INTRODUCTION TO TRANSACTION PROCESSING

Most of the events which occur in a business can be sorted into just a few groups: acquisition of materials, labor, and capital assets and the subsequent disbursement of payment; conversion of materials into goods and services using labor and assets; and sales of goods and/or services and the subsequent receipt of payment. Understanding what must happen in each of these cycles and what recordkeeping must be done will greatly enhance your understanding of what must occur within an accounting system.

The chapter opens with an overview of transaction processing. Although you are familiar with the terms source documents, journals, and ledgers, you will find the second part of the chapter enlightening. Because we need ways to represent (and therefore visualize) accounting systems, this chapter presents some system documentation techniques. The last section of the chapter introduces the basic ways in which an information system can use computer technology.

The objectives of this chapter are:

- to understand the broad objectives of transactions cycles;
- to recognize the types of transactions processed by each of the three transaction cycles;
- to know the basic accounting records used in transaction processing systems;
- to understand the relationship between traditional accounting records and their magnetic equivalents found in computer-based systems;
- to be familiar with the documentation techniques used for representing manual and computer-based systems; and
- to understand the characteristic differences between batch and real-time processing and the impact of these technologies on transaction processing.
I. An Overview of Transaction Processing

A financial transaction has been defined as:

an economic event that affects the assets and equities of the firm, is reflected in the accounts, and is measured in monetary terms.

Financial transactions are dealt with by the transaction processing system (TPS) which is organized to handle like transactions in a like manner.

A. Transaction Cycles

Three transaction cycles handle the three basic types of transactions: those related to the acquisition of materials, labor, and capital assets and the subsequent disbursement of payment (the expenditure cycle); the conversion of materials into goods and services using labor and assets (the conversion cycle); and the sale of goods and/or services and the subsequent receipt of payment (the revenue cycle). The interaction between the cycles is represented in Fig. 2-1 on page 49. This figure is worth careful study. Chapters 4 to 8 discuss these cycles in detail.

B. The Expenditure Cycle

The start of business activity is reflected in the expenditure cycle — the acquisition of the inputs to production: materials, labor, and fixed assets. Since most business transactions are conducted on a credit basis, your text distinguishes between the physical part of the transaction and the financial part. This is an artificial split and is used for clarity only. Considerably more effort is required when transactions are not conducted on a cash basis.

Four subsystems make up the expenditure cycle:

- Purchases/accounts payable involves the ordering of materials and recognizing the related liability;
- Cash disbursements handles the payment on those liabilities;
- Payroll handles both tasks for the purchase of labor; and
- Fixed assets deals with the acquisition, maintenance and disposal of property, plant, and equipment.
C. The Conversion Cycle

*Conversion* implies changing the form of something to make it different. The conversion cycle handles the activities which occur in a business to combine and convert raw materials to produce a product. There are two subsystems.

- *Production* includes all of the activities related to the *physical* creation of the product, including planning, scheduling, and controlling the product.

- *Cost accounting* handles the flow of *costs* through the system, the *financial* effort.

D. The Revenue Cycle

Businesses exchange their goods and services with customers through the revenue cycle. This may involve both cash sales and credit sales. As with the expenditure cycle, *physical* and *financial* parts of the transaction must be recognized. There are two fundamental subsystems.

- *Sales order processing* involves order preparation, credit granting, shipping, billing, and recording.

- *Cash receipts* takes cash receipts all the way to the bank.

II. Accounting Records

A. Manual Systems

Manual accounting systems are *paper based*. All of the information entered and organized in the system is *written* manually. We call the standard bookkeeping system a *double-entry* system because of the way it works.

This part of the chapter presents good discussion and examples of these paper records. For some of you this may be a review. If not, study it carefully.

