The land has an appraised value of $80,000.

Aug. 31 The company received a gift of land from the city of Irvington. The land is to be used as a parking lot adjacent to the property obtained from Mr. Jones. The land has an appraised value of $40,000.

Dec. 31 The company's operations for the year were profitable. There was a profit of $300,000 (debit miscellaneous assets). Despite the profitable operations the board of directors decided not to declare dividends on either the preferred or common stock.

1967

May 12 The board of directors decided to begin a bonus plan for executives. In view of this decision, it was decided to purchase some of the outstanding common stock, which was to be given to executives as a bonus.

May 15 The company acquired 1,000 shares of common stock at an average price of $22 per share. State law requires a restriction of retained earnings when common stock is acquired.

June 30 One-half of the 1,000 shares of stock acquired on May 15 were reissued at a price of $28 per share.

July 1 Dividends of $4 per share are declared and paid on the preferred stock. This covers the period July 1, 1966, to July 1, 1967.

Dec. 15 Dividends of $1 per share are declared on the common stock, payable on January 15, 1968. The regular dividend on the preferred stock is declared, payable on December 31, 1967.

Dec. 31 The preferred stock dividend is paid. The operations for the year resulted in a profit of $1,200,000 (debit Miscellaneous assets).

Required

Record the above transactions in journal form.

16-2 The Quasi Corporation has been operating for a period of years, and during the period 1945–56 incurred a large operating deficit. Despite this fact the cash position of the firm was good, since the management had reduced the scope of the company's operations. In view of these facts, the board of directors is considering resuming cash dividends. The operations during 1957 have been profitable, and orders on hand indicate a profitable 1958.

The stockholders' equity section includes the following accounts:

	Balance Dec. 31, 1957
Common Stock, Par $20	$20,000,000
Common Stock, Amount Paid in Excess of Par	5,000,000
Retained Earnings (debit balance)	9,000,000

It is decided to issue no par stock to the present stockholders and to eliminate the deficit. The following journal entry was made on December 31, 1957.

Common Stock	$20,000,000	
Common Stock, Amount in Excess of Par	5,000,000	
Common Stock, No Par		$15,000,000
Retained Earnings		10,000,000

Required

Comment on the procedure followed. Prepare an adjusting entry if you think one is required. Explain any entries you make.

16-3 In 1964 the Octopus Corporation acquired 100% ownership of the Smith Corporation by issuing 200,000 shares of common stock. At the time of acquisition, the position statements of the two corporations were as follows:

	The Octopus Corporation	*The Smith Corporation*
Assets	$100,000,000	$20,000,000
Liabilities	$ 60,000,000	$ 1,000,000
Common Stock	25,000,000	4,000,000
Retained Earnings	15,000,000	15,000,000
	$100,000,000	$20,000,000

Required

(a) Prepare journal entries to record the acquisition, assuming the Smith Corporation ceases to exist as a separate corporate entity.

(b) Show the position statement of the Octopus Corporation after the acquisition.

16-4 In 1964 the Octopus Corporation acquired the Magnum Corporation by issuing 1,000,000 shares of stock. The Octopus Corporation has varied operations. The Magnum Corporation has operated entirely in the movie industry. At the time of acquisition, the position statements of the two corporations were as follows:

	The Octopus Corporation	*The Magnum Corporation*
Assets	$160,000,000	$150,000,000
Liabilities	$ 90,000,000	$ 50,000,000
Common Stock	54,000,000	40,000,000
Retained Earnings	16,000,000	60,000,000
	$160,000,000	$150,000,000

Required

(a) Prepare journal entries to record the acquisition. Briefly explain the entries.

(b) Show the position statement of the Octopus Corporation after the acquisition.

16-5 The Carter Company

The Carter Company was organized on January 2, 1964, with stock authorized as follows:

	Number of Shares	*Par*
4% Preferred Stock (cumulative, nonparticipating)	100,000	$100
Common Stock	1,000,000	10

The following transactions took place during the years 1964 and 1965:

1964

Feb. 1 Issued 400,000 shares of common stock at a price of $12 per share.

Apr. 1 Issued 40,000 shares of preferred stock at a price of $110 per share.

July 1 Dividend of $1 per share declared payable to holders of the preferred stock.

July 10 Paid the dividend declared on July 1.

Aug. 18 Issued 100,000 shares of common stock at a price of $15 per share.

1965

Sept. 15 The Company acquired 10,000 shares of its own common stock at an average price of $12 per share. State law requires a restriction of retained earnings when common stock is acquired.

Oct. 1 The Company issues 2,000 shares of the stock acquired on September 15 at a price of $16 per share.

Required

Using journal entries, record the above transactions.

16-6 The common stockholders' equity of a corporation is equal to the sum of the accounts recording the capital received from stockholders, the retained earnings, and various miscellaneous stockholders' equity items such as "Surplus Arising from Appraisal" or "Donated Capital." The common stockholders' equity

is also equal to the total assets minus total liabilities and the preferred stockholders' equity. Despite the fact that these equalities are valid, it is frequently impossible to take a statement of financial position as prepared by the accountant and to compute a significant figure to represent the equity of the common stockholders.

Required

Explain the last sentence of the problem.

16–7 The position statement of the Dupy Corporation shows a retained earnings balance of $3,500,000. An analysis of the account revealed the following:

Analysis of Retained Earnings

Arising from past earnings	$2,500,000
Donation of land by the city	600,000
Amount paid in excess of par value of preferred stock	100,000
Gain on sale of treasury stock	180,000
Amount paid in excess of par value of common stock	120,000
	$3,500,000

Required

Comment on the amount shown as retained earnings.

16–8 Explain why it is possible for a corporation to have retained earnings of several million dollars while not being able to expand plant facilities by one million dollars without raising additional capital.

16–9 Commonwealth Edison Company [1]

Commonwealth Edison Company announced yesterday a new dividend policy under which it would distribute "approximately the full amount of the company's earnings" each year.

In a letter to stockholders the big Chicago utility said that directors would vote on the plan at their Sept. 12 meeting. Willis Gale, chairman, said that in the meantime the board had authorized him to announce "their intention to declare a 2 per cent stock dividend payable later this year in addition to continuing the present base quarterly cash dividend of 50 cents a share."

Dividends Would Grow

This would bring 1958 payments to $2, plus the 2 per cent stock dividend.

He called the stock payment "an annual supplementary stock dividend." He also said he believed Commonwealth Edison to be the only company ever to pay dividends on a schedule that would approximate earnings.

Mr. Gale said that the new policy had these aims:

> To better adapt payments to "the varying circumstances of different stockholders" by allowing those who wish to convert to cash and by providing others with a portion of their dividends free from taxes.

[1] The above news item is reproduced with permission from the New York Times of September 3, 1958.

To make Commonwealth stock, "through dividend flexibility," attractive to more investors.

To enable the utility, "without disadvantage to our stockholders, to retain and reinvest in the business a higher percentage of our earnings than we would retain under our past dividend policy * * * help us to finance our expansion program and cut down, if not eliminate, the need for periodic offerings of additional common stock."

In operation the new plan would work as follows: stock would be issued each year for approximately the full amount of the company's earnings on common stock in excess of base cash dividends. The number of shares distributed would be determined by dividing the amount of available earnings, as estimated at the time of the declaration of the stock dividend, by the market price at that time. A workable fraction would then be selected to leave some margin of undistributed earnings.

Commonwealth Edison also announced that it had filed yesterday with the Illinois Commerce Commission a petition seeking authority to issue the necessary stock for the 2 per cent dividend.

Mr. Gale told holders that "everything considered (they) should share about the same under the new plan as they would if we were to continue our past all-cash dividend policy."

He said that if the plan did not succeed, it would be "modified or discontinued."

Required

Discuss the new policy of the firm.

16–10 The 1957 annual report of the Johns-Manville Corporation contained the following note:

Reserves for contingencies, etc., include:

	December 31	
	1957	*1956*
Reserve for workman's compensation self-insurance	$ 425,000	$ 425,000
Reserve for retired employees' group life self-insurance	604,674	465,602
Reserve for product guarantees	633,992	711,751
Reserve for contingencies	7,661,910	7,661,910
	$9,325,576	$9,264,263

Required

Comment on the accounting for reserves.

16–11 The following statement was contained in the 1957 report to shareholders of the First National City Bank of New York and the City Bank Farmers Trust Company.

Unallocated reserves, which are deducted from loans and investments in our Statement of Condition, . . . built up by setting aside regularly a percentage of gross operating earnings. The total includes approximately $96,000,000 in the statutory "Bad Debt" reserve, which was increased during the year by $12,000,000. About half of the increase represents the related tax saving, since transfers to this reserve, to provide a cushion for possible future credit losses, are deductible from income for Federal tax purposes.

Required

Explain the meaning of the paragraph in your own words.

16–12 The 1957 annual report of the F. W. Woolworth & Co. included $30,880,118 as an asset titled "F. W. Woolworth & Co., Limited, England." The following was a note to the balance sheet.

Note B—Investment in F. W. Woolworth & Co., Limited, England:

The company owns 52.7% of the outstanding ordinary shares of F. W. Woolworth & Co., Limited, England. Based on published consolidated financial statements of the English company, the American company's equity in the net assets at December 31, 1957, converted into dollars at the rate of exchange on that date, amounted to $87,860,000, or $56,980,000 in excess of the carrying value of its investment. The aforementioned amounts include $22,333,700 which arose in 1957 as a result of the English company writing up its freehold and leasehold properties on the basis of an appraisal. Using the closing quotation on the London Stock Exchange on December 31, 1957, the ordinary shares owned by the American company had an aggregate market price of $403,583,000 which is not represented to be realizable value. The company's equity in consolidated net income of the English company for the year 1957, converted at the rate of exchange on December 31, 1957, amounted to $16,026,600, and dividends received therefrom totaled $11,421,251 net of taxes withheld.

The income statement reported the $11,421,251 of dividends as income.

Required

Comment on the accounting procedures followed.

16–13 The 1961 Annual Report of the Basic Products Corporation included the following statement:

Cash Requirements

Your Company's requirements for the employment of cash in its own business are expected to increase substantially in the period ahead. Internal expansion of product lines and facilities, such new acquisitions as may be made, the stepped-up research program, and other activities related to our growth anticipations will, as is normal, create this greater need.

In the past your Company has distributed liberal cash dividends to its

holders of common stock. Your management feels that the cash dividend policy for the immediate future should be re-evaluated in view of the changed character of the Company which affords opportunity for greater growth.

Your Company's management is therefore recommending to the Board of Directors that for the present the dividend policy be changed from a straight cash dividend of $1.20 per year to one of $.80 in cash and 2% in common stock per year. It further recommends that the change be made after payment of the October 1961 quarterly dividend at the present rate of $.30. In January 1962 the quarterly rate would be reduced to $.20 and at that time the 2% stock dividend for the 1962 fiscal year would be paid in full.

This policy, if adopted, will provide the Company with additional cash for use in the business and create potential for the increase in value of the stockholders' equity.

Required

Comment on the statement and the policy.

16-14 The 1961 Annual Report of the Anaconda Company contained the following note to the financial statements:

Note G—Property, Plant and Equipment

(a) Property, plant and equipment are included in the Consolidated Balance Sheet on the basis of cost to the consolidated group either in cash or in stock of the parent company at par value.

Buildings, machinery and equipment are depreciated over their estimated useful lives, using the unit-of-production, straight line, and other methods appropriate to the various operations. The remaining estimated lives used in depreciation computations are subject to periodic review, and are revised when necessary to conform to current forecasts of the economic life of individual properties or assets.

No representation is made that the values at which property, plant and equipment are carried in the Consolidated Balance Sheet indicate current values.

(b) As required by the United States Treasury Department, valuations as of March 1, 1913 of mining properties then owned, determined for depletion purposes in connection with Federal income taxes, have been recorded on the books but these values have not been reflected in the published accounts of the Company.

The Company and its subsidiaries have consistently followed the practice of publishing their accounts without deduction for depletion of metal mines, and no such deduction is included in these financial statements.

Depletion based on cost of timber lands and phosphate and sulpur deposits has been deducted from income in these financial statements and also from the cost basis shown in the Consolidated Balance Sheet.

The 1961 Annual Report of the Kennecott Copper Corporation contained the following note:

Mining Properties:

Over the years the ore reserves have increased as a result of development work and improvements in methods of recovery of metals which make possible the treatment of lower grades of ore. Accordingly, no provisions for depletion have been considered necessary.

Required

Comment on the accounting procedures described above.

17

Compound Interest, Annuities, and Related Accounting Problems

MONEY HAS VALUE. This is a familiar statement with which few people would argue. To have $5 may be good, but to have $10 is better. The problem of comparing the relative desirability of having $5 or $10 would be complicated, however, if the choice were between:

1. Having $5 today
2. Having $10 ten years from today

Which is the better choice? Obviously there is no one answer to the alternatives as stated. To some people, having $5 today is worth more than the prospect of having $10 ten years from today. If, on the other hand, you have no pressing need for the money now, the prospect of twice as much money in the future may be more desirable. How can this decision be solved scientifically? The problem cannot be solved with certainty in all cases, but in the majority of cases a cost or value of money may be assumed. This cost is expressed as a rate of interest. If the rate of interest is known, the present value of $10 due ten years from today may be computed by making use of a formula. Comparing the present value of the $10 with the $5 which may be received today gives the answer as to which is the more desirable alternative. Change the rate of interest, or the number of periods, and the answer may be different.

There are four types of problems that are basic to the study of compound interest (compound interest refers to the procedure of computing interest on *interest and principal*):

1. The present value of a dollar or a sum of money due at the end of a period of time. *Example:* What is the amount owed now, if you have to pay $1,000 in four years?
2. The future value of a sum of money. *Example:* If you deposit $1,000 today, what will be the worth of your bank account in four years?

3. The present value of a series of *equal* payments due at the end of each period. *Example:* Your annuity promises to pay you $1,000 a year for ten years. How much is the annuity worth today?
4. The future value of a series of equal payments to be paid at the end of each period. *Example:* If you deposit $1,000 a year for ten years, how much will you have at the end of the ten-year period?

The remainder of this chapter is devoted to evolving general formulas and solving problems like the four types given here. Mathematical formulas are used, but the mathematics is all of a low level of difficulty. While all the problem types enumerated may be solved by the use of tables (if tables are available), the correct application of the tables is somewhat more ensured if the person solving the problem has a working knowledge of the mathematics on which the tables are based.

In a previous chapter, the terms "interest rate" and "discount rate" referred to different computations. The discount rate was applied to the maturity amount of a loan by a bank to find the amount of interest. In this chapter (and generally in the literature on decision-making), the terms interest rate and discount rate are used interchangeably. Only in those cases when a bank loan is involved might the term discount take on the special meaning.

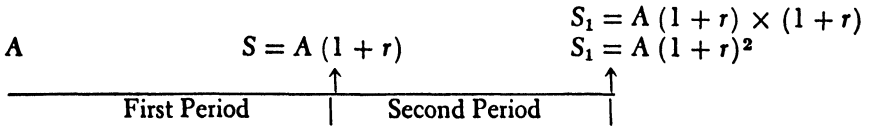
FUTURE WORTH OF A SUM OF MONEY

If you have a sum of money, A, today, how much will you have at the end of one interest period if the rate of interest is r? At the end of one period, you will have the original amount, A, plus the interest earned on A. If the amount to which A has accumulated is designated by S, then

$$S = A + Ar$$
$$S = A(1 + r)$$

The factor $(1 + r)$ is called the *accumulation factor*. If the value of S at the end of the second period is desired, then S or $A(1 + r)$ must be accumulated for one more period. This is accomplished by multiplying the "amount," S, by $(1 + r)$, the accumulation factor. Let S_1 equal the amount of A accumulated for two periods; then

$$S_1 = A(1 + r) \times (1 + r) = A(1 + r)^2$$



To find the amount S of a sum of money A for one period, the accumulation factor was raised to the first power; to find the amount S_1 of a sum of money A for two periods, the accumulation factor was raised to the second power. This analysis, carried far enough, will lead to the general equation for finding the amount of a sum of money:

I $$S = A\,(1 + r)^n$$

Where S = the future worth of a sum of money A
A = the sum of money which will accumulate to a value of S
r = the rate of interest
n = the number of periods

If A is equal to \$1, then the equation becomes

II $$S = (1 + r)^n$$

S in this equation is the future worth of *\$1* compounded at r rate of interest for n periods. S can be found in tables or can be computed.

If instead of \$1 the sum being accumulated is A, then it is necessary to multiply the future worth of \$1 by A. This is Equation I:

$$S = A\,(1 + r)^n$$

The future worth of A dollars can be expressed in a line diagram as follows:

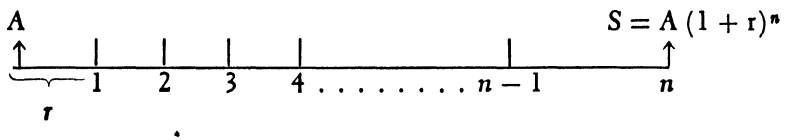


TABLE 17-1

$S = A\,(1 + r)^n$
The Future Worth of a Dollar

n/r	3%	3½%	4%
1	1.0300	1.0350	1.0400
2	1.0609	1.0712	1.0816
3	1.0927	1.1087	1.1249
4	1.1255	1.1475	1.1699

Note that as n increases, with r constant, S increases, and that as r increases, with n constant, S increases. The longer the period or the higher the interest rate, the greater the amount accumulated.

EXAMPLES

(a) Find the accumulated value of \$1 at the end of 4 years if interest is earned at the rate of 4%.
Answer: $S = 1.04^4 = \$1.1699$.

(b) Find the accumulated value of \$1 at the end of 2 years, if interest is compounded semi-annually and if interest is earned at the rate of 3% every half-year.
Answer: $S = 1.03^4 = \$1.1255$. (Note that n is equal to 4, the number of times the interest is compounded.)

(c) If Mr. Johns deposits \$100 in a bank which is paying 3.5% interest compounded annually, how much will he have at the end of 4 years?
Answer: $S = \$100\ (1.035)^4 = \$100\ (1.1475) = \$114.75$.

(d) What is the interest, I, earned in Probs. (a), (b), and (c)?
1. Interest is \$ 0.1699.
2. Interest is \$ 0.1255.
3. Interest is \$14.75.

(e) In terms of S and A, to what is I equal?
Answer: $I = S - A$; if A is \$1, then $I = S - 1$.

PRESENT WORTH OF A SUM OF MONEY

The preceding section developed the tools for computing the future worth of a sum of money (\$1 deposited will accumulate to how much in n periods at r rate of interest?). In terms of the equation used, the unknown was S, with A, r, and n known.

This section is concerned with the problem of computing how much has to be deposited in order to have \$1 (or S dollars) in n periods at r rate of interest. We know the values of S, r, and n, and are interested in finding the unknown A. We do this by using Equation I.

$$S = A\,(1 + r)^n$$

Dividing both sides by $(1 + r)^n$,

III $$A = \frac{S}{(1 + r)^n} = S\,(1 + r)^{-n}$$

Equation III is the general equation for present worth of S dollars. If $S = \$1$, then Equation III becomes

IV $$A = (1 + r)^{-n}$$

In Equation IV, A equals the present value of \$1 discounted at r rate of interest for n periods. A is also the amount that has to be deposited in order to have \$1 after n periods if the rate of interest is r.

The present worth of S dollars may be expressed in a line diagram as follows:

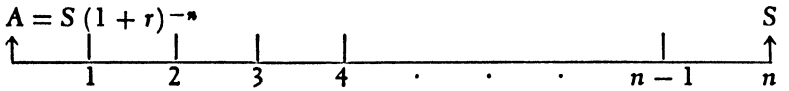


TABLE 17-2

$A = (1 + r)^{-n}$
Present Value of a Dollar

n/r	3%	3½%	4%
1	0.9709	0.9662	0.9615
2	.9426	.9335	.9246
3	.9151	.9019	.8890
4	.8885	.8714	.8548

Note that A decreases as n increases, with r constant, and that A decreases as r increases, with n constant; in other words, the present value of a given amount will be less, the longer the time period and the higher the rate of interest.

EXAMPLES

(a) What sum of money must be invested now at 3% so that \$1 will be available at the end of 4 years?

Answer: $A = (1 + 0.03)^{-4} = 1.03^{-4} = \$0.8885$.

(b) What is the present value of \$1 due in 3 years if the interest rate is 3½%?

Answer: $A = (1 + 0.035)^{-3} = 1.035^{-3} = \$0.9019$.

(c) Mr. A. promises to pay you \$8,000 for a used truck 2 years from now. The interest rate is 4%. How much is that promise worth now? (Assume that there is no risk that A will not pay, and that he signs a note.)

Answer: $A = S(1 + r)^{-n}$; $S = \$8{,}000$; $r = .04$; $n = 2$

$$A = \$8{,}000\,(1 + 0.04)^{-2} = \$8{,}000\,(1.04)^{-2}$$
$$= \$8{,}000 \times 0.9246 = \$7{,}396.80$$

(d) In Prob. (c), what is the amount of discount? What is the general equation for the amount of discount?

Answer: \$603.20; obtained by subtracting \$7,396.80 from \$8,000.00

Answer: $D = S - A$, or $D = 1 - A$ if $S = \$1.00$.

(e) What is the journal entry for the transaction described in Prob. (c)?

Answer:

Notes Receivable	\$7,396.80	
Sales		\$7,396.80

(f) If \$1 is invested at 3%, how much will have accumulated at the end of 4 years? (Use Table 17–2.)

Answer: $S = (1 + 0.03)^4 = \dfrac{1}{1.03^{-4}} = \dfrac{1}{0.8885}$

$= \$1.1255$ (Use Table 17–1 as a check.)

ANNUITIES

Another very important subject in the mathematics of business is the subject of annuities. The terminology unfortunately adds to the confusion surrounding this subject. The reader should be aware that the same terminology is not used by all accountants.

The word "annuity" is used to describe a series of *equal* payments, made at *regular* intervals of time. The period of time between payments is called the *payment period.* The period of time between computations of interest is called the *interest-conversion* period. When the payment period is equal to the interest-conversion period, the annuity is called an *ordinary annuity.* Only ordinary annuities will be covered in this chapter in order to avoid unnecessary complications.

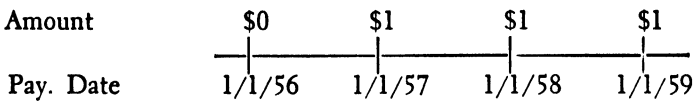
Future Worth of an Annuity

An immediate annuity (or annuity in arrears) is defined as a series of equal payments called *rents,* spread over equal periods of time. The first payment is due one period from the start of the annuity, and the last payment is due at the end of the annuity. Pictorially this may be presented as follows:

Amount	\$0	\$50	\$50	\$50
Pay. Date	1/1/56	1/1/57	1/1/58	1/1/59

If we deposit \$50 in the bank on January 1, 1957, 1958, 1959, the present date being January 1, 1956, then, by definition, this is an immediate annuity. There are equal payments (\$50.00), an equal period between payments (1 year), the first payment was one period from January 1, 1956, and

the last payment was coincident with end of the annuity. How much money will we have in the bank on January 1, 1959, if the interest rate is 3%? We simplify the problem by assuming that the deposits are \$1.00 each. We can represent this as follows:



On January 1, 1957, we shall have \$1.00 in the bank, the dollar we have just deposited. On January 1, 1958, we shall have the dollar deposited that day plus the dollar deposited last year together with the interest earned during 1957, or $1 + (1 + 0.03)^1$. On January 1, 1959, we shall have the dollar deposited that day, the dollar deposited on January 1, 1958 together with 1 year's interest, and the dollar deposited on January 1, 1957, together with 2 years' interest, or $1 + (1 + 0.03)^1 + (1 + 0.03)^2$. If we were to develop this example for any number of years, we would have a geometric series $(1 + r)^0 + (1 + r)^1 + (1 + r)^2 \cdots (1 + r)^{n-1}$. This geometric series may be expressed as

V $$S_{\overline{n}|r} = \frac{(1 + r)^n - 1}{r}$$

where $S_{\overline{n}|r}$ is the *amount* of an annuity, the rent \$1, the number of periods is n, and the effective rate of interest is r.

Above we developed the equation

$$I = S - A$$

in which I = interest.

S = amount of a sum of money.

A = the original amount.

If A equals 1, then by definition S equals $(1 + r)^n$. Substituting in the equation $I = S - A$, we obtain Equation VI.

VI $$I = (1 + r)^n - 1$$

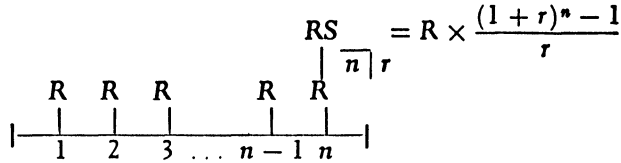
Equation VI is equal to the numerator of the right-hand side of Equation V and may be substituted into that equation to obtain Equation VII.

VII $$S_{\overline{n}|r} = \frac{I}{r}$$

If the rent is other than \$1, Equation V becomes

VIII $$RS_{\overline{n}|r} = R \times \frac{(1 + r)^n - 1}{r} \text{ or } R \times \frac{I}{r}$$

This can be expressed in a line diagram as follows:



Thus, if we know the interest rate r, the number of periods n, and the rent R, the future worth of the annuity can be calculated. In fact, if we are given any three of the four unknowns, the fourth can be calculated. Tables can also be used, if available.

TABLE 17-3

$$S_{\overline{n}|r} = \frac{(1+r)^n - 1}{r}$$

Future Worth of an Annuity of \$1

n/r	3%	3½%	4%
1	1.00000	1.00000	1.00000
5	5.30914	5.36247	5.41632
10	11.46388	11.73139	12.00611

EXAMPLE

(a) If we deposit \$500 each year, starting 1 year from now, how much shall we have at the end of 10 years? The interest rate is 3%. Given

$$R = \$500$$
$$n = 10$$
$$r = 3\%$$

Then

$$RS_{\overline{n}|r} = R\frac{(1+r)^n - 1}{r}$$

$$RS_{\overline{n}|r} = 500\left(\frac{1.03^{10} - 1}{0.03}\right)$$
$$= 500\left(\frac{1.3439164 - 1}{0.03}\right)$$
$$= 500\left(\frac{0.3439164}{0.03}\right)$$
$$= 500\ (\$11.46388)$$
$$= \$5{,}731.94$$

An easier solution would make use of the tables for the values of

$$\frac{(1+r)^n - 1}{r}$$

(*see* Table 17–3).

$$S_{\overline{10}|3\%} = \$11.46388$$

$$RS_{\overline{n}|r} = \$500\ (\$11.46388)$$
$$= \$5{,}731.94$$

(b) If, 10 years from now, we want \$5,731.94, how much shall we have to deposit at the end of each year? The interest rate is 3%.

$$RS_{\overline{n}|r} = \$5{,}731.94$$

$$R = \frac{\$5{,}731.94}{S_{\overline{10}|3\%}}$$

$$R = \frac{\$5{,}731.94}{11.46388}$$

$$= \$500 \text{ (yearly deposit)}$$

Present Worth of an Annuity

How much would we pay for an annuity of a given number of payments of a given amount if the rate of interest is r? The equation for the present worth of an annuity of \$1 per period is

IX $$A_{\overline{n}|r} = \frac{1 - (1+r)^{-n}}{r}$$

In a preceding section, we developed the equation

$$D = S - A \text{ or } D = 1 - A$$

If the amount being accumulated is \$1, and we apply Equation IV, $A = (1+r)^{-n}$, then

X $$D = 1 - (1+r)^{-n}$$

Equation X is the numerator of the right-hand side of Equation IX and may be substituted into that equation to obtain equation XI. Note that r is the effective rate of interest.

XI $$A_{\overline{n}|r} = \frac{D}{r}$$

If the rent is other than \$1, Equation IX becomes

XII $$RA_{\overline{n}|r} = R \times \frac{1-(1+r)^{-n}}{r}$$

If we are given any three of the four unknowns, the fourth can be calculated or can be obtained from tables.

TABLE 17-4

$$A_{\overline{n}|r} = \frac{1-(1+r)^{-n}}{r}$$

Present Value of an Annuity of \$1

n/r	3%	3½%	4%
1	0.97087	0.96618	0.96154
9	7.78611	7.60769	7.43533
13	10.63496	10.30274	9.98565

EXAMPLES

(a) How much would you be willing to pay now for nine payments of \$1,000, the first payment to begin 1 year from now? The rate of interest is 3%. (Use Table 17–4.)

$$RA_{\overline{n}|r} = \$1{,}000 \times 7.78611$$
$$= \$7{,}786.11$$

(b) How much would you be willing to pay for 13 payments of \$1, the first payment to begin 1 year from now? The rate of interest is 4%. The present value of \$1 due in 13 periods at 4% rate of interest is 0.600574.

$$A_{\overline{13}|4\%} = \frac{1-0.600574}{0.04} = \frac{0.399426}{0.04}$$
$$= \$9.9856$$

or, using Table 17–4,

$$A_{\overline{13}|4\%} = \$9.98565$$

ACCOUNTING FOR BONDS

Bonds are a promise to pay *a fixed sum* at a period of years hence, and a promise to pay *a certain amount each year* (or some other period) as interest. The

payment of interest may be viewed as an annuity. Thus, to find the present worth of a bond, it is necessary to find the present worth of an annuity equal to the periodic interest payments, and also the present worth of a sum of money due a given number of years from now.

If the coupon rate of the bond differs from the rate of interest expected by the market (the yield rate), then the price of the bond will differ from the par value or maturity value of the bond. If the yield rate is equal to the coupon rate, then the issue price of the bond will be equal to the amount due at maturity. The equality is the result of the fact that the *present value of the amount due at maturity plus the present value of the annuity of interest payments* is equal both to the present liability and to the amount due at maturity. It is important to note that the liability is not being recorded as the amount due at maturity but as the sum of two different present values. These present values are equal to the maturity value of the liability because the yield rate is equal to the coupon rate. The necessity for the equality can be explained in two ways. If the coupon rate is r, then A dollars invested will yield r only if the original amount is intact at maturity. The second explanation is mathematical. Using PV to represent "present value," we write

$$PV \text{ of debt} = PV \text{ of maturity amount} + PV \text{ of interest payments}$$

$$PV \text{ of maturity amount} = S(1+r)^{-n}$$

$$PV \text{ of interest payment} = rS\left[\frac{1-(1+r)^{-n}}{r}\right]$$

The interest of each period is equal to rS, i.e., the rate of interest times the amount due at maturity. Thus we have

$$A = S(1+r)^{-n} + rS\left[\frac{1-(1+r)^{-n}}{r}\right]$$

$$A = S(1+r)^{-n} + S\left[1-(1+r)^{-n}\right]$$

$$A = S(1+r)^{-n} + S - S(1+r)^{-n}$$

$$A = S$$

The tables given in the following example are constructed to show the liability at the end of each period for a bond. The component parts of that liability, the present value of the amount due at maturity, and the present value of the interest payments to be made are shown.

EXAMPLE

Compute the liability at the beginning of each period, assuming that the face value of the bond is \$1,000, the coupon rate is 5%, and interest is paid annually. The bond is due at the end of 4 years (beginning of the fifth year).

TABLE 17-5

Effective Rate of Interest of 5%
(Effective and coupon rates of interest are equal)

Beginning of period:	1	2	3	4	5
Present value of amount due at maturity date	$ 823	$ 864	$ 907	$ 952	$1,000
Present value of Interest payments of $50 per period (discounted at 5%)	177	136	93	48	
Total Liability	$1,000	$1,000	$1,000	$1,000	$1,000

TABLE 17-6

Effective Rate of Interest of 4%

Beginning of period:	1	2	3	4	5
Present value of amount due at maturity date	$ 855	$ 889	$ 925	$ 962	$1,000
Present value of interest payments of $50 per period (discounted at 4%)	181	139	94	48	
Total Liability	$1,036	$1,028	$1,019	$1,010	$1,000

TABLE 17-7

Effective Rate of Interest of 6%

Beginning of period:	1	2	3	4	5
Present value of amount due at maturity date	$792	$840	$890	$943	$1,000
Present value of interest payments of $50 per period (discounted at 6%)	173	134	92	47	
Total Liability	$965	$974	$982	$990	$1,000

EXAMPLE: Recording Issuance of Bonds

Find the present value of one $1,000, 20-year, 4% bond with interest payments once a year.

Assume that the effective rate of interest is 3%.

Present worth of $1,000 discounted at 3%	$ 553.70
Present worth of an annuity of $40 a year for 20 years (14.8775 × $40)	595.10
Present value of 4% bond (yield of 3%)	$1,148.80

The bond will sell at a price of $1,148.80. The journal entry to record issue is:

Cash	$1,148.80	
Bonds Payable		$1,000.00
Premium on Bonds Payable		148.80

The premium account is an adjunct account to bonds payable; the liability at the time of issue is $1,148.80.

Assume that the effective rate of interest is 5%.

Present worth of $1,000 discounted at 5%	$376.90
Present worth of an annuity of $40 a year for 20 years discounted at 5% (12.4622 × $40)	498.49
Present value of the 4% bond (yield of 5%)	$875.39

The journal entry to record issue is:

Cash	$875.39	
Bond Discount	124.61	
Bonds Payable		$1,000.00

Bond discount is a valuation or contra account to bonds payable; the liability at time of issue is $875.39.

The interest charge for the first year may be obtained by multiplying the net bond liability by the effective rate of interest. With an effective rate of interest of 5%, the interest charge for the first year will be $875.39 × 5%, or $43.77. The journal entry will be

Interest Charge	$43.77	
Interest Payable		$40.00
Bond Discount		3.77

The credit to the contra liability account bond discount increases the liability. At maturity the liability will be the face amount of $1,000. At the end of the first year, the bond liability is equal to $879.16.

Bonds Payable	$1,000.00
Less Bond Discount ($124.61 − $3.77)	120.84
	$ 879.16

The liability is also equal to:

Present worth of $1,000 discounted at 5% for 19 years	$395.73
Present worth of an annuity of $40 a year for 19 years discounted at 5% ($12.08532 × $40)	483.41
	$879.14

(There is a $0.02 rounding-off error.)

The bond discount will be credited each period until, finally, at maturity the balance in the account is zero, and the liability is recorded at its face amount, $1,000. At the end of the first year the account will have the following balance:

	Bond Discount	
	√ $124.61	$ 3.77
		√120.84
	$124.61	$124.61
Balance	$120.84	

The interest charge for the second year will be computed by multiplying the liability, $879.16, by the effective rate of interest, 5%.

	$879.16	
	×5%	
Interest Year 2	$ 43.958	
Interest Charge	$43.96	
Bond Discount		$ 3.96
Interest Payable		40.00

At the end of the second year, the bond liability is equal to

Bonds Payable	$1,000.00
Less Bond Discount	116.88
	$ 883.12

The liability can be checked by comparing it to

Present worth of $1,000, discounted at 5% for 18 years	$415.52
Present worth of an annuity of $40 a year for 18 years ($40 × 11.68959)	467.58
	$883.10

This same procedure will be repeated each year until the bonds mature.

COMPOUND INTEREST (OR SINKING FUND) METHOD OF DEPRECIATION

The main advantage of the compound interest method of depreciation accounting is that under certain conditions it accomplishes the objective of having the return on investment (income divided by investment) undistorted by the method of depreciation accounting. The net cash proceeds to be earned by the asset must be constant, and the interest rate chosen in computing the depreciation charge must be equal to the rate of return of the depreciable asset (where the rate of return is defined as that rate of discount which equates the present value of the cash proceeds to the cost of the asset).[1]

[1] Cash proceeds, as used here, refers to the difference between revenues and expenses which generated or used cash.

EXAMPLE

Assume an asset cost $288.39. It has an expected life of 3 years, and the earnings (net cash proceeds) are $100 per year. The cash proceeds are presumed to be earned on the last day of each year.

Step 1 Find the yield of the investment. This may be found by trial and error, or by consulting an annuity table. Since the present value of an annuity of $1 per period for three periods, using a rate of discount of 2%, is $2.8839, the yield of the asset is 2%.

Step 2 Compute the amount of deposit necessary to accumulate $288.39, if three deposits are made, and if the amount "deposited" earns 2%. This may be obtained from tables showing the periodic deposit that will amount to $1 with an interest rate of 2%, then multiplying by $288.39:

$$0.32675467 \times \$288.39 = \$94.23 \text{ (the annual "deposit")}$$

Alternative Computation:

$$R\,s_{\overline{3}|2\%} = 288.39$$

$$R \times 3.060 = 288.39$$

$$R = 94.23$$

The depreciation charge for each year will be as follows:

TABLE 17–8

Year	*Col. 1* Basic Deposit	*Col. 2* "Interest"	*Col. 3* Depreciation (Col. 1 & Col. 2)	*Col. 3* Total Accrued Depreciation	*Col. 4* Book Value (Beginning of Year)
1	$94.23	$ —	$ 94.23	$ 94.23	$288.39
2	94.23	1.89 *	96.12	190.35	194.16
3	94.23	3.81 †	98.04	288.39	98.04
			$288.39		

* 0.02 ($ 94.23) = $1.89
† 0.02 ($190.35) = $3.81

The depreciation charge for the first year is $94.23. The charge for the second year is equal to the basic "deposit," $94.23, plus 2% "interest" on the balance of the total accrued depreciation at the beginning of the year ($94.23 plus $1.89). The depreciation for the third year is equal to the basic "deposit," $94.23, plus 2% "interest" on the balance of the total accrued depreciation at the beginning of the year ($94.23 plus $3.81). Thus the depreciation for successive years increases by 2% of the depreciation charge of the prior year.

The mechanics of the procedure are quite simple. In effect, an attempt is made to *simulate* the workings of a sinking fund (a bank account). The

amount deposited each period is constant, and interest is earned on the bank account. Similarly the depreciation charge for each period is equal to the "deposit" (which is a fiction) plus the amount of interest earned on the balance of the account.

The first step is to find the rate of return expected to be earned by the asset, since that will be the interest rate used to compute the fictitious interest earned on the fictitious bank account. The second step is to compute the amount of "deposit" to be made in each period, in order to accumulate in the fictitious bank account (which is really the accumulated depreciation) an amount equal to the cost of the asset (less any salvage expected).

Table 17–9 shows what happens to income and return on investment when the compound interest method of computing depreciation is used.

TABLE 17–9

Year	Net Cash Proceeds	Depreciation	Net Operating Income	Investment Beginning of Year	Return on Investment
1	$100.00	$94.23	$5.77	$288.39	2%
2	100.00	96.12	3.88	194.16	2%
3	100.00	98.04	1.96	98.04	2%

Table 17–9 highlights the characteristics of the compound interest method. The operating income decreases through the years, since the depreciation charge for later years actually increases, but the return on investment is constant. The increase in depreciation does not agree with our intuition, but the constant return on investment is reasonable in view of the constant net cash proceeds. If attention is focused on depreciation, the compound interest procedure seems not to be very good; if attention is focused on investment return, the rating of the method improves.

Theoretical Basis of the Compound Interest Method of Depreciation Accounting

The preceding section described the mechanics of the compound interest method, but it did not offer a theoretical justification of the procedure. In this section, the theory behind the procedure will be explained.

When an asset is purchased, it is reasonable to look at the purchase of the asset as the purchase of future earning power. For example, the purchase of a piece of equipment for $288.39 may be said to be the actual purchase of future net cash proceeds. Assume that the asset is expected to earn net cash proceeds of $100 in each of the 3 years following its purchase. This results in an investment rate of return, or yield, of 2%. The present value of the future cash proceeds can be computed (Table 17–10).

TABLE 17–10

Year	Cash Proceeds	Present Value of $1 (2% Interest Rate)	Present Value of Cash Proceeds
1	$100	$0.9804	$ 98.04
2	100	0.9612	96.12
3	100	0.9423	94.23
			$288.39

It can be said that $98.04 is being paid for the first period's net cash proceeds, $96.12 for the second period's net cash proceeds, and $94.23 for the third period's proceeds. These amounts can be called the *basic* depreciation charges. To these basic charges can be added an implicit interest cost for using the investment. For the first year's revenues, the investment is 98.04 (the amount paid for the first year's revenues) and the interest cost is $1.96 (2% of $98.04). Thus the basic depreciation plus the implicit interest charge of the first year is $100. But the entire investment earned implicit interest revenue of $5.77 (2% of $288.39). The compound interest method of depreciation suggests that the depreciation for the first year is $94.23 ($98.04 plus $1.96 minus $5.77).

The interest revenue of $5.77 requires explanation. The $5.77 is equal to 2% of the book value of the investment and is the *implicit* interest revenue (and interest cost) brought into being by the use of the investment. If the interest cost of using the investment is $5.77, why was only $1.96 considered an interest expense of the period? The $3.81, the difference between the total interest cost of $5.77 and the portion applicable to this period, $1.96, is applicable to future periods. This is shown by Table 17–11.

The schedule of depreciation for the 3 years is given in Table 17–12.

TABLE 17–11

Year	Present Value of Cash Proceeds (Investment Applicable to Each Year)		The First Year's Implicit Interest Cost (2%)
1	$ 98.04	× 2%	$1.96 (applicable to 1st year)
2	96.12	× 2%	1.92 (applicable to 2nd year)
3	94.23	× 2%	1.89 (applicable to 3rd year)
	$288.39	× 2%	= $5.77

TABLE 17-12

Year	Basic Depreciation * (Cost of Net Cash Proceeds)	Implicit Interest Cost †	Sum of Deprec. Plus Int. Cost	Implicit Interest Revenue ‡	Deprec. Compound Int. Method
1	$ 98.04	$ 1.96	$100.00	$ 5.77	$ 94.23
2	96.12	3.88	100.00	3.88	96.12
3	94.23	5.77	100.00	1.96	98.04
	$288.39	$11.61	$300.00	$11.61	$288.39

* Present value of the predicted net cash proceeds.
† The interest cost on the investment (present value of the net cash proceeds) accumulated for the proper number of periods.
‡ The implicit interest revenue (2% of the net book value of the total investment as of the beginning of the period).

The foregoing computations may seem complicated, but they are necessary in order to understand the significance of the compound interest method of depreciation accounting. In the preceding section, Table 17-9 showed the *net* operating income. Table 17-13 shows additional refinements.

TABLE 17-13

Year	Net Cash Proceeds	Basic Depreciation	Net Operating Income	Interest Cost	Net Income before Interest Revenue	Interest Revenue	Net Income
1	$100.00	$ 98.04	$ 1.96	$ 1.96	$ -0-	$ 5.77	$ 5.77
2	100.00	96.12	3.88	3.88	-0-	3.88	3.88
3	100.00	94.23	5.77	5.77	-0-	1.96	1.96
	$300.00	$288.39	$11.61	$11.61	$ -0-	$11.61	$11.61

QUESTIONS AND PROBLEMS

17-1 If $1 is deposited on January 1, how much money will have accumulated at the end of 1 year if:

(a) The bank computes interest annually, using an interest rate of 4%?
(b) The bank computes interest every 6 months, using an interest rate of 2% every 6 months?
(c) What is the *effective annual* rate of interest for the situation described in part (b)? (Subtract the original deposit of $1 from the amount in the account at the end of 1 year.)

17-2 (a) What is the present value of $1,000 due in 10 years, discounted at 4%?
(b) What is the present value of $40 per year for a period of 10 years, if the rate of interest used to discount the payments back to the present is 4%?
(c) What is the sum of the two amounts obtained in parts (a) and (b)?
(d) At what price would a 4%-$1,000 ten year bond sell if it is to yield 4%?

17-3 (a) What is the present value of $1,000 due in 10 years? Use a 4% rate of interest.
(b) What is the present value of $50 per year for a period of 10 years? Use a 4% rate of interest.
(c) What is the sum of the amounts obtained in parts (a) and (b)?
(d) At what price will a 5%, $1,000, 10-year bond sell if it is to yield 4%?
(e) Record the issuance of such a bond on January 1, and the payment of the first year's interest on December 31.

17-4 The Machine Tool Company sold a piece of equipment for $100,000 (the nominal price) on January 1, 1957. The $100,000 is to be paid exactly 2 years from the date of sale. The rate of interest for 2-year loans is currently 4% per year. The company closes its books annually on December 31.

Required
(a) Record the sale of the equipment and the collection of the cash proceeds by the Machine Tool Company.
(b) Record the purchase of the equipment and the payment of the cash by the company which purchased the equipment.

17-5 The Machine Tool Company sold a piece of equipment for $200,000 (the nominal price) on June 30, 1957. The $200,000 is to be collected in four equal semi-annual payments of $50,000 each. The rate of interest for 2-year loans or less is currently 4% per 6 months, or 8.16% per year. The company closes its books annually on December 31.

Required
Record the sale of the equipment and the collection of the cash proceeds by the Machine Tool Company.

17-6 Determine the amount you would be willing to pay for a $1,000, 4%, 20-year bond. You desire a yield of 6.09% per year (3% compounded every 6 months). Interest is to be paid twice a year.

17-7 The Marwick Company authorized a bond issue of ten $1,000, 5%, 20-year bonds.

Required
(a) Record the issuance of the bonds on January 1, 1957, so as to yield 4.04% annually (2% compounded twice a year).

(b) Record the accrual of interest on June 30, 1957, and the payment on July 1.
(c) Record the accrual of interest on December 31.
(d) What will be the bond liability on January 1, 1967?

17-8 The Firewick Company authorized a bond issue of ten $1,000, 5%, 20-year bonds.

Required

(a) Record the issuance of the bonds on January 1, 1957, so as to yield 6.09% annually (3% compounded every 6 months).
(b) Record the accrual of interest on June 30, 1957, and the payment of interest on July 1.
(c) Record the accrual of interest on December 31.
(d) What will be the total bond liability on January 1, 1967?

17-9 On January 1, 1956, the X Company issued one hundred $1,000, 5% bonds to yield 4%. The 4% is a nominal rate of interest. The exact yield is 4.04% per year, or 2% per 6 months. The bonds were issued for 20 years, and interest is payable semi-annually. The X Company closes its books on December 31 of each year.

Required

(a) Compute the amount the X Company received for the issue on January 1, 1956. Record the issue of the bonds.
(b) Make all entries necessary to record.
    1. The first interest payment.
    2. The second interest payment.

17-10 A piece of equipment which cost $100,000 has an expected life of 5 years and a forecasted net salvage value at retirement of $1,024. It is purchased on January 1. Assuming a rate of interest of 6%, a deposit of $0.1774 per period for five periods will amount to $1 after five periods. Using the "compound interest" method of computing depreciation, compute the depreciation charge and the allowance for depreciation for each of the 5 years of the life of the asset.

17-11 The president of the Electric Utility Company is concerned about the choice of the method used to compute depreciation of plant assets. The straight-line method has been used in the past with the result that the company's rate of return has been increasing, despite the fact that the income of the firm has not been increasing. Unlike many public utilities, the company has been purchasing a relatively small amount of plant assets in recent years.

Equipment costing $10,000 was purchased in 1964. It has an expected life of 5 years. The rate commission allows a rate of return of 6%, based on the book value of the assets in use on January 1 of the year in question.

Required

(a) Compute the depreciation that will least distort the rate of return computation. The revenue earning power of the asset is assumed to be constant over its entire life. A deposit of $0.1774 per period for

five periods will amount to $1 after five periods, assuming an interest rate of 6%. It is expected that the rate commission will allow revenues of $2,374 to be earned on this asset each year of its life. Assume that there are no expenses except depreciation.

(b) Prepare a schedule showing revenues, depreciation, income, rate base (asset) balance, and return on investment (income divided by the beginning of the period investment) for each year.

17–12 The long-term debt of the Federated Department Stores was shown to be $23,854,497 on the February 1, 1958, position statement. The following information was contained in the notes to financial statements.

Long-term debt due after one year, comprising mortgage notes of $5,275,143 (interest of 3% and 3½%) and unsecured notes of $18,579,354 (interest of 3¼% to 4% on $18,491,854), matures as follows:

Year Ending January	*Amount*	*Year Ending January*	*Amount*	*Year Ending January*	*Amount*
1960	$1,665,504	1964	$2,121,484	1968	$ 2,550,530
1961	2,070,583	1965	3,261,803	1969	1,375,186
1962	2,402,107	1966	3,257,223	1971–75	1,650,000
1963	2,124,069	1967	1,376,008		
					$23,854,497

Long-term leases of the Company at February 1, 1958, comprised 89 leases with terms of more than three years after that date, with an aggregate minimum annual rental of approximately $7,638,000. In addition to fixed rentals, most of these leases required the Company to pay real estate taxes (recorded as taxes) and other expenses and, for some of the leases, additional rentals based on a percentage of sales. In so far as any of the main stores of the Company are in whole or in part on leased sites, no one of these is a percentage lease, the earliest expiration date on any of these leases is 1966, and all contain renewal provisions excepting eight, one of which expires in 2008, four in 2010, and three in 2016.

Required

Should leases be included as long-term debt?

17–13 The 1961 annual report of the Sinclair Oil Company contained the following note to its financial statements.

Note 8—Annual rentals on certain office buildings and on service stations held under long-term leases and annual charter obligations for tankers under long-term charters, expiring subsequent to December 31, 1964 will aggregate approximately $16,800,000 in 1962, after giving effect to estimated service stations rentals to be received.

Required

What amount (if any) would you want to show as a liability?

18

Consolidated Statements

IT IS NOT UNUSUAL for one corporation to own shares of common stock of one or more other corporations. The percentage of ownership may vary from a few shares, representing an insignificant percentage of ownership, to 100% of the shares outstanding. If the percentage of ownership is very small, the investment is generally presented on statements of financial position at cost. In situations where the percentage of ownership is large, it is general practice for the parent company (the corporation owning the stock of the subsidiary company) to present consolidated financial statements. Instead of presenting the original investment in the subsidiary corporation, the assets and liabilities of the subsidiary corporation are combined with the assets and liabilities of the parent company and presented in one statement of financial position. The revenues and expenses of the parent and subsidiary corporation, or corporations, are also shown in one consolidated income statement.

WHEN TO CONSOLIDATE

The financial affairs of two or more corporations should not be combined into single statements unless the extent of control is significant, i.e., the two corporations act effectively as one corporation. A study made by the American Institute of Certified Public Accountants showed that the criteria which determined whether or not to consolidate varied considerably from firm to firm.[1] Majority ownership was required by many firms, but some included corporations in which they had a minority interest. Another firm only included the subsidiary corporations in which it had interests as high as 90%.

Other factors affecting whether or not subsidiary corporations are consolidated are listed below.

[1] American Institute of Certified Public Accountants, *Survey of Consolidated Financial Statement Practices* (New York: American Institute of Certified Public Accountants, 1956), pp. 7–10.

(a) If the operations of the subsidiary and parent are materially different, the subsidiary is frequently excluded.
(b) Foreign subsidiaries are often excluded from consolidation.
(c) Differences in accounting periods may cause the consolidation to be impractical.
(d) If there are senior securities outstanding (such as bonds or preferred stock), the corporation may decide that even though it holds a majority of the common stock, the percentage of ownership of total equities is too small to warrant consolidation.
(e) If the subsidiary is in bad financial condition, especially if it is bankrupt or insolvent, it may be excluded.
(f) Several other factors are taken into consideration, such as materiality of the subsidiary and whether the subsidiary is inactive.

Consolidation of the financial affairs of corporations is inconsistent with the entity theory of accounting, which implies that we are accounting for the corporation, a separate legal entity. However, the accountant correctly sets aside the entity theory in order to avoid the hopeless tangle which would result if he presented separate reports of the parent and twenty subsidiaries. In any event, the reader would have to prepare his own consolidated statements in order to see the over-all financial picture of a complex organization. Instead of the legal entity, the accountant reports the affairs of an economic entity.

It should be recognized that even when the affairs of the parent and its subsidiaries are consolidated, it may still be desirable to show the financial affairs of the parent or one or more major subsidiaries separately.

CONSOLIDATED POSITION STATEMENTS

The first step in preparing consolidated statements of financial position is to eliminate two items which would result in double counting if they were included. These two items are the original investment of the parent and the stock equity of the subsidiary at the time of purchase. The stock equity of the subsidiary as of the date of stock purchase must be eliminated because the stock equity of the parent company (or of the consolidated company) is not increased by a purchase. The investment account must be eliminated, since the consolidation procedures effectively change the purchase of common stock into the purchase of assets and the assumption of liabilities.

The first illustration will assume that the parent, Company A, has purchased 100% of the common stock of Company B. Note that the amount paid in this simple example will be equal to the book value of the stock.

ILLUSTRATION

Company A buys 100% of the common stock of Company B for $10,000. The first two columns of the work sheet show the financial position of the two companies immediately after the purchase of stock. The consolidation procedures and the consolidated position statement are as follows:

Accounts	Company A	Company B	Eliminations		Consolidated Position Statement
			Dr.	Cr.	
Other Assets	30,000	18,000			48,000
Investment in Co. B	10,000			(1) 10,000	
	40,000	18,000			48,000
Liabilities	15,000	8,000			23,000
Capital Stock	20,000	7,000	(1) 7,000		20,000
Retained Earnings	5,000	3,000	(1) 3,000		5,000
	40,000	18,000	10,000	10,000	48,000

The elimination entries are to credit the investment account to eliminate the investment in Company B (but leaving the assets of Company B) and to eliminate the stock equity of Company B as of the time of purchase.

Let us assume that the elimination entries were not made and that the consolidated position statement was prepared by naively adding the asset and equity accounts of the two corporations.

Other Assets	48,000
Investment in Co. B	10,000
	58,000
Liabilities	23,000
Capital Stock	27,000
Retained Earnings	8,000
	58,000

The above statement shows total assets of $58,000, but this includes a double counting of $10,000 of B's assets, since not only are the real assets of Company B included but also the investment of Company A in Company B. The value of the investment of A in B is derived from the assets which are already included; thus, to include the investment also would be double counting. In like manner, the stock equity is overstated by $10,000, since not only are the rights to the investment of A in B included but also the rights to the assets of B, and this is also counting the same thing twice.

Complications may be introduced by having Company A purchase 100% of the common stock at a price different than the book value of the stock equity of Company B. For example, if Company A had paid $12,000 for book value of $10,000, this would indicate that Company A thought there were intangible values

in the situation or that the assets were undervalued. If the former is assumed to be true, the elimination entry would be:

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Goodwill	2,000	
Investments		$12,000

Again, the investment and the stock equity are eliminated. In this situation, an intangible asset of $2,000 is recognized, since we paid $2,000 more than the book value of the assets. If we can trace the excess of purchase price to specific asset accounts, then those asset accounts should be debited, not the goodwill account.

Instead of increasing specific asset accounts or creating a goodwill account, the difference between the amount paid and the book value of the stockholders' equity may be debited to an account "Excess of Investment over Book Value." This account is then treated as a noncurrent asset. The disadvantage of this procedure is that it results in a poorly defined asset item which the average reader of financial reports will have difficulty in interpreting. It is better for the accountant to make the decision as to whether the amount paid in excess of book value is a result of under-valuation of specific assets, in which case they should be written up to a realistic value. If there are intangibles connected with the utilization of the assets, which result in the expectation of high future earnings, it is reasonable to record the amount as goodwill.

Assume that we have paid $8,000 for the common stock. This is an amount less than the book value. The book value of the assets is overstated, and there is a type of negative goodwill. Negative goodwill indicates that the earning power of the assets is actually less than we might expect from assets of this nature. The elimination entry might be:

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Investment		$8,000
Excess of Book Value over the Investment		2,000

The credit item is frequently placed on the equity side of the position statement, although it would be reasonable to subtract it from the total tangible assets. As explained above, it is, in a sense, negative goodwill. Instead of crediting the account "Excess of Book Value over the Investment," we may credit the specific assets which are overvalued. This is appropriate if we are able to identify the assets which are overstated. It has the double advantage of being more straightforward, thus easier to understand, as well as presenting better information relative to the valuation of the assets owned.

MINORITY INTEREST

Another complication arises when we purchase an amount other than 100% of the common stock outstanding. This gives rise to a minority interest in the consolidated corporation. If we assume the same situation as above, except that we purchase 80% of the common stock for $8,000, the elimination entries would be:

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Investment		$8,000
Minority Interest		2,000

The minority interest would appear on the position statement between the liabilities and the stockholders' equity, or as part of the stockholders' equity section. It represents the interest of outside stockholders of the subsidiary in the assets of the consolidated corporation.

In the above example, A paid an amount equal to the book value of B times the percentage of ownership acquired by A (the percentage of ownership being measured by the fraction of common stock shares it acquired). Let us now assume that A paid $12,000 for 80% ownership in B. There are two possible solutions.

If A paid $12,000 for 80% of the ownership, then the entire stockholders' equity is worth $15,000. Let X equal the value of B, then:

$$.8X = 12{,}000$$
$$X = 15{,}000$$

The book value of the stockholder's equity is $10,000; thus there is $5,000 of goodwill (or any of the other possible interpretations previously described). The following elimination entry might be made:

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Goodwill	5,000	
Investment		$12,000
Minority Interest		3,000

The minority interest is equal to 20% of $15,000.

The above solution, which assumes it is appropriate to adjust the total assets of B, is reasonable, but some accountants prefer to take note of only $4,000 of goodwill. The $4,000 is computed as follows:

Investment by A	$12,000
Book equity of A (80% of book value)	8,000
	4,000

The following elimination entry would be made:

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Goodwill	4,000	
Investment		$12,000
Minority Interest		2,000

The minority interest is equal to 20% of the book value of the stockholders' equity.

The second solution assumes that it is reasonable to note the goodwill for the portion of the firm purchased by the parent, but it is not reasonable to record the goodwill of the minority interests.

In the following example, we shall assume that A paid $5,600 for 80% ownership. Again there are two possible solutions, but we shall illustrate only the procedure which assumes it is appropriate to adjust the asset valuation completely. We first find the value of the stockholders' equity. If 80% is worth $5,600, then the entire stockholders' equity is worth $7,000 (instead of the book value of $10,000). The elimination entry would be:

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Investment		$5,600
Excess of Book Value over Investment Value		3,000
Minority Interest		1,400

The minority interest is equal to 20% of $7,000, the value of the stockholder's equity.

OTHER ADJUSTMENTS

In addition to the entries eliminating the investment of the parent in the subsidiary and the stockholders' equity of the subsidiary, there may be other elimination entries required. For example, B may be in debt to A. Assume B owes A $2,000. The elimination entry would be:

Accounts Payable—B	$2,000	
Accounts Receivable—A		$2,000

Failure to eliminate the receivable on the books of A and the payable on the books of B would be like a husband declaring himself a millionaire since his wife lost that sum to him in a gin rummy game. For intra-family purposes, the data may be of interest, but to a third party it is of no significance.

If B declares a cash dividend, A might record the receivable in his

accounts. The following elimination entry would be required if the dividend has been declared and recorded by both parties but not yet paid (assume the total dividend is $4,000, of which $3,200 will go to A).

Dividends Payable—B	$3,200	
Dividends Receivable—A		$3,200

It is possible for B to have paid the dividend and A not to have yet received the cash. The following entry would then be required:

Cash—A	$3,200	
Dividends Receivable—A		$3,200

The entry has the effect of eliminating the inter-company receivable and recording as an asset the cash that is currently floating between B and A.

If A has sold product to B, some of which is still in B's inventory, and there is an element of profit in the price charged by A, then it is necessary to eliminate the profit from the inventory of B and from the retained earnings of A. Assume A has made a profit of $.25 per dollar of sale, and that B has $4,000 of inventory which was purchased from A. It is necessary to make the following eliminations:

Retained Earnings—A	$1,000	
Inventory—B		$1,000

In the presence of a 20% minority interest, some accountants would make the above entry and some would eliminate 80% of the profit in the inventory. Other accountants argue that if the sale was made following the same procedures as if the companies were separate entities and not parent and subsidiary, then none of the profit should be eliminated (this would be consistent with a strict interpretation of the entity theory). The lack of sharp and exact rules here is a reflection of the inconsistent acceptance by the accounting profession of the entity concept as a guide to accounting practice. Fortunately the amounts involved in the above adjustments are not generally material.

It should be noted that when a debt exists between a parent and subsidiary, the entire amount of the debt is eliminated despite the presence of minority interests. This should be interpreted as a rule established for uniformity, since other possible procedures would be equally (or more) acceptable from a theoretical point of view. For example, the elimination of a fraction of the amount (equal to the fraction of ownership) could be justified, since the interests of the minority stockholders make the debt real. It would not be real if the subsidiary was 100% owned by the parent.

CONSOLIDATION IN A LATER PERIOD

In the periods after purchase, the basic elimination entry for consolidation is the same as the one made at the time of purchase. The significance of this treatment is that the incomes earned and retained since the purchase of stock are *not* eliminated. However, additional elimination entries may be necessary for debts owed by one of the corporations to another or proper recognition of other transactions.

Returning to the first illustration, where the book value was $10,000 and the amount paid for 100% of the stock was $10,000, let us assume that, after one period of operations, the accounts of the two companies are as presented in the first two columns. Company B owes Company A $4,000 for a cash advance made by Company A. The consolidation worksheet would be as follows:

Accounts	Company A	Company B	Eliminations		Consolidated Position Statement
			Dr.	Cr.	
Other Assets	35,000	21,000		(2) 4,000	52,000
Investment in Co. B	10,000			(1) 10,000	
	45,000	21,000			52,000
Liabilities	16,000	10,000	(2) 4,000		22,000
Capital Stock—A	20,000				20,000
Capital Stock—B		7,000	(1) 7,000		
Retained Earnings—A	9,000				9,000
Retained Earnings—B		4,000	(1) 3,000		1,000
	45,000	21,000	14,000	14,000	52,000

Note that elimination entry (1) is the same as that made for consolidation at the time of purchase. Only the stock equity in existence at the time of purchase is being eliminated. The retained earnings coming into being since the time of acquisition do not have to be eliminated, since they actually do increase the total retained earnings of the consolidated company. Entry (2) eliminates the receivable and payable which exists between the companies being consolidated. This is, in effect, saying that we cannot owe ourselves money, and if one segment of a consolidated company owes another segment of the same company, then the asset and debt must both be eliminated. If this were not done, we would be in the strange position of reporting an asset which consists of a promise to pay by the same consolidated entity which re-

ports the asset. This is a type of double counting of assets and liabilities and must be eliminated.

If there is a 20% minority interest, then the entire $1,000 of earnings of B since acquisition cannot be shown as retained earnings on the consolidated position statement. It is necessary to compute the minority interest in the $1,000 (i.e., 20% of $1,000, or $200) and record that amount as minority interest rather than retained earnings. The elimination entries would then be (assuming $8,000 was paid for 80% of B):

Capital Stock—B	$7,000	
Retained Earnings—B	3,000	
Investment		$8,000
Minority Interest		2,000
(to eliminate the initial investment)		
Retained Earnings—B	200	
Minority Interest		200
(to record the equity of the minority interests in the earnings since acquisition of B)		

If an amount other than $8,000 is paid for the 80% interest, then the first entry would be different (this has been explained previously), but the second entry is unchanged.

FIXED ASSET TRANSFERS

An interesting type of transaction is when A sells to B a long-lived asset and A makes a profit on the transaction. If there is a minority interest, one possible interpretation is that the transaction was conducted at arms length (if it was not, the minority stockholders have a valid complaint), thus no adjustment is necessary for the amount of profit which A made in the transaction. Another interpretation is that the profit of A connected with the transaction and the overstatement of the asset must be eliminated, at least the fraction of the profit equal to the fraction of A's ownership (if there is no minority interest, then the entire profit is eliminated).

EXAMPLE

Assume that A sold a tanker to B for a price of $1,000,000. A's profit is $100,000, and A owns 80% of B. B has recorded the tanker at a cost of $1,000,000, and immediate payment was made to A. The elimination entry at the moment of purchase would be:

Retained Earnings—A	$80,000	
Tanker—B		$80,000

The above entry eliminates 80% of A's profit, since A owns 80% of B. As indicated previously, some accountants would suggest no elimination, and others would eliminate the entire $100,000 in an inter-company transfer of this nature.

Let us assume that the tanker has an estimated life of 20 years. B will record $50,000 of depreciation expense per year, and this will include as an expense $5,000 of the profit of A; after one year, the elimination entry required will be:

Retained Earnings—A	$76,000	
Tanker—B		$76,000

It is no longer necessary to eliminate $80,000, since $50,000 of the cost of the tanker has been written off, and the $50,000 contained $5,000 of A's profit, of which $4,000 was related to the majority interests of A in B. Another method of computing the necessary adjustment is as follows:

Cost of Tanker	$1,000,000
Less: Accumulated Depreciation	50,000
Unamortized Cost of Tanker	950,000

The profit of A connected with $950,000 of cost = .10 × 950,000 = $95,000
The interest of A in the $95,000 = .80 × 95,000 = $76,000
Computations of the same type would be made each year.

INCOME STATEMENTS

If the several corporations being consolidated do not sell products to each other, the consolidated income statement is very simple. It is merely a matter of adding up the total revenues of the several corporations and subtracting the expenses.

A complication arises when the corporations sell goods to each other. Assume that A has sold goods to B, a wholly-owned subsidiary. The goods cost A $850, and they were sold to B for $1,000. B in turn sold the goods to third parties for $1,200. The $1,000 appears as revenue for A and as an expense for B. Actually, the relevant revenues for purposes of consolidation are the $1,200 obtained by selling the goods to third parties. The relevant expense from the same point of view is the $850 of expenses incurred by A. Thus the $1,000 must be eliminated from the revenues of A and from the expenses of B.

Revenues—A	$1,000	
Expenses—B		$1,000

The consolidated income statements might appear as follows:

	Company A	Company B	Eliminations Dr.	Eliminations Cr.	Consolidated Income Statement
Revenues	4,000	3,000	1,000		6,000
Expenses	3,300	2,400		1,000	4,700
Income	700	600	1,000	1,000	1,300

If it is assumed that Company B still has all the goods in inventory, Company A would report revenues of $1,000, expenses of $850, and an income of $150. Should this $150 of income be shown in the income statement of the consolidated company with the goods still in Company B's inventory? There are strong arguments in favor of eliminating the profits of an inter-company transaction which have not yet been realized by a sale to a third party when the transaction is between a parent and wholly-owned subsidiary. In this case, it would be necessary to reduce the revenues, the expenses, and the profit connected with the transaction which is in the inventory. In effect, the following elimination entry would be made for the consolidated income statement:

Revenues	$1,000	
Cost of Goods Sold		$850
Inventories		150

For purposes of the consolidated income statement, we have to reduce revenues of A by $1,000, expenses of A by $850, and inventories of B by $150. The elimination must also be shown on the worksheet for preparing the consolidated position statement. It is necessary to reduce the inventory of Company B, because the inventory includes $150 of inter-company profit. It is also necessary to eliminate the $150 increase in retained earnings of Company A which can be traced to this transaction. The elimination entry would be:

Retained Earnings (Company A)	$150	
Other Assets (Inventory Company B)		$150

The consolidated income statement for the above situation would be:

	Company A	Company B	Eliminations Dr.	Eliminations Cr.	Consolidated Income Statement
Revenues	5,000	4,000	1,000		8,000
Expenses	4,300	3,500		850	6,950
Income	700	500	1,000	850	1,050
Decrease in Inventory				150	
			1,000	1,000	

ACCOUNTING FOR INVESTMENTS— WITHOUT CONSOLIDATION

Let us assume A's investment in B is considered to be too small to warrant consolidating the financial affairs of the two companies. There are then three possible procedures available to A:

(a) Recording the investment at cost.
(b) Recording the investment at market value.
(c) Recording the investment at cost plus a percentage of the earnings of B since the purchase by A, the percentage being equal to the percentage of ownership of A (the percentage of total shares outstanding owned by A).

The disadvantage of recording the investment at cost is that, with the passage of time, cost loses significance. It is not significant information for A to indicate it paid $1,000,000 for shares of stock of B thirty years ago. The advantage of using cost is that the cost of the stock is objective evidence, but the passage of time reduces the economic significance of the objective evidence to close to zero.

Recording the investment at market value is an improvement over the use of cost. It reflects what the market thinks the investment is currently worth. It has the disadvantage of resulting in a valuation which will fluctuate as the stock market fluctuates. Also, for many investments there is no market. This is true where several companies join forces to form a subsidiary. In these situations, market valuation cannot be used.

The third possibility is attractive, since it retains an objective basis for recording the investment, yet does not arbitrarily retain the original cost as the measure of the value of the investment.

EXAMPLE

Company A pays $100,000 for an investment in B (10% of the common stock of B). Company A records the investment as being $100,000. In the year since acquisition, B earns $80,000. Following the third procedure, A would make the following entry:

Investment in B	$8,000	
Retained Earnings		$8,000

The above entry increases the assets of A by an amount equal to its equity in B's earnings. The credit is to retained earnings, but it could also be made to

an income account such as "Income arising from ownership in B." If B declared a dividend of $2,000, the following entry would be made by A:

Dividends Receivable	$2,000	
Investment in B		$2,000

This procedure assumes that A realizes the earnings of B when B makes the earnings rather than when B declares the dividend. There is some justification for this procedure, even if it is not consistent with the legalistic interpretation of corporations being seperate entities.

SUMMARY—CONSOLIDATED STATEMENTS

The basic concepts and purposes of consolidated statements are relatively simple. We are attempting to merge the financial results of many operating units into one financial statement, eliminating internal transactions and double counting which would otherwise appear in the consolidated statements. However, the execution of preparing consolidated statements can become extremely complex if we remove the simplifying assumptions.

It should be recognized that when the financial affairs of many corporate entities are merged together, the good and bad points of the several corporations will be averaged together. Thus, the consolidated reports may conceal trouble spots which may exist either in the parent or in the subsidiaries. On the other hand, consolidated reports are ingenious devices for summarizing the financial results of many financial institutions in a form relatively easy to understand.

QUESTIONS AND PROBLEMS

18–1 On January 15, 1958, Company A purchased all the common stock of Company B for $20,000. At the time of purchase, the position statements of the two companies were as follows:

	Company A	*Company B*
Other Assets	$50,000	$30,000
Investment in Company B	20,000	
	$70,000	$30,000
Liabilities	$30,000	$10,000
Capital Stock	25,000	15,000
Retained Earnings	15,000	5,000
	$70,000	$30,000

Required

Prepare a worksheet for a consolidated position statement at the time of purchase of the stock.

18–2 (Continuing Problem 18–1) As of December 31, 1958, the position statements of the two corporations were as follows:

	Company A	*Company B*
Other Assets	$70,000	$40,000
Investment in Company B	20,000	
	$90,000	$40,000
Liabilities	$20,000	$ 5,000
Capital Stock	25,000	15,000
Retained Earnings	45,000	20,000
	$90,000	$40,000

Company B owes Company A $3,000. This has been recorded by both corporations.

Required

Prepare a worksheet for a consolidated position statement as of December 31, 1958.

18–3 (Continuing Problem 18–1) As of December 31, 1959, the position statements of the two corporations were as follows:

	Company A	*Company B*
Other Assets	$ 80,000	$55,000
Investment in Company B	20,000	
	$100,000	$55,000
Liabilities	$ 30,000	$15,000
Capital Stock	25,000	15,000
Retained Earnings	45,000	25,000
	$100,000	$55,000

Company B has in inventory $3,000 of goods purchased from Company A. The income of Company A associated with the transaction was $1,200.

Required

Prepare a worksheet for a consolidated position statement as of December 31, 1959.

18–4 (See Problem 18–1) Assume Company A purchased all the common stock of Company B for $24,000.

Required

Prepare the elimination entries for the consolidated position statement at January 15, 1958.

18–5 (See Problem 18–1) Assume Company A purchased 80% of the common stock of Company B for $14,400.

Required

Prepare the elimination entries for the consolidated position statement at January 15, 1958.

18–6 (See Problem 18–1) Assume Company A purchased 70% of the common stock of Company B for $28,000.

Required

Prepare elimination entries for the consolidated position statement at January 15, 1958.

18–7 Company A owns 100% of the common stock of Company B. Company A has sold $1,000,000 of goods to B (which cost $900,000), of which $50,000 (which cost $45,000) are still in B's inventory. The total revenues and expenses of A and B are as follows:

	Company A	*Company B*
Revenues	$50,000,000	$10,000,000
Expenses	45,000,000	7,000,000
Income	$ 5,000,000	$ 3,000,000

Required

(a) Prepare the elimination entries which would appear on the position statement worksheet for the inter-company sales.

(b) Prepare a consolidated income statement.

18–8 Company A owns 60% of the common stock of Company B. In 1948, Company A sold a building to Company B for $10,000,000. The building cost A $8,000,000. On December 31, 1963 the net book value of the building was $7,000,000.

Required

Prepare the elimination entry which would appear on the position statement worksheet for the building.

18–9 In 1950, Company A paid $5,000,000 for an investment in B (5% of the common stock of B). Since acquisition, B has earned $200,000,000 of income and paid $80,000,000 of cash dividends. The market value of the investment as of December 31, 1963, was $70,000,000.

Required

How should the investment be presented on Company A's position statement?

18–10 On June 1, 1958, Company X purchased 70% of the common stock of Company Y for $35,000. At the time of purchase, the position statements of the two companies were as follows:

	Company X	*Company Y*
Other Assets	$145,000	$60,000
Investment in Company Y	35,000	
	$180,000	$60,000
Liabilities	$ 20,000	$10,000
Capital Stock	50,000	30,000
Retained Earnings	110,000	20,000
	$180,000	$60,000

Required

Prepare a worksheet for a consolidated position statement at the time of purchase of the stock.

18–11 (See Problem 18–10) As of December 31, 1958, the position statements of the two corporations were as follows:

	Company X	*Company Y*
Other Assets	$155,000	$70,000
Investments	35,000	
	$190,000	$70,000
Liabilities	$ 40,000	$15,000
Capital Stock	50,000	30,000
Retained Earnings	100,000	25,000
	$190,000	$70,000

Required

Prepare a worksheet for a consolidated position statement as of December 31, 1958.

18–12 The notes to the 1955 financial statements of General Electric Company contained the following item.

Note 4. *Investments*—Carrying values of investments in nonconsolidated affiliates represented the sum of outstanding advances to, and equity in the net worth of, each nonconsolidated affiliate at the close of the year. The net worth of each nonconsolidated affiliate was determined on the same accounting basis as was employed by the consolidated companies, including (a) the elimination of unrealized intercompany profits, and (b) the application of safety factor discounts to foreign currency values. In addition to advances made to nonconsolidated affiliates included in investments, there were also amounts due on open account included in Receivables totaling $57,970,288, and $54,730,167, and $54,078,578, at the end of 1955, 1954, and 1953 respectively.

Amounts due to nonconsolidated affiliates included in Accounts Payable totaled $3,261,744, $4,078,458, and $3,923,367 at December 31, 1955, 1954, and 1953.

Borrowings by domestic nonconsolidated affiliates from outside sources as of December 31, 1955, amounted to $155,299,500 borrowed by General Electric Credit Corporation and $85,550,000 by General Electric Distributing Corporation.

Investment in General Electric Common Stock represented the cost of 577,947 shares held for corporate purposes on December 31, 1955, the aggregate quoted market value of which was $33,376,439.

Miscellaneous securities were valued at cost except for certain investments which were written off some years ago as war losses and have subsequently been recovered in part. On December 31, 1955, their estimated market or fair value was $32,434,307.

Details of Investments	*December 31*		
Nonconsolidated Affiliated Companies:	*1955*	*1954*	*1953*
Canadian General Electric Company, Ltd.	$ 69,884,339	$ 58,785,602	$ 52,032,888
General Electric Credit Corporation	97,082,398	75,513,308	61,552,341
General Electric Distributing Corporation	22,990,463	26,931,078	28,004,817
Others	29,486,264	27,911,472	23,142,970
General Electric Company common stock	16,498,604	23,801,029	9,626,859
Miscellaneous securities	8,574,179	5,218,238	5,387,098
	$244,516,247	$218,160,727	$179,746,973
Reserve for investments	7,500,000	7,500,000	7,500,000
	$237,016,247	$210,660,727	$172,246,973

The investments were shown on the 1955 statement of financial position as $237,016,247.

Required

Comment on the amount of investment shown on the statement of financial position, i.e., the computation of the $237 million figure.

18–13 The following information was presented in the 1961 Annual Report of The Republic Steel Corporation.

REPUBLIC STEEL CORPORATION
AND CONSOLIDATED SUBSIDIARIES
Statement of Consolidated Income
Years Ended December 31, 1961 and December 31, 1960

	1961	*1960*
Sales, less discounts allowed	$965,902,989	$1,053,873,006
Dividends, interest, and other income—Note B	28,034,412	10,270,924
Total	$993,937,401	$1,061,143,930
Costs and expenses:		
Manufacturing cost of products sold—Note F	$801,237,734	$ 865,871,396
Administrative and selling expenses—Note F	47,701,805	51,770,129

REPUBLIC STEEL CORPORATION
AND CONSOLIDATED SUBSIDIARIES (continued)

Statement of Consolidated Income—Years Ended December 31, 1961 and December 31, 1960 (continued)

	1961	*1960*
Provision for depreciation, depletion, and amortization	41,091,883	36,371,446
Interest on long-term debt	8,844,809	5,646,550
Sundry other deductions	906,917	1,238,036
Federal taxes on income-estimated	$ 37,200,000	$ 50,400,000
Total	$936,983,148	$1,011,297,557
Consolidated Net Income	$ 56,954,253	$ 52,846,373

See Notes to consolidated financial statements.

Note B—Unconsolidated subsidiaries

The equity of the Corporation in the undistributed net income of unconsolidated subsidiaries, since dates of acquiring controlling interest therein, amounted to approximately $30,560,000 at December 31, 1961, and dividends received ($19,275,000) exceeded net income for the year 1961, by approximately $12,679,000.

In connection with certain bank loans of an unconsolidated subsidiary, the Corporation has agreed to purchase the notes evidencing such loans up to a maximum of $8,600,000 principal amount if such notes are not paid at maturity.

Note F—Pensions

Payments into pension trusts in prior years and aggregate payments of $14,154,339 for the year 1961, all of which were charged against income, have been sufficient to fund fully the cost of pensions granted to December 31, 1961, and to provide additional sums for funding pensions which may be subsequently granted. Assuming the continuance of pension plans as now constituted it is the present intention that similar payments will be made in future years.

Required

Comment on the measure of income for 1961.

18–14 The 1961 annual report of Union Carbide contained the following note:

The principles applied in preparing the accompanying consolidated statements are as follows: All 100 per cent owned subsidiary companies that operate in the United States, Puerto Rico and Canada are consolidated.

Current assets, deferred charges, and current liabilities of Canadian subsidiaries are translated at the rate of exchange in effect at December 31, 1961. Other assets and liabilities of Canadian subsidiaries are translated at the prevailing rate at the time of acquisition or assumption. Income of Canadian subsidiaries is translated monthly at the closing rate of exchange. The net accumulated unrealized gain of $209,000 from Canadian exchange has been credited to a suspense account.

Foreign subsidiary companies 100 per cent owned, and affiliated companies less than 100 per cent but not less than 50 per cent owned, are shown as investments. As of the dates of latest financial statements received, the Corporation's equity in these companies exceeds the amount at which the investments are carried by $118,926,000. A substantial portion of this amount has been invested in working capital and plant expansion of the foreign subsidiaries and affiliated companies. Only that part of the income of foreign subsidiaries and affiliated companies received as dividends is included in the income of the Corporation. The Corporation's equity in these companies increased by $6,600,000 during the current year. Financial statements of the foreign subsidiaries and affiliated companies are certified by independent auditors.

Required

Comment on the accounting procedures followed.

18–15 The consolidated balance sheet of the 1961 annual report of the Standard Oil Company of California showed investments of $106,781,000 in companies which were not over 50% owned. The notes to the financial statements included the following:

Principles of Consolidation

The accounts of subsidiary companies over 50% owned and controlled are included in the consolidated financial statements.

Dividends in 1961 from affiliated companies owned approximately 50% or less exceeded the Company's equity in their 1961 net income by $7,053,000. The Company's equity in the net assets of such companies at book value exceeded the investment in the Company's books at December 31, 1961 by $451,049,000.

No provision has been made for foreign and domestic taxes which may be payable on future distributions from surplus of subsidiaries and of companies owned approximately 50% or less.

Required

Comment on the accounting procedures followed.

18–16 The 1961 annual report of American Telephone and Telegraph Company included the following statement:

The Bell System Consolidated Financial Statements on the following pages consolidate the accounts of American Telephone and Telegraph Company and its principal telephone subsidiaries (listed on page 32). These companies maintain their accounts in accordance with the Uniform System of Accounts prescribed for telephone companies by the Federal Communications Commission.

For the companies consolidated, all significant intercompany items are excluded from these statements. Investment in subsidiaries not consolidated as stated in the Balance Sheets includes the proportionate interest in the net assets of such subsidiaries, and the proportionate interest in their earnings is included in the Income Statements.

Western Electric Company, the principal subsidiary not consolidated, manufactures most of the telephone equipment and apparatus used by the companies consolidated and sells to them materials and supplies procured fro mothers. Con-

tracts with the telephone companies provide that Western's prices to them shall be as low as to its most favored customers for like materials and services under consolidated and sells to them materials and supplies procured from others. Companies are entered in their accounts at cost to them, which includes the return realized by Western on its investment devoted to this business.

(Western Electric is 99.82% owned by AT&T.)

Required

Comment on the procedures.

19

Preparation and Analysis of Income and Position Statements

THE MAIN FUNCTIONS of this chapter will be to suggest a few of the more popular arrangements in use, to point up the limitations of the various methods of presenting the income statement and position statement, and to introduce the subject of financial statement analysis.

ALL-INCLUSIVE SINGLE-STEP INCOME STATEMENT

The all-inclusive single-step income statement has the virtue of being simple; yet it discloses all information that the reader of a financial report may desire. This description may give the impression that the search for a perfect income statement ended with the development of this form. Unfortunately, it has one fault: the information is disclosed, but it requires expert interpretation. The necessity for interpretation occurs because the revenues and expenses of this year are intermingled with the adjustments of previous years' incomes and charges arising from extraordinary occurrences (such as losses arising from floods, fires, wars) to obtain an item labeled "Net Income." Thus the results of this period's operations are, in a sense, buried with items which did not necessarily result from this period's operations.

EXAMPLE: All-Inclusive Single-Step Income Statement

The following form is the simplest form in which the income statement can be presented. Though it often is not explicitly stated, the "Net Income" shown in the following income statement is the income of the stockholders. Frequently the "Net Income" *of all capital contributors* will be shown, and then interest charges will be subtracted to find the income of the stockholders. If dividends are then subtracted, the residual will become the addition to the retained earnings for the year.

ABC COMPANY

Income Statement for Year Ending December 31, 19—

Revenues			
Sales Revenues	$20,000		
Less Sales Discounts	400	$19,600	
Other Revenues		900	
Adjustments (describe)		1,100	$21,600
Revenue Deductions			
Expenses (list)		$13,000	
Interest Charges		100	
Taxes		4,000	$17,100
Net Income			$ 4,500

ALL-INCLUSIVE MULTI-STEP INCOME STATEMENT

Instead of preparing the income statement so that there is only one "Income" figure shown, various subtotals may be included. Used in moderation, this is a useful device. For example, it would be possible to show the "Income from Operations," and then add or subtract the various adjustments and extraordinary items to compute the "Net Income." Having two income figures may confuse the reader slightly, but the necessity for distinguishing the results of this year's operations from other items which affected the change in the retained earnings may well justify the amount of confusion introduced.

Unfortunately the multi-step income statement often does not stop with two "Income" figures but continues on with such subtotals and titles as: Gross Income from Sales (actually revenues), Gross Profit, Income before Depreciation, and Income before Taxes. An accountant can get lost in the forest of figures that are sometimes shown on income statements.

By-passing the Income Statement

Up to this section it has been assumed that accountants never make entries directly to retained earnings for any transactions other than the declaration of dividends, transfer of the period's income, or transactions concerned with retiring of capital stock. Actually, some accountants make entries directly to retained earnings for transactions which do not affect this period's operations or which are extraordinary in nature. Making entries directly to

EXAMPLE: An All-Inclusive Multi-Step Income Statement

ABC COMPANY

Income Statement for Year Ending December 31, 19—

Revenues			
Sales		$20,000	
Less Sales Discounts		400	$19,600
Revenue Deductions—Expenses			
Manufacturing Cost of Goods Sold		$10,000	
Selling Expenses		2,000	
Administrative Expenses		1,000	
Taxes, Income		4,000	17,000
Net Operating Income			$ 2,600
Other Revenues and Adjustments			
Interest Revenues	$ 900		
Adjustment of Depreciation	1,100	$ 2,000	
Other Deductions			
Interest Charges		100	$1,900
Net Income			$4,500

retained earnings carries the implication that the transaction will not be disclosed in the income statement. By-passing the income statement is not a good practice. It gives management an opportunity to manipulate the incomes of successive periods, which is not possible if all items must be disclosed. For example, they may charge less than normal depreciation for four years and show an income. If in the fifth year, depreciation is adjusted by debiting retained earnings directly and crediting the allowance for depreciation, none of the incomes of the five years will be charged with the pro rata cost of using the fixed assets during the five-year period. If the accountant is not allowed to make entries directly to retained earnings, then the fifth year's income will have to bear the burden of the depreciation adjustment, and the manipulation will lose much of its purpose.

THE POSITION STATEMENT

The most popular method of presenting the financial position of a business enterprise is the *balanced array* presentation. This procedure shows the total assets and the total equities arrayed side by side, or the equities immedi-

ately below the assets. The total assets will, of course, equal the total equities.

An alternative method of presentation is the *step* presentation. This form has the advantage of highlighting the relationship of the current assets to the current liabilities and of showing the difference between the two (net working capital). It has the disadvantage of not showing the total assets, and even more important, of not showing the total liabilities. (*See* the position statement of the United States Steel Corporation.)

EXAMPLE: Single Step Income Statement

UNITED STATES STEEL CORPORATION*

Consolidated Statement of Income

	1960	*1959*
Products and services sold	$3,698,494,931	$3,643,040,035
Costs		
Employment costs		
Wages and salaries	1,453,317,932	1,355,034,915
Pensions and other employe benefits	246,669,660	221,168,500
	1,699,987,592	1,576,203,415
Products and services bought	1,091,166,958	1,278,199,885
Wear and exhaustion of facilities	208,424,291	189,854,452
Interest and other costs on long-term debt	16,942,052	17,647,717
State, local and miscellaneous taxes	107,803,048	93,571,165
Estimated United States and foreign taxes on income	270,000,000	233,000,000
Total	3,394,323,941	3,388,476,634
Income	304,170,990	254,563,401
Dividends declared		
On cumulative preferred stock ($7 *per share*)	25,219,677	25,219,677
On common stock ($3 *per share*)	162,016,191	161,816,789
Income reinvested in business	$ 116,935,122	$ 67,526,935

* Courtesy the United States Steel Corporation.

EXAMPLE: Step Position Statement

UNITED STATES STEEL CORPORATION*

Consolidated Statement of Financial Position

	Dec. 31, 1960	*Dec. 31, 1959*
Current assets		
Cash	$ 276,501,195	$ 258,430,638
United States Government securities, at cost (approximates market)	175,218,208	257,015,168
Receivables, less estimated bad debts	218,523,857	311,985,387
Inventories	725,599,116	596,341,886
Total	1,395,842,376	1,423,773,079
Less		
Current liabilities		
Accounts payable	373,065,094	452,895,240
Accrued taxes, less United States Government securities of $154,000,000 at December 31, 1960 and $153,300,000 at December 31, 1959	336,194,106	275,756,872
Dividends payable	46,835,794	46,793,037
Long-term debt due within one year	31,652,777	32,789,544
Total	787,747,771	808,234,693
Working capital	608,094,605	615,538,386
Miscellaneous investments, less estimated losses	43,036,483	41,402,425
United States Government securities set aside for property additions and replacements	300,000,000	495,000,000
Plant and equipment, less depreciation	2,787,553,310	2,511,840,798
Operating parts and supplies	48,898,855	49,924,902
Costs applicable to future periods	51,518,319	37,196,216
Total assets less current liabilities	3,839,101,572	3,750,902,727
Deduct		
Long-term debt	422,778,670	454,447,447
Reserves for insurance, contingencies and accident and hospital expenses	114,455,398	112,727,898
Excess of assets over liabilities and reserves	$3,301,867,504	$3,183,727,382
Ownership evidenced by		
Preferred stock, 7% cumulative, par value $100 (authorized 4,000,000 shares; outstanding 3,602,811 shares)	$ 360,281,100	$ 360,281,100
Common stock (authorized 90,000,000 shares; outstanding 54,033,307 shares at December 31, 1960 and 53,961,007 shares at December 31, 1959)	2,941,586,404	2,823,446,282

UNITED STATES STEEL CORPORATION * (continued)

Consolidated Statement of Financial Position

		Dec. 31, 1960	*Dec. 31, 1959*
Par value $16\frac{2}{3}$ per share	$ 900,555,117		
Income reinvested in business (*addition of $116,935,122 in 1960*)	2,041,031,287		
Total		$3,301,867,504	$3,183,727,382

* Courtesy the United States Steel Corporation.

