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ABSTRACT

Electronic data processing provides a fast and accurate system for handling large volumes of routine data. If properly employed, computers can perform myriad functions for purchasing operations, including purchase order writing; equipment inventory control; vendor inventory; and equipment acquisition, transfer, and retirement. The advantages of computer applications are now available to any size school district through a variety of computer sharing plans. The use of computers for routine procedures frees the purchasing agent for a more creative role in administration. (HA)

CALIFORNIA ASSOCIATION OF SCHOOL BUSINESS OFFICIALS
PURCHASING RESEARCH COMMITTEE – SAN DIEGO – IMPERIAL SECTION

STATE CONFERENCE, SACRAMENTO, CALIFORNIA
APRIL, 1970

Practical Applications of Data Processing to School Purchasing

FOREWORD

This study was prepared for the school administrator who is concerned about meeting the challenges of the present business environment created with the advent of electronic data processing equipment and the procedural systems and techniques associated with it.

The material presented herein should be viewed as a broad general guide in the application of data processing to school purchasing and not a complete program appropriate for all school districts. Because of organizational and procedural differences, each school district should tailor its data processing program to meet its particular needs.

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TABLE OF CONTENTS

INTRODUCTION TO THE

PRACTICAL APPLICATIONS OF DATA PROCESSING TO SCHOOL PURCHASING

I. BACKGROUND

The age of the computer is upon us - and whether we like it or not we had better learn to live and work with it. Sooner or later, we will have to get on the "computer band wagon." Why not start making preparations now. There are a number of ways to gain entry to this new field of processing data. The plan may be to use a school-owned or leased computer, or to rent EDP time at a service bureau or time-sharing with other districts. But whatever the setup, you are going to have to join the "affluent" group With this reality of business life in mind, the CASBO Purchasing Research Committee of the San Diego-Imperial Section will attempt to present a broad, general guide for the practical applications of data processing to school purchasing.

Your reaction to computerizing will depend on how much factual experience you have had with EDP, and what you have heard about it from friends and associates. You may accept it as an inevitable consequence of the technological advances in the business world. Or perhaps you will be indifferent to the whole idea. If you are indifferent or hostile to the thought of working with a computer, the reason may be that you expect the new arrangement to dehumanize you and your job. You may even view it as a threat to your job security.

If such be the case, get rid of any such preconceived notions. Far from dehumanizing the Purchasing Agent's role, the computer puts an even greater premium on human brainpower and judgment. It frees the Purchasing Agent of much detail work, and gives him time for planning. It gives him more time for decision-making, and provides him with the kind of data he needs for choosing

among alternate courses of action. For example, the computer can identify groups of items warranting pooled orders or annual contracts; it can pinpoint likely areas for cost reduction study; and it can print out bid analyses a hundred different ways.

Purchasing has been one of the last functions of business to feel the effects of the computer and has not utilized EDP (electronic data processing) to the extent that most other business functions have.

Since the computer is a fact of purchasing life and, clearly, it is here to stay, the Purchasing Agent who is a key member of the school team, must learn to harness the computer. The task is difficult but not impossible. The Purchasing Agent must overcome the current knowledge barrier that exists between purchasing people and the technicians who man the EDP (electronic data processing) equipment. Next he must learn a little about the general capabilities of the computer. Once the Purchasing Agent understands these capabilities, he can begin to develop some practical applications for his Purchasing Department.

In contemplating computer operations for your Purchasing Department certain questions arise. Can any particular machine help do a better job than we have been doing? Is there an optimum or maximum size to be reached before a school district should think about automating its data processing? If we decide to automate, what equipment should we purchase? Should a school person be expected to run the equipment?

At the outset, it may be stated that there is no optimum or maximum size before automating your data processing. Any school district can accomplish automation either by having its own equipment, by paying for the services through an outside agency, or by joining several other school districts for a combination setup. Size, in itself, is not the determining factor in the decision to automate.

Will it cost mor. money t utomate? Costs depend upon the application that is to be automated and the frequency of need for certain types of information. The initial investment may be large, but the long term benefits will more than offset this cost. The equipment to be purchased will depend upon the applications involved. A school district should start with a minimum amount of equipment and add to it as needed. The minimum requirement for a unit record installation should be a key punch, verifier (optional), accounting machine with a summary punch, a sorter, and a reproducer. If a small computer installation is desired, the minimum required would be a key punch, verifier (optional), computer, and a sorter. Regardless of the degree of sophistication of the equipment, it is all for the same purpose - to provide accurate, timely, usable information.