1. *Documents* are paper forms used to collect information. There are several basic types of documents.

   a. *Source documents* capture the information needed by the system
2. **Journals** are called “books of original entry” because a journal is the first place that information is entered into the accounting system. The term comes from the Latin word for day. A journal is sometimes called a “day-book” to emphasize the fact that it is a chronological list of events. All significant information about an economic event, or transaction, appears together in one of the journals. There are several types.

a. **Special journals** are created to handle like transactions that occur in large numbers. Work is reduced by entries taking only one line with columns for the normal accounts used. Many organizations have sales, purchases, cash receipts, and cash disbursements journals. See Fig. 2-6 on page 54.

b. **Registers** are a subgroup of special journals that serve as logs of activities such as payroll or receiving.

c. A **general journal** is used to initially record transactions for which there is no special journal. These are typically nonrecurring or infrequent transactions. Fig. 2-7, on page 55, shows the form with which you are quite familiar. As its name implies, it is general. Any number of accounts can be listed, one to a line.
3. **Ledgers** serve as the filing/sorting mechanism of the system. Extracting information from the journals would be very time consuming and probably very inaccurate. The pieces of information in the parts of a journal entry are sorted, or *posted*, to a second place that collects information about specific accounts. These filing systems are the ledgers. See Fig. 2-8, on page 56.

By using the ledger accounts to collect this information, a balance of an account can be obtained without going through the entire journal. There are two basic types of ledgers.

a. The *general ledger* collects information about the basic types of accounts. Fig. 2-9, on page 57, should look familiar.

b. *Subsidiary ledgers* collect information about individual accounts of a similar type. Each credit customer has an account in the *accounts receivable subsidiary ledger*. The total of all customer accounts appears in the general ledger in a *control account*. The control account and the subsidiary ledger must be reconciled regularly. This serves to double-check both the control account and the sub-ledger. See Fig. 2-10, on page 58.

B. The Audit Trail

Because financial information is communicated to interested parties outside the organization, it is important that such parties trust the information that is reported. One thing that creates confidence in financial reports, especially annual financial statements, is the opinion of an *independent, unbiased professional* that the statements are, indeed, a fair presentation of the performance and financial state of the firm. In order to arrive at a judgment, an “audit” is conducted—an extensive examination of the accounting system and the information in it—to yield an *audit opinion*. This *audit opinion* is not conferred casually. A great deal of work is done examining the financial system. The ability to trace an item on a financial statement all the way back to the original...
entry in a journal and further, to the source document, is referred to as the audit trail. This is assisted in manual systems by the information recorded in the “Post. Ref.” columns of journals and registers. The existence of an audit trail in an automated system should not be assumed. It must be designed into the system.

C. Computer-Based Systems

In this part of the chapter you are introduced to some basic file types used in a computer-based system. These types refer to the nature of the information in the file, not to the physical form the file takes. Study the different types. Their meanings may become clearer as you study the material.

- **master file**, which contains account data (e.g., the general ledger)
- **transaction file**, which contains data on transactions which will update the master file (e.g., a sales journal)
- **reference file**, (a price list)
- **archive file**, the record of past transactions (e.g., prior payroll period).

Fig. 2-11, on page 60, represents the relationship between the magnetic files in an audit trail. Use the narrative to improve your understanding of the way in which information can be traced.

III. Documentation Techniques

Any individuals who need to know how a system functions can be helped to visualize the operation, by what are called documentation techniques. Your book describes five of these. We will have a lot of immediate use for the first three, less for the latter two, although they are used extensively in business. Often, your accounting courses do not give students a good feel for the movement of data in the system.

A. Data Flow Diagrams

Fig. 2-13, on page 63, is a sample of a data flow diagram (DFD) created using the symbols shown in Fig. 2-12, on page 62. This type of diagram is very simple. Only four symbols are used. Only the flow of data is shown, not the movement of paper, not the organizational unit(s) involved, and not how the data is processed. DFDs are very good as a starting point for understanding information movement. They will provide an overview of the procedures that occur in
each of the subsystems of the transaction cycles to be discussed in later chapters.

B. Entity-Relationship Diagrams

The representation of entities (which can be resources, events, and agents as introduced in Chapter 1’s discussion of the REA model), and the relationships between them, is very important. **Fig. 2-14, on page 64**, shows the symbol set used in entity relationship diagrams (ERDs). This figure also serves as a sample ERD for a sales example. Read this material carefully. Recognize that the numbers at the ends of the connecting lines indicate the nature of the relationship, one-to-one, one-to-many, or many-to-many. The examples given in the book are very clear. Study them well. ERDs will be used extensively later in the book. **Fig. 2-15, on page 65**, is the entity relationship diagram for the data flow diagram in Fig. 2-13.