Position Statement and Financial Position

It should never be assumed that the position statement as prepared by the accountant reflects the present worth of the enterprise. This is not to imply that accountants are dishonest, for the discrepancies are the inevitable result of accepted accounting conventions, changing price levels, changing economic conditions, or faulty judgment. It should be remembered that the corporation is assumed to have an infinite life, and the "going concern" convention is the foundation for the methods used by the accountant in reporting financial position.

The following items are illustrative of the reasons why the position statement may fail to reflect the present financial situation of the corporation:

Result of Accepted Accounting Conventions
- Use of LIFO for measuring value of inventories
- Treatment of development and organization costs

Result of Changing Price Level (with accounting conventions)
- Inventories (especially if LIFO is used)
- Fixed Assets

Changing Economic Conditions
- Inadequate accruals of depreciation
- Failure to write off obsolete plant and equipment

Faulty Judgment
- Inadequate depreciation accruals
- Inadequate allowance for uncollectible accounts
- Treatment of goodwill and other intangibles

ANALYSIS OF FINANCIAL STATEMENTS

There are no short cuts to intelligent analysis of financial statements, for there are many items in financial statements which are not what they seem to be, and only a knowledge of accounting theory and practice can ensure a sound interpretation. Equally important is the fact that the analysis should be detailed and should not rely upon a few rules of thumb (usually taking the form of ratios). There are various tools that, when intelligently used, are exceedingly helpful, but none of these tools of analysis is any better than the information upon which it is based.

This section will deal with some of the more common pitfalls awaiting the unwary analyst of financial statements, and the use of the tools of financial analysis. It should be noted that financial analysis based on published accounting data is essentially a short-run analysis. The long-run future of the firm is related to future business conditions, technology, and other items which the accountant does not measure (such as the caliber of the younger executives of the firm).

Assets or Debits?

One of the first things the analyst should realize is that not all items on the asset side of the position statement are assets; some are accounts with debit balances which are mistakenly placed in the assets section. Some examples of these items are treasury stock, treasury bonds, "prepaid interest," bond discount, and even operating deficits.

Another problem arises because certain items which the accountant classifies as assets have no liquidation or sale value. They appear on the position statement because they apply to the revenues of future periods or because they are considered permanent assets. Among these items are goodwill, organization costs, bond issue costs, and development costs. For certain decisions items of this nature may be eliminated by the financial analyst when he is computing the assets of the firm. It may be appropriate to include only tangible assets and intangible assets which have a determinable value, for example, a patent recently purchased.

Equities or Credits?

Public utilities are frequently guilty of the practice of placing the allowance for depreciation on the equity side of the position statement. This tends to overstate total assets and should be adjusted by the analyst. The allowance for depreciation is properly a subtraction from fixed assets.

Another difficulty is the treatment of the various items found between the liabilities and the stockholders' equity. There is little need for using this category of accounts. Such items can be usually classified as liabilities or stockholders' equity. Thus, advances by customers (sometimes called *unearned income*) is actually a liability, and reserve for contingencies is usually stockholders' equity (unless the reserve is set up for a specific event which has already occurred and is in fact a liability).

Valuation of Assets

The four main problems of valuation arise in the areas of intangibles, inventories, investments, and fixed assets. The problem of valuing intangibles may be avoided if they are subtracted by the analyst from the asset total (they may be considered a residual, valued by earning power in excess of what would normally be expected from the tangible assets). The problem of valuing inventories is especially important when the firm has been using LIFO. Usually, the analyst will not have the information necessary for accurate adjustment unless he has access to company records or unless the market value of the inventory is stated in the financial report. Taking this information, the analyst may either make a rough estimate or use the LIFO valuation and qualify his figures. The problem of valuing investments is simplified by the fact that market values are often given in the financial report. If they are not given, and the specific nature of the investment is not stated, then the analyst is again at a disadvantage. The problem of valuation of fixed assets is actually a double problem of finding the present value of the assets and the extent to which their useful life has expired. These two items may bear little or no relationship to the original cost of the asset or book depreciation. Usually, the analyst will accept the book figures, although he should realize that the information given on the position statement may have no relationship to current values of the fixed assets.

Indirectly, these comments on the asset and equity sides of the position statement and on the valuation of assets stand as an indictment of current financial reporting. For many purposes, financial reporting is inadequate and far from complete. In some cases, it is actually misleading.

The Income Statement

It is somewhat comforting to see that a share of stock earned X dollars and Y cents. This is a positive and clear-cut statement, although it may also be misleading. The measurement of the income of a business entity for a short period of time is a difficult process. The smaller the period of time, the more difficult the measurement, but this is not the place for a critique of

current income measurement theory. Thus, only a few items requiring appraisal will be mentioned.

One of the main difficulties is the inclusion or exclusion of items that are essentially adjustments of prior years' incomes and not revenues of this period or expenses of gaining the revenues of this period. An item of this nature, when large, can distort the measurement of the period's income.

Two other difficulties stem from the measurement of depreciation and tax expense of the period. The depreciation expense is complicated by the changes in the price level, the choice of the method of depreciation, and the allowance of rapid depreciation for tax purposes. The last item is especially important when it is being administered under a certificate of necessity given by the federal government, which allows a firm to depreciate the cost of an asset over a 5-year period. The income tax is affected because it will be decreased in the early years and increased in the later years. The handling of these difficulties varies to a great extent among companies, and the analyst should not compare without adjustment companies which use different procedures.[1]

The cost-of-goods-sold charge will be affected by the choice of inventory procedure; thus the analyst may be faced with a necessity for adjustment. This is especially true, since both FIFO and LIFO may be used.

There are a whole host of problems connected with deciding whether an item is an expense of this period or actually should be spread over several accounting periods. Examples of these items are repairs, maintenance, research, and development expenditures. The analysis is even further complicated by the fact that many of these expenditures may be postponed for several periods. Thus, a major railroad, which commonly charged all repairs to expense, improved its reported income for a year by reducing necessary maintenance. As might be expected, in the next period trains began to break down with increasing frequency.

Despite these complications, an analysis and comparison of the incomes of corporations can be very revealing, especially if the measurements of the incomes are placed on comparable bases.

RATIO ANALYSIS

Financial ratios are useful because of their ability to summarize briefly the results of detailed and complicated computations. The danger from using

[1] Certificates of necessity were used to stimulate expansion of selected industries in World War II and the Korean War. The accounting problems created by their use still exist since the assets currently in use may have been depreciated over a five year period, understating the income of the early years and overstating the current incomes.

ratio analysis is to examine only one ratio and draw an unwarranted conclusion. For example, an investor purchased the stock of a company largely on the basis of its sound current position (current assets were 20 times as large as current liabilities). The fact that this company was committed to purchasing a large amount of fixed assets had not been taken into consideration.

Among the ratios to be studied are:

Position Statement Ratios
- Quick Ratio
- Current Ratio
- Stock Equity Ratio
- Stock Equity—Asset Ratio

Income Statement Ratios
- Operating Ratios

Income-Position Statement Ratios
- All-Asset Earning Rate
- Stock-Equity Earning Rate

In addition to these ratios, there are other computations which are relevant:

Working Capital
Book Value per Share of Common Stock
Earnings per Share of Common Stock
Dividends per Share of Common Stock

Quick and Current Ratios

Both the quick and current ratios give an indication of the current position of the firm. The two ratios differ in that the quick ratio includes only the more liquid of assets, usually only cash, marketable securities, and good accounts receivable. Thus the quick ratio gives a picture of the firm's ability to meet its immediate liabilities, assuming the very worst in terms of operations. The current ratio, by including all current assets, gives an indication of the firm's ability to meet its short-term liabilities, assuming normal operations.

The quick ratio is also called the *acid test* ratio.

$$\text{Quick ratio} = \frac{\text{very liquid assets}}{\text{current liabilities}}$$

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

Stock Equity Ratio and the Stock Equity—Asset Ratio

These ratios give an indication of the ability of the firm to survive losses from the point of view of the financial position of the firm. Obviously the

earning prospects of the firm are also relevant in judging a firm's ability to survive in the long run. The stock equity ratios are only two of the factors to be taken into consideration.

There are numerous ways in which the stock equity ratio may be expressed, for example, the ratio of stock equity to total assets, the ratio of long-term debt to stock equity, or the ratio of stock equity to the sum of long-term debt and stock equity. Two definitions will be used here.

$$\text{Stock equity ratio} = \frac{\text{stockholders' equity}}{\text{long term debt plus stockholders' equity}}$$

$$\text{Stock equity–asset ratio} = \frac{\text{stockholders' equity}}{\text{total assets}}$$

Operating Ratios

It is more reasonable to speak of operating *ratios* than an operating *ratio*. The most useful procedure is to take a ratio of each revenue deduction and the income to the total revenue figure. In effect, the uses of the revenues are being identified.

EXAMPLE

		Operating Ratios
Sales	$10,000	100%
Less Sales Discounts	300	3
Net Revenues	$ 9,700	97%
Expenses and Taxes		
Cost of Goods Sold	$ 3,000	30%
Selling Expense	2,000	20
Administrative Expense	2,700	27
Income Taxes	1,000	10
Total Expenses and Taxes	$ 8,700	87%
Net Income	$ 1,000	10%

Two percentages are often picked out for special attention. One is the ratio of cost of goods sold to sales. In fact, a subtotal called "Gross Profit" is often computed (sales less the cost of goods sold), and this is expressed as a percentage of sales. In the preceding example, this would be 67%. The second percentage of interest is the ratio of total expenses to total revenues (87% in the example). This is sometimes termed *the* operating ratio. Because of the difficulty in determining what should and should not be included, the broader and more useful definition of operating ratios is used in this text.

By comparing like firms, or the same firm in successive periods, significant changes can be observed by using the operating ratios. Thus, if selling expense is 20% of each sales dollar in 1957 and 35% of each sales dollar in 1958, the increase should be investigated.

All-Asset Earning Rate

The all-asset earning rate gives an indication of the efficiency with which the resources of the firm are being used. In order to eliminate the effects of the capitalization structure, the interest charge is not deducted in computing the earnings of the firm. Taxes may or may not be deducted, depending on the use of the rate when computed. The danger in not deducting taxes is that the rate of return thus obtained may be incorrectly assumed to be the return available to the owners of the enterprise. Some accountants advocate the elimination of noninterest-bearing current liabilities or the addition of an implicit interest chargeback to the income as computed for the earnings on assets financed by these assets. This is a complication that will be ignored here in order to prevent the confusion which accompanies this adjustment.

$$\text{All-asset earning rate} = \frac{\text{net income (before deduction of interest)}}{\text{average total assets used during period}}$$

The net income is divided by the average total assets used during the period. This average may be made exact by noting the specific dates on which assets are added or retired from service, or it may be taken as a simple average of the beginning and ending balances of total assets. The book figures should not be accepted as given but should be adjusted as needed.

Stock-Equity Earning Rate

The stock-equity earning rate gives an indication of how efficiently the investment of the stockholders is being used. There is a danger in not analyzing beyond this rate. A good stock-equity earning rate may be obtained by using a large amount of debt (this is called *trading on the equity*). While this may result in a high stock-equity earning rate, it will also increase the financial risk connected with running the enterprise.

$$\text{Stock-equity earning rate} = \frac{\text{earnings of stockholders}}{\text{average stockholders' equity}}$$

Working Capital

Working capital is a term which has two meanings. It may refer to total current assets or to the difference between current assets and current liabilities. The latter definition is more useful and will be used here.

$$\text{Working capital} = \text{current assets} - \text{current liabilities}$$

Book Value per Share of Common Stock

In recent years, the book value per share of stock has lost much of its meaning. This is related to the inflation of the post-World War II period,

and certain accounting practices, such as LIFO, "Cost or Market, whichever Is Lower," adherence to the original cost for fixed assets and investments, etc. Despite the validity of the suspicions directed against book value, the fault does not lie with book value itself but with the conventions of reporting the financial position of a firm. The book value per share of stock does have significance when the "books" are kept in a significant manner or when the relevant information is supplied in supplementary reports.

$$\text{Book value per share of common stock} = \frac{\text{common stock equity}}{\text{number of shares outstanding}}$$

Earnings and Dividends per Share

Both the earnings and the dividends per share of common stock are meaningful to investors. Complications arise in the treatment of stock dividends, i.e., the issuance of additional shares of stock instead of cash disbursements. These additional shares are not income to the stockholders and thus should be excluded when computing dividends per share. They will, however, influence the number of shares outstanding.

$$\text{Earnings per share} = \frac{\text{earnings of stockholders}}{\text{number of shares outstanding}}$$

$$\text{Dividends per share} = \frac{\text{total cash dividends}}{\text{number of shares outstanding}}$$

Earning of Interest

The holders of bonds are interested in the security of their investment, and one measure of safety is the number of times the total interest is earned. This is called *times interest earned* and is computed by dividing the net income of the corporation (before the deduction of interest charges) by the total interest payments. While the bondholder is really interested in future earnings, the present earnings are frequently used.

EXAMPLE

The income of the ABC Company before deducting interest is $200,000. There are 100 $1,000 bonds outstanding with a coupon rate of 4%. Compute the number of times the interest is earned.

Solution: The annual interest payments are 40×100, or $4,000. The interest is earned $\frac{\$200,000}{\$4,000} = 50$ times.

Because of difficulties in measuring income and because interest is paid out of funds, some analysts prefer to use funds generated by operations instead of using net income. The computation of funds generated by operations is explained in Chapter 20.

Investors in preferred stock have a problem analogous to that of the bondholders in that they expect a fixed payment. Thus they will make a computation to see how many times the preferred stock dividend is earned (net income minus interest charges are used in the numerator).

QUESTIONS AND PROBLEMS

19–1 The Exray Company

Required

Compute Quick Ratio, Current Ratio, Stock Equity Ratio, Operating Ratios, All Asset Earning Rate, Stock Equity Earning Rate, and Working Capital for the year 1964, or as of December 31, 1964.

THE EXRAY COMPANY

Comparative Balance Sheets

	December 31	
	1964	*1963*
Cash	$ 38,000	$ 41,000
Accounts Receivable	65,000	35,000
Inventories	175,000	100,000
U.S. Treasury Notes (maturing February 10, 1969		60,000
Prepaid Expenses	7,000	4,000
Land	70,000	40,000
Buildings	160,000	80,000
Machinery and Equipment	180,000	120,000
	$695,000	$480,000
Allowance for Uncollectibles	$ 2,000	$ 1,000
Allowance for Depreciation	55,000	35,000
Accounts Payable	48,000	34,000
Notes Payable (due June 30, 1965)	40,000	
Common Stock	400,000	300,000
Retained Earnings	150,000	110,000
	$695,000	$480,000

THE EXRAY COMPANY

Income Statement
for Year Ending December 31, 1964

Sales (net)		$200,000
Less:		
Operating Expenses *	$104,000	

Loss on Sale of Machinery †	1,000	
Taxes	35,000	140,000
Net Income		$ 60,000
Dividends		20,000
Increase in Retained Earnings		$ 40,000

* Includes $25,000 of depreciation.

† The cost of the machinery sold was $8,000. The book value at the time of the sale was $3,000. The machinery was sold for cash.

19–2 The Rogers Company

Required

Compute the following for the year 1964: Quick Ratio, Current Ratio, Stock Equity Ratio, Operating Ratios, All Asset Earning Rate, Stock Equity Earning Rate, Working Capital, Book Value per Share, and Dividends per Share. The company issued the additional shares of stock on January 1, 1964, as a stock dividend.

THE ROGERS COMPANY

Comparative Balance Sheets

	December 31	
	1964	*1963*
Cash	$120,000	$100,000
Accounts Receivable	173,000	120,000
Inventories	40,000	90,000
Machinery and Equipment	55,000	40,000
Bonds Payable, Discount	4,750	5,000
	$392,750	$355,000
Allowance for Uncollectibles	$ 2,000	$ 1,000
Allowance for Depreciation	6,000	4,000
Accounts Payable	40,000	50,000
Bonds Payable	100,000	100,000
Common Stock	150,000 *	50,000
Retained Earnings	94,750	150,000
	$392,750	$355,000

THE ROGERS COMPANY

Income Statement for Year Ending December 31, 1964

Sales	$300,000	
Less Allowance for Uncollectibles	3,000	$297,000
Expenses and Taxes		
Cost of Goods Sold	$200,000	
Operating Expenses	40,000	

THE ROGERS COMPANY (continued)

Income Statement
for Year Ending December 31, 1964

Taxes	7,000	247,000
Net Income		$ 50,000
Interest Charges		5,250
Earnings of Stockholders		$ 44,750
Stock Dividends		100,000
Decrease in Retained Earnings		$ 55,250

* Represents 10,000 shares of common stock outstanding.

19-3 The Ithaca Gas Light Company

Required

Compute Quick Ratio, Current Ratio, Stock Equity Ratio, Working Capital, and Book Value per Share.

THE ITHACA GAS LIGHT COMPANY

Position Statement
as of December 31, 1964

Assets

Current			
Cash		$ 100,000	
Marketable Securities		200,000	
Accounts Receivable	$150,000		
Less Allowance for Uncollectibles	40,000	110,000	
Inventories		40,000	
Prepaid Expenses		50,000	$ 500,000
Plant Assets			
Land		$100,000	
Buildings		150,000	
Equipment		450,000	700,000
Total Assets			$1,200,000

Equities

Current Liabilities		
Accounts Payable	$ 50,000	
Interest Payable	140,000	
Taxes Payable	10,000	$ 200,000
Long Term Liabilities		
Bonds Payable		400,000

Reserves		
Reserve for Depreciation	$150,000	
Reserve for Contingencies	100,000	
Reserve for Possible Future Price Decline	50,000	300,000
Stockholders' Equity		
Common Stock *	$200,000	
Retained Earnings	100,000	300,000
Total Equities		$1,200,000

* Represents 20,000 shares of common stock outstanding.

19-4 The Quick Company

The president of the Quick Company has made arrangements to obtain a loan from the City National Bank. One of the requirements of the loan is that the Quick Company have a current ratio of two to one as of the date of the loan, and three to one after the loan. The controller has made the following *pro forma* position statement for the date of the loan (May 15, 1964) which does not include the loan.

QUICK COMPANY

Pro Forma Position Statement
as of May 15, 1964

Cash	$210,000
Accounts Receivable (net)	40,000
Inventories	50,000
Plant Assets (net)	200,000
	$500,000
Accounts Payable	$100,000
Taxes Payable	150,000
Common Stock	60,000
Retained Earnings	190,000
	$500,000

A computation of the current ratio as of May 15 indicates a current ratio of 300,000/250,000, or 1.2 to 1.

There is not enough time to issue additional shares of common stock or long term debt securities.

Required

(a) What would you suggest be done in order to attain the desired current ratio of two to one?

(b) What does this suggest about the reliability of current ratios?

19-5 The Current Company

THE CURRENT COMPANY

Position Statement
as of December 31, 1964

Cash	$ 250,000	Accounts Payable	$ 100,000
Accounts Receivable	60,000	Taxes Payable	100,000
Inventories	90,000	Reserve for Depreciation	200,000
Plant Assets	600,000	Common Stock	100,000
		Retained Earnings	500,000
	$1,000,000		$1,000,000

ADDITIONAL INFORMATION:

1. The company does not set up an allowance for uncollectible accounts. Past experience indicates that 5% of the accounts currently shown will not be collected.
2. The company uses a LIFO inventory procedure. The current market value of the inventory is $50,000.
3. The actual liability to the government for taxes is $250,000. The $100,000 is the result of subtracting $150,000 of government bonds which the company owns from the amount owed, $250,000.
4. Depreciation has been accrued without taking into consideration the factor of obsolescence. If this had been considered, the depreciation accrual for assets currently in use would be $100,000 greater.

Required

Compute the following ratios, before and after taking note of the additional information given: Quick Ratio, Current Ratio, and the ratio of Stockholders Equity to the Total Assets Employed.

19-6 The following questions apply to the annual report of the X Company. (Note to student: The annual report will be passed out in class or will be made available in the library.)

Required

(a) Compute the following ratios or percentages:
  Position Statement Ratios
    Quick Ratio
    Current Ratio
    Stock-Equity Ratio
  Income Statement Ratios, Operating Ratios
  Income, Position Statement Ratios
    All-asset earning rate
    Stock-equity earning rate

(b) Compute the following items:
    Working Capital

Book Value per Share
Earnings per Share of Common Stock
Dividends per Share of Comomn Stock
Times interest earned

(c) What additional financial (accounting) information do you desire that is not presented in the annual report? Is there any significant financial information that is presented in the body of the report or in footnotes which is not incorporated into the financial statements? Write a brief critique of the annual report and the financial statements.

(d) Write a brief statement describing the financial condition of the Company. Make use of the ratios computed in part (a).

(e) Before forming an opinion as to the desirability of investing in this firm, what additional information would you desire?

19–7 On December 20, the management of the Hood Company held a conference. The following pro forma (predicted) statement was presented by the Controller.

THE HOOD COMPANY

Position Statement (Pro Forma) as of December 31, 1964

Cash	$100,000	Current Liabilities	$100,000
Accounts Receivable	40,000	Common Stock	300,000
Inventories	60,000	Retained Earnings	100,000
	$200,000		
Long-lived Assets (net)	300,000		
	$500,000		$500,000

The Controller also presented the pro forma current ratio and working capital computations. These two figures are particularly relevant, because the company expects to be making a short-term loan from a bank shortly.

$$\text{Current ratio} = \frac{\$200{,}000}{\$100{,}000} = 2 \text{ to } 1$$

$$\text{Working capital (net)} = \$200{,}000 - \$100{,}000 = \$100{,}000$$

The president of the firm was dissatisfied with the projected financial report because he had informally promised the loan officer of the bank a current ratio of three to one and net working capital of $100,000. He requested suggestions from the other members of management as to how to improve the current position of the firm by December 31, 1964.

One suggestion offered was to borrow money on a long-term loan or issue new stock. These suggestions were sound, but the president and the treasurer were of the opinion that neither of the suggestions could be carried out in the 10 days remaining in the year. Another suggestion was to postpone making purchases of raw material, etc. This suggestion was vetoed by the production manager on the grounds that inventories were already down to an operating minimum.

Required

(a) If you were the treasurer of this firm, what would you suggest?
(b) What does this problem suggest relative to the reliability of the current ratio?

19–8 The Large Automobile Company and the Current Utility Company have position statements as follows as of December 31, 1964:

THE LARGE AUTOMOBILE COMPANY

Position Statement
as of December 31, 1964

(Dollars in Thousands)

Cash	$ 450,000	Current Liabilities	$1,350,000
Securities	800,000	Long-term Liabilities	650,000
Accounts Receivable	500,000	Stockholders' Equity	3,000,000
Inventories	950,000		
	$2,700,000		
Long-lived Assets (net)	2,300,000		
	$5,000,000		$5,000,000

THE CURRENT UTILITY COMPANY

Position Statement
as of December 31, 1964

(Dollars in Thousands)

Cash	$ 30,000	Current Liabilities	$ 80,000
Accounts Receivable	50,000	Long-term Liabilities	460,000
Materials and Supplies	10,000	Stockholders' Equity	460,000
Other (prepayments)	10,000		
	$ 100,000		
Long-lived Assets (net)	900,000		
	$1,000,000		$1,000,000

Required

(a) Compute and compare the following ratios of the two companies:
Quick Ratio
Current Ratio
Stock Equity Ratio
(b) Comment on the significance of the ratios for the two companies. Are the ratios comparable? If not, why?

19–9 The Tuck Company

THE TUCK COMPANY

Position Statement as of December 31, 1964

Assets

Current		
Cash	$100,000	
Investments in Subsidiary Companies	400,000	
Accounts Receivable	200,000	
Inventories		
Materials and Supplies	150,000	
Construction of Plant in Progress *	100,000	
Prepaid Interest on Notes Payable	50,000	$1,000,000
Long-lived Assets (Cost)		
Land	$200,000	
Buildings	400,000	
Machinery	100,000	700,000
Investments, Tuck Company Stock		200,000
Goodwill		100,000
Total Assets		$2,000,000

Equities

Current Liabilities		
Accounts Payable	$ 60,000	
Taxes Payable	40,000	
Notes Payable (due on July 1, 1965)	500,000	$ 600,000
Long-term Liabilities		
Bonds Payable (due 1975)		400,000
Reserves		
Reserve for General Contingencies	$100,000	
Reserve for Uncollectible Accounts	20,000	
Reserve for Deterioration and Obsolescence of Long-lived Assets	80,000	
Advances by Customers	15,000	
Reserve for Inventory Valuation †	25,000	240,000
Stockholders' Equity		
Capital Stock		500,000
Retained Earnings		260,000
		$2,000,000

* The company is having a new plant constructed. This represents payments to date.

† The company uses LIFO. This reserve is set up for the difference between the book figure for inventory of materials and supplies ($150,000) and the market value of the inventory.

Required

Compute the Quick Ratio, Current Ratio, and Stock Equity Ratio. Present a revised position statement prepared in good form.

19–10 The Foxy Corporation has been struggling along for a period of years, being neither profitable nor very well managed. Its financial statements for 1954 were as follows:

THE FOXY CORPORATION

Position Statement
as of December 31, 1954

Total Assets	$30,000,000
Current Liabilities	$ 1,000,000
Stock Equity (one million shares outstanding)	29,000,000
Total Equities	$30,000,000

Income Statement for Year
Ending December 31, 1954

Revenues	$40,000,000
Revenue Deductions	39,500,000
Net Income	$ 500,000

No dividends were paid in 1954, and the stock was selling for $5 per share (this was ten times earnings).

In the beginning of 1955, controlling interest in The Foxy Corporation was acquired by a group of dynamic investors. They immediately shuffled management around, but by the end of 1956 it was obvious that more drastic action would be needed if they were to make a profit on their investment. The stock was still earning $0.50 per share and selling at $5.00 per share, and there was no prospect of dividends, since all the cash being generated was being used to replace machinery.

In January of 1957, The Foxy Corporation acquired The Blue Chip Company. The Blue Chip Company had earned $2,000,000 in the year 1956. The acquisition was financed by the issuance of 5% debenture bonds. It cost The Foxy Company $30,000,000 to acquire 100% ownership of The Blue Chip Company. The projected financial statements of The Foxy Corporation for the year 1957 were as follows:

THE FOXY CORPORATION

Projected Position Statement
as of December 31, 1957

Total Assets	$63,500,000
Current Liabilities	$ 1,000,000

Long-term Debentures	30,000,000
Stock Equity	32,500,000
Total Equities	$63,500,000

THE FOXY CORPORATION

Projected Income Statement for the Year Ending December 31, 1957

Revenues	$100,000,000
Revenue Deductions (expenses and taxes)	97,500,000
Net Income	$ 2,500,000

The reasoning of the investors who controlled The Foxy Corporation was as follows: The income would increase to $2,500,000, or $2.50 per share. This was based on the assumption that The Blue Chip Corporation would continue to earn $2,000,000 per year (there was reason to believe the present management would continue to run the new division), and the old Foxy Corporation would continue to earn $500,000 per year.

With earnings of $2.50 per share, the cash dividends could be resumed, and the price of the stock of The Foxy Corporation could be expected to increase to $25.00 per share (ten times earnings).

Prior to purchase, The Blue Chip Corporation had a stock equity ratio of 100%.

Required

Analyze the situation before and after the acquisition of The Blue Chip Company. Would you expect the price of the stock to increase to $25.00 per share? Explain.

19–11 The following is a preclosing trial balance of the Kalb Company.

THE KALB COMPANY

Trial Balance as of December 31, 1964

Accounts Payable		$ 20,000
Accounts Payable, Allowance for Purchase Discounts	$ 1,000	
Accounts Receivable	35,000	
Accounts Receivable, Allowance for Sales Returns		500
Accounts Receivable, Allowance for Uncollectibles		2,500
Bank	40,000	
Land	10,000	
Building	50,000	
Building, Accumulated Depreciation		18,000
Cash	2,000	
Cost of Goods Sold	30,000	
Depreciation Cost	1,000	

THE KALB COMPANY (continued)

Trial Balance
as of December 31, 1964

Interest Charge	500	
Interest Payable		250
Investments	3,500	
Merchandise	6,000	
Notes Payable (due March 1, 1959)		10,000
Salaries, Administrative	10,000	
Salaries, Selling	5,000	
Sales		70,000
Sales, Adjustment for Uncollectibles	3,000	
Sales, Returns	1,000	
Capital, Stock		40,000
Retained Earnings		42,000
Taxes	12,000	
Taxes Payable		6,000
Wages and Salaries Payable		750
	$210,000	$210,000

Required

Prepare an income statement and position statement from the trial balance.

19–12 The Kane Company

THE KANE COMPANY

Trial Balance
as of December 31, 1964

Accounts Payable		$ 10,000
Accounts Receivable	$ 30,000	
Accounts Receivable, Allowance for Sales Discounts		1,000
Accounts Receivable, Allowance for Sales Returns		400
Accounts Receivable, Allowance for Uncollectibles		2,600
Adjustment of Depreciation, Prior Years	10,000	
Bank	45,000	
Building	80,000	
Building, Accumulated Depreciation		50,000
Cash	5,000	
Cost of Goods Sold	50,000	
Depreciation Cost	2,000	
Dividends on Stock	4,000	
Interest Charges	3,000	
Interest Payable		1,500
Land	10,000	
Investments	51,000	
Marketable Securities	6,000	
Merchandise	20,000	

Notes Payable		30,000
Revenues, Dividends and Interest		2,500
Revenues, Sales		120,000
Sales, Adjustment for Uncollectibles	3,000	
Sales Discounts	2,000	
Sales Returns	1,000	
Capital Stock		20,000
Retained Earnings		123,000
Taxes, Current Year	4,000	
Taxes, Adjustment of Prior Years	20,000	
Taxes Payable		22,000
Wages and Salaries	40,000	
Wages and Salaries Payable		3,000
	$386,000	$386,000

Required

Prepare an income statement and a position statement from the trial balance.

19–13 The United States Steel Corporation

The 1959 annual report of the United States Steel Corporation contained this description of the accounting for pensions (pp. 17–18).

Pension Trusts

The sums shown in the table for the current service costs of pensions are determined by an independent actuary as the present value of that part of prospective future pensions to which present employes, as a group, may become entitled by reason of service rendered during the year.

In 1959 full provision was made for funding of current service pension costs on the same basis as in 1957 and prior years. For each year 1950 through 1957, U.S. Steel has funded the annual current service cost of pensions, including interest on past service cost, and in addition has paid the approximate maximum permitted by United States Treasury Department tax regulations against past service cost. Such additional payments totaled $297 million to December 31, 1957, of which $61 million was used to cover the current service cost of noncontributory pensions for the first three quarters of 1958. If provision for current service cost had been made in 1958 on the same basis as in 1959, the additional employment cost charged against income for the year 1958 would have amounted to approximately $61 million before the effect of income taxes and $29.3 million after such taxes.

Past service cost applies against the actuarial cost of noncontributory pensions for service rendered prior to March 1, 1950, the effective date of the present plan. The cost which had not been funded at that date was then estimated at $496 million. Although full provision was made for current service pension cost in 1959, the Board of Directors, in the exercise of its discretion with respect to making financial provisions for pension costs, determined that because of the reduced steel operating rate which was brought about by the steelworkers' strike, no payments be made toward the funding of past service cost for the year 1959. In 1958 the Board of Directors also determined that no payments be made in that

year toward the funding of past service pension cost. Payments provided since March 1, 1950, for funding past service pension costs totaled $236 million to December 31, 1959.

There is no unfunded past service cost in connection with contributory pensions, since no service prior to the date of employe participation is involved in determining benefits.

Cost of Employe Benefits

	1959	1958
Pension costs		
Noncontributory part of pension plan		
Funding of current service cost (including interest on past service cost)	$ 94,677,379	$ 85,502,658
Funding of portion of past service cost	—	—
Funding of past service cost in prior years used in 1958 for current service cost	—	(60,984,345)
Total noncontributory pension costs	94,677,379	24,518,313
Contributory part of pension plan—current service cost	9,679,252	8,777,821
Total pension costs	104,356,631	33,296,134
Social security taxes	46,978,835	34,669,605
Insurance costs	20,981,897	26,291,921
Supplemental unemployment benefit costs	10,902,835	12,419,192
Savings fund costs	11,541,557	11,065,077
Payments to industry welfare and retirement funds and other employe benefit costs	26,406,745	26,250,103
Total cost	$221,168,500	$143,992,032

Required

Comment on the accounting procedures followed.

19–14 The following notes were extracted from the 1958 annual report of the Celanese Corporation of America.

Inventories

Inventories are priced at average cost or less, and are not in excess of market. Such cost, consistent with the policy followed for many years, does not include depreciation of fixed assets.

Depreciation

The Corporation and its domestic subsidaries follow the general policy of providing for depreciation and obsolescence of site improvements, buildings, machinery and equipment (other than facilities covered by certificates of necessity) over the estimated useful lives of the assets, computed on the straight-line method. The amounts thus computed with respect to machinery and equipment in or related to production departments are modified for variations from normal production at certain manufacturing plants so that such amounts may be accelerated to

a maximum of 150% thereof or retarded to a minimum of 50% thereof. If the production depreciation policy had not been in effect in 1958 and 1957, the additional charge to income would have been $411,356 and $806,689 in the respective years.

Depreciation on new fixed assets is being computed on the declining-balance method for Federal income tax purposes. In 1958 the amount thus computed exceeded depreciation on the straight-line method by approximately $1,564,000. To absorb anticipated future taxes when depreciation computed on the declining balance method will be less than that computed on the unmodified straight-line method, a provision of $814,000 has been added to the deferred Federal taxes on income in 1958.

Required

Comment on the presentation of inventories and depreciation.

19–15 The 1958 annual report of the Brown Company had the following footnote:

Note 3—Fixed assets:

Plants and equipment are carried substantially at cost, less depreciation provided. Timberlands are carried at $1 per cord of estimated standing softwood at November 30, 1904 plus subsequent purchase acquisitions at cost, less depletion based on timber cut. The carrying values of timberlands do not reflect regrowth in areas which have been cut or current market values for stumpage which are believed to be substantially higher than carrying values.

Required

Comment on the procedure followed.

19–16 The current liability section of the 1958 annual report of the Harris-Intertype Corporation was as follows:

	June 30	
Current Liabilities	*1958*	*1957*
Notes of subsidiaries payable to banks	$ 380,679	$ 400,698
Accounts payable-trade and other current liabilities	2,280,121	3,050,985
Salaries, wages, and other compensation, acrued taxes and interest	1,787,231	2,584,250
Advance payments by customers on unfilled orders	3,393,476	1,503,208
United States and foreign taxes on income (after deducting $1,980,311 and $2,125,035, respectively, of United States Treasury securities)	980,836	1,592,100
Current portion of long-term liabilities	600,000	900,000
Total Current Liabilities	$9,422,343	$10,031,241

The current asset section showed United States Treasury securities of $900,000 and $1,800,000 in 1957 and 1958 respectively.

Required

Comment on the presentation of the income tax liability.

19–17 The 1957 annual report of the Colgate-Palmolive Company showed miscellaneous investments at $2,535,675. One of the notes to the report was as follows:

Consolidated Statements

Since 1944, the accounts of foreign subsidiaries have been excluded from the financial statements of the Company and presented separately in supplementary statements. In the Company's financial statements, foreign subsidiaries were carried as investments, at cost or less, and foreign earnings were reflected in net income only as dividends were received in United States dollars.

For the year 1957, the financial statements include the accounts of all foreign subsidiaries and the comparative statements for the year 1956 have been restated accordingly. In addition to the Consolidated Income Account and Balance Sheet, statements of Domestic and Foreign Income Accounts and Net Assets are also presented.

Foreign Earnings

Undistributed earnings of foreign subsidiaries do not represent United States dollars immediately available since the amount which may be transferred to the parent company is dependent upon the working capital requirements and plant expansion programs of the foreign companies. Foreign exchange restrictions in effect in certain countries also limit the ability of the subsidiaries to transfer funds to the United States as dividends or otherwise. In addition, foreign dividends received by the parent company are subject to United States income taxes less applicable foreign tax credits.

The Company's equity in net income of foreign subsidiaries and dividends received therefrom for 1957 and 1956 were as follows:

	1957	*1956*
Company's equity in net income	$12,984,000	$10,580,000
Dividends received	7,473,000	5,621,000
Earnings retained by subsidiaries	$ 5,511,000	$ 4,959,000

Required

Should Colgate-Palmolive recognize as income the $7,473,000, the $12,984,000, or some other figure?

19–18 The Glidden Company

A quarterly statement issued in April 1960 to the stockholders of the Glidden Company contained the following statement:

Net income for the first half was equal to $1.05 a share compared with $1.32 a share last year. The decrease in profits was caused entirely by higher selling and administrative expenses resulting from a continuation of our investments in marketing facilities and development programs. The sales gains made to date have not been sufficient to cover these increased costs which have been incurred to produce long-term growth.

Required

Comment on the accounting implications of the above statement.

19–19 United Fruit Company

The following paragraph was contained in an interim statement to the shareholders of the United Fruit Company (dated November 1, 1960):

We are making a realistic appraisal of various assets shown on our balance sheet in the light of present-day conditions existing in the countries where the Company operates. Considerable progress has been made but this work has not been completed. One result of this appraisal to date has been to charge Earned Surplus with write-offs approximating $20,135,000. In general these write-offs result from a redetermination of the remaining useful life of certain of our tropical facilities. In addition, by charges to current income, additional reserves for certain non-current accounts receivable have been established. These adjustments do not yet reflect the property seizures in Cuba, accounting procedures for which will be worked out before year-end and will be based on possible action by our Government authorities and the pattern adopted by other American companies similarly affected. Any such charges will of course be reflected in a lower book value which as of September 30th amounted to $37 per share.

Required

Comment briefly on the procedures followed.

19–20 Aluminium Limited and Consolidated Subsidiaries

The following information was taken from the 1961 annual report:

Notes to Financial Statements

1. *Principles of Consolidation:*

The consolidated financial statements include the accounts of all subsidiaries (companies more than 50% owned) with the exception of (a) seven partially-owned foreign subsidiaries, the inclusion of which would have no significant effect, and (b) a fully-owned subsidiary, Bauxites du Midi, referred to below. All intercompany items and transactions, including profits in inventories, have been eliminated. Intercompany profits on sales to subsidiaries not consolidated are not significant.

The consolidation of certain subsidiaries for the first time in 1961 resulted in the addition of $1.7 million to consolidated earned surplus as of 1st January 1961, representing Aluminium Limited's equity in their earnings since acquisition, but had no significant effect on net income for the year.

As a consequence of the circumstances explained on page 8, the accounts of Bauxites du Midi, a fully-owned subsidiary, have been excluded from the consolidated financial statements as of 31st December 1961, and the estimated loss of $24,500,000 has been written off directly to earned surplus. The operations of Bauxites du Midi, being mainly in the development stage, have had no significant effect on consolidated earnings.

Accounts, other than Canadian currency accounts, included in the consolidated balance sheet are translated into Canadian dollars at rates of exchange current at 31st December 1961, except that (a) certain bank balances, inventories,

investments and fixed assets with related reserves are at rates current at dates of acquisition, and (b) debts not maturing within one year are at rates current at dates of issue except that the Aluminum Company of Canada, Ltd., first mortgage 3½% sinking fund bonds, due 1974, payable in United States currency, are stated on a dollar for dollar basis.

2. *Depreciation Policy and Reserve for Future Income Taxes:*

With minor exceptions, depreciation recorded in the accounts is calculated on a straight-line basis in respect of all completed facilities. Commencing in 1958 depreciation on this basis has also been charged in respect of the uncompleted facilities in British Columbia referred to in Note 5.

Income tax regulations in Canada, and in certain other countries, permit the use (for the purpose of determining income taxes) of various forms of capital cost allowances which do not coincide with the amount of depreciation recorded in the accounts. These allowances generally exceed straight-line depreciation during the early life of new assets and later fall short of it.

When capital cost allowances utilized for determining income taxes exceed straight-line depreciation, an amount equivalent to the resultant reduction in current income taxes is charged to income and credited to Reserve for Future Income Taxes. When the allowances so utilized fall short of straight-line depreciations, resulting in higher current income taxes than would otherwise be payable, an appropriate portion of the reserve is transferred back to income.

3. *Other Income:*

	1961	*1960*
Gain on disposal of surplus fixed assets	$ 674,759	$ 1,359,089
Profit from redemption of debt	(348,048)	1,444,794
Cancellation fee	—	9,009,875
Write-off of overseas investment and other assets	—	(2,552,399)
Other	1,925,135	1,411,401
	$2,251,846	$10,672,760

Consolidated Statement of Income

For the year ending 31st December 1961
In Canadian Dollars

	1961	*1960*
Sales and Revenues:		
Sales	$458,403,703	$449,801,256
Operating revenues (transportation services, power sales, etc.)	58,527,250	58,829,779
Income from companies not consolidated	1,825,254	1,808,651
Other income (note 3)	2,251,846	10,672,760
	521,008,053	521,112,446

Costs and Expenses:		
Cost of sales and operating expenses	329,620,064	322,852,567
Provision for depreciation and depletion (note 2)	55,393,732	51,855,385
Selling, general and administrative expenses	48,167,830	45,755,261
Interest on debt not maturing within one year	23,913,648	22,951,235
Other interest	4,411,248	3,219,658
	461,506,522	446,634,106
Income before income taxes	59,501,531	74,478,340
Provision for current income taxes	25,146,111	25,013,557
Reserve for future income taxes (note 2)	(725,656)	6,436,194
	24,420,455	31,449,751
Income after income taxes	35,081,076	43,028,589
Dividends on preferred shares of consolidated subsidiaries, etc.	4,471,696	3,918,827
Net income	$ 30,609,380	$ 39,109,762

Required

Comment on the measurement of income for 1961.

19–21 The 1961 annual report of the Armstrong Rubber Company contained the following statement:

New Financing Strengthens Financial Position

A number of significant changes occurred in your Company's financial position during 1961, largely as a result of the $25,000,000 borrowing from institutional investors to provide the funds required for the construction of the Hanford plant and for working capital. Available funds from this loan were invested temporarily in short-term Government securities, and as a result, cash and Government securities totaled $21,652,250 at September 30, 1961 compared with $6,073,082 a year earlier. No short-term bank indebtedness existed at the close of the 1961 fiscal year, whereas, at the close of the previous year, such loans totaled $10,000,000.

Long-term debt increased during the year to $34,951,000 from $17,667,000.

As a result of these changes, working capital increased to $47,166,938 from $32,164,924, and the ratio of current assets to current liabilities was 3.18 to 1 as compared to 2.02 to 1 at September 30, 1960. During fiscal 1962, expenditures of approximately $16,000,000 will be made to complete construction of and to equip the Hanford plant using working capital provided by the term-loan previously referred to.

The following is a note to the financial statements:

Note B. Long-term debt as of September 30, 1961 consisted of the following unsecured promissory notes:

Maturity	*Rate of Interest*	*Long-term Portion*	*Current Portion*
October 30, 1963	4%	$ 600,000	$ 300,000
January 29, 1965	5%	1,650,000	550,000
October 2, 1966	5%	3,200,000	—
March 1, 1969	4¼%	1,039,000	870,000
September 1, 1972	5⅞%	3,462,000	346,000
April 1, 1980	5⅞%	25,000,000	—
		$34,951,000	$2,066,000

The loan agreements provide, among other things, that the Company will maintain consolidated net current assets at a stated minimum, and impose limitations on the acquisition of its own stock and payment of dividends. Earnings retained at September 30, 1961 available for the payment of dividends amounted to $4,422,279.

A statement on the balance sheet indicated that there were $12,500,000 of commitments outstanding for purchase of plant assets as of September 30, 1961.

Required

Comment on the strengthening of the financial position.

20

Preparation of the Funds Statement

A FEW YEARS AGO, attention of the investment analyst shifted from the position statement to the income statement. In recent years, another financial statement has increased in importance. It is known by various names, such as "Statement of Funds," "Statement of Changes in Working Capital," and "Statement of Financial Operations." This report is becoming more and more popular because it helps explain why, despite the presence of high earnings, dividends cannot be increased (the same applies to wages, executive salaries, and expansion programs). By projecting into the future, the report can be used to anticipate changes in working capital. Because of these uses, management also has a vital interest in this report.

What is the funds statement? It explains the change of *working capital* from one point in time to another. A variant of the funds statement shows the sources and applications of *cash* rather than working capital. While this second type of report is very useful, it is of less use for general financial statement analysis than is a statement of sources and applications of working capital (hereafter *working capital* and *funds* will be used interchangeably). The cash balance is too easily influenced by postponing purchases, payments, etc. Working capital is somewhat less subject to changes of this kind; thus, a report of changes in working capital is generally more useful.

There is no general agreement as to the specific form that the funds statement should take. A variety of forms are found in practice, and several methods of presentation will be illustrated later in this chapter.

OPERATING INCOME AND FUNDS FROM OPERATIONS

Funds from operations is one of the main sources of funds of an enterprise. The funds from operations, however, will only rarely be equal to the operating income. Unfortunately there is often confusion as to how to compute the funds from operations if the income of the period is given.

To compute the net funds from operations, it is necessary to add back to the operating income those revenue deductions which did not utilize funds (decrease current assets or increase current liabilities), and to subtract those revenue or other income items which did not generate funds (increase current assets or decrease current liabilities). An alternative treatment is to start with revenues that increase working capital and then deduct only those expenses, losses, and taxes which utilize funds. The disadvantage of this last procedure is that it does not tie in directly with the income figure reported in the income statement.

The main items that may necessitate adjustments to income to obtain the funds from operations are:

Depreciation of Fixed Assets
Depletion of Natural Resources
Amortization of Patents and Other Intangibles
Loss on Sale or Retirement of Noncurrent Assets
Gain on Sale of Noncurrent Assets (the cash received from the sale is included in another section of the statement)
Accumulation of Bond Discount (on bonds payable)

EXAMPLE

Computation of funds from operations:

Given the following conventional income statement, compute the funds from operations.

Sales		$50,000
Less:		
Labor, etc.	$35,000	
Depreciation	12,000	
Total Expenses		47,000
Net Income		$ 3,000

The funds from operations may be computed by using either of two techniques. One adds back to income those expenses which did not use funds. The other subtracts from revenues only those expenses which did use funds. The funds from operations will be equal for the two procedures.

First Procedure		*Second Procedure*	
Income Reported	$ 3,000	Revenues	$50,000
Add back expenses not using funds (Depreciation)	12,000	Subtract expenses using funds	35,000
Funds from Operations	$15,000	Funds from Operations	$15,000

The first procedure has the advantage of tying-in to the income figure for the period, but it has the disadvantage of having to add back depreciation (this results

in confusion as to the relationship of depreciation and funds). The second procedure has the advantage of being straightforward. A comparison of the two procedures should prove beyond all doubt that depreciation is not a source of funds.

Depreciation of Fixed Assets

The accounting entry to accrue depreciation is a debit to depreciation expense and a credit to the fixed asset account (usually a contra account, such as allowance for depreciation, is used). The asset that has been decreased is not a current asset but a long-lived asset. Thus working capital is not affected by the accrual of depreciation, and depreciation should not be deducted from revenues if we are computing funds from operations. If it has been subtracted, i.e., if we are starting from the income figure rather than from the revenue figure, it is necessary to add back to income the amount of depreciation deducted from income in order to work toward the funds from operations figure.

It is often stated that funds are obtained from depreciation charges, depreciation allowances, or depreciation reserves. This is obviously an incorrect observation. (*Funds are not generated by charging or accruing depreciations; they are created by sales.*) Charging more or less depreciation will have no effect on the amount of working capital. The depreciation charge will affect the income of the period, and it will affect the amount that has to be added back to income to compute the funds from operations.

The depletion charge encountered in industries that are of an extracting nature (mining, oil, etc.) should be treated in a manner similar to that of depreciation. Since the depletion charge does not result in a decrease of current assets, it must be added back to income to obtain funds from operations.

At this point it is possible and desirable to make a generalization. The revenue deduction arising from the amortization of any long-lived asset must be added back to income to obtain the funds from operations figure.

Loss or Gain on Sale of Noncurrent Assets

The two most common classifications of long-lived assets that are likely to be sold are fixed assets (land, buildings, or equipment) and investments. The loss or gain arising from the sale of these assets must be eliminated in order to compute the funds from operations. The loss must be added to income (since it has been subtracted), and the gain subtracted (since it has been added). By doing this, the effect of these items is eliminated.

Any *current assets* received from the sale of long-lived assets are, of course, included and described in the fund statement. To include the *gain* also would be double counting.

EXAMPLE

A fixed asset with a book value of $10,000 is sold for $12,000 cash.

(a) What is the gain?
(b) What current assets are generated by the transaction?
(c) What adjustment must be made to the income for the period to obtain the funds from operations?

Solutions

(a) The gain is $2,000.
(b) Cash of $12,000 is generated by the transaction.
(c) The $2,000 gain must be subtracted from income (assuming that it has been included in other income). Not to subtract the $2,000 would mean that funds of $14,000 would be reported to have been generated, but that only $12,000 of working capital was actually received (the $14,000 is equal to the $2,000 plus $12,000).

EXAMPLE

A fixed asset with a book value of $10,000 is sold for $8,000 cash.

(a) What is the book gain or loss?
(b) What current assets are generated by the transaction?
(c) What adjustment must be made to the income for the period to obtain the funds from operations?

Solutions

(a) The book loss is $2,000.
(b) Cash of $8,000 is generated by the transaction.
(c) The $2,000 book loss must be added back to income (assuming that it had been subtracted to obtain the income figure). Not to add back the $2,000 would mean that a loss, which did not utilize funds, was subtracted in computing funds from operations. Assume that the sales were $50,000, depreciation $12,000, other expenses $28,000, and the loss from sale of fixed assets $2,000. Either of the two following solutions would be correct.

Income		$ 8,000	Sales	$50,000
Add Back:				
Depreciation	$12,000		Less:	
Book Loss	2,000	14,000	Other Expenses	28,000
Funds from Operations		$22,000	Funds from Operations	$22,000

Bond Discount

The normal entry for recording a year's interest accrued on a bond payable which had been issued at a discount is:

Interest Charge	$40	
Bond Discount		$ 2
Interest Payable		38

The deduction from the revenue (or income) is $40, but the decrease in working capital (by an increase in current liabilities) is only $38. The difference of $2 is caused by the fact that long-term liabilities have been increased by $2 (the credit to bond discount effectively increases the long-term debt). Thus the interest charges for the period are not equal to the decrease in funds.

The adjustment that should be made is to add $2 back to income, if interest charges have been subtracted to obtain income. If interest charges have been reported separately as a utilization of funds, then only $38 of interest charges would be reported as using funds.

This same sort of analysis would also have to be made by the holders of a long-term debt purchased at a discount, as the discount is being accumulated.

OTHER SOURCES OF FUNDS

The funds from operations are one of the most important sources of funds in a business entity. The other more important sources are the raising of funds by issuing new securities, both long-term debt and stock equity. This includes common and preferred stock, bonds, and long-term notes.

A less important source, although it can be relevant in any one year, is the sale of long-lived assets or the reclassification of special cash "funds." This includes the sale of investments (but not marketable securities classified as current assets), land, buildings, and equipment. Cash set aside for building purposes, debt retirement, etc., is sometimes classified as a noncurrent asset. Thus, when the fund is liquidated, any residual cash may be a source of funds. As explained in a previous section, the gains from the transactions that involved long-lived assets are excluded, but the current assets which were acquired are included.

A relatively minor source of funds is the funds arising from the fact that in a manufacturing operation, depreciation finds its way into current assets via the application of overhead. Thus, in a very limited sense, depreciation can be a source of funds.

Utilization of Funds

Funds are most commonly utilized to purchase long-lived assets (land, buildings, equipment, investments, patents, etc.) or to retire long-term debts. Other uses of funds include the payment of dividends on stock and the retirement of different types of stock.

TRANSACTIONS NOT INVOLVING WORKING CAPITAL

Most of the problems arising in the preparation of funds statements are not connected with those transactions which are sources of funds or applications of funds, but are the result of transactions which do not affect funds. A transaction of this nature is the accrual of depreciation and depletion. The creation of "surplus" reserves, whether or not identified as retained earnings, is also of this nature. The setting up of an account such as "Reserve for Income Taxes of Future Years" does not involve working capital; thus it should not affect the fund statement. A stock dividend (not a dividend on stock) is another transaction that does not directly affect the working capital position of the firm.

Many transactions will not change the total amount of funds but will affect the balances of individual fund items. For example, the payment of accounts payable will reduce two fund accounts, but the net change in funds is zero. The payment reduced the current asset cash, but the current liability accounts payable was reduced an equal amount.

Another type of transaction does not explicitly change the working capital, but there is an *implicit* source and application of funds. Assume that bonds are issued to the owner of land in exchange for the land. Working capital has not been touched by this transaction, but many accountants would say that there has been a source of funds (the issuance of bonds) and application of funds (purchase of land), even though the formal exchange of cash was bypassed. In order to avoid complexity, the rule will be followed that a "fund" transaction must explicitly affect a current account.

Transactions that recognize expenses are fund transactions if the cost factor which is expiring has been considered a current asset. If the solution for funds from operations is to start from income, this type of transaction does not have to be explicitly considered, since the expense has already affected the income figure. If funds from operations are being computed, starting from sales, then expenses that used funds have to be subtracted when computing the funds from operations.

SUMMARY OF FUNDS TRANSACTIONS

The fund position of a firm is affected by transactions involving the gaining of revenue, as evidenced by the receipt of a current asset or the reduction of a current liability, and by transactions involving:

Current Assets or Current Liabilities and Noncurrent Assets
Current Assets or Current Liabilities and Noncurrent Equities

The fund position of a firm is *not* affected by transactions involving:

Current Assets or Current Liabilities only
Long-Term Assets or Long-Term Equities only

EXAMPLE: A Funds Statement

UNITED STATES STEEL CORPORATION *

Summary of 1960 Financial Operations

Additions to working capital		
Income		$304,170,990
Add—Wear and exhaustion of facilities		208,424,291
Proceeds from sales and salvage of plant and equipment		8,265,089
Proceeds from sale of common stock under Stock Option Incentive Plan		2,932,500
Miscellaneous additions		528,756
Total additions		524,321,626
Deductions from working capital		
Expended for plant and equipment	$492,401,892	
Less—Use of funds set aside in prior years	195,000,000	
	297,401,892	
Added to costs applicable to future periods	14,322,103	
Reduction in total long-term debt	32,805,544	
Dividends declared on preferred and common stocks	187,235,868	
Total deductions		531,765,407
Reduction in working capital		$ 7,443,781
Working capital per Consolidated Statement of Financial Position		
December 31, 1960	$608,094,605	
December 31, 1959	615,538,386	
Reduction		$ 7,443,781

* Courtesy the United States Steel Corporation.

SUGGESTED FORMS OF FUNDS STATEMENT

Since it is desirable to keep accounting reports simple, the following sample is probably one of the more suitable forms of the funds statement.

XYZ COMPANY

Funds Statement
for the Year Ending ———

Sources of Funds	
From Operations:	
Income	$xxxxx
Plus expenses of a nonfund nature which have been deducted	xxxxx
Total from Operations	$xxxxx
New Financing, Stocks	xxxxx
New Financing, Bonds	xxxxx
Sale of Fixed Assets	xxxxx
Total Sources	$xxxxx
Applications of Funds	
Retirement of Long-Term Debt	$xxxxx
Purchase of Fixed Assets	xxxxx
Dividends on Stock	xxxxx
Total Applications	$xxxxx
Net Increase (decrease) in Funds	$xxxxx

There are many variations of this form, and of course only some of the possibilities in terms of transactions have been illustrated. The main criticisms of this presentation are that it does not give sufficient information and that the treatment of depreciation is misleading. There are other subtotals that might be useful, but they are not essential, since the person using the statement may rearrange the information to suit his specific needs. The danger of having too many subtotals, thereby detracting from the one or two more significant figures, should be avoided. The second criticism is more valid. The treatment of nonfund items is a tricky matter and should be handled with care. Adding back the expenses of a nonfund nature, such as depreciation, could give credence to the popular fallacy that depreciation is a source of funds. A possible solution would be to show only the "Funds from Operations" total and not to show the derivation of that amount from the income figure except in a footnote.

The following form is one method of overcoming the second of the two criticisms. Some accountants use this same approach but include several more subtotals. Note that the problem of depreciation is solved by leaving it off the statement entirely.

XYZ COMPANY

Funds Statement
for the Year Ending ———

Revenues	$xxxxxx
Less Expenses, Taxes, and Interest which use funds	xxxxxx
Funds from Operations	$xxxxxx
Other Sources	
New Financing, Stocks	xxxxxx
New Financing, Bonds	xxxxxx
Sale of Fixed Assets	xxxxxx
Total Sources	$xxxxxx
Applications of Funds	
Retirement of Long-Term Debt	$xxxxxx
Other applications	xxxxxx
Total Applications of Funds	$xxxxxx
Net Increase (decrease) in Funds	$xxxxxx

TECHNIQUES FOR PREPARING FUNDS STATEMENTS

There are various techniques for preparing the material that goes into the funds statement. One of the simplest techniques was developed by Professor William J. Vatter. The following procedure has been adapted from the method used by Professor Vatter. It makes use of the fact that the only relevant transactions are those which affect noncurrent accounts. If the transaction affects only current accounts, the effect on working capital is zero. Thus attention is focused on the changes occurring in noncurrent accounts. The causes for the changes in the noncurrent account are traced to find if the current accounts have been affected.

The technique assumes implicitly that the funds statement is being prepared without having access to the accounting records and detailed information of the firm. If this information is available, the procedure followed will be different in one respect. The entries made to the noncurrent accounts will be the entries made in the books of record. They will be summarized but not changed. This procedure will supply more complete information than

could be obtained from the beginning and ending position statements, income statement, and miscellaneous information, the use of which tends to net-out various transactions.

The mechanics of the procedure are as follows:

1. Set up "T" accounts for all *noncurrent* balance sheet accounts, showing the opening balances.
2. Set up two additional "T" accounts. One is a *working capital* account for items affecting current assets or current liabilities. The other is the *operations* account used to clear those items which affect the funds from operations.
3. For each noncurrent account, make the entry (or entries) necessary to bring the beginning balance into agreement with the known ending balance. If a current account is affected, make the entry to the *working capital* account. If the funds from operations are affected, make the entry to the *operations* account.
4. Close the *operations* account to the *working capital* account (the amount transferred is the funds from operations).
5. The debit balances of the working capital account are sources of funds; the credit balances are applications of funds.
6. Prepare the funds statement, using the information obtained from the *working capital* account.

Instead of using "T" accounts, this same general technique may be employed by using a worksheet. Both procedures will be illustrated in the following problem:

ILLUSTRATION: Preparation of a Funds Statement

XYZ COMPANY

Position Statements
for January 1 and December 31, 19—

	January 1	*December 31*
Cash	$ 40,000	$ 44,400
Accounts Receivable	10,000	20,700
Inventories	15,000	15,000
Land	4,000	4,000
Buildings	20,000	16,000
Equipment	15,000	17,000
Accumulated Depreciation	(5,000)	(2,800)
Patents	1,000	900
Total Assets	$100,000	$115,200

	January 1	*December 31*
Current Liabilities	$ 30,000	$ 32,000
Bonds Payable	22,000	22,000
Bonds Payable, Discount	(2,000)	(1,800)
Capital Stock	35,000	43,500
Retained Earnings	15,000	19,500
Total Equities	$100,000	$115,200

Additional Information

1. Income for the period, $10,000.
2. A building that cost $4,000, and which had a book value of $1,000, was sold for $1,400.
3. The depreciation charge for the period was $800.
4. There was a $5,000 issue of common stock.
5. Cash dividends of $2,000 and a $3,500 stock dividend were declared.

Solution

Working Capital

Sources		Applications	
(1)	$ 1,400	(2)	$2,000
(6)	5,000	(8)	2,000
(a)	10,700		

Accumulated Depreciation

(1)	$3,000	√	$5,000
		(3)	800

Operations

(3)	$ 800	(1)	$ 400
(4)	100		
(5)	200		
(7)	10,000	(a)	10,700

Patents

√	$1,000	(4)	$100

Land

√	$4,000

Bonds Payable

	√ $22,000

Buildings

√	$20,000	(1)	$4,000

Bonds Payable, Discount

√	$2,000	(5)	$200

Equipment

√	$15,000		
(2)	2,000		

Capital Stock

		√	$35,000
		(6)	5,000
		(9)	3,500

Retained Earnings

		√	$15,000
(8)	$2,000	(7)	10,000
(9)	3,500		

Explanation of Entries

1. Records the sale of the building, which cost $4,000. Credit building $4,000, debit the allowance for depreciation for $3,000, debit working capital to record the receipt of $1,400, and credit operations to accomplish the elimination of the $400 from the income in order to compute the funds from operations. Note that this is a balanced logical accounting entry.
2. Records the purchase of $2,000 of equipment.
3. Records the accrual of depreciation for the year.
4. Records the amortization of patents.
5. Records the accumulation of bond discount (note the debit to operations for $200).
6. The issuance of $5,000 of capital stock.
7. The income for the period of $10,000 (operations is debited).
8. The cash dividends of $2,000.
9. The stock dividend of $3,500.
   (a) To close the funds from operations to working capital: Note that the ending balance in each "T" account agrees with the account balances contained in the December 31 position statement. Entries were made in each account so that this would occur. In some problem situations, the most logical transaction has to be assumed. For example, the purchase of the $2,000 of equipment was not explicitly described. In this case the transaction has to be assumed by the person preparing the funds statement (if the ending balance is $2,000 greater than the beginning balance, then it is assumed that $2,000 of equipment was purchased).

The funds statement may be obtained from the working capital account. The debit entries of this account are sources, and the credit entries are applications of funds.

XYZ COMPANY

Funds Statement
for Year Ending December 31, 19—

Sources of Funds		
From Operations *	$10,700	
New Financing	5,000	
Sale of Building	1,400	
Total Sources		$17,100
Application of Funds		
Purchase of Equipment	$ 2,000	
Cash Dividend on Stock	2,000	
Total Applications		4,000
Net Increase in Working Capital		$13,100

* The $10,700 was obtained in the following manner:

Income for Period		$10,000
Less Book Gain on Sale of Fixed Assets		400
		$ 9,600
Plus: Depreciation	$800	
Bond Discount	200	
Amortization of Patents	100	
Nonfund Deductions		1,100
Funds from Operations		$10,700

XYZ COMPANY

Statement of Changes in Working Capital
for Year Ending December 31, 19—

	January 1	*December 31*	*Increase (Decrease)*
Cash	$40,000	$44,400	$ 4,400
Accounts Receivable	10,000	20,700	10,700
Inventories	15,000	15,000	
Total Current Assets	$65,000	$80,100	$15,100
Current Liabilities	$30,000	$32,000	$ 2,000
Net Working Capital	$35,000	$48,100	$13,100

NOTE: Increase in working capital is equal to the amount indicated in the funds statement as the change in working capital.

Some accountants prefer to prepare funds statements by using worksheets. The following solution is designed to illustrate a worksheet solution, making use of the same techniques as those previously illustrated. The funds statement may be obtained from the transactions column opposite the "Working Capital" and "Operations" accounts.

XYZ COMPANY

Worksheet for Funds Statement
for Year Ending December 31, 19—

	January 1, 19—		*Transactions*		*December 31, 19—*	
Working Capital *	$35,000	$	(1) $ 1,400	(2) $ 2,000	$48,100	$
			(6) 5,000	(8) 2,000		
			(a) 10,700			
Operations			(3) 800	(1) 400		
			(4) 100	(a) 10,700		
			(5) 200			
			(7) 10,000			
Land	4,000				4,000	
Buildings	20,000			(1) 4,000	16,000	
Equipment	15,000		(2) 2,000		17,000	
Accumulated Depreciation		5,000	(1) 3,000	(3) 800		2,800
Patents	1,000			(4) 100	900	
Bonds Payable		22,000				22,000
Bonds Payable, Discount	2,000			(5) 200	1,800	
Capital Stock		35,000		(6) 5,000		43,500
				(9) 3,500		
Retained Earnings		15,000	(8) 2,000	(7) 10,000		19,500
			(9) 3,500			
Total	$77,000	$77,000	$38,700	$38,700	$87,800	$87,800

* The debit entries of the transactions column (opposite working capital) are sources of funds. The credit entries are applications of funds.

MANAGERIAL USES OF THE FUNDS STATEMENT

The funds statement has been defined in this chapter as a statement of sources and applications of working capital. This type of statement is useful, since it tells where the working capital (current assets less current liabilities) is coming from and where it is being used. It is by necessity a summary, but it does indicate what is happening to the current position of the firm and why it is happening. This is of importance to management and investors.

While the funds statement as defined is useful, management needs

additional information. Even of more importance than the change in working capital is the change in cash. Explanations of why the cash balance has changed are desirable, and forecasts of what is going to happen in the future to cash and working capital are often essential. This information is necessary in order to ensure that the proper amount of cash will be on hand for operations of the future periods. As productive facilities are enlarged, the treasurer of the corporation must ensure that cash is on hand to pay for the construction of the facilities. As the facilities are placed into operation, new workers must be paid, materials purchased, etc. All these items require that cash be available long before the product being produced is sold.

The forecasting of cash is commonly thought of as being a budgeting problem (it is discussed further in Chapter 25). However, it is also directly related to the funds statement, since the method of presentation and computation are very much similar.

SUMMARY

The funds statement is useful to management, but statements of changes in cash may be even more useful. Also, the reporting of what has happened is desirable, but in planning for the future, estimates of sources and applications of cash and working capital have to be made for the coming accounting periods.

QUESTIONS AND PROBLEMS

20–1 The Exray Company

Required

Prepare a statement of sources and applications of funds and a schedule of changes in working capital. See Prob. 19–1 for necessary data.

20–2 The Rogers Company

Required

Prepare a statement of sources and applications of funds and a schedule of changes in working capital. See Prob. 19–2 for necessary data.

20–3 Financial analysts suggest that "cash flow" is of great significance. Cash flow is defined as the income of the period plus depreciation. Comment on the significance and usefulness of this concept.

20–4 The Reno Company

Required

Prepare a:

Statement of sources and applications of funds

Schedule of changes in working capital

THE RENO COMPANY

Comparative Balance Sheets

	December 31	
	1964	*1963*
Cash	$ 40,000	$ 43,000
Accounts Receivable	63,000	33,000
Inventories	165,000	100,000
Prepaid Expenses	7,000	4,000
Investments, Common Stock of Subsidiary	75,000	60,000
Land	70,000	40,000
Buildings	100,000	80,000
Machinery and Equipment	180,000	120,000
	$700,000	$480,000
Allowance for Uncollectibles	$ 2,000	$ 1,000
Allowance for Depreciation	55,000	35,000
Accounts Payable	48,000	34,000
Preferred Stock	40,000	
Common Stock	400,000	300,000
Retained Earnings	155,000	110,000
	$700,000	$480,000

THE RENO COMPANY

Income Statement for Year Ending December 31, 1964

Sales	$300,000	
Gain on Sale of Machinery *	500	$300,500
Expenses and Taxes		
Operating Expenses †	$100,000	
Taxes	40,500	140,500
Net Income		$160,000
Dividends on Stock		20,000
Increase in Retained Earnings from Operations		$140,000

* The cost of the machinery sold was $8,000. The book value at the time of sale was $1,500. The machinery was sold for cash.

† Includes $26,500 of depreciation.

THE RENO COMPANY

Reconciliation of Retained Earnings for 1964

Retained Earnings January 1, 1964		$110,000
Plus:		
Earnings of Subsidiary	$ 15,000	
Increase resulting from operations	140,000	155,000
		$265,000
Less:		
Stock Dividend	$100,000	
Write-off of obsolete inventory	10,000	110,000
Retained Earnings December 31, 1964		$155,000

20–5 The president of the Flush Corporation asked his controller for a statement of sources and applications of funds. He had heard a speech at a local businessmen's group which praised this type of report. For many years, he had been puzzled by the fact that in some periods cash would decrease despite good earnings, and in other periods cash would increase despite the fact that the results of operations were a loss. He hoped a funds statement would eliminate this confusion.

The controller prepared the following statement:

THE FLUSH COMPANY

Statement of Sources and Applications of Funds for Year Ending December 31, 1964

Sources		
Operations:		
Income	$500,000	
Plus items not using funds	150,000	$ 650,000
Issue of Stock		200,000
Issue of Bonds		250,000
		$1,100,000
Applications:		
Purchase of Plant Assets		$280,000
Payment of Mortgage Debt		120,000
Dividends		400,000
		$800,000
Increase in Funds		$300,000

The president looked over the report carefully and then tried to tie it into the change in cash indicated in the comparative position statements. Much to his surprise, he found that cash actually decreased $110,000 during the period. He

called in the controller, who gave the following explanation: "A statement of funds is a statement of sources and applications of working capital, not cash." The working capital had indeed increased by $300,000. The president recognized the need for such a report but asked that a statement be prepared to show the sources and applications of liquid assets. Liquid assets were to include cash, accounts receivable, and marketable securities. The president reasoned that all these items could be used to satisfy claims of creditors without disrupting the normal operation of the business (the accounts receivable could be sold to factors).

The current asset section of the position statement for December 31, 1964, was as follows (the current liabilities for the two periods were equal):

	December 31, 1964	*December 31, 1963*
Cash	$ 190,000	$300,000
Marketable Securities	150,000	60,000
Accounts Receivable (net)	100,000	200,000
Inventories	470,000	100,000
Prepaid Expenses	100,000	50,000
	$1,010,000	$710,000

Required

(a) Prepare the statement the president desires.
(b) Prepare a statement explaining the change in cash.
(c) Comment on the relative usefulness of the report prepared by the controller and the two reports required above in parts (a) and (b).

20–6 "Higher depreciation accruals have reduced the need of corporations to borrow."

Required

Comment on the above statement.

20–7 The 1961 annual report of the Pure Oil Company included the following statement.

THE PURE OIL COMPANY

Source and Disposition of Funds

Source:		
Reported Net Income	$30,102,000	
Depreciation, Depletion and Amortization	32,314,000	$62,416,000
Sales and Retirements of Properties, Including Dry Holes		15,546,000
Decrease in Working Capital, Prepaid and Deferred Charges, etc.		18,585,000
Deferred Income		2,200,000
		$98,747,000

Disposition:

Capital Expenditures	71,219,000
Dividends Paid to Common Shareholders	15,872,000
Cost of Treasury Shares Acquired	5,326,000
Investments and Advances	2,192,000
Decrease in Net Long-Term Debt	1,464,000
All Other	2,674,000
	$98,747,000

Required

Discuss the form of the statement and the items on the statement.

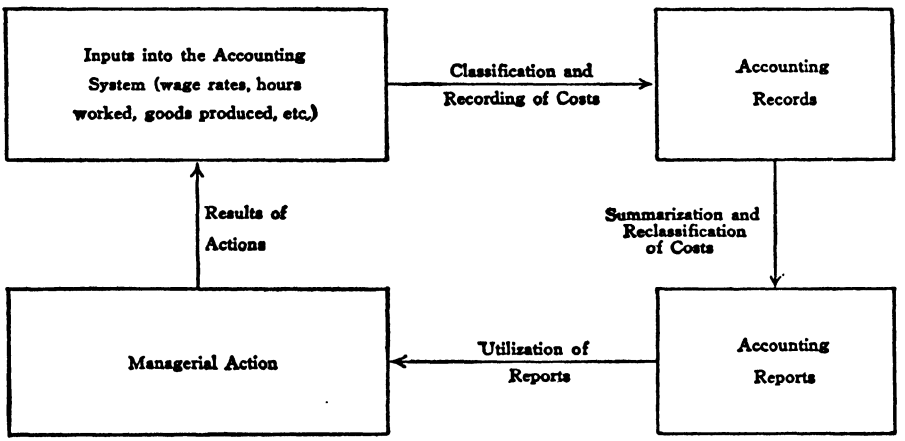
II

MANAGERIAL ACCOUNTING

21

Organization for Cost Control and Recording of Costs

THE FOCUS OF attention of managerial accounting is on cost control and the uses of cost information. The managerial accounting cycle of operation may be illustrated as follows:



This chapter introduces the managerial accounting cycle of operations by first describing the organizational setting in which the system exists. The second step is to develop useful classifications of costs. The third step is to survey the technical problem of the mechanical means used to accomplish the accumulation and classification of the costs. Finally, the problems of preparing the reports and using the information are introduced.

ORGANIZATION OF A LARGE CORPORATION

Understanding the organization of a large corporation helps us to understand managerial accounting and what the accountant is accounting for. At the very

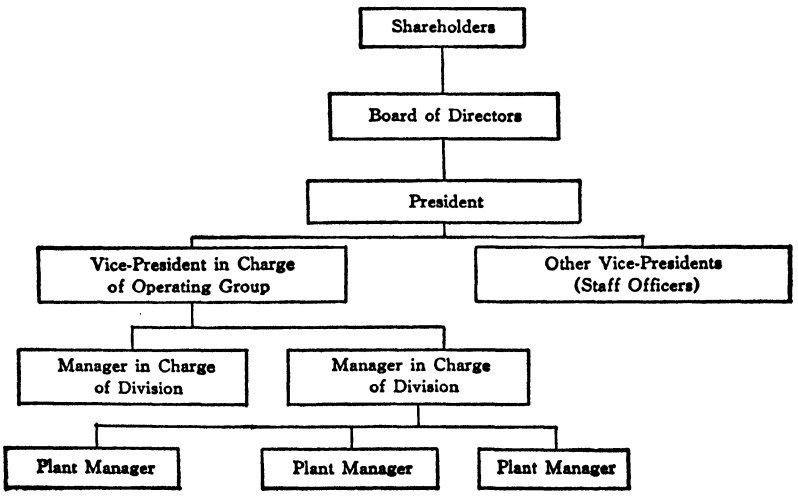
top of the organization are the owners or shareholders. The shareholders exercise control by electing the board of directors, who in turn choose the executives responsible for administering the general policies decided on by the board of directors.

The amount of control that the individual shareholder will effectively wield is limited by the relative size of his holdings, but as a group the stockholders are powerful. The "proxy" battles which are frequently publicized in the newspapers are actually fights for the votes of the stockholders so that one or another group may control the board of directors, and thus control the corporation.

The liaison between the board of directors and operating management is frequently the president of the firm, although in many firms the connecting link is maintained by the use of committees such as the "Executive Committee" and "Finance Committee." These committees will frequently include members of the management who are also on the board of directors. In some situations the chairman of the board of directors will also be the chief executive officer of the corporation, although he may or may not also be called the "president" of the firm. Thus the same man who is directly responsible to the stockholders may also be in charge of the everyday running of the corporation.

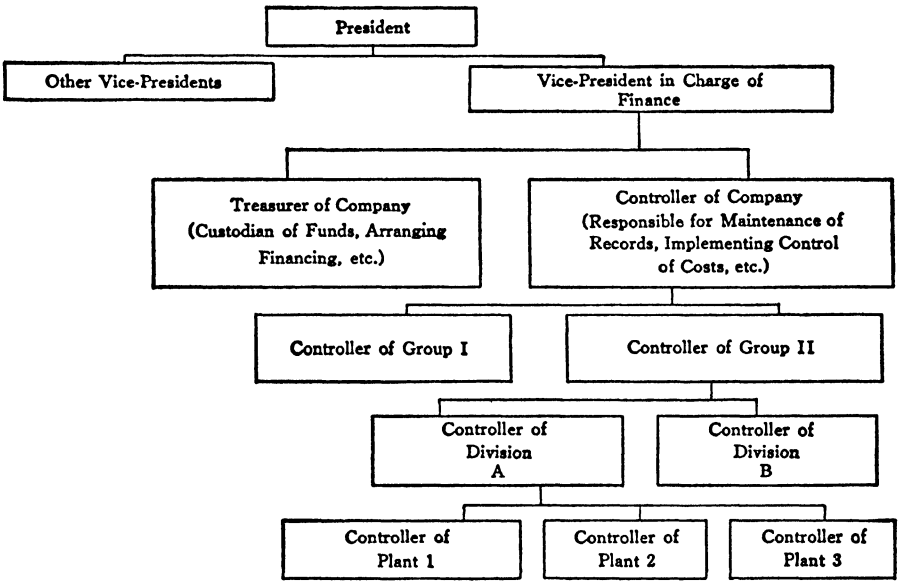
Working under the president (chief executive officer) will be various vice-presidents. If the corporation is organized along decentralized divisional lines, then the list of vice-presidents would include those men in charge of operating groups or divisions, as well as those in charge of staff or functional operations.

The line, or operating, organization of a corporation may be set up in the following manner:



Among the "Other Vice-Presidents" presented in the foregoing chart will be one or more vice-presidents who may be called *accountants*. These executives are staff officers, since they are only indirectly associated with the production of the end product and are more concerned with supplying information to the operating personnel.

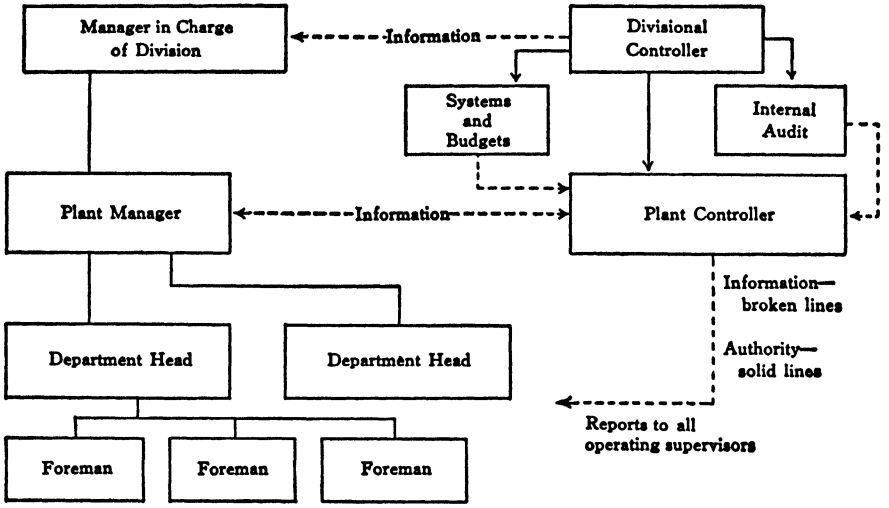
That part of the organization concerned with the staff function, accounting, may be thus:



Note that the "Custodianship" and "Recording" of the company's cash are separated. This division of responsibilities is part of the company's "Internal Control." Internal control refers to the various procedures set up to help prevent waste, fraud, and theft of the company's assets. The exact duties of the treasurer and the controller will vary from company to company, but this division between the custodian and recorder of cash transactions should exist at all levels of operations.

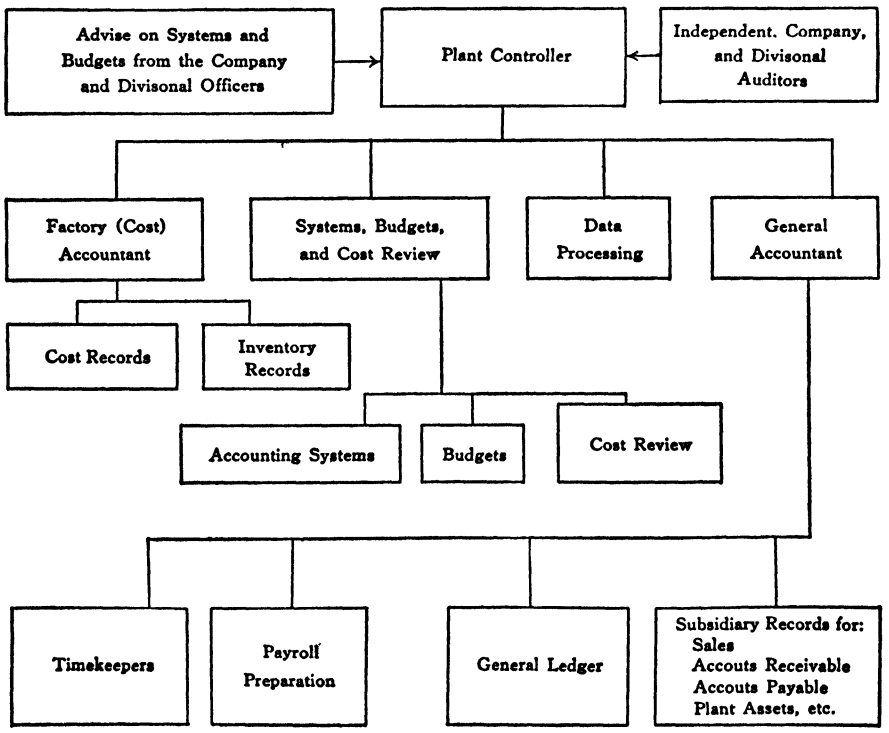
To be more meaningful, the two organization charts illustrated here should be combined. To avoid unnecessary confusion, the following chart shows only the organization of the accounting department and the line organization at the divisional and plant level.

In this example the plant controller supplies information to the plant manager, but he is directly responsible to the divisional controller. If the plant controller is placed under the authority of the plant manager (as he often is), the accounting reports to top management may be somewhat less reliable. The man whose efficiency is being measured, the plant manager, would be in a position to dictate the methods used to measure that efficiency.



For example, obsolete material may be maintained in inventory rather than being written off to expense.

The next organization chart shows in detail the organization under the plant controller. The organization will not be the same for each company.



Some companies do much of their accounting at the central office and do very little at the individual plants. Other companies have decentralized the accounting function, and each individual plant is practically self-sufficient and is a separate accounting entity. The choice of the degree of decentralization will depend on the size of the plants and the extent to which the individual plants can make use of labor-saving accounting machines.

The preceding charts are by no means complete or applicable to all corporate organizations. Several important departments are left off the charts completely; for example, the production control department, which controls the ordering of inventory and scheduling of production, could be included, since it supplies the accounting department with information and uses accounting reports. Another important department is the manufacturing engineering department. This department sets the manufacturing standards used in accounting for costs and also determines the methods to be used in production. Without this information the accounting department cannot record costs so that they can be used for control purposes.

Summary of Organization for Cost Control

The meanings of the various job tasks will become clearer as the reader progresses through the text, but the following brief descriptions may be of some assistance in understanding the organization charts of the controller's department.

Cost Records: record the manufacturing costs incurred and the cost of product being manufactured.

Inventory Records: record the materials and supplies on hand.

Accounting Systems: install and improve the methods used to record and report accounting information.

Budgets: prepare budgets used for forecasting, decision-making, and control of costs.

Cost Review: review the actual costs incurred compared with what they should have been for the amount of product produced and attempt to explain the differences.

Timekeepers: summarize time cards of workers and compare the total from the time cards to the total of time reported by the individual foreman.

Payroll: prepare the pay checks and record the total payroll cost for each period; summarize the time keepers' records (different individuals may be assigned to these tasks).

Accounts Receivable, Accounts Payable, etc.: maintain the various subsidiary or detailed records necessary for the operation of the plant

(for example, the accounts receivable section records in detailed records the amounts which the individual customers owe).

General Ledger: maintain the general ledger. (This is the *summary* record of all financial transactions. It is also the record which shows in total that information shown in detail elsewhere. For example, the amount owed by customers is recorded in detail by the Accounts Receivable section in a subsidiary record, but the total amount owed is recorded in the general ledger.)

Data Processing: implement the application of electronic and electric accounting machines to the accounting problems of the unit.

THE CLASSIFICATION AND RECORDING OF COSTS

One problem which has plagued accountants is how to accumulate costs in all the desirable classifications and still keep the clerical staff at a reasonable size. In the past the problem was solved by sacrificing some of the information which might have been made available. In the present the problem is being solved by mechanical and electronic computers. Thus the accountant is able to classify costs in many ways and to obtain speedily the information in the form he desires.

It is interesting to note some of the different possible ways costs may be recorded. Many of the classifications overlap, but there are important distinctions. Some of the classifications are useful for recording purposes, but others are useful only when the specific problem to be solved is known.

Classifications useful for recording costs as well as for decision-making:

Responsibility (division, plant, department, or other areas of responsibility)

Job, Process, and Product (these are usually referred to as "systems," but they are also methods of classifying costs)

Direct and Indirect Costs

Fixed, Variable, and Semi-variable Costs

Natural and Functional Classifications

Area of Responsibility

The recording of costs by division or by plant is necessary with multi-divisional or multi-plant organizations, especially where the accounting is done by a central accounting organization. To be useful, the various costs must be classified according to the location where they were incurred. This is also true when we are dealing with one plant organized on a departmental basis. The objective of classifying costs in this manner is to *establish the responsibility*

for the cost. Establishing responsibility for costs is the *first step toward controlling costs,* and an important function of any cost system is to control costs.

Job, Process, and Product

Manufacturing costs may be accumulated by job (the cost of each specific production order are accumulated separately), manufacturing process, and (or) by type of product. The different procedures will be explained in detail in Chapter 23; at this point, it is merely necessary to realize that a choice is available. In some cases, costs will be classified by job (a special turbine to be built) and by process (the cost of various processes necesary to produce the turbine).

Direct and Indirect Costs

Certain costs can be easily identified with specific departments, products, or processes. These costs are *direct costs.* Costs that cannot be easily identified with product or process are called *indirect costs.* It is not unusual for the accountant to restrict the classification "direct" to direct labor and direct material. Even such costs as the glue holding the product together may be classified as an indirect cost, not because it could not be identified with a specific product but because it cannot be *easily* identified. The materiality of the item should be taken into consideration. A physical component of the product being made may have a small unit value, and the cost of treating the item as a direct cost may be excessive when compared with the benefit gained.

The borderline between direct and indirect costs is very cloudy and often depends on the frame of reference. The salary of a foreman may be a direct cost of the plant and may be directly identified with a specific department, but if that department produces several products, the salary of the foreman will be an indirect cost when we are interested in determining the cost of each product.

For decision-making purposes, the accountant's classification of direct and indirect costs is not very useful. An indirect cost may be just as relevant as a direct cost in making a decision. The indirect cost may be variable in nature and out-of-pocket (for example, power costs), or it may be a fixed cost and sunk (for example, building depreciation). Thus, to describe a cost as being an indirect cost tells little about that cost and lets us know only that it cannot be directly (or readily) identified with the end product (or the process or the department).

Fixed, Variable, and Semi-variable Costs

For decision-making purposes, this is one of the most useful classifications of costs. Product-pricing and level of production decisions are to some extent based on the information supplied by this cost classification. The ability

to control costs also relies upon a knowledge of how the cost should react to changes in the level of production.

A variable manufacturing cost is one that will vary in total amount directly with production. If production increases 10%, the variable cost will increase 10%. Examples of variable manufacturing costs are direct labor, direct material, and the power necessary to run the machines, although under certain conditions even some of these costs are not purely variable (direct labor workers may not be laid off immediately if production slackens).

A fixed manufacturing cost is a cost that is constant in total amount over wide ranges of production. Thus the president's salary is fixed, as is the depreciation of the factory. If production continues to increase so that one factory is inadequate, a second factory may be built. Once built, the depreciation of this second factory is also a fixed cost. Thus, while depreciation expense of factories is a fixed cost, it too may increase if production passes a certain point. This characteristic of fixed cost (i.e., that it is frequently not absolutely fixed) creates the need for the classification of semi-variable costs. Fixed costs are fixed relative to the level of production, but they may change from period to period (for example, salary increases may be given to foremen).

A semi-variable cost may increase in a discontinuous manner. For example, two foremen may be required for normal production, but if another five laborers are hired, another foreman is required. Thus the need for foremen may be related to direct labor, but it may not be directly proportional to the number of workers.

Natural Classification and Functional Classification of Costs

Labor cost can be classified according to its natural classification, i.e., *labor*, or its functional classification, for example, *manufacturing*. The natural classification can be divided into direct and indirect labor, and then further classified by the exact nature of the labor, for example, material handler, packer, shipper, etc. Other examples of natural classifications of costs are material, supplies, taxes, and depreciation. The functional classification includes selling and administrative costs as well as manufacturing costs. The choice between natural and functional classifications carries over to the income statement. The expenses on the income statement may be classified by their natural or functional classifications.

CLASSIFICATIONS NOT USUALLY USED FOR RECORDING PURPOSES

Classifications not usually used for recording purposes but commonly used for decision-making:

Out-of-pocket vs. Sunk Costs
Avoidable vs. Unavoidable Costs
Relevant vs. Irrelevant Costs
Controllable vs. Noncontrollable Costs
Marginal and Incremental (or differential) Costs

This list is by no means all-inclusive, but it does give an indication of the various ways in which costs may be thought of. Costs which are relevant for some decisions will not be relevant for others. While exact definitions are not essential, the reader must know how the terms are likely to be used and the different situations in which they are likely to be useful.