II. PRACTICAL APPLICATIONS

A. Purchase Order Writing

Data processing can assist in the preparation of purchase order in two ways:

1. An assist from the manual typing of purchase orders for items which are purchased infrequently, have unusual terms and conditions or require special handling instructions.
   (a) Specifications, price and vendor is determined by the buyer in the same manner as in a manual system and the information passed to a purchase order typist
   (b) The purchase order typist is equipped with a typewriter-type terminal which performs basic arithmetic functions and has access to information stored in the computer:
      (1) Vendor's name and address.
      (2) Ship-to addresses.
      (3) Standard item descriptions.
      (4) Budget information.
      (5) Open purchase order information.
   (c) As the typist prepares the purchase order the information stored in the computer is used to assist as appropriate:
      (1) From the typing of the vendor number the vendor's full name and address is typed automatically.
      (2) From the entry of a ship-to location code the name and address of the school site or warehouse is typed automatically.
      (3) If the item is a standard item maintained by catalog number in the master file the typist enters the catalog

number and the complete description automatically; otherwise type in the description manually.

(4) From the entry of the account number the validity is checked, the availability of funds verified and the amount encumbered.

(5) As a by-product the information is posted to an open purchase order file, with cross indexes by buyer and vendor number.

(6) Special terms, conditions and instructions are manually typed using the terminal as a regular typewriter.

2. Fully automated preparation of purchase orders for frequently recurring items with standard catalog numbers.

(a) Frequently recurring standard items are assigned to buyers equipped with video-type terminals. These terminals would have access to the same information stored in the computer under A.1. (b) above and have the advantage over a typewriter terminal of being able to display data much more rapidly and quietly. The actual preparation of the purchase order however, would be done in batches on the printer in the computer facility.

(b) The buyer keys in the catalog number of the item he is interested in buying and could immediately verify the item with the general description of the purchase request. If the item is covered by bid, the bid number, price and vendor information is automatically displayed.

(c) To complete the purchase of a bid item the buyer enters the

quantity, the account number, the ship-to location code and a purchase order number.

(1) The account number and availability of funds is verified and the amount encumbered.

(2) The open purchase order file is updated.

(3) The vendor name and address, quantity and description, bid number, etc., is stored and once or twice a day the accumulated purchase orders printed in the computer room and forwarded to the Purchasing Department.

(d) To complete the purchase of a non-bid item the buyer goes through the usual procedure of determining a vendor and a unit price and when this information is entered with the quantity, the account, the ship-to location code and the purchase order number, the same series of steps are taken as listed above.

B. Vendor Listings

There are several by-products of a computerized purchase order writing function that are of value to the purchasing function:

1. A listing of activity by vendor with such information as number of purchase orders, cumulative dollar volume, frequency delivery commitments are met, etc.
2. Open purchase order listings by date of delivery can be provided to each buyer to facilitate follow up of unfilled purchase orders.

C. Inventory Analysis Report

This report, a Data Processing function, can furnish a Purchasing department with a broad practical operational picture, limited only by the length of the page and the number of items the page can contain.

As its name implies, it can and does provide valuable needed data of an inventory nature, and in broader context, is a specific practical operational tool to be used not only as information, but as a measuring gauge of a department's efficiency.

How well is my purchasing department doing? Where are the excesses in my stock? How many "out of stock" items do we have, and how many more are about to enter that category? When was stock ordered and when was it received and what type of service are we receiving from our vendor in these instances - Is he a partial, a late shipper? How is the stock moving and at what rate? When is it time to reorder, at what stock level, and what are the total dollars by item in inventory? What are our outstanding orders?

All these questions, and others you may wish to include subject to page limitations can be answered via the Inventory Analysis report.

The flexibility lies with the Purchasing Department in deciding what information is desired. It is then reviewed with the Data Processing Department and programed in format.

The intervals between reports are again as requested by the Purchasing Department and governed by other school district demands upon the data processing department. It could be weekly, every 10 days, bi-monthly, or monthly.

In addition, it could be possible to include a "dollar-open to buy" report indicating the amount of dollars available for expenditure in various classifications, and by school. This would necessitate expeditious handling of all paperword, orders, bills of lading, invoices, etc., to achieve a great degree of accuracy in the end figure.

In summation, the Inventory Analysis report is a progressive practical comprehensive, advanced tool which provides current stock position, specific

operational knowledge, and an indicator of a department's degree of efficiency in coping with the many facets of school requirements in the Purchasing Department.