C. Flowcharts

The remaining three document types are all forms of flowcharts. Three flowcharts are presented here: document, system, and program. Document and system flowcharts have several characteristics in common. They use standard symbols [although each type has its own set], are divided vertically according to organizational unit [we will see later that this helps verify separation of duties—a key control technique], and use special connector symbols to jump between points on a single page and from page to page. These are used to minimize the mess that can result if flowlines cross each other.

• As the name implies, document flow charts show the flow of documents, or paper, through the system or part. Document flowcharts use the symbols shown in **Fig. 2-17, on page 68**. In the example, a flowchart of a sales order processing system is created. This is a very long example but is very beneficial. Read the narrative slowly and carefully. The completed flowchart is presented in **Fig. 2-20, on page 71**.

One concept that is introduced here is that of batch processing. When a business has large groups of similar transactions, processing them in batches is more efficient and more controllable than handling the
transactions individually. Think of how most people do laundry.

- **System flowcharts** are used to show the relationships between parts of a system, namely inputs, processes, and outputs. Although typically used for computer-based systems, they can be used to represent manual systems also. The symbol set for system flowcharts is shown in Fig. 2-21, on page 72. Several of these represent the storage medium involved. This section walks through the process of describing symbolically what happens in the sales order department. The end result is Fig. 2-23, on page 75.

- Each program shown in a system flowchart would be supported by a **program flowchart** which shows the detail of processing. Fig. 2-24, on page 75, shows the symbols used in program flowcharts. Fig. 2-25, on page 76, presents the logic of the edit program shown in Fig. 2-26, on page 77.

If you have little programming experience, read this narrative carefully. It will help you understand how the edit task would be performed.

### IV. Computer-Based Accounting Systems

This last part of Chapter 2 introduces computer-based accounting systems, beginning with the differences between the two basic types: **batch systems** and **real-time systems**.

#### A. Differences Between Batch and Real-time Systems

**Table 2-1, on page 78,** is a table contrasting batch and real time-systems. There are three criteria that differ: time lag (or the time it takes for the system to reflect a transaction), resources used (in terms of complexity), and operating efficiency.

When decisions must be made between the two types of systems (later chapters) we will consider two characteristics: response time (a measure of the lag) and activity ratio (proportion of a file that is processed each time the file is updated). These will help answer the efficiency v. effectiveness issue.
B. Alternative Data Processing Approaches

Despite the availability of very modern information systems, many organizations continue to use older systems. Early legacy systems were mainframe based, batch oriented using flat-files. Newer legacy systems use databases. More modern systems are network based and process data in real time. It is important that accountants have an understanding of older system because they are still in use. Section B of the chapter appendix provides a great discussion of legacy systems including data structures and processing modes.

An excellent example is presented on updating master files from transactions in the sales order system. The discussion refers to Fig. 2-28, on page 81, which shows sequential record structures for the hypothetical system. In the figure are the labels (PK) and (SK). (PK) refers to the primary key for the record—the piece of information that uniquely identifies a record, e.g., your social security number is used by the university to uniquely identify your records, not your name or anything else that might have a duplicate. Try to follow the logic of the processing and not get lost in the details.

Anyone who uses a PC has experienced the loss of data when the “save” command is given for a file that has changed. The new file replaces the old—which is gone! Read carefully the simple discussion of the need for database backup procedures.

C. Batch Processing Using Real-Time Data Collection

One hybrid using the best of both worlds is to capture data in real-time and process it in batches. This is shown in Fig. 2-31, on page 84. This will walk through a sales order system. Follow the narrative carefully. We will see much more about this and other parts of a system in later chapters.

D. Real-Time Data Processing

What many people think of when computer processing is mentioned is a situation in which data is captured live and processed immediately—*in real-time*. This section of the chapter introduces the concepts of distributed processing and networking. Study Fig. 2-32, on page 86, carefully and contrast it to Fig. 2-31. This is just an introduction. Don’t be intimidated.
Review Questions for Chapter 2: 1-10, 17-33

Discussion Questions for Chapter 2: 4, 5, 7, 10-13