Many of these items overlap, but all have their uses. There are hairline distinctions that are more useful in making decisions than for definitional purposes. Thus, "Sunk Costs" and "Unavoidable Costs" are very similar, but there is a difference. The difference is useful when it is realized that some costs which are not out-of-pocket costs (i.e., they are sunk) are still avoidable. Thus the depreciation of a building is a fixed and sunk cost, but it may be avoided if a buyer can be found for the building. It is generally impossible for the accountant to use these classifications for recording purposes. The classification in most cases will depend on the decision being made.

Out-of-Pocket vs. Sunk Costs

Out-of-pocket costs require a utilization of current resources, usually cash or near cash. Sunk costs do not require a utilization of current resources. Examples of sunk costs are depreciation, amortization of patents, and depletion of natural resources. Out-of-pocket costs may be fixed (the president's salary) or variable (material or labor). Sunk costs are usually fixed, but they may also be variable (depreciation of a truck on a production or mileage basis). In some cases a sunk cost may be avoidable (for example, a building sold at a profit avoids building depreciation).

Avoidable vs. Unavoidable Costs

These terms are used by the accountant with the same meaning as the reader is accustomed to associating with them. The main pitfall is in assuming that all avoidable costs are variable and out-of-pocket and that all unavoidable costs are sunk. The president's salary is generally unavoidable, but it is also out-of-pocket. A true generalization is that unavoidable costs are fixed.

Relevant vs. Irrelevant

The purpose of this classification is to point up the fact that not all costs are relevant for specific decisions. Thus the book depreciation or book value of a machine currently being used is not relevant in making the decision

whether or not to replace it. In measuring a firm's ability to survive short-run adversity, only the out-of-pocket costs are relevant. In pricing a bid for a government contract, only variable and certain semi-variable costs are relevant. Thus, for each decision, the business manager must determine which costs are relevant.

How many executives, when faced with the decision of whether or not to replace a long-lived asset, first dial the accounting department to find out if the asset being replaced is fully depreciated? The cost of the asset being replaced is a "sunk cost" (which will usually be incurred whether the asset is used or retired), and the depreciation charged or not charged does not affect the replacement decision. Something akin to depreciation can affect the decision, namely, the decrease in salvage or resale value. This is a relevant cost and should be considered.

The following example will attempt to illustrate why the extent of depreciation is not relevant in making a replacement decision. The complication that money has value over time has been left out of the illustration in order to avoid an unnecessary complication, but it obviously should be included in an actual decision-making situation.

ILLUSTRATION

Assume that management is considering the replacement of an asset that cost $40,000 and which is 75% depreciated (net book value is $10,000), with a new piece of equipment which costs $50,000. The new asset will result in a saving of labor and material over a 5-year period of $56,000. The resale value of the old equipment is equal to the removal cost (no net salvage).

Should the asset be replaced? Two possible solutions are offered here. One includes the depreciated cost of the old asset, the other ignores this cost. To simplify the illustration, interest is not taken into consideration.

	Correct Procedure (excludes depreciated cost)	Incorrect Procedure (includes depreciated cost)
Indicated Gross Savings	$56,000	$56,000
Less:		
Cost of New Asset	50,000	50,000
Depreciated Cost of Old Asset		10,000
Net Saving (Dis-saving)	$ 6,000	($ 4,000)

One procedure (the correct) argues for replacement; the other (the incorrect) argues in favor of retention of the old asset. Let us see what happens when we follow the two procedures. Assume that revenues for the 5-year period are $100,000. This figure is net of all expenses except those factors being considered in this example:

	Results of Operations	
	Correct Decision	Incorrect Decision
Net Revenues	$100,000	$100,000
Less:		
Write-off of Old Asset	$ 10,000	$ 10,000
Depreciation of New Asset	50,000	
Additional Costs Incurred (because new machine was not purchased)		56,000
Total Deductions	$ 60,000	$ 66,000
Net Income	$ 40,000	$ 34,000

The financial position of the firm that followed the correct procedure of ignoring the depreciated cost of the old asset is $6,000 better off than the position of the firm that followed the incorrect procedure of including the depreciated cost in the replacement calculations. To make a proper replacement decision, it is necessary to compare the value of the savings with the cost of the new asset. The book value of the asset being replaced does not affect the decision.

Opportunity Costs

The principle of opportunity costs is very important to the analysis of accounting data and to business decision-making. It defines the cost of one course of action in terms of the opportunities which are given up in order to carry out that course of action. If an asset can be used to perform only one function, and it cannot be used in other ways or sold as scrap, the opportunity costs of that asset are zero. Thus, the opportunity costs of using the underground gas pipe of a gas company in the city of Chicago are zero, because the pipe is going to carry gas and nothing but gas in Chicago. As long as the revenues from carrying the gas are greater than the incremental costs connected with delivering the gas, it will be desirable for the company to continue to deliver the gas. The costs of using the gas pipe are zero, because there are no other alternative opportunities. In a theoretical sense, as well as physical sense, the costs of the gas pipe are sunk; the pipes have zero opportunity costs.

A machine used to make product A will have an opportunity cost if it can also make product B. For example, assume that a period's production of B can be sold for $10,000 and that the costs which vary directly with production are $8,000. The opportunity cost of not producing product B is $2,000. The proceeds that are forsaken by producing A instead of B are actually a cost of producing A. The opportunity cost principle is extremely useful in deciding on alternative uses of productive facilities.

ILLUSTRATION

A machine is currently being used to make product A, which has a price of $1.50 per unit and a cost (which varies with production) of $1.10 per unit. The

depreciation of the machine has not been included in the unit cost because it is considered to be a fixed cost. The machine could be used to make product B, which could be sold for $2 per unit and which has variable costs of $1.20 per unit. Is the machine depreciation relevant in making the decision whether or not to continue producing product A?

Answer: The depreciation of the machine is not relevant, but the opportunity cost of not producing product B is relevant. We must know how many units of product B can be produced per period in order to know the exact opportunity cost per period.

Controllable vs. Noncontrollable Costs

The concept of controllable costs is important because, if properly applied, it will help avoid much confusion in the area of cost control. It is generally accepted that a person should be held responsible for only those costs which he can control. A corollary of this is that reports to junior managers should contain only those costs which they control. Thus, a foreman of an operating department would not receive a report comparing actual building depreciation with budgeted depreciation, since the foreman cannot control the rate of building depreciation. The inclusion of this or like items serves to detract from those items that the foreman can control. The plant manager is responsible for the most efficient utilization of the factory building; thus, the report measuring his efficiency would include building depreciation.

Marginal and Incremental (or Differential) Costs

The marginal cost is the cost added by producing one more unit. The incremental cost (or differential cost) is the cost added by producing more than one unit. Both definitions are extremely important, since many decisions are based on marginal or incremental costs.

The accountant often takes a practical short cut and assumes that the incremental cost is equal to the variable costs times the number of units to be added, plus any fixed (or semi-variable) costs which have to be added to produce the additional units. This ignores changes in efficiency, but otherwise it is a useful approximation.

DISTINGUISHING BETWEEN COSTS AND EXPENSES

A *cost* is an asset value. While it may have been consumed within the company and changed form, it may still be traced within the company. Thus the labor of a man on the production line in a sense may be traced to the product on which he is working, and the same is true of factory depreciation.

An *expense* is a *cost* or *asset* that has expired in the gaining of revenues.

It has gone forth from the company. Thus, when the manufactured goods are shipped to the customers, all the costs that went into the production of those goods become expenses.

It must be admitted that the accounting profession does not universally recognize this distinction in its terminology. Thus "Cost of Goods Sold" is used rather than the more exact "Expense of Goods Sold" or "Cost of Goods Sold Expense."

CONTROL OF COSTS

One of the most important tasks of any cost accounting or budget system is the control of costs. The control is actually accomplished in two ways. One is the psychological impact which the review of performance has upon the way managers will perform, and the other is the review of costs which enables management to correct deficiencies which would otherwise be unnoticed.

Psychological Impact

If the various levels of management know that their performances are being reviewed, they are more likely to be on the lookout for inefficiencies and to take steps to rectify these situations. The psychological impact is not easily measured, but very possibly, this is the most important contribution of a cost accounting-cost control system.

Review of Costs

It is common to speak of cost standards in relation to direct material and direct labor, and of budgeted costs when speaking of overhead and nonmanufacturing costs. Standard and budgeted costs are the backbone of any cost control system. They set the "par," or goal, that management attempts to attain. The standard is frequently set so that it can be attained only by a high level of efficiency. If the actual costs are in excess of the standard costs, then management has not reached this high level of efficiency, and the unfavorable variance from standard costs must be explained.

Some companies follow the unwise practice of establishing standards only for direct material and direct labor and not controlling manufacturing overhead and nonmanufacturing costs. This is a procedure that can result in undetected inefficiencies. Overhead is just as important an item as direct costs and should be subjected to the same cost controls. One company, after installing a control system for overhead costs, found that a plant had recently purchased a 20-year supply of First Aid material; another plant was obviously supplying small tools for the do-it-yourself workshops of its workers.

Flexible Budgets

The flexible budget procedure for controlling costs compares the *actual* overhead to the *budgeted* overhead at the *same level* of operations. Comparing costs at the same level of activity is extremely important, since the reporting of the incurred cost has control significance only when compared with what the cost should have been at the same level of activity.

The flexible budget procedure implies a knowledge of how costs will be affected by changes in the level of operations. The nature of the cost (how it will react to changes in activity) can be determined in either of two ways:

1. By a study of how the cost should theoretically react to changes in activity (for example, wages of material handlers may be expected to be variable, since the more activity, the more material to be handled).
2. By a study of how the cost (or costs) has reacted to changes in activity (this problem is most simply solved by using a graphic solution but mathematical solutions are also possible).

The first of the two procedures is the preferred method. It eliminates the danger of using past experience as a sole guide in setting standards. When past experience is used, past inefficiencies may be built into today's standards. The standards should reflect a predetermined level of efficiency, not merely what has happened in the past.

However, past experience may be useful in showing the attainable level of efficiency. It may also uncover factors that influence costs but which have previously been ignored. For example, some costs may increase as the activity increases but may then show a reluctance to decrease when the level of operations slackens (for example, new foremen have to be hired for a second shift, but when the shift is disbanded, the foremen remain). Another method of uncovering inefficiencies is to compare the cost experience of different plants of similar characteristics. This often will uncover areas where important inefficiencies have been occurring. A company, in comparing the heat expense of its different plants, found that a Chicago plant had higher costs than its other plants. This was at first blamed on the Lake Michigan winds, but engineers disproved this explanation. Size of plant also did not account for the high heat bill. The answer was found in an open loading platform. The firm was attempting to heat all of Chicago.

Plotting Expenses

It is helpful to plot on the same graph the past experience of a cost for different levels of activity and a line representing the budgeted costs. When the actual cost is incurred, it can be plotted on this graph and compared with

what it should be (the budgeted amount), and also compared with what it has been in the past for a comparable level of operations.

EXAMPLE

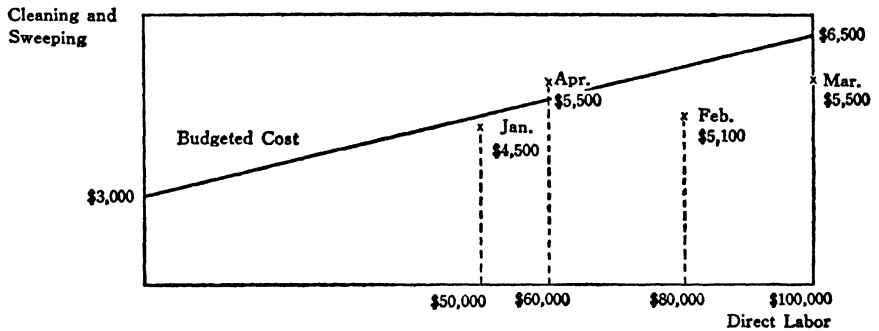
An analysis of laborers engaged in cleaning and sweeping indicated that the cost would be $3,000 at zero level of activity and would increase $3.50 for every $100 of direct labor.

The experience of the cost for the past three months is as follows:

	Sweeping Cost	*Direct-Labor Dollars*
January	$4,500	$ 50,000
February	5,100	80,000
March	5,500	100,000

Plot the "budgeted cost" line and the points representing experience of the past three months.

The actual cleaning-labor cost for April is $5,500, and the direct-labor cost is $60,000. Plot this information, and give comments.



COMMENTS

The expense for April is above the budgeted cost line. This indicates there may be inefficiency in April. Recent past experience also leads to a conclusion that the cost for April was too high. Since the cost for April is the same as for March, it may be that the extra cleaners hired for the peak operations in March were kept on the payroll in April.

Reports: Form, Frequency, and Timing

The reports used in controlling costs take various forms; there are direct-labor reports, material-usage reports, overhead cost reports, etc. While different in detail (for example, labor reports also give hourly information), they have many similarities and can be expected to have all or some of the following columns:

Name and Account Number of the Cost
Actual Cost for the Period

Budgeted (standard) Cost for the Period
Variance (difference between actual and standard cost)
Actual Cost (year to current date)
Budgeted Cost (year to current date)

This information is often recorded on "punched" cards, and the reports take the form of a "run" (automatically typed report) of the machine. The use of machines tends to decrease the cost of each successive report and make the reports more readily available. Management can get information that previously would have been too expensive or too time consuming to accumulate.

The frequency and nature of the reports vary from company to company. Many firms report labor costs *daily*. Some firms also report material and overhead daily, although this is relatively less common than daily reporting of labor; the cost of getting daily reports must be weighed against the usefulness of getting information while it is still significant. The timing of reports is extremely important. A labor report in the hands of the plant manager 12 hours after the event has occurred is more useful than the same labor report delivered 30 days later. Monthly cost reports may be better than none at all, but they are a poor substitute for daily or weekly reports that are placed in the hands of management fast enough so that the causes of the inefficiency can be corrected before they waste resources for a month. Explanations are also earlier and more significant if the person explaining inefficiencies is explaining something which has happened on the preceding day. On the other hand, frequent reports prepared soon after the event add to the cost of information.

Establishing Responsibility

Two of the primary precepts of any cost control system are that definite responsibility for the costs must be established, and that a manager must be held responsible only for those costs which he can control. Both of these precepts have accounting implications.

Costs should be recorded and accumulated by areas of responsibility. These areas of responsibility may be entitled departments, burden centers, overhead centers, etc., but whatever the title, the goal is to accumulate costs so that the efficiency of the person responsible for the costs may be judged.

The precept that a manager cannot be held responsible for costs that he cannot control means that reports must be prepared with noncontrollable costs carefully labeled as such or left off the report entirely. In too many cases, the attention of executives is focused on the size of costs over which no control is being exercised by the person whose efficiency is supposedly being measured.

The allocation of manufacturing overhead costs to operating departments and the absorption of the overhead costs to find unit costs of product often result in confusion when attention is shifted to the control of costs. The allocation of overhead does not assist in the control of costs. To control costs, it is necessary to focus attention at that point where the costs are incurred. Thus, to control the cost of the accounting function, it is necessary to investigate the costs of the accounting department which were incurred in the accounting department and not to consider the size of the cost allocations from the building department, power department, personnel department, etc. The allocation of these costs may be relevant, but not for the control of costs.

Cost Control and People

Costs are not controlled by the *issuance* of reports but by their *use* by members of management in making decisions that will result in costs being less than they would be if the data had not been accumulated and circulated. The importance of *people* in this process should not be overlooked. Only by the action of people in authority will costs be controlled.

The accounting department must take an active part in the education of management as to the importance of cost control and how accounting reports can help to accomplish this end. The job of the accounting department does not end with the preparation of a report. The person receiving the report should be helped to understand it and also to understand how it can be used to help him do his job more efficiently.

Control of Distribution and Administrative Costs

The focus of attention of this text is on the control of manufacturing costs. This is not meant to imply that the control of administrative costs and the costs of distribution is not important. The same types of procedures and reports used to control manufacturing costs should be used to control nonmanufacturing costs.

Several problems in the control of nonmanufacturing costs should be noted. Administrative costs and distribution costs are often less controllable than manufacturing costs. For instance, how can you measure with certainty whether the advertising expenditures are excessive, or that the president of the firm is traveling too much? Another problem may arise because it may not be possible to identify the administrative cost or selling cost with one product. If a salesman is selling four products, how much of his costs should be allocated to each product?

Thus, to some extent, the ability to control nonmanufacturing costs with accounting tools is limited by the nature of these costs. A large amount of the real control in this area is exercised by the executives who practice re-

straint in making expenditures because they have been indoctrinated in the importance of cost control in general. The accountant can report the actual expenditures made and can compare these expenditures with the budgeted amounts, but frequently this comparison will not reveal whether the expenditures have been wisely made. This will be shown in the long run by the income statements of successive periods.

MARGINAL AND DIFFERENTIAL COSTS, AND DECISION-MAKING

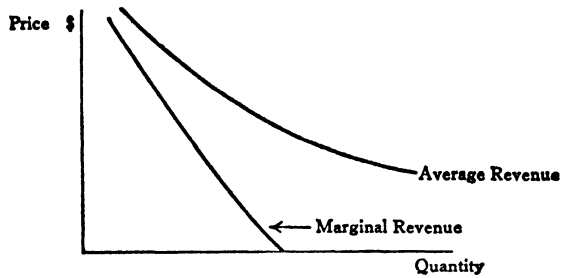
Two of the most important decisions that businessmen must make are the pricing decision and the decision as to level of output. How are these decisions made? This question has never been answered satisfactorily. Economists have evolved a theory of the firm which is based on marginal analysis and which shows how the businessman should make these decisions. It is not important whether this type of analysis is being used in a majority of cases or whether it is not practicable in many situations. What is important is that essentially the marginal analysis is common sense, and therefore the method should be understood in its simplest form by all students of business. The basic principles are valid, whether or not they are actually applied in their pure theoretical form. Instead of marginal analysis, the businessman will frequently think in terms of differential revenue and costs, this often being the closest that the accounting records can come to marginal costs.

Marginal Analysis: The Economic Approach

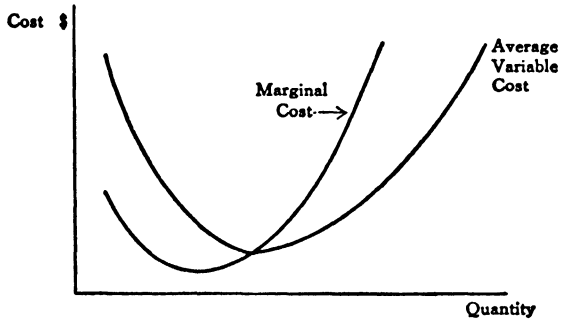
The economist states that a firm should produce where marginal costs equal marginal revenues and that at this point the firm will maximize its income. As long as the revenue from the next unit (the marginal revenue) is greater than the costs of producing that unit (the marginal costs), the firm should produce that unit. The firm should cease expanding production when marginal costs equal marginal revenues. The logic of this conclusion becomes evident if the graphic presentation is studied.

It is assumed that the lower the price of the product, the more units of product will be sold. Thus the average revenue curve slopes downward to the right (this is also the price curve). The marginal revenue curve slopes downward to the right also and is below the average revenue curve. The revenue added by the sale of an additional unit is less than the price, since the price of all previous units had to be lowered to make the additional sale.

The average variable cost curve slopes downward to the right, reflecting increasing efficiency, and then curves upward as the quantity produced exceeds



the point of maximum efficiency. The marginal cost curve passes through the average variable cost curve at its minimum point and then "pulls" it up.



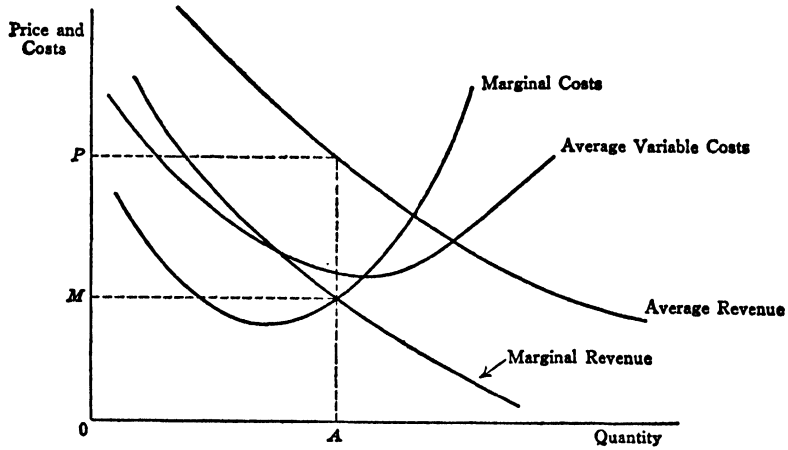
The next step is to combine the two graphs. From this new graph may be picked off the optimum level of production (*0A*), this being where the marginal costs equal marginal revenues.[1] The price to be charged for the product (*0P*) may be obtained by finding the average revenue (price) necessary to sell *0A* units of product. It is extremely important to recognize that the price charged is *not* the marginal revenue (*0M*). The intersection of the marginal revenue and marginal cost curves determines the *output*, but the price is determined by the average revenue curve.

In the following graph, the average revenues are greater than the average variable costs at the optimum level of output. Thus it is possible that the firm is profitable. To know for certain, it will be necessary to draw in the "Average Total Cost" curve. The location of this curve will determine whether the firm is profitable.

This discussion is by no means the complete story of marginal analysis. Among the questions ignored is the question of the degree of competition. Is the average revenue line for the firm a horizontal straight line, and if it is not, what is the slope? What is the shape of the average variable cost curve? What conditions are necessary for a condition of equilibrium? Most important, does the individual businessman know the shape of all or any of these

[1] The firm will not produce in excess of *0A* units, since the costs of each additional unit are in excess of the revenues of those units.

curves? The marginal cost curve is not readily available from the accounting records. This is not merely an oversight on the part of the accountant. The informed accountant appreciates the importance of marginal costs, but he also



recognizes the expense of accumulating information when the change in costs is caused by adding or dropping *one unit* in production. Instead, the accountant compromises and uses a technique that makes use of *differential costs.*

Differential Costs: The Accounting Approach

The economic approach concerned itself with the increase in revenues and expenses arising from the additional sale of *one unit.* The accounting approach concerns itself with the increase in revenues and expenses arising from the additional sale of a *block of units.* For instance, what will be the effect of a sale of 1,000 units at a price of $5 a unit? To answer this question, the total costs without the sale must be compared with the total costs with the sale made. The difference is the "differential cost" of making the sale. If the revenues ($5,000) are greater than the differential costs, then the sale will increase total profits. Differential costs will also be equal to the variable costs per unit times the number of units *plus* any "fixed costs" that will be added because of the additional production.

The differential cost analysis is particularly valuable in making a decision as to the desirability of "bidding" for additional business. If the revenues obtained from these sales are greater than the differential costs, then the firm will be better off gaining the business.

EXAMPLE

The ABC Company has an opportunity to bid for the right to sell 1,000 containers to the government. A study reveals the following information:

Direct Material Costs per Container $2.50
Direct Labor Costs per Container ..... 1.25 (1 hr. of direct labor)
The Company has the following overhead rates:
Fixed Costs ..... $2.25 per direct-labor hour
Variable Costs ..... 1.50 per direct-labor hour
In addition the company will have to buy special equipment costing $500. This equipment will have no foreseeable use after this contract.

Required

Compute the *minimum revenue* the company must obtain in order for it to be no worse off than if it did not get the order. Assume the company has excess capacity.

Solution

Direct Material	$2.50 × 1,000 =	$2,500
Direct Labor	1.25 × 1,000 =	1,250
Variable Overhead	1.50 × 1,000 =	1,500
Cost of Additional Equipment .	0.50 × 1,000 =	500
Differential Costs per Unit (not the marginal cost) [2]	$5.75	
(Differential Costs of the Sale of 1,000 Units)		$5,750

If revenues of $5,750 are obtained for the 1,000 containers, the firm will be no worse off than if it did not have the order, since the differential costs are equal to the additional revenues. Actually the firm would bid something higher than $5.75 per unit in order to better its position by the transaction. However, the maximum price bid will be tempered by the fear of losing the bid and possibly by non-economic motives (such as patriotism).

Accounting Data and Decision-making

The problems and reading material in accounting textbooks generally imply that decisions can be made by using only accounting data. Accounting information can help in making decisions, but it does not replace judgment. The business manager must look beyond the accounting analysis to be able to choose the best course of action.

Information for decisions generally incorporates estimates and forecasts. This is especially true in pricing decisions. The costs for different levels of production must be predicted, as well as the levels of sale for different unit prices. But even if the forecasts and estimates are absolutely correct, other considerations must be reviewed. What will be the effect of a price rise on customer goodwill? What will be the long-run impact of a price change? How will a price change affect the company's labor relations? Are there any legal implications? These factors and others must be considered before a decision can be made intelligently.

[2] The marginal cost of the first unit is $505.25. This strange answer arises because of the discontinuity of the costs. The first unit bears the total cost of the equipment.

RECORDING ACCOUNTING INFORMATION

At this point it should be apparent to the reader that costs may be recorded and used in many different ways. The problem remains of actually getting the costs recorded so that the information is readily available for use by management when it is needed. There are four basic methods of recording data and a large number of combinations of these methods. Information may be recorded by using:

1. Manpower
2. Key-driven machines
3. Electrical—mechanical punch-card equipment
4. Electronic data-processing equipment

For small organizations a combination of manpower and key-driven machines will usually be sufficient. Key-driven machines refer to typewriters, adding machines, calculators, and bookkeeping machines. These machines enable the manpower to be used more effectively than if only pencil and paper were used and are the first steps toward mechanization of the office force.

If the number of transactions being recorded is large enough, the next step toward mechanization may be warranted. This is the use of electrical-mechanical punch-card equipment. Up to about 1950, this type of equipment was the last word in office mechanization. An "automatic" accounting system at that time meant a system using punch cards. The basic system is simple. Information is recorded on the punch card by the operator of a machine which codes information on a card by punching a series of holes in it. Each hole has a meaning which is translated by another machine. Thus to record the incurrence of direct labor of the finishing department in the Albany plant, it would be necessary to punch five different series of holes, one each to identify the cost as: a manufacturing cost, direct labor, labor incurred in the finishing department, incurred in the Albany plant, the amount of cost. It may also be desirable to record additional information, such as the product being manufactured and the shift or foreman in charge of the shift.

To save time and effort, a "mark-sensing" system may be used to record the source information on a card. Following this procedure, the foreman marks a card with a special pencil to indicate the facts of the above example (manufacturing cost, direct labor, finishing department, Albany plant, and the amount of the cost incurred). When this card is inserted into a machine, the machine translates the marks on the one card into holes on another. This

procedure has the advantage of reducing both paper work and the chance of human error. Errors are bound to occur if the information is transferred manually from document to document.

When information is desired from the punched cards (such as the total direct labor costs of the finishing department), the cards are mechanically sorted, any calculations are made (such as the extension of hours worked by the hourly wage), and then the cards motivate a machine which types a "run" or list with the desired information on it. These steps are not all performed by the same machine but by different machines for each function. Thus there will be a sorting machine, a calculator, a card punch, etc.

During World War II the armed forces used mechanical computers to solve problems in predicting the location of a ship or airplane so that guns could be aimed to fire a projectile where the target was going to be, rather than where it just had been. By the end of the war, planes were going faster than the computer could compute, so scientists went to work and came up with an electronic computer which could solve the problem of aiming guns for faster targets. These electronic computers are cousins to the electronic data-processing equipment which is available to the business community today. The electronic data processors are capable of receiving, storing, and processing vast quantities of information. When information is desired, the electronic computer can search its "memory" unit (this memory unit may take the form of a tape or another type of magnetic storage device) at a fantastic speed to obtain the desired information.

The use of electronic data-processing equipment in industry has grown tremendously in recent years. Progress has been accelerated as management learned how to use this new marvel. The cost of the equipment has decreased as manufacturers and scientists improve the design and make use of improved production techniques (for example, the expanded use of transistors has helped decrease the cost). There is a tremendous need for business managers who understand the capabilities and limitations of these machines, or for machine experts who understand the needs of the business manager. For the electronic computers to be used properly, the person in charge of programming (setting up the control instructions for the computer) should know the needs of management, as well as having the technical knowledge necessary to record the information.

QUESTIONS AND PROBLEMS

21–1 Accounting reports indicate what has happened in the past; what we want is information relating to the future. The past is gone and not relevant.

Required
Discuss this statement.

21-2 Why is it desirable that a cost be classified as to job? To process? To product?

21-3 The distinction between direct and indirect costs is frequently very elusive. Determine which of the following costs are direct costs (a) from the point of view of the plant, (b) from the point of view of Department One, (c) from the point of view of the foreman in charge of making Product A in Department One:

General cleaning supplies.
Wages of oiler (services all machines in Department One).
Wages of worker on production line. His machine produces components for Products A and B, but all his output is produced and used in Department One.
Wages of assembly line worker. Works only on Product A in Department One.
Cost of heating the plant.
Cost of machines used both by Department One and Two.
Cost of machine used only by Department One.

21-4 Are all fixed costs sunk costs? Unavoidable? Noncontrollable? Explain.

21-5 Are all variable costs out-of-pocket? Avoidable? Controllable? Explain.

21-6 The salary of the president of the firm is usually considered a fixed cost. Is it a relevant cost in trying to price the product for sale to the government? Is it a relevant cost in the decision as to whether or not to sell the organization? Explain.

21-7 Certain costs are controllable and certain costs are noncontrollable. This is a meaningless statement unless we define what portion of the organization is being discussed. Explain.

21-8 Distinguish between marginal and incremental (or differential) costs.

21-9 What is the technical distinction between a cost and an expense? Is this distinction consistently observed? Do you think it would be helpful if it were?

21-10 Mr. Jones is trying to decide whether or not to trade in his automobile for a new one. He finds his 1948 Chevrolet has no trade-in value at this date (he paid $1,500 in 1948). Relative to the decision at hand, discuss the costs which are relevant and irrelevant.

21-11 The ABC Manufacturing Company is considering expanding by acquiring a plant currently being operated by the XYZ Company. The XYZ Company has submitted the following list of costs for normal level of operations:

Direct Labor	$100,000
Direct Material	200,000
Indirect Manufacturing Costs, Fixed	
Plant and Equipment Depreciation	150,000
Salaries of Personnel (includes allocation of central office salaries, $100,000)	200,000
Indirect Manufacturing Costs, Variable	40,000
	$690,000

The plant is so designed that it can produce only widgets. Widgets sell for a price of $1 per unit. The widget industry is very competitive, and a price change is very unlikely. At a normal level of operations, the plant produces 500,000 widgets.

The XYZ Company has operated the plant efficiently, and it is unlikely that the ABC Company could introduce any additional efficiencies. Selling costs are nominal. The ABC Company would not have to add to its central office staff.

Required

(a) In computing the maximum price that the ABC Company should offer for the plant, what "income" figure should be used (assume normal sales)?

(b) If the XYZ Company cannot sell the plant, should they close it down? Explain.

21-12 The president of the ABC Company has suggested to his controller that costs be classified and recorded according to whether or not they are relevant. What should be the controller's action?

21-13 The president of the ABC Company, in an effort to find out why profits were down, closely inspected the variable costs incurred and compared the actual costs with the costs which should have been incurred at actual level of operations. He ignored the fixed cost classification, since the fixed costs are "fixed." Discuss.

21-14 If an income statement were prepared, using a functional classification, what information would not be disclosed?

21-15 The following questions apply to a family of five who own their own home (with mortgage). Name some home costs which are:

Out-of-pocket	Sunk
Avoidable	Unavoidable
Controllable	Noncontrollable

21-16 The following schedule was prepared for the president of the ABC Company:

Production	Fixed	Variable	Total Costs
1,000 units	$500	$1,000	$1,500
1,001	500	1,001	1,501
2,000	800	2,000	2,800

Required

(a) At 1,000 units of production, what is the marginal cost of producing one more unit?

(b) At 1,000 units of production, what is the differential cost of producing 1,000 more units?

(c) Why may fixed costs increase from $500 to $800 as production is doubled? Are these costs really "fixed"? What label would you suggest?

21–17 The Miner Company is considering the elimination of an outlying plant. The elimination would result in increased efficiency because of savings in transportation of material and parts. The present plant, which is 40 miles from the main plant, would be replaced by a plant adjacent to the main plant. In preparing an analysis of the pros and cons of the elimination, one of the researchers suggested that a portion of the salaries of the executives of the plant and headquarters should be considered, i.e., the portion reflecting the amount of time spent traveling during company hours between the plants. Another researcher said, "The salaries should not be considered, because they are a fixed cost. The executives would be paid the same amount whether they traveled or not; thus the cost is not relevant."

Required

(a) Should the time the executives spent traveling be considered in making the decision whether or not to replace the present plant?

(b) What other information would you want if you were going to make the decision?

21–18 The Miller Company is considering the sale of the physical assets of a subsidiary company. The president of the Miller Company has requested an analysis of the costs of the subsidiary and has been given a breakdown of costs (assuming normal operations) into fixed and variable classifications.

Required

(a) Name some "fixed" costs that would be avoidable if the subsidiary were sold.

(b) Name some "fixed" costs that would be avoidable if the subsidiary were retained but not operated.

(c) Name some costs that would continue even if the subsidiary were not operated (assuming it were not sold).

21–19 The J.B. Clark Company

Required

(a) Assuming the following information, determine the total revenue and marginal revenue amounts for the different possible prices. At what price would the company maximize revenues?

Units Sold	*Price Necessary to Sell the Numbers of Units Indicated in Column 1*
1	$10
2	9
3	8
4	7
5	5
6	4
7	3

(b) Can you determine the optimum price or the optimum level of production from the given information? Explain.

21–20 The J. B. Clark Company (continued)

Assume that the company has fixed costs of $5 and variable costs for the different levels of production as follows:

Units Produced	*Total Variable Costs*
1	$ 8
2	15
3	21
4	26
5	32
6	40
7	50

Required

(a) Compute the marginal cost for each level of production.
(b) Plot the various curves necessary to determine the optimum level of output. What is the price at that level of output?
(c) Will the price equal marginal cost at the optimum level of output? Explain.
(d) Will the firm make a profit at the optimum level of output? Of what significance were fixed costs in determining the optimum level of output and price?

21–21 The Marshall Company

The Marshall Company is about to bid for a government contract. The president of the firm desires to know the minimum bid which the company can make in order for the firm to be no worse off than if the firm did not get the order. Assume that the firm has adequate capacity to produce the product for the government without adding to plant. The contract will be for 10,000 units.

The analyst prepared the following report:

	Per Unit	*Total*
Direct-Material Costs	$ 1.30	$ 13,000
Direct-Labor Costs	4.60	46,000
Overtime Incurred because of Contract	.10	1,000
Overhead		
Variable Overhead	1.00	10,000
Fixed Overhead	2.00	20,000
Special Equipment (to be purchased)	4.00	40,000
Allocation of Selling and Administrative Expenses (Fixed Costs)	3.00	30,000
Safety Factor (100% of the overhead rate)	3.00	30,000
Minimum Price	$19.00	$190,000

Required

Prepare a supplemental report for the president.

21–22 The Make-or-Buy Company

This company uses machine tools which it has been manufacturing for its own use. The company currently has excess capacity, and the tools are being manufactured in a part of the plant that would otherwise lie idle.

A salesman of machine tools, who has been attempting to sell to The Make-or-Buy Company, has prepared the following analysis in cooperation with company personnel:

	Cost of Manufacturing the Next Year's Supply of Tools	*Cost of Buying the Next Year's Supply of Tools*
Cost of Purchasing Tools		$210,000
Cost of Parts and Material	$100,000	
Labor (especially hired for this type of work)	40,000	
Labor (distribution of labor costs of regular hourly workers based on hours of actual labor)	30,000	
Labor (allocation of labor costs of salaried employees)	20,000	
Variable Overhead	10,000	
Fixed Overhead (includes $20,000 of depreciation of equipment especially purchased for this purpose in the past)	40,000	
	$240,000	$210,000

The purchased machine tools will have no operating advantage over the tools made by the plant itself.

Required

Prepare an analysis showing whether The Make-or-Buy Company should purchase or make its machine tools to fill its needs.

21–23 The presidents of two corporations were discussing their businesses. The conversation consisted of the following:

MR. FIX: My problem is having too low a volume of sales. I have fixed costs of $100,000 and variable costs of $1 per unit of product. With my present volume of 10,000 units, the average cost of product is $11 per unit. If I could sell 100,000 units, the average cost would be $2 per unit.

MR. VARIABLE: You are lucky—all you need is more volume. My problems are more complex. I have plenty of volume. My fixed costs are also $100,000 and I am selling 100,000 units of product. My variable costs are $1.90 per unit, which is $0.10 less than my selling price of $2.00. What is your selling price?

MR. FIX: My selling price is $11 per unit.

Required

(a) Compute the incomes presently being earned by the firms of the two gentlemen.

(b) Assume that Mr. Fix could increase his volume to 200,000 units by decreasing his price to $1.80 per unit. Would this price reduction be desirable, assuming that the present plant capacity is adequate?

(c) Assume that Mr. Variable could sell only 50,000 units if he raised his price to $4 per unit. Would this price increase be desirable?

(d) Assume that Mr. Variable could sell 300,000 units of product if he decreased his price to $1.93. Is this price decrease more desirable than the present price, or the price suggested in part (c)?

(e) The generalization is often made that "with high fixed costs, the only answer is to increase production and sales." Discuss the validity of this statement.

21–24 Pulp and Paper Mill

The production manager of a pulp and paper mill wanted to know if it would be better if the pulp mill ran only one kind of pulp. At the present time, the pulp mill manufactured 75% hi-bright pulp and 25% regular to meet the demands of the various grades of paper produced in the paper mill. The production manager felt that if the pulp mill would make only hi-bright, savings could be realized in decreased cost of chemicals, improved uniformity, decreased loss in time because of changeovers, and decreased cost of titanium to hold or increase brightness. In order to obtain the necessary regular pulp needed in the manufacture of certain grades, he felt that the hi-bright pulp could be "dyed back" to a regular brightness. He realized that an all hi-bright production meant increased steam cost, as the pulp would have to be cooked longer, as well as an increase in certain other chemical costs.

The following memo is the answer the financial analyst department submitted to him in reply to the request.

Memo to: Mr. X
From: Mr. Y
Subject: Analysis of cost of manufacturing all hi-bright pulp vs. our present method of running two blends.

Assumptions:

1. We currently make about 75% hi-bright pulp and 25% regular brightness. At a production of 3,600 tons per month, this would mean making our present 900 regular tons to high brightness.
2. The only way we can justify changing to all hi-bright pulp is by assuming that we will be able to cook enough pine separately to replace *all* outside pulp we now use (averaging 150 tons per month).

Increased Costs of Making 900 Tons More Hi-Bright Per Month

	Monthly Total
1. Increased cost of bleaching—$2.63/ton	$ 2,367
2. Increased steam cost $\frac{1}{10}$ meg/ton @ $0.528/meg	50
3. Assume 20% more TiO_2 in coating to increase opacity	1,800
4. Assume double present amount of dye on coated grades to reduce brightness	500
Total Increased Costs	$ 4,717

Savings to Accrue from Making 900 Tons More Hi-Bright Per Month (Using 300 tons of pine pulp)

	Monthly Total
1. Assume making 300 tons pine pulp (enough to replace 150 tons purchased pulp and 150 tons regular pulp) Present incremental cost of 150 tons of present blend hi-bright	$ 9,600
Present cost of 150 tons of purchased pulp	24,000
	33,600
Anticipated incremental cost of 300 tons of pine pulp	20,250
Savings	$13,350
2. Decreased rejections for low brightness and paper lost in changing from regular to hi-bright on paper machine—30T	1,500
Total Savings	$14,850
Total Increased Costs	4,717
Total Net Savings Per Month	$10,133

Should the mill make only hi-bright pulp?

22

Manufacturing Overhead

ALL COSTS CONNECTED with the manufacturing process, other than direct labor and direct material, are frequently classified by the accountant as *manufacturing overhead.* This differs somewhat from the economist's definition of overhead, which includes only fixed costs. The difference in the two definitions is not important as long as it is recognized which definition is being used. In this chapter, manufacturing overhead refers to both fixed and variable manufacturing costs that cannot be readily identified with a specific product, process, or job.

Manufacturing overhead includes a wide range of costs. They will be fixed and variable, sunk and out-of-pocket, avoidable and unavoidable, and so on. The following list gives some idea of the variety of the costs:

Building Depreciation Cost
Heating Cost
Repair Cost
Indirect Labor: Cleaners, Electricians, Shippers, etc.
Supplies: Cleaning supplies, small tools, gloves, etc.
Taxes: Payroll taxes (the payroll taxes on direct labor are often treated as overhead for practical reasons)
Cafeteria Cost
Foreman's Salary
Cost Accounting Department Cost

Overhead (or Burden) Centers—Establishing Responsibility

Overhead costs, no less than other costs, must be controlled. To accomplish this end and also the sensible allocation of costs to product, various overhead or burden centers are established. Each department has at least one overhead center, where the overhead costs are first recorded. This process is called *distributing* the costs. The distribution of costs is accomplished by identifying where the costs were incurred. Note that this is a matter of identification, not arbitrary allocation. For example, if labor costs were in-

curred in five departments, the time each worker spent in each department would be tabulated and would be the basis of the *distribution* of labor costs.

The next step is to assign all overhead costs to operating departments. Some of the costs have been directly identified with an operating department by the cost distribution procedure. However, many overhead costs have been distributed to service departments, and these costs have to be *allocated* to operating departments. The allocation of the costs is often made by using arbitrary bases, and the allocated costs have no use for purposes of cost control.

After the allocation of service department costs to the operating departments, the next step is to *absorb* or *apply* the overhead costs to product.

It should be noted that there are actually three steps in recording overhead:

1. Recording manufacturing overhead to cost or burden centers (responsibility centers). This may be called *cost distribution.*
2. *Allocating* the costs of service departments to operating departments.
3. *Absorbing* or *applying* the overhead to product.

The overhead is first charged to (distributed to) the burden centers where they are incurred to establish the responsibility for the costs. Only if the responsibility for cost incurrence is clearly defined can costs be effectively controlled. For example, the costs of maintaining the factory building should first be classified as a building department cost for cost control purposes and then should be allocated to the various operating departments so that the product being produced may be charged with a pro rata share of the cost of maintaining the building. The allocation should be based on the benefits received by the departments.

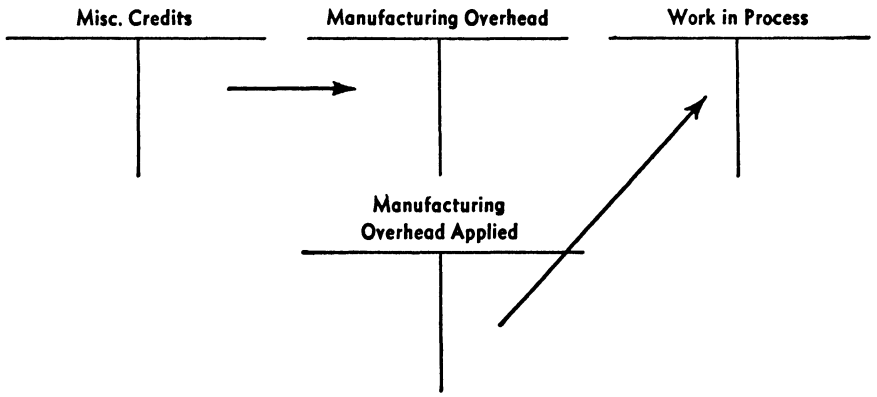
Manufacturing overhead is accounted for in numerous ways. The methods of *allocating* the overhead to operating departments and *absorbing* the overhead to product vary from company to company and even within different plants of the same company. The purpose of this chapter is twofold. One is to suggest possible accounting systems for recording manufacturing overhead. The second is to clarify the theory of accounting for overhead by explaining the relation of overhead application to income measurement and determination of financial position.

RECORDING MANUFACTURING OVERHEAD

General Ledger Accounts

Theoretically only one account is needed to record manufacturing overhead in the general ledger. A manufacturing overhead account can be used to

record all indirect manufacturing costs. Subsidiary accounts can be used to record detailed information such as the *natural classification* of the cost and the *department where it was incurred.* A refinement of this procedure could be to use two accounts: one to record the manufacturing costs as they are incurred, *manufacturing overhead;* and the second, *manufacturing overhead applied,* to record the application of the costs to product (debit work in process and credit manufacturing overhead applied). This procedure has the advantages of retaining in one account the total manufacturing costs incurred. (If this account was credited to absorb overhead, the account will merely show the unabsorbed balance.) The manufacturing overhead account also acts as a control account over the departmental subsidiary ledgers.



EXAMPLE

The Manufacturing Company has *incurred* $120,000 of manufacturing costs during the month of January. It has *applied to product* $105,000 of overhead (the $105,000 is determined by the use of predetermined overhead rates). Record this information in the appropriate general ledger accounts.

Misc. Credits	
	(1) $120,000

Manufacturing Overhead Applied	
	(2) $105,000

Manufacturing Overhead	
(1) $120,000	

Work in Process	
(2) $105,000	

Explanation of Entries

(1) Records the incurrence of the overhead costs.

(2) Records the application (absorption) of the overhead to product. (The $105,000 could have been credited directly to the manufacturing overhead account.)

What is the disposition of the balance of $15,000 (the $120,000 cost incurred, less the $105,000 applied to product)? One possibility is to carry this balance forward from month to month and then close it out to variance accounts at the end of the year. An alternative treatment is to close the "Manufacturing Overhead Incurred and Applied" accounts each month, with the amount necessary to balance the entry being closed to variance accounts (or prorated to inventory and cost of goods sold accounts). In this example this would mean that the $15,000 would be debited to one or more variance accounts. The use and analysis of variance accounts will be explained in detail in Chapter 24.

Is it better to close the overhead accounts or to carry the balances forward to the end of the year? In a company engaged in very seasonal operations, there is much merit in carrying forward the accounts and not attempting to close the balance until the end of the year. In the average situation, despite the presence of a seasonal factor, the choice is not so clear-cut. The choice should remain with the accountant, and he should use the system that presents the best financial and managerial information.

If the balances are carried forward, they will have to appear on the position statement. Where should they appear? The proper location is a subject of controversy. The author suggests that a debit balance be treated as a subtraction from retained earnings (a cost factor of no value, not yet expensed), a credit balance as an addition to retained earnings (the cost of product has been overstated; thus the cost of goods sold has been overstated and income understated). This is not a perfect solution to the dilemma of where to put this item, but it is one possibility.

Subsidiary Records of Manufacturing Overhead

The general ledger accounts used to record manufacturing overhead have been discussed in the preceding section. An accounting system that used only these accounts would have several shortcomings. For one thing, the natural classification of the cost has not been recorded. Of what type of costs is the $120,000 of manufacturing overhead composed? Supplies? Depreciation? Indirect labor? Secondly, in what department were the costs incurred? What department head is responsible for the $120,000?

The first of these questions can be answered relatively simply by first recording the manufacturing costs incurred by their natural classification and then transferring the balances in these accounts to the manufacturing overhead account. But the second question remains unanswered. *What department is responsible for the overhead costs?* The costs as they are incurred should be assigned to departments, so that the person responsible for each department can be held accountable for the costs incurred in his department.

One solution is to set up subsidiary records of manufacturing overhead. These records commonly take the form of departmental cost ledgers, for example, one set of accounting cards for each department or a cost distribution sheet for each department. These departmental cost ledgers would record by department the natural classification of each cost incurred. Assume that $1,000 of manufacturing supplies were used as follows:

Building Department	$200
Operating Department No. 1	300
Operating Department No. 2	500

The following entry would be made in the *general ledger:*

Supplies Inventory

√ $50,000	(1) $1,000

Manufacturing Overhead

(1) $1,000	

The debit of the same transaction would be recorded in detail in the appropriate *departmental cost ledgers.*

Building Department, Cost Ledger

Indirect Labor	Allocation from Service Dep'ts.	Supplies Used	(Other columns)
		$200	

Operating Department No. 1, Cost Ledger

Indirect Labor	Allocation from Service Dep'ts.	Supplies Used	(Other columns)
		$300	

Operating Department No. 2, Cost Ledger

Indirect Labor	Allocation from Service Dep'ts.	Supplies Used	(Other columns)
		$500	

To be more useful, the natural classifications may be broken down into even finer divisions. Thus types of supplies may be identified as cleaning supplies, office supplies, first aid supplies, small tools, etc. If this system is used, *no entry can be made to the manufacturing overhead account without there being an equal amount recorded in the departmental subsidiary ledgers.* The total debit balance in the manufacturing overhead account will be equal to the total costs recorded in the departmental cost ledgers. Thus the manufacturing overhead account acts as a control account.

Use of Accounting Machines for Recording Manufacturing Overhead

The preceding example was simple and thus easily recorded in the departmental cost ledgers. Imagine a situation where the accounting department is recording information of this nature for 10 plants, each of which has 30 departments and an average of five overhead centers in each department. In this situation costs will have to be coded to 1,500 different burden or cost centers. Each cost will have to be identified as to:

Plant (10 choices)
Department (300 choices)
Overhead Centers (1,500 choices)
General Ledger Account, Manufacturing Overhead
Natural Classification (supply, indirect labor, tax, etc.)
Detailed Description of Natural Classification (under the classification "Indirect Labor," for example, will be oilers, material handlers, sweepers, electricians, etc.)

To record this information inexpensively and yet to keep it readily available often requires the use of accounting machines. Accounting machines generally have the virtue of being cheaper than clerical labor, but this depends on the facts of the particular situation. It can almost always be said in their favor that accounting machines will enable the accountant to record information in more ways than he could feasibly record if he had to rely on clerical labor. Also the information usually can be obtained more rapidly when needed. This last item is frequently the deciding factor in deciding whether accounting machines of an automatic nature should be employed.

If accounting machines are used, then a system of coding manufacturing overhead will be employed. The exact system will depend on the type of installation, but the system will probably make use of a series of number "groups," each group identifying a bit of relevant information. For example, a cost may be coded:

15–14–015–23–45–34

EXPLANATION OF CODE

First Group:	15	General Ledger Account (Manufacturing Overhead)
Second Group:	14	The code of the plant (the New York plant is No. 14)
Third Group:	015	The department (the packing department)
Fourth Group	23	The overhead center (this operation weighs the product)
Fifth Group:	45	Natural classification (indirect labor)
Sixth Group:	34	Detailed description (this worker is a weigher)

At the end of the month (in some companies this is done daily or weekly), the machine prints a "run" similar to the following:

PLANT: New York DEPARTMENT: Packing MONTH: January, 1957

Overhead Center	Natural Classification	Code Description	Actual Amount	Budgeted Amount	Variance
23	Indirect Labor	45–34	$435	$420	15
23	Indirect Labor	45–44	520	534	[14] *
23	Supplies	46–23	130	126	4

* The favorable variances are bracketed.

Reports of this nature enable management to determine those specific areas which contain inefficiencies and to take action to rectify the causes of the variances.

ALLOCATING COSTS

Departmental Overhead Rates

The necessity for assigning overhead costs to the departments where they are incurred for cost control purposes has already been explained. It is also necessary so that the cost of product may be computed more exactly. Overhead is generally applied to the product by using overhead rates. Different overhead rates should be computed for each operating department instead of using one overhead rate for the plant. To compute reasonable rates the costs of the service departments are first allocated to the operating departments based on the benefits actually received or expected to be received.

Why is it important to absorb overhead to product by using different

overhead rates for each operating department? The importance can be best shown by a simple illustration.

EXAMPLE

Two operating departments have the following characteristics:

	Operating Department 1	Operating Department 2
Direct-Labor Hours (at normal activity)	10,000	10,000
Machinery and Equipment (cost)	None	$5,000,000
Floor Space	1,000 sq. ft.	29,000 sq. ft.
Power	$100 (lighting only)	$5,000

If only *one* overhead rate is used for the plant, and both departments are worked at normal activity, the product of the two departments will receive the same amount of overhead. With an overhead rate of $4.255 per direct-labor hour there would be $42,550 absorbed by product in each department. Is this reasonable? No, Dept. No. 2 should bear a larger share of the overhead than Dept. No. 1, because it uses more floor space, more equipment, more power, etc. If overhead were first properly *allocated* to departments and separate overhead rates were computed for the two departments, then Dept. No. 2 would have a higher overhead rate, and the product being produced in Dept. No. 2 would then bear a fair share of the overhead costs.

Assume that the following costs are budgeted for the year and are the basis for the one company-wide overhead rate:

Depreciation of Machinery and Equipment	$50,000
Building Costs	30,000
Power Costs	5,100
	$85,100

The overhead rate will be $4.255 per direct-labor hour. Assume that each unit of product produced in Dept. No. 1 and Dept. No. 2 requires one hour of direct labor, and $5.00 of costs other than overhead. According to the figures developed, each unit of product, whether produced in Dept. No. 1 or Dept. No. 2, will cost $9.255 ($5 of direct costs $4.255 of overhead). Instead of using one overhead rate, let us now compute departmental rates.

	Allocation of Costs	
	Dept. No. 1	*Dept. No. 2*
Depreciation of Machinery and Equipment	$——	$50,000
Building Costs (allocation based on floor space)	1,000	29,000
Power	100	5,000
	$1,100	$84,000
Overhead Rates (based on 10,000 direct-labor hours in each department)	$0.11	$8.40

The cost of the product made in Dept. No. 1 will now be $5.11 (the direct costs of $5.00 plus the overhead of $0.11). The cost of the product made in Dept. No. 2 will be $13.40 (the direct costs of $5.00 plus the overhead of $8.40).

Allocation of Overhead to Operating Departments

Assume that all costs connected with maintaining and running the factory building are first accumulated in a burden center called "Burden, Building." It is next necessary to allocate the accumulation of overhead costs to operating departments. What would be a reasonable basis? Floor space occupied by each operating department (or each burden center) is one likely choice. Cubic volume would also be reasonable.

Note that "burden" is being used interchangeably with "overhead."

EXAMPLE

The following items have been debited to the account "Burden, Building":

Factory Building	
Depreciation	$10,000
Repairs	150
Cleaning Supplies	100
Labor	2,750
	$13,000

There are four operating departments, and they use the following floor space:

Operating Departments	
1	3,000 sq. ft.
2	2,000
3	4,000
4	1,000
	10,000 sq. ft.

Compute the allocation of building overhead to the operating departments.

Solution

Allocation of Building Overhead

Department	Floor Space	Basis of Allocation	Building Costs	Allocation of Building Costs
1	3,000 sq. ft.	30%	$13,000	$ 3,900
2	2,000	20	13,000	2,600
3	4,000	40	13,000	5,200
4	1,000	10	13,000	1,300
	10,000 sq. ft.	100%		$13,000

The allocation of building costs is based on the floor space used (the benefit received). If a department was shut down it might still be reasonable to assign the same amount of costs since the building costs were incurred with the expectation of servicing that department (the department was expected to benefit from the cost).

The journal entry to record the *allocation* would be:

Burden Operating Department		
1	$3,900	
2	2,600	
3	5,200	
4	1,300	
Burden Building		$13,000
To allocate overhead of factory building to operating departments.		

If there is only one burden account in the general ledger, then no formal journal entry is required; the transfer would take place in the subsidiary records.

There are no firm rules for choosing the basis of allocation. The overhead of the service departments is generally allocated on some basis which is reasonable. The following list indicates some of the more likely choices:

Overhead Costs To Be Allocated	Basis of Allocation
Power	Rated Horsepower of Equipment
Heat	Cubic Volume of Spaced Used
Water	Engineering Study of Usage
Repair Shop	Actual Costs Incurred by Each Department
Personnel Department	Number of Personnel
Cafeteria	Number of Personnel
Payroll Department	Number of Personnel
Purchasing Department	Cost of Material Used

Note that an attempt is made to allocate the costs to the departments on the bases of the benefits actually received by the departments. Predetermined assignments are often used for the allocation of fixed costs since the amount of cost is not a function of activity but rather of the capacity which was made available.

A Problem of Re-allocation

A problem arises when the department services another service department and is serviced in turn by that department. The allocation of overhead in this type of situation is best solved by the use of algebra. The solution is relatively simple unless the number of departments involved becomes large.

The *usefulness* of this computation (in effect an allocation and re-allocation) *is limited. It serves no function relative to the control of costs.* It does result in a more logical allocation of costs to the operating departments, and thus leads to a better unit-cost computation. In many cases a reasonable solution can be obtained by using common sense and bypassing the mathematical solution.

EXAMPLE OF RE-ALLOCATION PROBLEM

The Building Department should be allocated as follows (percentages are based on use of floor space):

20% to Repair Department
70% to Operating Department No. 1
10% to Operating Department No. 2

The Repair Department should be allocated as follows (percentages are based on this period's repairs):

80% to Building Department
20% to Operating Department No. 1

The costs incurred in the Building Department were $5,960.
The costs incurred in the Repair Department were $2,000.
Compute the total costs of the Building and Repair Departments, and the allocation of these costs to the two operating departments.

Solution

Let B = total building costs (costs incurred directly in the Building Department plus the allocation from the repair shop).
R = total repair costs (costs incurred directly in repair shop plus the allocation from the Building Department).

Then

$$B = 5{,}960 + 0.8R$$
$$R = 2{,}000 + 02B$$

The next step is to solve for B and then R.

$$B = 5{,}960 + 0.8R$$
$$B = 5{,}960 + 0.8\,(2{,}000 + 0.2B)$$
$$B = 5{,}960 + 1{,}600 + 0.16B$$
$$0.84B = 7{,}560$$
B = $9,000 (The "total" Building Department cost)
$$R = 2{,}000 + 0.2B$$
$$R = 2{,}000 + (0.2 \times 9{,}000)$$
R = $3,800 (The "total" Repair Department cost)

Allocation of Building and Repair Department Costs

	Total Cost	Allocated to			
		Op. 1	Op. 2	Building	Repair
Building	$ 9,000	$6,300 (70%)	$900 (10%)		$1,800 (20%)
Repair	3,800	760 (20%)		$3,040 (80%)	
	$12,800	$7,060	$900	$3,040	$1,800

The total of Building Department cost ($9,000) and Repair Department cost ($3,800) is greater than the total cost incurred in the two departments ($7,960). This occurs because of the re-allocation of building cost to Repair Department and then repair cost back to Building, etc. The *total overhead allocated to the operating departments* is $7,960, which is equal to the costs incurred in the two service departments ($5,960 plus $2,000).

The journal entries to record the allocation of the Service Department costs will be similar to the following:

Burden—Repair Department	$1,800	
Burden—Operating Dept. No. 1	6,300	
Burden—Operating Dept. No. 2	900	
Burden—Building		$9,000
Burden—Building	3,040	
Burden—Operating Dept. No. 1	760	
Burden—Repair Department		3,800

(These entries will frequently be made only in the subsidiary records.)

ABSORPTION OF MANUFACTURING OVERHEAD

To this point we have been concerned with initial *recording* and the *allocation* of overhead costs to the various operating departments. The next problem is *to absorb* the costs into work in process. This may be accomplished by the use of an overhead rate, the overhead rate being applied to some measure of activity. Among the possible choices for the *measures of activity* are:

Direct Labor, Dollars
Direct Labor, Hours
Units of Product
Hours of Machine Operation
Dollars of Material Used

These items are listed in approximate frequency of use. Any of the above can be acceptable, but the ultimate choice will depend on the facts of the

situation. For example, machine hours will not be a good measure of activity where machines play only a small part in the manufacturing process, and the same can be true of direct labor where automation is present. In some cases the information, such as direct-labor hours, is not readily available, and an alternative, such as direct-labor dollars, is used in its stead.

All of the above measures of activity require a computation of an overhead rate to accomplish the absorption of overhead to the product. The general formula for the rate is:

$$\text{Manufacturing overhead rate} = \frac{\text{Budgeted overhead for some level of activity}}{\text{Level of activity}}$$

EXAMPLE

The budgeted fixed manufacturing costs are $50,000 and the budgeted variable overhead for a level of activity of 100,000 direct labor hours is $150,000. A possible computation of the overhead rate is:

$$\text{Manufacturing overhead rate} = \frac{50{,}000 + 150{,}000}{100{,}000} = \$2 \text{ per direct labor hour.}$$

Note that the costs used in the numerator of the formula are budgeted overhead costs and not the actual costs. The overhead rates are generally computed before we know what the actual costs of the period are going to be.

Capacity Considerations

It would be possible to compute the overhead absorbed by product if we were to use an overhead rate based on the actual fixed cost divided by the actual level of activity. Thus, if the overhead were $10,000 (all fixed costs), and there were only one unit produced, the overhead per unit would be $10,000. If, instead of producing one unit, 1,000 units were produced, the overhead per unit would be $10 per unit. This wide change in the overhead per unit is caused by fluctuations in production. To avoid the possibility that unit costs would be affected by changes in production, the accountant hit upon the idea of computing the overhead rate based on capacity operations. If the actual operations were less than capacity, the unabsorbed overhead was considered a cost of idle capacity. Several problems then arose. One was the definition of capacity. Another was the fact that many accountants believed that all the overhead ought to be absorbed by product, not at capacity but at a normal level of operations. Other accountants believed that it should be entirely absorbed at the expected level of operations.

As a result of these complications, many different methods of choosing the level of activity for computing overhead rates are found in practice. Among the most common are:

Practical Capacity
Normal (or Average) Activity
Expected Activity
Actual Activity

There is no general agreement as to which of these methods is best to use. Actual and expected activity are probably the most undesirable. Practical capacity is the procedure with the best theoretical justification, but it is difficult to define. Normal activity is a reasonable compromise. In a normal period, all overhead would be absorbed.

The term *capacity* brings up some troublesome definitional problems. For example, what is practical capacity: an 8-hour day, 16-hour day, or a 24-hour day? A 320- or a 365-day work year? Is the practical capacity of a football stadium the number of seats times 365 days, or times the number of Saturdays in the playing season? These are the types of problem to which the accountant must come up with reasonable answers for specific situations.

It is important to realize the implications of using the different levels of activity for computing the overhead rates. The balance in the manufacturing overhead account must be interpreted in view of the choice of the level of activity.

Overhead Absorbed

Once the overhead rate has been computed, it is applied to the actual level of activity to find the amount of overhead transferred from the manufacturing overhead account to work in process.

EXAMPLE

Assume that the following information is available and that overhead is to be absorbed, using direct-labor hours:

	Direct-Labor Hours for January	Total Budgeted Overhead for January
Practical Capacity	100,000	$340,000
Normal (or average) Activity	60,000	300,000
Expected Activity	50,000	290,000
Actual Activity	40,000	280,000

Compute the different overhead rates possible from the given information.

Solution (dividing the second column by the first column)

Practical Capacity	$3.40 per direct-labor hour
Normal (or average) Activity	5.00 per direct-labor hour
Expected Activity	5.80 per direct-labor hour
Actual Activity	7.00 per direct-labor hour

Compute the overhead absorbed by work in process in January, if 40,000 direct-labor hours are incurred.

Solution

Using Practical Capacity	$3.40 × 40,000 =	$136,000
Using Normal (or average) Activity	5.00 × 40,000 =	200,000
Using Expected Activity	5.80 × 40,000 =	232,000
Using Actual Activity	7.00 × 40,000 =	280,000

The wide differences in overhead cost transferred to work in process will affect the income for the period and the valuation of inventories. This dramatically points up the importance of the choice of activity level for the computation of the overhead rates. The use of any level of operations other than practical capacity will result in a portion of the cost of idle capacity being transferred to product and being lodged in inventory.

FIXED AND VARIABLE OVERHEAD RATES

For many business decisions, it is necessary to have the total costs separated into the fixed and variable components. Thus the accountant will commonly compute two overhead rates, a fixed overhead rate and a variable overhead rate.

EXAMPLE

Compute the variable and fixed overhead rates, using a practical capacity of 100,000 direct-labor hours. The budgeted fixed costs are $240,000 and the budgeted variable costs are $100,000 at the level of activity.

Solution

$$\text{Fixed overhead rate} = \frac{\$240{,}000}{100{,}000} = \$2.40 \text{ per direct-labor hour}$$

$$\text{Variable overhead rate} = \frac{\$100{,}000}{100{,}000} = \$1.00 \text{ per direct-labor hour}$$

$$\text{Total overhead rate} = \underline{\underline{\$3.40}} \text{ per direct-labor hour}$$

If, instead of practical capacity, the expected activity of 50,000 direct-labor hours were used, the two overhead rates would be:

$$\text{Fixed overhead rate} = \frac{\$240{,}000}{50{,}000} = \$4.80 \text{ per direct-labor hour}$$

$$\text{Variable overhead rate} = \frac{\$50{,}000}{50{,}000} = \$1.00 \text{ per direct-labor hour}$$

$$\text{Total overhead rate} = \underline{\underline{\$5.80}} \text{ per direct-labor hour}$$

The *variable overhead rate is unchanged,* but the *fixed overhead rate has changed radically.* The choice of the activity level will always affect the fixed overhead rate (and by affecting the fixed overhead rate, it will affect the total overhead rate). The absorption of fixed overhead costs is a troublesome item, since it is so dependent on the choice of the activity level at which the fixed overhead rate is computed. For certain purposes, better information is obtained if fixed costs are not absorbed by product but are treated as period costs. This possibility is covered more completely in Chapter 28, Variable Costing.

SUMMARY OF MANUFACTURING OVERHEAD

The reader should keep in mind the objectives connected with the accounting for manufacturing overhead. The accountant wants to:

1. Control costs
2. Determine costs of product for purposes of measuring income, determining financial position, and decision-making

These objectives are not always compatible, and the accountant may have to make special computations to accomplish the specific objectives at hand.

The control of costs is facilitated by the recording of overhead costs by cost centers and by the identifying of costs in as much detail as is possible. Periodically the actual costs are compared with the budgeted costs to determine whether the specified level of efficiency has been attained.

The cost of products is determined by the use of predetermined overhead costing rates. These costing rates should be broken up into their fixed and variable components, so that costs for different purposes may be computed. The costing rates should be computed not for the company or plant as a whole but for each operating department (or cost center). The use of departmental overhead rates will give more realistic unit-cost figures, since the cost of the product will include those costs which are identified with the product, either through direct identification or through reasoned bases for the allocation of indirect costs not directly identified with an operating department.

Since the cost of product as computed by a cost accounting system is greatly affected by the method used to absorb fixed costs to product, the unit cost of a product should never be accepted at its face amount but only after due consideration is paid to the method used to absorb fixed overhead cost to each unit of product.

It should be noted that the allocation of overhead to operating departments and the absorption of overhead by product are not useful for the

control of costs. Costs should be controlled at the point of incurrence by the person who is responsible for the area where they are incurred. For example, accounting costs are controlled by the controller, not by the operating department foreman who may have some of the accounting department costs allocated to his department.

Why then should costs of an indirect nature be allocated to operating departments and absorbed by product? There are several valid purposes:

1. Determining income of a product or division, department, etc.
2. Determining cost of the goods remaining in inventory
3. Determining cost for government "cost-plus" contracts
4. Determining cost of product sold to see how well unit price recovers total unit cost

Knowing how the allocations of overhead costs *cannot* be used is just as important as knowing how they *can* be used. A great deal of effort is wasted in trying to use overhead allocations for purposes for which they cannot be used.

QUESTIONS AND PROBLEMS

22-1 The Absorption Corporation is in the process of changing its cost accounting system. It has decided on the use of direct-labor dollars as the basis for absorbing overhead into work in process.

Required

(a) Given the following information, compute the different variable and fixed overhead rates which might be used.

Budget Information for 1964

	Budgeted Direct-Labor Dollars	Budgeted Fixed Overhead	Budgeted Variable Overhead
Practical Capacity	$200,000	$450,000	$400,000
Normal (average) Activity	90,000	450,000	180,000
Expected Activity	100,000	450,000	200,000

(b) Compute the overhead absorbed by product in January, 1964, if $10,000 direct-labor dollars of cost were incurred. Fixed overhead incurred was $38,000, and variable overhead was $22,000. Give four different answers based on four different assumptions. State the assumptions made.

(c) Explain the difficulties connected with determining the "actual" cost of product.

(d) In this problem, overhead is absorbed, using direct-labor dollars. What other measures of activity could be used?

22-2 The Allocation Company

Part 1. The Allocation Corporation has two operating departments and three service departments. The costs of the service departments are assumed to be *fixed.*

Service Department	Basis of Allocation	Budgeted Cost for 1964
Cafeteria	Personnel Budgeted	$ 45,000
Building	Floor Space	120,000
Repair Shop	Past Experience (the previous year's assignment of costs)	31,200

Operating Department	Personnel Budgeted	Floor Space (Sq. Ft.)	Repair Shop Jobs, 1963
1	50	4,000	$10,000
2	100	6,000	20,000

In addition to the above indirect costs, the only other overhead costs are manufacturing supplies and indirect labor. These are budgeted for 1964 as follows:

Operating Department	A Year's Normal Activity (Direct-Labor Hr.)	Manufacturing Supplies, Fixed	A Year's Budgeted Costs for Normal Activity: Manufacturing Supplies, Variable	Indirect Labor, Variable	Indirect Labor, Fixed
1	100,000	$ 9,000	$20,000	$75,000	$50,000
2	200,000	15,000	30,000	80,000	60,000

Required

(a) Prepare a schedule that allocates the service department budgeted costs to the operating departments.
(b) Compute one overhead rate for the Allocation Company as a whole.
(c) Compute separate overhead rates for the two operating departments.
(d) Comment briefly on the relative usefulness of the various overhead rates computed above.

Part II. During the month of January, 1964, the following costs were incurred:

	Cafeteria Dept.	Building Dept.	Repair Shop	Operating Dept. No. 1	Operating Dept. No. 2
Direct Labor (the hourly rate is $2.00)				$20,000	$32,000
Direct Material				40,000	70,000
Indirect Labor	$2,000	$1,000	$3,000	14,000	15,000
Manufacturing Supplies	200	100	1,000	1,500	1,900
Fuel + Power	600	1,200		1,000	4,000

Required

(a) Record the incurrence of the costs in the appropriate cost (burden) centers. (Use both factory ledger and departmental subsidiary records.)

(b) Record the allocation of the Service Department costs to the operating departments (also prepare a schedule of the allocation).

(c) Record the debits made to the work in process account during the month. Show the entries in the "T" accounts. Use the overhead rates computed in Part I(c).

(d) From the point of view of controlling costs, is the allocation of costs (b) and (c) useful?

22-3 The Re-allocation Corporation has two operating departments and two service departments.

The Building Department should be allocated as follows:

10% to Utility Department
45% to Operating Department No. 1
45% to Operating Department No. 2

The Utility Department should be allocated as follows:

50% to Building
40% to Operating Department No. 1
10% to Operating Department No. 2

The costs incurred in the Building Department were $90,000; in the Utility Department, $10,000.

Required

(a) Compute the allocation of the service departments, and prepare journal entries to accomplish the allocation to the operating departments.

(b) Discuss the usefulness of the allocation from the point of view of controlling costs and determing unit costs of product.

22-4 The Williams Manufacturing Company's production activities involve three producing departments and a factory office. All materials are added at the

start of process 1. Processed material moves from process 1 through process 2, then through process 3, where the product is completed.

The following account balances reflect costs of the Williams Company for the month of January, 1964.

Materials Used	$ 8,200
Direct Labor	11,600
Indirect Labor	1,700
Sales Salaries	4,200
Taxes, Properties	2,100
Depreciation of Factory Building	714
Depreciation of Equipment	550
Advertising	1,455
Factory Office Labor	900

Direct-labor costs were as follows:

Process 1	$ 4,900
Process 2	2,700
Process 3	4,000

Indirect labor is primarily janitorial in nature, and distribution is made to the three producing departments and the factory office, giving double weight to the producing department. Floor space is as follows:

Process 1	2,500 sq. ft.
Process 2	3,500
Process 3	2,000
Factory Office	1,000

Property tax valuations are as follows:

Process 1	$13,000
Process 2	16,000
Process 3	10,000
Factory Office	3,000

Depreciation is charged at a uniform rate on all equipment. The cost of equipment in each department is as follows:

Process 1	$ 7,500
Process 2	5,500
Process 3	13,000
Factory Office	1,500

Since the factory office is maintained primarily for timekeeping and employee services, the cost of operating the office is distributed to the producing departments on the basis of the number of workers in each department. They are as follows:

Process 1	10 workers
Process 2	4
Process 3	6
Factory Office	2

Required

Prepare a schedule allocating production costs to the three producing departments. Set up overhead accounts for each of the four departments. Make entries to these accounts, showing the results of the allocation.

22-5 The Webster Corporation

The Webster Corporation uses normal activity for determining overhead rates. Overhead is applied to product, using direct-labor hours.

Part I. Determining Overhead Rates:

	Dept. No. 1 Normal Activity	*Dept. No. 2 Normal Activity*
Budgeted Direct-Labor Dollars	$200,000	$400,000
Budgeted Direct-Labor Hours	100,000	200,000
Budgeted Fixed Overhead	50,000	40,000
Budgeted Variable Overhead	150,000	180,000

Required

(a) Compute the fixed and variable overhead rates for the two departments

(b) Explain briefly how the amounts of fixed overhead were obtained for the two departments.

(c) Explain how the above computations would be changed by the use of practical capacity instead of normal activity.

Part II. Recording Overhead in Burden Centers:

During the month of January the following overhead costs were incurred:

	Building Dept.	*Dept. No. 1*	*Dept. No. 2*
Indirect Labor (fixed)	$200	$ 4,000	$ 2,000
Indirect Supplies (fixed)	$100	1,000	1,200
Indirect Labor (variable)	...	10,000	11,000
Indirect Supplies (variable)	...	2,000	3,000

Required

(a) Record the given information in general ledger accounts.

(b) Record the given information in departmental subsidiary ledgers.

(c) If the direct-labor hours actually worked during the month were 9,000 in Department No. 1 and 18,500 in Department No. 2, are the variable overhead costs under or over the budgeted amounts? Prepare a schedule.

Part III. Allocation of Overhead to Operating Departments:

The Building Department costs are allocated to the two operating departments, based on the floor space used.

Department	*Floor Space Used, Sq. Ft.*
1	30,000
2	10,000

Required

(a) Record the allocation of the Building Department overhead to the two operating departments in the departmental subsidiary ledgers.
(b) Would the allocation of Building Department costs be relevant for controlling the costs of the Building Department or the operating departments? Explain.

Part IV. Absorption of Overhead by Product:

During the month of January there were 9,000 direct-labor hours worked in Department No. 1 and 18,500 worked in Department No. 2.

Required

(a) Record the absorption of overhead by product in the general ledger.
(b) What are the factors that caused the amount of overhead absorbed by product to be different from the amount incurred?
(c) What disposition do you suggest for the overhead variances?

22-6 The Ithaca Oil Company prepares income statements by product line and by customers for each product. It sells directly to gasoline stations, to wholesalers, and to jobbers. The following report was prepared for the sale of gasoline to gasoline stations.

THE ITHACA OIL COMPANY

Income Statement
for month ending March 31, 1960

Sales (1,000,000 gals.)		$200,000
Expenses		
Cost of Product Sold *	$120,000	
Local Delivery	8,000	
Storage and Handling	2,000	
Selling Costs	1,000	
Accounting and Credit	800	
Administrative	1,200	
Advertising and Sales Promotion	4,000	
Headquarters	10,000	
Total Expenses		147,000
Net Income		$ 53,000

* Transfer price from the manufacturing division times 1,000,000 gallons.

Required

(a) For each expense discuss the nature of the assignment of the cost. Was it a direct cost or an allocation? What is the nature and basis of the allocations?
(b) Assume that you are attempting to measure the performance of the manager in charge of sales of gasoline to gasoline stations. Would you use the figure of $53,000? Explain.
(c) Assume you are considering the construction of an additional gaso-

line station. What quantitative factors would you take into consideration? Which costs would be relevant? Explain any assumption which you may make in answering the question.

(d) Assume the cost of product sold was $190,000 instead of $120,000. Should the sale of the product to gasoline stations be dropped? Assume the present prices of the product sold and purchased are expected to continue in the foreseeable future.

22–7 The City Steel Company sells five different product lines. The costs which are regularly incurred include the following:

Cost of Sales
Purchasing
Order Processing
Materials Handling
Delivery (including shipping)
Storage
Advertising
Selling
Credit and Collection
Bad Debts
General Administrative
Public Relations
Auditing (fee to public accounting firm)

Required

(a) For each expense discuss how (if at all) each cost should be assigned to the five product lines.

(b) Assume you are considering dropping one of the product lines. Which of the above costs would be relevant to the decision? Explain.

22–8 The Spring Manufacturing Company is considering accepting a special order for 50,000 mattresses which it received from a large chain of department stores. The order specified a price of $30 per unit. This compared unfavorably to the company's regular price of $33 per unit. The accounting department prepared the following analysis in an attempt to show that there would be cost saving resulting from the additional sales:

	Cost per unit without the additional sales (100,000 units)	Cost per unit with the additional sales (150,000 units)
Variable Costs	$20	$20
Fixed Costs	9	6
	$29	$26

No additional fixed costs would be incurred since there was excess capacity. Since the average cost per unit will be reduced from $29 to $26 the president of the firm believes he would be justified in reducing the price by $3 to sell to the department store chain.

Required

Should the order for the 50,000 units at a price of $30 be accepted? Explain.

23

Systems of Cost Accounting

COST ACCOUNTING SYSTEMS may be classified under three general headings:

Job Order Cost Accounting
Process Cost Accounting (either by process and/or by product)
Standard Cost System (used most commonly with the process cost system)

The reader should not be deluded into thinking that the accountant is limited to only three systems. There are many variations and combinations which he may use. The ultimate choice of systems will depend on the facts of the situation and the needs of management.

JOB ORDER COST SYSTEM

Costs are best accumulated by jobs when the firm is engaged in a non-repetitive type of productive process and where each product or group of products is more or less distinctive.

Each job is given a job number or code. When material or labor costs connected with the job are incurred, they are recorded in the work-in-process account of the general ledger and in a subsidiary ledger which maintains the cost of each job. This subsidiary ledger often takes the form of a card called a job cost sheet.

Illustration of Job Cost Sheet (subsidiary ledger)

Job Number _____

Description _____

Date _____ Date To Be Completed _____

Specifications _____ Bill of Materials _____

	Date	Direct Material	Direct Labor Hours	Direct Labor Dollars	Overhead
Completed Job	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____

For every cost recorded in the work-in-process account of the general ledger, an equal entry is made on a job cost sheet. Thus the *work-in-process* account acts as a *control* over the subsidiary record, the *job cost sheets*, and the sum of the costs recorded on the individual job cost sheets should be equal to the balance in the work-in-process account.

ILLUSTRATION

The following is an illustration of the job cost procedure. Three entries will be recorded in the general ledger and in the subsidiary record.

Entry No.	Transaction	Source of Entry
1	Material placed into production	Summary of material requisitions
2	Direct-labor cost incurred	Labor distribution sheet of timekeeper
3	Overhead applied to product	The overhead rate is $1.60 per direct-labor hour

Summary of Material Requisitions

Date	Req'n. No.	Job No.	Amount, Lb.	Amount, $	Type of Material
Jan. 21	26	556	60	$ 600	Plastic Powder
21	27	557	40	400	Plastic Powder
			100	$1,000	

Direct-Labor Distribution

Date	Job No.	Hours	Wages	Overhead Rate	Overhead Applied (DLH × $1.60)
Jan. 21	556	700	$1,400	$1.60	$1,120
21	557	300	600	1.60	480
		1,000	$2,000		$1,600

General Ledger

Material Inventory

xxxxx	(1) $1,000

Manufacturing Overhead

xxxxx	(3) $1,600

(The credit could be made to "Manufacturing Overhead, Applied")

Payroll

	(2) $2,000

Work in Process

(1) $1,000	
(2) 2,000	
(3) 1,600	

Subsidiary Record (Job Cost Sheets)

Job Cost Sheet

Job No. 556

Date	Material			Labor		Overhead	
	Req'n. No.	Amount, Lb.	Amount, $	Hours	Dollars	Rate	Dollars
1/21	26	60	$600	700	$1,400	$1.60	$1,120

Job Cost Sheet

Job No. 557

Date	Material			Labor		Overhead	
	Req'n. No.	Amount, Lb.	Amount, $	Hours	Dollars	Rate	Dollars
1/21	27	40	$400	300	$600	$1.60	$480

Job Cost Sheets

The total costs recorded on the job cost sheets equal the total costs recorded in the work-in-process account.

Work in Process

Material	$1,000
Direct Labor	2,000
Overhead	1,600
Balance	$4,600

Job	Material	Labor	Overhead	Total Costs
556	$ 600	$1,400	$1,120	$3,120
557	400	600	480	1,480
Totals	$1,000	$2,000	$1,600	$4,600

When the job is completed, the job cost sheet is taken from the work-in-process file and placed in the finished goods file. The completed cost card serves as the subsidiary ledger for the finished goods account. A journal entry is then made, transferring the total cost of the job from work in process to finished goods.

There is a column on the cost card for overhead. If the job is completed during the accounting period, the overhead can be computed for the entire job rather than on a daily basis as the labor cost is incurred. If the period ends before the job is completed, the overhead should then be computed. The total of the overhead is the basis for the entry transferring overhead from the manufacturing overhead account to the work-in-process account.

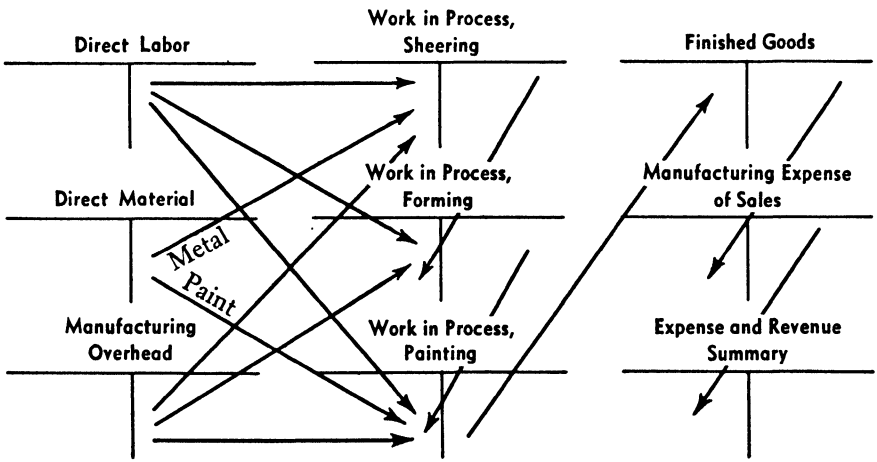
The job order cost system is fairly expensive to maintain, because it

requires considerable clerical work to record the detailed information on the job cost sheets. The process type of cost system should be used if possible, but it should be recognized that the job cost system fills a need in those situations where the manufacturing operation is not repetitive.

PROCESS COST SYSTEM

The process cost system makes no attempt to account for costs of individual items or specific groups of items. Instead, all costs are placed into "reservoirs" and allocated to product on a systematic basis. The costs may be accumulated for different processes in the production of one product, or it may be necessary to have different series of "reservoirs" for different products. These "reservoirs," or places to accumulate costs, are actually work-in-process accounts, there being different process accounts for every major manufacturing process for each product.

Let us assume a manufacturing process of three steps in which only one product is made. Metal is first sheared, then formed, and then painted. This requires three work-in-process accounts, and the costs will flow as indicated in the accompanying flow chart (in the chart, paint is considered a direct material; it could be treated as overhead).



Only one overhead account is shown in the flow chart. In many cases to set up different overhead accounts for each process is desirable. These overhead accounts are sometimes referred to as "burden centers." The more overhead accounts, the more accurate the cost accounting tends to be, but the costs of recording the information are increased.

If an additional product, which also requires three processes, is being

made, there are three additional work-in-process accounts, an additional finished goods account, and one or more additional overhead accounts. If the amount of work required for the two products were exactly the same, and the only difference were in the characteristics of the end product, then no additional accounts except an additional finished goods account would have to be opened.

Instead of having *one* work-in-process account for the shearing process, it is also possible to have *three* in-process accounts, one each for material, labor, and overhead. This is useful in practice.

Problems Peculiar to Process Cost Accounting

So far it has been assumed that the amount of cost to be transferred from process 1 to process 2 has been known. Actually, this type of transfer requires computations that, though simple in principle, become complicated in practice if the manufacturing process (and the cost accounting system) is complicated. The procedure to be followed in computing the transfer to the next process and the amount remaining may be illustrated by a short example.

EXAMPLE

Compute the transfer of labor in process to finished goods, given the following facts:

Beginning Inventory	100 units (¼ completed)
Ending Inventory	200 units (½ completed)
Completed during the Period	500 units
Labor Costs Incurred during the Period	$1,150
Labor in Process at the Beginning of the Period	$75

Solution: The *first step* in the solution is to compute the *"equivalent" units of work performed.*

Total Units Finished	500
Plus Ending Inventory (200 × ½)	100
	600
Less Beginning Inventory (100 × ¼)	25
Total Equivalent Units of Labor during the Period	575

The same solution may be obtained by using a slightly different technique.

Units of Labor Required to *Complete* the Beginning Inventory (100 × ¾)	75
Units of Labor Required to *Start and Complete* 400 units	400
Units of Labor Required to *Start* the Ending Inventory (200 × ½)	100
Total Equivalent Units of Labor Performed during the Period	575

The *second step* in the solution is to compute the *cost per unit of work performed during the period.*

$$\text{Cost per equivalent unit of labor} = \frac{\text{direct-labor costs incurred}}{\text{equivalent units of labor}} = \frac{\$1,150}{575} = \$2 \text{ per unit of labor.}$$

The *third step* is to assume *a flow of costs* (FIFO, LIFO, or average). This is necessary because the cost per unit of the opening inventory will rarely agree with the cost per unit incurred during the period. In the problem being illustrated, the cost per unit of the opening inventory is

$$\frac{\$75}{100 \times 0.25} = \frac{\$75}{25} = \$3 \text{ per unit.}$$

If a *FIFO* assumption as to the flow of costs is assumed, then the transfer to finished goods can be computed as follows:

Opening Inventory ($100 \times \frac{1}{4} \times \$3$)	$ 75
Required to Complete the Opening Inventory ($100 \times \frac{3}{4} \times \$2$)	150
Required to Start and Complete 400 units ($400 \times 1 \times \$2$)	800
Transfer to Finished Goods	$1,025

The *fourth step* is to compute the *amount remaining in work in process.* This may be done in either of two ways.

Beginning Inventory, Labor in Process	$ 75
Labor Costs Incurred during the Period	1,150
	$1,225
Less Amount Transferred to Finished Goods	1,025
Amount Remaining in Process	$ 200

The $200 can also be computed (or checked) by multiplying the equivalent units of labor in the ending inventory by the labor cost per unit of labor. This can be done *if* all the ending inventory was constructed during this period.

$$200 \text{ units} \times \tfrac{1}{2} \times \$2 = \$200 \quad \text{(Labor in Process, Ending Inventory)}$$

The *fifth step* is to prove the solution. This consists of adding the amount transferred to finished goods ($1,025) to the ending inventory ($200) and checking the sum ($1,225) to see that it equals the sum of the costs incurred ($1,150) and the beginning inventory ($75).

Summary: The solution consists of five steps:

1. Determine the number of equivalent units of labor performed.
2. Determine the cost per unit of work performed.
3. Assume a flow of costs and compute the transfer to finished goods.
4. Compute the ending work in process inventory.
5. Prove the solution.

If a *LIFO* assumption was made as to the flow of costs, the transfer to finished goods will be:

500 units × \$2 = \$1,000 (Transfer of Labor Costs to Finished Goods)

The ending inventory of labor in process would be \$225.

25 equivalent units of labor valued at \$3	= \$ 75
75 equivalent units of labor valued at \$2	= 150
100 equivalent units valued as indicated	= \$225

The computations can be checked by adding the \$1,000 and \$225 and comparing this with the sum of the opening inventory and the labor cost incurred during the period (\$1,225).

Instead of FIFO or LIFO, an *average* costing procedure can be used. To value the transfer to finished goods, the same average cost per unit will be used as is used to value the amount remaining in the work in process; thus the opening inventory is used in computing the average cost per unit.

$$\text{Average cost per unit} = \frac{\$75 + \$1{,}150}{25 + 575} = \frac{1{,}225}{600} = \$2.04167$$

Transfer to finished goods (500 × \$2.04167)	= \$1,020.83
Amount remaining in process (200 × ½ × \$2.04167)	= 204.17
	\$1,225.00

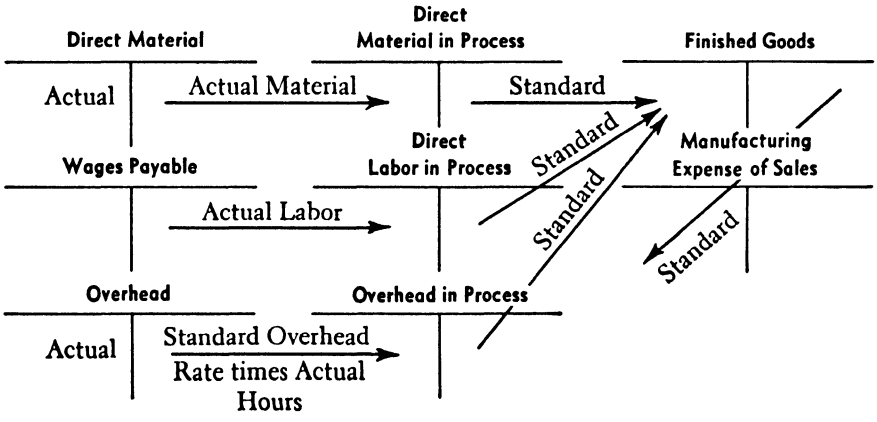
Various complications may occur. Some of the material may be added when the product is partially completed, or it may all be introduced at the beginning of the process. Part of the material may "evaporate," resulting in a complication, especially when the disappearance of material is in excess of normal. Normal spoilage or loss is spread over the good product, but abnormal spoilage is considered a loss. There are techniques for solving all these problems, and they soon get to be second nature to the practicing accountant. The various complications will not be illustrated here because they are specialized problems which are better treated in a more advanced course.

STANDARD COST SYSTEM

Standard cost systems are usually process cost systems in which accountants use set standards instead of attempting to compute a so-called actual cost per unit for each period. There are several advantages of a standard cost system. It may actually be cheaper to operate than a process or job order system (usually a standard cost system is not generally applicable to a situation where a job order system is being used, although there may be exceptions). The advantages of a standard cost system are that it highlights inefficiencies and allows management to manage by exception, i.e., concentrate on the areas where there are inefficiencies.

The actual labor and the actual material incurred are debited to the work-in-process accounts.[1] The *standard labor* and *standard material* are transferred to the finished goods account. What happens to any differences between the actual costs incurred and the standard costs? These differences are called *variances*. They are identified according to their causes and are transferred to variance accounts. For material and labor, the two variance accounts are price and efficiency variances. These will be explained in detail in Chapter 24.

Overhead is treated in a variety of ways. The following system is suggested as one of many logical procedures. The *standard* overhead rate is applied to the *actual* direct-labor hours incurred to find the amount of the manufacturing overhead incurred, which is transferred to the work-in-process account. The amount of overhead transferred from the work-in-process account to finished goods is found by multiplying the *standard* hours per units of product by the *standard* overhead rate. Thus part of the variances for overhead will be found in the work-in-process account and part in the manufacturing overhead incurred account. The nature and disposition of the variances will also be discussed in Chapter 24.



FACTORY LEDGER

Frequently the amount of accounting necessary to record the factory operations becomes so great that a separate accounting section is set up to perform

[1] In many cases it will be possible to record material into inventory by using standard prices and by taking the material to work in process at standard prices instead of actual prices. There is much to be said for this procedure, since it recognizes the price variance in the period in which the material is purchased, and it should be used whenever possible.

this function. In some cases the location of the factory accounting department is geographically distant from the general accounting department. In order to maintain control and to help ensure that neither the general accounting nor the factory accounting department misses entries or makes incorrect entries, use is made of two control accounts, a factory ledger account and a general ledger account.

The general accounting department will maintain the general ledger, in which there will be a "Factory Ledger" account. The factory accounting department will maintain the factory ledger, in which there will be a "General Ledger" account. The balances of these accounts will always be equal when they are fully and correctly posted. Just what other accounts will be kept at the factory or at the general accounting office will vary considerably from company to company. The main differences are in the area of fixed assets, material inventory, and finished goods. If the last two items are physically controlled by the plant, then the plant should also account for them.

When a company has several branch offices, a necessity arises for the same type of accounting system as is being introduced here. The only differences are in the titles of the control accounts. These titles may be "Home Office" (in the accounting records maintained by the branch office), and "Branch Office" (in the accounting records maintained by the central or home office).

Illustration of the Use of a Factory Ledger (Branch Accounting)

The following four entries are to be recorded in the factory ledger and the general ledger.

1. Purchase of $1,000 of raw material.
2. The factory places into production $800 of the raw material.
3. Direct-labor costs of $2,000 are incurred.
4. Finished goods of $1,500 are shipped to the storehouse.

General Ledger

Accounts Payable

	(1) $1,000

Factory Ledger Account

(1) $1,000	(4) $1,500
(3) 2,000	

Payroll

	(3) $2,000

Inventory, Storehouse

(4) $1,500	

Note: Entry (2) requires no entry in the general ledger. The debits in the factory ledger account are in a sense recording "receivables" from the factory.

Factory Ledger

Material Inventory

(1)	$1,000	(2)	$800

General Ledger Account

(4)	$1,500	(1)	$1,000
		(3)	2,000

Work in Process

(2)	$ 800	(4)	$1,500
(3)	2,000		

Note: The balance in the factory ledger account is equal to the balance in the general ledger account (although one has a debit and the other a credit balance).

The credits in the general ledger account are in a sense recording "payables" to the central office. The amount payable is reduced by the transfer of goods to the central office, to warehouses under control of the central office, or to customers.

QUESTIONS AND PROBLEMS

23-1 The Matson Mfg. Co. specializes in producing machine tools according to specifications provided by its customers. It uses the job cost system of accounting.

Required

Enter the following information directly into the accounts in the factory ledger. Make all necessary entries on job cost sheets. All accounts not in the factory ledger are in the general ledger, which is kept by someone else. Key each item in the accounts.

(a) Materials inventory, Oct. 1 ..... $16,500
(b) Supplies inventory, Oct. 1 ..... $ 3,150
(c) Unfinished cost sheets, Oct. 1, as follows:

Job No.	*Materials*	*Direct Labor*	*Burden (rate is $160 per DLH)*
1115	$1,325	400 hr. $ 800	$ 640
1118	810	250 hr. 500	400
1120	765	300 hr. 475	480
	$2,900	$1,775	$1,520

(d) Materials used during October were as follows:

Req'n. No.	*Job No.*	*Cost*
56	1118	$ 515
57	1120	665
58	1121	910
59	1124	720
		$2,810

(e) The balance in the manufacturing overhead account on Oct. 1 was $60 (Dr).
(f) Material purchases during October amounted to $3,890.
(g) A summary of labor costs is as follows (ignore taxes):

Job No.	*No. of Hr.*	*Cost*
1115	50	$ 95
1118	120	215
1120	85	160
1121	65	120
1124	30	65
Total Direct Labor	350	$655
Indirect Labor	72	115
	422	$770

(h) Supplies purchased during October were $440.
(i) Supplies consumed during October were $545.
(j) Miscellaneous other burden charges for October were $105.
(k) The burden rate is the same as in previous periods ($1.60 per direct-labor hour).
(l) The following jobs were completed in October and delivered to the customers: Jobs 1115, 1118, and 1120.
(m) The accounts in the factory ledger are:
Materials, Inventory
Supplies, Inventory
Burden
Material in Process
Labor in Process
Burden in Process
General Ledger

The form to use for the cost sheets is as follows:

Cost Sheet

Job No. _____

Material		Direct Labor		Burden	
Requisition Number	Cost	Hours	Cost	Rate	Cost

23–2 The Labor-in-Process Company

(a) Compute the equivalent units of labor performed on the following products.

Product	Beginning Inventory in Process	Completed Production	Ending Inventory in Process
1	100 units (¼ completed)	200	None
2	———	200	100 units (¼ completed)
3	100 units (¼ completed)	200	100 units (½ completed)
4	100 units (½ completed)	200	100 units (¼ completed)

(b) If the labor cost incurred in making Product 2 during the period was $10,000, compute the amount of labor in the ending inventory of labor in process for Product 2.

(c) If the labor cost incurred during the period in manufacturing Product 3 was $20,000, compute the amount of labor in the ending inventory of labor in process of Product 3. The beginning inventory of labor in process was $2,600. Assume a FIFO flow of costs.

23–3 The Allison Manufacturing Company produces a single product. Raw Material A is committed to the production process at the start of Process 1. Operating data for the period just ended are as follows:

	Process 1		Process 2	
Beginning Inventories	270 lb. (⅓ finished)	$1,152	160 lb. (½ finished)	$1,972
Raw Material A Used	650 lb.	1,170		
Direct Labor and Burden		5,616		3,774
Ending Inventories	200 lb. (¾ finished)		90 lb. (⅓ finished)	

The weight of the finished product is exactly equal to the weight of the material used.

Required

(a) How many pounds of product were transferred from Process 1 to Process 2 during the period? How many equivalent units of labor were performed in Process 1? What is the cost per equivalent unit of labor and burden in Process 1 for the period?

(b) Set up "T" accounts for Process 1, Process 2, and finished goods, and enter therein the operating results for the period. Assume a FIFO flow.

(c) What was the labor and burden cost per pound of product (cost per equivalent unit) in Process 2 for this period?

(d) How do labor costs for the period just ended compare with those of the preceding period for Process 1? Assume that material costs were the same in each period and that a constant overhead rate is used throughout the year.

23-4 The following information applies to the only product produced by the May Company:

Work in process, January 31 inventory, 900 units, ⅓ completed.
Work in process, January 1 inventory, 800 units, ½ completed.
Product finished during January, 1,000 units.

Direct Labor Cost for January		$2,205
Material Used during January		$3,850
Direct Labor in Process, January 1	$ 800	
Material in Process, January 1	$3,200	
Overhead in Process, January 1	$1,600	

The material is introduced in the beginning of the production process. The labor is applied evenly throughout the production process. The overhead rate is $2 per direct-labor dollar.

Required

(a) The equivalent units of labor performed during January.

(b) Units of product started during January.

(c) Average cost of equivalent unit of product started and produced during January.

The following two parts assume a FIFO flow of costs:

(d) The cost of goods finished during January.
(e) The cost of the January 31 inventory is:
_____ direct labor in process, January 31
_____ material in process, January 31
_____ overhead in process, January 31

23–5 The Firehouse Company

The Firehouse Company uses a LIFO procedure for inventory. The company does not use a finished goods account but transfers the cost of product sold directly from work in process to the "Cost of Goods Sold" account.

The following information applies to the month of July:

July 1, Inventory of Labor in Process, 1,000 equivalent units which cost $2,000.
Production for July was 100 equivalent units. The direct-labor cost for the month was $300.
During the month, 900 units were shipped.

The amount of labor cost to be transferred to cost of goods sold was computed as follows:

$$\text{Labor costing rate} = \frac{\text{direct-labor cost for July}}{\text{equivalent units produced}} = \frac{\$300}{100} = \$3 \text{ per unit}$$

$$\text{Transfer to cost of goods sold} = \text{units shipped} \times \text{labor costing rate}$$
$$= 900 \times \$3 = \$2{,}700$$

Required

Comment on the procedure followed.

23–6 The Waterhouse Company

The plant manager of the Waterhouse Company is confused by the accounting reports of income which have been coming across his desk. It appears recently that the more inefficient the workers are (according to the production reports), the higher the profit reported by the accounting department. Since this does not appear to be reasonable, he has called in an expert (you).

The Waterhouse Company manufactures dashboard assemblies for a large automobile producer. Beginning in July the company starts building up an inventory so that when the new model year starts in October, it can supply a steady stream of product without resorting to an excessive amount of overtime.

The company has adopted a process cost accounting system, using actual costs. Since the stock is handled so that the oldest goods are shipped first, an FIFO assumption as to the flow of costs is followed. As is common with many manufacturers, the Waterhouse Company keeps all product in the work-in-process account until it is shipped and does not use a finished goods account (work in process is credited and manufacturing cost of goods sold is debited when goods are shipped).

The following information is made available to you for the month of September (all the information refers to direct labor in process):

Beginning Work in Process Inventory (Sept. 1)		$2,520
Units of Goods Completed	850	
Units of Goods One-half Completed	100	
Units Shipped during the Month	100	
Ending Work in Process Inventory:		
Units of Goods Completed	975	
Units of Goods One-half Completed	50	
Direct-Labor Costs for the Month	$600	
Equivalent Units of Production during September	200	

The amount transferred to cost of goods sold was computed by the following procedure:

Ending Inventory, Equivalent Units:		
Goods Completed	975	
Goods in Process ($50 \times \frac{1}{2}$)	25	
Total Equivalent Units in Inventory	1,000	
Cost per Unit Produced during the Period ($600 ÷ 200)	$3.00	
Cost of Ending Inventory (assuming that the most recently produced goods are still in inventory) 1,000 × $3.00	$3,000	
Computation of Transfer to Cost of Goods Sold:		
Work in Process, Beginning of Period		$2,520
Plus Costs Incurred		600
		$3,120
Less Ending Inventory		3,000
Amount To Be Transferred to Cost of Goods Sold		$ 120

Required

(a) Why does the above procedure give misleading information?

(b) If the direct-labor costs for the month had been $800 (assuming the same production), what would have been the transfer to cost of goods sold?

(c) Compute the transfer to cost of goods sold, following a reasonably correct FIFO procedure.

23–7 The Stan-low Corporation

Part I. The Stan-low Corporation makes two products, A and B. The company uses two work-in-process accounts, one for product A and the other for product B.

The following standard costs have been established and are used in the cost accounting system:

	Product A	*Product B*
Material		
Standard Cost of Wood	$0.20	$0.30
Standard Cost of Paint	—	0.02

	Product A	*Product B*
Labor		
Cutters (standard cost per unit)	0.40	0.60
Finishers (standard cost per unit)	0.25	0.30
Overhead Rates		
Variable (varnish, power, glue, etc.)	0.25 *	0.50 *
Fixed (foreman, depreciation, etc.)	0.75 *	1.00 *

* Per direct-labor dollar. Cutters earn $2.00 per hour; finishers, $2.50 per hour.

Required

(a) Compute the standard cost per unit for each product.

(b) If the total fixed costs budgeted for the year were $30,000, and if $7,500 of these costs were allocated or identified with *product* A, what amount of direct-labor dollars was used in computing the fixed overhead rate? What would the fixed overhead rate be if the level of activity used to compute the rate was 200,000 units of product A?

Part II. The following information relates to the month of May for product B:

Cost of Wood Used	$310
Cost of Paint Used	$21
Direct Labor, Cutters	$620
Direct Labor, Finishers	$290
Overhead Incurred	
Variable	$450
Fixed	$1,000
Units Finished during May	950
Units in Process May 31	
(Units assumed to be one-half completed, labor and paint; all completed, wood)	250
Units in Process May 1	
(Units assumed to be one-half completed, labor and paint; all completed, wood)	150

The work in process at the beginning of May was valued at standard cost.

Required

Set up a work-in-process account for product B. Record the beginning work in process, the costs incurred, the transfer to finished goods, and the closing of the variances to an account called "Variances from Standard Costs." Overhead is to be absorbed to product, using direct-labor dollars.

23–8 The Newcastle Corporation

The Newcastle Corporation makes one model of one product. The following information is available for the month of April:

	Actual Costs Incurred	*In Process Inventory, the Beginning of the Period at Standard Cost*	*Goods Finished during April at Standard Cost*	*Goods in Process, End of Period at Standard Cost*
Direct Material (Requisitioned)	$ 43,400	$12,000	$ 40,000	$13,000
Direct Labor	84,300	20,000	80,000	20,400
Fixed Overhead	21,000	5,000	20,000	5,100
Variable Overhead	163,000	40,000	160,000	40,800

There were $7,500 of finished goods (500 units) in inventory at the beginning of the period. During the month of April, 20,000 units were completed and 19,000 units were shipped to customers.

The company uses four variance accounts:

Direct Material Variances
Direct Labor Variances
Fixed Overhead Variances
Variable Overhead Variances

The overhead rates used are:

Variable overhead = $2 × direct-labor dollars
Fixed overhead = $0.25 × direct-labor dollars

Required

Set up "T" accounts and prepare summary entries to record the given information.

23–9 If overtime is incurred in a job cost shop, how should the overtime be charged to the jobs? Does it make any difference if the job worked on during the overtime period was accepted after the regular work hours of the shop had been scheduled?

23–10 Would you want to use a fixed (i.e., determined at the beginning of the budget period) or a variable basis (i.e., based on some measure of actual activity) to allocate the following corporate costs to divisions?

(a) Corporate controller's costs,
(b) President's salary and staff costs,
(c) Trucking costs (assuming the corporate office handles all divisional transportation).

23–11 If a company acquires excess capacity (say it builds a boiler twice as large as is currently needed), should the cost of that excess capacity be considered a cost of product during the early periods, when that part of the capacity is not being used?

23–12 Should standard costs be used for planning purposes?

24

Analysis of Cost Variances

IF A STANDARD cost accounting system is used, then the accountant has the task of analyzing the cost variances. This is the first step toward the goal of identifying the factors that caused the differences between the standard and actual costs so that the inefficiences can be eliminated.

Actual costs will differ from standard costs for many specific reasons (the wrong type of material was used, the material was the incorrect size, the machine was not adjusted correctly, too much material was used, etc.), but in general, variances for labor, material, and variable overhead will be either "price" or "efficiency" variances. Price variances will be caused by payment of a price higher or lower than the standard price (or wage rate). Frequently the firm will not be able to control the price it pays for a raw material or for labor, but there are exceptions. For example, material may be purchased from several suppliers who have different prices, different transportation costs, and different discounts for quantity purchases. In like manner, workers of several different pay grades may be able to perform a function. If only workers in the higher pay grades are employed, this may create a wage variance. Usually the "efficiency" variance will be more subject to control by management than the price variance; thus it should receive the greater attention.

LABOR VARIANCES

It has been suggested that the *actual* labor cost should be debited to a labor-in-process account and that the labor transferred from this account to finished goods (or to the next process) should be at a full standard. This means that the credit to the labor-in-process account will be obtained by multiplying the standard hours of labor by the standard rate of pay per hour. The difference between the actual labor cost incurred and the standard labor applied is the labor variance.

The labor variance must next be broken up into the part caused by

paying higher than standard rates of pay (wage rate variance) and the part that is caused by working an excessive number of hours (efficiency variance).

The *wage rate variance* is equal to the *hours actually worked times the difference between the actual and standard wage rates.*

Wage rate variance = actual hours × (actual wage rate − standard wage rate)

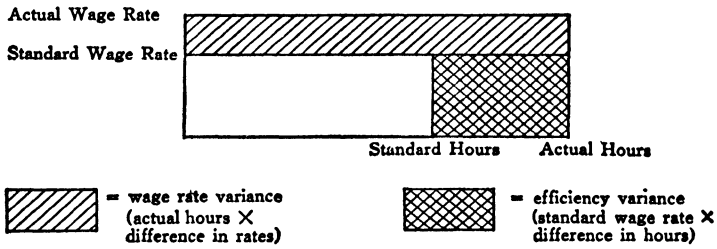
or

Wage rate variance = actual wages − standard wage rate × actual hours

The *efficiency variance* is equal to the *standard wage rate times the difference between the actual hours and the standard hours.*

Efficiency variance = standard wage rate × (actual hours − standard hours)

The wage rate variance gives that portion of the labor variance caused by paying an amount per hour other than the standard rate. The efficiency variance discloses the extra cost incurred because of hours worked in excess of standard hours or the saving because less than the standard hours were worked. Note that if hours in excess of standard are worked, they are valued at standard wage rates for purposes of computing the efficiency variance. It is sometimes helpful to see the variances pictured graphically.[1]



Computation of Standard Hours Worked

The total of standard hours worked is obtained by multiplying the equivalent units produced during the period by the current work standards (expressed in hours per unit). Before a product goes into production, engineers take out their boards, stop watches, and slide rules, and compute how many hours (or minutes) of labor are required to produce each end product and each component part. If the time required to produce Product A is 10 minutes, then the current work standard is 10 minutes. If there are 600 units of Product A produced during the period, then the standard units of labor are 6,000 minutes, or 100 standard hours. Beginning and ending inventories are

[1] It can be argued that the upper right hand area, which is caused by both the excess hours and excess wages, should be isolated as a third variance. The choice between the two-variance and three-variance analysis is a matter of definition.

taken into consideration in the same manner as they were handled in computing equivalent units of product for process cost accounting.

EXAMPLE

From the following information, compute the labor variances:

Work Standard per Unit for Product A	0.20 hr.
Equivalent Units of Product A Produced	100,000
Actual Hours of Direct-Labor Time	22,000 hr.
Actual Wages Paid to Direct Laborers	$45,000
Standard Wages per Direct-Labor Hour	$2
Budgeted Direct-Labor Hours for the Period	80,000 hr.

Solution: It should first be noted that the budgeted direct-labor hours do *not* enter into the solution of this problem. Budgeted direct hours (the budgeted level of activity for the period) do not affect the computation of labor variances.

The solution of this type of problem does not hinge on memorizing a series of formulas. It does require an understanding of the two variances.

Wage rate variance. This is the difference between the actual and standard wage rates applied to the total hours worked. The actual wage rate is equal to the actual wages ($45,000) divided by the actual hours (22,000).

$$\text{Wage rate variance} = 22{,}000 \left(\frac{\$45{,}000}{22{,}000} - \$2 \right) = \$45{,}000 - \$44{,}000 = \$1{,}000$$

The $1,000 wage rate variance is *unfavorable.*

Efficiency variance. This is the difference between the standard hours that should have been worked and the hours actually worked, valued at the standard wage rate.

$$\begin{aligned}\text{Efficiency variance} &= \text{standard rate} \times (\text{actual hours} - \text{standard hours}) \\ &= \$2\ (22{,}000 - 20{,}000) = \$4{,}000\end{aligned}$$

The $4,000 efficiency variance is *unfavorable.*

The 20,000 *standard hours* of direct labor was obtained by multiplying the equivalent units produced by the work standard per units.

$$\text{Standard hours} = 100{,}000 \times 0.20 = 20{,}000 \text{ hr.}$$

MATERIAL VARIANCES

Material variances are very similar to labor variances. The variance titles change slightly, for we now speak of price variance instead of wage rate

variance, and usage variance instead of efficiency variance, but the computations are exactly the same.

Material price variance = actual quantity × (actual price − standard price)
Material usage variance = standard price × (actual quantity − standard quantity)

The standard quantity of material used is equal to the units produced times the standard material usage per unit of product. The importance of an accurate count of units produced cannot be overstressed, for it is the foundation of all efficiency variance computations. Firms often have difficulty getting accurate counts because human beings are subject to accidental and intentional errors. Mechanical counts often serve as a check, but unfortunately they are also subject to manipulation. The best check on reported production is the inventory of finished goods. If production reports are inflated, the ending inventory of finished goods will disclose this fact.

Equally important to good production counts are reliable material usage and labor work standards. If these are not carefully made out at the beginning of the accounting period, they can lead to faulty financial accounting as well as a blunting of the cost accounting system as a tool for controlling costs. One way of ensuring that the standards are reasonable is for the cost accountant actually to get into the plant and inspect the production process. In one situation where the cost accountant was using a material usage standard of 5 pounds, it should have been 0.5 pounds. This error in placing of the decimal point would have been caught sooner if the accountant had been familiar with the manufacturing process and the product being made.

EXAMPLE

Compute the material variance from the following information:

The ending inventory of work in process is equal to the beginning inventory.	
Material Standard per Unit of Product	0.50 lb.
Equivalent Units of Product Produced	100,000
Actual Quantity of Material Used	46,000 lb.
Actual Cost of Material Used	$135,000
Standard Cost per Pound	$3

Solution: Material price variance is the difference between the actual and standard prices per unit of material applied to the actual quantity of material used.

The actual cost per pound is equal to the actual cost incurred, divided by the actual quantity used.

$$\text{Material price variance} = \text{actual quantity} \times \left(\frac{\text{actual cost incurred}}{\text{actual quantity}} - \text{standard price}\right)$$

$$\text{Material price variance} = 46{,}000 \left(\frac{\$135{,}000}{46{,}000} - \$3.00\right)$$

$$= \$135{,}000 - \$138{,}000$$

$$= \$3{,}000 \textit{ favorable variance}$$

Material usage variance is the difference between the actual quantity used and the amount that should have been used, valued at standard prices.

Material usage variance = standard price × (actual quantity − standard quantity)
Material usage variance = \$3.00 (46,000 − 50,000)
= \$12,000 *favorable variance*

The 50,000 pounds (standard quantity) was obtained by multiplying the units produced by the material standard.

Standard quantity = 100,000 × 0.50 = 50,000 lb.

If there had been changes in work in process, then this would have had to be taken into consideration in computing the standard usage of material.

OVERHEAD VARIANCES

To analyze overhead variances, it is first necessary to separate the overhead incurred and the overhead applied to product into fixed and variable overhead. The variances for fixed and variable overhead are computed individually.

The following discussion assumes that the actual overhead costs will be debited to two accounts, "Fixed Overhead Incurred" and "Variable Overhead Incurred." The overhead will be applied to in-process accounts, using the actual direct-labor hours worked times fixed and variable overhead rates. The overhead will be transferred from the in-process accounts to a finished goods account, using the standard direct-labor hours worked and the same overhead rates as used in the first transfer. The variances will be found in the overhead incurred and the in-process accounts.

Variable Overhead Variances

There are two variable overhead variances, the budget variance and the efficiency variance. They are analogous to the price and efficiency variances encountered in labor and material. The efficiency variance occurs because the actual hours worked differed from the standard hours. A budget variance occurs when the actual variable overhead incurred differs from the variable overhead budgeted for the actual level of operations.

Efficiency variance = variable overhead rate × (actual hours − standard hours)
Budget variance = actual variable overhead − (actual hours × variable overhead rate)

The amount left in the "Variable Overhead Incurred" account after the transfer to the in-process account will be the budget variance. The debit to the account is the actual overhead incurred, and the credit is the actual hours times the standard variable overhead rate.

The efficiency variance will be found in the "Variable Overhead in Process" account. The debit to this account is the same as the credit to the

overhead incurred account (actual hours × variable overhead rate). The transfer from this account is the variable overhead rate times the standard hours; thus, the balance in the account will be the efficiency variance for the variable overhead.

Fixed Overhead Variances

In addition to two variances similar to the budget and efficiency variances encountered in variable overhead, there is another variance, an *idle capacity variance,* which is encountered when analyzing the fixed overhead variances. This variance is caused by the fact that an amount of time other than the budgeted hours was worked. The use of a predetermined fixed overhead rate will result in a balance in the "Fixed Overhead Incurred" account. Thus, there will be two variances in that account (the budget variance and the idle capacity variance), and they have to be separated. This is accomplished by turning the definitions of the variances into formulas and applying the formulas.

Budget variance = actual fixed costs − budgeted fixed cost
Idle capacity variance = fixed overhead rate × (budgeted hours − actual hours)
Efficiency variance = fixed overhead rate × (actual hours − standard hours)

The formula for the efficiency variance is unchanged from that for variable costs except that the fixed overhead rate is used instead of the variable overhead rate. The significance of the variance is changed, however. The fixed overhead efficiency variance does not have much usefulness. The budget variance is important because it shows the difference between actual and budgeted fixed costs. The idle capacity variance is of use because it points up the problem of overcapacity. The efficiency variance for fixed overhead cost accomplishes a minor purpose. It shows that part of the fixed overhead was not assigned to product because the actual number of hours worked differed from the standard number of hours.

There is actually one additional fixed overhead variance, the *calendar variance.* This occurs when the number of working days in each month is different. In this text this complication is assumed not to exist so that the overhead problem will not be further complicated, and the calendar variance is buried in the idle capacity variance.

EXAMPLE

Part I. From the following information, compute the manufacturing overhead rates. Use normal activity. All costs listed are manufacturing costs.

Budgeted Variable Costs (for 80,000 direct-labor hours	$20,000
Budgeted Fixed Costs	$40,000
Normal Activity	80,000 direct-labor hours

Solution:

$$\text{Variable overhead rate} = \frac{20{,}000}{80{,}000} = 0.25 \text{ per direct-labor hour}$$

$$\text{Fixed overhead rate} = \frac{40{,}000}{80{,}000} = 0.50 \text{ per direct-labor hour}$$

Part II. From the preceding information given and that which follows, compute the variable and fixed overhead variances.

Actual Hours Worked	22,000 hr.
Standard Hours	20,000 hr.
Actual Variable Overhead Costs Incurred	$5,100
Actual Fixed Overhead Costs Incurred	$39,800

Solution: Efficiency variance is the difference between the actual and standard hours valued at the applicable overhead rate.

$$\text{Variable overhead efficiency variance} = 0.25\ (22{,}000 - 20{,}000) = \$500 \textit{ unfavorable}$$

$$\text{Fixed overhead efficiency variance} = 0.50\ (22{,}000 - 20{,}000) = \$1{,}000 \textit{ unfavorable}$$

Budget variance is the difference between what the overhead should have been and the actual overhead incurred. The budgeted variable overhead has to be adjusted to the actual level of operations.

$$\text{Variable overhead budget variance} = 22{,}000 \times 0.25 - \$5{,}100 = 5{,}500 - 5{,}100 = \$400 \textit{ favorable}$$

$$\text{Fixed overhead budget variance} = 40{,}000 - 39{,}800 = \$200 \textit{ favorable}$$

Idle capacity variance is the difference between the actual and budgeted hours valued at the fixed overhead rate.

$$\text{Idle capacity variance} = 0.50\ (80{,}000 - 22{,}000) = \$29{,}000 \textit{ unfavorable}$$

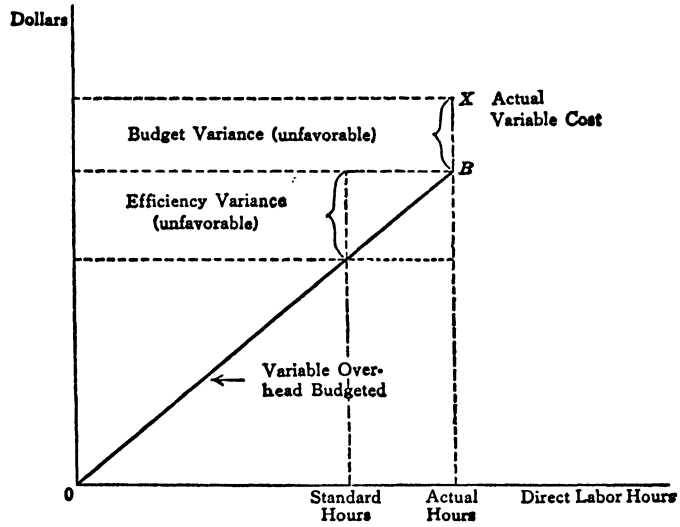
The foregoing examples for labor, material, and overhead variances are all related. Taken as a unit, they are an example of a problem in the analysis of all cost variances.

GRAPHIC SOLUTIONS

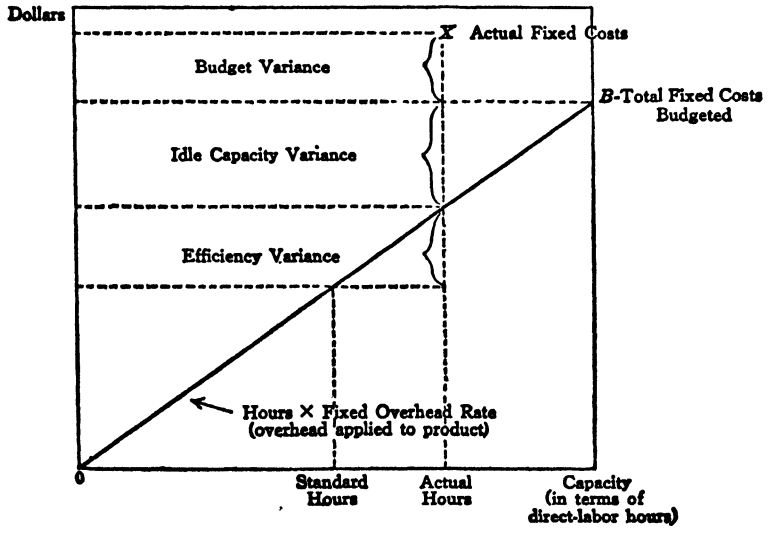
Graphic solutions of the problems of computing the fixed and variable variances may be used. They are especially useful for purposes of enabling the reader to visualize the relationships of the variances that have been discussed.

The line *0B* of the graphic solution for the variable overhead variances is the variable overhead budgeted for the different levels of activity, and it is also the amount of overhead that will be applied to product for different hours of activity. Thus, for any amount of *standard direct-labor hours*, the amount of

variable overhead to be applied to product may be found by the intersection of *0B* and a vertical line extended up from the appropriate amount (standard direct-labor hours) on the X axis. For any amount of *actual direct-labor hours* the variable overhead that should have been incurred (the budgeted amount) can be found by the intersection of *0B* and a vertical line extended up from the appropriate amount (actual direct-labor hours) and the X axis.



When attention is shifted to the graphic solution for fixed overhead variances, the line *0B* on that chart has somewhat more limited significance. It no longer represents the budgeted costs for different levels of activity. This



is reasonable, since the costs are fixed over the entire range of activity being studied and are represented by a horizontal line. Thus the line *0B* on the chart for fixed costs represents the amount of fixed overhead that will be absorbed by product at different levels of standard direct-labor hours.

FAVORABLE AND UNFAVORABLE VARIANCES

Variances may be either favorable or unfavorable. Unfavorable variances will result when actual costs (or hours) are greater than standard costs (or hours) or budgeted costs. Favorable variances will occur when the actual costs (or hours) are less than the standard costs (or hours). The idle capacity variance will almost always be unfavorable if the practical capacity is chosen as the level of activity for computing the fixed overhead rate. It may or may not be favorable if some other basis is chosen or if the practical capacity can be exceeded.

Whether a variance is favorable or unfavorable can also be decided by inspection of the accounts. If there is a debit balance, the variance is unfavorable (tending to decrease the stockholders' equity). If there is a credit balance, the variance is favorable (tending to increase the stockholders' equity).

SIGNIFICANCE OF VARIANCES

Management cannot investigate each and every variance. There must be criteria established that determine whether the variance is significant enough to be investigated. The absolute size of the variance may be one factor, the size of the variance relative to the total cost incurred in that classification may be another, and the characteristic of the cost is a third consideration. These criteria are best established by someone other than the person responsible for the operations and by someone with a knowledge of statistics, for this problem of determining significance can be handled by using statistical techniques.

It should be remembered that the analysis of variances illustrated in this chapter is only the first step. Once the budget variance is computed, the causes for the variance will be investigated in detail. For example, the actual cleaning expense will be compared with the budgeted expense.

DISPOSITION OF VARIANCES

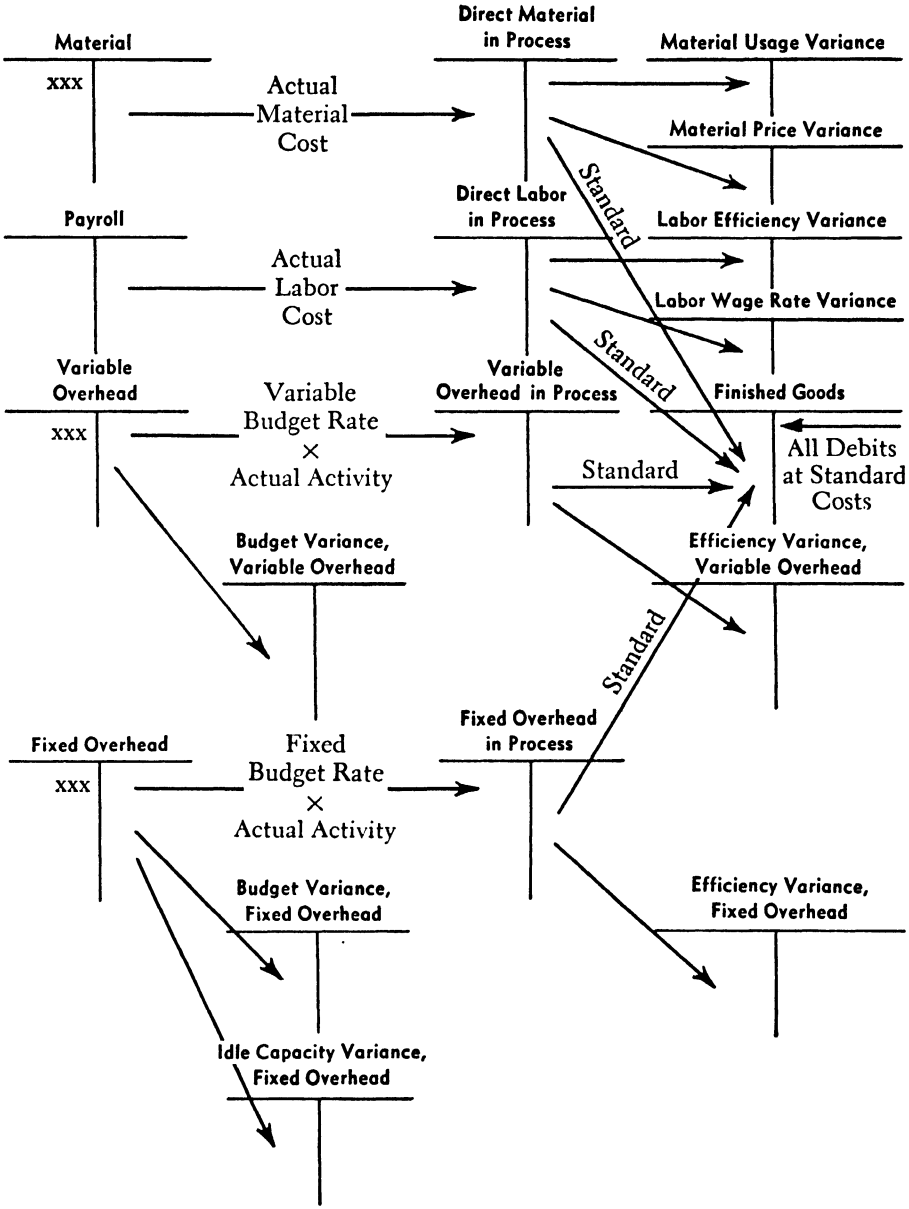
Cost variances may be disposed of by following either of two basic procedures. They can be considered a cost of inefficiency and not a cost of product

and thus can be charged against the revenues of the period. Or they can be considered a cost of product and thus can be allocated to work in process, finished goods, and cost of goods sold. The proper procedure is to judge each variance individually and to make a decision based on the nature of the cause of the variance. In general, price variances caused by changes in the prices of goods are a cost of product and therefore should be allocated to product. At the other extreme is an idle capacity variance caused by operating 100 direct-labor hours instead of the normal 800 direct-labor hours per week. This is a cost of idleness, not a cost of the product made. In between the two extremes are borderline cases where it is not possible to determine with certainty whether the cost should be considered as a cost of product. Labor efficiency variances are of this nature, especially if the labor standards are very tight.

Of more importance than the exact treatment of specific variances is an appreciation of what is affected by the choice of procedure. Both the inventory valuation and the measurement of income will be affected. The control of costs is not directly affected, since the cost variances should be analyzed in the same manner without regard to their ultimate disposition. Practical considerations, such as the costs of record keeping, may result in expensing all variances.

SUMMARY DIAGRAM OF FLOW OF ENTRIES —STANDARD COST SYSTEM

The following diagram is an attempt to present the accounts of a possible standard cost system. The reader should realize that there are many alternative possibilities.


Material
xxx
Actual Material Cost
Direct Material in Process
Material Usage Variance
Material Price Variance
Payroll
Actual Labor Cost
Direct Labor in Process
Labor Efficiency Variance
Labor Wage Rate Variance
Variable Overhead
xxx
Variable Budget Rate × Actual Activity
Variable Overhead in Process
Finished Goods
All Debits at Standard Costs
Standard
Budget Variance, Variable Overhead
Efficiency Variance, Variable Overhead
Fixed Overhead
xxx
Fixed Budget Rate × Actual Activity
Fixed Overhead in Process
Budget Variance, Fixed Overhead
Efficiency Variance, Fixed Overhead
Idle Capacity Variance, Fixed Overhead

QUESTIONS AND PROBLEMS

24–1 The Bobb Company

The Bobb Company makes one product. The following data are accumulated for the month of July. Overhead is absorbed, using direct-labor hours.

	Standard	*Actual*	*Budgeted*
Hours of Direct Labor	95,000	90,000	100,000
Dollars of Direct-Labor Cost	$190,000	$185,000	$200,000
Pounds of Material A Used	76,000	75,000	80,000
Dollar Amount of Material A Used	$228,000	$228,000	$240,000
Variable Manufacturing Overhead		$82,000	$100,000
Fixed Manufacturing Overhead		$47,500	$50,000
Units of Equivalent Product	38,000	38,000	40,000

Required

Compute the material, labor, and overhead variances.

24–2 The Thrower Company

The Thrower Company produces one product. For the month of March, the following information is accumulated:

	Actual Hours and Tons	*Standard Hours and Tons*	*Actual Cost*	*Standard Cost per Unit*
Direct Labor	10,500 hr.	10,000 hr.	$21,500	$ 2.10 per hr.
Direct Material	550 tons	540 tons	52,250	100.00 per ton

	Budgeted Overhead for Year	*Actual Overhead for March*
Variable	$216,000	$15,200
Fixed	72,000	6,200

The overhead is budgeted for average (normal) activity of 144,000 hours of direct labor per year.

Required

(a) Compute the labor and material variances.
(b) Compute the overhead variances.
(c) Show the overhead variances graphically.
(d) Assuming no beginning or ending balances in work in process, set up necessary "T" accounts to show the entries that would be made to record the manufacturing costs and variances. Set up a separate "T" account for each variance.

24-3 The Pitcher Company

The Pitcher Company produces one product. For the month of March, the following information is accumulated:

	Actual Usage	*Standard Hours and Tons*	*Actual Cost*	*Standard Cost per Unit*
Direct Labor	11,000 hr.	10,000 hr.	$22,500	$ 2.10 per hr.
Direct Material	530 tons	540 tons	52,650	100.00 per ton

	Budgeted Overhead for Year	*Actual Overhead for March*
Variable	$288,000	$20,900
Fixed	144,000	13,200

The overhead is budgeted for average (normal) activity of 144,000 hours of direct labor per year and 12,000 hours per month.

Required

(a) Compute the labor and material variances.
(b) Compute the overhead variances.

24-4 The Auburn Company

The Auburn Company manufactures one product, *Bypo*. The standards for one unit of product Bypo are as follows:

10 lb. of material X at $1 per lb.	$10
3 hr. of direct labor at $3 per hr.	9
Burden	
Fixed: $2 per direct-labor hour	6
Variable: $1 per direct-labor hour	3
Total standard cost for one unit of Bypo	$28

Material X is added at the beginning of the manufacturing process. Burden is budgeted on the basis of direct-labor hours.

The inventory of work in process on February 1, consisted of 900 units of Bypo, 66⅔% complete with regard to labor and burden. A purchase of 92,000 pounds of material X was made during February at a cost of $1.05 per pound. During the month, 26,000 hours of direct labor were worked at an average wage of $3.10 per hour. February plant capacity was 30,000 direct-labor hours. Actual fixed burden costs amounted to $63,000 during February, and actual variable burden costs amounted to $26,000 during the month.

During February, 8,900 units of Bypo were completed. The inventory of work in process as of February 28 consisted of 1,000 units of Bypo, 80% complete with regard to labor and burden. 92,000 pounds of X were used.

Required

Compute labor, material, and overhead variances for the month of February. Indicate whether the variances are unfavorable (debit) or favorable (credit).

24-5 The I.C. Thelite Company

The I.C. Thelite Company has accumulated the following information in an effort to explain the differences between standard and actual cost for the month of March. Overhead is absorbed, using standard direct-labor hours. All the actual costs given are for March. There is no beginning or ending balance in work in process.

Production for March

Product	*Equivalent Units Produced*	*Direct-Labor Standards*	*Standard Direct-Labor Cost per Hour*	*Material Standards*	*Standard Material Cost per Ton*
A	900,000	6.0 min. per unit	$2.10	1.0 lb. per unit	$100.00
B	800,000	4.8 min. per unit	2.20	3.0 lb. per unit	200.00

Actual Direct Labor and Material

Product	*Direct-Labor Hours*	*Direct-Labor Dollars*	*Material Tons*	*Material, Dollars*
A	80,000	$164,000	530	$ 54,500
B	70,000	190,000	1,248	259,000

Budget Information

Product	*Budgeted Fixed Cost, March*	*Budgeted Production, March*	*Budgeted Variable Overhead, March*	*Budgeted Direct-Labor Hours, March*
A	$150,000	1,000,000	$200,000	100,000
B	340,000	850,000	170,000	68,000

Additional Information

Product	*Actual Fixed Cost, March*	*Actual Variable Cost, March*
A	$148,000	$210,000
B	343,000	168,000

Required

Prepare an analysis of all variances. Overhead is applied to product, using direct-labor hours.

24-6 The Carter Corporation

The Carter Corporation makes one product, widgets, and uses a standard cost system to record the costs of making that product. On December 1, manufacturing inventory accounts had balances as follows:

Finished Goods	$18,000	1,000 units
Work in Process, Labor	1,000	500 units one-half completed
Work in Process, Material	5,000	500 units completed as far as material is concerned.
Work in Process, Overhead	1,000	The overhead rate is $2.00 per direct-labor hour.

The standard cost of a widget is:

Direct Labor	$ 4
Direct Material (20 lb. of material)	10
Overhead	
Fixed	3
Variable	1
	$18

The current work standard is 2 direct-labor hours per unit of product. The fixed overhead rate is $1.50 per direct-labor hour, and the variable overhead rate is $0.50 per direct-labor hour.

The normal activity for a month is 200,000 direct-labor hours, and the overhead rates are based on normal activity. The fixed manufacturing costs budgeted for a month are $300,000, and the variable manufacturing overhead costs are $100,000.

The following transactions took place during December:

Direct-Labor Costs Incurred (180,000 hr. of work)	$ 380,000
Material Requisitioned and Used (1,800,000 lb.)	1,150,000
Fixed Overhead Incurred	320,000
Variable Overhead Incurred	95,000
Selling Expenses Incurred	1,000,000
Administrative Expenses Incurred	800,000
Income Taxes	100,000
Sales on Account (95,000 widgets)	4,800,000

During the month of December, the plant completed 100,000 units of product. The work in process on December 31 consisted of 400 units, 50% completed as far as labor and 100% completed as far as material.

Required

(a) Record in "T" accounts the transactions of December, including the adjusting entries.

(b) Give the ending inventories in finished goods and work in process.

(c) What additional information should be obtained for purposes of controlling costs?

24–7 A corporate controller was pleased that the overhead variances for the year were very small. He said, "This shows that we effectively predicted costs and activity in setting our burden rates." Comment on this statement.

25

Administration of the Budget Program

WHAT IS A budget? First, we should realize that there is no such thing as the budget, but rather a series of budgets, each made for a specific purpose. The entire subject of cost control is based on the assumption that the budgeted costs establish a standard of a high level of efficiency. This type of budget is useful for cost control purposes but not for forecasting cash needs or *probable* income. Thus, there are essentially two types of budgets. One is a *forecast*, which tells where you are likely to be, and the other is a *standard*, which tells whether or not the predetermined high level of efficiency is being maintained.

GENERAL PROCEDURE

The Budget Committee

Preparation of the budget is not the sole responsibility of any one department. To be useful, the budget must be prepared by the department to which it applies. Thus the production department prepares the production department expense budget, and the sales department prepares the budget for the sales department expense. Obviously, the budget preparation must have some central guidance; this is often supplied by a budget committee.

The budget committee should consist of the heads of the various departments or other high-level executives. Its prime task is to see that the budgets are realistically established. If a department submits a budget that does not reflect a high level of performance, the budget should not be approved by the budget committee. It should be sent back to the originating department with comments. The originating department should either adjust the original budget or attempt to defend it. If the budget is adjusted perfunctorily merely to "please" the budget committee, then this will cause unfavorable cost variances to appear throughout the fiscal year, and these will require explanations. It is very important that all parties agree that the budgeted costs can be attained and are not an impossible goal. This is the

prime reason for not having the accounting department prepare all budgets. If this were done, the operating departments might well say that the budgets are meaningless, since they were prepared by a group of people sitting at desks who do not understand the problems of production. By having the departments prepare their own budgets, this weakness is avoided.

Usually, the budget committee will appoint a budget officer. This executive is responsible for seeing that the budget system actually works. The budget officer may be an accountant or an executive familiar with accounting, since the accumulation of the budget information is very much related to the problems of accounting.

In the absence of a budget committee, the budget officer may well assume the tasks which the budget committee normally would carry out. His main task would be coordinating and gaining the full cooperation of all departments. The budget committee accomplishes this by giving all departments a seat on the budget committee. Without the budget committee the budget officer must consciously create a situation where all departments realize their responsibility for the budget. If the situation becomes one where the budget officer or the accounting department prepares the budget, a large percentage of the usefulness of the budget is lost.

Budget Mannual

Budget manuals are used because they place the objectives and procedures of the budget program in writing. This is helpful because it provides a reference source for the questions of the personnel responsible for preparing the budget. The danger of a manual is that current procedures may be radically different from the written instructions. This should be avoided, since it tends to add to the confusion surrounding an already difficult procedure. The budget manual should always be kept up to date. One way of accomplishing this is to have the budget manual take the form of a collection of loose-leaf pages in a binder. When procedures are changed, a new page should be issued to change the budget manual.

Cost Control Use of the Budget

For purposes of cost control, the budgeted costs should reflect a high level of efficiency. How can this be reconciled with the other uses of the budget? The reconciliation is accomplished through the use of forecasted variance accounts. If the standard has been established, but if it is very unlikely that the standard will be attained, then a cost variance should be budgeted. This forecasted variance will be used for purposes of forecasting but will not be used for purposes of cost control.

The Budget Period

For how far ahead should budgets be prepared? Sales and production budgets are commonly made 12 months in advance and then adjusted monthly or quarterly. The forecast for each month should definitely be reviewed before the beginning of the month.

Budgets of capital expenditures should be made for periods as far as 5 to 10 years ahead. To prepare these budgets, estimates of sales and costs that far in advance will also have to be made, so that the desirability of the various capital expenditures may be judged. Thus short-range forecasts of one month and long-range forecasts of 10 years will have to be made simultaneously.

Budget Summaries

Practically every report prepared from actual accounting data is also prepared by using the budget forecast data. Thus there will be budgeted income statements, position statements, and funds statements. A possible method of tackling the problem of preparing these reports is to set up the accounts and to record the forecasted transactions in summary form.

FORECASTING USES OF THE BUDGET

The Sales Budget

The budget has many uses as a forecasting device. By using the budgeted costs, the income resulting from a certain course of action can be predicted. This is extremely useful, since management is enabled to change its strategy before the event has occurred, rather than after. Also, by knowing where it should be going, management can tell immediately (by comparing the budgeted cost or income with the actual cost or income) when its plans are not being realized.

The budget can also be useful in planning material purchases, hiring employees, scheduling production, and arranging for the supply of sufficient cash to accomplish the production plan. To be useful for all these purposes, we need more than a "flexible" budget. We need to know the predicted sales for each of the coming months. The sales forecast is the backbone of the forecasting budget. It is not within the scope of this chapter to do more than mention some of the methods of predicting sales. However, there is abundant literature on this subject if the reader should desire to investigate it further.

Sales forecasts based on:
Estimates of Salesmen

Estimates of Sales Managers
Economic Analysis

These forecasts may be based on:

Past Sales (Demand Analysis) and Prospective Pricing Policy
Prediction of General Business Activity
Outside Factors (growth in population, shifting habits, etc.)
Interviews with Clients
Unfilled Orders

A sales forecast or sales budget should be made out for each product. The sales of the various products for each geographical location should be forecasted, and finally the sales by the types of customer (government, wholesalers, retailers, etc.) should also be predicted. This information should be summarized in various ways so that information of the following nature is readily available: total sales by geographical location and total sales to the various types of customer; the same information should be applied for each different type of product.

Selling and Distribution Cost Budgets

The selling and distribution cost budget is directly related to the sales budget. Sales will be determined to some extent by the amount spent for selling effort, and distribution costs will be a function of the units sold. The sales budget cannot be made out until the advertising budget and sales expense budget have been decided upon, since sales will be a function of the selling effort.

Production Budget

The production budget may be made out as soon as the sales budget is prepared and the inventory policy of the next period is decided upon. The production manager will attempt to stabilize production to minimize interruptions of the production stream which tend to decrease efficiency. Production budgets will be made out by departments and will show the different amounts of product to be made in the different time periods.

The production in any period may be computed by applying the basic equation:

$$\text{Production} = \text{desired ending inventory} + \text{unit sales} - \text{opening inventory}$$

EXAMPLE

Compute the required production for the first quarter assuming either: (a) it is desired to keep an ending inventory of 500 units; (b) it is desired to stabilize

production at 600 units per month; (c) it is desired to have on hand at the end of each month an amount equal to one month's sales.[1] The inventory at the beginning of the year is 500 units. The projected sales are:

January	400 Units
February	300
March	500
April	700

	Month	(1) Desired Ending Inventory	(2) Unit Sales	(3) Opening Inventory	(4) Production for Month *
(a)					
	January	500	400	500	400
	February	500	300	500	300
	March	500	500	500	500
(b)					
	January	——	400	500	600
	February	——	300	700	600
	March	——	500	1,000	600
(c)					
	January	300	400	500	200
	February	500	300	300	500
	March	700	500	500	700

* Col. 4 = Col. 1 + Col. 2 − Col. 3, except for part (b).

The Production Cost Budgets

The production cost budgets consist of three budgets:

Direct-Labor Budget
Direct-Material Budget
Overhead Budget

For forecasting purposes, these three budgets are based on the production budget, which in turn is based on the sales budget. Since they are used for cost control purposes, the three budgets are flexible budgets and are adjustable to the actual level of operations.

Both the direct-labor and direct-material budgets are computed by applying *standards* to the number of units to be produced. Thus, if the current work standard is 0.5 hour of direct labor per hour per unit of Product A, then the budgeted direct labor for 1,000 units of Product A would be 500 hours (1,000 units times 0.5 hour per unit). If there were only 800 units of Product A produced, then the actual hours of direct labor would be compared with 400 hours (800 units times 0.5 hour per unit). The standard hours can

[1] Chapter 27 will introduce better methods of determining inventory levels.

be converted to dollars by multiplying by the standard direct-labor hour-wage rate.

The material budget is computed in the same manner as the labor budget. If the standard material per unit of Product A is 1.5 pounds, then the budgeted material for 1,000 units of product will be 1,500 pounds. This can be converted into dollars by multiplying by the standard cost per pound of the material being used to make Product A.

The overhead budget is somewhat more difficult to prepare, because overhead costs may be fixed, variable, or semi-variable. Semi-variable is used here to represent all costs that are not fixed over the entire range of production or which do not vary directly with production. The person preparing the budget should indicate whether the costs are fixed, variable, or semi-variable. If the costs are fixed or variable, they are relatively simple to handle; but if they are semi-variable, they are more difficult to incorporate into the budget cost control system. One way of handling semi-variable costs is to have the budget preparation sheet take the following form:

Budget—Semi Variable Costs

Account Number	Account Title	Indicate the Total Cost for Each Level of Activity:					
		40-Hr. Week	Number of Employees	60-Hr. Week	Number of Employees	80-Hr. Week	Number of Employees

For purposes of cost control, the actual cost incurred will be compared with the cost budgeted at the applicable level of activity. Some semi-variable costs will be linear. These will be no problem, since the budgeted cost at the actual level of activity may be easily computed or may be plotted on a graph. If the cost is nonlinear (or it does not increase in a continuous manner), then the accompanying form will be useful, and while the actual hours worked may not be 40, 60, or 80, it will be possible to interpolate. The advantage of this system is that it forces production personnel to think in terms of what the various costs should be for different levels of activity.

For purposes of absorbing the costs to product and computing overhead

rates, the choice of the level of semi-variable costs will depend on the choice of level of activity chosen for purposes of cost absorption (see Chapter 22 on overhead). If 80 hours were practical capacity and if practical capacity were being used for purposes of absorbing fixed costs, it would also be used to absorb semi-variable costs. Thus the costs at 80 hours of activity would be divided by the total direct labor hours, assuming an 80-hour week, to find the semi-variable costing rate per direct-labor hour.

Capital Expenditures Budget and Research Budget

Since the capital expenditures budget is the subject of Chapter 26, the subject will not be reviewed here. The research budget is used more for planning purposes than for cost control purposes. It gives those executives in charge of research an indication of the resources at their disposal. It may also indicate the direction in which the research should go, although this is less a part of the budget program than a general management problem.

CASH BUDGETS

It is important that the *right* amount of cash be provided for operating the business. If there is not enough cash, then it may be necessary to curtail operations. If there is too much cash, then the firm is paying for money that it is not using. For this reason the cash budget is extremely important to the executive in charge of ensuring that there is the right amount of cash available.

The corporate finance officer must plan his cash and credit sources so that the normal operations of the corporation are not disrupted by a shortage of cash and so that opportunities for capital expenditures are not lost because of inability to finance them. This requires some type of forecasting procedure. There are several methods of arraying the information for cash planning (or cash budgeting, as it is frequently called). We shall illustrate and discuss two:

(a) The cash account method
(b) The non-cash accounts method

The two procedures are directly related and the differences are procedual, not substantive.

Cash Account Method

This method involves forecasting the specific entries to be made to the cash account in the coming period. Some large companies prepare this type of computation daily. Other companies do it on a weekly or monthly basis. For purposes of this computation, it is convenient to consider cash and market-

able securities alike and to assume that they are recorded in one account. We are interested in all changes in this account.

To the beginning balance of this "cash" account are added all sources of cash and subtracted all uses of cash expected during the period. These are the entries which are expected to be made, based on the forecasts of the transactions which will take place.

One possible approach is to construct "T" accounts which reflect the probable operations of the next period. By making summary entries to the cash account, the projected balance may be obtained. The debits to the cash account represent *sources* of cash and the credits represent *application* of cash. One of the problems is to forecast the timing of the cash receipts and disbursements. With the assistance of past experience, this is not an insurmountable problem.

EXAMPLE

Compute the expected cash receipts for May. Collections from customers follow the below pattern:

60% in the month of sale,
30% in the month following the sale,
8% in the second month following the sale,
2% bad debts.

Forecasted Sales:

January	$ 60,000
February	70,000
March	80,000
April	100,000
May	90,000

Solution

May Receipts		
From May Sales,	90,000 × 60%	= $54,000
April Sales,	100,000 × 30%	= 30,000
March Sales,	80,000 × 8%	= 6,400
Total		= $90,400

Typical sources of cash are:

Cash sales
Collection of accounts receivable
Sale of investments
Sale of fixed assets
Interest and dividend collections
Bank or other loans (including bonds)
Issue of stock (common or preferred)

Typical uses of cash are:

Payment of accounts payable or other current liabilities (material, wages, supplies, taxes, freight, interest, insurance, dividends, rent, etc.)
Purchase of long-lived assets (plant, equipment, or security-type investments)
Payment of loans (bank loans, bonds, mortgage, etc.)
Retirement of stock

The amounts of some of the above items are known with a fair degree of certainty. For example, the insurance payments may be the result of an annual contract, and the amount to be paid on any day, week, or month may be easily forecasted. Other items are more uncertain. The estimates of cash sales, materials, wages, etc., may be subject to a great deal of uncertainty. However, the physical use of material and wages will be a function of sales, and thus the estimate of the difference between the sales and the costs of making the sales may be better than the estimate of the components. For example, the estimate of the sales may be off by $1,000,000, but the estimate of the sales less the payments caused by the sales may be off by only $100,000.

EXAMPLE

Forecasted and Actual Figures for January

	Forecasted	*Actual*	*Differences*
Sales	11,000,000	10,000,000	1,000,000
Payments varying with sales	9,900,000	9,000,000	900,000
	1,100,000	1,000,000	100,000

The exact form of the forecast presentation may vary considerably. The following is one possibility.

CASH FORECAST

For Week Beginning January 15, 1965

	Monday	Tuesday	Wednesday	Thursday	Friday
Beginning Balance Cash and Marketable Securities					
Add: Sources of Cash					
Total Cash Available					
Less: Uses of Cash					
Ending Balance					

As much of the detail of sources and uses of cash may be shown as is desired. Not only may the sources be listed by type (i.e., sales, issue of debt, etc.) but also by name of the operating unit making the contribution where there are plants, divisions or operating companies which are accounting entities.

The cash account method is a reasonable method of forecasting the cash needs of a period. Ideally the transactions implied by the transactions indicated should be recorded in a pro-forma set of accounts and the income and positions statements prepared for each date. This will help ensure that the implicitly assumed financial relationships of the firm are reasonable.

Non-Cash Accounts Method

This method requires that we look at all accounts other than cash and note the expected changes to the accounts. The expected income affects the expected changes in the retained earnings account. The income is adjusted for items not utilizing cash (such as depreciation) to obtain the cash from operations. This general procedure has already been illustrated in the chapter on funds statement.

The change in each account is either:

(a) A source of cash
(b) An adjustment to the cash from operations (the cash from operations is a source)
(c) A use of cash
(d) A transaction which does not affect cash (for example, a stock dividend)

A change in accounts payable may be either a source or a use. If accounts payable increases, this is a source of cash. If accounts payable decreases, this is a use of cash. Assume the present balance of accounts payable is $10,000 and the expected balance is $12,000. Adjusting accounts payable results in a debit (or an increase) to cash for $2,000.

Cash		Accounts Payable	
(1) 2,000			√ 10,000
			(1) 2,000

It could be properly argued that the debit should go to inventories, since not cash, but rather some account such as inventories, was increased by the

increase to accounts payable. This is true, and we could attempt to record the expected transactions more exactly. The advantage of the procedure shown is that it is easier, and does not affect adversely the forecast of cash. For example, if accounts payable changed as indicated and if inventories had an opening balance of $20,000 and an ending balance of $23,000, we could record the changes in cash as follows:

Cash		Inventories		Accounts Payable	
(1) 2,000	(2) 3,000	√ 20,000			√ 10,000
		(2) 3,000			(1) 2,000

The above entries show a decrease in cash of $1,000. The same change could be indicated by the following more exact entries.

Cash		Inventories		Accounts Payable	
	(2) 1,000	√ 20,000		(2) 1,000	√ 10,000
		(1) 3,000			(1) 3,000

By recording the exact transactions or the approximate transactions expected in each account, we can trace through the sources and uses of cash for the coming period.

The non-cash account procedure of computing and presenting the changes in cash is reasonable. It has a minor advantage over the cash account method in that the position statements are required to be prepared at successive dates, whereas in the previous method (the cash account method) the cash forecast could be prepared without preparing the statements. Thus there is a slight increase of consistency. The disadvantage of the procedure is also minor. It shows net changes (for example, the net cash spent increasing inventories), but it does not show the total amount spent for raw materials during the period. For the person controlling cash, the former information will generally be sufficient.

The author has no preference between the two procedures, since equally useful information for cash control may be obtained from either. Both rely on forecasts of sales and level of costs, and these estimates are much more important than the exact form of presentation.

Illustration of a form for the non-cash accounts method is shown below:

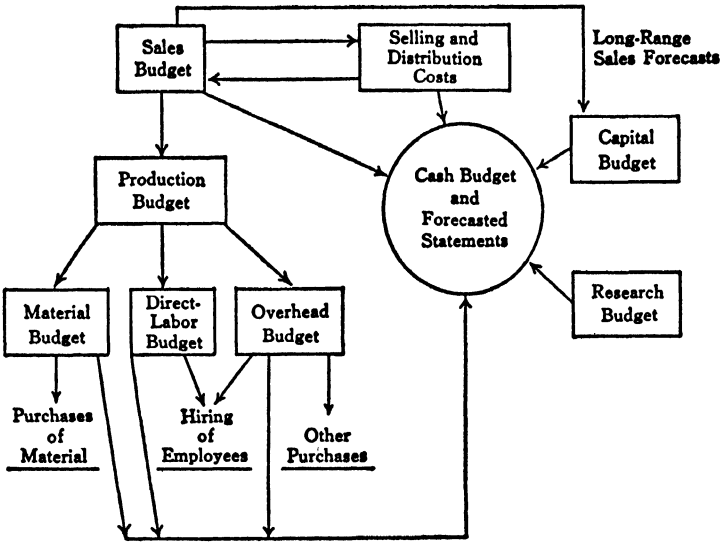
CASH FORECAST

For Week Beginning January 15, 1965

	Monday	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
Beginning balance:					
Cash and Marketable Securities					
Add:					
Income					
Plus: Depreciation					
Other Non-Cash Items					
Other Sources:					
Decrease in Current Asset Accounts					
Sale of Long-Lived Assets					
Increase in Current Liabilities					
Issue of Long-Term Debt					
Issue of Stock					
Total Cash Available					
Less:					
Capital Expenditures					
Increases in Current Assets					
Decreases in Current Liabilities					
Payment of Long-Term Debt					
Retirement of Capital Stock					
Dividend Payments					
Total Expenditure					
Ending Balance					

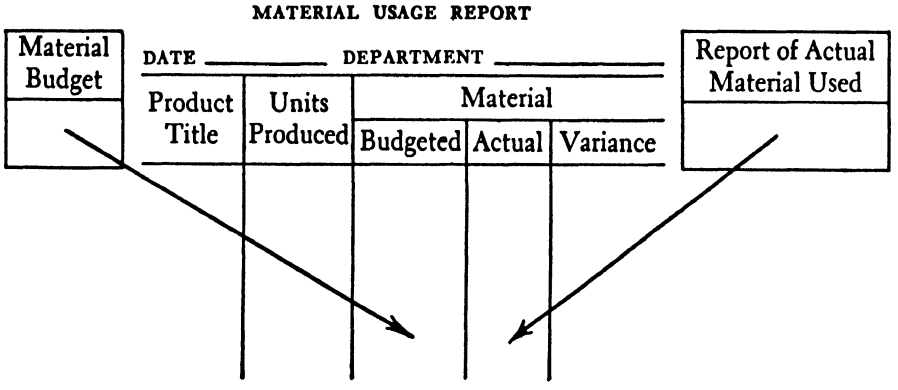
INTERRELATIONSHIPS OF THE VARIOUS BUDGETS

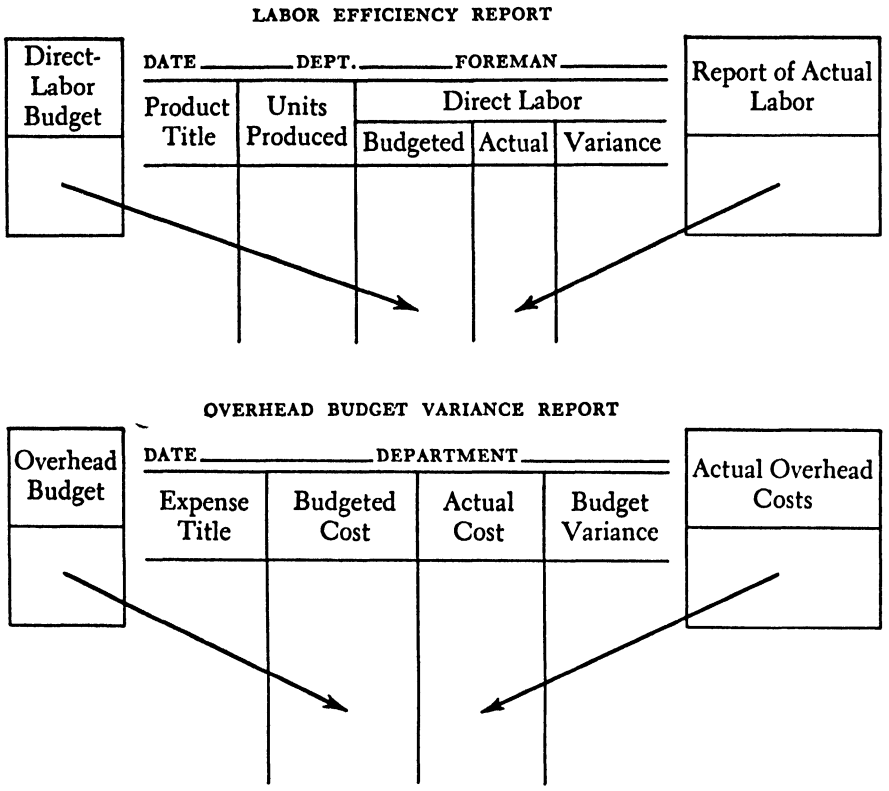
The following diagram attempts to illustrate the interrelationships of the different budgets. The arrows indicate flows of relevant information. Thus, to prepare the production budget, it is necessary to have the information from the sales budget.



INTERRELATIONSHIPS OF THE BUDGET, ACTUAL COSTS, AND COST CONTROL REPORTS

The preceding section illustrated the preparation of the budget and how the preparation of one budget influenced the preparation of the other budgets. This section is concerned with the use of the material, labor, and overhead budgets for cost control purposes. Instead of "budgeted" direct labor and material, the terms *standard direct labor* and *standard material* are frequently used. This is a matter of terminology and does not affect the use of the reports.





QUESTIONS AND PROBLEMS

25–1 The Kracked Bat Company

Each December the Kracked Bat Company prepares a series of budgets for the coming year. The complete budget has the following components:

Sales and Selling Expenses
Production Budget
Material and Labor Budgets
Manufacturing Overhead Budget
Cash Budget
Projected Financial Statements

The Kracked Bat Company's only products are baseball bats. The bats are all produced at one plant. There are four sales offices. The company uses a LIFO procedure for pricing inventory and cost of goods sold expense.

Part I. Sales and Selling Expense Budgets

The sales and selling expense budgets are prepared by the sales department with the assistance of the controller's office. The sales forecasts are based on re-

ports from the salesmen and information from the company economist, whose task it is to incorporate into the forecast such things as changes in prices, population, age of the population, and income. For the year 1964, the following projections were made:

Sales Projections for 1964

Sales District	Number of Bats	Sales in Dollars	Budgeted Selling Expense
New England	500,000	$1,500,000	$20,000
Middle West	300,000	900,000	18,000
South	150,000	450,000	10,000
South West	50,000	150,000	12,000
	1,000,000	$3,000,000	$60,000

Required

What additional information should be contained in the completed sales budget and selling expense budget?

Part II. Production Budget

The production department receives from the sales department a breakdown of forecasted sales by months.

Sales Projections for 1964

By Months (number of bats)

January	200,000	July	Vacation
February	200,000	August	60,000
March	100,000	September	60,000
April	100,000	October	100,000
May	50,000	November	40,000
June	50,000	December	40,000

The company follows a policy of stabilizing employment throughout the year. If it did not follow this policy, it would probably lose its skilled workers to other plants in the area. Studies and experience indicate that the plant can produce 60,000 bats a month when it is operating without overtime and employing only the basic work force. By working overtime and adding temporary workers, production can be upped to 120,000 bats a month. The entire plant and sales force is given a month's vacation in July. Normal activity for budget purposes is 100,000 bats a month.

There will be a January 1, 1964, beginning inventory of 180,000 bats. The company tries to keep a basic minimum inventory of 20,000 finished bats, and it builds up the inventory to 180,000 bats as of the beginning of each year. Where there is conflict between inventory control and employment policy, the stabilized employment policy has priority.

Required

Plan the production (number of bats) to be produced in each month.

Part III. Material and Labor Budgets

The material and labor standards for the type of bat being produced are as follows:

Wood (standard rough weight)		2 lb.
Standard Cost per Pound		$0.10
Standard Cost of Wood Used in Bat		$0.20
Direct Labor:		
Cutters	0.25 hr. at $2.00 per hr. =	$0.50
Finishers	0.50 hr. at $3.00 per hr. =	1.50
Standard Direct-Labor Cost per Bat	=	$2.00

Required

Compute the total direct labor and material to be used during the year, and also for each of the first three months of the year.

Part IV. Manufacturing Overhead Budget

The manufacturing overhead costs are budgeted as follows:

Fixed Overhead

Equipment Depreciation	$ 24,000
Salaries of Supervisors	180,000
Building Rent	96,000
Manufacturing Labor, Indirect	36,000
Manufacturing Supplies	24,000
	$360,000

Variable Overhead

(for normal activity of 1,200,000 bats per year)

Indirect Labor	$ 96,000
Power	24,000
Indirect Supplies	48,000
	$168,000

Required

(a) What additional information should be presented in the detailed budget?

(b) Compute the fixed and variable overhead rates to be used for 1964. Overhead is to be absorbed, using direct-labor hours.

(c) What is the standard overhead per unit of product?

Part V. Cash Budget

The only sources of cash in the next period are sales and the collections of

accounts receivable. Past experience indicates that the following schedule of collections holds true:

Collections in Month of Sale	20%
Collections in Month Following Sale	70
Collections in Second Month Following Sale	9
Uncollectible Accounts	1
	100%

The accounts receivable balance as of December 31, 1963, is expected to consist of the following items:

Source	Accounts Receivable	Expected Uncollectibles
December Sales	$32,000	$ 400
November Sales	3,000	300
October Sales	1,000	1,000
September Sales	500	500
	$36,500	$2,200

Payments of cash are expected to be equal to the sum of:

Selling Expenses
Cost of Direct Material Used
Direct-Labor Cost Incurred
Out-of-Pocket Overhead Costs

There is a cash balance of $100,000 on January 1, 1964.
No income tax payments are due in 1964.

Required

Prepare a statement of forecasted sources and applications of cash for 1964.

Part VI. Projected Financial Statements

The December 31, 1963, position statement is expected to include the following items:

Assets		*Equities*	
Cash	$100,000	Accounts Payable	$200,000
Accounts Receivable	36,500	Capital Stock	400,000
Allowance for Uncollectibles	(2,200)	Retained Earnings	154,300
Inventories	400,000		
Equipment	300,000		
Allowance for Depreciation	(80,000)		
	$754,300		$754,300

Required

Prepare a projected income statement for the year 1964 and a projected position statement (as of December 31, 1964). Assume that the income tax rate is 50% and that the taxable income (if any) is the same as the income per books.

Part VII. Budgets and Variances

Assume that certain price (wage) and usage (efficiency) variances can be forecasted. Which of the budgets will be affected by these items? Explain briefly.

Part VIII. Actual Costs of January

During January, 1964, the following events occurred:

Bats Produced		125,000
Cutters Worked 30,000 hr. and Earned		$ 75,000
Finishers Worked 62,000 hr. and Earned		250,000
Cost of Wood Used (260,000 lb.)		28,000
Fixed Overhead		
Equipment Depreciation	$ 2,000	
Salaries of Supervisors	15,000	
Building Rent	8,000	
Indirect Labor	4,500	
Indirect Supplies	2,500	
		32,000
Variable Overhead		
Indirect Labor	$ 9,000	
Power	2,000	
Indirect Supplies	5,000	
		16,000
Selling Expense		5,000

Required

(a) Compute the material price and usage variances; labor efficiency and wage rate variances; variable overhead budget and efficiency variances; and fixed overhead budget, efficiency, and idle capacity variances.

(b) Assuming that all the bats produced could be sold for $3 per bat, analyze the results of operations for January. What possible actions could be taken to improve the profit picture?

25-2 The Universal Corporation

The Universal Corporation uses a flexible budget procedure to control variable overhead costs. Each month the actual cost incurred is plotted, using direct-labor hours as a measure of activity. At the end of the year, the points are correlated and a correlation line is plotted. The equation of the line is determined in order to obtain the fixed and variable components of the cost. This equation is used as the basis for the flexible budget for the next year.

Required

(a) Comment on the effectiveness of the procedure followed.
(b) How could the procedure be improved? Could the monthly plottings of cost be used for cost control purposes? Explain.

25–3 The Hall Corporation

The Hall Corporation has made an analysis of how the salaries of foremen should react to changes in activity.

	Foremen's Salaries
From Plant Shutdown to 20,000 Direct-Labor Hours per Month	$4,000 (monthly)
From 20,000 Direct-Labor Hours to 22,000 Direct-Labor Hours per Month	$4,000 + ($0.50 per direct-labor hour in excess of 20,000)
From 22,000 Direct-Labor Hours to 23,000 Direct-Labor Hours per Month	$5,000 (monthly rate)

There is a core of foremen who would be retained even if the plant were temporarily closed. If production required more than 20,000 hours of direct-labor hours per week but less than 22,000, then these foremen could handle the extra work by taking overtime. If the direct-labor hours increased above 22,000 hours, it is expected that a new foreman would be hired.

The actual costs for the first quarter were as follows:

	Direct-Labor Hours per Month	*Foremen's Salaries*
January	20,400	$4,800
February	22,400	5,600
March	19,600	4,900

Required

(a) Plot the budgeted costs and the actual costs for the first quarter.
(b) Comment on the level of foremen's salaries for each of the first three months.

25–4 The Small Automobile Company (sales, $1 billion per year) is very much concerned with the control of indirect labor. To help control this cost, the following report is prepared monthly:

PLANT _____ DEPARTMENT _____ MONTH _____

Code Number	Account Title	Budgeted for Month	Actual Exp. for Month	Variance	Budgeted for Year	Actual Exp. for Year

This report is expensive to prepare ($400,000 per year), and it has several weaknesses. The timing of the report is not good. It is distributed 20 working days after the end of the month. Some executives feel that by the time they receive the report, it is too late to take action.

Another difficulty has to do with sick leave and vacations. If the person who goes on sick leave or vacation is replaced by a temporary worker, this appears as a variance, since the wage cost of this extra worker has not been budgeted for the month. This annoys executives who have to explain why they had an unfavorable variance.

The company has a procedure whereby the wage rates are strictly tied to the type of work being done. A higher grade of labor cannot be used for a job other than that approved without the personnel department's written permission. Changes in wage rates (increases in wages) are also strictly controlled, requiring the permission of the head of the department, the immediate supervisor, the personnel department, and the budget control officer.

Since wage rates are so well controlled, wages-rate variances only appear because of authorized wages-rate changes not yet incorporated into the budget figure. The significant variances in labor expense are caused by an excessive number of hours worked in proportion to the amount of direct-labor activity budgeted.

An analyst in the budget control group has suggested that the present report be replaced by a report that would compare the budgeted manpower with the actual manpower (a head-count basis). Overtime would be controlled by a separate but accompanying report. These reports could be distributed on the second working day following the end of the month.

Required

Assuming that you are controller of the Small Automobile Company, what action will you take?

25-5 A flexible budget is a budget that adjusts the indirect labor (and other variable overhead costs) to the actual level of activity. This is necessary if variable indirect costs are to be effectively controlled. Usually, direct-labor hours, direct-labor dollars, machine hours, or some other *one* basis is used to adjust all indirect costs. In recent years the weakness of this procedure has been noted. Many indirect costs will not vary directly with direct-labor hours. In the long run, there may be a good correlation, but in the short run there may be leads and lags. For example, the receiving department may have to expand to receive raw material before the direct-labor force is expanded. The accounts receivable department may not have to expand, although the direct-labor force has been expanded.

To secure better control of indirect labor, attempts have been made in recent years to obtain types of work measurement more immediately related to the work than direct labor. For example, the accounts payable labor cost is related to the number of invoices processed.

Required

Name several types of indirect labor and the measures of work that can help to control these indirect labor costs.

25-6 The XYZ Company has the following trial balance as of December 31, 1965:

Cash	41,000
Accounts Receivable	35,000
Inventories	100,000
U.S. Treasury Bills	60,000
Prepaid Expenses	4,000
Land	40,000
Buildings	80,000
Machinery and Equipment	120,000
	480,000
Estimated Uncollectibles	1,000
Accumulated Depreciation	35,000
Accounts Payable	34,000
Capital Stock	300,000
Retained Earnings	110,000
	480,000

The following transactions are forecasted for the month of January.

1. Cash sales, $20,000.
2. Sale on account, $182,000. The estimated uncollectibles associated with these sales are $2,000.
3. Collections of accounts receivable, $151,000.
4. Estimated accounts which will be recognized as being bad, $800.
5. Purchases of inventories, $150,000 (all on account).
6. Cost of goods sold, $75,000.
7. Collection of Treasury Bills, $60,000 (collected on January 2).
8. Incurrance of liability for expenses of $7,000 which are classified as prepayments. During the period, $4,000 of prepaid expenses expired in the earning of the revenue of the period.
9. Purchase of land (for cash), $30,000.
10. Purchase of building (for cash), $80,000.
11. Purchase of machinery and equipment (for cash), $68,000. During the period, machinery which cost $8,000 is to be sold for $2,000. There will be a book loss of $1,000. The sale will be for cash.
12. The depreciation expense of the period is $25,000.
13. Payment of accounts payable, $143,000.
14. A bank loan is being arranged for $40,000 (a note).
15. Capital stock of $100,000 is to be issued.
16. A dividend of $20,000 will be declared and paid during the period.
17. Taxes of $35,000 will come due during the period and will be paid.

Required

(a) Prepare a cash budget (or forecast) for January, using the cash account method.

(b) Prepare comparative trial balances as of January 31 (compare January 1 and 31) and the projected income statement for the month.
(c) Using the comparative position statements and the information from the income statement, prepare a cash budget for January, using the non-cash account method.

25–7 The Sell-More Company followed a strict budgeting procedure with respect to advertising expenditures. The president of the firm received a forecast of sales from the sales vice-president and a forecast of expenses from the controller. He computed the profit without deducting advertising expense and compared it to a budgeted profit (based on a reasonable return on investment). The difference between the two profits was then allocated to advertising (assuming that the expected profit was greater than the budgeted profit).

Required

Comment on the policy described above.

25–8 The College Text Book Company was regularly faced with accept or reject decisions concerning the possible printing of books. To make this decision, it employed a projected income per copy of the book. In computing this projected income, no general overhead was assigned, and editorial work on the book was excluded. Included were the printing costs and advertising and distribution costs of a direct nature (the salaries of the salesmen were excluded).

Required

Comment on the policy described above.

26

Capital Budgeting

THE TERM capital budgeting refers to systematic procedures used to allocate funds available for investment so that the income objectives of the firm will be realized. Which of various long-lived assets will be most profitable and thus most deserving of investment? The problem arises because resources are scarce; thus a firm will invest in selected projects which best fit into the income objectives of the firm.

The decision relative to directing the flow of investment resources is one of the most important decisions which management makes. Once the funds have been sunk into the long-lived assets, the firm is generally committed to operating the assets. It is a relatively unusual situation when a firm can sell off a long-lived asset at anything except a loss. If the correct investment decision is made, then the firm is in a good competitve situation for making profits in the future.

Capital budgeting is a continuous problem from which management never has respite. The problem of when to replace or to retire equipment is essentially a capital budgeting problem, as is the expansion of plant facilities. Some managements delegate these problems to subordinates or to chance, but the problems are nevertheless present and should be solved by using the best information and techniques available.

TIME SHAPE OF CASH FLOWS

One complication in budgeting capital expenditures arises because of the different time shapes of the cash flows of different assets. One asset may be expected to earn equal proceeds each period. Another may be expected to earn greater cash proceeds in the early years than the later years, or just the opposite. The duration of the earning period is also a factor that must be considered. The complications arising because of the time shape of the cash flows is illustrated in the following table by different investment possibilities with the same cost.

	Cash Flows Generated at the End of Year		
Investment	*0*	*1*	*2*
A	−1,000	1,100	
B	−1,000	550	550
C	−1,000		1,100

The three investments are equally desirable, using the criterion of total income earned over their lives. The positive cash flows of all three investments exceed the outlays by $100. However, the three investments are not equally desirable as long as money earns a positive rate of interest, i.e., as long as a dollar today is more valuable than a dollar in the future. Investment A is to be preferred over B and C; also, B is preferable to C. The three investments earn the same total cash flows, but the timing of the cash flows influences the desirability of the investments, since the earned funds may be reinvested in other investments.

We can assume that the firm can earn some positive rate of interest with the returned funds. If this rate of interest is .05, at the end of the two years, the three investments will have earned:

Investment	*Terminal Value of Cash Flows*
A *	1,155
B †	1,127.50
C	1,100

* 1,100 (1.05) = 1,155.
† 550 + 550 (1.05) = 1,127.50.

Investment A is the most desirable of the three investments, since it received as much in total from its initial outlay as the other two investments and received it earlier.

A reasonable capital budgeting procedure should take the timing of the cash flows into consideration. The best method of accomplishing this objective is the present value method.

THE PRESENT VALUE METHOD

The basic objective of the present value method is to find the present equivalent for one or more dollars which will be received in a future time period. This is accomplished by applying a discount factor to the future sum to convert it to a present value.[1] In the examples of this chapter, we shall assume the cash flows are known with certainty.

[1] The discounting process in this chapter should not be confused with the discount process in connection with a bank loan. The discount factor in connection with capital budgeting is a rate of interest. The discount factor used by the bank is a special computation and is not to be used in other contexts.

Assume Mr. Jones has $1,000 cash and is considering an investment opportunity which is as follows:

Period:	
0	1
−1,000	1,100

Mr. Jones wants to determine whether this investment is acceptable. Assume he can obtain or lend funds at a .05 rate of interest. He may reject the investment because he wants to use the $1,000 he is holding to go on a vacation, but this is faulty reasoning. He can borrow the $1,000 needed for the investment at .05, repay the $1,050 of loan plus interest, and still have $50 left over from the $1,100 generated by the investment. The same conclusion can be reached by finding the present equivalent of $1,100 if money is worth .05.

X		$1,100
0	.05	1 year

We want to find the value of X, where:

$$X + .05X = 1{,}100$$
$$X = \frac{1{,}100}{1.05} = \$1{,}047.61$$

The present value equivalent of $1,100 is $1,047.61, assuming a .05 rate of interest. Mr. Jones can compare the present value of $1,100 with the immediate outlay of $1,000 and, based on the net present value of $47.61, decide to accept the investment.

The $47.61 is the present equivalent of the $50 already determined to be the excess value of the investment after one year. If we accumulate $47.61 for one period (i.e., invest the funds) using a .05 rate of interest, we will obtain $50.

$$\$47.61(1.05) = \$50.$$

The net present value (in this case $47.61) may be interpreted as a measure of the incentive to invest. We could actually pay $1,047.61 for the investment and be no worse off than if we did not invest. Assume we obtained $1,047.61 from investors and had to pay that amount for the investment. At the end of the year, we would have to pay $1,100 and this would be generated by the investment.

$$\$1{,}047.61\ (1.05) = \$1{,}100.$$

Where we have an amount being generated in the future, we can make use of tables to find the present value of that sum. In the example, we would want the present value of a dollar discounted for one time period at an interest rate of .05. From Table A in the appendix to the book, we find this amount to be .9524. We multiply the present value factor by the future amount of dollars to find the present value.

$$\$1{,}100 \times .9524 = \$1{,}048.$$

If the series of cash flows is an annuity, we can use Table B.

The net present values of Investments A, B, and C of the previous section, using a discount rate of .05, are:

Investment	*Net Present Value*
A	48.
B	23
C	−2

Assuming these three investments are three different ways of doing the same task, we would prefer investment A, since it has the highest net present value. If the three investments are independent of each other (that is, the cash flows of the one do not affect the cash flows of the other), we would accept both A and B. Investment C is rejected, since the net present value is negative.

In the above example, the relative desirability of the three investments is not affected by the choice of the rate of interest, but this is not generally the case. Assume two different investments:

	Period:		
Investment	*0*	*1*	*2*
X	−1,000	50	1,050
Y	−1,000	—	1,102.50

Using a rate of interest of .05, the present values of the two investments are zero, and we are indifferent between X and Y. If we use a lower rate of interest, say .04, then investment Y is more desirable. If we use a higher rate of interest, say .10, then investment X is more desirable. This difference arises because the timing of the cash flows is different, and the comparative desirability of the two investments depends on whether it is good or bad (relatively) to get the funds back early or late.

Fortunately, for decisions involving independent investments, we do not need to choose the best of several investments or to rank them but have to decide whether or not the investment is acceptable. Using the present value method, an investment is desirable if its net present value is positive.

Assume the investments being considered are mutually exclusive (i.e., if one is undertaken, the others will not be accepted, because they are the same way of the doing of a task or it is not feasible for some other reason to undertake more than one of the investments). The investment with the highest net present value is the investment which should be chosen.[2]

[2] This assumes the investments are comparable. See H. Bierman, Jr. and S. Smidt, *The Capital Budgeting Decision* (New York: The Macmillan Company, 1960).

An important problem in using the present value method is the choice of the interest rate. It should be the opportunity cost, i.e., the interest rate offered by investments which are outside the firm (or the return implicit in returning the funds to the stockholders), and ideally this would be equal to the cost of obtaining funds from outside the firm. While the determination of this rate of interest is not an easy problem, this does not weaken the arguments in favor of the present value method. All methods which take time discounting into consideration require that an acceptable rate of discount be determined before the decisions can be made.

A criticism frequently made of the present value method is that two investments, one with an outlay of $10,000 and a second with an outlay of $1,000,000, may both have net present values of $1,000. The size of the initial investment outlay cannot be determined by looking at the net present value. There are two rejoinders to this criticism:

(a) The net present value is over and above the capital costs, which do take the size of the outlay into consideration.
(b) The complete analysis of major investments should be presented to management, not just the one measure of net present value. The net present value is one useful measure; it is not a substitute for expert judgment and overall evaluation.

THE RATE OF INTEREST

The present value method of capital budgeting uses a given rate of interest for discounting future cash flows to the present. In this chapter, we shall employ the term "cost of capital" to represent this rate of discount.

The term "cost of capital" as used in this chapter refers to an over-all cost of obtaining funds (a combination of stockholders equity and debt sources), and it is assumed that new funds may be obtained at a cost equal to this cost of capital. It is also implicitly assumed that funds loaned outside of the firm will earn a return equal to the cost of capital of the firm and that stockholders have an opportunity cost equal to the cost of capital.

Another assumption is that all independent investments with a return equal to or greater than the cost of capital will be accepted by the firm. Since the firm may obtain funds at the cost of capital, it is reasonable to assume that all independent investments yielding more than this return will be accepted.

There is a temptation to use the term "mutually exclusive" to refer to a situation where the investments are independent but competing for a limited supply of funds. We shall reserve the term "mutually exclusive" for

the situation where only one of the investments may be undertaken because of the characteristics of the investment, and not where an investment is rejected because of a rationing of funds. This latter situation will not be discussed in this book.

RATE OF RETURN

The rate of return method of making capital budgeting decisions is one of the more popular methods of incorporating time discounting into the analysis. Instead of computing a net dollar amount as we did with the present value method, the rate of return method gives a ratio or percentage.

For example, investment A of an earlier example required an outlay of $1,000 and returned $1,100 i.e., an income of $100 a year later. This is a return of $\frac{100}{1{,}000}$, or .10.

We can define the rate of return as the rate of interest which makes the sum of the present values of the cash flows equal to zero. Using an interest rate of .10, investment A has a net present value of zero.

Period	*Cash Flow*	*Present Value Factor*	*Present Value*
0	−1,000	1.0000	−1,000
1	1,100	.9091	1,000
		Sum	−0−

The present value factor used in the calculations is for a rate of interest of .10; thus, .10 is the rate of return for the investment. In this example, the rate of return can also be described as the rate of growth of the investment, that is, $1,000 grows at an annual rate of .10 to reach a value of $1,100.

The rate of return of a capital investment is also analogous to the yield of a bond. In fact, it would be correct to speak of the yield of an investment rather than the rate of return. In complicated situations, the rate of return is best solved by trial and error. The objective of the computations is to determine the rate of interest which will equate the present value of the stream of cash proceeds with the cost of the investment, or more generally, to make the sum of the present values equal to zero.

Assume that an asset cost $276.64 and that it is expected to earn $100 the first period and $200 the second period. What is the rate of return? The first estimate at the rate of return may be 4% (a reasoned guess), the second 6%, and finally the correct estimate of 5% is found by halving the difference between the estimated rates.

Year	*Cash* Proceeds	*First Estimate* 4%	*Second Estimate* 6%	*Third Estimate* 5%
1	$100	$ 96.15	$ 94.34	$ 95.24
2	200	184.91	178.00	181.40
Present Value of Cash Proceeds		$281.06	$272.34	$276.64

The first estimate of 4% is too low a rate of discount, as evidenced by the fact that the present value of the proceeds is greater than the cost of the asset, $276.64. In like manner, the second estimate is too high, as evidenced by the fact that present value of the proceeds is less than the cost of the asset. The third estimate turns out to be the rate of return, since the present value of the cash proceeds is equal to the cost of the asset.

By inserting the initial outlay of $276.64 in the table of present values, we can show that the sum of the present value of the cash flows is equal to zero, if we use 5% as the rate of interest.

Period	*Cash Flow*	*Present Value Factor*		*Present Value*
0	−276.64	1.0000		−276.64
1	100.00	.9524		95.24
2	200.00	.9070		181.40
			Sum	−0−

This procedure for computation of the rate of return could be carried out for all possible investments. The investments may then be arrayed according to their projected rates of return. Those independent investments with rates of return greater than the firm's cost of capital would be accepted. Those investments with a return less than the cost of capital would be rejected.

The rate of return method is difficult to use if we are choosing the best of a set of mutually exclusive investments. A rate of return, being a ratio, fails to take into consideration the scale of the investment. For example, consider the following two investments:

	Period:			
Investment	0	1	2	*Rate of Return*
X	−10,000	2,000	12,000	.20
Y	−100,000	18,000	118,000	.18

The rate of return of investment X is higher than the rate of return of Y, but with a cost of capital of .10, Y has the higher net present value and is the more desirable investment. This can be seen by looking at the difference between X and Y as an incremental investment, Y-X.

	0	1	2	*Rate of Return*
Y-X	−90,000	16,000	106,000	.18

The incremental investment Y-X has a return greater than the .10 cost of capital; thus Y is more desirable than X.

Assume a situation where an investment of $100 will pay $5 a year for perpetuity. The rate of return is the ratio of income to investment.

$$r = \frac{5}{100} = 5\%$$

The general formula for the rate of return of a perpetuity is:

$$\text{Rate of Return} = \frac{\text{Annual proceeds}}{\text{Investment}}$$

The present value of a perpetuity is:

$$\text{Present Value} = \frac{\text{Annual proceeds}}{\text{Rate of interest}}$$

Assuming a cost of capital of .10, an investment yielding a perpetuity of $5 a period is worth $50.

$$\text{Present Value} = \frac{5}{.10} = \$50$$

The rate of return is frequently used to rank investments, but for several reasons the rankings will not be absolutely correct (even assuming that the cash proceeds are correctly forecasted). Most of the reasons are outside the scope of this text, but they include the problems of mutually exclusive investments and the implicit assumption made by the rate of return method that proceeds can be reinvested at the same yield as the investment being considered.

The rate of return is widely used and for many cases will give good results. For example, if the rate of return of a normal *independent* investment is greater than the cost of capital, the investment is acceptable. But in such a situation the present value, using the cost of capital as the rate of discount, is also positive; thus the rate of return and present value methods would lead to the same decisions with independent investments.

RETURN ON INVESTMENT

A widely used investment procedure is based on the average income divided by the average investment. This measure is called the return on investment:

$$\text{Return on Investment} = \frac{\text{Average Income}}{\text{Average Investment}}$$

Return on investment is a useful device to measure performance after the investment is undertaken, since it relates the flow of net assets to the firm (income) to the resources used (investment). It is less useful as a decision tool.

The prime disadvantages of return on investment as a decision tool is that it is a ratio and thus does not take into consideration the scale of the investment (this is relevant in dealing with mutually exclusive investments), and it fails to take effectively into consideration the timing of cash flows, i.e., the capital cost associated with the investment. Despite these important weaknesses, return on investment is widely used and thus is of interest.

EXAMPLE

Compute the return on investment of the following two mutually exclusive investments:

	Period:		
	0	1	2
X	−10,000	8,000	8,000
Y	−10,000	—	16,000

The average income of both investments is $3,000 (the outlay of $10,000 is subtracted from the total cash flows). The average investment is $5,000.

$$\text{Return on investment} = \frac{3{,}000}{5{,}000} = .6$$

The return on both investments is the same. However, X is to be preferred to Y, since, although the same total amount of cash is generated, some of the cash is received earlier and thus may be reinvested.

CASH PAYBACK METHOD OF CAPITAL BUDGETING

The cash payback procedure is one of the most popular methods used to choose among different investment possibilities. The investments are ranked according to the length of time required for them to earn an amount of cash equal to their cost.

EXAMPLE
Compute the cash payback period for the following investments:

Investment	Cost of Investment	Cash Proceeds per Year
A	$ 10,000	$ 5,000
B	100,000	20,000

The cash payback of Investment A is 2 years ($10,000 divided by $5,000). The cash payback of Investment B is 5 years ($100,000 divided by $20,000).

Many executives would argue that Investment A was a better investment than Investment B, since its payback period was shorter. The weakness of this approach may be shown by adding the additional information that Investment A has a life of 2 years and Investment B a life of 20 years. The payback approach ignores the useful life of the investment and also the time shape of the cash proceeds.

Despite its limitations, the payback method is widely used. It is argued that payback gives a measure of the risk associated with an investment. An investment with a payback of one year seems to have less risk than an investment with a payback of ten years. If all other factors are the same, it certainly has less risk, but any of the other measures will also indicate this fact. If the investment with a one-year payback has an expected life of one year, it may actually be more risky than the investment with the longer life.

In some situations the payback measure may give all the information we need to know. If an investment has a one-year payback, a twenty-year life, and constant cash flows, it would not be necessary to compute the net present value or the rate of return. The investment will be desirable under any measure likely to be used. In describing an investment, it will be useful to state the payback period of the investment. Management is justly interested in this type of information. However, payback should not be used as the prime criterion in making decisions. It is useful as a rough indication of one of the risks (of not breaking even), but it should not be expected to do more than this limited function.

MEASURING CASH FLOWS

The cash flow of a period may be described in an approximate manner as being equal to the net change in the bank account of a firm. Certain adjustments must be made to this interpretation, since some items affecting cash are excluded. For example, changes caused by the financing (obtaining funds,

paying interest, or paying off debts) are all excluded. Other items not directly affecting cash are included. For example, an opportunity cost connected with an investment would be included as a cash outlay. If an executive would have to spend time with the investment project, his time has a "cash" outlay, even where there is no change in his salary, i.e., he would be paid in any event. The justification for including this as a deduction is that he would be spending his time on other projects if he were not working on the investment being considered.

Because we are using a bank account analogy, a build-up of inventory or accounts receivable is a use of cash. In fact, a required build-up of cash is in this context a use of cash. A decrease in current liabilities is a use of cash.

The cash flow procedure assumes that the moment of benefit to the corporation is when the cash is received. At that moment, the cash is free for further investment or distribution to capital contributors.

Determining Future Cash Proceeds—The Problem of Uncertainty

With all methods of making investment decisions, it is necessary to forecast future cash flows. In the examples of this chapter, we assume that the flows are known with certainty. It is reasonable to solve the certainty problem before being concerned with the problems of making investment decisions where the future is uncertain.

If there is uncertainty about the cash flows, the present value analysis presented in this chapter is reasonable if:

(a) The cash flow estimate used in the computation is the mean value of the probability distribution.
(b) The investments are small enough so that the investor is not psychologically disturbed by large losses or so prosperous that large gains add very little to his well-being (in technical terms, his utility function is linear with respect to money).

If the two requirements are not valid, then the present value analysis suggested in this chapter may not be applicable. Unfortunately, there is no simple effective method of solving the problems that exist because the cash flows are not known with certainty. Not only is it necessary to take into consideration the likelihoods of different cash flows occurring, but also the attitudes of the various parties taking the risk toward the various possible outcomes. This analysis is beyond the scope of this text. A reasonable procedure is to present the entire array of information, including present value calculations and the rate of return, and have the higher levels of management make the decision based on their analysis of the over-all presentation.

DEPRECIATION AND THE INVESTMENT DECISION

An occasional misunderstanding arises as to the relation of depreciation to investment decisions. If the investment in question is a piece of equipment with an estimated useful life of four years, should one-fourth of the cost of the equipment be considered as an expense in making the investment decision? The answer is *no*. It is not necessary to subtract depreciation from the revenues, since the cost of the asset is automatically taken into consideration. The present value of the cash proceeds are compared with the cost of the asset. Using this procedure avoids the arbitrary allocation of the cost of the asset over its useful life. This treatment in no way argues against the allocation of depreciation for accounting purposes but is useful for the decision-making procedure illustrated in this section. Depreciation for tax purposes does affect the investment decision.

Accounting for financial purposes is greatly interested in the income of each accounting period, thus attention is paid to the allocation of the cost of a long-lived asset over its useful life. When we are concerned with the investment decision, the net present value of the investment is the important consideration, not what happened in year X.

The need for the allocation of the cost of the investment to all time periods is eliminated. Also, the inclusion of the cash outlay may be interpreted as a substitution of the present value of the depreciation charges for the charges of each specific year.

OTHER CONSIDERATIONS

Up to this point in the chapter, it has been assumed that investment decision could all be solved on the basis of profit expectations. This is the general rule, but there are exceptions. Some investments must be undertaken in order to ensure continuity of operations. These "necessary" investments will not be subjected to a rate-of-return test. Another exception is the investments which are desirable but which do not directly earn profits. Examples of these are employee recreational centers, exhibits in museums, and training facilities. While these projects do not directly increase profits, they may nevertheless be desirable. A possible procedure for handling items of this nature is to array them with profit-earning assets and then arrive at an answer to the question, "Which is more desirable, a rate of return of 5% or a new employee swimming pool?"

REPLACEMENT OF FIXED ASSETS

A special classification of investment decisions involves the replacement of fixed assets. The present value procedure is as equally applicable to the problem of when to replace fixed assets as it is to the over-all problem of allocating scarce resources (funds available for investment).

Instead of computing the absolute cash proceeds of each period, we can compute the savings resulting from using the new asset instead of the old asset. These savings are then discounted back to the present and equated to the cost of the asset in order to find the rate of return, or we can compute the net present value, using the cost of capital.

One of the most confusing problems in this type of analysis is the treatment of depreciation. If the problem is solved in the manner recommended here, the book depreciation of neither the new asset nor the old will be included. The cost of the new asset is already taken into consideration by treating it as an outlay at the time of purchase. The book depreciation of the old asset is not relevant, since it is a sunk cost and will occur whether the asset is replaced or not. Any decrease in salvage value of the old asset is relevant and should be taken into consideration.

EXAMPLE

The cost of capital is 5%. If the rate of return is greater than the cost of capital, the asset should be replaced. The following facts are available:

	Old Asset	*New Asset*
Cost New	$10,000	$7,024
Book Value	$ 6,000	—
Estimated Useful Life (with zero salvage now and at the end of 10 years).	10 yr.	10 yr.
Savings per Year (including labor, power, maintenance, etc.)		$1,000

Should the asset be replaced?

Solution: Find the rate of interest that will equate an annuity of $1,000 a year for ten years to the cost of the asset, $7,024.

$$\$1{,}000\, A_{\overline{10}|r} = \$7{,}025$$

$$A_{\overline{10}|r} = \$7.024$$

The rate of interest that will equate an annuity of $1 a year for ten years to $7.024 is 7%. This may be obtained from Table B. The rate of return is greater than the cost of capital, and the asset should be replaced. Note that the cost or book value of the old asset did not influence the decision.

An alternative method is to compute the present value of the cash flows, using the cost of capital as the rate of discount. The present value of the cash proceeds is $7,722 ($1,000 times the present value of a dollar a period for ten periods, discounted at 5%). The present value of the outlays is $7,024, the cost of the investment. Since the present value of the proceeds exceeds the outlays, the investment is desirable.

Assume that the *new asset* will have a salvage value equal to $690 at the end of ten years. This information complicates the solution, since the present value of the $690 plus the savings per year should be equated to the cost of the asset. The salvage of the new asset may be considered to *increase the savings* of the last year. The rate of interest that equates an annuity of $1,000 a period for ten periods and salvage of $690 available at the end of ten periods is 8%. Thus, the rate of return is 8%, and the old asset should be replaced.

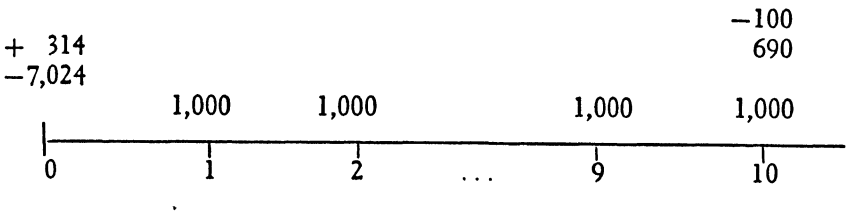
Returning to the original problem, if the *old asset* has an expected *salvage value today* of $314 (and no value ten years hence), then the net cost of replacing the old asset will not be $7,024 but $6,710. The $6,710 is obtained by subtracting the present value of the salvage of the old asset, $314, from the cost of the new asset, $7,024. If the old asset has salvage value at the end of the ten years, then a possible treatment is to decrease the savings of the last year (since, if the equipment is replaced, there will be no salvage of the old equipment in the tenth year) by the amount of the salvage expected in the tenth year, and then equate the yearly savings to the cost of the new asset *minus* the salvage value of the old asset today.

EXAMPLE

Assume that the savings are $1,000 a year and that the initial cost of the new equipment is $7,024. Also, the

Salvage now of the old is	$314
Salvage in ten years of the old is	100
Salvage in ten years of the new is	690

The picture of cash flows, assuming we replace now, is:



The $100 is subtracted in year ten, since the salvage of the old equipment is being taken now and will not be taken in year ten. By retiring the old now, we are increasing the present cash flow by $314 and decreasing the flow in year ten by $100.

The present value of these cash flows using a discount rate of 5% is:

Year 0: −7,024 plus 314	=	−$6,710
Savings, years 1–10: $1,000 × 7.7217	=	7,722
Year 10: (690 − 100) × .6139	=	362
Net present value	=	1,374

The net present value is positive, and the investment should be undertaken.

The above solution assumes away a very interesting problem. How do we know that the new equipment will have a life of ten years? The life of the new equipment can be determined if we make assumptions relative to the expected salvage of each year, the repair costs of each year, and the type of equipment likely to be encountered in the future. Assuming that these events can be expressed in mathematical formulas, a mathematical solution can be derived.

INCOME TAXES AND CAPITAL BUDGETING

The preceding example bypassed the effect of corporate income taxes. There is no question but that corporate income taxes affect the incentive to invest in capital assets. Just what that effect is, and the direction of the effect, is the subject of some difference of opinion. Is a tax of 52% too high because it reduces the opportunity for making profits (the corporation can keep only $0.48 on every dollar of taxable income) and thus reduces the incentive to invest? Or is a tax of 52% actually an incentive to invest, since in the presence of other profitable activities, the investment being considered can lose only $0.48 per dollar of investment (the tax loss would reduce taxes on other activities by $0.52 per dollar of loss)?

The two extremes are fairly easy to establish. With an income tax now of 0%, and no increase expected in the future, the investment decision would be entirely dependent on the amount of the cash flows (as in the preceding example).

With an income tax now of 100%, and no decrease expected in the future, there would be no chance at all for a net profit, and there would be no incentive to invest. An income tax of 100% would result in a complete drying up of investments.

Now let us assume a tax greater than 0% and less than 100%. Is it possible to predict the effect of the income tax on the rate of return? To obtain a generalization, it will be necessary to assume that depreciation for tax purposes will be spread evenly over the useful life of the asset. With this assumption, the conclusion is that any increase in taxes will make an investment (otherwise profitable) less profitable, i.e., decrease the rate of return.

How does a decrease in the rate of return affect the total dollars of

investment? A marginal investment whose rate of return was above the cut-off rate (that rate of interest which determines whether an investment will be undertaken or not) will find its rate of return decreasing with an increase in the corporate income tax. Thus it is inevitable that some additional investments will now find themselves with lower rates of return than the cut-off rate. The larger the income tax, the more influence the tax will have on determining the rate of return.

Maximizing Profits or Avoiding Losses

The foregoing discussion has assumed that investment decisions are made based on a discounted cash flow approach to the capital budgeting decision. This approach implicitly assumes that an attempt is being made to maximize profits. It is possible that a firm will be more impressed with the fact that its prospective losses are minimized. This is consistent with the comments that are often made "that this expenditure costs only $0.42; the government pays the rest because of reductions in income taxes."

A corporation with this point of view would be happiest with an income tax of 100%. Then, if it had sufficient taxable income, it could invest in any scheme with no chance of "losing." Any loss incurred would merely reduce income taxes and would in effect be paid by the government. This point of view is, of course, absurd, but nevertheless it is the reason why income taxes cannot be increased past X% (X representing that rate of tax which would lead a firm to waste resources, since the government is footing a large percentage of the bill and the corporate share of the expenditure is very small).

While the statement that the government helps pay the expenditure has an element of truth, it also has a basic fallacy. That fallacy was brought out in the preceding section. An increase in income taxes will reduce the rate of return of an asset and will tend to discourage desirable investment decisions, not encourage them, as long as attention is focused on the possibility of making profits.[3]

Present Taxes and Future Taxes

A complication that should be incorporated into the analysis is the possibility of a future change in taxes. If the income tax rates are going to be different in the future, then these future tax rates will affect both the amount by which the cash savings will be taxed and the amount of tax saved as a result of using the cost of the investment as a deduction for tax purposes.

The prospect of tax changes downward, combined with the privilege of writing off depreciable assets at an accelerated rate, is stimulating to invest-

[3] This analysis is from the point of view of the individual firm and does not take into consideration any macro effects which a change in corporate income taxes may have.

ment. This combination tends to minimize the possible loss, since the cost of the asset can be subtracted now for tax purposes at the high tax rate. The possibility of large gains is not removed, since the taxes in the future are expected to be decreased.

Income Taxes—An Example

If income taxes are introduced into the analysis, it is necessary to *reduce* the cash proceeds by the amount of the income tax on the earnings generated by the investment and to *add* to the cash proceeds the income tax saved as a result of using the cost of the investment as a deduction for tax purposes.

If the straight-line method of computing depreciation is used for tax purposes, then the tax savings in each year of use will be equal. Since the passing of the 1954 revenue code, corporations have had more leeway in the choice of method used to write off depreciable assets. Any of the decreasing-charge methods of computing depreciation will cause the tax savings of each year to be unequal. Since these depreciation procedures are advantageous from a cash position point of view and should be used, they should also be used for capital budgeting purposes. A minor result is to complicate the analysis since the solution to the problem of finding the rate of return becomes a matter of trial and error (testing different rates of return) rather than the simpler procedure of going to a table for the present value of an annuity.

EXAMPLE

The cost of capital is 5%. The tax rate if 60%. The old asset is fully depreciated for tax purposes. The new asset will be depreciated for tax purposes, using the straight-line method and a life of ten years.

No tax changes are expected in the future. Salvage value and removal of this type of asset are approximately equal.

	Old Asset	*New Asset*
Cost (new)	\$10,000	\$7,024
Estimated Useful Life	10 yr.	10 yr.
Savings per Year (labor, power, etc.)		\$1,000

Should the asset be replaced?

Solution

To solve this problem, we may determine the rate of return that this asset will earn. What rate of discount will equate the cash proceeds to the cost of the new asset? There are actually two factors that must be considered: (1) the economic savings, and (2) tax savings.

Tax Saving:

$$\text{Tax depreciation times the tax rate} = \frac{\$7{,}024}{10} \times 0.60 = \$421.44$$

Net Economic Saving:		
Economic Saving	$1,000	
Less Tax on the Saving	600	400.00
Saving per Year		$821.44

$$\$821.44 \, {}^{A}_{\overline{10}|r} = \$7,024$$

$${}^{A}_{\overline{10}|r} = \$8.55$$

The asset should not be replaced, since the rate of return (r) is slightly less than 3%. The 3% is obtained from Table B, giving the present value of annuities. Note that the solution to this problem, when a zero tax rate was assumed, indicated a rate of return of 7%.

The solution using the present value method is:

Immediate outlay		− 7,024
Present value of savings	$821.44 \, {}^{A}_{\overline{10}|.05} = 821.44 \times 7.7217 =$	6,343
Net present value		− 681

The net present value is negative; thus based on this analysis the present equipment should not be replaced.

CONTROLLING CAPITAL BUDGET EXPENDITURES

The capital expenditures should be controlled in the same general manner as manufacturing expenditures. Reports should be prepared which compare the actual expenditures with the amounts budgeted. Where the actual expenditures exceed the amount budgeted, explanations should be sought before further amounts are authorized for expenditure.

One of the most difficult tasks is the estimate of the progress toward completion of the project. Thus, if the authorized expenditure is $100,000, and $50,000 has been expended, this is no cause for alarm as long as the project is 50% completed or more. Where reasoned estimates cannot be made, it is better to indicate that the percentage of completion cannot be estimated than it is to undermine the management's faith in all the percentages of completion by making an unreasonable estimate.

Appraising the Results of the Decisions

Periodically, the results of the capital expenditure decisions should be reviewed. How far from actual realized earnings were the projected earnings? Were the estimates of service life and net salvage reasonable? While there

are elements of chance connected with any projections, there are accepted methods of estimating the effect of various factors (such as population growth, shifts in habits of people, etc.) on the demand for products. The other variables can also be predicted. If the persons or person making the predictions are reasonably accurate, then they should be praised. If they consistently are incorrect, then a new source of information must be obtained. The decisions related to making capital expenditures are too important to be based on inaccurate information and faulty procedures.

At all times it should be remembered that capital budgeting is an example of decision-making under uncertainty; thus the "correct" decision made before the event occurs may seem to have been an incorrect decision after the event has occurred. To minimize misunderstanding after the project is undertaken, the analyst should indicate in his appraisal of the investment the likelihood of the project not being a success.

Limitations of Capital Budgeting Procedure

The procedures described in this chapter are useful, but they are sometimes difficult to apply. The foundation of the procedures is the assumption that the time shape of the future cash flows may be forecast. In many situations this is very difficult to do with any degree of certainty. Rather than setting up one schedule, it may be necessary for the analyst to make a whole series of schedules, each based on different assumptions. These schedules should be for a whole range of earning possibilities rather than for *one* estimate. We have here a tool that is useful when properly applied but which can be no better than the information it uses and the manner in which it is employed.

It was once hoped that the present-value or rate-of-return techniques would offer simple solutions to the problem of making capital investment decisions. It is now obvious that these decisions are complex and that there is no one, simple, and correct answer to be obtained. But even at their worst, the procedures outlined in these pages are an improvment over rules of thumb currently being widely used. The present-value or rate-of-return approach, intelligently applied, will be of assistance in making investment decisions, and all business managers should be familiar with the strengths and weaknesses of the procedures.

QUESTIONS AND PROBLEMS

26–1 For each of the investments, compute the net present value (use a cost of capital of .15) and the rate of return.

Investment	*Period*		
	0	*1*	*2*
A	(1,000)		1,322
B	(1,000)	615	615
C	(1,000)	1,150	

26-2 For each of the investments of 26-1, re-compute the present values, using:

(a) a cost of capital of .20
(b) a cost of capital of .05

26-3 Prepare a schedule showing that, with a rate of growth of .15 per year, $1,000 will grow to $1,322 in two years.

26-4 Determine the rate of return of the following investment:

Period	*Cash Flow*
0	(9,120)
1	1,000
2	5,000
3	10,000

26-5 Determine the rate of return of the following investment:

Period	*Cash Flow*
0	(30,215)
1	2,000
2	10,000
3	50,000

26-6 How much could you pay in excess of the indicated cost for each of the investments of 26-4 and 26-5 if you had a cost of capital of .10?

26-7 Consider the three investments of 26-1 to be mutually exclusive investments.

Required

(a) Using the rate of return of the three investments, which is preferred?
(b) Using the present-value method and a cost of capital of .05, which is preferred?

26-8 Consider the following two mutually exclusive investments.

Investment	*Period 0*	*Period 1*	*Rate of Return*
A	(20,000)	30,000	.50
B	(100,000)	130,000	.30

Required

Assuming a cost of capital of .10, which investment is to be preferred?

26-9 The ABC Company is considering an investment in a new product. The information for the year 1965 is given below:

Sales	$200,000
Manufacturing costs of sales (includes $20,000 of depreciation)	80,000
Selling and administrative expenses (directly associated with the product)	40,000
Equipment purchases	10,000
Decrease in contribution of other products	5,000
Increase in accounts receivable	15,000
Increase in inventories	20,000
Increase in current liabilities	30,000
Income taxes associated with product income	12,000
Interest on bonds expected to be used in financing	18,000

Required

Compute the cash flow which can be used in the present-value computations of this investment.

26-10 a. For each of the investments, compute the net present value (use a cost of capital of .10) and the rate of return.

Investment	*Period*		
	0	*1*	*2*
A	(1,000)		1,210
B	(1,000)	576	576
C	(1,000)	1,100	

b. For each of the investments, re-compute the present values, using:

A cost of capital of .15
A cost of capital of .05

26-11 Determine the rate of return of the following investment:

Period	*Cash Flow*
0	(8,294)
1	1,000
2	10,000

26-12 Determine the rate of return of the following investment:

Period	*Cash Flow*
0	(6,531)
1	2,000
2	10,000

26-13 How much could you pay in excess of the indicated cost for each of the investments of 26-11 and 26-12 if you had a cost of capital of .10?

26-14 Determine the present value, rate of return, and the return on investment of each of the following three investments:

Investment	*Period*		
	0	*1*	*2*
A	−10,000	1,000	11,000
B	−10,000	6,000	6,000
C	−10,000	12,000	

The cost of capital of the firm is .10.

26-15 The following conversation may have taken place between a professor of accounting and a controller of a large corporation:

PROFESSOR: I am curious as to how you make capital budgeting decisions.
CONTROLLER: We use a combination of cash payback and other factors.
PROFESSOR: Do you take into consideration the rate of return?
CONTROLLER: Yes. Actually we take into consideration many factors.
PROFESSOR: What do you mean?
CONTROLLER: A large percentage of our capital budgeting decisions are not actual decisions. They just happen. For example, if the cafeteria of a plant needs enlarging, then it is enlarged without considering the rate of return. Also, if we find one of our products selling real well, and the plant capacity isn't large enough, then the plant is expanded.
PROFESSOR: In those decisions where cash payback and rate of return are used, how do you reconcile any conflicting results obtained from the computations?
CONTROLLER: Let me explain how we use the cash payback procedure. Let us assume that we can determine with a fair degree of accuracy the amount that a new capital project will cost. Estimates are then made of cash proceeds to be earned in each period. In this way we can determine in how many periods the asset will earn its cost.
PROFESSOR: How do you determine whether or not to replace a piece of equipment?
CONTROLLER: The savings from using the new process or new equipment is computed. The cash payback period is then computed in the manner described above. Of course, the estimates of savings are subject to wide error. You should

realize that to a great extent the capital budgeting procedure is a "bargaining" process. Each plant manager thinks his capital project is most important. The allocation of investment funds between plants is to some extent dependent on the plant manager's ability to state his case.

Required

Comment on the capital budgeting procedure used by this company.

26-16 The March Company is preparing its capital budget for the year. One problem that has arisen is whether or not to replace three bolt-making machines presently in use by two more modern machines. The new machines will have the same total capacity, but they will result in labor saving, since one operator will be able to service both machines, whereas three operators were required for the old machines. There will also be a saving in material cost, since the new machines can use a type of wire which has not received the special treatment that was required for the old machines. A complete analysis of the facts revealed the following situation. The below information is based on operations of a normal level of activity.

	Old Machines	*New Machines*
Cost New (including installation)	$20,000	$160,000
Book Value (as of now)	$12,000	
Estimated Physical Life Remaining	10 yr.	10 yr. or more
Depreciation per Year	$1,200	$16,000
Labor Cost per Year	$26,000	$8,000
Material Cost per Year	$500,000	$495,000
Power	$5,000	$6,600
Maintenance	$4,500	$5,900

Assume that, for both the old and new machines, the forecasted removal cost and salvage are approximately equal.

The cost of capital and the investment cut-off rate for the March Company is 5%.

Required

(a) Compute the rate of return promised by the investment in the new machine (compute to the nearest whole per cent). Should the old machines be replaced? Explain briefly. Assume a zero tax rate.

(b) Compute the rate of return promised by the investment in the new machines, assuming a present (and expected) tax rate of 50%. The old machine is fully depreciated for tax purposes. The new machine will be depreciated by using the straight-line procedure over a ten-year period.

26-17 The May Company is preparing its capital budget for the year. A question has arisen as to whether or not to replace a machine with a new and more efficient machine. A complete analysis of the facts reveals the following situation. The below information is based on operations at a normal level of activity.

	Old Machine	*New Machine*
Cost New (including installation)	$40,000	$80,000
Book Value (as of now)	$30,000	
Estimated Physical Life Remaining	10 yr.	10 yr.
Depreciation per Year	$3,000	$8,000
Labor Cost per Year	$15,000	$5,000
Material Cost per Year	$350,000	$345,000
Power per Year	$2,000	$4,500
Maintenance per Year	$5,000	$7,500
Interest Cost of Borrowing Funds to Finance the Purchase		$3,200

The income tax is currently 52% of taxable income. The old asset is fully depreciated for tax purposes. The new asset will be depreciated by using straight-line depreciation and a useful life of ten years.

Assume that, for both the old and new machines, the forecasted removal cost and salvage are approximately equal.

The cost of capital and the investment cut-off rate for the May Company is 5%.

Required

(a) Compute the rate of return promised by the investment in the new machine (compute to the nearest whole per cent). Show all computations.
(b) Should the old machine be replaced? Explain briefly.
(c) Compute the rate of return, assuming the income tax rate to be zero.

26–18 This company uses 4% as the cut-off rate in determining which investments should be undertaken. Assume that the proceeds are to be earned on the last day of the year. Which investments should be accepted?

	Cost of	Year		
Investment	Investment	1	2	3
A	$8,000	$10,400		
B	2,000	1,000	$1,000	$1,000
C	600		1,082	

26–19 Many companies use the following general procedure for making capital budgeting decisions:

1	2	3	4
Investment	Cost of Investment	Cash Proceeds per Year	Cash Payback Period (Col. 2 divided by Col. 3)
A	$10,000	$ 2,000	5 yr.
B	20,000	2,000	10 yr.
C	50,000	10,000	5 yr.

Required

Comment on the procedure indicated, assuming that investment decisions are based on the information given in Column 4 (the shorter the payback period, the better the investment).

26–20 Alcoa

The 1960 annual report of Alcoa included the following comment in the statement of the Chairman of the Board and the President to the stockholders of the company:

> In the field of capital expenditures, prudent planning dictates that Alcoa must be prepared to meet the anticipated changing pattern of demand. At the same time, current conditions require that your management exercise great care in evaluating each proposed new expenditure, initiating only those which promise the most immediate gain.

Required

Comment on the statement and its implications relative to criteria for capital budgeting decisions.

26–21 Consider the investment of 26–8. Compute the index of present value (present value of positive cash flows divided by the present value of the outlays) of the two investments and decide which one is to be preferred.

26–22 Determine the optimum method of depreciation for tax purposes for an investment which costs $15,000 and has a life of five years and no salvage. The proper discount rate is .10.

26–23 The ABC Company must determine whether to make or buy a component part. The cost of purchasing the part would be $20 per unit. Equipment is presently owned by the company which can only be used for this product (it will be sold for salvage or sit idle). The book value of the equipment is $20,000 (it cost $35,000 and has a salvage value now of $5,000). The expected value of the equipment at the end of three years is zero. The part would be made in a part of a plant which could be rented for $12,000 a year. Other costs connected with the production of the part are:

Direct labor	$3
Material	7
Fixed overhead (allocations of service departments and central office costs)	2
Variable overhead	3
	$15 per unit

Not included in the above is the fact that the company will have an average raw material inventory of $3,000. It is expected that the company will use 2,000 units a year of the part for the next three years at which time the product will be discontinued.

Required

Should the company make or buy the part? Assume a zero tax rate and a cost of capital of .10.

26-24 Under what conditions does the reciprocal of the payback give the rate of return of the investment?

26-25 Advocates of the payback method sometimes use different payback periods as cut-offs for assets of different characteristics. For example, a machine may have a required payback of two years and a building of ten years. Discuss.

26-26 Why may any measure, which is a ratio, lead to faulty investment decisions?

26-27 It is sometimes suggested that the rate of return method is preferred over the present value method since it is necessary to decide on a cost of capital to use the latter method. Discuss.

26-28 Is it more reasonable to assume that future net cash flows will be invested at the rate of return of a specific investment or at the cost of capital? Which method of capital budgeting is indicated as the preferred method based on your answer to the first part of this question?

27

Control of Inventory

THE PROBLEM of determining and controlling the level of inventory is one of the most difficult problems that management faces. There is danger that management may ignore the problem of inventory control and incur various unnecessary costs which accompany excessive inventories. Unfortunately, many of the costs arising from excessive inventories appear to be "normal"; thus the problem of controlling inventory costs is best solved by attacking the core of the problem, i.e., the amount ordered and the timing of the order.

The accountant's interest in inventory has generally been to determine inventory turnovers (divide usage by the average inventory) or the number of days' supply of inventory on hand (divide the expected usage per day into the beginning-of-the-period inventory). These measures are helpful in gaining approximate impressions of how effective the inventory control actions have been in the past, but they are not useful guides to making reliable decisions. In recent years much work has been done in the area of developing decision rules for inventory control. These rules broaden the responsibilities of the person responsible for inventory control, for it is no longer sufficient to judge how effectively the inventory measures appear, based only on the above computations. A much more important task is to review the inventory decision-making rules. If the decisions are being made properly, the results in a short period may be good or bad without reflecting credit or dishonor on the people applying the rules. It is true that bad performance may reflect faulty rules, but it is equally true that the causes of the bad performance may be non-controllable factors. Measuring the results of the actions of the persons responsible for inventory control is desirable, but it is no more important than reviewing and improving the procedures which were used.

If the system used to determine order size and the order point is the best system that can be devised, and if this system is periodically reviewed to see that it is currently applicable and is being correctly used, then the importance of the review of inventory turnovers is considerably reduced, though not necessarily eliminated. Periodic measures of how well the system is working may well be helpful in picking out those spots where errors have been made in designing the inventory control system.

REVIEW PROCEDURES

Controlling Amount on Hand: Inventory Turnover

One method of reviewing performance and controlling inventories is periodically to check the inventory turnover of each type of raw material, supplies, and finished good. The turnover is frequently computed on a yearly basis; thus, if a turnover for a month is computed, it must be multiplied by 12 to place it on a yearly basis.

$$\text{Inventory turnover} = \frac{\text{usage (in dollars or units) for a year}}{\text{average inventory}}$$

$$\text{Inventory turnover} = \frac{\text{usage for a month}}{\text{average inventory}} \times 12$$

Generally speaking, a high turnover is better than a low turnover, but there are exceptions. A high turnover may be the result of a very small inventory which is losing sales, causing production interruptions, etc. Thus, while a high turnover of inventory is an indication that inventory is being properly controlled, it is only a small portion of the entire evidence relative to the efficiency of management.

Instead of expressing inventory turnover as "times per year," the number of times the inventory turns over may be divided into 365 days in order to find the period of time it takes for the inventory to turn over. Expressing the inventory turnover in terms of days may be of assistance in impressing upon management the fact that the inventory is excessive.

Controlling Amount on Hand: Number of Days' Supply on Hand

For each item in inventory, a maximum amount of inventory could be stipulated. This can be determined by using the maximum possible usage (or most optimistic sales) per day and taking into consideration the minimum quantity desired, the time it takes to place an order, and the optimum order size. Once the maximum stock has been determined, then a report could be made out each month, indicating the number of days' supply on hand for each product. To compute the number of days' supply on hand, the amount on hand and the projected usage in the coming months must be known.

$$\text{Number of days' supply on hand} = \frac{\text{inventory on hand}}{\text{projected usage per day}}$$

If the number of days' supply on hand is in excess of the maximum stock allowable, an explanation would be sought for the cause of the variance.

EXAMPLE

The A Company had the following experience for January:

	Beginning Finished Goods Inventory—Tons	Sales—Tons
January	2,000	5,000
February	2,800	5,600 (a projection)

The inventory turnover for January (on an annual basis) is:

$$\text{Inventory turnover} = \frac{5{,}000}{\frac{1}{2}(2{,}000 + 2{,}800)} \times 12 = 25 \text{ times per year, or once every 14.6 days } \left(\text{i.e.} \frac{365}{25}\right).$$

The number of days' supply on hand on February 1, based on the projected usage for February, is:

$$\text{Usage per day} = \frac{5{,}600}{28} = 200 \text{ tons per day,}$$

$$\text{Number of days' supply on hand} = \frac{2{,}800}{200} = 14 \text{ days.}$$

If the number of days' supply on hand exceeded the number of days in the month, we would have to assume a rate of usage for the following month.

The above computations are reasonable checks on the efficiency of the operating procedures being used to make inventory decisions. However, they do not assist in making the inventory decisions. The following sections discuss these decisions.

THE INVENTORY DECISIONS

There are two basic inventory decisions. One is to determine the optimum size of an order or the amount to be manufactured on a given run. The second decision is to determine when the order should be placed. These decisions can be made, assuming the amount to be used (or demanded) in the future is known, or it can be assumed that the exact amount is unknown but that the likelihood of different amounts being ordered (i.e., the probability of the distribution of demand) is known.

We shall discuss two different inventory models. Knowledge of these two will not qualify the reader as an expert in inventory control, there being many models which will not be covered in this chapter. However, the basic founda-

tion for inventory analysis will be developed, and an attempt will be made to systematically derive the formulas. The two models will be:

(a) Determining the optimum order size, assuming the demand is known.
(b) Determining the optimum order size, assuming demand is uncertain and reordering is not allowed.

We shall not consider the problems of determining order size and order point if the demand for the product is uncertain and reordering is allowed. The reader should be aware that methods of obtaining solutions exist for this type of problem.[1] By applying formulas somewhat more complex than those to be presented in this chapter, we could solve for the amount to be ordered and when to order under conditions of uncertainty. However, the development of these models would introduce complexities which would confuse the basic objective of this chapter, namely, to show that there are systematic means of making inventory decisions.

Costs of Carrying Inventories

What are the costs of carrying goods in inventory? These costs will be losses arising from inefficiency if the inventory on hand is excessive. Among the costs connected with the carrying of inventory are:

Storage Space Costs	Interest on Capital Invested in Inventory
Handling Costs	Risks of Spoilage and Obsolescence
Property Taxes	Paper Work (including the costs of counting
Insurance	the excessive inventory)

It has been estimated that the annual costs of carrying inventory are approximately 25% of the cost of the inventory. The validity of this rule of thumb will depend on the characteristics of the items in inventory, but it does dramatize the cost of inefficiency in controlling inventory.

Costs of carrying inventory are generally a function of how long the inventory has to be carried. We shall use the symbol k_c to represent the carrying costs per unit per year. The choice of a year as the unit of time is arbitrary; we could have chosen any other duration of time.

In one of the models, we shall assume that the costs of carrying the inventory are zero (the period of carrying is very short) but that there is a cost connected with units of inventory left over at the end of the period. This cost is not a function of time, and we shall use the symbol k_o to represent this cost of overage. An example is the cost associated with purchasing a

[1] See H. Bierman, L. E. Fouraker and R. K. Jaedicke, *Quantitative Analysis for Business Decision* (Irwin Publishing Company, 1961), or Alan S. Manne, *Economic Analysis for Business Decisions* (McGraw Hill Book Company, 1961).

stock of calendars for resale, if the calendars are not sold during the year. The cost k_o is equal to the purchase price if they are not sold.

Costs of Insufficient Inventory

Inefficient inventory management is a two-edged sword. Not only are there costs of carrying excessive inventory, but there are also costs connected with not carrying sufficient inventory. These costs or losses sometimes are forgotten, but they are every bit as important as carrying excessive inventory. Some of these costs are:

1. Lost sales because the customer could not obtain the desired product.
2. Shipping costs connected with rush purchase orders of parts and material.
3. Disruption of the production process, resulting in labor inefficiencies, layoffs, hiring, training costs, and overtime costs to make up lost production.

In the one model of this chapter using cost of underage, we shall use the symbol k_u and assume the cost is not a function of time. That is, for every unit we are short, there is a cost of k_u dollars. In other, more complex models, we might want to consider how long we were short, and the total cost of underage would be affected by the duration of the shortage.

Determining Order Size—Trial and Error

Determining the optimum order size is not an easy problem to solve, for there are several variables that have to be taken into consideration. Some costs will argue in favor of a few large orders. For example, the total investment may be less if small orders are placed, but the cost of paper work will be increased. There are also quantity discounts that have to be taken into consideration. The factors relating to the problem of optimum order size are:

Expenses tending to increase with an increase in order size
- Investment Cost (interest)
- Storage Space Costs
- Insurance, Taxes (larger inventories on hand)
- Risks of Spoilage and Obsolescence

Expenses tending to decrease with an increase in order size
- Cost of Paper Work (purchasing, receiving, paying bills)
- Cost of Product (quantity discounts)

One method of solution is to compute the average cost per unit. This may be plotted on a graph to show the various costs for different order sizes. The average cost per unit of product should be plotted on the Y axis against

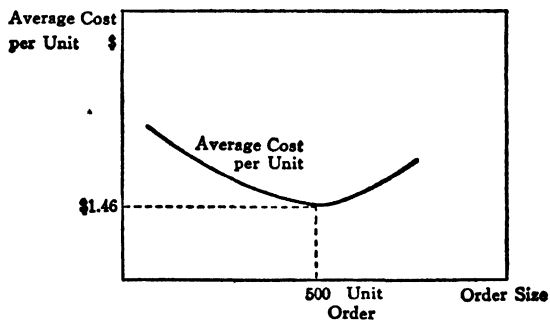
the order size on the X axis. The point where the average cost curve reaches a minimum is the best order size. The following example illustrates this procedure.

Size of Order, Units	*Invoice Cost per Unit*	*Cost of Paper Work per Unit*	*All Other Costs (investment cost, etc.) per Unit*
50	$1.00	$0.10	$0.50
100	0.95	0.05	0.51
500	0.85	0.01	0.60
1,000	0.70	0.005	0.80

Solution

Size of Order	*Average Cost per Unit (all costs)*	*Total Costs for 1,000 Units*
50	$1.60	$1,600
100	1.51	1,510
500	1.46	1,460
1,000	1.505	1,505

The optimum order size is 500 units per order. If other order sizes were possible, we would need to know the average cost per unit for those other orders.



The above method of solution has the advantage of flexibility. It can be used in a variety of situations, since it uses the basic cost information. We are minimizing the total cost for the year (or the average cost per unit used), i.e., finding that proper size for which the total cost curve is a minimum by a series of computations. The next section makes use of a formula for the same purposes. This formula simplifies the computations, if we have the information in a suitable form.[2]

The total costs used in the above computations are for the total units

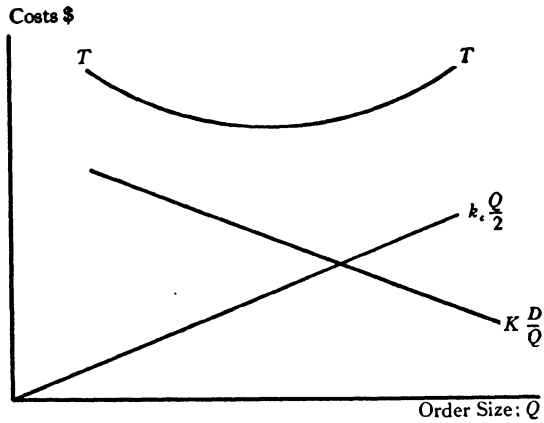
[2] The formula requires that the cost functions be continuous and differentiable. The longer procedure does not have this requirement.

expected to be used during the coming year. The average costs per unit are based on a year's expected usage. It would be incorrect to minimize the total cost per order, since the number of units per order are different.

Determining Optimum Order Size—Known Demand

Instead of computing the costs connected with all possible order sizes, it may be possible to determine the optimum order size by the use of a relatively simple formula.

The following illustration shows three cost curves. Curve $K\frac{D}{Q}$ is a cost curve of total costs per year for those costs which decrease with increases in the order size. K is the cost of placing an order, and $\frac{D}{Q}$ is the number of orders placed during the year. Curve $k_c\frac{Q}{2}$ shows those costs which increase with an increase in order size. The symbol k_c represents the carrying cost per unit, and $\frac{Q}{2}$ is the average inventory. The curve TT shows the sum of these two cost curves, that is, the total cost per year which results from the use of different possible order sizes.



Total costs per year for different order sizes.

The order size which leads to the minimum total costs is the optimum order size; thus we must find the minimum point of the total cost curve. We make use of the fact that the slope of the curve is zero when curve TT is at a minimum (the change in T is zero for a small change in order size, and T is increased by lowering or raising Q). We want a formula for optimum order size, assuming demand is known with certainty, and we can reorder. Let:

Q = optimum size of order (or production run).
K = cost per order (or cost of setting up a production run).

k_o = cost of carrying one unit in inventory one unit of time; we will use a time period of one year.

D = usage or demand during the one year period (the unit of time for D and k_o must be the same).

The cost of carrying the inventory is equal to $\frac{Q}{2}$, the average inventory, times k_c, the cost of carrying one unit in inventory one year.

$$\text{Cost of carrying inventory} = k_c \frac{Q}{2}.$$

The cost of placing orders is equal to the number of orders, $\frac{D}{Q}$, times the cost of placing an order, K.

$$\text{Cost of placing orders} = K \frac{D}{Q}.$$

The total cost is equal to the sum of the above two costs. By finding the Q which minimizes the total cost, we find the optimum order size.[3] This is equal to:

1.1
$$Q = \sqrt{\frac{2KD}{k_c}}$$

Equation 1.1 states that the optimum order size is equal to the square root of $\frac{2KD}{k_c}$. If the demand D, or the cost of placing an order, K, increases, the optimum order size also increases. If k_c, the cost of carrying inventory per unit time increases, the optimum order size decreases.

The relationship between the optimum order size and usage should be noted. If usage doubles, the optimum order size increases by the square root of 2. If the usage is multiplied by four, Q increases by the square root of 4, or 2. This casts doubt on the usefulness of setting a maximum inventory level in terms of days' supply and using the number of days' supply on hand as a control device. The optimum order size will increase if demand increases, but the relationship is not linear; thus we cannot assume that if sales double, the amount on hand should also be doubled so that we still have the same amount on hand expressed in terms of the number of days' supply. If the amount of sales expected in the next period doubled, we would expect the order size to increase by approximately 1.4.

EXAMPLE

K = \$4.50 per order.
D = 20,000 units per year.
k_c = \$2 per year (note that D and k_c are for the same time period).

[3] See the appendix to this chapter.

The optimum order size is:

$$Q = \sqrt{\frac{2 \times 4.50 \times 20{,}000}{2}} = \sqrt{90{,}000} = 300$$

The total cost T associated with the inventory decision if we use an order size of 300 is T (300):

$$T(300) = \frac{D}{Q}K + \frac{Q}{2}k_c = \frac{20{,}000}{300} \times 4.50 + \frac{300}{2} \times 2 = \$600$$

If we used an order size of 100, the total cost would be:

$$T(100) = \frac{20{,}000}{100} \times 4.50 + \frac{100}{2} \times 2 = \$1{,}000$$

If we used an order size of 200, the total cost would be:

$$T(200) = \frac{20{,}000}{200} \times 4.50 + \frac{200}{2} \times 2 = \$650$$

These computations of total cost tend to confirm the fact that 300 is the optimum order size.

Instead of using 20,000 units a year, assume that usage decreased to 5,000 units per year. The optimum order size is now:

$$Q = \sqrt{\frac{2 \times 4.50 \times 5{,}000}{2}} = \sqrt{22{,}500} = 150$$

Usage is now one-fourth of what it was previously, but the optimum order is only cut in half.

By assuming that demand is known, we eliminated the problem of when to order. Assuming a lead time of one month and usage per month of 100 units, we would order when inventory reached a level of 100 units, thus insuring that we would receive the new order just as the goods on hand were completely used.

Inspection of the formula for optimum order size shows that Q is a function of demand and the ratio of K to k_c. For each expected usage, D, we could plot the optimum order size for different values of $\frac{K}{k_c}$.

In situations where other factors (such as quantity discounts) will affect the total costs, then a new formula must be derived, since price per unit is affected by the quantity ordered. The mathematics may become complex, depending on the relationships of price to order size.

Inventory Limits

Managers sometimes establish a minimum inventory level, as well as a maximum stock, and an order point, using intuition relative to the determination of the optimum buffer stock. This procedure is inferior as a general decision process to a procedure which determines the optimum order size and the order point. In deciding an order size and order point, it is recognized

that there should be some probability of running out of inventory (assuming some cost of carrying inventory). Also, the maximum inventory is established by the sum of the order point and the order size, though it is unlikely that the actual inventory will ever be as large as the maximum.

A correct procedure of determining the order point under conditions of uncertainty must take the costs of underage and overage into consideration. The following procedure relies on intuition to decide on the desired buffer stock. The minimum stock may be defined as being equal to the product of the number of days' supply which is to be held as a buffer stock times the maximum possible usage per day.

EXAMPLE

Compute the *minimum* inventory if it is desired to have on hand at least a 10-day supply. The maximum usage is 20 units a day, and the average usage is 15 units per day.

Solution: Minimum inventory $= 10 \times 20 = 200$ units.

The use of maximum usage in the computation is arbitrary. With a large cost of carrying inventory, the normal usage might be more appropriate. Also, it is difficult to justify the choice of the 10-day supply (why not 15 or 20?).

The next step is to determine the *order point*. When is an additional order for the material (or part or product) submitted? To determine this, we must know the ordering time. Assume that:

It takes 8 days to fill an order.
The optimum size of the order is 500 units.
The minimum inventory is 200 units (see preceding solution).
The maximum usage is 200 units a day.
The average usage is 15 units a day.

If it takes 8 days to fill an order, then the maximum usage during that period will be $8 \times 20 = 160$ units. This is obtained by multiplying the number of days of order time by the maximum usage per day. The minimum inventory that we desire to maintain is 200 units. Thus, if we order 500 units when the inventory reaches 360 units (160 plus 200), we shall receive the 500 units when the inventory is no less than 200 units and almost certainly will be more than that.

It is possible to encounter a situation where the optimum order was less than the average or maximum usage during the ordering period. In this case the firm will have to submit a second order before the first order's materials are received.

What is the maximum possible inventory likely to be encountered, assuming the facts to be as given?

If 500 units are ordered when the inventory reaches a point of 360 units (the order point), and if no further units are used, there will be 860 units (500 plus 360) on hand when the order of 500 units is received. Thus, the absolute maximum inventory is 860 units, and this only in rare circumstances. If an average usage of 15 units a day was maintained, there would be 740 units (860 minus 120) on hand after the receipt of the order. For managerial purposes, this could be considered the "normal" maximum, although it should be remembered that 860 units will be found if the usage from time of ordering to time of receipt is zero.

Uncertain Demand and No Reordering

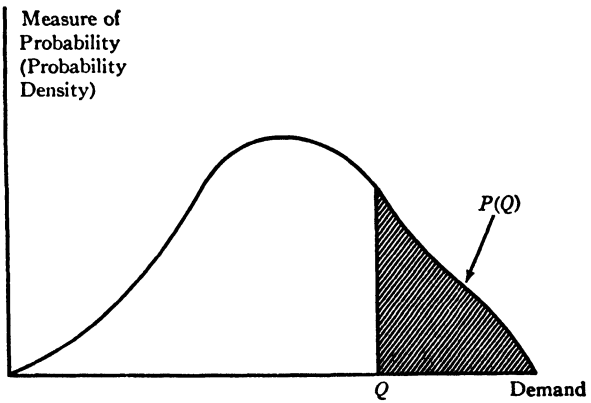
We now assume demand is uncertain, but reordering is not possible. The problem is to determine how many units we should order, assuming that there are costs of being short of inventory and costs of having excess inventory, i.e., units left over that we cannot sell.

k_o = cost of having overage of one unit, i.e., one unit we cannot sell at the end of the selling period. k_o is equal to the purchase cost less the resale or salvage value of the unit.

k_u = cost of being short one unit. This is equal to the sum of the profit which is lost by not making the sale plus any ill-will which is created by the customer being disappointed.

$P(Q)$ = the probability of having Q or more units of inventory demanded (this is the right tail of the probability distribution).

$1 - P(Q)$ = the probability of having less than Q units of inventory demanded.

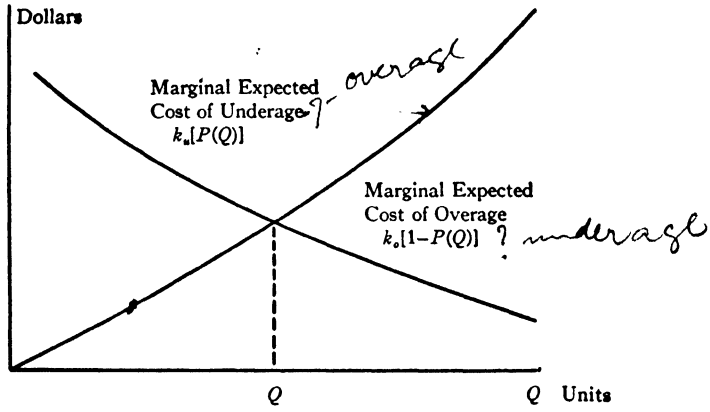


P(Q)—continuous probability distribution.

$k_u P(Q)$ = the marginal expected cost of having Q or more units demanded.

$k_o[1 - P(Q)]$ = the marginal expected cost of having less than Q units of inventory demanded.

The graph below shows that the marginal expected cost of overage increases as the order increases, and the marginal expected cost of underage decreases as the order size increases. The point where the two curves intersect gives the Q which is optimum.



Marginal expected costs.

Solving for $P(Q)$:

$$k_u P(Q) = k_o [1 - P(Q)]$$

$$P(Q) = \frac{k_o}{k_o + k_u} \tag{1.2}$$

The optimum order size is the maximum Q which still allows the probability of having the demand for one or more units in excess of Q to be equal to or more than $\frac{k_o}{k_o + k_u}$. As long as the probability of selling a unit is greater than the ratio we should order that unit.

K, the fixed cost of ordering, does not affect the order size decision, since K is common to all possible decisions. There is going to be one order, no matter what the decision. The only question is, what size order will lead to the largest expected profits.

EXAMPLE

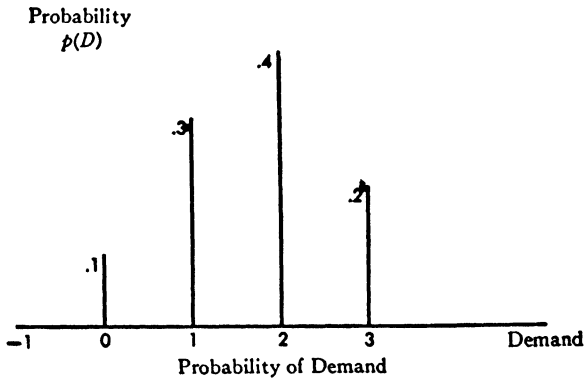
k_o = \$5.00 per unit. Assume the purchase cost is \$8, and the salvage value if not sold is \$3. The \$8 is the only incremental cost.

k_u = \$15.00 per unit. The sale price is \$14, and the ill-will, if there is a shortage, is \$9 per unit of shortage.

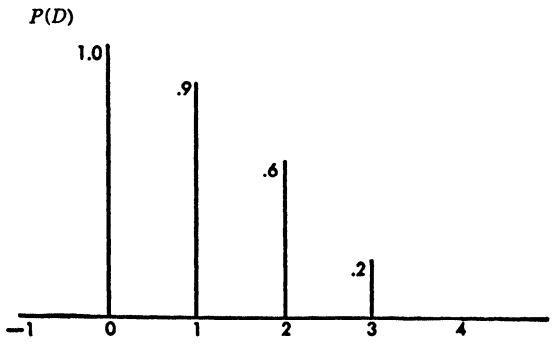
Sale price	\$14
Cost per unit	8
Profit per unit	\$ 6
Ill-will per unit	9
$k_u =$	\$15

The probability distribution of demand is:

D: Number of Units	*Probability of D* $p(D)$	*Cumulative (right tail) Probabilities* $P(D)$
0	.10	1.00
1	.30	.90
2	.40	.60
3	.20	.20
	1.00	



Probability of Demand



Probability Distribution of Demand

We first solve for $P(Q)$.

$$P(Q) = \frac{k_o}{k_o + k_u} = \frac{5}{5 + 15} = .25$$

We should increase Q until the probability of selling one or more units in excess of Q is equal to .25, if possible, but not less than .25. This Q is two units. If we consider three units, we find the probability of selling the third unit (or more) is .20, which is less than the critical probability of .25.

The above example makes use of a discrete probability distribution of demand. The same principles would apply if the probability distribution were continuous.

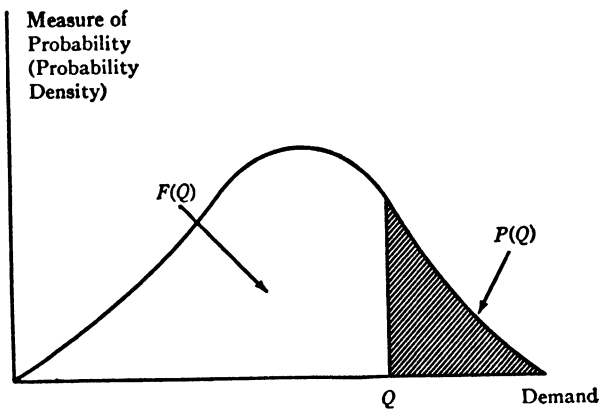
The appropriateness of the formula $P(Q) = \frac{k_o}{k_o + k_u}$ can be tested in a general way by letting k_u, the cost of underage, be equal to zero. $P(Q)$ then equals 1, i.e., the probability of demand exceeding the units carried should be 1, and we would interpret this to mean we should carry no inventory. This is reasonable, since there is no cost of being out of stock.

If k_u is very large relative to k_o, $P(Q)$ will tend to be very small, and the inventory carried will be large. We would expect to carry a large inventory if there are large costs of running out of inventory.

If the salvage value is zero, and there is no customer ill-will created by shortages, then $k_o + k_u$ is equal to the sale price of the product, and k_o is the cost per unit (assuming there are no other incremental costs). The equation then becomes $P(Q) = \frac{\text{Cost}}{\text{Price}}$.

Instead of using the right tail probability, $P(Q)$, we can use $F(Q)$, the left tail, i.e., the probability of demand being equal to or less than Q. The equation 1.2 becomes: [4]

$$1.3 \qquad F(Q) = 1 - P(Q) = 1 - \frac{k_o}{k_o + k_u} = \frac{k_o + k_u - k_o}{k_o + k_u} = \frac{k_u}{k_o + k_u}$$



$P(Q)$, $F(Q)$—continuous probability distribution.

[4] To be more exact, we could define $F(Q)$ as the probability of Q being *equal to or less than* Q, and $P(Q)$ as the probability of Q being *greater than* Q. This refinement is not used in this text. It would be of no importance if we used continuous probability distribution.

SUMMARY

Inventory control is an example of decision-making under uncertainty. The accountant has responsibility for appraising the inventory procedures by applying measures of performance such as the inventory turnover and number of days' inventory on hand. In addition, it is necessary to review the decision process being used to make the inventory decisions. Because of the uncertainty relative to the usage of the inventory item during the coming periods, it is likely that either there will be extra units on hand at the end of the period or we will run out of inventory. A reasonable inventory procedure will incorporate a probability of there being an amount demanded in excess of the number of units on hand. Even if the actual probability model of usage were known, we would still expect an overage or shortage to occur. For example, if we knew there was a probability of .5 of one unit being needed and a .5 probability of two units being needed, we still would not know whether the demand of the coming period was going to be one or two. Thus the accountant's reappraisal of the efficiency of the manager making inventory decisions must be tempered by the appreciation of the difficulties of making decisions under uncertainty. It is more important that the process be correct than that the results of any one period be good. It is possible for a very bad decision process to give good results for a number of periods, using the accounting measures of performance. Thus the need for appraising the decision process used exists no matter what the results of operations.

The foregoing discussion has concentrated on controlling the amount of inventory on hand. There are other problems connected with inventory control. It is important, for example, that proper inventory records be kept of the dollar amounts as well as the physical units. The procedures for receiving and requisitioning inventory items should be well thought out and controlled. Storage facilities should be adequate so as to minimize loss from spoilage and theft. Methods of storing and moving material should be reviewed to ensure a high level of efficiency in those areas.

Problems of inventory control have many facets, but reasonable solutions to these problems promise rewards worthy of the effort to find the solution.

APPENDIX

The symbols used in the following derivation are consistent with those used in the chapter.

We want to show that the optimum order size is:

$$Q = \sqrt{\frac{2KD}{k_e}}$$

Let p be the invoice cost per unit, and T be the total cost of ordering and carrying the inventory:

$$T = \text{Invoice Cost} + \text{Carrying Cost} + \text{Ordering Cost}$$

$$T = pD + k_e\frac{Q}{2} + K\frac{D}{Q}$$

Taking the first derivative with respect to Q and setting it equal to zero:

$$\frac{dT}{dQ} = \frac{1}{2}k_e - \frac{KD}{Q^2} = 0$$

Solving for Q, the optimum order size: [5]

$$Q = \sqrt{\frac{2KD}{k_e}}$$

It should be noted that pD, the invoice cost, became zero when we took the derivative of T. If p, the cost per unit, is affected by the order size, the derivative of pD would not be zero.

QUESTIONS AND PROBLEMS

27-1 The Quincy Company

The following information is made available for the first two months of the year:

	Forecasted Sales	Sales, Actual	Manufacturing Cost of Sales	Opening Inventory Finished Goods
January	$10,000	$10,000	$8,000	$8,000
February ...	12,000			12,000

The work-in-process inventory is constant each period. The manufacturing cost of sales is a standard cost figure and is equal to .80 of sales.

Required

To assist management in forming an opinion as to the efficiency of production planning and inventory control during January, compute the:

(a) Turnover of finished goods for January.

(b) Number of days' supply on hand as of February 1.

[5] The second derivative $\frac{d^2T}{dQ^2} = \frac{2KD}{Q^3} > 0$; thus, Q is a minimum.

27–2 The Queen Company

The Queen Company is attempting to determine the optimum order size for ordering a type of steel plate. The steel may be ordered by using three different size orders.

Size of Order	*Total Invoice Cost per Order*
5 tons	$ 5,000
100 tons	80,000
200 tons	150,000

Other costs connected with ordering and storing inventory are:

Cost of Paperwork	$4 per order
Handling Costs	$1 per order plus $8 per ton
Property Taxes	$30 per ton of average inventory
Insurance	$10 per ton of average inventory
Interest on Capital Invested (use invoice cost and average inventory)	20%
Risks of Spoilage	$20 per ton of average inventory
Storage Costs	$1,000 (This covers the rent on a storehouse which will store 120 tons.)
	$10 per ton for additional storage space (the cost is determined by maximum possible demand for space).

Inventories for each of the three order sizes (in tons) would be:

Size of Order	*Average Inventory*	*Maximum Inventory*
5	7.5	10
100	52.5	105
200	102.5	220

Required

Determine the optimum order size. Present a schedule of the costs for the different order sizes. Assume that the firm expects to use 300 tons of this material in the next year.

27–3 The Quill Company

The Quill Company is setting up an inventory ordering system. For one type of material, the following information is obtained:

It is desired to have on hand at least a 10-day supply at all times.
Maximum usage per day is 40 units.
Normal usage per day is 15 units.
It takes 5 days to fill an order.
The optimum size of an order is 500 units.

Required

(a) Determine the order point (use maximum usage in the computations).
(b) Determine the "absolute" maximum allowable inventory.
(c) What relevant factors are omitted form this analysis?

27–4

	January	*February*
Projected Finished Goods, Beginning Inventory (in tons)	1,000	1,200
Projected Finished Goods, Ending Inventory (in tons)	1,200	1,600
Forecasted and Actual Units of Sales	3,300	2,800

Required

Compute the:
Inventory Turnover (annual basis)
Number of Days Inventory on Hand at the Beginning of the Month
Use the following number of days: January 31, and February 28.

27–5 Given the following information, determine the optimum order size:

The company uses 450 units a year. The costs, which vary with inventory, have been obtained by multiplying the anticipated cost per year, per unit of inventory, by the average or maximum inventory for each order size, and dividing that amount by the number of orders to be made during the year.

Schedule of Costs on a Per Order Basis

	Order Size		
	50 Units	90 Units	450 Units
Invoice Cost	$250	$360	$1,710
Costs that Vary with Number of Orders	27	15	3
Costs that Vary with Average Inventory	63	100	412
Costs that Vary with Maximum Inventory	15	20	35
Cost per Order	$355	$495	$2,160

27–6 The Quint Company

Part I. Compute the projected number of days supply of raw material on hand for each of the first three months of the year.

	Projected Usage per Day, Tons	*Projected Beginning Inventory, Tons*
January	5	150
February	6	150
March	8	160

Part II. Compute the projected usage per day for each of the first three months of the year.

	Projected Usage for Month, Tons	*Number of Days in Month*
January	155	31
February	168	28
March	248	31

Part III. Compute the projected usage of raw material for each of the first three months.

	Raw Material in Cost of Sales, Tons	*Raw Material in the Increase in Finished Goods, Tons*
January	100	55
February	120	48
March	260	(12)

Part IV. The cost of the raw material in the end product is equal to 50% of the sales price and 80% of the costs of the finished goods. Compute the cost and the tons of raw material used during the month of January. There is no loss or gain in weight during the production process.

Actual Sales (price $160 per ton)	$14,400	90 tons
Actual Beginning Finished Goods Inventory	11,000	110
Actual Ending Finished Goods Inventory	16,500	165

27–7 Compute:

(a) Inventory turnovers for finished goods for each of the first three months of the year.

(b) The period of time (number of days) it takes for the finished goods inventory to turn over.

	Beginning Finished Goods Inventory, Tons	*Sales, Tons*
January	1,000	4,400
February	1,200	3,500
March	1,600	5,250
April	1,400	

27–8 The Queen B Company follows a policy of ordering raw material based on an analysis of the optimum order size. The following analysis was prepared for one particular raw material:

Size of Order, Units	*Cost per Order*	*Units per Order*	*Average Cost per Ton per Order*
50	$ 280	50	$5.60
90	495	90	5.50
450	2,250	450	5.00
900	4,590	900	5.10

The Queen B Company uses 1,800 units of this raw material a year. The following list is a sample computation of cost per order (order size 450 units):

Invoice Cost	$1,800
Cost of Paperwork, Handling Costs (which vary with number or orders)	15
Cost of Insurance, Taxes, Interest, etc. (which vary with average inventory) *	400
Cost of Storage (varies with maximum inventory)	35
	$2,250

* The average inventory of 500 units is multiplied by the anticipated cost per year of one unit of inventory, $0.80 per unit.

Required

Comment on the procedure followed by the Queen B Company.

27–9 The costs of placing an order are $16 per order. It is estimated that 1,000 units will be used in the next 12 months. The cost of carrying an item in inventory is $.20 per year.

Required

Compute the optimum order size.

27–10 Assume the same facts as in problem 9, except that the estimated usage in the next 12 months is 4,000 units.

Required

Compute the optimum order size.

27–11 Assume the same facts as in problem 9, except that the costs of placing an order are $4 per order.

Required

Compute the optimum order size.

27–12 The probability distribution of the demand for a product is estimated to be:

Units Demanded: D	*Probability: p(D)*
0	.10
1	.20
2	.30
3	.30
4	.06
5	.04
6	.00
	1.00

Reordering is not possible. Assume the incremental profit associated with each unit sold is $4. If the unit is not sold, it is not worthless. Each unit costs $6.

Required

Compute the amount to be ordered.

27-13 Assuming the same facts as given in 12, except that there is a customer ill-will of $10 associated with being short of inventory.

Required

Compute the amount to be ordered.

27-14 Assuming the same facts as given in 12, except that the goods may be returned with a $1 penalty (that is, there is salvage of $5).

Required

Compute the amount to be ordered.

27-15 Assume the same facts as given in 12, except that the goods may be returned with a $1 penalty and there is customer ill-will of $15 associated with being short.

Required

Compute the amount to be ordered.

27-16 Indicate which of the following factors would be included in the computation of the cost of underage and the cost of overage (for an order size decision where there is no reordering):

(a) Cost of the item
(b) Salvage or resale value of the item if not sold in the primary market
(c) Price set by the selling firm
(d) Loss in goodwill created by being short
(e) Incremental selling costs
(f) Fixed costs of the firm
(g) Costs of ordering

27–17 The conventional optimum order size formula is:

$$Q = \sqrt{\frac{2KD}{k}}$$

K is the cost of ordering (per order)
D is the annual usage in units
k is the cost of carrying a unit of inventory one year
Q is the optimum order size in units

The National Corporation uses a variant of the above formula,

$$Q = \sqrt{\frac{KD}{.10\,C}}$$

where C is the cost of a unit in inventory.

Required

Assuming that costs of carrying inventory other than interest costs amount to \$.05 per dollar of average inventory per year (this includes taxes, insurance, spoilage, etc.), compute the cost of capital which this firm is implicitly using in making decisions concerning inventories.

28

Variable Costing, or "Direct Costing"

THE "DIRECT COSTING" procedure has received much attention in business literature. Unfortunately, some confusion has arisen because the procedure under discussion is not concerned with the treatment of direct and indirect costs but with the treatment of fixed and variable costs. This chapter will discard the term *direct costing* in favor of the more descriptive and accurate title, *variable costing.*

DEFINITION OF VARIABLE COSTING

There are many possible ways in which costs may be classified and channeled through the accounts. The problem at hand is to determine which costs of a manufacturing firm are inventoriable. Following conventional treatment, the criterion is whether or not the cost is connected with the manufacturing process. Following the variable costing procedure, costs must be further classified as to whether they are fixed or variable.

The question of what costs are to be inventoried and what costs are to be written off as expenses against the period's revenues is important not only for general financial statement purposes but also for statements being used for managerial purposes. It is usually argued that if the service that caused the incurrence of the cost is directly or indirectly connected with the manufacturing process, then the cost of the product being made should include some fraction of the cost of this service. Identified by this criterion, the following costs are indicative of those items that would be considered inventoriable: direct labor, material, cleaning supplies, factory depreciation, and a fraction of the president's salary. Note that some of these costs are fixed and some are variable. Some require cash disbursements during the period; some do not. One thing they have in common is that they are treated as inventoriable, according to conventional treatment.

Variable costing uses the foregoing criterion, but it also makes use of

another. A cost is considered inventoriable if it is *variable* and connected with the manufacturing process. The *exclusion of fixed costs* from the inventoriable classification is primarily justified because of the usefulness of the income figure, computed by using this procedure, compared with the usefulness of the other alternative procedures. For managerial purposes, the income computed under a variable costing procedure is more useful than the income computed under a procedure that attempts also to absorb the fixed costs to product.

Using the variable costing procedure, a cost is inventoriable if it is (1) connected with the manufacturing process and (2) of a variable nature. A variable cost is a cost that will vary directly with production. If production doubles, the cost will also double. A fixed cost is a cost that is constant over wide ranges of production. Included in this classification are building depreciation, the president's salary, and the costs of many of the service departments. Some costs will not fit snugly into one of the two classifications mentioned. For most cases the cost may be "squeezed" into one of the classifications; if it cannot, then it should be classified as a semi-variable cost and should be treated as an inventoriable cost. The assumption is that the cost was incurred because the product was produced. If production had been decreased, the cost would have decreased, although not necessarily in a proportionate amount.

THE PROBLEM

The need for variable costing arises because of the following dilemma: if the fixed costs are $1,000 and 1 unit is produced, what are the fixed costs per unit? The obvious answer is $1,000. If, instead of 1 unit, there are 1,000 units produced, the fixed cost per unit becomes $1. If the sale price is $5 per unit, the following situation may well develop: Plant A *produces and sells 1 unit*; Plant B *produces 1,000 units and sells 1 unit*. The two income statements appear as follows:

	Plant A	Plant B
Sales	$ 5	$5
Less Cost of Product	1,000	1
Income (loss)	($ 995)	$4

Each plant sold only 1 unit for the same price of $5 per unit. Each plant has the same fixed cost of $1,000 (the variable cost is assumed to be zero in order to keep the illustration simple). Despite these facts, one plant shows a loss of $995, and the other plant shows a profit of $4. The reason for this

confusing report is that in the case of Plant B, its inventory now contains 999 units of product valued at $1 per unit. Should the manager of Plant B be praised for his "efficiency" and the manager of Plant A be fired because of his bad showing? The manager of Plant B may actually be more inefficient, since he is building up an inventory that may well be too high!

TWO SOLUTIONS

The accounting profession recognized this difficulty in measuring performance and came up with a procedure that helped solve the problem somewhat by eliminating the changes in the costs per unit when there are fluctuations in the level of production. Let us assume that the capacity of each plant is 1,000 units of product. The fixed cost per unit of both plants will then be the total fixed costs divided by the units that could be produced at capacity. In the situation being discussed, the fixed cost is $1,000; thus the fixed cost per unit is $1. Therefore, if Plant A produces 1 unit, the fixed cost per unit is $1; if it produces 500 units, the fixed cost per unit is $1; and if it produces 1,000 units, the fixed cost per unit is still $1; but there are differences in the "underabsorbed" fixed costs. Thus, if 1 unit is produced, there is an underabsorbed fixed cost of $999. If 500 units are produced, there is an underabsorbed fixed cost of $500; and if 1,000 units are produced, there are no underabsorbed fixed costs. Following this procedure, the income statements of the two plants, A and B, would appear as follows:

	Plant A		Plant B	
Sales		$ 5		$5
Less:				
Cost of Product	$ 1		$1	
Underabsorbed Fixed Cost	999	1,000	–0–	$1
Income (loss)		($ 995)		$4

Plant B again shows an income of $4, since it has again avoided the charge of $999 by having it lodge in inventory. These two income statements would be perfectly adequate if the reader were capable of judging the significance of the charge for "Underabsorbed Fixed Costs." Unfortunately, there is a tendency to ignore all information except the so-called key figure, the income for the period. This failing frequently makes it desirable for the accountant to revise the income statement and place it on a variable costing basis. The income statements would then appear as follows:

	Plant A	Plant B
Sales	$ 5	$ 5
Less:		
Variable Cost (zero in this illustration)	–0–	–0–
Fixed Cost of Period	1,000	1,000
Income (loss)	($ 995)	($ 995)

At last, the incomes of the two plants are equal. Each plant had sales of $5, which resulted in equal profits. There is no confusion arising from the absorption of fixed costs into inventory. The relative performance of the two plants is made to depend on the sales and efficiency of the plants and not on the amount of goods produced for inventory. This is more meaningful than a situation where a plant or division can better its income position by merely increasing production.

The preceding illustration will be made more realistic by the addition of some variable costs. Assume that the variable costs per unit are $2 per unit. It is useful to strike a subtotal, indicating the excess of revenues over variable costs. For many managerial decisions, this is useful information.

	Plant A	Plant B
Sales	$ 5	$ 5
Less Variable Costs of Product Sold	2	$ 2
Excess of Revenues over Variable Costs	$ 3	$ 3
Less Fixed Costs	1,000	1,000
Income (loss)	($ 997)	($ 997)

FINANCIAL REPORTS

The reports discussed in the preceding section are significant for managerial purposes. It must be decided whether it would serve any purpose to use the variable costing procedure for general financial statement purposes. The fixed manufacturing costs are conventionally considered to be a cost of product, and the value of the inventory reflects this fact. If only variable costs are placed into inventory, the effect will be an understatement of inventory. One solution is to issue different reports to management and to other users of financial reports.

Assume that variable costing is used for financial reporting purposes. During the year in which variable costing is inaugurated, the income for the period will be lower than it would be if the shift had not been made to variable costing. This results from the fact that all the fixed costs are being

charged to expense during the period, and none are being charged to inventory. In the subsequent years, the income for each period will be approximately equal to what it would have been if variable costing were not used. While all the fixed costs are being charged against revenues, this is compensated for by the fact that the beginning inventory, also charged to expense, has no fixed costs in it. Unless there is a considerable fluctuation in inventory, the above will hold true. Variable costing does have a LIFO effect which may be detected if attention is focused on fixed costs. With variable costing, the fixed costs of this period are charged against the revenues of this period. If variable costing is not used, some of these fixed costs will not be charged against revenues until the next period, and some of the fixed costs in this period's expenses will come from the last period. This LIFO effect is not too significant, since a large percentage of the fixed costs are not subject to wide and sudden fluctuations in price, and also because only a small percentage of the period's production usually ends up in inventory.

EXAMPLE

The following information applies to the Umbrella Division of the A Company for the years 1964 and 1965.

Fixed costs	$100,000
Variable costs	$1 per unit
Price per unit	$4

	1964	*1965*
Production	10,000	100,000
Units sold	5,000	5,000
Average cost per unit	$11	$2

If the division computed its income using the average cost per unit, the income statements would appear as follows:

	1964	*1965*
Revenues ($4 × 5,000)	20,000	20,000
less:		
Manufacturing cost of goods sold		
$11 × 5,000	55,000	
$ 2 × 5,000		10,000
Income (loss)	(35,000)	10,000

The division was equally efficient in the two years and sold the same number of units in each year for the same unit price. Nevertheless, one year has an income of $10,000 and the other a loss of $35,000. Using the average cost per unit, income is a function of production and the change in the level of inventory rather than sales and efficiency.

To rectify the above situation, the firm may decide to stop using the "actual" cost which fluctuates with activity and substitute a predetermined normal, or

standard, cost. Assume the normal activity for both years is 50,000 units, and this is chosen as the basis of absorbing the fixed overhead to product. The normal (or standard cost per unit) is now $3.

Variable cost per unit	$1
Fixed cost per unit $\left(\frac{\$100,000}{50,000}\right)$	2
Normal cost	$3

Using this normal cost, the income statements become:

	1964	*1965*
Revenues	20,000	20,000
less:		
Manufacturing cost of goods sold ($3 × 5,000)	15,000	15,000
Cost variances	80,000	(100,000)
	95,000	(85,000)
Income (loss)	(75,000)	105,000

The cost variances may be explained as follows:

1964:

Fixed costs incurred	100,000
Variable costs ($1 × 10,000)	10,000
Total costs	110,000
less:	
Costs absorbed to product $3 × 10,000	30,000
Unabsorbed fixed costs	80,000

1965:

Fixed costs incurred	100,000
Variable costs ($1 × 100,000)	100,000
Total costs	200,000
less:	
Costs absorbed to product $3 × 100,000	300,000
Overabsorbed fixed costs	(100,000)

Again, the incomes of the two years are different, the differences being caused by the different levels of production. Basing the absorption of fixed costs on a predetermined overhead rate changed the income, but it did not eliminate the distortion. Income is still affected by the number of units produced.

Some accountants would object to the above disposition of the cost variances and would recommend that they be allocated to inventory and expense, rather

than the entire amount being charged to expense. Let us assume that the cost variances are allocated:

1964:

The variance is $80,000. Since 5,000 units have been sold and 5,000 are still in inventory, we will charge one-half of the $80,000 variance to inventory and one-half to expense.

1965:

The variance is $100,000. Since 5,000 units have been sold and 95,000 units are still in inventory, we charge .05 of the $100,000 to expense and .95 to inventory.

The income statements are:

	1964	*1965*
Revenues	20,000	20,000
less:		
Manufacturing cost of goods sold	15,000	15,000
Cost variances	40,000	(5,000)
	55,000	10,000
Income (loss)	(35,000)	10,000

This is the same set of incomes we obtained from the use of the actual average cost. This is not a coincidence but rather is a result of the procedure. Since we allocated the variances back to the inventory and expense, we essentially converted the normal costs back to actual costs. Just as in the first computations, the income is again affected by the level of production.

Using variable costing, the incomes of both periods are equal.

	1964	*1965*
Revenues	20,000	20,000
less:		
Variable costs ($1 × 5,000)	5,000	5,000
Excess of revenues over variable costs	15,000	15,000
less:		
Fixed costs	100,000	100,000
Net Income (loss)	(85,000)	(85,000)

The incomes of the periods are equal, consistent with the equal total revenues and the constant efficiency in the two periods. The variable costing procedure accomplishes the elimination of the distortion which affects the other two procedures.

A by-product of the variable costing procedure is an inventory which includes only variable costs (the fixed costs having been expensed). This understatement of inventories is not desirable and should be avoided. The

necessary adjustments are beyond the scope of this book and are controversial; nevertheless, the reader of this book should realize it is not impossible to obtain the advantages of variable costing and at the same time adjust the cost of the inventories so that they represent reasonable measures of the costs of the factors of production which were used in the manufacturing process.

SUMMARY

Variable costing is a procedure wherein only the variable costs are charged to inventory. The fixed costs are considered a cost of the period and are charged to expense. This procedure is commonly known by the somewhat confusing title of "direct costing" (confusing because the question of direct costs does not enter into the discussion).

The procedure is especially useful in eliminating the income distortion caused by producing for inventories rather than sales. It is also useful in supplying information for managerial decisions that require a distinction between fixed and variable costs.

The variable costing technique is not conventionally used in the financial statements made available to the public. Fixed costs are considered a cost of product and are included in inventory. The two conflicting points of view are coped with by separate reports for management and the public.

Proponents of variable costing state that incomes of successive periods will be distorted by changes in finished goods inventory if absorption costing is used, i.e., a method in which the cost of product includes a pro rata share of fixed costs. Absorption costing could give results as good as variable costing (using this one criterion) if the idle capacity variance were not allowed to affect the income figure being analyzed. If this were done, the measure of operating efficiency would not be affected by changes in inventory, since the cost of product would be determined by using a set overhead rate. The idle capacity variance, which is affected by changes in the level of production, would be excluded from the computation. While absorption costing could be used in a manner to eliminate the effect on income of changes in inventory, one problem remains. If the idle capacity variance is excluded from the measurement of income, the income of the period will be overstated (if the industry has seasonal characteristics, the idle capacity variance may reflect a loss arising from idleness or merely the seasonal slack).

Direct costing solves the problem of distortion of income of successive periods caused by fluctuations in inventory. It does this by including all fixed costs as costs of the period. Absorption costing may solve the same problem by excluding certain costs (the idle capacity variance) from the measurement

of income. Direct costing results in understated inventories; absorption costing may result in overstated incomes if all idle capacity variances are excluded from the measurement of the income of a period. For managerial purposes, it seems that variable costing will be the more useful in situations where production and finished goods inventories are likely to fluctuate.

QUESTIONS AND PROBLEMS

28–1 The United States Can Company

The can industry is an industry in which there are wide fluctuations in production and sales, due to the seasonal nature of the products being canned. The United States Can Company has two plants, one in San Francisco and one in New York. The physical characteristics of the plants are similar, and the results of operations of the two plants are compared each month in order to judge the performance of the two managements. The March income statements of the two plants were as follows:

	San Francisco Plant	*New York Plant*
Sales	$1,000,000	$1,000,000
Less:		
Manufacturing Cost of Sales	$ 700,000	$ 800,000
Selling and Administrative Expenses	200,000	200,000
Total Expenses	$ 900,000	$1,000,000
Net Income	$ 100,000	—

Each plant sells their product for the same price. During the month of March, both plants sold and shipped 20,000,000 cans. The production for the month at the two plants was as follows:

	San Francisco Plant	*New York Plant*
Opening Inventory (number of cans)	50,000	50,000
Production During the Month	30,000,000	20,000,000
	30,050,000	20,050,000
Cans shipped during month	20,000,000	20,000,000
Ending Inventory	10,050,000	50,000

The San Francisco plant built up its inventory in March in anticipation of the canning season, which begins in April on the West Coast. The East Coast canning season begins in the middle of May.

The standard cost card for the type of can sold in March discloses the following information:

Standard Cost Card (for both plants) Can No. 4593

	Cost per 1,000 Cans
Direct Material	$20
Direct Labor	4
Overhead	
Variable	1
Fixed	10
	$35

For both plants the manufacturing fixed costs budgeted for the month were $300,000. There were no spending (expense) or efficiency variances.

All selling and administrative expenses were of a fixed nature.

Required

Write a report relative to the operations of the two plants during the month of March. Explain the differences in income and prepare a revised statement which would be more useful in appraising the results of the operations of the two plants.

28–2 The New York Plant: The United States Can Company

For several months top management has been puzzled by fluctuations in the income reported by the New York plant. The results for February, March, and April were as follows:

	February	*March*	*April*
Sales	$1,000,000	$1,000,000	$500,000
Less Manufacturing Cost of Sales	$1,000,000	$ 800,000	$250,000
Selling and Administrative Expenses	200,000	200,000	200,000
Total Expenses	$1,200,000	$1,000,000	$450,000
Net Income (Loss)	$ (200,000)	$ 0	$ 50,000

There has been no change in sales price during the three-month period. During the months of February and March, the plant sold and shipped 20,000,000 cans. In April it shipped one-half that total. The production for the three months was as follows:

	February	*March*	*April*
Opening Inventory	20,050,000	50,000	50,000
Production during Month	———	20,000,000	40,000,000
	20,050,000	20,050,000	40,050,000
Cans Shipped during Month	20,000,000	20,000,000	10,000,000
Ending Inventory	50,000	50,000	30,050,000

The standard cost card for the type of can sold discloses the following information:

	Cost per 1,000 Cans
Direct Material	$20
Direct Labor	4
Overhead	
Variable	1
Fixed	10
	$35

The fixed manufacturing costs budgeted for each of the months were $300,000. There were no spending (expense) or efficiency variances during the three months.

All selling and administrative expenses were of a fixed nature.

Required

Present comparative income statements for the three months which would be most useful in appraising the results of operations for the three months.

28-3 The Can Company of New York has decided to use a variable costing procedure for internal accounting reports. Following this procedure, all fixed costs will be considered a cost of the period, and only variable costs will be inventoried.

The results of June's operations for the Ithaca plant were as follows:

Manufacturing Costs Incurred	
Variable Manufacturing Costs	$500,000
Fixed Manufacturing Costs	$250,000
Selling Costs Incurred	
Variable Selling Costs	$50,000
Fixed Selling Costs	$80,000
Administrative Costs Incurred	
Fixed Administrative Costs	$100,000
Number of Cans Produced	25,000,000
Number of Cans Sold	24,000,000
Revenues from Sales	$1,000,000

Required

(a) Prepare two income statements, one following conventional overhead absorption accounting techniques, the other using variable (direct) costing. Assume that there was no beginning inventory of finished goods and that the *fixed* overhead absorption rate is $10 per 1,000 cans. Except for fixed overhead, actual costs are used in determining the cost of product.

(b) Prepare two additional income statements, one assuming that the fixed overhead absorption rate is $5 per 1,000 cans and that the company *does not* close out the idle capacity variance monthly; the other

assuming that the plant uses normal activity of 20,000,000 cans as the basis for computing the fixed overhead rate, an absorption rate of $12.50 per 1,000 cans, and the company *does* close the variance account monthly to cost of goods sold.

(c) Is it possible to use absorption costing and still retain the benefits of variable costing? Explain.

28-4 Some accountants state that fixed costs should not be considered a cost of product (should not be inventoried), since these costs will be incurred regardless of production or sale. These items should be treated as period expenses.

Required

Name several costs that can be considered as fixed costs and which would *not* be incurred unless there was *intent* of producing the product.

28-5 The Sunbeam Corporation

The Sunbeam Corporation's annual report for the fiscal year ending March 25, 1961, included the following information:

Sales and earnings for the year, and for the preceding year adjusted for comparative purposes to include the operations of John Oster Manufacturing Co. and related companies combined with Sunbeam in 1960, were as follows:

	March 27, 1960 to March 25, 1961	*March 29, 1959 to March 26, 1960*
Sales	$156,956,443	$162,287,521
Net Earnings after Provision for United States and Foreign Taxes on Income	8,473,244	12,221,629
Net Earnings per Share [1]	2.51	3.62

[1] Based on 3,376,022 shares outstanding, March 25, 1961.

Sales for the fiscal year ended March 25, 1961, were sustained at a high level in spite of sharp declines in the appliance industry and in the general economy. The decrease in sales was 3.3%. In the final quarter ending March 25, 1961, earnings decreased substantially when production was drastically cut back to bring inventories into balance.

The satisfactory level of Sunbeam's sales was achieved by intensive advertising and sales promotion efforts. However, the curtailment of operations in the last quarter, when shipments were made largely from inventory, greatly distorted the profit ratio. Inventories have now been reduced to a reasonable, balanced amount, and normal production has been resumed.

Assets

	March 25, 1961	*March 26, 1960*
Current Assets:		
Cash	$21,007,994	$16,108,224
United States and foreign government securities, at cost	222,362	3,052,216
Accounts receivable	18,531,793	16,949,621
Inventories, at lower of cost or market—		
Raw materials and supplies	4,950,549	5,027,330
Work in process	7,204,294	8,647,820
Finished products and parts	36,084,686	31,466,817
Prepaid expenses	1,350,651	1,316,875
	89,352,329	82,568,903

Required

(a) Comment on the effect of the inventory change on earnings.

(b) Assume fixed manufacturing costs are .20 of the standard cost per unit of finished product. How much was income affected by the increase in finished goods inventory?

28-6 Company X has sales of $200,000 in both May and June (this represents 50,000 units at $4 per unit). The production costs for each of the two months are as follows:

Fixed costs per month	$150,000
Variable costs per unit	$1.

The production for May was 50,000 units and for June 150,000 units (the plant operated at capacity). The May 1 finished goods inventory is zero.

Required

Prepare income statements for May and June based on:

(a) Actual costs and actual activity for the month.

(b) Overhead absorption using normal activity of 100,000 units as the basis of overhead absorption.

(c) Overhead absorption using practical capacity of 150,000 units as the basis of overhead absorption.

(d) Variable costing.

28-7 The ABC Company was organized on January 1, 1958.

	Financial Position		
	Jan. 1, 1958	*Jan. 1, 1959*	*Jan. 1, 1960*
Cash	10,000	6,000	20,000
Inventories	–0–	15,000 *	5,000 †
	10,000	21,000	25,000
Capital Stock	10,000	10,000	10,000
Retained Earnings	–0–	11,000	15,000
	10,000	21,000	25,000

* Includes $3,000 of fixed overhead.
† Includes $1,000 of fixed overhead.

Required

(a) What were the reported incomes for 1958 and 1959 assuming no dividends were declared?
(b) What would have been the income if variable costing had been used in the two years?

28–8 The 1957 annual report of the Olin Mathieson Chemical Corporation had the following note:

"Inventories are priced, for the most part, at the lower of cost or market of materials plus direct labor and other direct costs, including overhead; however, in continuation of practices adopted by certain companies merged into the Corporation in prior years, overhead has been omitted from a portion of the inventories. The omission of such overhead ($6,826,618 in 1957 and $5,609,148 in 1956) resulted in a reduction in net income (after taxes of approximately $600,000 for 1957."

Required

Comment on the procedure followed. How was the $600,000 probably computed?

29

Break-Even Analysis

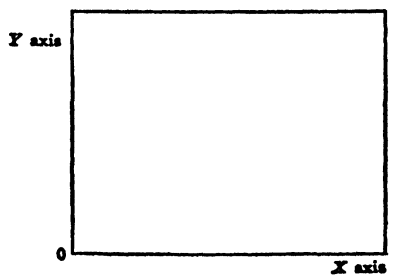
THE TERM "BREAK-EVEN analysis" may be interpreted either in its broad or narrow sense. Taken in its narrow sense, it refers to a system of determining that level of operations where total revenues equal total expenses. In its broad sense, it refers to a system of analysis that can be used to determine the probable profit at any level of operations. This type of analysis is extremely useful for forecasting purposes as well as for judging the results of operations.

Usually the break-even analysis is presented graphically. This method of visual presentation is particularly well suited to the needs of businesses, since the manager can appraise the situation at a glance. It bypasses the danger that accompanies many accounting reports, i.e., that the reader will get bogged down in the detail and the many computations and never get to the heart of the matter. The graphic break-even analysis eliminates the detail and presents the information as simply as one desires. Break-even analysis is especially appealing to a person of a non-accounting background.

THE GEOMETRY OF GRAPHS

Before beginning with the study of the break-even analysis itself, it is well to review a bit of elementary geometry.

Each graph has two sides which are called *axes*. The X axis is the bottom horizontal side. The Y axis is the left-hand vertical side.



The plotting of points on a graph may result in a straight line or a smooth curve, or it may follow an irregular path. The simplest plot is a straight line. The equation for a straight line is relatively easy to solve, since all the variables in an equation of a straight line are of the "first power" (i.e., they are not squared, cubed, etc.).[1] The basic equation for a straight line is:

$$Y = a + bX$$

The small letters a and b represent constants. To solve the equation for a line, it is necessary to solve for these two constants. Once these constants are determined, any value of Y may be solved for any value of X.

The constant a is the intercept of the line through the Y axis (the value of Y where X is zero). It is positive if the line intersects above the X axis, and it is negative if the line intersects below the X axis.

The constant b is the slope of the line. It is the amount that Y will increase if X increases one unit. It is positive if the line slopes upward to the right. It is negative if the line slopes downward to the right. It may have any value from minus infinity to plus infinity, including zero (a horizontal line). Expressed algebraically, the equation for the slope is:

$$b = \frac{\text{change in Y}}{\text{change in X}} = \frac{\Delta Y}{\Delta X}$$

It is possible to solve for the equation of a straight line if two points of the line are known. Assume that the following coordinates are known:

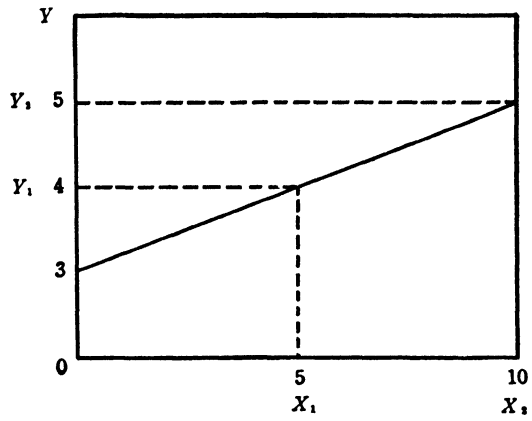
X	Y
5	4
10	5

The easiest method of solution is to plot these two points on a graph and then to draw in the line by connecting the two points and extending it to intersect through the Y axis. This gives the value of a, the intercept of the Y axis. The slope may be determined by dividing the change in Y by the change in X.

$$b = \frac{\Delta Y}{\Delta X} = \frac{5-4}{10-5} = \frac{1}{5} = 0.2$$
$$a = 3$$
$$Y = a + bX$$
$$Y = 3 + 0.2X$$

An alternative method of solving for a is to solve first for b and then, substituting in the equation for b, solve for Y when X is zero.

[1] A variable is of the first power if it does not have an exponent accompanying it. X is of the first power, while X^2 is of the second power.



$$b = \frac{\Delta Y}{\Delta X} = \frac{Y - Y_1}{X - X_1}$$

$$0.2 = \frac{Y - 4}{0 - 5}$$

$$Y - 4 = 0.2\,(0 - 5)$$

$$Y - 4 = -1$$

$$Y = 3 \text{ (when X is zero; thus } a = 3)$$

With the equation, it is then possible to solve for Y for any value of X. What is the value of Y if X equals 15?

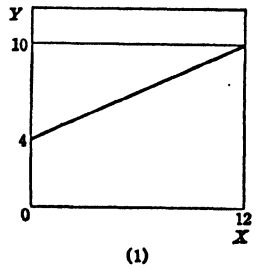
$$Y = a + bX$$

$$Y = 3 + 0.2X$$

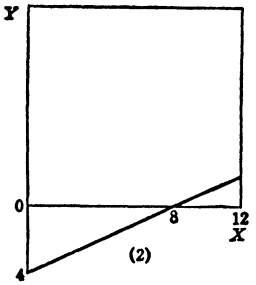
$$Y = 3 + 0.2(15)$$

$$Y = 6$$

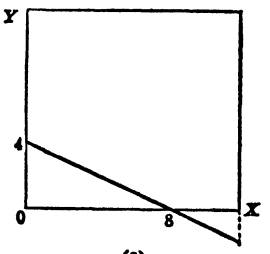
Determine the Equations for Lines Plotted on the Following Graphs



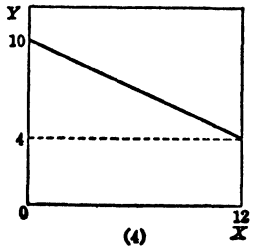
(1)



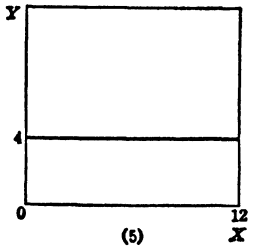
(2)



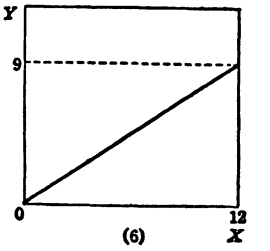
(3)



(4)



(5)



(6)

Answers

	$Y = a + bX$
Graph 1	$Y = 4 + 0.5X$
" 2	$Y = -4 + 0.5X$
" 3	$Y = 4 - 0.5X$
" 4	$Y = 10 - 0.5X$
" 5	$Y = 4 + 0X$ or $Y = 4$
" 6	$Y = 0 + 0.75X$ or $Y = 0.75X$

PLOTTING TOTAL REVENUES AND TOTAL EXPENSES

By following simplifying assumptions, total expenses and total revenues can both be plotted as straight lines. The exceptions to the assumptions will be discussed later, but in general the assumptions are fairly realistic.

Assuming that the price of the product being sold is set, then total revenues will be a function of the units sold. At zero units sold, total revenue will be zero. Thus the total revenue line will pass through the origin of the graph, and the value of the constant a is zero. The value of the constant b (the slope of the line) will be equal to the price per unit. Thus the equation for the total revenue line will be:

$Y = bX$
$Y =$ the total revenues
$X =$ the units sold
$b =$ the price per unit

The plot of total expenses asumes that all expenses are fixed or are variable. By definition, there will be fixed expenses at zero sales; thus the value of a, the Y axis intercept, is equal to the fixed expenses. The value of the constant b is equal to the variable cost per unit. For every additional unit sold, the total expense will increase by an amount equal to b. To avoid confusion with the equation for the total revenues, the various components (except X) of the equation for total expenses will be accompanied by a "prime"; thus Y becomes Y′.

$Y' = a' + b'X$
$Y' =$ the total expenses
$a' =$ the fixed expenses
$b' =$ the variable expenses per unit of product
$X =$ the units sold

EXAMPLE

The price of the product being sold is \$1.50 per unit. The fixed expenses are \$100, and the variable expenses per unit are \$0.50.

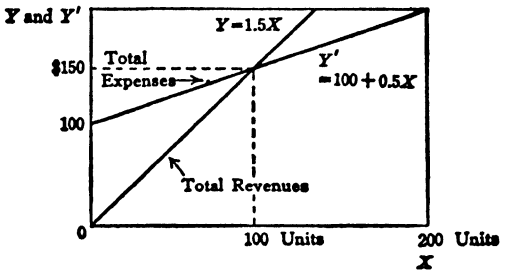
Determine the equations for total revenues and total expenses, and plot them on one graph.

Solution: The equation for the total revenue line is

$$Y = bX$$
$$Y = 1.5X$$

The equation for the total expense line is

$$Y' = a' + b'X$$
$$Y' = 100 + 0.5X$$



THE BREAK-EVEN POINT

By definition, the break-even point is that amount of sales where the total revenues equal the total expenses. The firm neither makes a profit nor suffers a loss.

If the total revenues and total expenses are plotted graphically, as they were in the preceding example, the lines will intersect at one point (if they do not intersect, it means that there is no level of operations where the firm can break even). The intersection of the total expense and the total revenue lines determines the break-even point. It is the level of operations where revenues equal expenses. The break-even point in the preceding example is at sales of 100 units. With sales of 100 units, the total revenues will be $150, and the total expenses will be $150. If the firm sells fewer than the 100 units, it will suffer a loss; if its sales rise above the 100-unit level, a profit will be realized.

The break-even point may be solved algebraically as well as graphically. To do so, we should assume that the facts are the same as they are in the above example.

$$Y = 1.5X$$
$$Y' = 100 + 0.5X$$
$$Y = \text{total revenues}$$
$$Y' = \text{total expenses}$$

At the break-even point, Y must equal Y'; thus

$$1.5X = 100 + 0.5X$$
$$X = 100 \text{ units}$$

The break-even point is sales of 100 units.

Another method of solving for the break-even point makes use of the following analysis. Each unit sold "recovers" an amount that is equal to the difference between the selling price and the variable costs. To find the break-even point, we should divide the fixed costs by the amount that is "recovered" by each unit.

$$\text{Break-even point} = \frac{\text{fixed costs}}{\text{selling price} - \text{variable costs}}$$
$$= \frac{100}{1.50 - 0.50}$$
$$= \frac{100}{1} = 100 \text{ units}$$

BREAK-EVEN CHARTS: THE DIFFERENT FORMS

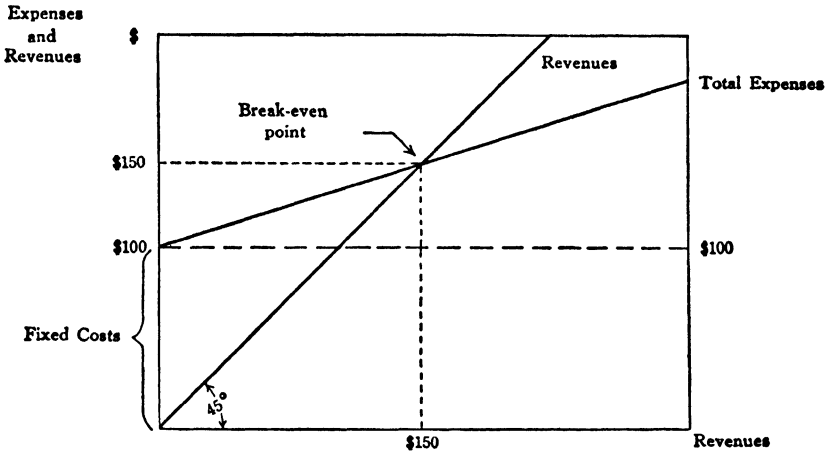
The break-even chart takes many different forms. The needs of the specific situation should dictate the choice of the form to be used.

One of the things that will cause break-even charts to vary is the choice of the factor to be measured on the X axis. The following items will be found measured on the X axis:

Unit Sales
Units Produced
Dollar Sales
Dollar Production
Per Cent of Capacity, Production
Per Cent of Capacity, Sales

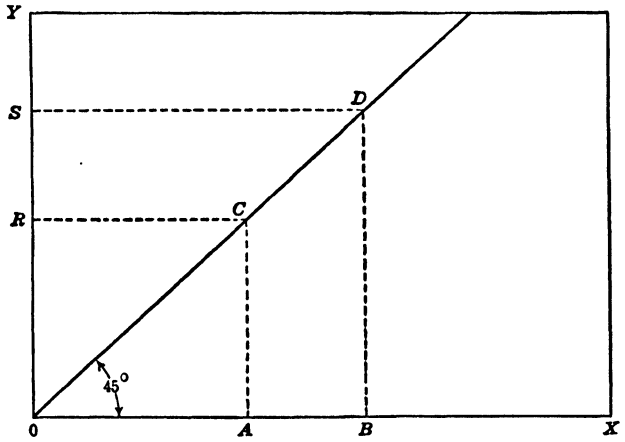
The firm may break even in terms of production or sales, thus the choice between production and sales. In a technical accounting sense, revenue is not realized until the sale is made; thus, strictly speaking, the only true break-even analysis will have the X axis measure sales. Having made this decision, the choice must still be made whether to measure units sold or to express sales in terms of dollars or as a percentage of capacity. All are useful. The use of dollar sales has two advantages. It may be used because it simplifies the presentation of the graphs and despite the sale of products of different dollar value per unit. If dollars of sales are measured on the X axis, and *if the Y axis has the same scale as the X axis*, then use may be made of

a 45-degree construction line. This line derives its title from the fact that it is drawn at a 45-degree angle to the X axis. It is used to represent sales; thus, only the expense line has to be actually drawn in.



Given the same information as before, the preceding chart illustrates the use of this construction line and the measuring of dollar sales (revenues) on the X axis.

The use of this construction line is possible because of the characteristics of a 45-degree isosceles triangle and the fact that the opposite sides of a rectangle are equal.

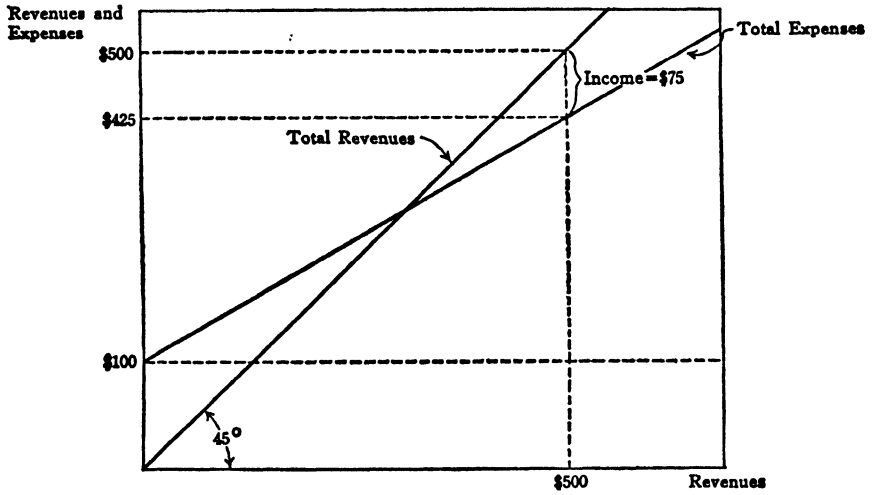


In the accompanying diagram OA is equal to AC because they are two sides of an isosceles triangle opposite the 45-degree angles. AC is equal to OR, since they are opposite sides of a rectangle; thus OA, AC, and OR are all equal. If revenues are measured on the X axis, they can also be measured on the Y axis; for example, OA equals OR, and OB equals OS. The

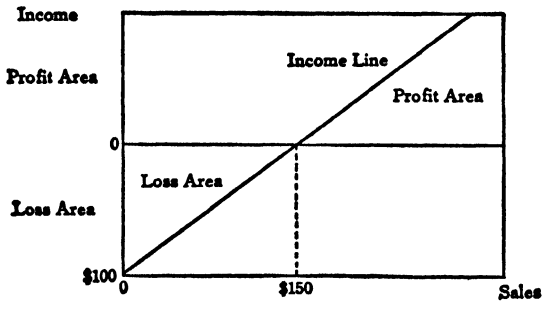
line *OCD* represents revenues, since any point on the line may be measured either on the X axis or the Y axis.

If an expense line is added, the expected income for any level of revenue may be determined by finding the difference between the revenue line (the 45-degree line) and total expense line. In the following diagram, the income is $75 when the sales are $500 (the expenses are $425).

A break-even chart of this nature finds its greatest use in those situations where total expenses at different levels of sales are to be plotted. Using this type of chart gives a break-even chart, even though only the total expenses are directly plotted.

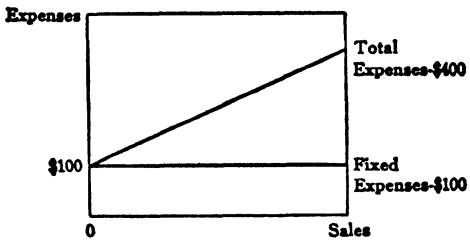


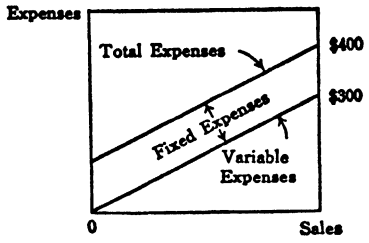
Another type of break-even chart plots neither expenses nor revenues, but rather the net of the two, i.e., income. This form has the possible advantage of being easier to interpret. Note that, at zero sales, the loss is equal to the fixed costs.



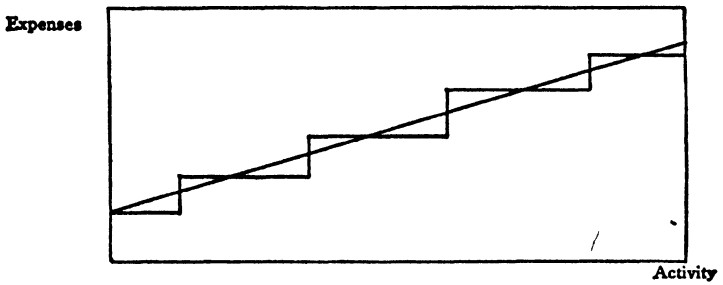
When total expenses are plotted, the fixed expenses are sometimes plotted first, and then the variable expenses are plotted on top of the fixed

expenses. It is also possible to plot them the other way around. The following two graphs illustrate the two different techniques:

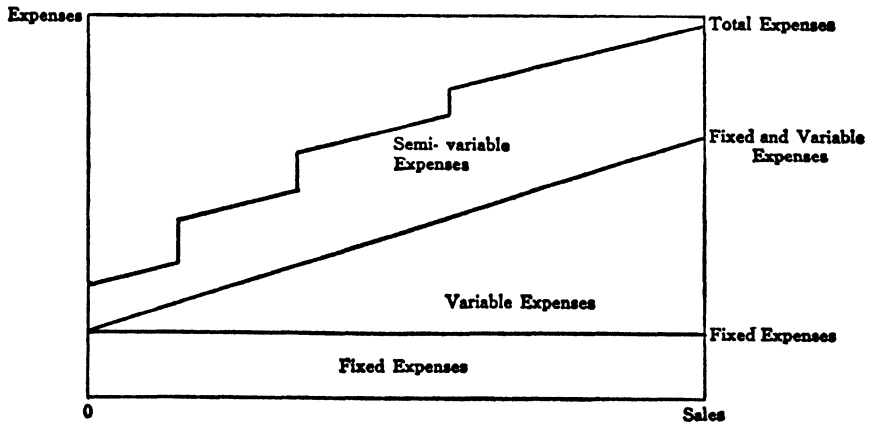




Some expenses are neither variable nor fixed. Expenses of this nature are usually lumped together into one classification and called *semi-variable* expenses. If these expenses can be predicted, then they do not harm our analysis. If the semi-variable expenses are of relatively small amounts, then it is sometimes assumed that a straight line fairly well approximates them. The following graph illustrates a semi-variable expense and the straight line approximation.

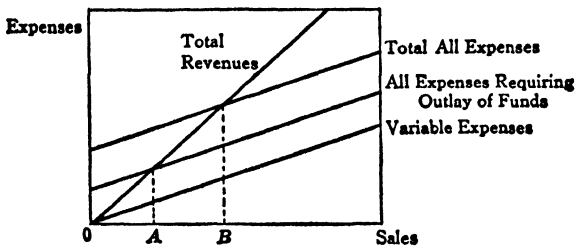


If the semi-variable expenses are significant in size and a more exact treatment is desired, then they can be added to the fixed and variable expenses. The graph of total expenses will then appear as follows:



SPECIAL BREAK-EVEN ANALYSES

There are many special applications of the break-even analysis techniques. One of the most useful applications is in the determination and illustration of the "cash" break-even point. The objective is to determine the point of sales at which current outlays are recovered. The revenue-total expense break-even point may be illustrated on the same graph as the "cash" break-even point.



In the accompanying graph, the "cash" break-even point is at sales of *OA*. At that level of sales, the current position of the firm can be maintained. The revenue-expense break-even point is *OB*. At that level of sales, the total assets of the firm can be maintained (it should be recognized that the current position can be changed by factors other than operations; for example, dividends and purchase of equipment).

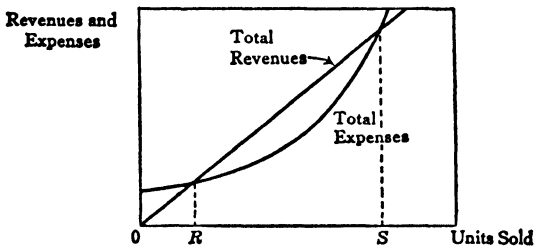
It is possible to show on the break-even chart the detailed breakdown of the expenses. Thus, labor, material, taxes, etc., could all be plotted on the graph to show the make-up of the total expenses. A danger is that the graph will become too cluttered. If too many items are plotted, the "forest may not be seen because of the trees."

Another possibility is to draw another line above the total expenses to show the total expenses and dividends on stock. This has some use, since it shows that level of sales which must be obtained in order to maintain the level of dividends. On the other hand, there may be an implication that dividends on stock are a fixed expense. Dividends are not fixed but are a voluntary distribution of earnings. Subject to this limitation, this type of break-even chart will have some application, especially to a divisional manager who is responsible for maintaining a certain dividend payment to the parent company.

RELAXING OUR ASSUMPTIONS

Up to here, it has been assumed that the total revenue and total expense lines are straight. It is likely that neither one will be a straight line in practice.

The plot of total expenses will be affected by the fact that, as more variable factors of production are applied to the fixed factors, a point will be reached where there is a decrease in efficiency. This will cause the total expense curve to have an increasing slope. It is possible that, at the low levels of production, efficiency was actually increasing; thus the slope of the total expense curve would be decreasing at that level of production. This latter possibility can usually be ignored, with no harm to the analysis, since the firm is more likely to be operating at a level where the marginal costs of successive units are either constant or increasing.



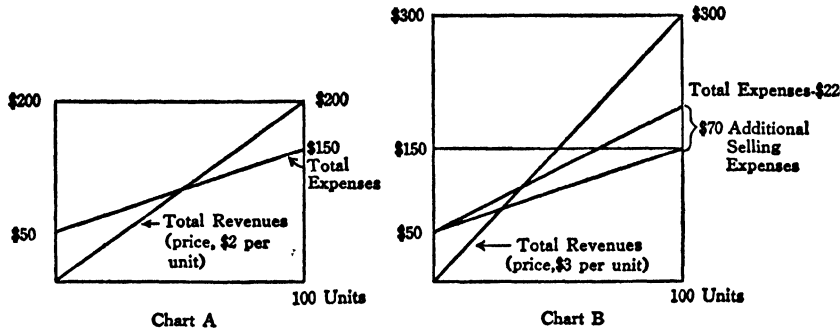
It is interesting to note that there are two break-even points in the accompanying graph, one at OR and one at OS. This occurs because it is assumed that the total expense curve, instead of being a straight line, curves upward (reflecting decreasing efficiency). The firm will actually attempt to operate somewhere between sales of OR and OS units. The point of maximum profitability will be where the curve and the line are furthest apart (where the difference between the revenues and expenses is the greatest).[2]

The total revenue curve, when plotted as a straight line, assumes that there will be no decreases in prices necessary to accomplish the increased sales. If it is assumed that in order further to increase unit sales, it is necessary to decrease price, then the shape of the total revenue plot is not a straight line. An attempt to plot the different total revenues resulting from different unit sales, assuming different pricing policies, would complicate the analysis. A simple solution of this problem is to plot the total revenues and expenses, assuming different pricing policies on different graphs. It is likely

[2] This point is also where the tangent of the total expense curve is parallel to the total revenue line (thus marginal revenues equal marginal expenses).

that the total expense curves will also be different because of the necessity of changing selling policies to correspond with the pricing policies.

Charts A and B illustrate the type of analysis that may be used to decide which of various pricing policies will be most desirable. Chart A shows



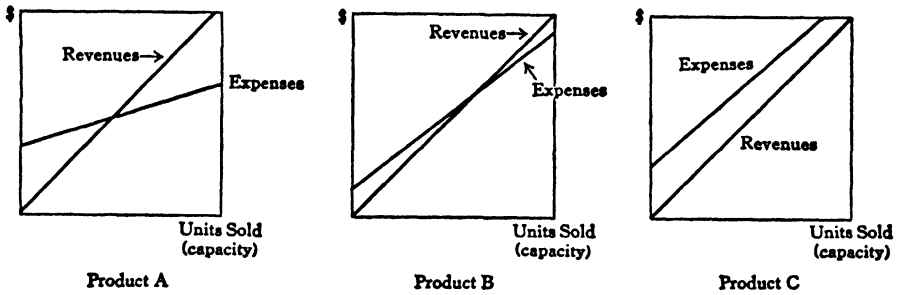
the break-even analysis with a price of $2 per unit. Chart B shows the break-even analysis assuming a price of $3 per unit. Chart B is exactly similar to Chart A, except that the total revenue line has a greater slope, reflecting the higher price, and there are additional selling expenses anticipated. Which is the better course of action? The answer will depend on a bit of information necessarily not on the charts. What will be the number of units sold (the level of activity) following each policy? When this information is obtained and evaluated, the decision can be made.

The justification for using straight lines to represent total revenues and total expenses is twofold. For one thing, it is much simpler to make that assumption. Secondly, the error is not so great as one would think by looking at a graph of total expenses or total revenues. Actually, in the area where the firm is likely to operate, both the total revenue and the total expense curves approximate straight lines. The straight line assumptions are probably as accurate as more complicated curves. The problem of what would happen if prices were lowered may be handled by drawing another break-even chart with the new total revenue line reflecting the decreased price. This new line would still be a straight line, and the procedure would show the different profits that could be expected from different pricing decisions. Another possibility would be to plot the most likely revenues for different prices.

PRODUCT BREAK-EVEN CHARTS

Break-even analysis is useful for analyzing all different levels of operations. Thus a chart can be drawn to show the break-even point for the Ford Motor Company, or a chart can be drawn to show the break-even point for the Ford

Division or for a particular model of Ford motor car. The break-even chart drawn for a specific product may often be the most useful. Using the break-even analysis, one is able to detect a product that will not be profitable no matter how many units are sold. Too often the failure to make a profit is blamed on the lack of sales volume, whereas the real culprit is the characteristics of the revenue-expense relationship. Consider the following three break-even charts made for three different products.



Assume that the three graphs above are all drawn to the same scale and that price changes are out of the question. Product A clearly has more potential for profitability than products B and C. Product B can show a small profit, but no matter how great the sales become, it can never be very profitable (compared with the profit which product A can make). Product C cannot make a profit unless the price is increased (changing the slope of the total revenue line) or the total expense line is changed. In an actual situation, the actual maximum profit that each of these products could make would be computed from the graphs.

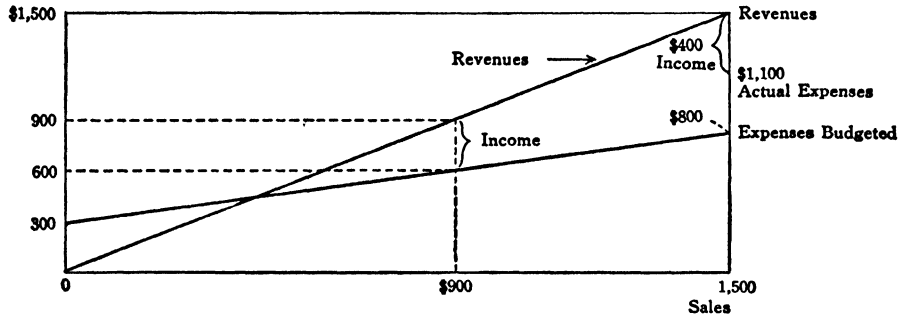
Graphs of the nature described here will be adequate to decide whether to add any of the three products. If the products are currently being produced, and the decision that has to be made is whether or not to continue to produce them, then break-even charts showing other information will be useful. For example, the break-even point for out-of-pocket costs is relevant, as is the break-even point for avoidable costs. Before a product is dropped, you will want to know whether you are going to be better or worse off without it. The break-even chart can help in making that decision.

USING BREAK-EVEN CHARTS FOR PROFIT CONTROL

The break-even charts have many uses, but two of the most important uses are classified as "profit control." These uses are:

1. Forecasting the profit of the next period if certain courses of action are taken.
2. Comparing the actual profit of the past period with what it should have been according to the break-even analysis.

Assume that sales equal to $900 were forecasted. At that level of sales, profits of $300 are to be expected. If this level of profits is satisfactory, then the plans will be carried out and the firm will be working toward that end.



At the end of the period, the actual sales are $1,500, and the actual profits are $400. The sales manager may be praised, but someone will have to explain why the profits are not equal to the forecasted profits for the *actual* level of sales. Thus the break-even chart lends itself to a flexible control of the costs and profits. The absolute level of profits is not so important as what the profits should be at the actual level of activity. In this example, the actual profits were $400, while the budgeted profits were $300, but this was not cause for rejoicing. The profits for sales of $1,500 should have been $700, not $400. Expenses should have been $800, not $1,100.

LIMITATIONS OF BREAK-EVEN ANALYSIS

The break-even analysis is a very useful tool, but like many gadgets, it is sometimes oversold by its adherents. If the user of a break-even chart is aware of the limitations of this type of analysis, then it becomes a safe tool. Among the points raised against the use of break-even analysis are:

1. The total expense plot is not actually a straight line. (*Ans.*: If the total expenses are known not to have the characteristics of a straight line, then they should be drawn differently. The break-even analysis does not depend on the assumption of a straight line for total expenses. It does require an ability to predict expenses at different levels of sales.)
2. The total revenue line is not a straight line. (*Ans.*: In many cases it *is* a straight line; this is especially true when the individual seller

cannot influence the price. If the seller has a pricing decision to make, a series of break-even charts is useful.)

3. The X axis cannot measure "units sold," since many unlike types of product are sold by the same firm. (*Ans.:* This is true. Where there are unlike products being sold, the X axis cannot measure the number of units sold. However, measuring units sold on the X axis is useful if the plant is making only one product. It is also useful when the break-even analysis is being made for only one product.)

4. A break-even analysis is of doubtful value when the firm is selling many products with different profit margins. (*Ans.:* There is some truth in this statement. However, a series of break-even charts can be made to show the results of sales of different product mixes. Break-even charts of the sales of the individual products are also useful.)

5. The objectives gained by break-even analysis can be also accomplished by schedules. (*Ans.:* This is essentially true, although the break-even analysis has the advantage of offering a *picture* of the possible results at *all* levels of operations. Schedules cannot accomplish this as well.)

6. Break-even analysis implicitly assumes that income is influenced only by changes in sales, i.e., changes in inventory will not directly affect income. If variable costing (direct costing) is used, this will be valid; otherwise, changes in inventory will affect income, since the absorption of fixed costs will depend on production, not sales. (*Ans.:* The break-even analysis when used for planning can assume that the finished goods inventory will be unchanged. If the break-even chart is being used for profit control, and if variable costing is not being used, then changes in inventory will affect the actual income.)

APPENDIX

A Regression Line

If X is an independent variable (such as direct-labor hours) and Y is a dependent variable (such as cost of handling material), we may assume that the relationship of X and Y is linear and compute the regression line.

The equation for the regression line is:

$$Y = a + bx$$

where:

$$b = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$

$$a = \overline{Y} - b\overline{X}$$

EXAMPLE

Observation	*Direct Labor Hours* x	*Cost of Handling Materials* y	xy	x^2
1	10	9	90	100
2	20	14	280	400
3	6	7	42	36
	$\Sigma x = 36$	$\Sigma y = 30$	$\Sigma xy = 412$	$\Sigma x^2 = 536$

$$n\Sigma xy = 3 \times 412 = 1{,}236$$
$$\Sigma x \Sigma y = 36 \times 30 = 1{,}080$$
$$n\Sigma x^2 = 3 \times 536 = 1{,}608$$
$$(\Sigma x)^2 = 36 \times 36 = 1{,}296$$
$$b = \frac{1{,}236 - 1{,}080}{1{,}608 - 1{,}296} = \frac{156}{312} = .5$$
$$a = \overline{Y} - b\overline{X} = \frac{30}{3} - .5\left(\frac{36}{3}\right) = 10 - 6 = 4$$

The regression line is:

$$Y = a + bx$$
$$Y = 4 + .5x$$

The fixed cost is \$4, and the variable component of the cost is \$.40 per direct-labor hour.

Hints on the Derivation of the Formulas

The derivation of

$$b = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$
$$a = \overline{Y} - b\overline{X}$$

Assume there is a line, $Y = a + bx$, and a series of observations, y, for each value of x. The difference between Y and y is a measure of how much the line fails to predict the true y.

In choosing the line (i.e., the values of a and b), assume we want to minimize the square of the differences between Y and y for each value of x. Mathematically, we want to minimize $F\ (a,b)$ where $F\ (a,b) = \Sigma(Y - y)^2$.

Since Y is equal to $(a + bx)$, we have:

$$F\ (a,b) = \Sigma(a + bx - y)^2$$

We then take the partial derivatives with respect to a and b, set the two equations equal to zero, and solve for b and a.

QUESTIONS AND PROBLEMS

29–1 Plot each of the given equations. How can you determine (without plotting) whether an equation represents a curve or a straight line?

(a) $Y = 20 + 3X$
(b) $Y = -20 + 0.5X$
(c) $Y = 4X^2$
(d) $Y = 15 - 2X$

29–2 Assume that the equation for total expenses (Y) for the Rose Company is

$$Y = 20{,}000 + 0.8X$$

If X represents dollars of sales, what is the significance of the $20,000 and the 0.8?

29–3 Assume that the equation for the total revenues of the Rose Company is

$$R = 3Q$$

in which R = the total revenue
Q = the number of units sold

Required

(a) What is the significance of the 3?
(b) Substitute Q (units) for X (dollars of sales) in the equation for total expenses. (See Prob. 29–2.)
(c) Determine the break-even point in terms of dollars and units. Solve graphically and algebraically.

29–4 To determine the break-even point, the company plotted total revenues on the X axis and total expenses and total revenues on the Y axis. The president of the firm wanted to know the effect of a 10% increase in price on the break-even point. The analyst shifted the slope of the revenue line and read off the new break-even point. Comment on this procedure.

29–5 Given the following equation, determine what X, Y, and Z represent.

$$\text{Break-even point} = \frac{X}{Y - Z}$$

29–6 The Maple Company

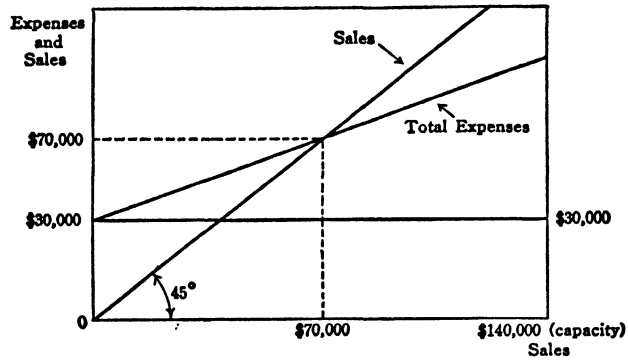
Required

(a) Given the following information, plot a break-even chart, using a 45-degree construction line:

Price = $3 per unit
Variable cost per unit = $2.60
Fixed costs = $10,000

(b) Using the same information, plot a break-even chart, using only an income line.

29–7 The Moore Company



Required

(a) The break-even point is $_____ of sales.
(b) At the break-even point the income is $_____.
(c) The fixed costs are $_____.
(d) The variable costs for sales of $140,000 would be $_____.
(e) Operating at 80% of capacity, the variable costs would be $_____.
(f) Operating at capacity, the income would be $_____.
(g) Operating at capacity, the income per dollar of sales (the earning rate) would be _____%.
(h) Operating at $70,000 of sales, the income per dollar of sales (the earning rate) would be _____%.
(i) If the selling price per unit were lowered, the total expense line would shift (*upward, downward*). Choose one. Explain.
(j) If the price per unit is $3.50, then the break-even point is _____ units.

29–8 The Brake-Even Company

The Brake-Even Company manufactures two general types of brakes, automobile and truck brakes. The management of the Brake-Even Company is concerned because of the fluctuations in income which have been experienced in the past few years. Some members of management have also suggested that one of the product lines should be dropped.

The company has made an analysis of its sales and income by product line (each of the products is organized as a department for manufacturing and sales purposes).

		Sales of Brakes		Income before Taxes	
Year	Quarter	Auto	Trucks	Auto	Trucks
1963	1	$2,000	$ 500	$200	(450)
	2	2,400	600	440	(440)
	3	3,200	1,200	920	(380)
	4	1,500	2,000	(100)	(300)
1964	1	2,100	1,500	260	(350)

(All dollar figures in thousands)

An analysis of the expenses associated with the sales of the product disclosed the following information:

	Auto Dept.	*Truck Dept.*
Variable Costs per Dollar of Sales, 1963		
Material	$ 0.10	$ 0.25
Direct Labor	.21	.50
Variable Overhead	.05	.10
Variable Selling Expenses	.04	.05
	$ 0.40	$ 0.90
Fixed Costs for 1963		
Directly Associated with the Department:		
Avoidable (foremen's salaries, etc.)	$1,600,000	$ 80,000
Unavoidable (depreciation of special equipment, etc.)	400,000	320,000
Allocated from Other Departments (including administrative costs)	2,000,000	1,600,000
	$4,000,000	$2,000,000

The unavoidable costs cannot be avoided by sale of the equipment, since the removal costs would approximately equal the sales price. General overhead would not be reduced by elimination of any one of the product lines.

For internal reporting purposes, the company charges all fixed costs to the period in which they are incurred, and only variable costs are considered a cost of product.

Required

(a) Prepare an analysis explaining the fluctuations in income.
(b) Make recommendations as to the desirability of continuing the sale and production of any of the products.
(c) Prepare a break-even chart for the auto department. Explain the difficulties connected with preparing one break-even chart for the company as a whole.
(d) Assume that during the first quarter of 1964 the auto brakes were sold at a price of $20 per unit. If the price were dropped to $15 per unit, 200,000 would be sold (according to the company's economist). Is the reduction in price desirable? Assume that the variable costs are $8 per unit.

29-9 The New York Company manufactures folding chairs for sale to clubs, commercial establishments, and individual consumers. The sales for the past several years have been cut back to 40% of capacity. At this level, the company produces 60,000 chairs, which it sells at an average price per chair of $2.10. Total costs at the 40% level are made up of $54,000 for fixed items and $90,000 for variable items. Variable costs are known to change exactly in proportion to output.

Required

(a) If the average selling price remains the same as it has been in the past, at what level of activity will the company break even?

(b) What would the company's profit be if it could operate (and sell) at capacity?

(c) Assume that the company computes the fixed cost per unit, using capacity level of operations. What is the average total cost per unit?

(d) Assume that a new customer offers the New York Company $1.70 per unit for its product. Provided that there are no effects on sales to old customers (and no legal complications), should the New York Company accept an order for 40,000 chairs? Briefly justify your answer.

30

Measuring and Reporting Performance

TOP MANAGEMENT IS constantly attempting to measure the performance of junior executives and supervisors. This is necessary in order to determine who is worthy of promotion, as well as to uncover those areas where the profit potential is not being fully realized.

There are various tools available for measuring performance. As in other areas of accounting, the accuracy of some of the measurements is subject to interpretation. The limitations of the accountant's ability to measure performance with absolute correctness must be recognized. If several of the tools described in this chapter are used to judge performance, and if the possibility of distortion is investigated and eliminated when possible, then these tools will be useful to management. It should be noted that the single most meaningful measure of over-all performance, income, is not described in this chapter, because the problems of measuring income are covered throughout the text.

MEASURES OF PERFORMANCE

Investment Turnover

The intensiveness of the use of the investment is of significance. Investment, as used in this chapter, refers to the funds invested in buildings, equipment, inventories, receivables, cash, etc. The ratio of sales to investment gives one measurement of the degree of utilization of the resources.

$$\text{Investment turnover} = \frac{\text{sales for year}}{\text{investment}}$$

If the computation is being made for a month's sales, then the equation becomes:

$$\text{Investment turnover} = \frac{\text{sales for month}}{\text{investment}} \times 12$$

Investment is used in several of the computations, and some warning is necessary relative to any ratio that uses this item. The measurement of investment is frequently only an approximation at best. The area of greatest difficulty is in valuing the investment in fixed assets; there are two main problems:

Assets purchased under different price levels.
The method and extent of depreciation.

If the building of Plant A was built in 1940 and the building of Plant B was built in 1960, then the same cubic footage of space for Plant B will be recorded at three times to four times the cost of the cubic footage of Plant A. This occurs because of inflation, but it will distort a comparison of the degree of utilization of the two plants. Another difficulty will arise if the two plants are being depreciated by using the straight-line method of depreciation. The rate of utilization of Plant A will tend to be higher than Plant B, because the book value of the former will be less, since Plant A will have been depreciated for a longer period of time. If the two plants have used different methods of depreciation (for example, if Plant A had been arbitrarily written off during the period of World War II), the distortion will be even greater.

EXAMPLE

The ABC Company computes investment turnover, using the net investment (depreciation accruals are subtracted) as of the beginning of the year. Assume that the plant has a life of two years and sales for each year of life of $100,000. No other assets are used.

Situation 1: Plant A, which costs $20,000, was purchased on January 1, 1957. Compute the investment turnovers for 1957 and 1958.

$$\text{Investment turnover, 1957} = \frac{100{,}000}{20{,}000} = 5 \text{ times}$$

$$\text{Investment turnover, 1958} = \frac{100{,}000}{10{,}000} = 10 \text{ times}$$

Investment decreases from $20,000 to $10,000, since the straight-line depreciation for the first year is $10,000. If a different method of depreciation had been used, the investment turnover for the second year would have been different.

Situation 2: Plant B, exactly similar to Plant A, was completed on January 1, 1958. Due to inflation of building costs, the plant cost $40,000. The sales for 1958 were $100,000. Compute the investment turnover for 1958 and compare the turnover with that of Plant A.

$$\text{Investment turnover, 1958} = \frac{100{,}000}{40{,}000} = 2.5 \text{ times}$$

Plant B has an investment turnover of 2.5 times, which compares unfavorably with either year of the life of Plant A. The plant built earlier has two advantages.

It was built before the inflation, and it has been depreciated. If Plant B is technologically more advanced, these advantages may be balanced out by the increased efficiency.

The distortion caused by the change in the price level can be corrected by adjusting the cost of the plants into common dollars. The distortion caused by the use of straight-line depreciation is somewhat more difficult to eliminate. Much depends on whether the output of the asset is affected by the age of the asset. If output is inversely proportional to age, then it may be that it is logical to use the depreciated value of the asset. If output is not affected by the age of the asset, then it may be logical to use the undepreciated cost of the asset, adjusted for changes in the price level, as the base for computing the investment in the fixed asset.

Earning Rate

The earning rate gives an indication of how efficiently the plant operated as it gained the sales.

$$\text{Earning rate} = \frac{\text{earnings}}{\text{sales}}$$

The primary problem here lies in determining the earnings of the period. All the problems of income measurement are involved here, and they are compounded by the fact that the period of time for which the income is being measured is frequently of short duration. The comparison of different plants, and to some extent the comparison of the same plant for several periods, is complicated by the following factors:

1. Inventory flow problem (FIFO, LIFO, Average Cost, etc.).
2. Depreciation cost (the method of computing depreciation).
3. Depreciation cost (the problems arising from the change in the price level).
4. Overhead absorption (changes in the level of activity or sales will affect profit).
5. Different product mix (some products may have higher profit margins than other products).
6. Expensing or not expensing supplies and small tools when purchased (some plants expense supplies and small tools when purchased, others maintain them in inventory; this will also affect the investment of the plant).

Fairly satisfactory methods of adjusting for the first four items will be covered in Chapters 32–33 or have already been discussed in Chapter 28. The fact that products have different profit margins can be handled by making analyses by product as well as by plant. Item 6 in the list of factors is a result of poor accounting practice which should be eliminated. Supplies and other similar items should be maintained in inventory until they are used, and then they should be expensed. Unfortunately the policy of expensing all

items as rapidly as possible is encouraged by the fact that it is "smart," since it reduces the total income tax paid to date, reduces property taxes in some areas, and reduces the investment in plant (thereby increasing the return on investment).

Return on Investment

The return on investment is the ratio of the earnings to the total investment in assets employed. It gives an indication of the efficiency of the utilization of the plant as well as the intensity of utilization.

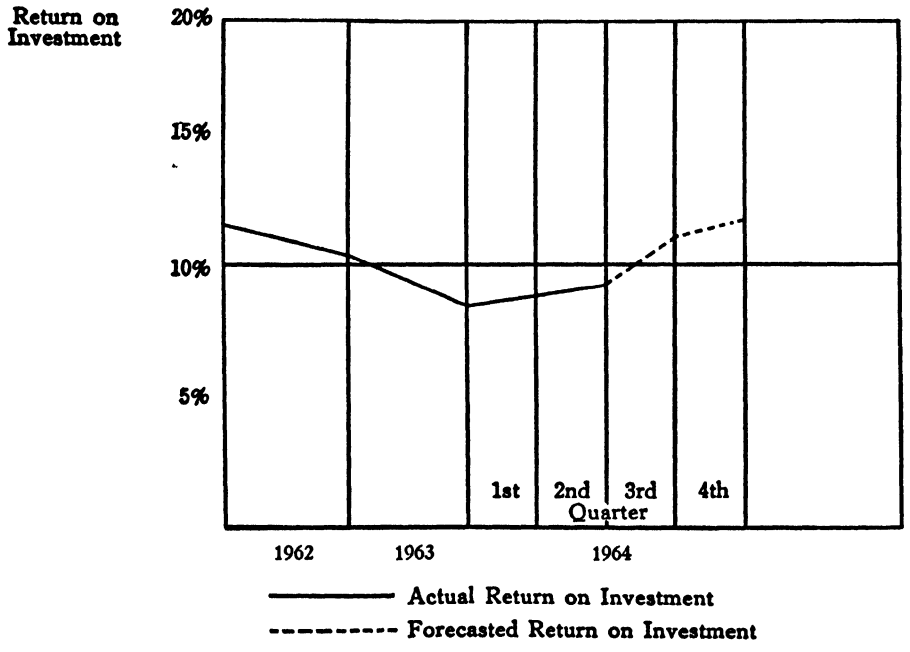
$$\text{Return on investment} = \frac{\text{earnings}}{\text{investment}}$$

The return on investment may also be computed by making use of the two rates already determined.

$$\text{Return on investment} = \text{investment turnover} \times \text{earning rate}$$

$$= \frac{\text{sales}}{\text{investment}} \times \frac{\text{earnings}}{\text{sales}} = \frac{\text{earnings}}{\text{investment}}$$

The return on investment is probably the most significant of the computations made to this point. Unfortunately it picks up all the weaknesses connected with the measurement of the investment and the measurement of the



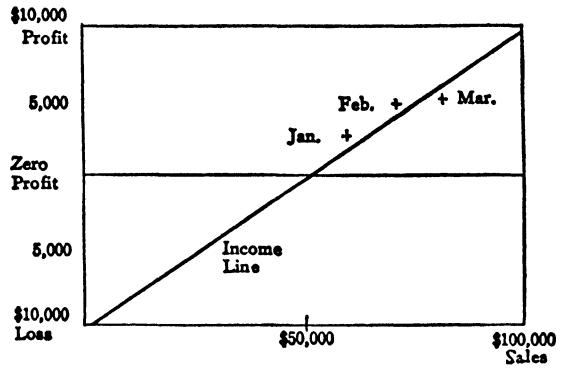
The 10% line represents the *expected* return for this investment.

earnings. Despite these limitations, it is a very useful tool for measuring the performance of divisional managers.

The results of the preceding computations can all be plotted on graphs, so that the results of successive periods may be compared. The forecast for the next period may be placed on the same graph so that it may be compared with the actual results.

A Flexible Budget and Measuring Performance

The flexible budget has been discussed previously in the chapters on break-even analysis (Chapter 29) and the control of costs (Chapter 20). It is mentioned here to stress the fact that it can be a useful device to measure performance, because it does take into consideration the effects of changes in activity. The flexible budget type of analysis used in this manner makes an implicit assumption that *all the fixed costs are considered as period costs (a variable costing procedure)*.



The accompanying chart is only one of many types of chart which may be used. The income line represents the budgeted income for different levels of sales. At zero level of sales, the budgeted loss is $10,000; thus the fixed costs are $10,000. Each month, the actual incomes for the actual sales are plotted on the chart. In January and February, the plant was more efficient than budgeted; in March it was less efficient. This method of presentation is extremely useful, since it shows at a glance the actual profit compared with what it should have been. The information is presented simply, without the complications of confusing titles which often accompany accounting reports.

Controlling Current Assets

The plant manager often has to take the plant and equipment as given to him; thus he cannot control the investment in long-lived assets. He can control, however, the current assets being used. The largest and most im-

portant items are cash, accounts receivable, and inventories. The subject of controlling inventories has been discussed in detail in Chapter 27, and similar methods for the control of cash and accounts receivable should be applied. The efficiency of the application of these methods should be checked by watching such measurements as:

Number of Days' Inventory on Hand
Inventory Turnover
Number of Days' Receivables on Hand
Turnover of Receivables
Number of Days' Cash Supply on Hand

Excess investments in current assets will also be disclosed by lower than standard return on investment.

EXAMPLE

Balance of Accounts Receivable, March 1, 1958	$31,000
Balance of Accounts Receivable, March 31, 1958	29,000
Sales in March	62,000

Compute

(a) The number of days' receivables on hand on March 1.

$$\text{Sales per day} = \frac{\$62{,}000}{31} = \$2{,}000 \text{ per day}$$

$$\text{Number of days' receivables} = \frac{31{,}000}{2{,}000} = 15.5 \text{ days}$$

(b) The turnover of receivables for March.

$$\text{Average receivables} = \frac{31{,}000 + 29{,}000}{2} = 30{,}000$$

$$\text{Rate of turnover} = \frac{62{,}000}{30{,}000} \times 12 = 24.8 \text{ times per year}$$

The turnover may also be expressed in terms of days:

$\frac{365}{24.8} = 14.7$ days (the receivables are turning over at the rate of once every 14.7 days)

Comparable computations can be made for cash and inventories.

ACCOUNTING REPORTS FOR MANAGEMENT

In preparing accounting reports, attention should be focused on who will use the report and how the report will be used. It can be just as bad reporting practice to supply too much information, which overwhelms the reader, as too little, which leaves him guessing.

In preparing a report, the accountant should not feel that he has to conform to a set of rules that places him in a straight jacket. However, there are a few guides that he should keep in mind. The rules will not be valid in all cases because of the differences in the capabilities of top management to digest information and because of variations in the form in which management wants that information. Thus it is necessary to shape the reports to the desires of the parties for whom the reports are being prepared. Nevertheless, there are some general guides that should be followed. The following are some of the more important:

1. Summarize detailed or long reports.
2. Report exceptions instead of (or in addition to) the detail. Do not attempt to show all the detail in all reports.
3. Distinguish between controllable and noncontrollable costs.
4. Explain technical aspects of the report.
5. Never distribute machine runs without headings. (These are automatically typewritten lists produced by accounting machines.)

There is a tendency to overpower top management with detail, much of which is irrelevant. Detailed reports going to top management should be minimized and, when presented, should be accompanied by a summary. This summary will enable the reader to bypass the detail if he wishes. Lower levels of management will be interested in more details, since they are working with them.

The rule of managing by exception is generally accepted. To carry out this rule effectively, management needs reports that report the exceptions, i.e., the trouble spots. Frequently a company will spend thousands of dollars accumulating and summarizing information to prepare reports that could be economically replaced by reports which reported only the areas requiring attention. If there are 10,000 jobs in production, management does not have to worry about the 9,990 which are on schedule but the 10 jobs that are falling behind schedule. One company with which the author is familiar often sets very tight production schedules, with the result that all jobs are always behind schedule. This means that all jobs receive the attention of manage-

ment and have to be reported. But by making all jobs priority jobs, no jobs are priority, and the principle of managing by exception is lost, because all the jobs are exceptions.

The principle of controllable and noncontrollable costs has been introduced previously. It is repeated here to highlight the fact that a member of management should not be burdened with cost information if he cannot control the costs being reported. Any report that measures a member of management's efficiency should include only those costs which he can control or, at a minimum, should clearly indicate and classify the noncontrollable costs.

Control of Reports

With large corporations, one of the biggest areas of possible cost-saving is the reduction of report preparation cost, especially the cost of preparing those reports concerned with the control of cost. There is a tendency for any extensive cost control program to go wild and for reports to create additional reports which serve little useful function. How is this to be prevented, and how can it be assured that the proper reports are being prepared?

The general answer to these questions (and all other problems) is to have capable managers who know what they want and, even more important, who only want useful information. Failure to attain 100% perfection in this goal indicates a need for a "report group" which has authority to review the need for new reports before they are authorized and also to review the format and use of old reports.

Report preparation is a large cost of doing business. It is a large cost in absolute as well as relative amounts. Management needs the information supplied by reports, but it needs it on a selective and economical basis. One of the hardest things to find in the business world is a subordinate willing to say to a superior (or a superior willing to listen): "You don't really need that information" or "The cost of preparing that information would be $110,000; do you need it that badly?" The slightest request from top management is frequently interpreted as a mandate to spend thousands of dollars to get the information. We prepare elaborate programs to control capital expenditures and to ensure that the funds are wisely invested. Labor and material are controlled with a great deal of care, but the costs connected with preparing reports are often ignored.

The Physical Preparation of Reports

A layman pictures an accounting report to be an array of many numbers, frequently accompanied by some verbal description. This is fairly close to the

truth, but there is one missing link. Behind the array of numbers may be literally hundreds of thousands of detailed numbers. This is true in a summary of payroll, material inventory, work in process, etc. This detailed information has to be accumulated, sorted many times, summarized, and then presented. This is an expensive series of procedures, even though the accumulation of information is an art which has progressed rapidly in the past few years. Electric accounting machines, using punched cards, were the first big step toward mechanization of data-processing. The second step was the electronic data-processing machines. Both these processing systems can process information at rapid rates of speed, with the electronic machines far outstripping the older type of punched-card equipment.

These accounting machines have captured the imagination of businessmen, and it is no secret that the mechanization of record-keeping is progressing at a rapid rate. There seems to be no doubt that these machines will take over more and more of the routine bookkeeping jobs. Nevertheless, there are still several questions which should be asked before placing a record-keeping task on one of these machines:

1. Should the job be done at all?
2. Can the job be done more cheaply by using another process?
3. Can the results be obtained more rapidly by using another process?
4. Is the information more accurately obtained (less chance for error) by this process than by using other processes?

It cannot be assumed that the more mechanical procedure will necessarily give better results. In some cases, a manual record-keeping procedure that uses a mechanical file system will do a better job than an elaborate electronic data-processing system. All possibilities should be reviewed before a decision is reached.

Duplication in Reporting

Scientific articles have been written proving a man cannot be 20 feet tall and that a bee cannot be as big as an elephant. The problem of staying alive is multiplied as the organism becomes larger, and the structure of certain component parts of both the man and the bee prevents them from reaching the sizes mentioned. Corporations also probably have a size that is most efficient and beyond which they become less efficient. To date, this size has not been determined, and when it is finally determined, it may be several times larger than any of our present corporations, for the advent of data-processing equipment seems somewhat to raise the ceiling on efficient size. Nevertheless, as a corporation grows larger, the possibility of inefficiencies due to size in-

creases. Little mistakes become big mistakes when they affect thousands of personnel and hundreds of thousands of units of products being made.

A by-product of size, in the area of reporting, is the danger of inadvertently duplicating existing reports. The importance of eliminating duplication is highlighted by the fact that some reports will cost several hundred thousand dollars a year to produce. Duplication of these reports can obviously put a dent in the income of the firm.

Duplication is generally the result of several different departments having need for the same information but not taking the time to find out if someone else is already preparing the information. The following are a few examples of duplication;

1. Both the finance department and the personnel department were preparing a weekly report of the average wage rates of personnel in the different departments. There was considerable overlap in the distribution list of these two reports, yet they existed side by side for several years.
2. Both the production control and the production departments were preparing a status report of jobs in process. The information on the two reports was slightly different, but with minor changes the two reporting systems could have been combined.
3. Both the cost accounting and the industrial engineering departments were accumulating direct-labor costs and issuing control reports. This duplication was known, but the two empires were allowed to exist.
4. Production control and accounting were both maintaining complete inventory records for raw material and nonproductive supplies and issuing reports of inventory. The purpose of the duplication was to decrease the possibility of error.

These are only a few examples of duplication, but the duplications illustrated here resulted in a yearly waste of thousands of dollars. Elimination of waste in the area of reports is surely worth while.

EXAMPLES OF REPORTS

The following sections will illustrate a few reports and some of the difficulties in making these reports.

Report of Manufacturing Costs

A popular report with accounting textbook writers (possibly with businessmen also) is the report of manufacturing costs. The exact form of the report will vary, but it will essentially be as follows:

THE SAMPLE MANUFACTURING COMPANY

Report of Manufacturing Costs for
Month Ending January 31, 19—

Work in Process (beginning of period)		$ 20,000
Manufacturing Costs Incurred		
Direct Labor	$60,000	
Material	30,000	
Overhead	70,000	
Total Manufacturing Costs		160,000
		$180,000
Goods Finished during Month		165,000
Work in Process (end of period)		$ 15,000

By changing the form and content slightly, this report can be made to show the manufacturing cost of goods sold for the period.

The report of manufacturing costs is easy to prepare, since the information is accumulated for other purposes and will be readily available. Thus the report is not costly. On the other hand, is it useful? Only in a very limited way, i.e., by supplying general background information. Is there a specific decision that can be made by using this information? Is there a conclusion that can be reached from looking at this report? To both these questions the answer is "no." As presented, the information cannot be used for either purpose. To be useful, the costs have to be placed in some frame of reference. If the physical production of the period were known, if the budgeted or standard costs were known, if the cost and production of the last period were known—then conclusions could be reached and decisions made. What would a useful report look like? The following is an example:

THE SAMPLE MANUFACTURING COMPANY

Report of Manufacturing Costs for
Month Ending January 31, 19—

Comparison of Actual Costs and Standard

	Actual	Standard	Variance, (Favorable) Unfavorable
Direct Labor	$ 60,000	$ 62,000	($2,000)
Material	30,000	36,000	(6,000)
Overhead, Variable	50,000	45,000	5,000
Overhead, Fixed	20,000	19,000	1,000
	$160,000	$162,000	($2,000)

An equally acceptable report shows the costs on a per-unit basis. Some firms like to have costs placed on a per-unit basis without using standard costs. The control is then carried out by comparing the costs of successive months.

The accompanying report focuses attention on the control of manufacturing costs. It assists in the control of costs by indicating that there have been unfavorable variances in fixed and variable overhead. This report should be backed up by supplementary reports showing the specific areas where the excessive spending occurred. Note that this report shows that something is wrong, but it does not show specifically what is wrong. This task is reserved for other reports.

Divisional Income Statements

The desire for decentralization has led many large corporations to divisionalize. This in turn has led to the need of measuring the performance of the various divisions. The accounting entity becomes the division instead of the corporation. The problems of accounting for segments of a corporation are more complex, however, than the accounting for a corporate entity. One problem is the pricing of the sale of products among divisions. In accounting for a corporation, the price is part of a legal contract and relatively easy to determine. With intra-company transfers, the price is often arbitrarily determined by management. Since the price of product will determine the total revenue, the income is to a great extent determined even before production is commenced. Thus the *actual efficiency* will influence the *measure of efficiency* only to a limited extent.

Even where intra-company transfers and pricing are not a problem, there still exists the problem of the allocation of costs between the divisions. These may be headquarters (central office) costs that have to be allocated to the operating divisions, or the costs of one division performing services (such as accounting or transportation) for the other divisions. Arbitrary allocations result which are not necessarily harmful but which unfortunately often become harmful because they form the basis of reports for which they were never intended. These costs are frequently joint costs incapable of clear-cut allocations.

The allocation of costs among divisions and the allocation of central office overhead are useful for determining the cost of inventory (work in process and finished goods). They also indicate to the operating divisions the total costs that have to be recovered by the division in order for the company to be heading for a profitable operation.

The allocation of these costs is not useful for purposes of controlling costs, nor is it useful in pin-pointing the income of the division. The allocation of the costs is too arbitrary and too subject to complaint, so that it does not accomplish these goals. When divisional income reports include these alloca-

tions in detail, there is a tendency for the divisional management to focus attention on these items and to place the blame on them for decreases in income. It is not hard for a person to take exception to the basis of allocation of joint costs. The following report is an example of the type of report that leads to this misuse of management time:

THE DETROIT DIVISION OF
THE SAMPLE COMPANY

Income Statement for the Month
Ending June 30, 19—

Sales Revenues			$50,000
Less			
Manufacturing Costs (standard costs of product)		$40,000	
Unfavorable Variances from Standard Costs		1,500	
Selling Costs		4,000	
Allocations from Central Office			
Personnel Department	$300		
Production Department	700		
Finance Department	400		
President's Office	600		
Purchasing Department	500	2,500	48,000
Income of Division			$ 2,000

There are several weaknesses in the preceding statement. There is only one income figure, and this is reported after the allocations from central office. The efficiency of the division manager is being measured by the income of $2,000, even though this figure is affected by the $2,500 of costs which he cannot control. Also, the income statement devotes more space to the irrelevant allocations than to the remainder of the costs. A more significant income statement would be as follows:

THE DETROIT DIVISION OF
THE SAMPLE COMPANY

Income Statement for the Month
Ending June 30, 19—

Revenues		$50,000
Less		
Manufacturing Costs (standard costs of product)	$40,000	
Unfavorable Variances from Standard Costs	1,500	
Selling Costs	4,000	
Total Divisional Costs (controllable by division)		45,500
Contribution of Division		$ 4,500
Less Allocation of Central Office Costs		2,500
Net Income of Division		$ 2,000

This second income statement highlights the contribution of the division, since for many purposes this $4,500 would be the significant figure, not the $2,000. The allocations from the central office are played down by combining them into one figure.

Neither of the income statements distinguishes between fixed and variable costs. Frequently it will be desirable to compute the contribution of the division in terms of the difference between revenues and variable costs.

Reporting Costs by Divisions

The criticisms made relative to the divisional income statements also apply to the cost reports. These are too frequently cluttered up with costs that the division (or smaller operating unit) cannot control. This is especially true where the allocations are arbitrary.

In some cases, allocations of costs may have significance. The prime example of this is repair costs. Repair costs can be controlled by the repair shop foreman who sees that jobs are done quickly in an efficient manner. They can also be controlled, in a sense, by the operating departments, which properly maintain the machines so that the need for repairs is reduced. With costs of this nature, the allocation (when based on actual jobs worked) does have significance, since the costs are to some extent controllable by the operating personnel.

A cost report should highlight those costs which are truly controllable. Other costs should be combined and presented as noncontrollable costs. This will allow the manager to focus attention on those areas which he can control. The report should also be so designed that those areas requiring attention will be highlighted and thus bring *exceptions* to management's attention.

Daily Labor Reports

One of the most valuable tools of the plant manager in controlling costs and measuring performance is the daily labor report. This report may take various forms, but it is essentially a comparison of the actual labor incurred (in hours and dollars) each day in various classifications and processes with the standard labor (the labor which should have been incurred). The labor report enables the factory manager to correct inefficiencies as they occur, rather than waiting until they have been happening for a long period of time.

Daily Material and Spoilage Reports

Two other useful reports are the daily (or weekly) material usage report and the daily scrap report. The material usage report compares the actual material used in production with the standard material (the amount of material which should have been used). The report should include quantities and

dollars, since not only may a quantity of material be used inefficiently, but there may also be waste in terms of dollars. Thus, using the wrong *size* of steel plate would result in a variance arising from excessive amounts of material used. Using the wrong *type* of steel plate may not result in more material being used, but it may result in more expensive material being used.

Spoilage and scrap reports are important because they may be the first hint that something is wrong with the manufacturing process or the material being used in the process. The sooner this is found out, the quicker it may be corrected and further waste avoided.

Reports of Overhead Costs

Overhead costs are generally reported less frequently than direct labor. The reports should be by control points. Thus the costs of the production control department will be accumulated so that a report of that department's costs may be made out periodically. This report will measure the ability of the manager of the production control department to control his costs.

Monthly Reports

Costs are controlled daily and weekly, but the results of operations should be summarized monthly. This should be in the form of an income statement and reports explaining the various labor, material, and overhead variances. A position statement should also be made out so that the total investment and the various rates and ratios may be computed. It is extremely important that these monthly reports be made out and placed in the hands of top management shortly after the month ends. This is not an easy task. There are many problems in closing the accounting records, and it not unusual for monthly reports to be issued more than a month after the period ends. This can be avoided by careful planning and by sacrificing a bit on some of the details.

VALUE OF HISTORICAL REPORTS FOR CONTROL PURPOSES

Some students of management state that accounting reports are not useful for control purposes because they come out after the event has already happened. They say that what they want are reports which show what will happen in the future if certain action is taken. If the reports indicate that the action is not desirable, then it can be changed before the event has taken place. Reporting what has happened is no help, since it is too late to avoid the errors.

These people are not entirely wrong, but there is enough error in their supposition to be worthy of comment. The request for reports to indicate the probable results of different actions is justifiable, and the accountant should fulfill this request. But this does not negate the usefulness of historical information. Since foremen and other supervisors know that the historical reports will come out sooner or later and that they will be criticized or praised on the basis of these reports, they have some motivation to do a good job. The effectiveness of the motivation will depend both on the timeliness of the reports and how well management uses the reports to help enforce a high level of efficiency.

It would be interesting to construct a situation in which historical reports have been eliminated and entirely replaced by forecast reports. The supervisors would soon find out that their actual performance was not being measured and that they would have to worry only about presenting a rosy picture for the future. Obviously this would not lead to a satisfactory control system. It is necessary to measure the results of the past to encourage efficiency in the future.

TIMING OF REPORTS

Frequently reports are prepared and distributed too late for them to be as useful as they might be. A classic example of bad timing is the corporation which cut off material requisitions on the twelfth day of the month and then distributed the financial reports more than 30 days after the end of the month. Thus, to prepare the report for June, the material requisitions had to be cut off on the twelfth of June, but the financial reports were not prepared until sometime after the first of August. In the meanwhile, management worried about the current problems in August as well as the problems of July until the report for June was distributed. Could the management really use the report when it came out? It is surely better to get a report a month late than not at all, but how much better? Obviously, the report that is a month late loses much of its usefulness.

The reader may well wonder why it takes over a month to prepare a financial report. He may think the problem to be inefficiency or lack of modern equipment. In the case being discussed, the company had access to the latest in accounting equipment, including electronic data-processing equipment. Why were the reports so late? One reason is the size and complexity of the information. Inventories consist of thousands of items, there are eighty thousand workers, and purchase invoices number in the hundreds of thousands. The second reason is equally important. The information is checked and

rechecked for accuracy. Thus the accounting machine prepares a run (a printed report), which is then verified, and adjustments (refinements) are made. This all takes time.

How can we expedite the preparation of the report? There is no simple answer to this problem, and the answer will vary from firm to firm. Several general procedures can be suggested, however.

1. Material requisitions and invoices can be cut off several days prior to the end of the month.
2. Refinements to the data can be postponed to the following month.
3. The number of "checks" to prevent errors can be reduced and the possibility of errors increased, if the errors are not material.
4. Careful scheduling of the accounting machines and judicious use of overtime can decrease the "flow" time of the reports as they are being processed.

Some accountants, accustomed to penny accuracy and numerous checks to catch errors, will often tend to resist the foregoing suggestions. It is important for them to realize that the penny accuracy is a fiction, especially when we are talking about managerial decisions revolving around the size and use of inventories (where the choice of inventory flow procedure will affect the figures to the extent of millions of dollars) or about the depreciation charge (which is so greatly affected by the choice of depreciation procedure and the year of purchase). There are many other examples of rough estimates. Reasonableness and usefulness must be the guiding principles for reports prepared for managerial purposes, and the impact on the timing of the report must be taken into consideration before incorporating refinements into the data-gathering system.

SPECIAL REPORTS

In an examination a student once criticized accounting for failing to classify costs as relevant or irrelevant. This seems to be plain common sense and a valid criticism, until we think over the implication. Can the accountant classify costs as to whether or not they are relevant? Unfortunately he cannot, because the specific decision which is being made must be known before the costs can be classified.

If the production of a plant can be sold for X dollars, then the desirability of producing and selling can be determined by a differential cost analysis (the revenues to be earned minus the additional costs which would be incurred because of the production). All fixed costs (costs that will be incurred in

any event) should be excluded from consideration. But if there is a possibility of selling the plant, then the analysis should include different costs, since certain "fixed costs" can be avoided by the sale of the plant (the plant manager's salary, accounting cost, etc.). This illustrates the fact that special reports will be needed to make special decisions. The routine accounting report cannot and should not be expected to answer all needs. When special information is needed, then special reports resulting from special studies should be prepared.

The danger of regularizing special reports should be avoided. Once a report starts, it is very difficult to get complete agreement that it should be discontinued. Someone can always remember the time that he used the report. Another difficulty is the fact that one or more employees start considering that report as their sole job. They develop a vested interest in the report and will defend it with all the vigor with which a lioness will defend her cubs.

SUMMARY

It is not unusual for the pounds of paper consumed during a manufacturing period to be in excess of the weight of the product being made (a major airplane company checked this out and found it was true in their case). In this age of scientific management, stress is laid on getting useful information. Unfortunately this stress often has the undesirable by-product effect of developing unnecessary reports.

The quantity and quality of reports should be strictly controlled. This can be done by an organization currently existing, by a separate report group, or by special consultants. It is incorrect to assume that the reporting is being done correctly just because it is being done in the same manner it was done ten years ago and "We were profitable then." A thoughtful executive once said at a cost control meeting, "Maybe we should review everything we are doing, and if we are doing it in the same manner as we were doing it five years ago, we should change." The speaker was aware that many things being done today were being done correctly, even if they were being done in the same manner as they were done five years ago. He was also aware that paralysis had begun in many segments of the organization and that the prevailing feeling was "If it was done this way in the past, it should be done this way now." Report preparation is one area especially susceptible to this paralysis. Seek out a business manager and ask him how he uses the reports which cross his desk. You will find that he uses very few of them. Ask him if he would approve of certain reports being discontinued; you will find that he is reluctant to do away with anything he is currently receiving. The result is that corporations

spend millions of dollars for preparing reports which are not used and also millions for preparing reports which should not be used.

The only solution seems to be a hard-hitting organization that can control and review the reports being prepared. The problem still remains of what happens when an executive requests a report that he should not have. This is a political question which has to be resolved by taking into consideration the personalities involved.

QUESTIONS AND PROBLEMS

30–1 The Red River Steel Company

Part I. The Red River Steel Company has five operating plants, all engaged in the manufacture of steel plate. The operations of all five plants are comparable in terms of raw materials used and end product.

The central management is concerned with the problem of maintaining a high level of efficiency at the five plants. To ensure that central management is informed, a detailed system of reporting operations has been installed. This system includes the computation of ratios and various other tools of measuring performance.

Information for the Year 1953

(All money figures in thousands of dollars)

(All physical units in thousands of tons)

Plant	Average Investment	Sales	Income	Finished Goods, Average Inventory	Tons of Production	Tons Sold	Capacity
Athos	$10,000	$ 20,000	$ 1,000	20	200	200	400
Black Rock	80,000	240,000	12,000	200	2,400	2,400	3,000
Cardiff	90,000	225,000	4,500	450	2,500	2,250	4,000
Danville ..	50,000	200,000	18,000	100	2,000	2,000	2,500
Great Rock	40,000	200,000	12,000	200	2,100	2,000	3,000

Required

Prepare a schedule showing the results of operations for the period. Include in the schedule:

Investment Turnover
Earning Rate (ratio of earnings to sales)
Return on Investment
Inventory Turnover for Finished Goods
Percentage of Capacity Utilized

Part II. Investigation discloses that the plants were all purchased in different years. The Black Rock plant was built in 1949; the Athos, Cardiff, and Danville plants were all built between 1920 and 1930; the Great Rock plant was built in 1939–40.

Since the plants were built in years of such varying general price levels, management has questioned whether the "Average Investment" figures taken from the accounting records are significant. For example, the Black Rock and Great Rock plants both have the same capacity, but the average investment in operating one plant is $80,000,000, and in the other, $40,000,000. It was decided to adjust all plant acquisitions into dollars of the same purchasing power so that the effects of the changes in the general price level might be eliminated. The wholesale price index was chosen as a fair approximation of the general price level. The plant acquisitions of each year still in use in 1953 were multiplied by "conversion factors," based on the wholesale price index, in order to convert them into 1953 dollars.

Required

(a) Assume that the allowance for depreciation, adjusted for changes in the price level for the Great Rock plant, is $55,686,000, and that other investment in the plant (inventories, supplies, etc.) total $10,000,000. Using the adjusted information, compute the investment turnover.

(b) Assume that the adjusted depreciation charge, based on the plant expressed in 1953 dollars, would be $2,000,000 greater than the amount computed by using unadjusted original cost. Re-compute the earning rate and the return on investment, using this additional information.

Adjustment of Capital Acquisitions into 1953 Dollars (Great Rock Plant)

Year of Acquisition	Amount Acquired (and still in use) *	Conversion Factor	Plant Acquisitions in 1953 Dollars *
1953	$ 8,900	1.000	$ 8,900
52	——	0.987	——
51	——	0.959	——
50	2,000	1.068	2,136
49	6,000	1.110	6,660
48	——	1.055	——
47	——	1.142	——
46	——	1.399	——
45	——	1.600	——
44	——	1.629	——
43	——	1.643	——
42	——	1.715	——

Year of Acquisition	Amount Acquired (and still in use) *	Conversion Factor	Plant Acquisitions in 1953 Dollars *
41	10,000	1.938	19,380
40	30,000	2.155	64,650
39	20,000	2.198	43,960
	$76,900		$145,686

* The amounts in these columns are "cost" and "adjusted cost" before depreciation allowances. Dollar amounts are in thousands.

(c) Comment briefly on whether the figures computed in Part I are more meaningful than those in this part.

Part III. A review of the accounting procedures followed at the plants indicates that all plants use FIFO in accounting for inventory except the Danville plant, which uses LIFO. A review of the Danville Plant's inventory records discloses the following information for 1953:

Danville Plant

	LIFO Valuation	*FIFO Valuation*
Beginning Inventory of Finished Goods . . .	$8,000,000	$8,000,000
Ending Inventory of Finished Goods	3,000,000	6,000,000
Manufacturing Cost of Goods Sold	$163,000,000	$160,000,000

Required

Re-compute the investment turnover, earning rate, and return on investment for Danville.

Part IV. All plants except Cardiff follow a procedure of considering fixed costs as period costs and of inventorying only variable costs (a direct or variable costing procedure). Cardiff inventories fixed costs and, at the end of each month, allocates the unabsorbed overhead between costs of goods sold and ending inventory. Placing the beginning and ending inventories of Cardiff on the same basis as the remainder of the plants would result in a decrease in average investment of $1,000,000 and a decrease in income for the period of $500,000.

Required

Re-compute the investment turnover, earning rate and return on investment for Cardiff.

Part V. Briefly describe other difficulties that may further invalidate the comparison of the different plants.

30-2 The Robert Company

During the year 1964, the Robert Company has reported the following income and sales:

	Income	*Sales*
January	($30,000)	$100,000
February	(10,000)	200,000
March	20,000	350,000

The budgeted fixed costs per month were $100,000, and variable costs were budgeted at $0.60 per dollar of sales. The company considers fixed costs as a cost of the period (variable costing).

Required

(a) Draw a break-even chart for the Robert Company. At what level of sales will the company break even? What comment would you make relative to the results of operations of each of the three months?

(b) If sales for April are forecasted at $450,000, what income should the company earn if it attains the budgeted level of efficiency?

(c) Assume that the sales price of the product being sold has been $5.00 per unit. If the sales price is changed to $5.50, what would be the break-even point? What would be the income for the sale of 50,000 units?

30–3 The United States Airplane Company

The United States Airplane Company was divisionalized in the spring of 1960. As part of a general program to control costs, a "Divisional Overhead Statement" was prepared monthly. The report was prepared by the cost accounting section of the central office, and the goal was to distribute it fifteen days after the end of the month to all top management of the divisions and headquarters (including the president of the firm). The March report was dated June 27, 1961.

The company had wrestled with the problem of allocation of mutual support costs (costs incurred by one division in servicing other divisions). Usually these costs were of a joint cost nature and could not be directly identified with a specific division. For example, one division might be doing the payroll for another division, using the same personnel, buildings, and machines that it used to do its own payroll. The company finally decided that, while it would be feasible to allocate these costs, using many different bases, it would also be expensive. To avoid this expense, one base (direct-labor hours) was chosen as the basis of allocation of all mutual support costs and the costs of the central office.

Indirect manpower is also controlled, using a ratio of indirect workers to direct workers (see Schedule III).

The fact that the report was making an impression was borne out when several divisional executives called the cost accounting section which prepared the report and challenged the amount of various costs they were being charged. The divisional overhead statement was also the basis of a report that showed in detail the extent to which the various divisions had been divisionalized.

In order to obtain the information presented in Schedules II and III, each individual cost which was incurred in servicing other divisions was multiplied by the appropriate allocation percentages. This information was also distributed to the divisions for cost control purposes.

Required

(a) Write a critique of the reports as presented. How can these reports be used?
(b) How would you revise the reports?
(c) Comment on the use of direct-labor hours as the basis of allocation.

Schedule I

UNITED STATES AIRPLANE COMPANY

Divisional Overhead Rates
(Per Direct-Labor Hour)

Year to Date: 1961	*Los Angeles*	*Detroit*	*Chicago*
Jan.	$3.80	$4.71	$4.55
Feb.	3.82	4.75	4.51
Mar.	3.82	4.75	4.46
Month 1961			
Jan.	$3.80	$4.71	$4.55
Feb.	3.85	4.78	4.44
Mar.	3.82	4.76	4.43

Schedule II

UNITED STATES AIRPLANE COMPANY

Statement of Overhead Expenses Applicable Direct Labor for the Month of March, 1961
(Dollars in Thousands)

	Los Angeles		Detroit		Chicago	
	Dollars	Rate per Hour	Dollars	Rate per Hour	Dollars	Rate per Hour
Straight Distribution						
Salaries and Wages	$ 4,688	$	$136	$	$ 696	$
Costs Closely Related to:						
Indirect Salaries and Wages	860		24		118	
Direct Salaries and Wages	1,471		38		163	
Total	$ 7,019	2.02	$198	2.64	$ 977	2.73

UNITED STATES AIRPLANE COMPANY (continued)

Statement of Overhead Expenses Applicable Direct Labor for the Month of March, 1961 (Dollars in Thousands)

	Los Angeles		Detroit		Chicago	
	Dollars	Rate per Hour	Dollars	Rate per Hour	Dollars	Rate per Hour
Mutual Support						
Salaries and Wages						
Headquarters	$ 85		$ 2		$ 9	
Los Angeles	2,325		71		226	
Chicago	186		3		15	
Total	$ 2,596		$ 76		$ 250	
Costs Closely Related to Salaries and Wages	473		14		45	
Total	$ 3,069	0.88	$ 90	1.20	$ 295	0.82
Allocable Expenses						
Supplies, Ins., Tax, Deprec., etc.	$ 2,801		$ 60		$ 276	
General Research	409		9		42	
Total	$ 3,210	0.92	$ 69	0.92	$ 318	0.88
Manufacturing Overhead to Work-in-Process	$13,298	$3.82	$357	$4.76	$1,590	$4.43

Schedule III

UNITED STATES AIRPLANE COMPANY

Summary of Direct and Indirect Manpower Number of Workers as of March 15, 1961

	Los Angeles	*Detroit*	*Chicago*
Exclusive Support of Own Division	8,141	249	1,306
Mutual Support			
Headquarters	132	3	20
Los Angeles	4,038	196	561
Chicago	466	8	41
Total Indirect	12,777	456	1,928
Total Direct	17,696	454	1,842
Per Cent of Indirect to Direct	72.20%	100.44%	104.67%

30–4 The following report is submitted monthly to the plant manager of the Chicago plant of the Hammond Corporation:

Chicago Plant

DEPARTMENT MANAGER: J. M. Jones DEPARTMENT: Operating 1

Account Number	Account Title	Budgeted Cost for 300,000 Direct-Labor Dollars	Actual Cost Incurred	Cost Variance
54–78	Direct Labor	$300,000	$180,000	$120,000
64–56	Indirect Labor (fixed)	20,000	21,000	(1,000)
54–82	Indirect Labor (variable)	30,000	19,000	11,000
65–21	Supplies (fixed)	8,000	8,500	(500)
55–21	Supplies (variable)	6,000	4,600	1,400
44–22	Allocation from Production Control	2,100	2,500	(400)
44–23	Allocation from Accounting Dept.	4,000	4,200	(200)

Required

(a) Comment critically on the above report.
(b) Prepare a revised report.
(c) Is there any additional information you would want to know?

30–5 In preparing reports for the control of costs, it is desirable to include only those costs which are controllable. It is also necessary to determine how costs react to changes in activity.

Required

(a) Name some costs that may be incurred in, or allocated to, a department (or plant) which are not controllable by the man in charge.
(b) Name several costs that are clearly fixed or variable in nature. Name several costs that may vary but not with the level of production.
(c) Explain what is meant by a variable selling cost.

30–6 The Bright Automobile Company has a centralized training program for many skills that are common to all divisions. The training group, as are all departments of the company, is very cost conscious. To help control costs, the training group prepares a monthly report showing for each division the "cost of training" for the month. This cost of training is broken down by course and shows the hours of trainee time spent in each course, as well as the dollar cost.

The training cost is computed by multiplying the hours each trainee spends in training by his hourly rate of pay.

The training group, in its description of the report and its use, states that "the function of this report is to assist divisions and departments in the control of their training costs."

The cost of preparing the report is estimated at $15,000 per year. Several divisional managers have expressed interest in the report and have made inquiries to the cost control group as to whether or not training costs can be decreased.

The divisions of the Bright Automobile Company follow a policy of mutual support. This means that skilled employees of one division may be transferred to another division if the transfer is thought to benefit the company as a whole.

Required

Discuss pros and cons of continuing the present report.

30–7 The following conversation may have taken place:

SENATOR: When measured as a percentage of stockholders' investment, your profits are too high. Why cannot consumers get some benefit of this efficiency?

STEEL COMPANY PRESIDENT: Our accounting is very conservative. Thus the profits are inflated when measured as you suggested.

Required

Do conservative accounting practices inflate profits? Comment.

30–8 Explain the difference between the reported income and the $22,000 income budgeted for sales of $100,000.

THE GRIPPER COMPANY

Income Statement
for month ending July 31, 1958

Sales (10,000 units sold for $10 a piece)			$100,000
Expenses:			
Manufacturing Cost of Sales (see note 1)		60,000	
Selling Expenses			
Variable	$10,000		
Fixed	15,000	25,000	
Administrative Expenses		5,000	
			90,000
Income (before taxes)			$ 10,000

Note 1:

Standard Cost:		
Material	$ 8,000	
Labor	15,000	
Variable Overhead	3,000	
Fixed Overhead (based on a fixed overhead rate of $2 per direct labor dollar)	30,000	56,000

Note 1: (*continued*)

Spending and Efficiency Variances (unfavorable)	19,000	
Activity Variance (favorable)	15,000	4,000
		60,000

Note 2:

The budgeted fixed costs for the month were

Manufacturing Overhead	$25,000
Selling	12,000
Administrative	5,000
	$42,000

Budgeted Variable Selling Expense is 10% of Sales.

31

Procedures for Recording Costs: Internal Control

EVERY ACCOUNTING department should standardize the procedures for recording financial transactions. These procedures should be in writing in order to minimize misunderstandings. Transactions should be recorded to conform to generally accepted accounting principles and in a manner to maximize internal control.

INTERNAL CONTROL

Recording procedures should be designed to ensure accuracy and efficiency at the lowest cost, but also the system should be designed to conform to the best principles of "Internal Control." Internal control refers to the organizational and operational procedures that are designed to *safeguard the assets of a firm by controlling costs, preventing fraud, and detecting errors.* It is possible that the objectives of recording transactions cheaply and conforming to good practices of internal control may not appear compatible. The objectives may be reconciled by the inclusion of the hidden costs associated with bad practices arising from the failure to maintain good internal control. By ignoring the requirements of good internal control, it may appear that the firm is economizing, but the saving may actually be dissipated by the theft of cash and inventory or by innocent errors which have to be found and corrected but which could have been prevented or found sooner with good internal control.

What elements are necessary for a good system of internal control? There are essentially two items: (1) automatic safeguards which accompany a well-installed accounting system, and (2) a state of mental awareness of the necessity for good internal control. The first item is primarily a matter of having an expert install a good accounting system. The mental awareness may be developed through education and training, but it is to a great extent contingent on the hiring of qualified personnel.

Among the more important principles of internal control are:

1. The accounting department must be independent of the operating or manufacturing departments.
2. The recording and custodian functions must be separated (for example, the handling and recording of cash will be performed by different personnel).
3. Transactions should not generally be recorded entirely by one person (for example, one person should record the accounts receivable control account and another should record the accounts receivable subsidiary, or detailed, ledger).
4. Work must be adequately supervised and must be performed by *qualified* personnel.
5. The system of recording transactions must be in writing, and periodic reviews must be made to ensure that the system as prescribed is actually being used.
6. Reviews (audits) must be made to ensure that data has been correctly recorded.

For various types of transactions (such as handling payments of accounts payable or receipt of cash from customers), comprehensive lists of the requirements of a good system of internal control have been prepared. The American Institute of Certified Public Accountants has published several publications dealing with internal control, including case studies on auditing and on internal control. It is not necessary that we have at our fingertips the various detailed requirements for a good system of internal control. It is important for the reader to realize that theft, fraud, and errors are possible and that systems have been devised to minimize the possibility of these events happening undetected. Descriptions of these systems can be obtained by consulting publications of the American Institute of Certified Public Accountants or other appropriate publications.

A CASE STUDY—THE NILES PLANT

The remainder of this chapter is concerned with a case study of the operating procedures for recording selected financial transactions of a manufacturing plant. The plant studied is assumed to be one of seven plants in the Parts Division of a large corporation.

Organization

The controller of the Niles plant is directly responsible to the divisional controller of the Parts Division. The plant manager relies on the plant con-

troller for information but has no authority over the controller. If he were not receiving adequate information, he could report this fact to the vice-president in charge of the division.

The divisional controller has one auditor who makes periodic audits of the accounting department of each of the seven plants. The auditor's written instructions direct him to audit the accuracy of the financial information being recorded. They also direct him to investigate compliance with operating procedures relative to the recording of financial transactions and the handling of the various "business paper" connected with financial transactions. The plant is audited annually by the company auditing staff and approximately every three years by independent public accountants.

The divisional controller also has a staff of three men concerned with budget systems, cost control and cost review, and the cost accounting system. These men try to find new methods to improve the reporting and to maintain a high level of general and theoretical accuracy in the reporting by the plants in the division. They are responsible for seeing that directives from the central office are carried out in an expeditious manner.

In addition to the above divisional personnel, the central office of the company has an audit staff, cost accounting staff, and cost control staff. The functions of these staffs are very similar to the functions of the staff personnel at the divisional level. In general, they attempt to ensure a high level of reporting of financial information throughout the company. They aim toward uniformity, but they recognize that there are differences among various divisions and plants which require differences in accounting systems. Nevertheless, the company does publish a standard accounting manual (which the plants and divisions are expected to follow or explain the reason for diverging from it) and standard operating instructions relative to the taking and pricing of inventories, etc.

The central office staff is encouraged to get out in the field, and they make an attempt to get to know plant personnel and encourage an informal relationship. The plant personnel are encouraged to think of the central office accounting department as a source of information and assistance rather than a police force. To a great extent they are successful in promulgating this feeling, but the plant personnel suspect that the people from central office have considerable control over their future. There is some justification for this suspicion, since an uncooperative plant controller may find his career taking two steps backward if a notation is sent "upstairs" reporting that he has ignored suggestions from central office.

COMMENTS

The organizational set-up of the company and division is excellent. The plant controller receives assistance from both the divisional and company level.

There is a danger that the divisional auditor will get in a rut in his audits of the seven plants of the division. If possible, the man holding this position should be rotated to another job within the corporation after a few years. The possible dangers of this man becoming stale are relieved somewhat by the fact that the plants are audited annually by the company auditors.

QUESTIONS

1. Should the plant controller be under the authority of plant manager? Explain.
2. Why is it desirable that each division have its own staff personnel (auditors, systems, etc.)?
3. In some companies, there is a feeling that central office staff personnel are a luxury that can be afforded during prosperity but during periods of business recession is one area where savings can be made. Discuss the validity of this point of view. Could the company save money by eliminating the central office audit staff, etc., in the case being studied?
4. The independent public accountant annually issues an opinion as to the fairness of financial position of the company being discussed. Do you think that they can do this without actually visiting the Niles plant annually? Explain.

Organization of the Plant Accounting Department

The controller of the Niles plant has three supervisors assisting him:

General Accountant: In charge of the general ledger and payroll department.

Factory Accountant: In charge of the recording of costs incurred and the maintenance of inventory records.

Financial Analyst: This title is somewhat misleading. This man is in charge of investigating the reasons for differences between actual and standard (or budgeted) cost.

Though the accounts payable and payrolls are paid by the divisional office, the information necessary for the preparation of the checks is a responsibility of the plant. All accounting for fixed assets, including the accounting for construction in process, is accomplished at the plant.

The accounting department relies heavily on the production control department and the manufacturing engineering department. These two departments supply technical information which is needed by the accounting department in order to carry out its responsibilities.

Recording Procedures for Material

Raw material receipts are recorded when purchased in a raw material control account at actual invoice cost. Individual cards, for each type of raw material, are maintained by the accounting department. These cards show the quantities, standard unit prices, and actual dollar amounts paid for the material. The source for the entry to the cards and to the raw material account in the general ledger is a machine run (a typed list of purchases) which is prepared from the matched receiving reports and vendors' invoices. At the end of the month, the difference between the actual amount paid and the standard cost of the material is computed and closed to a price variance account. The inventory cards are reconciled monthly to the raw material control account.

Transfers from the raw material account to work in process are made on the basis of a material disbursement sheet. The disbursement sheet, a summary of daily disbursements of material, is obtained from the production control department. A lift-tag procedure is used as the basis for this report. The lift-tag procedure more or less ensures that all material placed into production is reported. When a foreman places a bundle of steel plate into production, he removes an identifying tag which is sent to the production control department. This tag is the basis for the report of material disbursed (or used). If the foreman neglects to remove the tag or the tag is lost, then a periodic inventory will disclose that the bundle of inventory, for which a lift-tag stub is on file in the raw material inventory file, is no longer in inventory. This will require an inventory adjustment and will give rise to considerable snarls from several levels of management. To ensure that all tags are removed when raw material is placed into production, a representative of the production control department will usually try to be present when raw material is requisitioned for production. This is not always possible, since the material is stored in an open location and foremen occasionally bypass red tape and place the material into production without notifying the production control representative.

The debits to work in process are made at standard prices for material. Detailed inventory cards are maintained, showing balances, receipts, scrap, and shipments. No finished goods accounts are maintained. When the product is finished, it remains in the work-in-process account until it is shipped, at which time it is transferred to cost of goods sold.

The material is charged to cost of sales at a full standard (standard price and standard usage). The transfer is based on a summary of shipping reports. These shipping reports are summarized mechanically, and the units of each type of product shipped are multiplied by a standard "rough weight" (weight of raw material necessary to make the end product) to find the amount of

material in work in process which should be transferred to cost of goods sold. The difference between the monthly physical inventory of raw material in process and book inventory is charged to a material usage variance account.

From the foregoing discussion, it is obvious that accounting must know how much raw material should be going into each end product. Where is this information obtained? The manufacturing engineering department supplies the specifications (material and labor to be used) and bill of materials (list of component parts). Changes will be made periodically in the specifications, and it is necessary that the accounting department be informed immediately. For this reason, manufacturing engineering sends advance notice of changes in material to be used or other changes in the bill of material or specifications. Accounting makes a complete check every three months with the manufacturing engineering department of the specifications and bill of materials it is using.

The specifications are not checked against shop usage by the accounting department, but manufacturing engineering does check them every two weeks.

The production control department also keeps detailed inventory records for raw material. The accounting department reconciles its records monthly with the production control department records. The production control department's records are maintained only in physical units, and it does not maintain detailed inventory cards for raw material in work in process. They argue that the summary of the monthly physical inventory is actually all the record of work in process that they need. This physical inventory of work in process is made by production control, and it is the basis of the entry adjusting the raw material in work in process (closing out the material usage variance).

The financial analysis section conducts detailed investigations into the cause of material price variances. Specific purchase orders and vendors' invoices are reviewed in detail to determine reasons for the variances. Usage variances are investigated by first checking the material specifications. If the metal being used is 0.001 inch thicker than the specification used for costing purposes, this will result in a significant usage variance. Scrap reporting is also reviewed, as is the inventory taking. If the inventory of work in process is incorrectly taken, this may well result in a usage variance.

All raw material is supposed to be used within six months after purchase. To implement this rule, the rotation of raw material is controlled by the means of the lift-tag file. Actually, some of the stock is over six months old, since foremen have a tendency to use the metal at the top of the pile. In most cases, this is not a harmful practice, but there are several types of metal whose physical characteristics change with time, and these should be used during the six-month period.

The raw material inventory consists of approximately 150 different

categories. The raw material and work in process are both inventoried monthly by production control. Completed products are counted both mechanically and manually. At the end of the month, the production count is checked against the production indicated by the physical inventory and shipping record. In the past, this check has indicated that the production counts are not accurate. The foremen's counts tend to be optimistic, and the mechanical counter has fallen before man's ingenuity to "beat the system."

COMMENTS

Raw material is recorded on individual cards by type. The question may be raised as to whether it is necessary to record the actual dollar amounts paid for the material on the inventory cards. In fact, the inventory cards could be kept by using physical quantities only. Dollar amounts could be found by multiplying the physical units by the standard cost per unit. Is there any reason why the raw material could not be recorded into the general ledger, using standard costs, instead of waiting until the end of the month to determine the standard cost and price variance?

The lift-tag procedure used is reasonable. To be workable, it requires the complete cooperation of the foreman. The foreman should be educated as to the function of the system and the necessity for their cooperation.

If possible, better storage facilities should be developed, so that more control could be exercised over raw material.

The product specifications are not checked against shop usage by the accounting department. This is permissible if there are good communications between the accounting and manufacturing engineering (as there seem to be), and if the manufacturing engineering department is efficiently run. The case does not state how accounting is to know whether it has received all changes of specifications. Are the changes serially numbered? They should be, and accounting should check more frequently than every three months to see that it has all the changes.

Since the production control department maintains detailed inventory records for raw material, the accounting department could consider dispensing with its detailed records of receipts and disbursements of raw material.

QUESTIONS

1. What factors may cause a material price variance?
2. What factors may cause a material usage variance?
3. If the production counts are not accurate, why bother making them?
4. In recording material, accounting relies on several reports not prepared by the accounting department. Discuss the nature of the reports and the possibility of errors being incorporated into the records.

Recording Procedures for Supplies

The cost accounting department does not keep any detailed inventory records for supplies (these are frequently called nonproductive materials). Production control keeps detailed records of quantities and latest purchase order prices. Requisitions are priced by production control. The cost department extends the prices and summarizes the information from the requisitions for the journal entry transferring the requisitioned supplies to manufacturing overhead.

Seventy per cent of the supplies purchased are expensed when purchased, rather than when used. There is no specific divisional policy as to what items should be carried in inventory and what items should be expensed when purchased. As a result, there are wide differences of procedures followed. One plant in the division inventories all supplies, and another plant expenses all supplies when purchased.

Inventory record cards are maintained by production control for each supply item, including items expensed as received. The cards show quantity only, though the latest purchase order price is noted on the card.

Charges based on actual invoice price are made to the supply account. As stated before, the latest purchase order price is used to relieve these inventory accounts. These prices are checked monthly by accounting to ensure that they are current.

All stock withdrawals are covered by requisitions. The requisitions for non-inventoriable items are not the basis for an accounting entry, because these items have been already expensed. The men in charge of the inventory cribs have a file of cards with the signatures of personnel authorized to requisition material. These files are primarily to please the auditor and are rarely used by the crib attendants, who rely on the fact that they have talking acquaintance with the foremen and know who can requisition supplies. Foremen often send direct-labor workers to requisition their supplies.

Obsolete and excess inventory are listed, and lists are sent to production control (forwarded to manufacturing engineering). The cost department sets up a 100% reserve for the cost of the supplies which are obsolete and excess. Production control is responsible for seeing that the supplies of this nature are disposed of in a reasonable period of time.

Each item in inventory is counted four times a year by the production control department. Explanations for differences between the physical count and the quantity indicated by the book inventory are supplied by production control. These explanations tend to become routinized, because it is almost impossible to explain the difference without a detailed audit of receipts and requisitions (and this would only explain the discrepancy if an honest error has been made).

Each month, an item-by-item analysis is made of supplies used during the month. This summary is made out by department so that each head of department can check the supplies his department is using.

COMMENTS

The practice of expensing supplies when purchased should be discouraged. All plants should use the same procedure. Expensing supplies as they are received results in their being charged as a cost of product (and affecting various measures of efficiency) in a period when they may merely be sitting on a shelf; when they are used, no charge is made to cost of product.

The use of latest purchase order price to price supplies used is reasonable because it reduces much paper work which arises when some of the other inventory procedures (such as LIFO or FIFO) are used.

The procedure for requisitioning supplies should be tightened so that only authorized personnel may draw supplies.

QUESTIONS

1. If latest purchase order prices are used to relieve the supplies inventory, how should the ending inventory be adjusted? Explain.
2. Production control personnel count supplies four times a year. Do you believe the accounting department should make any counts?
3. Discuss the effects of expensing supplies when purchased on financial reports.
4. Discuss the procedure for setting up the "reserve" for obsolete and excess inventory.

Recording Procedures for Labor

There are six operating or productive departments in the Niles plant. For each department, the total direct-labor pay for the month is divided by the total hours worked during the month to obtain an average incurred cost per direct-labor hour. The average labor cost incurred is used to value the end-of-the-month in-process inventory.

The direct-labor hours are accumulated by the foremen on time sheets. The timekeepers daily summarize the foremen's time sheets and check the total hours worked according to the department in which the work was incurred. The time cards are sent to the payroll department, as is the summary of hours worked by department. The payroll department sample-checks the extensions of the time cards and prepares a payroll distribution. This classifies the total payroll for the period according to the department in which the cost was incurred. Thus we have the hours worked and the labor cost of the individual operating departments. The labor cost per hour of labor can be

readily computed. It is the labor rate that is used to value the ending work-in-process inventory. The labor rate as computed excludes all wage premiums.

The actual hours worked are obtained from the summaries just explained. The standard number of hours of production is obtained by using the following procedure:

Add: Standard Hours Shipped
Standard Hours in Process at the End of the Period
Standard Hours of Labor in Scrapped Material
Subtract: Standard Hours in Process at the Beginning of the Period
To Obtain: Standard Hours of Production

The standard hours are obtained in the following manner:

Standard Hours Shipped: The parts shipped are multiplied by the current work standard applicable to that part.

Standard Hours in Process: An estimate of standard hours in process is made by the takers of the inventory (units between pay points are assumed 50% completed). This is added to the standard hours obtained by extending the units in process which are completed by the applicable current work standard.

Standard Hours of Labor in Scrapped Material: The standard hours are computed for the amount of labor performed prior to the last inspection (which the product passed). Credit is also given for labor performed since that point to the point of scrapping.

The direct labor to be charged to cost of goods sold is obtained by adding the direct labor in process at the beginning of the period to the actual direct labor payroll and subtracting the standard direct labor in process at the end of the month (computed as indicated above).

The standard hours of production for the month are computed as indicated above. Every working day, each shift foreman turns in a report of production for his shift, and these reports are extended to obtain standard hours of production. The standard hours of production from the two sources are compared at the end of the month. If a variance exists (one usually does), the reason for the variance is investigated, and an attempt is made to eliminate future variances.

If the labor rate per standard hour changes from month to month, the variances are analyzed if they are significant. Small changes are not investigated.

The payroll department conducts two payroll checks per year. As the men are paid, their badges are checked by a member of the payroll department. The divisional auditor attempts to conduct one line check per year, i.e., check the time cards punched in for the day against the foreman's time

sheet and against the men actually on the production line. It is hoped that these procedures will reduce the number of "dead men" being paid.

COMMENTS

The explanation of labor reporting describes a procedure that caused the Niles plant to actually show better profits in a month in which labor inefficiencies were up. This resulted from the following computations, combined with large ending inventories (which occurred at the end of a model year as the plant built up inventories for the new models).

$$\text{Average labor cost} = \frac{\text{total direct labor costs for month}}{\text{total hours worked during month}}$$

Ending work in process inventory = average labor cost × standard hours in process

Charge to cost of goods sold = beginning inventory + actual payroll − the ending inventory

If the labor costs for the month are *high*, the average cost for the month is *high*, and the ending work in process inventory is *high*, then the charge to cost of goods sold will be *low*.

QUESTIONS

1. The comments suggest that the procedure followed in costing labor is incorrect. Suggest a procedure that will be more useful.
2. Do the standard hours of production require accurate production counts? Explain. What are the possible causes of error?

Recording Procedures for Overhead

The Niles plant has 30 burden centers. This means that indirect manufacturing costs are accumulated and classified so that they may be identified with 30 different responsibility centers. The 6 operating departments are actually divided into 14 burden centers. The other 16 burden centers are nonproductive or service functions.

The service departments are allocated to the operating departments, using various bases. Among these are:

Service Functions	Basis of Allocation of Monthly Cost
Controller's Office	Headcount (number of employees)
Quality Control	Budgeted Direct Labor
Plant Engineering (building costs)	Budgeted Direct Labor
Tool Room	Services Rendered
Utility Cost (steam, water, and electricity)	Fixed Percentages (based on combined factors of headcount, area, and connected horsepower)

Each month the actual overhead charges are distributed to the applicable productive or operating departments. This actual manufacturing cost incurred is compared with the amount of overhead absorbed by the department, using the normal burden absorption rates. The over- or underabsorbed burden is then spread to unit-product cost of goods sold on the basis of the standard hours shipped, where the department is making more than one product (when only one product is made, there is no need for allocation).

The normal burden absorption rate is applied to direct-labor dollars actually incurred in order to find the amount of burden transferred to work in process. To relieve the in-process account of the burden portion of cost of sales, the following formula is used:

Burden in cost of goods sold = burden rate × labor costing rate × standard hours shipped

This formula may be expressed as follows:

Burden in cost of goods sold = burden rate × direct-labor dollars in goods sold

The normal burden absorption rate is computed annually by the cost analysis section. The budgeted overhead for each department is divided by the budgeted direct-labor dollars. Both the overhead and direct labor is budgeted for a predetermined *normal level* of activity. The burden rate, once computed, is not changed because of changes in specifications, labor rates, etc. Only major operational changes that would drastically change the budget would result in changes in the burden absorption rate.

COMMENTS

Allocation of common costs is at best a difficult problem. The basis of allocation should, however, bear some relationship to the benefit received from the cost. This does not seem to be valid for several of the service departments illustrated.

The spreading of over- or underabsorbed overhead to unit-product cost on the basis of the standard hours shipped is not a reasonable procedure. The portion of this variance, which arises because of idleness, should not burden the product which was manufactured. It is a cost of not making any product, i.e., being idle.

1. Comment on the basis of allocation for each of the service functions illustrated.
2. Why is it not reasonable for under- or overabsorbed overhead to be allocated to unit-product cost on the basis of standard hours shipped?
3. Why are burden rates not changed during the budget year except for

major changes in operations? What would be some operational changes that would require changes in the burden rate?

SUMMARY

This chapter contains only a very brief description of internal control and the recording procedures. Many areas of importance were slighted in a desire to highlight a sampling of some of the more important aspects of the recording process. Other areas that could have received attention are:

Handling and Recording of Work Orders (a job cost system)
Receiving and Shipping Procedures
Scrap Handling and Reporting System (including both material and machine scrap)
Setting of Standards by Manufacturing Engineering
Control of Inventory and Production by Production Control
Analysis of Costs by the Cost Analysis Section
Procedure Used in Taking Inventory
Recording of By-products

The procedures followed by the Niles plant are not perfect; in fact, there are several glaring faults. The point that should be impressed on the reader's mind is not the specific procedures followed but that accounting consists of more than merely recording some cut-and-dried figures. The information recorded by the accountant is supplied to him from many different sources. These sources are of varying degrees of reliability. It is up to the accountant to check his sources of information and ensure that the information flowing to him is as good as can be obtained. This requires that the accountant frequently leave his office and see what is going on in the plant. He should be familiar with the methods used to receive material as it comes in, the process used to store it, and the methods of production. Nothing can be taken for granted. A physical inventory is a useful thing and should be used frequently to confirm the accuracy of the records, but a physical inventory is no better than the man taking it. The Niles plant actually took frequent enough inventories, but a check by the company auditors revealed that the inventory-takers were frequently not actually taking an inventory but were merely guessing at the amounts of work in process. Their accuracy was good, considering the method used, but totally useless for the purposes for which it was being taken. This situation could have been avoided by periodic checks by the accounting department of the procedures used by production control inventory-takers. The accountant must be constantly investigating and re-

viewing so that management can use with a fair degree of confidence the information and reports turned out by the accounting department.

QUESTIONS AND PROBLEMS

31–1 List four procedures found in the case of the Niles plant which were designed directly or indirectly to strengthen the internal control. Explain briefly how each procedure accomplished its function.

31–2 Scrap reporting is not described in the chapter. What would be the major objectives of a good scrap accounting system?

31–3 Instead of using a process cost system, do you think the Niles plant should be using a job cost system? Explain.

31–4 Is the system of cost accounting used by the Niles plant a standard cost system? Explain.

32

Inventories and a Changing Price Level

THE PROBLEM OF accounting for inventories with a changing price level are among the more interesting problems the accountant must face. The choice of a procedure (there are many from which to choose) can turn a profit into a loss or a loss into a profit. Rules of reporting prevent the accountant from changing procedures without disclosure, and it should not be assumed that companies constantly change their inventory accounting procedures. However, at the same moment in time, companies in the same industry will use different procedures which cause their incomes to be noncomparable without adjustment.

In the period following World War II, many companies shifted to LIFO because of the possible tax savings. The use of LIFO resulted in the more recently purchased, higher-priced goods being charged against the revenues of the period. This had the result of lowering taxable incomes and thus lowering the federal income tax. The effects that the use of LIFO had on the financial reporting (both on the income statement and the position statement) were largely ignored. It is these questions that are reviewed in this chapter.

THE FLOW OF COSTS—FIFO AND LIFO

Just as the *physical flow* of the materials through the plant is dependent on the material handling procedures, the flow of the *costs* of the inventories through the accounts is dependent on the choice of accounting procedures. Usually the first materials purchased are used or sold first. This could argue that the costs of the oldest materials should be charged to expense first, since this costing procedure generally agrees with the physical flow of materials. This assumption of cost flow is called *first-in first-out* and is commonly referred to as "FIFO."

Illustration of FIFO

January 1 Inventory, 100 units @ $2.00	= $200
Purchases during January, 100 units @ $2.50	= 250
	$450

Assume that 100 units were used during the period. Each unit was priced at $2.00 per unit, and the transfer from inventory was $200. If more than 100 units were used, the first 100 units would have been priced at $2.00, and the remaining units would have been priced at the purchase price of the next batch, $2.50.

The prime objection to the FIFO assumption of the flow of costs is that the *oldest* costs are charged against the revenues. These are likely to be costs which were incurred in the preceding period. With a changing price level, these oldest costs will not reflect the true expense of gaining the revenues.

Continuing the example, assume that the 100 units were sold for $2.25 per unit (total revenues were $225) and that there were no other expenses. The income statement would appear as follows:

Sales	$225
Costs of Goods Sold	200
Income	$ 25

With a FIFO flow of costs, an income of $25 is reported. If the firm started the period with $100 of cash, how much cash will it have at the end of the accounting period (assuming the purchases of material are paid for with cash)? The sales brought in $225 of cash, the replacement of the goods sold cost $250; thus the cash on hand decreased $25, while the physical units of inventory remained unchanged. Is it useful for the accountant to report an income of $25 at the same time as the total real assets of the firm actually decrease? At the beginning of the period, the company had at its disposal 100 units of product and $100 of cash. At the end of the period, after an income of $25, the company had 100 units of product and $75 of cash. This occurred because the FIFO system of measuring the flow of costs causes the income figure to *include the results of market gains and losses.*[1] There is a need for the accountant to break up the income figure as reported into two segments: "Operating Income," which measures the efficiency of

[1] Market gains or losses may arise from fluctuations in the general price level (in which case the market gains or losses are fictitious) or from changes in the specific price of the product being sold (in which case the market gains or loss are real, since this company has benefited or suffered a loss when compared with the remainder of the economy).

operating management; then, by adding the market gain or subtracting the market loss, obtaining the "Net Income," which measures the change in the stockholders' equity (in some situations, the market gain or loss may be used to measure the efficiency of the purchasing officer).

The first step toward accomplishing this objective is to use a "last-in first-out," or "LIFO," assumption as to the flow of costs. This accomplishes the objective of having the most recent costs matched against the revenues of the period, and it also *eliminates* the so-called market profits from the income.

Continuing the above example, the cost of goods sold, following a LIFO assumption as to the flow of costs, is 100 units priced at $2.50 or $250. The income statement then becomes:

Sales	$ 225
Cost of Goods Sold	250
Loss	($ 25)

The income of the period now appears to be a loss of $25. This is consistent with the $25 decrease in cash while the company was merely maintaining its inventory in terms of physical units. The disadvantages of LIFO become apparent when one focuses attention on the ending inventory figure. The amount remaining in the material account would be $450 minus the $250 charged to cost of goods sold, or $200. This seems to be inadequate reporting, since there are 100 units on hand and the most recent purchase price was $2.50 per unit. This seems to indicate that the inventory valuation should be $250 (which it was, following FIFO) instead of the $200 obtained by following LIFO.

LIFO—FIFO and the Statement of Financial Position

It is interesting to compare the position statements that result from using the FIFO and LIFO procedures for costing inventories.

Financial Position:

	As of January 1, Using Either Procedure	As of December 31, Using FIFO	As of December 31, Using LIFO
Cash	$100	$ 75	$ 75
Inventory	200	250	200
	$300	$325	$275
Owners' Equity	$300	$325	$275

Using FIFO, the inventory presented on the position statement is $250. This is the cost of the most recently purchased inventory. Usually the

inventory resulting from the use of FIFO will be a close approximation to replacement cost, especially if the inventory turns over rapidly. In any event, a FIFO inventory will reflect recent costs in all cases except those situations where the inventory moves very slowly.

Using LIFO, the inventory valuation at the end of the year becomes $200 (100 units at $2.00 per unit). The last goods purchased are charged as cost of goods sold first; thus the costs of the oldest goods remain as inventory. This is unrealistic, because the oldest goods were probably sold first, and there is no sound theoretical reason for valuing the ending inventory by using the costs of units already sold. These costs will bear little relationship to what similar goods will cost on December 31. If this problem were carried forward, unless the firm arrived at a year-end date with no inventory, the costs of a portion of this inventory would be carried on the books period after period at the same per-unit cost.

If the $250 figure is accepted as the actual cost of the inventory on hand, then the inventory using LIFO is actually $50 *less than the goods cost.* If the assets are understated by $50, then the owners' equity is understated by an equal amount. Actually the owners' equity is understated by the amount of the market gain not recognized, since LIFO is being used.

This difficulty may be resolved by making the following journal entry.

Inventory	$50	
Equity Adjustment-Market Gain		$50
To adjust the inventory to current prices and record the market gain		

The inventory is then stated at the most recent purchase price, and the cost of goods sold is measured in terms of the most recent costs. The income statement will then appear as follows:

Sales	$225
Cost of Goods Sold	250
Net Operating Loss	(25)
Market Gain	50
Net Income	$ 25

This procedure combines the best of the FIFO system with the best of the LIFO system. The final net income is the same as obtained from using FIFO, but an important decision-making subtotal is also developed. The ending inventory figure, instead of being a hodgepodge of meaningless costs accumulated in the distant past (as is done with LIFO), represents current values. Actually it is easy to use replacement costs, instead of most recent purchase prices, for valuation of the ending inventory. This will make the ending inventory figure even more meaningful. Unfortunately, while FIFO

and LIFO are both generally accepted by accountants, the procedure developed here is not currently acceptable. For the present, it is useful as a theoretical model and as a device to point out what the accounting for inventory flow could accomplish but does not.

The objection of the practicing accountant to the scheme discussed here rests on the question of whether the "Equity Adjustment—Market Gain" should be recognized or not. It is argued that the goods have not been sold, and therefore the gain should not be recognized. *It is generally agreed that gains not realized by sale should not be recognized.* To satisfy this objection, the credit can be made to an account "Equity Adjustment—Unrealized Market Gain." Using the preceding example for making the entry at the end of the accounting period, we have:

Inventory	$50	
Equity Adjustment—Unrealized Market Gain		$50
To adjust the inventory to current prices and record the adjustment to the stockholders' equity		

If, in the next period, the price level continues to increase, a similar entry will be made to bring the inventory up to the current price level. If, in a subsequent accounting period, the price level decreases, and the LIFO inventory is actually more than it should be, using current prices, then a write-down of inventory will be in order. The credit will be to "Inventory," and the debit to "Equity Adjustment—Unrealized Gain." Assume that it is necessary to write down the inventory $40. The entry would be as follows:

Equity Adjustment—Unrealized Market Gain	$40	
Inventory		$40
To adjust the inventory to current prices and record the adjustment to the stockholders' equity		

If the write-down to inventory is greater than the balance in the equity adjustment account, then the debit will be made to a loss account (loss arising from price decline). Why can a loss account be debited to record a market *loss* while a gain account cannot be credited to record a market *gain*? This is simply an accounting convention. Record losses when they occur (even though they may not have been realized by the sale of the goods), since this is "conservative." Do not recognize gains, since this is not "conservative." The question may well be asked, "What is the basic nature of the equity adjustment—unrealized market gain account?" It is basically the same account as equity adjustment—market gain, but the concession is being made to accounting practice not to recognize as income "unrealized" gains. Thus the unrealized market gain account will appear in the stockholders' equity section of the position statement, but the gain will not appear in the

income statement of the period. The attempt to compromise serves only to point up the weakness of present accounting conventions relative to accounting for inventories.

Summary: FIFO vs. LIFO

Using FIFO, are market gains recognized? Using LIFO, are realized gains unrecognized (look at the preceding ending inventory understatement)? To the first question, the answer must be that the gain which is described as a "market gain" is recognized when using FIFO, even though it is buried in cost of goods sold by reducing the cost of goods sold below the *current cost* of the goods sold. Using LIFO, there is an understatement of assets and stockholders' equity (in a rising price level), as illustrated by the failure of the inventory figure to represent significant figures. This suggests a failure to recognize an economic change which has occurred, namely, an increase in the dollar value of the inventory.

Generally the inventory valuation resulting from the use of LIFO will be far removed from any indication of current values or even the actual costs of the physical inventory on hand. Thus the use of LIFO weakens the statement of financial position, because it results in a misstatement of inventory and also a misstatement of the stockholders' equity.

If LIFO gives a bad static picture, does it make up for this shortcoming by presenting a significant income statement? The answer to this question is only a qualified "yes." The LIFO procedure is to be praised when it matches current costs with the revenues of the period. If fails, however, since it ignores the market gain or loss. This market gain or loss (the gain or loss arising from holding inventory during a period of changing prices) is relevant financial information and should be reported. LIFO also fails to match current costs and revenues when part of the LIFO inventory (the inventory at the time of adoption of LIFO) is used.

If LIFO is bad (as the discussion implies), is FIFO good? The answer must again be a qualified "yes." FIFO gives a reasonable position statement. The use of replacement cost may improve the presentation in certain cases, but in general, FIFO is adequate when the resulting position statement is the criterion. However, FIFO fails to present a cost-of-goods-sold figure which represents a realistic cost of sales where there has been a change in prices. The costs matched against the period's revenues are not current costs but costs carried forward from the preceding period. The result is an income figure that includes the market gain or loss buried in with the operating income (in fact, it is buried in the cost of goods sold). The burying of this market gain or loss is objectionable. The failings of FIFO and LIFO can be remedied relatively simply by computing the cost of goods sold (using LIFO)

and then adjusting the inventory to a FIFO, or current-cost, basis. The amount necessary to adjust the inventory is debited or credited to an equity adjustment account (the exact title being dependent on the interpretation of this market gain).

AVERAGE COST

The possibilities open to the accountant do not end with FIFO and LIFO. One of the most popular alternatives is a weighted-average, inventory-pricing system. The total units available for sale during the period were 200 units which had a total cost of $450. The average cost per unit was $2.25. Using this average cost to price the goods sold gives a figure of $225 for cost of goods sold. The income statement appears as:

Sales	$225
Cost of Goods Sold	225
Income	$–0–

The use of average costs is a compromise procedure that has all the basic advantages and disadvantages of FIFO and LIFO, but these are softened somewhat by the use of averages. It does nothing to solve the basic problem, i.e., with the same situation, the accountant may come up with an income of $25 (FIFO), a loss of $25 (LIFO), and no profit or loss (Average Cost). There are actually other alternatives that will give even different answers (replacement cost, basic stock procedure, highest-in first-out, unweighted average, specific identification of costs, etc.). There are some who argue that the measurement of business income is an impossible task. The variety of answers obtained following generally accepted principles seems to support that contention. However, this author is not so pessimistic. There may not be a "one correct income," but there are some income computations that seem to be more correct than others.

REPLACEMENT COST

There are several interpretations to the term "replacement cost" as it applies to inventory accounting. We shall consider two alternatives. The first adjusts both the ending inventory and the cost of goods sold to a replacement-cost basis. The second adjusts only the inventory to its replacement cost.

Adjusting both the cost of goods sold and the ending inventory to a replacement-cost basis tends to misstate the cost of goods sold. The goods

are sold throughout the period, and it is incorrect to adjust the costs to the end of the period replacement cost.

EXAMPLE

Opening Inventory	100 units @ $4 = $400
Purchases	200 units @ $5 = $1,000

There were 180 units sold for $8. Current replacement cost is $6. Adjusting both the cost of goods sold and the inventory would result in an inventory of 120 units valued at $6, or $720. The income statement would be

Revenues (180 × $8)	$1,440
Cost of sales (180 × $6)	1,080
Income	$ 360

The income is understated, since valuing the units sold at $6 overstates the cost of the units sold. The revenues were generated throughout the period; it is not reasonable to use only end-of-the-period costs.

An alternative procedure is to adjust only the ending inventory. We shall use LIFO to compute the cost of goods sold.

Revenues (180 × $8)	$1,440
Cost of goods sold (180 × $5)	900
Income	$ 540

The inventory would be presented at $720, the same valuation as was obtained using the previous procedure.

If the number of units sold was 250, and it was necessary to use some of the beginning inventory, then we would have some units sold which are valued at $4.

Revenues (250 × $8)		$2,000
Cost of goods sold		
(200 × 5)	1,000	
(50 ×4)	200	1,200
Income		$ 800

This procedure is reasonable, since the beginning inventory is valued at beginning-of-the-period prices (i.e., replacement cost). If a conventional LIFO procedure were being used, the use of the beginning inventory in computing the cost of goods sold could result in a distortion, since the costs used may be from a long-distant time period.

We have previously illustrated the above procedure in discussing a LIFO procedure adjusted to result in a reasonable inventory measure. Thus LIFO adjusted so that the inventory is reasonably presented, and replacement cost interpreted to be an adjustment of the ending inventory and not the cost of goods sold, are equivalent procedures.

THE INVENTORY VALUATION ADJUSTMENT

Economists and others are very much interested in the gross national product of the country, i.e., the total goods and services produced and the distribution of that product in the form of dividends, wages, interest, etc. One of the sources of their information is reports prepared by accountants for purposes different from those for which they are used by the economists; thus there are several adjustments which must be made.

Since an attempt is being made to measure the goods and services *produced,* the change in inventory must be added (if inventories have increased) to the sales of the period. The book inventory changes cannot be accepted for this purpose, because these changes will not reflect the change in *physical* inventory when the company uses a FIFO accounting procedure. The same is true if LIFO is used and the inventory decreases.

EXAMPLE

The following entries illustrate the need for adjustment in a company using FIFO.

January 1 Inventory, 100 units @ $3	$ 300
Purchases, 400 units @ $2	800
	$1,100
Ending Inventory (FIFO), 130 units @ $2	$ 260

The book inventory change is a decrease of $40, despite the fact that the physical inventory increased by 30 units. This inconsistency is corrected by valuing the physical change of 30 units by the most recent prices. Thus the inventory change will be 30 × $2, or an increase of $60.

The economist is also interested in extracting the "market profits or losses" from the reported profits. If sales in the preceding example were $1,480, the reported income would be:

Sales		$1,480
Cost of Goods Sold,		
100 @ $3	$300	
270 @ $2	540	840
Income		$ 640

It has been shown previously that the FIFO procedure includes market gains or losses. To this the economist would agree. To remove the market gain or loss, the goods sold should be priced at the purchase prices of the period. This will give an income statement as follows:

Sales	$1,480
Cost of Goods Sold, 370 @ $2	740
Income	$ 740

To adjust the reported income, following FIFO, it is necessary to add $100 to the reported income (or subtract $100 from the cost of goods sold). This adjustment is also equal to the amount by which the book inventory change had to be adjusted in the example. The technical title of this amount is "Inventory Valuation Adjustment." In effect, the following journal entry is being made:

Inventory change	$100	
Income		$100
To adjust income to eliminate the market loss and to cause the inventory to reflect the physical change in inventory. Actually the credit should be to an "Inventory Valuation Adjustment" account.		

The need for the journal entry may also be shown by using "T" accounts. The explanation for entry (1) is the same as for the preceding journal entry.

Inventory

Beginning Inventory $300	

Income

	Reported Income $640

Inventory Change

Purchases $800	Goods Used $840
(1) 100	

Inventory Valuation Adjustment

	(1) $100 (to be added to the reported income)

The actual computation of the "Inventory Valuation Adjustment" made by the Department of Commerce is somewhat different from that given here because of refinements. Index numbers are used to implement the adjustment, and average prices are used instead of most recent prices. Nevertheless, the basic nature of the adjustment is comparable to that indicated by the above entries.

Accountants should increase their awareness of how the information they prepare will be used by social scientists. This will help to improve the reporting and also tend to ensure that the information prepared will be properly used.

QUESTIONS AND PROBLEMS

32-1 The Emerson Company

On January 1, 1964, the position statement of the Emerson Company was as follows:

Cash	$10,000	Stock Equity	$30,000
Inventory	20,000		
	$30,000		$30,000

The inventory consisted of 10,000 bushels of Grade I winter wheat.

During the year the Emerson Company engaged in two transactions. It sold all of its 10,000 bushels of inventory for $2.50 per bushel. It replaced its inventory by buying 10,000 bushels of identical wheat for $2.80 per bushel. The current replacement price of wheat of this type was $2.90.

The controller of the firm prepared the following income statement and position statement:

EMERSON COMPANY

Income Statement for the Year Ending December 31, 1964

Sales	$25,000
Less Cost of Sales *	20,000
Income	$ 5,000

* Assuming a FIFO flow of goods.

EMERSON COMPANY

Position Statement as of December 31, 1964

Cash	$ 7,000	Stock Equity	$35,000
Inventory	28,000		
	$35,000		$35,000

Required

(a) Prepare income statements, using LIFO, average value, and replacement cost for valuation of inventory.

(b) Prepare position statements for each of the income statements.

(c) Evaluate the income statements and position statements arising from each of the three procedures.

32-2 The Even Flow Company uses a periodic inventory procedure. The following information is obtained from its records:

	Units	*Dollars*
January 1, Opening Inventory	100	$200
January 10, Purchases	40	100
January 25, Purchases	100	300

A physical inventory discloses that there were 100 units on hand on January 31. At that date the replacement cost of the material was $3.25 per unit.

Required

Complete the following table:

	Ending Inventory	*Cost of Goods Sold*
(a) FIFO		
(b) LIFO		
(c) Average Cost		
(d) Replacement Cost		
(e) A LIFO system that also presents a significant inventory figure for the balance sheet.		
(f) Give journal entries necessary for implementing (d)		
(g) Give journal entries necessary for implementing (e)		

32-3 The Foulball Company has the following items on the equity side of its position statement between the current liabilities and stock equity sections:

Reserve for Inventory Losses, Obsolescence	$100,000
Reserve for Inventory Losses, Price Decline	$200,000

Investigation discloses that the first item was created by a charge to a loss account. It was created because special raw material purchased for a customer who went out of business has value only as scrap. The scrap value is approximately equal to the cost of disposing of it.

The "Reserve for Inventory Loss, Price Decline" was created because the president of the firm feared that prices were too high and he wanted to be sure that the firm had sufficient assets to weather the storm. The debit for the entry creating this account was to "Retained Earnings."

Required

Make any journal entries required to improve the accounting for the given information.

32–4 General Electric Company

The notes to the 1955 financial statements of General Electric Company contained the following item: [2]

Note 3. Inventories at substantially all locations were verified by physical count during the latter part of the year. Inventories are carried at cost (exclusive of certain indirect manufacturing expenses) which was not in excess of market value. Cost of substantially all inventories is determined on a last-in-first-out (LIFO) basis, less reserves which (a) make provision for possible losses on inactive and excess stocks, and (b) eliminate unrealized intercompany profits. Heretofore, the inventory of tungsten was the only item valued on the last-in-first-out basis. Other inventories were priced on a first-in-first-out basis and an additional reserve was provided, which had the effect of accounting for the inventory of copper substantially in accordance with the base stock principle. The adoption of the LIFO method resulted in a charge to income of $20,271,000 on a net after-tax basis. This charge was offset by the return to income of certain inventory reserves provided in prior years which were no longer required. Additional comments on this subject appear on page 22.

The following explanation was found on page 22:

LIFO Method of Inventory Accounting Adopted

The last-in-first-out, or LIFO, method of valuing inventories was adopted by the Company effective January 1, 1955. This method is based on the concept that a continuing quantity of inventory is necessary for the operation of a business. By maintaining this quantity of inventory at a constant price level, the higher costs of current replacements during periods of price increases are matched against current selling prices. As a result, earnings more nearly reflect the effect of current costs.

Costs of materials, especially copper, showed substantial increases during 1955, and future rises in costs of materials seemed probable. In addition, the employee program developed in 1955 provides for wage increases over a five-year period. The LIFO method was adopted because of the desirability of reflecting these increasing costs in the computation of current earnings.

In general, except for tungsten stocks, the first-in-first-out, or FIFO, method was used for inventories prior to 1955. A simplified comparison of the two methods during periods of rising costs may be made as follows:

	Former Method: FIFO	*Present Method: LIFO*
Used for Valuing Inventory:	Higher current costs	Lower earlier costs
Charged against Income:	Lower earlier costs	Higher current costs

[2] Reprinted by permission of the General Electric Company.

During periods of rising costs the LIFO method results in lower inventory valuations. By matching higher current costs against current income, LIFO also results in lower income during periods of cost inflation. During periods of declining prices, the reverse is true.

As a result of this new procedure, the Company's 1955 net earnings were reduced $20 million. As previously mentioned, the LIFO method gives lower inventory valuations in periods of rising prices. As these lower valuations are put into effect, certain inventory reserves provided in prior years will no longer be required. Return of such reserves to income in 1955 approximately offset the effect on net earnings of the LIFO revaluation.

Required

(a) Comment on the company's reasons for shifting to LIFO and its comparison of FIFO and LIFO.

(b) Comment on the $20 million offset to the additional charge against income. What entries did the company probably make to set up the reserve? What entries did the company make in 1955? (The inventories are shown as net reserves on the statement of financial position.)

32-5 The Overall Company

The Overall Company uses a FIFO procedure to account for inventory. The following information relates to the year 1963:

January 1, Inventory	200 units @ $7 per unit
Purchases during the Year	1,300 units @ $3 per unit
December 31, Inventory	400 units

The income statement of The Overall Company was as follows:

Sales, 1,100 units @ $6		$6,600
Cost of Goods Sold:		
200 @ $7	$1,400	
900 @ $3	2,700	4,100
Income		$2,500

Required

(a) What is the book change in inventory?

(b) What is the physical change in inventory?

(c) What is the physical change in inventory valued at most recent prices?

(d) What would have been the cost of goods sold if the units sold had been valued at the most recent prices?

(e) For purposes of determining this firm's contribution to gross national product, what would be the inventory change? What adjustment would have to be made to the income (this is the inventory valuation adjustment)?

(f) Prepare the journal entry which is in effect being made by the inventory valuation adjustment.

32-6 The High Mining Company had $1,000,000 of gold in its inventory on January 1. It retained this same physical inventory throughout the year, but the price of gold increased .10 (the gold was worth $1,100,000). The general price level also increased by .10 (the measure of the index price level went from 200 to 220). All assets were financed by stockholders.

Required

(a) Was there a gain? Explain.
(b) Would your answer be different if the price of gold increased .10 but the measure of the general price level remained constant?
(c) Instead of the inventory being gold, assume the inventory consists of wheat. Would your answer to parts *a* or *b* be different, assuming the price of wheat increased by .10?

32-7 If you were the president of a corporation making automobiles, how would you want your accountant to report the dollar measures of inventory on hand and cost of goods sold?

32-8 The following statement has been made: "LIFO is acceptable, since it makes use of historical cost; replacement cost is not acceptable, since it adjusts cost figures to a value which is not related to the amount paid for the item."

Required

Discuss this point of view.

32-9 The ABC Company has two types of finished goods inventories, steel and plastic, both recorded using FIFO procedures. The following information is obtained:

	Current Market Value (replacement cost)	*Cost (FIFO)*	*Amount to be presented on financial reports*
Steel	5,000,000	6,000,000	5,000,000
Plastic	4,000,000	3,600,000	3,600,000

Required

Discuss the amounts to be shown on the financial reports from the point of view of the person receiving the report.

32-10 Both LIFO and FIFO inventory procedures are accepted by public accounting firms as being generally accepted accounting procedures. These procedures will almost invariably result in different measures of inventory. Adjusting LIFO to current prices during a period of rising prices is generally rejected, since the gain has not yet been realized by sale.

Required

Is it reasonable to consider both LIFO and FIFO procedures to be acceptable? Is the inventory gain resulting from an adjustment to a FIFO basis

unrealized during a period of rising prices if the basic method used is LIFO? Should the LIFO inventory be adjusted if the current market value is less than the LIFO cost?

32-11 The notes to the financial statements of the Archer-Daniels-Midland Company for 1959 included the following:

Note A. Grain and grain products shown in the balance sheet as priced at market have been priced on the basis of market prices for grain at June 30, including adjustments of open purchases and sale contracts to market at that date. The Company generally follows a policy of hedging its transactions in these and certain other commodities to the extent practicable to minimize risk due to market price fluctuations.

The current replacement cost of oils priced in the inventory at last-in-first-out cost exceeded the inventory basis thereof by approximately $2,470,000 at June 30, 1959, and $3,480,000 at June 30, 1958. The decrease in this "lifo reserve" results both from decreases in market prices and from decreased quantities in the physical inventories at June 30, 1959. The excess of the cost of anticipated replacement of decreased quantities prior to the end of the income tax reporting year (December 31, 1959) over the lifo basis thereof is reflected in the reserve for anticipated replacement of inventories, after adjustment for allocable income tax effect.

The balance sheet as of June 30, 1959 showed "Reserve for anticipated replacement of inventories, less related income tax reduction-Note A . . . $620,000" as a current liability.

Required

Discuss the accounting for inventories.

33

Depreciation and the Measuring of Income with a Changing Price Level

THE MEASURING OF corporate income during periods of severe fluctuation in the general price level has been a pertinent issue in accounting circles for the past 40 years. The inflation after World War I, the deflation and depression of the 1930's, the inflation following World War II, and the inflation caused by the Korean War have made thoughtful accountants reconsider the accounting assumption of a stable monetary unit. There have been few years in which price fluctuations have not significantly distorted the corporate income reports prepared in accordance with generally accepted accounting procedures.

The arguments of those who are against the issuance of financial statements that show adjustments to reflect changes in the price level have been strengthened by the apparent lack of interest on the part of businessmen in general. There is a reasonably good explanation for this apathy. Corporate managements, by and large, had justification for believing that their companies were prosperous in the two decades following World War II. If they recognized the presence of inflation at all, they claimed to take it into consideration in making their decisions. The magical process by which they could systematically do this without actually making the detailed computation has never been explained. Unless the computations are made, the evaluations of management will be based on incomplete and inaccurate information.

DEPRECIATION AND DECISIONS

Fortunately, most decisions made by managers are not dependent on a correct measure of depreciation. The decisions based upon marginal or incremental costs may be made without knowing what the plant and equipment depreciation is for the period. These decisions include the pricing decision.

A manager should be able to make a pricing decision without knowing the depreciation expense of the period. Decisions to abandon a facility are also made independent of the book depreciation charge. The salvage value now of the facility and expected salvage value of the facilities in the future are relevant considerations, but the amount of depreciation to be charged as an expense in any time period is not important. Internal investment decisions are based on projection of the future, not the depreciation charges of past purchases.

To the manager of the normal competitive firm, depreciation is of interest, since it affects the measures of income and of the assets he employs. It is because of the limitation of the use of the depreciation accrual that the question of adjusting depreciation for the change in the price level has been largely of academic interest to the largest number of corporate managers.

However, there are two areas where the depreciation measure is of crucial importance. These are the publicly-regulated firms (public utilities) and all firms subject to income tax.

The correct measure of depreciation and assets affects public utilities in two ways. The measure of the income and the asset base are both affected. During periods of inflation, the public utility executive has an interest in adjusting depreciation for changes in the price level.

For many firms the measure of depreciation is not particularly important in the determination of the firm's income tax. With firms having a large amount of capital equipment (such as the steel industry), it is important that the deduction for depreciation be a reasonable amount. Consider a situation where a building is purchased for $1,000,000, and the price level has increased until the present price index is 100 times the price index at time of purchase. The right to deduct $1,000,000 over the useful life is now worth something less than $10,000. In different words, the million-dollar building and a fancy automobile would have approximately the same depreciation for tax purposes.

It is this sort of distortion that disturbs many business managers and results in their requesting a revision in the tax law which would enable a corporation to adjust the depreciation for purposes of computing income taxes. Fortunately, in the United States the degree of inflation has been only at the rate of 2% a year since 1950, and thus the question of adjusting depreciation for tax purposes is not as impelling as it is in many parts of the world.

The remainder of this chapter will be concerned with the question of whether or not to adjust depreciation for changes in the price level as a problem in measurement. If we can understand the problems of measuring income, it will enable us to transfer this understanding to specific types of

situations, such as rate regulation for a public utility or determining whether depreciation for tax purposes should be adjusted. It should be understood that economic and moral considerations may enter into these decisions, and they are not just measurement problems.

COST AND OBJECTIVE MEASURES

At the time of purchase, cost is a significant figure. In a normal arm's-length transaction, cost indicates the exchange value of the asset purchased. In the case of fixed assets, which are used over a period of years, the cost figures lose their significance as an indication of value as the years progress.

If unadjusted historical cost and unadjusted depreciation are of limited use, then they should be adjusted so that they become more useful. The argument that recorded costs are objectively determined, while the adjustments are a matter of opinion, is no more valid than not accruing any depreciation because the useful life of fixed assets is a matter of conjecture. It is better to revise cost figures of limited use on the basis of judgment than to use depreciation computations in situations for which they are not valid. Costs adjusted on the basis of changes in the general price level should be thought of as historical costs brought up to date. To be significant for many purposes, the costs must be expressed in terms of dollars of the same purchasing power as the revenues.

MEASURING CORPORATE INCOME

The accountant defines income as the difference between revenues and the sum of expenses and losses associated with the obtaining of those revenues. With a stable price level, recorded dollars may well be used to measure revenues and to measure expenses. Income is obtained by a simple subtraction. With a fluctuating price level, the significance of the accountant's computations becomes more limited.

If an income statement states that the depreciation of fixed assets is six million dollars, what is the significance of this figure? It measures that portion of the original cost of the asset, unadjusted for changes in the price level, which has expired during the period. To be economically significant, depreciation should be expressed in present-day dollars. The revenues must be compared with the costs of obtaining those revenues. The assumption that the accountant can show on his income statement the same depreciation charge with a rising price level as with a falling or a stable price level is a

theoretically weak assumption. It ignores the fact that the value of the dollar may change radically.

Matching revenues with the applicable expenses is a concept that is especially important in analyzing accounting information under conditions of inflation, since the purpose of the adjustment to depreciation for the change in the value of the dollar is to match expense dollars against revenue dollars with the same purchasing power. This is a logical extension of a theory which the accountant already makes use of, namely, matching expenses with revenues.

DEPRECIATION AND REPLACEMENT

There is general agreement that depreciation is a necessary subtraction from revenues in order to obtain an income figure, but there is less agreement as to the exact nature and significance of the depreciation charge. There is some confusion as to the relation between depreciation and replacement of fixed assets. Depreciation accounting is only indirectly connected to the problem of replacing fixed assets. How do we reconcile this view with the statement that, in a period of inflation, business fails to maintain its capital because it is charging inadequate depreciation? As stated before, there is no direct relation; yet there is a vital indirect relation which should be recognized.

The direct function of depreciation is not to provide a replacement fund but to measure the cost of using long-lived assets. Cash is generated by making sales, not by charging more or less depreciation. Depreciation has no direct effect on current assets except for that small fraction of depreciation which works its way into ending inventories in the case of a manufacturing firm. Charging less than normal depreciation will result in an inflated income, but there will be no proportionate increase in the funds of the corporation. In fact there are several indirect repercussions which may cause the funds available to be decreased. It is these indirect effects that must be considered in order to understand fully the effect of depreciation policy on the ability of a corporation to maintain its productive capacity and the purchasing power of its assets.

Depreciation policies, in conjunction with the institutions of administered prices, taxation of income, public utility rate regulation, labor demands for higher wages based on the ability to pay, and the stockholders' demands for higher dividends in the presence of undistributed earnings, do indirectly affect the ability of a corporation to replace the capital assets being used. The depreciation that is allowed as a tax deduction does influence the fund position of the firm. Likewise, to the extent that costs as computed by business-

men determine price, to the extent that ability to pay determines wages, and to the extent that income determines dividend distribution, depreciation charges will affect the fund position of a corporation.

In the case of the public utilities, the relevance of depreciation to replacement is even more obvious. Prices are regulated on the basis of a fair rate of return. Thus the size of the depreciation charge has a direct relationship to the ability of a public utility to replace fixed assets, since the revenues will be a function of the depreciation charge.

The foregoing discussion does not alter the fact that the primary and recognized purpose of depreciation is not to provide for replacement of depreciable assets but to allocate the cost of a capital asset over its useful life.

ADJUSTMENT OF DEPRECIATION: USING AN APPRAISAL

The adjustment of depreciation and the cost of long-lived assets may be implemented by the use of index numbers or by appraisal. The prime disadvantage of the appraisal method is that it relies upon human judgment and thus is apt to be inconsistent from locality to locality and from time period to time period. The appraisal method is useful, however, to illustrate the basic procedure for adjusting long-lived assets and depreciation.

EXAMPLE

Assume that a building cost $100,000 and had an expected life of 40 years. After the beginning of the eleventh year, an appraisal revealed that the current replacement cost of the building was $300,000 but that the original estimate of useful life was correct.

The following accounts record the entries required to reflect the appraisal and the first year's depreciation accrual after the appraisal.

Building

√	$100,000		
(1)	200,000		

Retained Earnings

			xxxx

Building, Allowance for Depreciation

		√	$25,000
		(1)	50,000
		(2)	7,500

Equity Adjustment, Appraisal

(3)	$5,000	(1)	$150,000

Depreciation			Realized Gain from Increase in Value of the Building		
(2)	$7,500			(3)	$5,000

EXPLANATION OF ENTRIES

(1) Records the increase in value to the building (debit building $200,000), the increase in the allowance for depreciation to record the fact that the building is 25% depreciated (credit the allowance for $50,000), and the increase in the stockholders' equity resulting from the good fortune of holding a building which increased in dollar value (credit an adjustment to stockholders' equity for $150,000).

(2) Records the year's accrual for depreciation. The amount is equal to 2.5% of the adjusted building.

(3) Records the recognition of $\frac{1}{30}$ of the adjustment as being realized; thus the credit is to a realized gain account. This entry is, in effect, the second half of entry (2).

The net effect of these entries on the stockholders' equity is zero, since the depreciation (a subtraction from revenues) has been increased by $5,000, and the realized gain (an addition to the income for the period) is also equal to $5,000. The justification for this procedure is that it makes additional information available to management and others attempting to make decisions.

In the preceding problem, there was no change made in estimated service life. Often there will also be a change in the service life which requires further adjustment to the allowance for depreciation. If, in the example, the service life had been increased to 50 years, the opening balance in the allowance account would have been written down to 20% of the cost of $100,000, or $20,000 (debit the allowance for $5,000), and the retained earnings would have been increased by $5,000 (credit retained earnings). The credit to the allowance for depreciation to record appraisal value of the asset would only be for $40,000 (20% of the adjustment of $200,000).

ADJUSTMENT USING INDEX NUMBERS

The use of index numbers to adjust the cost of long-lived assets and depreciation has the advantage of being more objective than appraisals. Each company would be using the same index series each year; thus the reader of financial reports would know what adjustment was being made. This discussion assumes the use of a general price index. The argument over the use of specific price indexes and general price indexes is unrewarding. Each type

of computation has its uses. The use of a general price index finds its rationale in the argument that we are attempting to convert the costs of the assets purchased in different years into dollars of common purchasing power, i.e., to eliminate the effects of the *general inflation.*

EXAMPLE

Assume that the X Company has purchased buildings in the following three years:

Year	Cost	Estimated Life	Rate of Depreciation
1932	$ 50,000	50 yr.	2 % per yr.
1940	75,000	25 yr.	4 per yr.
1955	200,000	40 yr.	2.5 per yr.

The general price index series for the applicable years is as follows (the wholesale price index may be used as an approximation of the general price index series).

Year	Price Index	Factor to Convert to 1955 Dollars
1932	50	$\frac{250}{50} = 5.0$
1940	100	$\frac{250}{100} = 2.5$
1955	250	$\frac{250}{250} = 1.0$

Compute the depreciation adjusted for changes in the price level for the year 1955.

Solution

Year of Purchase	(1) Unadjusted Cost	(2) Factor to Convert to 1955 Dollars	(3) Adjusted Cost (1) × (2)	(4) Depreciation Rate	(5) Adjusted Depreciation (3) × (4)
1932	$ 50,000	5.00	$250,000	2 %	$ 5,000
1940	75,000	2.50	187,500	4	7,500
1955	200,000	1.00	200,000	2.5	5,000
	$325,000		$637,500		$17,500

The unadjusted depreciation would be $9,000 (2% of $50,000 + 4% of $75,000 + 2.5% of $200,000). Thus the adjustment to depreciation necessary to convert the unadjusted depreciation into dollars of purchasing power equal to the dollars of revenues earned during the period is $8,500. The journal entry to record the depreciation cost for the period might be as follows:

Depreciation Cost	$17,500	
Building, Allowance for Depreciation		$9,000
Stock Equity Adjustment		8,500

This procedure adjusts the depreciation for the period, but it does not adjust the cost of the fixed asset. It is an incomplete procedure, although it does accomplish the objective of adjusting the depreciation cost of the period. A more complete procedure could be used which would adjust the building account and the allowance for depreciation. This procedure would be the equivalent to the procedure illustrated for the appraisal adjustment. It will not be illustrated here because it would merely obscure the computation for the adjusted depreciation which is the main function of the computation.

Note that the depreciation cost, adjusted for price changes, is $8,500 greater than it would be if an unadjusted original cost were used. Thus the operating income will be decreased by an equal amount. The credit for the $8,500 is to a "Stockholders' Equity Adjustment" account. What is the basic nature of this credit of $8,500? It is a gain that accrues to the stockholders because they held fixed assets during a period of inflation. It is not a real gain if the stockholders' position is merely being maintained in real terms. (If the stock equity were $100,000 in 1940 and $100,000 in 1955, would the stock equity be maintained in real terms?) It may be a real gain to the stockholders if there is long-term debt outstanding, but this is a complicated question upon which the accounting profession is not in agreement. The net result to the stockholders' equity from this entry is to leave their position unchanged (the depreciation is increased and the adjustment or gain is increased by an equal amount). Despite the fact that the net effect is zero, the entry is important because of the different significance of the depreciation cost, a deduction from revenues, and the adjustment to the stockholders' equity which does not affect the operating income.

APPRAISAL OF DESIRABILITY OF ADJUSTING DEPRECIATION

This chapter has argued that adjustments to depreciation for changes in the price level are desirable; in fact, they are necessary for purposes of measuring income. The reader should note the qualification made here. For purposes

of *measuring income*, it is necessary to adjust depreciation for changes in the price level. Does this mean that adjusted depreciation should be used for public utility rate regulation and for income tax determination? To these questions the answer is less clear-cut. For example, allowing adjusted depreciation for tax purposes may be business-cycle intensifying (all other things being equal, adjusted depreciation would reduce corporate tax payments, thus giving corporations more funds to spend during periods of inflation; this would tend to make the inflation more severe). The questions of public utility regulation, income taxes, and income measurement are all too complicated for one simple answer to be given here. The reader should realize that in periods of changing prices, the accountants' reports lose some of their reliability. There are many accountants who believe that the recorded data should be adjusted to indicate the change in the price level.

QUESTIONS AND PROBLEMS

33–1 Assume a building cost $200,000 and had an expected life of 20 years. After the beginning of the eleventh year, an appraiser revealed that the current replacement cost of the building was $400,000. The estimated life of the asset remained at a total of 20 years.

Required

(a) Set up "T" accounts to record the situation immediately before the appraisal.
(b) Record the appraisal.
(c) Record the depreciation for the year.
(d) Set up a new set of "T" accounts. Record the given information and the additional fact that the building is estimated to have 30 more years of use.

33–2 Assume that the Power Utility has purchased buildings and equipment in the following years:

Year	Cost	Estimated Life	Index of General Prices
1932	$ 25,000	40 yr.	50
1940	50,000	25 yr.	100
1947	100,000	20 yr.	150
1955	125,000	25 yr.	250
1957	50,000	10 yr.	300

Required

(a) Compute the depreciation charge for 1957, based on unadjusted original cost. Assume that all assets were purchased on January 1 in the year in which they were acquired.

(b) Adjust all the plant and equipment costs into 1957 dollars. Compute the depreciation for 1957 in terms of 1957 dollars.

(c) Record the depreciation charge for the year 1957, using as the base for computing depreciation the original cost adjusted into 1957 dollars.

(d) The revenues for the period were $80,000; fuel expense, $15,000; labor expense, $10,000; taxes, $20,000. Prepare an income statement, using the adjusted depreciation.

33-3 The 1954 annual report of the United States Steel Corporation [1] included the following:

The money that industry spends for plant and equipment is important to a high level of employment. Not only does this money result in employment of those who produce the facilities, but once the facilities are installed they provide the continuing jobs of operating them. Stop such capital expenditures and not only is creation of new jobs cut off, but existing jobs are imperiled as existing facilities become worn out or obsolete and are not replaced. The factors impairing or encouraging capital expenditures for facilities are of vital importance.

One of the principal sources of funds spent for facilities is the money recovered through the wear and exhaustion cost of existing facilities—often called depreciation. This depreciation in any period represents that portion of the capital originally expended which is used up in the production of products in such period. Depreciation is properly regarded as a cost that is deductible in determining taxable income. Inadequate depreciation is a direct threat to capital expenditures and to employment.

With regard to the adequacy of depreciation we are faced with a disturbing fact: Since World War II, depreciation amounts as ordinarily calculated and recognized in tax laws have been quite insufficient to buy new facilities as fast as existing ones have been wearing out or becoming obsolete. These amounts have failed to perform their vital revolving-fund function of maintaining the supply and modernness of the tools of production.

The reason is this: The total number of dollars that can be recovered in depreciation over the life of a given facility is limited to the number of dollars originally expended for the facility. But the buying power of the dollar has not remained at all stable. According to the *Engineering News-Record*, it now takes $2.60 to buy as much construction as could be purchased for $1.00 in 1940. The buying power of the dollar during the years since 1940 has shrunk to 40 per cent of what it was. The depreciation dollars recovered today, based on the dollars spent many years ago for facilities, are simply not enough dollars to replace those facilities—not enough dollars to equal the buying power originally expended for those facilities.

The other principal source of funds, aside from borrowing or from selling

[1] Reprinted by permission of the United States Steel Corporation.

stock, that corporations have to modernize or purchase tools of production is income reinvested. If depreciation does not recover enough buying power, the income "after taxes" may have to be drawn upon to make up the difference if expenditures for facilities are to be sufficient to maintain the aggregate tool life of the concern.

This is unfair and unfortunate because it results in the taxation of capital. Thus, if depreciation cost is understated in current buying power, then income is correspondingly overstated. If the income tax rate is 50 per cent, then two additional dollars must be secured from customers to have one additional dollar after taxes to spend on facilities. This is tax absorption of the circulating flow of capital funds required to maintain the supply and modernness of the nation's tools of production.

Required

(a) Comment on the statement "money recovered through the wear and exhaustion cost of existing facilities—often called depreciation." Is depreciation a source of funds?

(b) Discuss the validity of the statements quoted. Is there some justification in the claim of United States Steel that unadjusted depreciation is inadequate? Should depreciation be adjusted for changes in the general price level for tax purposes? For purposes of measuring income?

33-4 The following letter was published in the *New York Times:* [2]

Your editorial of Jan. 5 laments the plight of business firms which are permitted to deduct for tax purposes a depreciation allowance which "only" covers the original cost of plant and equipment, although the cost of replacing such assets when they wear out may be much greater. You conclude with the surprisingly intemperate statement that Congress is led principally by "pure political demogogy" to refuse to permit depreciation allowances based on replacement cost.

Contrary to your view, historical cost is the only reasonable basis for tax depreciation. The use of replacement cost would be unsound and undesirable. The corporation profits tax is computed on the excess of income over costs.

Most costs—labor, materials—are deducted when they occur. Costs of capital goods are deducted as they are used up, after they are bought.

The company which must replace a $10,000 machine with a $20,000 machine does not lose out in taxes—they may claim higher depreciation allowances for the more expensive machine as it wears out. (Firms seldom replace a machine with another identical model, anyway—the new one is frequently improved.)

Depreciation calculations based on replacement cost would give a totally unjustified windfall to many firms—particularly the large, well-established firms who already enjoy so many strategic advantages from the tax system. Using replacement cost would be particularly lucrative for firms which have borrowed to finance capital goods. For them the excess of replacement cost over original cost would be a tax-free money profit.

You are certainly correct when you state that business firms need more access to capital. There are many legitimate ways in which the Government could pro-

[2] At the time of this letter, the letter writer was an Associate Professor of Economics at Kenyon College. Reprinted by permission of Professor Trescott and the *New York Times.*

mote this, including beneficial changes in the tax laws (such as a reduction in the corporate tax rate).

But sleight-of-hand with depreciation allowances does not meet the requirements of equitable taxation.

PAUL B. TRESCOTT
GAMBIER, OHIO, JAN. 8, 1957

Required

Discuss the validity of the arguments presented.

33-5 The following items were extracted from Accounting Research Bulletin No. 43 of the American Institute of Certified Public Accountants (Chapter 10, pp. 67–68):[8]

The committee recognizes that business management has the responsibility of providing for replacement of plant and machinery. It also recognizes that, in reporting profits today, the cost of material and labor is reflected in terms of "inflated" dollars while the cost of productive facilities in which capital was invested at a lower price level is reflected in terms of dollars whose purchasing power was much greater. There is no doubt that in considering depreciation in connection with product costs, prices, and business policies, management must take into consideration the probability that plant and machinery will have to be replaced at costs much greater than those of the facilities now in use.

When there are gross discrepancies between the cost and current values of productive facilities, the committee believes that it is entirely proper for management to make annual appropriations of net income or surplus in contemplation of replacement of such facilities at higher price levels.

It has been suggested in some quarters that the problem be met by increasing depreciation charges against current income. The committee does not believe that this is a satisfactory solution at this time. It believes that accounting and financial reporting for general use will best serve their purposes by adhering to the generally accepted concept of depreciation on cost, at least until the dollar is stabilized at some level. An attempt to recognize current prices in providing depreciation, to be consistent, would require the serious step of formally recording appraised current values for all properties, and continuous and consistent depreciation charges based on the new values. Without such formal steps, there would be no objective standard by which to judge the propriety of the amounts of depreciation charges against current income, and the significance of recorded amounts of profit might be seriously impaired.

It would not increase the usefulness of reported corporate income figures if some companies charged depreciation on appraised values while others adhered to cost. The committee believes, therefore, that consideration of radical changes in accepted accounting procedure should not be undertaken, at least until a stable price level would make it practicable for business as a whole to make the change at the same time.

Required

Comment on the recommendation of the American Institute of Certified Public Accountants (six members of the committee dissented to the adoption of this section).

[8] Reprinted by permission of the American Institute of Certified Public Accountants.

33–6 The statement is sometimes made that it really does not make a difference how depreciation is computed. Explain why (or why not) the question of depreciation computation is (or is not) important.

33–7 The following items were extracted from Accounting Research Bulletin No. 43 of the American Institute of Certified Public Accountants (Chapter 10, p. 73): [4]

DEPRECIATION ON APPRECIATION

Historically, fixed assets have been accounted for on the basis of cost. However, fixed assets in the past have occasionally been written up to appraised values because of rapid rises in price levels, to adjust costs in the case of bargain purchases, etc. In some of these instances companies have continued to compute depreciation on the basis of cost.

When appreciation has been entered on the books, income should be charged with depreciation [5] computed on the written-up amounts. A company should not at the same time claim larger property valuations in its statement of assets and provide for the amortization of only smaller amounts in its statement of income. When a company has made representations as to an increased valuation of plant, depreciation accounting and periodic income determination thereafter should be based on such higher amounts.

Required

Assume that an asset which cost $10,000 is appraised in 1957 and found to have a value of $25,000. Record the appraisal and the depreciation for the year in accordance with the ARB 43. The life of the asset is 25 years. As of December 31, 1957, the asset is 6 years old.

33–8 It has been said that allowing firms to accelerate their depreciation (charge more in the early years than would otherwise be charged) and to use shorter service lives are substitutes for adjusting depreciation for changes in the price level.

Required

Discuss this statement.

33–9 The President of the X Steel Company was impatient with the attitude of the accounting profession with respect to adjusting depreciation for the change in the price level. It was his opinion that this attitude resulted in a shortage of funds for replacement of equipment. To correct this situation, he had his controller adjust the depreciation expense shown as a deduction in the income statement.

Required

(a) If you were his public accountant, would you object to the adjustment (assuming it was reasonably computed)?

[4] Reprinted by permission of the American Institute of Certified Public Accountants.

[5] The word *depreciation* is used here in its ordinary accounting sense and not as the converse of *appreciation*.

(b) How would this adjustment affect the funds available for investment?
(c) If you were the President of the X Steel Company, would you adjust the depreciation?

33–10 Assume Mr. Jones bought a house in 1940 for $10,000 and sold it in 1960 for $40,000. He has had occasion to accumulate depreciation of $6,000. Mr. Jones claimed to have made a profit of $36,000 (the sale price of $40,000 less the book value of $4,000).

Required

(a) Is Mr. Jones correct in saying his profit was $36,000?
(b) Is Mr. Jones' experience at all comparable to the experience of American industry?

33–11 The Ayrshire Collieries Corporation

The 1960 annual report of the Ayrshire Collieries Corporation included the following statement:

PRICE-LEVEL DEPRECIATION

As in prior years, we have again deducted from the amount reported as net income a provision for price-level depreciation. The amount of this provision is equal to the difference between depreciation accepted by the U.S. Treasury Department for determination of Federal income tax and depreciation measured by current prices.

Our estimate of the amount by which ordinary depreciation was inadequate during the past fiscal year is $195,585.

The auditors' opinion was as follows:

ARTHUR ANDERSEN and CO.
120 South La Salle Street
Chicago 3

To the Stockholders and Board of Directors,
Ayrshire Collieries Corporation:

We have examined the consolidated balance sheet of AYRSHIRE COLLIERIES CORPORATION (a Delaware corporation) and subsidiaries as of June 30, 1960, and the related statements of income and surplus for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying financial statements referred to above present fairly the consolidated financial position of Ayrshire Collieries Corporation and subsidiaries as of June 30, 1960, and their consolidated net income for the year then ended, and were prepared in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Generally accepted principles of accounting for cost of property consumed in operations are based on historical costs and do not recognize the effect of changes in the purchasing power of the dollar since dates of acquisition or construction of the companies' depreciable property. In our opinion, therefore, the

consolidated net income for the year is more fairly presented after deducting the provision for price-level depreciation because such provision does recognize the effect of changes in the purchasing power of the dollar.

ARTHUR ANDERSEN AND CO.

August 12, 1960

The balance sheet contained the following items under stockholders' equity:

"Capital maintained by recognition of price-level depreciation (see note on statement of income) . . . 2,378,391."

The statement of consolidated income was as follows:

AYRSHIRE COLLIERIES CORPORATION AND SUBSIDIARIES

Statement of Consolidated Income for the Fiscal Years Ended June 30, 1960 and 1959

	June 30, 1960	June 30, 1959
Revenues:		
Sales of coal and coke	$46,372,686	$45,274,741
Income from other products, royalties, interest, rentals, etc.	1,051,449	929,358
Equity in net income of non-consolidated affiliates	555,413	476,933
	47,979,548	46,681,032
Expenses:		
Coal and coke purchased for resale	24,899,399	24,166,960
Coal production costs	12,117,043	11,594,147
Depreciation and depletion	1,653,747	1,976,682
Selling, administrative and general expenses	3,648,158	3,498,101
Interest expense	146,279	155,248
Federal income taxes	1,795,600	1,695,450
	44,260,226	43,086,588
Net Income	3,719,322	3,594,444
Provision for price-level depreciation (see note)	195,585	257,278
Net Income, after deducting provision for price-level depreciation	$ 3,523,737	$ 3,337,166

Note: The provision for price-level depreciation represents the excess of depreciation cost measured by the current purchasing power of the dollar over depreciation cost measured by the purchasing power of the dollar at the dates of acquisition or construction of the companies' depreciable property. Reference is made to the opinion of Arthur Andersen and Co. for approval of this accounting.

Required

Comment on the information presented in the annual report.

34

Common Dollar Accounting

ADJUSTMENT OF ALL ACCOUNTS FOR CHANGES IN THE PRICE LEVEL

In previous chapters the problem of dealing with price fluctuations as they affected depreciation and inventories has been discussed. This chapter discusses a general solution to the problem of accounting for changes in the price level.

The general effects of inflation on the financial condition of an individual are well known. If the person has money claims, he suffers from inflation; if he owes money (others have claims against him) he benefits, at least insofar as his asset-debt position is concerned. The opposite effect will happen when the price level declines. These effects have largely been ignored in corporate accounting, although the theoretical tools are available for making adjustments.

There are actually two problems that face the accountant. One is the adjustment of all revenues and operating expenses into dollars of the same purchasing power. This will enable the operating income to be computed undistorted by changes in the price level. The second problem is to compute the gain or loss from being a debtor or creditor.

The Cash Account

If an individual holds cash during an inflationary period, he suffers a real loss from the change in the price level. Let us assume a situation where a corporation has $1,000 of cash at the beginning of a period, and there are no transactions during the period; thus it still has $1,000 at the end of the period. Assume further that there is a doubling of the price index during the period (from 100 to 200). In terms of the end-of-the-period purchasing power, the initial $1,000 was worth $2,000. At the end of the period, $1,000 held is worth $1,000 in terms of end-of-the-period purchasing power. The loss in purchasing power is $1,000 in terms of end-of-period dollars. We can also say that the initial $1,000 is now worth $500, and there is a loss of $500 (expressed in beginning-of-the-period dollars).

Instead of a doubling of the price index, assume the index went from 100 to 110. The loss in purchasing power is now $100.

$$\text{Initial amount in terms of year end buying power } \$1{,}000 \times \frac{110}{100} = \$1{,}100$$

Terminal amount in terms of year end buying power	1,000
Monetary loss	$ 100

It shall be useful to use the following method of explaining the loss:

$$\text{The expected balance } \$1{,}000 \times \frac{110}{100} = \$1{,}100$$

The actual balance	1,000
Monetary loss	$ 100

The $100 is interpreted as a loss, since the actual cash balance is less than the expected balance.

We shall now assume the following transactions take place at the given price indexes:

		Price Index
Opening balance—January 1	$1,000	100
Sale for cash—January 15	3,150	105
Disbursement of—January 15	2,100	105
Ending balance—January 31	2,050	110

The price index for the sale and disbursement may be the actual index at the specific dates, or it can be assumed that the collections and disbursements take place at an average of the indexes of the beginning and end of the period.

The cash account following conventional accounting would appear as follows:

Cash Account

Jan. 1	$1,000		
15	3,150	Jan. 15	$2,100
	4,150	Jan. 31 Bal.	2,050
			4,150
Jan. 31 Bal.	$2,050		

The common dollar computations would be:

	Dollars Unadjusted		Adjustment		Dollars Adjusted
Opening balance	1,000	×	$\frac{110}{100}$	=	1,100
Add:					
Collections	3,150	×	$\frac{110}{105}$	=	3,300
Total cash	4,150				4,400
Less:					
Disbursements	2,100	×	$\frac{110}{105}$	=	2,200
Balance	2,050				2,200

The expected balance is	$2,200
The actual balance is	2,050
The monetary loss	$ 150

The $150 is interpreted as a loss, since the actual cash balance is less than the expected balance.

Multiplying the number of transactions to a realistic level increases the number of computations but does not add to the complexity of the procedure. Adjusting the accounts requires that each transaction and the opening balance be adjusted by multiplying the actual dollar amount by the ratio of ending-price index to the price index at the time of the transaction.

Other types of monetary asset accounts are receivables and marketable securities which represent fixed dollar claims (such as Treasury bills). They would be adjusted in the same manner as the cash account was adjusted.

A Liability Account

Since a liability represents a dollar claim of a fixed amount, the corporation may benefit from inflation by being able to pay off liabilities which have decreased in real value. If a firm owes $1,000, and there is a severe inflation (say, a doubling of the price level in a short period of time), then the $1,000 may be paid off with dollars that have one-half the purchasing power of the money borrowed. In terms of the end-of-the-period purchasing power, the debt at the beginning of the period was $1,000 $\times \frac{200}{100}$, or $2,000. At the end of the period, it was $1,000; thus there was a $1,000 gain (expressed in terms of end-of-the-period dollars).

We shall continue the cash example. Assume the following facts apply to the accounts payable account:

		Price Index
Opening balance—January 1	3,500	100
Purchase of inventory	4,200	105
Payment of accounts payable	2,100	105
Ending balance	5,600	110

The common dollar computations would be as follows:

	Dollars Unadjusted		Adjustment		Dollars Adjusted
Opening balance	3,500	×	$\frac{110}{100}$	=	3,850
Add:					
Purchases	4,200	×	$\frac{110}{105}$	=	4,400
	7,700				8,250
Less:					
Payments	2,100	×	$\frac{110}{105}$	=	2,200
Balance	5,600				6,050

The expected balance is	$6,050
The actual balance is	5,600
Monetary gain	$ 450

The $450 is interpreted as a gain, since the actual liability is less than the expected liability. The same procedure would be followed with other types of monetary obligations. This includes other liabilities, including long-term debt. An interesting question is whether or not non-participating preferred stock should be treated in a manner analogous to debt. It would be reasonable to do so, since the value of preferred stockholders is a fixed sum if they are called (i.e., retired) and represents a claim for a given sum of money per period if they are not called. Thus the dollar amounts are fixed, but the value of these claims may change as the value of the dollar changes.

Real Assets

Unlike the monetary assets and the liability accounts, the relevant dates for real assets are the date of acquisition. For example, when we adjusted cash, we were interested in the price level at the beginning of the period and the price level at the end of the period. In adjusting real assets, we are interested in the price level at the time of acquisition and the price level at the end of the period.

EXAMPLE

A real asset (plant) cost $100,000 in 1950, when the price index was 80; the price index is now 240. The accumulated depreciation is $40,000. Assume the annual rate of depreciation is .05 of the cost. Using unadjusted cost, the asset has a net book value of $60,000 (the cost, $100,000, less the $40,000 accumulated depreciation). The depreciation expense of the period is $5,000 (i.e., .05 of $100,000).

Adjusting for the change in the price level, the asset would be presented at $180,000.

Cost:	$\$100{,}000 \times \frac{240}{80} = 300{,}000$
Less:	
Depreciation	$40{,}000 \times \frac{240}{80} = \underline{120{,}000}$
Adjusted book value	$\underline{180{,}000}$

The depreciation expense of the period would be $15,000, i.e., $5,000 times $\frac{240}{80}$ or .05 of the adjusted cost $300,000.

In the previous chapter, adjustments of depreciation or inventory also resulted in adjustment to the stockholders' equity. When common dollar accounting is used, these adjustments are automatically incorporated into the accounts as each account is adjusted. Assuming no dividend, the retained earnings at the beginning of the period plus the income of the period is equal to the retained earnings at the end of the period if they are all expressed in terms of year-end dollars. Also, the retained earnings at the end of the year may be obtained by subtracting from the year-end total assets (all in year-end dollars) the total liabilities and the other stockholder equity accounts.

The objectives of common dollar accounting are to remove the distortion in measuring financial position and in measuring income caused by changes in the price level and thus to improve financial reporting. We are attempting to adjust completely for the effects of inflation, rather than restricting ourselves to the fragmentary adjustments previously illustrated for inventory and depreciation in the previous two chapters.

EXAMPLE

All items are to be converted into year-end dollars.

Date of Index	A Fictitious Index of the General Price Level
December 31, 1940	100
December 31, 1954	150
December 31, 1955	200

The first step will be to convert a position statement dated January 1, 1955, into year-end dollars. The building was purchased on December 31, 1940.

	Jan. 1, 1955, Position Statement in Recorded Dollars	Factor		Jan. 1, 1955, Position Statement in December 31, 1955, Dollars
Cash	$30,000	$\times \frac{200}{150}$	=	$ 40,000
Building (net of Depreciation)	60,000	$\times \frac{200}{100}$	=	120,000
	$90,000			$160,000
Current Liabilities	15,000	$\times \frac{200}{150}$	=	20,000
Stock Equity	75,000			140,000 *
	$90,000			$160,000

* This is a residual computed by subtracting the liabilities from the total assets.

The monetary items are multiplied by the factor 200/150 in order to convert them into year-end dollars. For example, $40,000 of cash in year-end dollars would have the same purchasing power as $30,000 in beginning-of-the-year dollars. The building balance is multiplied by 200/100, since the asset was purchased in 1940, when the price level was 100. The stock equity is found by subtracting the current liabilities from the total assets.

The next step is to compute the gains or losses on monetary items for the year 1955. In this example, there are only two monetary accounts, cash and current liabilities. The only transactions were sales of $17,500 (all in cash) and the accrual of $5,000 depreciation (based on unadjusted original cost).

Cash Account

(Conventional Accounting)

Jan. 1 Balance	$30,000	
Jan. 1–Dec. 31	17,500	No Disbursements
Dec. 31 Balance	$47,500	

Cash Account

(Common Dollar Accounting)

$30,000 $\times \frac{150}{200}$ = $40,000	

$17{,}500 \times \frac{200}{175} =$	20,000 *
Expected Balance =	$60,000
Actual Book Balance =	47,500
Monetary Loss =	$12,500

* It is assumed that sales were made evenly throughout the year.

This amount of $12,500 represents the loss in purchasing power resulting from holding cash during a period of raising prices.

Current Liabilities

(Conventional Accounting)

	Jan. 1 Balance $15,000
	No Entries

Current Liabilities

(Common Dollar Accounting)

	Actual book balance = 15,000
	$\$15{,}000 \times \frac{200}{150} =$ 20,000
	Monetary Gain = $5,000

The amount of $5,000 represents the gain in purchasing power resulting from being in debt during a period of rising prices.

The net monetary gain or loss should be computed.

Gain from Being in Debt during a Period of Inflation	$ 5,000
Loss from Holding Cash	12,500
Net Monetary Loss	($ 7,500)

The next step is to adjust the conventional income statement into common dollars.

	Recorded Dollars (Conventional Accounting)		Adjustment Factor		December 31 Dollars (Common Dollar Accounting)
Sales (assumed to have been made at midyear)	$17,500	×	$\frac{200}{175}$	=	$20,000
Less Depreciation Expense	5,000	×	$\frac{200}{100}$	=	10,000
Net Operating Income	12,500				10,000
Monetary Gains (Loss)	—				(7,500)
Net Income	$12,500				$ 2,500

The next step is to compare the opening account balances in year-end dollars with the ending account balances *in year-end dollars.*

Assets			Equities		
	Jan. 1	*Dec. 31*		*Jan. 1*	*Dec. 31*
Cash	$ 40,000	$ 47,500	Current		
Building	120,000	110,000	Liabilities ..	$ 20,000	$ 15,000
			Stock Equity ..	140,000	142,500
	$160,000	$157,500		$160,000	$157,500

The increase in stock equity, $2,500, is equal to the change in stockholders' equity obtained from the income statement. This acts as a proof of the mathematical accuracy of the computations. The December 31, 1955, balance in the stock equity account may be obtained either by subtracting the liabilities from the total assets or by adding the net income from the income statement to the January 1 balance of the stock equity account (not the book balance, but the balance with all items expressed in December, 1955, dollars).

Appraising the Technique

The procedure outlined in the preceding section, unlike conventional accounting, takes into consideration the effect of the change in purchasing power on monetary items as well as adjusting non-monetary items. Common dollar accounting tells a more complete story than any other procedure of the financial condition of a company as it moves between two points in time.

However, there are some disadvantages to common dollar accounting. The procedure is complex. Even in this very simple example, several pages had to be used to explain the steps. The bookkeeping procedures can get very involved when common dollar accounting is used. Another important criticism is that reports become more complicated and require expert interpretation. These criticisms have enough validity to warrant consideration. Accounting reports should be kept simple so that they can actually accomplish their goal of communication. A third criticism is that common dollar accounting focuses attention on the monetary items, reporting the gains or losses in terms of these items. Actually this is only part of the story. The monetary gains can arise only when the assets are in the form of items that can appreciate in value as the price level increases. Assets of this nature are land, natural resources, buildings, equipment, and inventories.

With a creeping inflation, the distortion caused by adherence to unadjusted original cost for purposes of computing depreciation and inventory procedures that bring old costs into the income statement may well be the prime enemies. If inventory or depreciation policies are brought into line, the largest part of the distortion will have been eliminated. This may well be the best immediate goal of the accounting profession. However, there are

parts of the world which have recently suffered very severe inflationary periods. The following table indicates that there are many countries where conventional accounting procedures will not give reliable measures of income or financial position, and something similar to the methods illustrated in this chapter are required.

Depreciation of Money [1]

	Indexes of Value of Money			Annual Rates of Depreciation (Compounded)		
	1950	1955	1960	'50–'55	'55–'60	'50–'60
Philippines	100	104	94	−0.8%	2.1%	0.7%
United States	100	90	81	2.1	2.1	2.1
Canada	100	88	80	2.5	1.9	2.2
Italy	100	82	75	3.9	1.8	2.9
United Kingdom	100	76	67	5.2	2.6	3.9
New Zealand	100	75	65	5.6	2.7	4.2
Norway	100	74	64	5.8	2.8	4.3
Sweden	100	76	64	5.3	3.5	4.4
Spain	100	88	61	2.6	7.1	4.9
Israel	100	39	32	16.7	3.9	10.8
China (Taiwan)	100	45	28	14.9	8.8	11.9
Uruguay	100	59	21	10.0	18.4	14.3
Brazil	100	45	15	14.6	20.3	17.5
Argentina	100	44	9	15.3	27.6	21.7
Paraguay	100	14	8	33.0	11.1	22.8
Chile	100	18	5	29.1	23.6	26.4
Bolivia	100	7	1	40.5	34.6	37.6

Note: Depreciation computed from unrounded data and measured by reciprocals of official cost-of-living or consumer price indexes.

[1] Extracted from a table presented in the monthly letter, *Business and Economic Conditions*, of the First National City Bank of New York, May, 1961.

QUESTIONS AND PROBLEMS

34–1 Assume a corporation holds cash of $1,000,000 during a period in which the price level goes up by .10 (for example, from 80 to 88). What is the financial effect of this situation?

34–2 Assume a corporation has current liabilities of $1,000,000 outstanding during a period in which the price level goes up by .10. What is the financial effect

of this situation? Would your answer be different if the debt was bonds payable instead of current liabilities?

34-3 The following information applies to the accounts receivable account:

		Date	*Price Index*
Opening balance	$10,000	July 1	25
Sales on account	60,000	July 15	30
Collections	63,000	July 15	30
Ending balance	7,000	July 31	35

Required

Compute the monetary gain or loss associated with this account.

34-4 The Michigan Corporation

Comparative Position Statements

	January 1, 1956	*December 31, 1956*
Cash	$10,000	$ 4,750
Accounts Receivable	11,000	37,250
Inventories	20,000	41,000
	$41,000	$ 83,000
Fixed Assets	$33,000	$ 33,000
Less Allowance for Depreciation	(11,000)	(12,050)
	$22,000	$ 20,950
Total Assets	$63,000	$103,950
Current Liabilities	$20,000	$ 51,500
Stockholders' Equity	43,000	52,450
Total Equities	$63,000	$103,950

Transactions for the year included the following:

1. Sales of $52,500 (all on account)
2. Merchandise Cost of Goods Sold, $42,000
3. Collection of Accounts Receivable, $26,250
4. Purchase of Inventory (on account), $63,000
5. Payment of Accounts Payable, $31,500
6. Depreciation of $1,050, accrued

The income statement for 1956 was as follows:

Sales		$52,500
Less:		
Cost of Goods Sold	$42,000	
Depreciation	1,050	43,050
Income		$ 9,450

The Michigan Corporation uses a FIFO procedure in accounting for inventories.

An index of the general price level indicated the following:

Year	*Price Index* (a fictitious index of the general price level)
January 1, 1940	55
January 1, 1956	100
January 1, 1957	110

All transactions are assumed to have occurred evenly throughout the year at an average price level of 105 (the average of 100 and 110).

All fixed assets were purchased on January 1, 1940.

Management desires supplemental statements that eliminate the effects of the changes in the general price level.

Required

(a) Prepare comparative position statements for January 1 and December 31, 1956, where all items are expressed in December 31, 1956, dollars. (Dollars of different purchasing power are converted into dollars of the same purchasing power.)

(b) Compute the gain from being in debt and the loss from holding monetary assets (the monetary gain or loss).

(c) Convert all income statement items into dollars of the same purchasing power. Prepare an income statement that not only shows the operating income but also the monetary gain or loss.

(d) The stock equity, of January 1, 1956, obtained in part (a) plus the income computed in part (c) should equal the stock equity of December 31, 1956, obtained in part (a).

34-5 The Uprite Company

Comparative Position Statements

	January 1, 1957	*December 31, 1957*
Cash	$ —0—	$15,000
Inventories	10,000	8,000
	$10,000	$23,000
Accounts Payable	$ 6,000	$ 9,000
Stockholders' Equity	4,000	14,000
	$10,000	$23,000

Transactions for the year consisted of the following:

1. Merchandise Purchased Evenly throughout the Year, $3,000
2. Sales for Cash, $15,000
3. Cost of Merchandise Sold (on a FIFO basis), $5,000

The conventional income statement was as follows:

Sales	$15,000
Less Cost of Goods Sold	5,000
Income	$10,000

An index of the general price level indicated the following:

Date	*A Fictitious Index of the General Price Level*
January 1, 1957	100
December 31, 1957	200

Assume that all sales and purchases were made at an average of the period's beginning and ending price indexes.

Required

(a) Prepare comparative position statements for January 1 and December 31, 1957, where all items are expressed in December 31, 1957, dollars.
(b) Compute the monetary gain or loss.
(c) Prepare an income statement that shows all items in dollars of year-end purchasing power. This statement should include the monetary gain or loss and a reconciliation of the changes in the stock equity.

34-6 The Brazilian division of the All-American Corporation reported an income of 100,000 cruzeiros in 1960. The parent corporation had made an investment of 500,000 cruzeiros in 1950. The book value of the investment (including retained earnings) was 1,000,000 cruzeiros in 1960. All the financial measures were prepared in accordance with generally accepted accounting principles.

Required

What questions should be asked by the management of the parent company relative to the financial measures of the Brazilian division?

34-7 The X Corporation had $100,000,000 of bonds outstanding during the years 1962–1964. The price indexes during these years were:

	Price Index
January 1, 1962	100
January 1, 1963	110
January 1, 1964	100

Assume the bond proceeds were used to finance the construction of a dam.

Required

Compute the monetary gains or losses associated with the bonds during the years 1962 and 1963.

34-8 Assuming you are making a position statement for a firm as of now, using common dollar accounting, what conventional account balances would not require adjustment?

34–9 Assuming you are preparing an income statement for a firm using common dollar accounting, what items in the conventional accounting statement would not have to be adjusted?

34–10 If common dollar accounting is used, a firm will have a monetary gain or loss. What type of decisions will be appraised by this measure, and what other information would you want to know in forming judgments?

35

Income Taxes and Decisions

THE INTERNAL REVENUE code of the United States government is a pervading influence of all citizens and domestic corporations. This chapter will review briefly a few interesting rules affecting individual taxpayers, but it shall concentrate on the tax problems of corporations.[1]

In discussing taxes, we should remember that the primary objective of a tax is to obtain necessary revenue. In doing this, the tax should not hinder economic incentive or growth and might contribute to them. It should not contribute to economic fluctuations and, if possible, should tend to reduce them. The tax should be fair, capable of administration, and efficient, i.e., a large percentage of the tax should be received by the government.

The material which follows does not apply to all business firms. For example, life insurance companies, mutual savings banks, and savings and loan associations are taxed differently than the average business corporation. Non-profit organizations are not subject to income taxes.

THE INCOME TAX OF INDIVIDUALS

An attempt is made to tax all income, no matter what the source. The following is included as income: salaries and wages, dividends, interest, capital gains (for example, gains on the sale of common stock), illegal gains, gambling wins, receipts in kind (including meals and lodging), and cancellation of debts. Gifts are excluded, as are payments of insurance received by a beneficiary. The items specifically included and excluded are listed in the code.

A controversial income item is the interest on state and local government securities. This is classified by the code as being non-taxable. Many tax experts think the federal government has the constitutional power to tax this interest. It has not chosen to do this, and the prime reason offered is that the action would result in an increased cost to the government bodies

[1] This chapter is based on the Internal Revenue Code of 1954, Public Law 591, which was approved August 16, 1954.

whose securities are now exempt. The advocates of taxing this type of interest argue that it benefits the small group of taxpayers in high income tax brackets and removes a significant amount of income, which should be taxed, from the tax base.[2]

Gains on investments are given special tax treatment and are called capital gains. If the item is held for over 6 months, then 50% of the gain may be excluded from income; the maximum tax on a net long-term gain is 25%.[3] Capital losses in excess of capital gains can be deducted from operating income to the extent of $1,000 per year, and they can be carried forward for five years.[4] The capital gains treatment has been broadened to include:

(a) Employee stock options.
(b) Pension trusts lump-sum payments.
(c) Patent royalties (under certain cases).
(d) Sales of breeding stock (owned over 12 months) and unharvested crops (owned over 6 months).
(e) Coal royalties.
(f) Some timber sales.
(g) Sale of business assets.

The following are not capital assets: inventory or stock in trade, receivables, and real or depreciable property used in business. The last two items are called "Section 1231 assets." If the losses of these assets exceed the gains, they are deductible against operating income. If held over six months, and if the gain exceeds losses, the net gain may be treated as a capital gain.

There are esentially three points of view on capital gains:

(a) Reduce the tax rate (some say to zero).
(b) Tax all capital gains the same as other income.
(c) Tighten the definition of capital gains.

The opponents of an increase to the tax of capital gains argue that this would tend to freeze risk investments and that the tax is actually a tax of capital, not income. Those in favor of an increase in the tax argue that increments in wealth should not be given special treatment compared to the income generated by laboring.

Implicit Income

An interesting controversy involves the implicit rental value of owner-occupied homes. Some argue that this is income and should be so declared.

[2] Interest on life insurance also is not taxed.

[3] The lowest tax bracket is 20%, the highest is 91%. There is an overall limitation of 87% of income.

[4] The above applies to individuals. A corporation cannot deduct capital losses against operating income, but they can carry them forward for five years to be matched against capital gains.

But the opponents argue that other assets (such as automobiles) also offer services of value and, to be consistent, these services should also be considered income. There is also the implicit income resulting from the services of members of the family (such as the chores of a housewife). Do these services also generate taxable income? But if the value of the "rent" is not income if the owner occupies the house, should interest and taxes be allowed as a deduction from income (in lieu of a standard deduction of the lower 10% of income or $1,000 for a married couple)? Also, what effect would a change in the present statutes have on the housing industry?

Computation of Taxable Income—An Individual

The taxable income of an individual is computed using the following general formula (assume we are computing Mr. Jay's taxable income):

Gross Income		11,000
less: Deductions from gross income		2,000
Adjusted Gross Income		9,000
less: Personal exemptions	1,800	
Itemized personal deductions (or a standard deduction)	900	2,700
Taxable Income		6,300

Explanation of Mr. Jay's computations:

(a) He earned $11,000 during the year as a traveling salesman.
(b) He incurred $2,000 of expense in connection with his work. The expenses qualified as business expenses.
(c) He is married, under age 65, and has one child (three $600 exemptions); thus the personal exemptions are $1,800.
(d) He chose to use the standard deduction of $900 (i.e., 10% of adjusted gross income but not in excess of $1,000).
(e) His taxable income is $6,300.

Typical items included in each of the classifications in the above computations are described below.

Gross Income

The gross income includes many types of remuneration:

(a) Wages and salaries, including fees, commissions, tips, and similar items.
(b) Interest, dividends, rent.
(c) Royalties.
(d) Gains from sale of property.

Income does not have to be in the form of money. For example, in certain circumstances the use of a house may be considered income if the employer allows his employee to use it without paying normal rent.

Deductions from Gross Income

These are generally expenses incurred in connection with a business.

(a) Expenses incurred in carrying on a trade or business.
(b) Membership dues or fees to advance the business interests of the taxpayer.
(c) Reasonable and necessary travel and entertainment expenses incurred in connection with employment. There are necessary conditions which must be satisfied, and not all travel and entertainment expenses qualify as deductions from gross income.

Personal Exemptions

An individual can deduct $600 for each qualified dependent. If the taxpayer is over 65 or is blind, his exemption is $1,200.

Deductions from Adjusted Gross Income

These deductions are generally of a personal nature. For example:

(a) Interest.
(b) Taxes (to government bodies other than the federal government).
(c) Charitable contributions (limited to a percentage of adjusted gross income).
(d) Certain medical expenses (in excess of a given percentage of adjusted gross income).
(e) Casualty losses (such as a loss resulting from a fire).

The standard deduction for individuals is .10 of adjusted gross income, but an individual cannot deduct more than $1,000 ($500, if a married individual is filing separately) as a standard deduction.

CORPORATE INCOME TAX

Corporations with less than 10 shareholders may treat income in the same manner as a partnership (i.e., the same as individuals). If the corporation is taxed as a corporation, then the first $25,000 of income is taxed at a rate of 30%. Amounts in excess of $25,000 are taxed at 52%. Unlike the income tax of individuals, the corporate income tax is not a progressixe tax (there is only the one step in rate).

Depreciation

A tangible long-lived asset is charged to expense (depreciated or amortized) over its economic life. Guides to acceptable lives may be obtained from bulletins of the Internal Revenue Service.

There are essentially three problems associated with expensing long-lived assets.

(a) Basis, i.e., treatment of expected salvage value and whether changes in the price level should be recognized by adjusting the cost basis.
(b) Service life.
(c) The timing of the write-offs to expense.

The 1954 revision of the internal revenue code allows the use of accelerated methods of depreciation (if the life of the asset is in excess of three years), the two most popular methods being twice-straight-line declining balance (DDB) and sum of the years' digits (SYD).[5]

The proponents of accelated depreciation argue that the rapid write-offs are more realistic (assets depreciate more in early years) and that it stimulates investment in plant assets (by changing the pattern of deductions, not the amounts). Opponents call it a give-away to business, i.e., the advancing of depreciation actually increases the allowable depreciation, since plant investment is continuing and growing, and the advancing of depreciation is a permanent change. From the discussions have developed the following suggestions:

(a) Cash flow depreciation, i.e., charge long-lived assets to expense in the year of expenditure.
(b) Extra charge at acquisition (say 20%).
(c) Shorten the allowable service lives and (or) allow the corporation to determine timing.
(d) Return to the straight-line method, eliminating the provisions which allow accelerated depreciation.

Under the present code, businesses can use accelerated depreciation and, after several periods of use, sell the asset and possibly realize a gain which is taxed at capital gain rates (a maximum rate of 25%).

Depreciation and Changing Price Level

Though accelerated depreciation has helped industry obtain a reasonably satisfactory depreciation deduction, the fact that there has been an inflation does create concern for the adequacy of the present depreciation deductions.

[5] If the assets are not new, then 150% of straight-line declining balance rate may be used.

The following two suggestions have been made to recognize the inflation in price level:

(a) An extra charge at acquisition (say 30%), of which only 20% would be deducted from the cost base of the new asset.
(b) Replacement depreciation which would adjust original cost by the use of index numbers measuring inflation.

It is argued that the above changes are desirable, since the increased depreciation would:

(a) Increase the funds available for investment (and the tax funds re-received by the government).
(b) Increase the attractiveness of investments.

Percentage Depletion

Industries involved in finding and processing natural resources frequently have the right to use a percentage depletion deduction. The following illustrate some of the different allowable percentages:

Oil and gas	27½% of Gross Income
Uranium and 35 other metals	23% " " "
Clays, ores (outside United States)	15% " " "
Asbestos, coal, and other items	10% " " "
Brick, tile clay, and other items	5% " " "

Gross income as used here means the income earned from getting the substance from the ground and from the "ordinary treatment process" necessary to obtain commercially marketable products.

We shall discuss the percentage depletion for oil and gas. The percentage depletion is the smaller of:

(a) 27½% of the gross income (i.e., revenue) of mineral property.
(b) 50% of net income from the mineral property before any allowance for depletion.

Note that the deduction for depletion is not related to capital cost; it is a function of the sales of the product, processing costs, and the statutory percentage (27½%).

In addition to the above, all development costs and some exploration costs may be expensed. The exploration costs of productive properties are capitalized, but the costs of labor, fuel, materials, and tools of bringing in a well (about 75% of the total costs) may be expensed. In addition, all expenses of dry wells may be expensed.

EXAMPLE

Gross Income	$170,000
Less:	
Expenses	70,000
Taxable Income before Depletion	100,000
Less 27½%	46,750
Taxable Income	53,250

The $46,750 (27.5% of $170,000) is the percentage depletion, since it is less than 50% of the income before depletion.

The opponents of the percentage depletion allowance claim that it reduces the tax base, gives special privileges to a few industries (by allowing deductions not related to the cost of assets; this is contrary to accounting principles), and acts as a tax haven for people in the higher income tax brackets. Those in favor of percentage depletion say that it stimulates investment in very risky areas and that without the tax benefit the price of some products (for example, oil and gas) would increase significantly.

Other Deductions

Consider the following treatments allowed for tax purposes:

Research and Development Expenses—expensed in period of accrual.
Advertising—expensed in period of accrual (except for special advertising not considered an ordinary business expense [6]).
Buildings and Equipment—depreciated over their useful lives.
Entertainment—expensed in period of accrual (if ordinary and necessary).
Circulation Costs of Magazines—expensed when accrued.
Contributions—eligible contributions are allowed as deductions, up to 5% of net income (before deducting contributions, income taxes, and the 85% of dividends received which are not taxable).

It is interesting to compare the above with accounting procedures and with different possible tax treatments, taking note of the different economic incentives which result. The tax treatments described above are consistent with accounting practice, though one can question the correctness of expensing items in one year which will benefit several years (for example, research and development expenses, and advertising). More interesting is the question of whether advertising expenditures should be given preferential tax treatment over expenditures for plant and equipment.

[6] Advertising by a liquor store against state-run stores was not allowed as an allowable expense.

Computation of the Corporate Tax

Corporate income is subject to both a normal tax and a surtax. The normal tax of .30 is applied to all income (exclusive of capital gains). The surtax of .22 is applied to all taxable income in excess of $25,000 (again, exclusive of capital gains).

Two equivalent procedures for computing the tax follow:

(a) Applying the .52 rate and adjusting for the surtax. Assume a corporate has income of $100,000 subject to tax.

.52 of taxable income:	$\$100{,}000 \times .52 = \$52{,}000$
less:	$25{,}000 \times .22 = -5{,}500$
Income tax	$\$46{,}500$

The $5,500 is subtracted, since the first $25,000 of income is not subject to the surtax of .22.

(b) Computing the normal and surtax.

Normal tax:	$.30 \times \$100{,}000 = \$30{,}000$
Surtax	$.22 \times 75{,}000 = 16{,}500$
Income tax	$\$46{,}500$

Capital Gains

Capital gains or losses result from transactions involving capital assets. A capital asset is any property held by a corporation except:

(a) Inventories
(b) Receivables
(c) Real or depreciable property used in the business (the exclusion of this item is explained below)

Short-term capital gains are taxed as regular income. Capital gains resulting from holding capital assets over six months are taxed at a maximum rate of .25 and are called long-term gains. Since the normal incremental corporate tax rate is .52, it is desirable to have profits treated as long-term capital gains.

EXAMPLE

The ABC Company has taxable operating income of $1,000,000, and a long-term (the asset was held over six months) capital gain of $200,000. Compute the incremental tax resulting from the long-term gain.

The tax at .52 would be:

$$.52 \times \$200{,}000 = \$104{,}000$$

Since the maximum tax of a long-term capital gain is .25, the incremental tax would be $50,000.

The latter computation is called the "alternative tax" computation. The alternative tax is always less than the .52 tax, unless the operating income is a negative amount. If there has been an operating loss, then it may be desirable to treat the long-term capital gain as normal income.

EXAMPLE

Assume an operating loss of $1,000,000, and a long-term capital gain of $200,000.

Treating the $200,000 as normal income results in a net loss of $800,000 and no income. Applying the .25 rate to the capital gain would result in a tax of $50,000. Where there is a loss, the tax should be computed using both procedures to ensure that the method leading to the minimum tax is chosen.

If there are both long-term and short-term capital gains and capital losses, then they are all added together to obtain the net capital gain (or loss). However, the long-term items and short-term items must first be compared to see whether the balance is to be treated as a short-term or long-term gain.

EXAMPLE

Long-term gain		$200,000
less: long-term loss		50,000
Net long-term gain		150,000
Short-term gain	$100,000	
Short-term loss	140,000	
Net short-term loss		40,000
Net long-term gain		$110,000

If the short-term loss had been $200,000 larger, then the net capital gain would have been a net short-term loss of $90,000. Net capital losses cannot be deducted from the operating income of the period. However, they can be carried over for a period of five years to be deducted from capital gains of these periods. Thus, if there was a long-term loss of $90,000, this could be carried over and matched against the capital gains of any of the next five years.

Previously it was indicated that real or depreciable property used in the business was not classified as a capital asset. This is to the advantage of the corporation, since these assets may be treated as "Section 1231 assets." Under this section in the internal revenue code, the gain from the sale of this type of asset may be treated in the same manner as a capital gain. However, if the losses exceed the gains associated with this type of asset, the loss may be deducted against regular operating income (if the losses were treated as a capital loss, they could only be carried forward to be matched against pos-

sible capital gains). Thus, "Section 1231 assets" are in a preferred position compared to capital assets.

Accounting Principles and Taxes

The tax code should be judged on its merits as a taxing procedure, not as to whether or not it agrees with generally accepted accounting principles. Differences are to be expected.

The internal revenue code considers as income the cash received for such items as rent, airline tickets, and membership fees, even when the service will not be performed until the next tax period. However, the expense which is expected in performance of the above services is not allowed as an expense (nor are expected sales discounts, return, or guarantees).

The above differs from accounting principles in two respects. Under accrual accounting, revenue is recognized when the service is performed, not when the cash is received. Secondly, if it was decided that the cash basis is appropriate, then an attempt would still be made to charge the appropriate expenses against those revenues recognized on the cash basis.

The justification offered for the present procedures is that the receipt of cash is objective evidence, and the use of it to recognize revenues eliminates the necessity of determining how much revenue applies to several time periods. The expected expenses are not allowed as deductions, since the exact amount is not known.

The unrealized appreciation of readily marketable securities is not taxed, nor is it recorded for accounting purposes. This frequently is cited as a gain which is not taxed, since the amount is uncertain.

If the accrual method is used for tax purposes, it must also be used for accounting purposes.

Trade-ins

In the case of a trade-in (a new piece of equipment is acquired in exchange for old equipment), the tax treatment differs from the economic interpretation (or reasonable accounting treatment). In order to avoid establishing the value of the equipment which was traded in, the internal revenue code requires that no gain or loss be recognized at the time of trade-in. The taxable base of the new asset is equal to the sum of the cash paid (or cash equivalent) and the tax book value of the old equipment. While not good accounting, it is a good tax rule, since it avoids the necessity for having a corporation determine its own tax base, where there is often a lack of objective evidence relative to the true value of the old equipment given in trade.

Tax Allocations

When the accounting and the tax interpretations of transactions differ, a problem of tax allocation may arise. For example, the use of accelerated

depreciation for tax purposes and straight-line depreciation for book purposes may give rise to this situation. But the solution of this problem is too complex for this book; thus another situation will be used to illustrate the use of tax allocations.

Assume the XYZ Company considers a plant with a book value of $1,000,000 to be technologically obsolete, with no net salvage value. The following entry may be made:

Loss	1,000,000	
Plant		1,000,000

A complication arises if the internal revenue code requires that the plant be depreciated or be written off only if it is dismantled. The following entry might then be more appropriate (assuming a .52 tax rate):

Loss	480,000	
Tax loss carryover	520,000	
Plant		1,000,000

Taking the time value of money into consideration, the value of the tax loss carryover would be something less than $520,000. The tax loss carryover is an asset, assuming there is reasonable expectation of profitable operations in the future.

In the above situation, the book expense was recognized before the tax expense. It is also possible for the tax expense to occur in a period prior to the period of recognizing the book expense. For example, research and development costs may be expensed for tax purposes in the period in which they are incurred. Assume that the XYZ Company considers these costs to be assets for accounting purposes.

EXAMPLE

Assume $1,000,000 of R & D costs are incurred and expensed for tax purposes, but are considered to be assets for accounting purposes.

R & D—Costs	1,000,000	
Bank and other Credits		1,000,000
To recognize the incurrance of the costs.		
R & D—Asset	420,000	
R & D—Expense	580,000	
R & D Costs		1,000,000

The purpose of this second entry is to record the fact that part of the value of the R & D expenditure has been used in reducing the income taxes of this year ($580,000) and part exists as an asset ($420,000).

Some accountants might prefer the following entries in this type of situation:

R & D—Asset	1,000,000	
Bank and other Credits		1,000,000
Tax expense adjustment	520,000	
Income tax liability		520,000

The purpose of the second entry is to eliminate the effects on income taxes expense of being able to expense the R & D immediately. The credit to a liability account for taxes is made to record the fact that future taxes will be higher because the cost has been expensed in this year.

The author does not consider this latter procedure desirable, since:

(a) There is no tax liability of $520,000 now and will not be until revenues are earned and exceed the expenses incurred in the future.

(b) The cost basis of the R & D Asset is not $1,000,000, since the value of the amount expended has been reduced by the fact that the $1,000,000 has already been deducted for income tax purposes.

Loss Shifting

Corporations have the right to carry losses back or forward. This is a valuable privilege, since it tends to soften the blow of a bad year. The loss may be carried back three years or forward five years.

EXAMPLE

The XYZ Company had the following taxable incomes:

1960	$1,000,000	
1961	500,000	
1962	400,000	
1963	(1,100,000)	A loss.

The loss of $1,100,000 may be carried back to 1960 and used to adjust the taxable income of that year and also reduce the taxable income of 1961 by $100,000. The XYZ Company can then file for a refund of taxes for those two years.

If the loss of 1963 were in excess of $1,900,000, then the excess could be carried forward for five years to reduce the taxable incomes of those years until the loss carry forward has been consumed.

Section 102

Section 102 of the internal revenue code places a penalty tax on the accumulation of retained earnings beyond the legitimate needs of the business. The burden of proof is on the government.

A loose interpretation of section 102 could result in tax avoidance by the owner of the corporation (dividends, not being declared, would not be taxed).

Too strict an interpretation could result in corporations being prevented from retaining earnings which are necessary for growth.

Taxes and Mergers

In the past, there have been good tax reasons for corporations having tax loss credits to merge with profitable corporations. The result was a reduction in the tax bill of the united corporation and frequently liquidation of the loss business. Regulations now specify that an attempt must be made to put the loss business back on its feet, or the tax credit is not allowed. Also, the two corporations must be in related businesses. These two requirements limit the use of tax loss credits to special situations.

In addition to the above, the shareholders of the loss company must receive at least 20% of the market value of the surviving company. If they receive less than 20%, the loss carryover is reduced by 5% for every percent less than 20%.

Taxing of Executives

There are several ways in which the tax burden on executives may be lightened. The foremost among these are:

(a) Pensions (with capital gains for lump sum pension payments).
(b) Deferred compensation (payments after retirement).
(c) Stock option plans.

The stock option plan has been widely used in recent years. If the corporation conforms with rules of the internal revenue code, the gains of a stock option plan are taxed as capital gains or not taxed at all. We shall discuss the tax rules associated with two possible option plans: [7]

Plan 1

The price of the option is equal to or greater than .95 of the market price at the time the holder of the option may purchase the stock. No income is realized on the receipt of the option or when the option is exercised. If the stock is sold, the difference between sale price and option price is taxed as a capital gain.

Plan 2

The price of the option is equal to or greater than .85 of market price, but less than .95. No income is realized on the receipt of the option or when the option is exercised. If the stock is sold (or at the death of the stockholder),

[7] There are other possible plans and additional complications which will not be discussed here.

the difference between the lesser of market value at the time of the option (or time of death) and the option price is taxed as ordinary income.

There are several time requirements (common to both plans) for the option to qualify for capital gain consideration:

(a) The option time period cannot exceed ten years.
(b) The holders must not sell the stock before the expiration of two years from the date of the option was granted.
(c) The stock must be held for at least six months.

There are additional complexities if the holder of the option owns more than 10% of the stock of the corporation.

It has been ruled that an executive, after exercising an option, may purchase a "put," i.e., the right to sell stock at a fixed price in the future. This reduces somewhat the impact of the required six months holding period.

The proponents of the present regulations argue that it supplies incentive for members of management to act in a manner which will benefit stockholders. With regular income being taxed at a 91% rate for incremental amounts, special tax treatment is necessary if the monetary rewards are to be effective. Also, the cost to the corporation is low, since the corporation makes no cash outlays.

The opponents of the capital gain treatment applied to options say that it is discriminatory. Only a small percentage of workers, or even managers, have access to stock option plans. Not only is the cost of the option to the corporation real, since the equity of the present stockholders is diluted, but it is also hidden. It is impossible to compute exactly the value of the right to buy stock anytime in the next ten years at a set price, but that right is probably worth more than the difference between option price and market price at time of option. Also, the corporation suffers, since the issuance of a stock option does not result in a tax deduction. Finally, the fact that the manager can sell the stock (via the purchase of a "put") blunts the use of options as a means of having the manager identify his interests with those of the stockholders.

Dividends and Interest

Corporations are allowed to deduct interest payments to bondholders (and other debt securities) before computing taxable income. Dividend payments however, are not deductible. This has resulted in some incentive for corporations to use debt-type financing (of which one form is leases).

There are other problems involving dividends.[8] One is the double taxa-

[8] Dividends received by a corporation receive special consideration; 15% of the dividend is subject to tax, 85% is exempt.

tion of dividends, i.e., corporate earnings are taxed, and then the dividends when received by a stockholder are also taxed.[9] Retained earnings, on the other hand, are taxed as corporate income, and if the stockholder does not sell his investment, it is not taxable further as income (the stock held to death is given a new basis). If the stock is sold, the income is taxed as a capital gain, assuming the stock has been held over six months. The tax treatment afforded retained earnings gives corporations an extra incentive to reinvest earnings, especially if the corporation is closely held and the owners want to avoid the high marginal rates associated with large incomes.

The opponents of the present treatment argue that it is not fair for this group to be able to accumulate wealth and bypass the taxation of income (as when the stock is held till death). Other opponents argue that the double taxation of dividends results in a reduction in risk capital, and the difference between the treatment of interest and dividends results in an incentive to use a less stable form of capital structure.

Those in favor of taxing the retained earnings once, at the corporate rates, say this facilitates growth of the corporation and this is desirable.

Several possible actions have been suggested. Among them are:

(1) Eliminate the corporate income tax.
(2) Eliminate the tax on distributed dividends.
(3) Allow corporations to deduct cash dividends just as it presently does interest.
(4) Allow the individual to adjust his income tax by the amount of tax the corporation has paid.

In the future we can expect some further recognition that dividends have been taxed as corporate income (suggestion three above has merit).[10] It is also possible that increments in the value of stock will be taxed as capital gains upon the death of the holder.

Taxation and Decisions

All business decisions should be based on information which is on an after-tax basis. The timing of allowable deductions for tax purposes is extremely important. For example, all other things being equal, research and development expenditures (deductible when expended) have a distinct advantage over expenditures made on buildings and equipment which must be depreciated over a period of years. Thus the tax code in force at the time of

[9] Stock dividends are not taxed as income.

[10] There is currently a rule that $50 of dividends per individual are not taxable, and in addition there is a 4% tax credit. Some think this is too much, others too little. Most agree the present method is not the most desirable method.

the decision and the tax code expected during the period affected by the decision are relevant to the decision.

Among the operating decisions which will be directly affected are:

(a) Internal investment decisions (advertising, research and development, plant and equipment, investments in common stock, etc.).
(b) Type of securities issued in obtaining new financing (debt, preferred, or common stock).
(c) Dividend policy (cash or stock dividends).
(d) Compensation for executives, including stock option plans.
(e) Buy or lease of land, buildings, or equipment.
(f) Form of business organization (partnership or corporation; one or more corporations).

There will also be decisions relative to methods of computations to be used for tax purposes. For example:

(a) Method of accounting (cash or accrual methods).
(b) Method of depreciation computations for income tax purposes.
(c) Method of accounting for inventories (FIFO, LIFO, etc.).

These last three decisions will directly affect the cash flows from operations (by affecting the income tax).

SUMMARY

It is to be expected (indeed, hoped) that the future will bring changes to the internal revenue code. While legislation will change the law, the same issues will linger through the years. These include the inclusion or exclusion of items of income, timing of expenses, and the extent and direction of the use of taxes to influence economic incentives. It should be remembered that few tax questions are black and white. There are two sides to each question, and the resolution of the issues is not simple.

QUESTIONS AND PROBLEMS

35–1 Should the federal government tax as income interest paid to individuals by state and local governments?

35–2 Appreciation in the value of common stock held as an investment is taxed as a capital gain (a long-term capital gain if held over six months). Should

this type of income be given special tax treatment? Should the internal revenue code be changed relative to capital gains? How?

35–3 Section 1231 assets (real or depreciable property used in business) are not capital assets. What advantage or disadvantage do section 1231 assets have relative to capital assets?

35–4 Should the implicit rental value of an owner-occupied house be considered taxable income? Is the person who invests $20,000 in a house and a person who invests $20,000 in bonds and rents a home given equivalent income tax treatment?

35–5 Dr. Smith has earned fees of $25,000 during 1964. The expenses of his practice are $4,000. He has a wife and two children. Compute his tax base, using the standard deduction.

35–6 The question relative to the allowable depreciation for tax purposes has never been satisfactorily resolved. Among the primary issues are:

(a) The method of write-off
(b) The allowable life
(c) The estimated salvage
(d) The effect of the change in the price level

Cash flow depreciation has been offered as a solution to all of the above problems. Discuss the merits of this suggestion.

35–7 Discuss the percentage depletion allowed for oil (and other industries).

35–8 Discuss the tax treatment of:

(a) Research and development costs
(b) Advertising costs
(c) Plant and equipment costs
(d) Entertainment costs

Should the internal revenue code be based on generally accepted accounting principles? Discuss some differences which presently exist.

35–9 The ABC Company had an income of $100,000. This figure includes $20,000 of long-term capital gains. Compute the income tax. What would be the tax if the capital gain was a short-term gain?

35–10 The XYZ Company had an operating loss of $100,000, and a long-term capital gain of $20,000. Compute the income tax.

35–11 The XYZ Company has written off as a loss $10,000,000 of plant and equipment confiscated in Cuba. Assume the deduction was not allowed for tax purposes at this time. Prepare two different sets of financial entries to record the transactions.

35–12 A corporation may carry losses back three years or forward five years. Is it reasonable to extend the same principle to individuals so that the peaks and valleys of earnings may be leveled?

35–13 The ABC Company had the following taxable incomes:

1959	200,000
1960	2,000,000
1961	1,000,000
1962	(3,500,000)
1963	800,000

Compute the taxable incomes of each year after the loss has been distributed.

35–14 Should corporations be encouraged to pay out a large percentage of their income as dividends by applying section 102 or by allowing dividends as a deduction for computing income taxes?

35–15 Is it reasonable for bond interest to be deductible for tax purposes but not dividends? What are some economic consequences?

35–16 How may a corporate executive's income tax be reduced? Is the income tax treatment of stock options reasonable?

35–17 Discuss the double taxation of dividends question.

35–18 Name and discuss business decisions directly affected by the internal revenue code.

35–19 In August 1962 the U.S. Senate passed a law allowing corporations to deduct from their income taxes 7% of the investments made during the year (a 7% tax credit). This 7% was in addition to the allowable depreciation expense. Is this a desirable feature to incorporate into the corporate income tax code? How would the tax credit affect investment in plant and equipment?

APPENDIX

Table A *

Present Value of $1

$(1 + r)^{-n}$

n	1%	2%	3%	4%	5%	6%	7%	8%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460
26	0.7720	0.5976	0.4637	0.3607	0.2812	0.2198	0.1722	0.1352
27	0.7644	0.5859	0.4502	0.3468	0.2678	0.2074	0.1609	0.1252
28	0.7568	0.5744	0.4371	0.3335	0.2551	0.1956	0.1504	0.1159
29	0.7493	0.5631	0.4243	0.3207	0.2429	0.1846	0.1406	0.1073
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0994
35	0.7059	0.5000	0.3554	0.2534	0.1813	0.1301	0.0937	0.0676
40	0.6717	0.4529	0.3066	0.2083	0.1420	0.0972	0.0668	0.0460
45	0.6391	0.4102	0.2644	0.1712	0.1113	0.0727	0.0476	0.0313
50	0.6080	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213

* SOURCE: Bierman and Smidt, *The Capital Budgeting Decision*, pp. 209–214.

Table A. Present Value of $1 (cont'd)

n	9%	10%	11%	12%	13%	14%	15%	16%
1	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621
2	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432
3	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407
4	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523
5	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761
6	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104
7	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538
8	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050
9	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630
10	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267
11	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954
12	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685
13	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452
14	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252
15	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079
16	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930
17	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802
18	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691
19	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596
20	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514
21	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443
22	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382
23	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329
24	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284
25	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245
26	0.1064	0.0839	0.0663	0.0525	0.0417	0.0331	0.0264	0.0211
27	0.0976	0.0763	0.0597	0.0469	0.0369	0.0291	0.0230	0.0182
28	0.0895	0.0693	0.0538	0.0419	0.0326	0.0255	0.0200	0.0157
29	0.0822	0.0630	0.0485	0.0374	0.0289	0.0224	0.0174	0.0135
30	0.0754	0.0573	0.0437	0.0334	0.0256	0.0196	0.0151	0.0116
35	0.0490	0.0356	0.0259	0.0189	0.0139	0.0102	0.0075	0.0055
40	0.0318	0.0221	0.0154	0.0107	0.0075	0.0053	0.0037	0.0026
45	0.0207	0.0137	0.0091	0.0061	0.0041	0.0027	0.0019	0.0013
50	0.0134	0.0085	0.0054	0.0035	0.0022	0.0014	0.0009	0.0006

Table A. Present Value of $1 (cont'd)

n	*17%*	*18%*	*19%*	*20%*	*21%*	*22%*	*23%*	*24%*
1	0.8547	0.8475	0.8403	0.8333	0.8264	0.8197	0.8130	0.8065
2	0.7305	0.7182	0.7062	0.6944	0.6830	0.6719	0.6610	0.6504
3	0.6244	0.6086	0.5934	0.5787	0.5645	0.5507	0.5374	0.5245
4	0.5337	0.5158	0.4987	0.4823	0.4665	0.4514	0.4369	0.4230
5	0.4561	0.4371	0.4190	0.4019	0.3855	0.3700	0.3552	0.3411
6	0.3898	0.3704	0.3521	0.3349	0.3186	0.3033	0.2888	0.2751
7	0.3332	0.3139	0.2959	0.2791	0.2633	0.2486	0.2348	0.2218
8	0.2848	0.2660	0.2487	0.2326	0.2176	0.2038	0.1909	0.1789
9	0.2434	0.2255	0.2090	0.1938	0.1799	0.1670	0.1552	0.1443
10	0.2080	0.1911	0.1756	0.1615	0.1486	0.1369	0.1262	0.1164
11	0.1778	0.1619	0.1476	0.1346	0.1228	0.1122	0.1026	0.0938
12	0.1520	0.1372	0.1240	0.1122	0.1015	0.0920	0.0834	0.0757
13	0.1299	0.1163	0.1042	0.0935	0.0839	0.0754	0.0678	0.0610
14	0.1110	0.0985	0.0876	0.0779	0.0693	0.0618	0.0551	0.0492
15	0.0949	0.0835	0.0736	0.0649	0.0573	0.0507	0.0448	0.0397
16	0.0811	0.0708	0.0618	0.0541	0.0474	0.0415	0.0364	0.0320
17	0.0693	0.0600	0.0520	0.0451	0.0391	0.0340	0.0296	0.0258
18	0.0592	0.0508	0.0437	0.0376	0.0323	0.0279	0.0241	0.0208
19	0.0506	0.0431	0.0367	0.0313	0.0267	0.0229	0.0196	0.0168
20	0.0433	0.0365	0.0308	0.0261	0.0221	0.0187	0.0159	0.0135
21	0.0370	0.0309	0.0259	0.0217	0.0183	0.0154	0.0129	0.0109
22	0.0316	0.0262	0.0218	0.0181	0.0151	0.0126	0.0105	0.0088
23	0.0270	0.0222	0.0183	0.0151	0.0125	0.0103	0.0086	0.0071
24	0.0231	0.0188	0.0154	0.0126	0.0103	0.0085	0.0070	0.0057
25	0.0197	0.0160	0.0129	0.0105	0.0085	0.0069	0.0057	0.0046
26	0.0169	0.0135	0.0109	0.0087	0.0070	0.0057	0.0046	0.0037
27	0.0144	0.0115	0.0091	0.0073	0.0058	0.0047	0.0037	0.0030
28	0.0123	0.0097	0.0077	0.0061	0.0048	0.0038	0.0030	0.0024
29	0.0105	0.0082	0.0064	0.0051	0.0040	0.0031	0.0025	0.0020
30	0.0090	0.0070	0.0054	0.0042	0.0033	0.0026	0.0020	0.0016
35	0.0041	0.0030	0.0023	0.0017	0.0013	0.0009	0.0007	0.0005
40	0.0019	0.0013	0.0010	0.0007	0.0005	0.0004	0.0002	0.0002
45	0.0009	0.0006	0.0004	0.0003	0.0002	0.0001	0.0001	0.0001
50	0.0004	0.0003	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000

Table A. Present Value of $1 (cont'd)

n	25%	26%	27%	28%	29%	30%	31%	32%
1	0.8000	0.7937	0.7874	0.7813	0.7752	0.7692	0.7634	0.7576
2	0.6400	0.6299	0.6200	0.6104	0.6009	0.5917	0.5827	0.5739
3	0.5120	0.4999	0.4882	0.4768	0.4658	0.4552	0.4448	0.4348
4	0.4096	0.3968	0.3844	0.3725	0.3611	0.3501	0.3396	0.3294
5	0.3277	0.3149	0.3027	0.2910	0.2799	0.2693	0.2592	0.2495
6	0.2621	0.2499	0.2383	0.2274	0.2170	0.2072	0.1979	0.1890
7	0.2097	0.1983	0.1877	0.1776	0.1682	0.1594	0.1510	0.1432
8	0.1678	0.1574	0.1478	0.1388	0.1304	0.1226	0.1153	0.1085
9	0.1342	0.1249	0.1164	0.1084	0.1011	0.0943	0.0880	0.0822
10	0.1074	0.0992	0.0916	0.0847	0.0784	0.0725	0.0672	0.0623
11	0.0859	0.0787	0.0721	0.0662	0.0607	0.0558	0.0513	0.0472
12	0.0687	0.0625	0.0568	0.0517	0.0471	0.0429	0.0392	0.0357
13	0.0550	0.0496	0.0447	0.0404	0.0365	0.0330	0.0299	0.0271
14	0.0440	0.0393	0.0352	0.0316	0.0283	0.0253	0.0228	0.0205
15	0.0352	0.0312	0.0277	0.0247	0.0219	0.0195	0.0174	0.0155
16	0.0281	0.0248	0.0218	0.0193	0.0170	0.0150	0.0133	0.0118
17	0.0225	0.0197	0.0172	0.0150	0.0132	0.0116	0.0101	0.0089
18	0.0180	0.0156	0.0135	0.0118	0.0102	0.0089	0.0077	0.0068
19	0.0144	0.0124	0.0107	0.0092	0.0079	0.0068	0.0059	0.0051
20	0.0115	0.0098	0.0084	0.0072	0.0061	0.0053	0.0045	0.0039
21	0.0092	0.0078	0.0066	0.0056	0.0048	0.0040	0.0034	0.0029
22	0.0074	0.0062	0.0052	0.0044	0.0037	0.0031	0.0026	0.0022
23	0.0059	0.0049	0.0041	0.0034	0.0029	0.0024	0.0020	0.0017
24	0.0047	0.0039	0.0032	0.0027	0.0022	0.0018	0.0015	0.0013
25	0.0038	0.0031	0.0025	0.0021	0.0017	0.0014	0.0012	0.0010
26	0.0030	0.0025	0.0020	0.0016	0.0013	0.0011	0.0009	0.0007
27	0.0024	0.0019	0.0016	0.0013	0.0010	0.0008	0.0007	0.0006
28	0.0019	0.0015	0.0012	0.0010	0.0008	0.0006	0.0005	0.0004
29	0.0015	0.0012	0.0010	0.0008	0.0006	0.0005	0.0004	0.0003
30	0.0012	0.0010	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002
35	0.0004	0.0003	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
40	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
45	0.0000	0.0000	0.0000	0.0000				
50								

Table A. Present Value of $1 (cont'd)

n	33%	34%	35%	36%	37%	38%	39%	40%
1	0.7519	0.7463	0.7407	0.7353	0.7299	0.7246	0.7194	0.7143
2	0.5653	0.5569	0.5487	0.5407	0.5328	0.5251	0.5176	0.5102
3	0.4251	0.4156	0.4064	0.3975	0.3889	0.3805	0.3724	0.3644
4	0.3196	0.3102	0.3011	0.2923	0.2839	0.2757	0.2679	0.2603
5	0.2403	0.2315	0.2230	0.2149	0.2072	0.1998	0.1927	0.1859
6	0.1807	0.1727	0.1652	0.1580	0.1512	0.1448	0.1386	0.1328
7	0.1358	0.1289	0.1224	0.1162	0.1104	0.1049	0.0997	0.0949
8	0.1021	0.0962	0.0906	0.0854	0.0806	0.0760	0.0718	0.0678
9	0.0768	0.0718	0.0671	0.0628	0.0588	0.0551	0.0516	0.0484
10	0.0577	0.0536	0.0497	0.0462	0.0429	0.0399	0.0371	0.0346
11	0.0434	0.0400	0.0368	0.0340	0.0313	0.0289	0.0267	0.0247
12	0.0326	0.0298	0.0273	0.0250	0.0229	0.0210	0.0192	0.0176
13	0.0245	0.0223	0.0202	0.0184	0.0167	0.0152	0.0138	0.0126
14	0.0185	0.0166	0.0150	0.0135	0.0122	0.0110	0.0099	0.0090
15	0.0139	0.0124	0.0111	0.0099	0.0089	0.0080	0.0072	0.0064
16	0.0104	0.0093	0.0082	0.0073	0.0065	0.0058	0.0051	0.0046
17	0.0078	0.0069	0.0061	0.0054	0.0047	0.0042	0.0037	0.0033
18	0.0059	0.0052	0.0045	0.0039	0.0035	0.0030	0.0027	0.0023
19	0.0044	0.0038	0.0033	0.0029	0.0025	0.0022	0.0019	0.0017
20	0.0033	0.0029	0.0025	0.0021	0.0018	0.0016	0.0014	0.0012
21	0.0025	0.0021	0.0018	0.0016	0.0013	0.0012	0.0010	0.0009
22	0.0019	0.0016	0.0014	0.0012	0.0010	0.0008	0.0007	0.0006
23	0.0014	0.0012	0.0010	0.0008	0.0007	0.0006	0.0005	0.0004
24	0.0011	0.0009	0.0007	0.0006	0.0005	0.0004	0.0004	0.0003
25	0.0008	0.0007	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002
26	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002	0.0002	0.0002
27	0.0005	0.0004	0.0003	0.0002	0.0002	0.0002	0.0001	0.0001
28	0.0003	0.0003	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
29	0.0003	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001
30	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
40								
45								
50								

Table A. Present Value of $1 (cont'd)

n	*41%*	*42%*	*43%*	*44%*	*45%*	*46%*	*47%*	*48%*
1	0.7092	0.7042	0.6993	0.6944	0.6897	0.6849	0.6803	0.6757
2	0.5030	0.4959	0.4890	0.4823	0.4756	0.4691	0.4628	0.4565
3	0.3567	0.3492	0.3420	0.3349	0.3280	0.3213	0.3148	0.3085
4	0.2530	0.2459	0.2391	0.2326	0.2262	0.2201	0.2142	0.2084
5	0.1794	0.1732	0.1672	0.1615	0.1560	0.1507	0.1457	0.1408
6	0.1273	0.1220	0.1169	0.1122	0.1076	0.1032	0.0991	0.0952
7	0.0903	0.0859	0.0818	0.0779	0.0742	0.0707	0.0674	0.0643
8	0.0640	0.0605	0.0572	0.0541	0.0512	0.0484	0.0459	0.0434
9	0.0454	0.0426	0.0400	0.0376	0.0353	0.0332	0.0312	0.0294
10	0.0322	0.0300	0.0280	0.0261	0.0243	0.0227	0.0212	0.0198
11	0.0228	0.0211	0.0196	0.0181	0.0168	0.0156	0.0144	0.0134
12	0.0162	0.0149	0.0137	0.0126	0.0116	0.0107	0.0098	0.0091
13	0.0115	0.0105	0.0096	0.0087	0.0080	0.0073	0.0067	0.0061
14	0.0081	0.0074	0.0067	0.0061	0.0055	0.0050	0.0045	0.0041
15	0.0058	0.0052	0.0047	0.0042	0.0038	0.0034	0.0031	0.0028
16	0.0041	0.0037	0.0033	0.0029	0.0026	0.0023	0.0021	0.0019
17	0.0029	0.0026	0.0023	0.0020	0.0018	0.0016	0.0014	0.0013
18	0.0021	0.0018	0.0016	0.0014	0.0012	0.0011	0.0010	0.0009
19	0.0015	0.0013	0.0011	0.0010	0.0009	0.0008	0.0007	0.0006
20	0.0010	0.0009	0.0008	0.0007	0.0006	0.0005	0.0005	0.0004
21	0.0007	0.0006	0.0005	0.0005	0.0004	0.0004	0.0003	0.0003
22	0.0005	0.0004	0.0004	0.0003	0.0003	0.0002	0.0002	0.0002
23	0.0004	0.0003	0.0003	0.0002	0.0002	0.0002	0.0001	0.0001
24	0.0003	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
25	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
26	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000
27	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000		
28	0.0001	0.0001	0.0000	0.0000				
29	0.0000	0.0000						
30								
35								
40								
45								
50								

Table B *

Present Value of $1 Received per Period

$$\frac{1-(1+r)^{-n}}{r}$$

n	1%	2%	3%	4%	5%	6%	7%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940
21	18.8570	17.0112	15.4150	14.0292	12.8212	11.7641	10.8355
22	19.6604	17.6580	15.9369	14.4511	13.1630	12.0416	11.0612
23	20.4558	18.2922	16.4436	14.8568	13.4886	12.3034	11.2722
24	21.2434	18.9139	16.9355	15.2470	13.7986	12.5504	11.4693
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536
26	22.7952	20.1210	17.8768	15.9828	14.3752	13.0032	11.8258
27	23.5596	20.7069	18.3270	16.3296	14.6430	13.2105	11.9867
28	24.3164	21.2813	18.7641	16.6631	14.8981	13.4062	12.1371
29	25.0658	21.8444	19.1885	16.9837	15.1411	13.5907	12.2777
30	25.8077	22.3965	19.6004	17.2920	15.3725	13.7648	12.4090
31	26.5423	22.9377	20.0004	17.5885	15.5928	13.9291	12.5318
32	27.2696	23.4683	20.3888	17.8736	15.8027	14.0840	12.6466
33	27.9897	23.9886	20.7658	18.1476	16.0025	14.2302	12.7538

* SOURCE: Bierman and Smidt, *The Capital Budgeting Decision*, pp. 215–221.

Table B. Present Value of $1 Received per Period (cont'd)

n	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*
34	28.7027	24.4986	21.1318	18.4112	16.1929	14.3681	12.8540
35	29.4086	24.9986	21.4872	18.6646	16.3742	14.4982	12.9477
40	32.8347	27.3555	23.1148	19.7928	17.1591	15.0463	13.3317
45	36.0945	29.4902	24.5187	20.7200	17.7741	15.4558	13.6055
50	39.1961	31.4236	25.7298	21.4822	18.2559	15.7619	13.8007

Table B. Present Value of $1 Received per Period (cont'd)

n	*8%*	*9%*	*10%*	*11%*	*12%*	*13%*	*14%*
1	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772
2	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467
3	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216
4	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137
5	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331
6	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887
7	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883
8	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389
9	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464
10	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161
11	7.1390	6.8051	6.4951	6.2065	5.9377	5.6869	5.4527
12	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603
13	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424
14	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021
15	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422
16	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651
17	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729
18	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674
19	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504
20	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231
21	10.0168	9.2922	8.6487	8.0751	7.5620	7.1015	6.6870
22	10.2007	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429
23	10.3711	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921
24	10.5228	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351
25	10.6748	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729
26	10.8100	9.9290	9.1609	8.4881	7.8957	7.3717	6.9061
27	10.9352	10.0266	9.2372	8.5478	7.9426	7.4086	6.9352
28	11.0511	10.1161	9.3066	8.6016	7.9844	7.4412	6.9607
29	11.1584	10.1983	9.3696	8.6501	8.0218	7.4701	6.9830
30	11.2578	10.2737	9.4269	8.6938	8.0552	7.4957	7.0027
31	11.3498	10.3428	9.4790	8.7331	8.0850	7.5183	7.0199
32	11.4350	10.4062	9.5264	8.7686	8.1116	7.5383	7.0350
33	11.5139	10.4644	9.5694	8.8005	8.1354	7.5560	7.0482
34	11.5869	10.5178	9.6086	8.8293	8.1566	7.5717	7.0599
35	11.6546	10.5668	9.6442	8.8552	8.1755	7.5856	7.0700
40	11.9246	10.7574	9.7791	8.9511	8.2438	7.6344	7.1050
45	12.1084	10.8812	9.8628	9.0079	8.2825	7.6609	7.1232
50	12.2335	10.9617	9.9148	9.0417	8.3045	7.6752	7.1327

Table B. Present Value of $1 Received per Period (cont'd)

n	*15%*	*16%*	*17%*	*18%*	*19%*	*20%*	*21%*
1	0.8696	0.8621	0.8547	0.8475	0.8403	0.8333	0.8264
2	1.6257	1.6052	1.5852	1.5656	1.5465	1.5278	1.5095
3	2.2832	2.2459	2.2096	2.1743	2.1399	2.1065	2.0739
4	2.8550	2.7982	2.7432	2.6901	2.6386	2.5887	2.5404
5	3.3522	3.2743	3.1993	3.1272	3.0576	2.9906	2.9260
6	3.7845	3.6847	3.5892	3.4976	3.4098	3.3255	3.2446
7	4.1604	4.0386	3.9224	3.8115	3.7057	3.6046	3.5079
8	4.4873	4.3436	4.2072	4.0776	3.9544	3.8372	3.7256
9	4.7716	4.6065	4.4506	4.3030	4.1633	4.0310	3.9054
10	5.0188	4.8332	4.6586	4.4941	4.3389	4.1925	4.0541
11	5.2337	5.0286	4.8364	4.6560	4.4865	4.3271	4.1769
12	5.4206	5.1971	4.9884	4.7932	4.6105	4.4392	4.2784
13	5.5831	5.3423	5.1183	4.9095	4.7147	4.5327	4.3624
14	5.7245	5.4675	5.2293	5.0081	4.8023	4.6106	4.4317
15	5.8474	5.5755	5.3242	5.0916	4.8759	4.6755	4.4890
16	5.9542	5.6685	5.4053	5.1624	4.9377	4.7296	4.5364
17	6.0472	5.7487	5.4746	5.2223	4.9897	4.7746	4.5755
18	6.1280	5.8178	5.5339	5.2732	5.0333	4.8122	4.6079
19	6.1982	5.8775	5.5845	5.3162	5.0700	4.8435	4.6346
20	6.2593	5.9288	5.6278	5.3527	5.1009	4.8696	4.6567
21	6.3125	5.9731	5.6648	5.3837	5.1268	4.8913	4.6750
22	6.3587	6.0113	5.6964	5.4099	5.1486	4.9094	4.6900
23	6.3988	6.0442	5.7234	5.4321	5.1668	4.9245	4.7025
24	6.4338	6.0726	5.7465	5.4509	5.1822	4.9371	4.7128
25	6.4641	6.0971	5.7662	5.4669	5.1951	4.9476	4.7213
26	6.4906	6.1182	5.7831	5.4804	5.2060	4.9563	4.7284
27	6.5135	6.1364	5.7975	5.4919	5.2151	4.9636	4.7342
28	6.5335	6.1520	5.8099	5.5016	5.2228	4.9697	4.7390
29	6.5509	6.1656	5.8204	5.5098	5.2292	4.9747	4.7430
30	6.5660	6.1772	5.8294	5.5168	5.2347	4.9789	4.7463
31	6.5791	6.1872	5.8371	5.5227	5.2392	4.9824	4.7490
32	6.5905	6.1959	5.8437	5.5277	5.2430	4.9854	4.7512
33	6.6005	6.2034	5.8493	5.5320	5.2462	4.9878	4.7531
34	6.6091	6.2098	5.8541	5.5356	5.2489	4.9898	4.7546
35	6.6166	6.2153	5.8582	5.5386	5.2512	4.9915	4.7559
40	6.6418	6.2335	5.8713	5.5482	5.2582	4.9966	4.7596
45	6.6543	6.2421	5.8773	5.5523	5.2611	4.9986	4.7610
50	6.6605	6.2463	5.8801	5.5541	5.2623	4.9995	4.7616

Table B. Present Value of $1 Received per Period (cont'd)

n	22%	23%	24%	25%	26%	27%	28%
1	0.8197	0.8130	0.8065	0.8000	0.7937	0.7874	0.7813
2	1.4915	1.4740	1.4568	1.4400	1.4235	1.4074	1.3916
3	2.0422	2.0114	1.9813	1.9520	1.9234	1.8956	1.8684
4	2.4936	2.4483	2.4043	2.3616	2.3202	2.2800	2.2410
5	2.8636	2.8035	2.7454	2.6893	2.6351	2.5827	2.5320
6	3.1669	3.0923	3.0205	2.9514	2.8850	2.8210	2.7594
7	3.4155	3.3270	3.2423	3.1611	3.0833	3.0087	2.9370
8	3.6193	3.5179	3.4212	3.3289	3.2407	3.1564	3.0758
9	3.7863	3.6731	3.5655	3.4631	3.3657	3.2728	3.1842
10	3.9232	3.7993	3.6819	3.5705	3.4648	3.3644	3.2689
11	4.0354	3.9018	3.7757	3.6564	3.5435	3.4365	3.3351
12	4.1274	3.9852	3.8514	3.7251	3.6059	3.4933	3.3868
13	4.2028	4.0530	3.9124	3.7801	3.6555	3.5381	3.4272
14	4.2646	4.1082	3.9616	3.8241	3.6949	3.5733	3.4587
15	4.3152	4.1530	4.0013	3.8593	3.7261	3.6010	3.4834
16	4.3567	4.1894	4.0333	3.8874	3.7509	3.6228	3.5026
17	4.3908	4.2190	4.0591	3.9099	3.7705	3.6400	3.5177
18	4.4187	4.2431	4.0799	3.9279	3.7861	3.6536	3.5294
19	4.4415	4.2627	4.0967	3.9424	3.7985	3.6642	3.5386
20	4.4603	4.2786	4.1103	3.9539	3.8083	3.6726	3.5458
21	4.4756	4.2916	4.1212	3.9631	3.8161	3.6792	3.5514
22	4.4882	4.3021	4.1300	3.9705	3.8223	3.6844	3.5558
23	4.4985	4.3106	4.1371	3.9764	3.8273	3.6885	3.5592
24	4.5070	4.3176	4.1428	3.9811	3.8312	3.6918	3.5619
25	4.5139	4.3232	4.1474	3.9849	3.8342	3.6943	3.5640
26	4.5196	4.3278	4.1511	3.9879	3.8367	3.6963	3.5656
27	4.5243	4.3316	4.1542	3.9903	3.8387	3.6979	3.5669
28	4.5281	4.3346	4.1566	3.9923	3.8402	3.6991	3.5679
29	4.5312	4.3371	4.1585	3.9938	3.8414	3.7001	3.5687
30	4.5338	4.3391	4.1601	3.9950	3.8424	3.7009	3.5693
31	4.5359	4.3407	4.1614	3.9960	3.8432	3.7015	3.5697
32	4.5376	4.3421	4.1624	3.9968	3.8438	3.7019	3.5701
33	4.5390	4.3431	4.1632	3.9975	3.8443	3.7023	3.5704
34	4.5402	4.3440	4.1639	3.9980	3.8447	3.7026	3.5706
35	4.5411	4.3447	4.1644	3.9984	3.8450	3.7028	3.5708
40	4.5439	4.3467	4.1659	3.9995	3.8458	3.7034	3.5712
45	4.5449	4.3474	4.1664	3.9998	3.8460	3.7036	3.5714
50	4.5452	4.3477	4.1666	3.9999	3.8461	3.7037	3.5714

Table B. Present Value of $1 Received per Period (cont'd)

n	29%	30%	31%	32%	33%	34%	35%
1	0.7752	0.7692	0.7634	0.7576	0.7519	0.7463	0.7407
2	1.3761	1.3609	1.3461	1.3315	1.3172	1.3032	1.2894
3	1.8420	1.8161	1.7909	1.7663	1.7423	1.7188	1.6959
4	2.2031	2.1662	2.1305	2.0957	2.0618	2.0290	1.9969
5	2.4830	2.4356	2.3897	2.3452	2.3021	2.2604	2.2200
6	2.7000	2.6427	2.5875	2.5342	2.4828	2.4331	2.3852
7	2.8682	2.8021	2.7386	2.6775	2.6187	2.5620	2.5075
8	2.9986	2.9247	2.8539	2.7860	2.7208	2.6582	2.5982
9	3.0997	3.0190	2.9419	2.8681	2.7976	2.7300	2.6653
10	3.1781	3.0915	3.0091	2.9304	2.8553	2.7836	2.7150
11	3.2388	3.1473	3.0604	2.9776	2.8987	2.8236	2.7519
12	3.2859	3.1903	3.0995	3.0133	2.9314	2.8534	2.7792
13	3.3224	3.2233	3.1294	3.0404	2.9559	2.8757	2.7994
14	3.3507	3.2487	3.1522	3.0609	2.9744	2.8923	2.8144
15	3.3726	3.2682	3.1696	3.0764	2.9883	2.9047	2.8255
16	3.3896	3.2832	3.1829	3.0882	2.9987	2.9140	2.8337
17	3.4028	3.2948	3.1931	3.0971	3.0065	2.9209	2.8398
18	3.4130	3.3037	3.2008	3.1039	3.0124	2.9260	2.8443
19	3.4210	3.3105	3.2067	3.1090	3.0169	2.9299	2.8476
20	3.4271	3.3158	3.2112	3.1129	3.0202	2.9327	2.8501
21	3.4319	3.3198	3.2147	3.1158	3.0227	2.9349	2.8520
22	3.4356	3.3230	3.2173	3.1180	3.0246	2.9365	2.8533
23	3.4384	3.3253	3.2193	3.1197	3.0260	2.9377	2.8543
24	3.4406	3.3272	3.2209	3.1210	3.0271	2.9386	2.8550
25	3.4423	3.3286	3.2220	3.1220	3.0279	2.9392	2.8556
26	3.4437	3.3297	3.2229	3.1227	3.0285	2.9397	2.8560
27	3.4447	3.3305	3.2236	3.1233	3.0289	2.9401	2.8563
28	3.4455	3.3312	3.2241	3.1237	3.0293	2.9404	2.8565
29	3.4461	3.3316	3.2245	3.1240	3.0295	2.9406	2.8567
30	3.4466	3.3321	3.2248	3.1242	3.0297	2.9407	2.8568
31	3.4470	3.3324	3.2251	3.1244	3.0299	2.9408	2.8569
32	3.4473	3.3326	3.2252	3.1246	3.0300	2.9409	2.8569
33	3.4475	3.3328	3.2254	3.1247	3.0301	2.9410	2.8570
34	3.4477	3.3329	3.2255	3.1248	3.0301	2.9410	2.8570
35	3.4478	3.3330	3.2256	3.1248	3.0302	2.9411	2.8571
40	3.4481	3.3332	3.2257	3.1250	3.0303	2.9412	2.8571
45	3.4482	3.3333	3.2258	3.1250	3.0303	2.9412	2.8571
50	3.4483	3.3333	3.2258	3.1250	3.0303	2.9412	2.8571

Table B. Present Value of $1 Received per Period (cont'd)

n	36%	37%	38%	39%	40%	41%	42%
1	0.7353	0.7299	0.7246	0.7194	0.7143	0.7092	0.7042
2	1.2760	1.2627	1.2497	1.2370	1.2245	1.2122	1.2002
3	1.6735	1.6516	1.6302	1.6093	1.5889	1.5689	1.5494
4	1.9658	1.9355	1.9060	1.8772	1.8492	1.8219	1.7954
5	2.1807	2.1427	2.1058	2.0699	2.0352	2.0014	1.9686
6	2.3388	2.2939	2.2506	2.2086	2.1680	2.1286	2.0905
7	2.4550	2.4043	2.3555	2.3083	2.2628	2.2189	2.1764
8	2.5404	2.4849	2.4315	2.3801	2.3306	2.2829	2.2369
9	2.6033	2.5437	2.4866	2.4317	2.3790	2.3283	2.2795
10	2.6495	2.5867	2.5265	2.4689	2.4136	2.3605	2.3095
11	2.6834	2.6180	2.5555	2.4956	2.4383	2.3833	2.3307
12	2.7084	2.6409	2.5764	2.5148	2.4559	2.3995	2.3455
13	2.7268	2.6576	2.5916	2.5286	2.4685	2.4110	2.3560
14	2.7403	2.6698	2.6026	2.5386	2.4775	2.4192	2.3634
15	2.7502	2.6787	2.6106	2.5457	2.4839	2.4249	2.3686
16	2.7575	2.6852	2.6164	2.5509	2.4885	2.4290	2.3722
17	2.7629	2.6899	2.6206	2.5546	2.4918	2.4319	2.3748
18	2.7668	2.6934	2.6236	2.5573	2.4941	2.4340	2.3766
19	2.7697	2.6959	2.6258	2.5592	2.4958	2.4355	2.3779
20	2.7718	2.6977	2.6274	2.5606	2.4970	2.4365	2.3788
21	2.7734	2.6991	2.6285	2.5616	2.4979	2.4372	2.3794
22	2.7746	2.7000	2.6294	2.5623	2.4985	2.4378	2.3799
23	2.7754	2.7008	2.6300	2.5628	2.4989	2.4381	2.3802
24	2.7760	2.7013	2.6304	2.5632	2.4992	2.4384	2.3804
25	2.7765	2.7017	2.6307	2.5634	2.4994	2.4386	2.3806
26	2.7768	2.7019	2.6310	2.5636	2.4996	2.4387	2.3807
27	2.7771	2.7022	2.6311	2.5637	2.4997	2.4388	2.3808
28	2.7773	2.7023	2.6313	2.5638	2.4998	2.4389	2.3808
29	2.7774	2.7024	2.6313	2.5639	2.4999	2.4389	2.3809
30	2.7775	2.7025	2.6314	2.5640	2.4999	2.4389	2.3809
31	2.7776	2.7025	2.6315	2.5640	2.4999	2.4390	2.3809
32	2.7776	2.7026	2.6315	2.5640	2.4999	2.4390	2.3809
33	2.7777	2.7026	2.6315	2.5641	2.5000	2.4390	2.3809
34	2.7777	2.7026	2.6315	2.5641	2.5000	2.4390	2.3809
35	2.7777	2.7027	2.6315	2.5641	2.5000	2.4390	2.3809
40	2.7778	2.7027	2.6316	2.5641	2.5000	2.4390	2.3810
45	2.7778	2.7027	2.6316	2.5641	2.5000	2.4390	2.3810
50	2.7778	2.7027	2.6316	2.5641	2.5000	2.4390	2.3810

Table B. Present Value of $1 Received per Period (cont'd)

n	43%	44%	45%	46%	47%	48%	49%
1	0.6993	0.6944	0.6897	0.6849	0.6803	0.6757	0.6711
2	1.1883	1.1767	1.1653	1.1541	1.1430	1.1322	1.1216
3	1.5303	1.5116	1.4933	1.4754	1.4579	1.4407	1.4239
4	1.7694	1.7442	1.7195	1.6955	1.6720	1.6491	1.6268
5	1.9367	1.9057	1.8755	1.8462	1.8177	1.7899	1.7629
6	2.0536	2.0178	1.9831	1.9495	1.9168	1.8851	1.8543
7	2.1354	2.0957	2.0573	2.0202	1.9842	1.9494	1.9156
8	2.1926	2.1498	2.1085	2.0686	2.0301	1.9928	1.9568
9	2.2326	2.1874	2.1438	2.1018	2.0613	2.0222	1.9844
10	2.2605	2.2134	2.1681	2.1245	2.0825	2.0420	2.0030
11	2.2801	2.2316	2.1849	2.1401	2.0969	2.0554	2.0154
12	2.2938	2.2441	2.1965	2.1507	2.1068	2.0645	2.0238
13	2.3033	2.2529	2.2045	2.1580	2.1134	2.0706	2.0294
14	2.3100	2.2589	2.2100	2.1630	2.1180	2.0747	2.0331
15	2.3147	2.2632	2.2138	2.1665	2.1211	2.0775	2.0357
16	2.3180	2.2661	2.2164	2.1688	2.1232	2.0794	2.0374
17	2.3203	2.2681	2.2182	2.1704	2.1246	2.0807	2.0385
18	2.3219	2.2695	2.2195	2.1715	2.1256	2.0815	2.0393
19	2.3230	2.2705	2.2203	2.1723	2.1263	2.0821	2.0398
20	2.3238	2.2712	2.2209	2.1728	2.1267	2.0825	2.0401
21	2.3243	2.2717	2.2213	2.1731	2.1270	2.0828	2.0403
22	2.3247	2.2720	2.2216	2.1734	2.1272	2.0830	2.0405
23	2.3250	2.2722	2.2218	2.1736	2.1274	2.0831	2.0406
24	2.3251	2.2724	2.2219	2.1737	2.1275	2.0832	2.0407
25	2.3253	2.2725	2.2220	2.1737	2.1275	2.0832	2.0407
26	2.3254	2.2726	2.2221	2.1738	2.1276	2.0833	2.0408
27	2.3254	2.2726	2.2221	2.1738	2.1276	2.0833	2.0408
28	2.3255	2.2726	2.2222	2.1739	2.1276	2.0833	2.0408
29	2.3255	2.2727	2.2222	2.1739	2.1276	2.0833	2.0408
30	2.3255	2.2727	2.2222	2.1739	2.1276	2.0833	2.0408
31	2.3255	2.2727	2.2222	2.1739	2.1276	2.0833	2.0408
32	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408
33	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408
34	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408
35	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408
40	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408
45	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408
50	2.3256	2.2727	2.2222	2.1739	2.1277	2.0833	2.0408

INDEX

Absorption of overhead, 100–101, 347, 362, 372–75, 487–95
Accounting
  conventions, 10
  cycle, 81–92
  framework, 10–11
  introduction, 3–5
  limitations, 10
  periods, 11, 14
  private, 9
  public, 9
  statements, *see* Consolidated, Funds, Income, *and* Position statement
  theory, 10, 615
  use of machines, 352, 366–67
Account(s)
  adjunct, 121
  balances, 43
  contra, 121–22
  definition, 39
  nominal, 121
  rules of use, 39–42, 45
  ruling and balance, 43
  summary, *see* Expense and revenue summary *and* Income
Accounting research bulletins, 10
Accounts payable, *see* Current liabilities *and* Purchases
Accounts receivable, 120–32
  adjustments, 122–32
  aging, 124–25
  bad debts, 125–26
  control, 130–32, 525–26
  discounts, 128–30
  returns, 126–28
  uncollectible accounts, 122–26
Accrual(s), 14, 58
Accumulated depreciation, 151–53
Accumulation factor, 237
Acid test ratio, 286
Adjunct accounts, 121
Adjusting entries, 57–58
Administration, costs of, 105, 347–48
Advances by customers, 92–93, 145–46
Advertising costs, 20
All-asset earning rate, 288
Allocated cost, 347, 362, 367–70
Allowance(s)
  for depreciation, 151–53
  for purchase discounts, 141
  for sales discounts, 122, 128–30
  for sales returns, 122, 127–28
  for uncollectible accounts, 122–26
American Institute of Certified Public Accountants, 10, 257, 549
Analysis of variances, 401–11
Annuities, 241–45, 633–40
Application of burden, *see* Absorption of overhead
Appraisal(s), 582–83
Assets
  classification, 20–23
  current, *see* Normal activity
  definition, 4–5, 20–22, 342
  equality of assets and equities, 18–20, 31
  fixed, *see* Noncurrent assets
  intangible, *see* Noncurrent assets
  recording, 38–41
  tangible, *see* Noncurrent assets
Auditing, 9
Average capacity burden rate, *see* Normal activity
Average pricing method for inventory, 182–83, 568
Avoidable costs, 339

Bad debts, 122–26
Balance sheet, *see* Position statement
Bank certificates, 120
Bank reconciliation, 113–15
Bonds
  definition, 245–46
  discount, 248–49, 283
  interest, 146, 246
  issue costs, 23, 174
  premium, 248
  recording issue, 146
  times interest earned, 289–90
Book value of stock, 288–89
Branch accounting, 391–93

Break-even analysis, 501–15
  break-even point, 505–506
  by product line, 512–13
  cash break-even, 510
  charts, different types, 506–509
  geometry of graphs, 501–503
  limitations, 514–15
  measuring performance, 525
  profit control, 513–14
Budget(s), 417–30, *see also* Capital budgeting
  cash, 423–28
  committee, 417–18
  cost control, 418–19, 429–30
  description of, 417
  distribution costs, 420
  flexible, 344–45, 505–509, 525
  forecast, 419–20
  manual, 418
  officer, 418
  period, 419
  production, 420
  production costs, 421–22
  research, 423
  sales, 419–20
  selling costs, 420
Burden, *see* Overhead
Burden rate, *see* Overhead
Business enterprises, 9–10

Capital budgeting, 439–57
  appraising results, 456–57
  cash proceeds (cash flows), 249, 439–40, 448–49
  control of expenditures, 456–57
  cost of capital, 443
  depreciation, 450, 578–79
  income taxes, 453–56
  independent investments, 443–44, 446
  limitations, 457
  mutually exclusive investments, 443–44, 446
  payback method, 447–48
  present value method, 440–43
  rate of return, 444–46
  replacement, 340–41, 451–53
  return on investment, 446–47, 524–25
  uncertainty, 449
Capital gains, 607, 613–15, 619
Capital received from stockholders, 24, *see also* Common stock
Cash
  break-even, 510
  budgets, 423–28
  control, 111, 115–16, 117–18
  method of revenue recognition, 14, 72
  statements of sources and uses, 323, 423–28
Cash discounts, *see* Purchases *and* Sales
Cash flow (cash proceeds), 249, 439–40, 448–49
Certificate of necessity, 285
Certified Public Accountant, 9
Charge, definition of, 41
Check register, 83
Closing procedures, 58–62
Common dollar accounting, 593–601
Common stock
  issue, 216–18
  par, 217
  purchase of own shares, 218–20
  treasury shares, 218–20
Comparative statements, 5
Compound interest, *see* Interest
Compound interest method of depreciation, 249–53
Concentration banking, 117
Conservatism, 11, 13, 15
Consistency, 11, 13
Consolidated statements, 5, 257–69
Contingencies, reserve for, 222, 284
Continuity of existence, 9, 11–12, *see also* Going-concern concept
Contra accounts, 121–22
Control, *see* Cost control *and* Inventory
Control accounts, 90, 92
Controllable costs, 342
Controller, 333
Corporations, 9–10
Cost(s)
  as assets, 4–5, 20–22, 342
  classifications, 336–42
  control, *see* Cost control
  flow, 96–106, 411
  recognizing as expense, 11–12, 342–43
Cost accounting systems, 384–93
Cost allocations, 347, 362, 367–70
Cost centers, 336–37, 346–47, 361–63, 387
Cost of capital, 443
Cost control
  analysis of variances, 401–11
  and people, 343, 347
  plotting costs, 344–45, 515–16
  psychological impact, 343
  reports, 345–46, 527–38
  review of costs, 343–44
Cost distribution, 361–62
Cost of goods sold, 52
Cost of returns, 126–27
Cost or market, 183–85
Credit, explanation of term, 41
Creditors' equity, 18
Current
  assets, 22, 25, 525–26
  liabilities, 24, 138–47
Current ratio, 286

Debit, explanation of term, 41

Declining balance depreciation, 155–58, 455
Deficit, 32
Depletion, 167, 611–12
Depreciation, 151–62
  adjustment, 159–60
  base, 154–55
  compound interest method, 249–53
  definition, 151
  entries, 152–53
  group method, 160–62
  income taxes, 285, 610–11
  methods of computation, 155–58, 249–53
  relative to funds, 151, 311
  useful life, 158–59, 162
  with a changing price level, 578–86, 610–11
Differential costs, 348–51
Direct costing, *see* Variable costing
Direct costs, 99–100, 337
Direct labor, 99–100, 401–403
Discount
  and cash flow, 439–57
  on bonds, 248, 283
  on notes, 208–12
  on purchases, 139–41, 179
  on sales, 128–30
  on stock, 216–17
Distribution costs, 347–48
Distribution of costs, 361–62
Distribution of income, 33, *see also* Dividends *and* Interest
Dividend(s)
  cash, 33, 58, 146–47, 221, 289, 619–20
  stock, 147, 221–22
Donated capital, 218
Double-entry bookkeeping, 30

Earned surplus, 24, *see also* Retained earnings
Earning rate, 523–24
Earnings per share, 289
Economic assets, 21–23
Economic life of fixed assets, 158–59, 162
Economic transactions, 34–35
Electronic computers, 352–53, 366–67
Entity theory, 11–12, 15, 60, 70, 74–75
Equipment replacement, 170–71, 340–41, 451–53, 615
Equities, 18, 24
Equity ratio, 286–87
Equity, trading on, 288
Equivalent units of production, 388–89
Exchange of assets, 340–41, 451–53
Expense
  definition, 5, 30
  recognition, 34–53
Expense and revenue summary, 58–61, 69

Factory ledger, 391–93
FICA, 143–44
FIFO, 181–82, 562–68
Financial statements, *see* Consolidated, Funds, Income, *and* Position statement
Finished goods, 101–102
First in first out, *see* FIFO
Fixed assets, *see* Noncurrent assets
Fixed costs, 337–38, 508–509
Formula method of depreciation, 157–58
Flexible budget, 344–45, 505–509, 525
Functional classification, 106, 338
Funds
  definition, 309
  statement, 4–5, 309–23
  work sheet, 322

General ledger, 51, 336, 362–63
General Motors Corporation, 6–8
Going-concern concept, 11–12, 74–75
Goodwill, 23, 172–73
Gross price procedure
  purchases, 140–43
  sales, 128–30
Gross margin, 71
Gross profit, 69, 71
Group method of depreciation, 160–62

Idle capacity variance, 406–407
Implicit income, 607–608
Implicit interest, 207, 249–53
Income
  computation, 30, 34, 58
  definition, 30, 32, 72
  distributions, 33
  loss, 32
  summary account, 58–61
Income statement
  all-inclusive, 69–70, 76, 277–79
  analysis, 287
  definition, 4, 68
  illustrations, 8, 68
  managerial uses, 75–76
  multi-step, 71–72
  single step, 33, 68–69
Income taxes, 606–21
Incremental costs, 342
Independence of accountants, 9
Index numbers, method of adjusting depreciation, 583–85, 593–604
Indirect costs, 99–100, 337
Inflation, 12
  common dollar accounting, 593–601
  depreciation, 578–87
  inventory, 562–71
Intangible assets, *see* Noncurrent assets
Interest
  annuities, 241–45, 633–40
  compound, 236–53, 440–42

Interest (*continued*)
on bonds, 33, 146
on notes, 146, 203–12
recognition, 24, 58
revenue, 60
simple, 24, 204, 208
six per cent rule, 205–206
tables, 629–40
times interest earned, 289–90
Internal auditing, 9
Internal control, 111–12, 333, 548–60
Inventory, 179–97
control, 196, 465–79
cost identification, 183
cost of carrying inventory, 468–69
cost of insufficient inventory, 469
cost or market, 183–85
days' supply on hand, 466–67
flow, 180–83
inventoriable costs, 105–106, 179–80, 487–95
maximum and minimum inventories, 473–75
order point, 467, 473
perpetual and periodic, 52, 185–88
reserves, 196–97
size of order, 467, 469–73, 475–78, 479–80
turnover, 466
with a changing price level, 562–71
Inventory valuation adjustment, 570–71
Investments, 23, 35, 284
Investment turnover, 521–23

Job cost system, 384–87
Journal
columnar, 83–84, 87
posting, 84–87
proving, 88
special, 83–84, 87
two column, 51, 82, 87

Keying transactions, 40
Kiting, 118–19

Labor
direct, 99–100, 401–403
indirect, 99–100, 337
recording, 34, 556–58
variances, 401–403
Land, 171–72
Lapping, 130–31
Last in first out, *see* LIFO
Ledger, general, 51, 336, 362–63
Liabilities, 5, 18, 24, *see also* Current liabilities *and* Bonds
LIFO, 182–83, 562–68
LIFO dollar value method, 194–96
Limited liability, 9
Liquid assets, 110
Lock-box system, 117–18

Maintenance costs, 285
Managerial cycle of operations, 331
Manufacturing
flow of costs, 99–106, 411
Manufacturing costs of goods sold, 102
Manufacturing overhead, *see* Overhead
Marginal costs, 342, 348–51
Marginal revenue, 348–50
Marketable securities, 22–23, 119–20
Matching of expenses and revenues, 11–12, 15, 34, 53
Material
recording, 99–100, 552–54
reports, 429–30
variances, 403–405
Materiality, 11, 13, 147
Measuring performance, 521–38
Merchandise, *see* FIFO, Inventory, *and* LIFO
Mergers, 224–26, 618

National income accounting, the inventory valuation adjustment, 570–71
Natural classification, 106, 338
Net income, *see* Income
Net price procedure
purchases, 139–43
sales, 128–30
Net worth, *see* Stockholders' equity
Nominal accounts, 121
Noncontrollable costs, 342
Noncurrent assets, 166–74
adjusting for price level changes, 578–87, 593–601
depletion, 167, 611–12
exchange, 170–71, 340–41, 451–53, 615
fixed assets, definition, 22
intangible, 20, 23–24, 172–74
replacement decision, 170–71, 340–41, 451–53, 581–82
retirement, 168–70
tangible, 20, 23, 166–72
valuation, 20–22, 284
Normal activity, 101, 373–75
Notes, 203–12
discount cost, 211–12
discounted, 208–12
noninterest bearing, 208
prepaid interest, 211, 283

Objective evidence, 11–13, 15, 35
Obsolescence, 151, 158
Operating cycle, 22
Operating ratio(s), 287
Opportunity costs, 341
Organization, 331–36

Organization costs, 23, 173–74
Out-of-pocket costs, 339
Overabsorbed costs, *see* Overhead
Overhead costs, 361–76
  absorption (application), 100–101, 362, 372–76
  allocation, 347, 363, 367–70
  by departments, 361, 367–68
  capacity considerations, 373–76
  costs included, 361
  distribution, 361–62
  fixed overhead rates, 375–76
  overhead centers, 361–62, *see also* Cost centers
  re-allocation, 371–72
  recording, 363–67
  variable costing, 487–95
  variable overhead rates, 375–76
  variance analysis, 405–409

Partnership, 9–10
Par value, 217
Patents, 13, 20, 23
Payback method, 447–48
Period costs, 106
Periodic inventory procedure, 52, 185–88
Perpetual inventory procedure, 52, 185–88
Petty cash, 112–13
Pooling of interests, 224–26
Position statement
  analysis, 283–85
  balanced array, 17–19, 25, 279
  definition, 4–5, 68
  equations, 18
  functions, 5
  illustrations, 6–7, 25
  limitations, 5, 17, 26, 282
  managerial uses, 26
  preparation, 17–26
  step form, 279–81
Posting to ledger, 84–87
Practical capacity, 373–75
Preferred stock, 215–16
Premium
  bonds, 248
  preferred stock, 215–16
Prepaid expenses, 22
Present value method of capital budgeting, 440–43
Price level changes, 562–601
Price variance, 403–405
Pricing decision, 348–51
Private accounting, 9
Process cost accounting, 387–90
Profit, *see* Income
Profit and loss statement, *see* Income statement
Proprietorship, 9–10
Public accounting, 9
Purchases
  discount, 139–41, 179
  recording, 138–47, 179–80

Quick ratio, 286

Rate of return, 444–46
Ratios, 285–90
  acid test, 286
  all-asset earning rate, 288
  current, 286
  operating, 287
  quick, 286
  stock equity, 286–87
  stock equity asset, 286–87
  stock equity earning rate, 288
Raw material, *see* Material
Real accounts, 121
Realization of gains and losses, 11, 13–14, 35
Receivables, *see* Accounts receivable *and* Current assets
Reconciliation of bank account, 113–15
Regression line, 515–16
Relevant costs, 339–40
Reorganizations, 224
Replacement cost, 568–69
Reports for management, 345–46, 527–38
  cash, statement of sources and uses, 323, 423–28
  control of reports, 528
  divisonal income reports, 532–34
  duplicating in reporting, 529–30
  funds statement, 309–23
  historical reports, 535–36
  income statement, 75–76
  manufacturing cost reports, 530–31
  position statement, 26
  special reports, 537–38
  timing of reports, 536–37
Repurchase agreement, 120
Research and development costs, 23, 173
Reserve(s)
  bond sinking fund, 222
  contingencies, 222, 284
  depreciation, 151
  inventory, 196–97, 222
  liability, 58
  retained earnings, 196–97, 222–23
  secret, 196–97, 223
  self-insurance, 222
Responsibility, 336–37, 346–47, 361–62
Retail inventory method, 189–94
Retained earnings
  deficit, 32
  reserves, 196–97, 222–23
Return on investment, 446–47, 524–25
Revenue
  accretion basis, 73, 74

Revenue (*continued*)
accrual basis, 14, 15, 72
billable cost, 73
cash basis, 14, 72
marginal, 348–50
matching of expenses, 32, 74
production basis, 73
realization, 11, 13, 35
recognition, 11, 13, 35, 72–74, 145–46, 566
sales basis, 72
source of assets, 30–32
Reserving entries, 206
Ruling and balancing, 43

Sales, *see also* Revenue
adjustments, 122–30
discounts, 128–30
recognition, 14, 15, 72
recording, 14, 15, 72, 122–30
returns, 126–27
Salvage value, 154, 168–69
Secret reserves, 196–97, 223
Selling costs, 105
Semi-variable costs, 337–38, 509
Service departments, 364–65, 370
Service life, 158–59, 162
Sinking fund method of depreciation, 249–53
Social Security taxes, 143–44
Source and applications of funds, *see* Funds
Sources of assets, *see* Equities
Special Journals, 83–84, 87
Spin-off, 227
Stable monetary unit assumption, 11–13
Standard cost
analysis of variances, 401–11
flow of entries, 411
system, 390–91, 401–11
Statements, *see* Consolidated, Funds, Income, *and* Position statement
Stewardship function, 11–12
Stock, *see* Common stock *and* Preferred stock
Stock dividends, *see* Dividends
Stock equity asset rate, 286–89
Stock equity earning rate, 288
Stock equity ratio, 286–87
Stockholders' equity, 5, 215–27
Stock issue costs, 23
Stock option plans, 618–19
Straight line depreciation, 155
Subsidiary ledger, 86, 89, 92–93
Sum of the years' digits, 156–57
Sunk costs, 339
Surplus, 24, *see also* Retained earnings

"T" accounts, 40
Tangible assets, *see* Noncurrent assets
Tax allocations, 285, 615–16
Taxes
effect on decisions, 453–56, 620–21
income, 58, 145, 171, 606–21
payroll, 144
Temporary accounts, 49
Times interest earned, 289–90
Trading on the equity, 288
Transactions
equality of debits and credits, 39–41, 45
recording to accounts, 39–45
using expense and revenue accounts, 48–51
Treasurer, 333
Treasury stock, 218–20
Trial balance, 89–90

Unavoidable costs, 339
Uncollectible accounts, *see* Accounts receivable
United States Steel Corporation, 280–81, 315
Unit method of depreciation, 155–60
Usage variance, 403–405
Useful life, 158–59, 162

Variable costing, 487–95
Variable costs, 337–38, 509
Variances
disposition, 105
graphical solution, 407–409
labor, 401–403
material, 403–405
overhead, 101, 405–407
Vatter, W. J., 317
Voucher system, 82, 116–17

Wages and salaries, 143–44
Work in process, 99–100
Worksheet, 63–64, 91, 322
Working capital, 288, 309

Years' digits depreciation, 156–57
Yield
on bonds, 246–49
on internal investments, 444–46