D. "The Stores Catalog" - (Issue) Listing

The questions usually posed about stores stock are: (1) How do we order from Stores? (2) How do we know what is carried in Stores? (3) What are the advantages of Stores Stock?

Perhaps (3) is a good point at which to begin.

Stores Stock, in a data phone Tela Communication system lends itself to Data Processing and provides an automated expeditious time saving method of ordering, eliminating most paperwork, delays and late deliveries.

No requisitions are required except in areas inaccessable to the data phone, district offices and several other areas. A requisition of stock at the ordering school is transmitted via existing telephone facilities to the Data Center where it is received, processed, transmitted to warehouse (stores invoice) and the order is filled, all in one day as compared to a one to two week order and receipt cycle under a manual system.

An organized method of Cataloging Stores Stock items is necessary and must be prepared by the Purchasing department. As new items are added by Purchasing, they are submitted to Data Processing where cards are prepared, and mailed to all data phone outlets, warehouse, schools, other and incorporated into the data processing department master file (magnetic disk). It is then added to the stores catalog which answers question (2) in the opening paragraph.

This is a simplified booklet with number of items ranging from 15 to 25 per page.

The items are listed alphabetically within the purchasing group which facilitates locating them with no loss of time. The catalog shows such information as, catalog number, unit of issue (each, pair, package, dozen), a group number (1 - 2 - 3 - 4, usually falling into one buying desk area that is, to one purchasing clerk) and the unit price, followed by a concise description of the item, capacity, type, color, manufacturer and his number.

The Catalog, or ordering guide, is an efficient, time saving method of ordering by the schools and filling of orders by the warehouse.

The Catalog should list the bulk of most frequently used supplies which are subject to repetitive ordering and which lends themselves to quantity stocking. Items are added or deleted by performance. Usually on an annual basis.

It reduces time, labor, paper and vexed dispositions and expedites the flow of ordered merchandise so that the educational processes can function in an orderly manner.

E. Equipment Inventory

1. Equipment assets represent a considerable investment. Good school business practice requires the establishment of equipment inventory records and accounting controls even though legal requirements may not have been established.

   Equipment control records are needed for a variety of reasons:

   (a) To enable the school administrator to account for and control equipment assets under his care.

   (b) To assist in planning and providing proper equipment for schools by furnishing data as to cost, useful life, location, condition, adequacy, quantity, etc.

(c) To aid school districts in determining insurable values in securing insurance appraisals at minimum cost.

(d) To aid school districts in determining loss by fire or theft.

(e) To encourage employees and others to discharge their responsibilities better in the care and use of school district equipment.

(f) To fix responsibility for the custody of the equipment.

(g) To assist in the formulation of acquisition and retirement policies through accumulation of data regarding prices, sources of supply, and useful life.

(h) To provide data for financial reporting.

2. Information Obtained from Inventory Records

(a) Master index of equipment - a listing of all items of equipment arranged numerically in the order of school district identification numbers. Information required: (1) school district identification number, (2) item description, (3) current location of item, (4) person or department responsible for custody of item.

(b) Index to current location of equipment - arranged numerically by school district identification number, and current location. This would provide: (1) identification number, (2) item description, (3) manufacturer's identification or serial number, (4) location of item, (5) person or department responsible for custody of item.

(c) Report of equipment acquisitions - used to show new items of equipment added to the inventory during the reporting

period. This will probably be prepared monthly. A copy by location would serve to update custody lists originally produced as a result of item 2 above.

Information required: (1) item description, (2) classification code assigned, (3) person or department acquiring custody of the item, (4) purchase order number, (5) date acquired, (6) cost of the item.

(d) Report of equipment by type or classification - used for equipment on hand by major classification or dollar value of the same grouping. Information required: (1) item description, (2) acquisition cost, (3) classification code number, (4) current location, (5) quantity and/or cost of item by location, (6) quantity and/or cost of item in the school district.

(e) Report of equipment by age - assists in the preparation of annual budget for those school districts that replace equipment at regular intervals. Information required: (1) item description, (2) date acquired, (3) quantity on hand by age grouping, (4) classification code, (5) current location.

(f) Report of equipment disposals - used to provide a record of equipment dispositions and to also serve as a report showing persons who have been relieved of custody responsibility and to serve as authorization for removal of items from property accounts. Information required: (1) item description, (2) school identification number, (3) acquisition date, (4) acquisition cost, (5) type of disposition made, (6) revenue received, if any, (7) date sold, or other disposition made, (8) classification code.

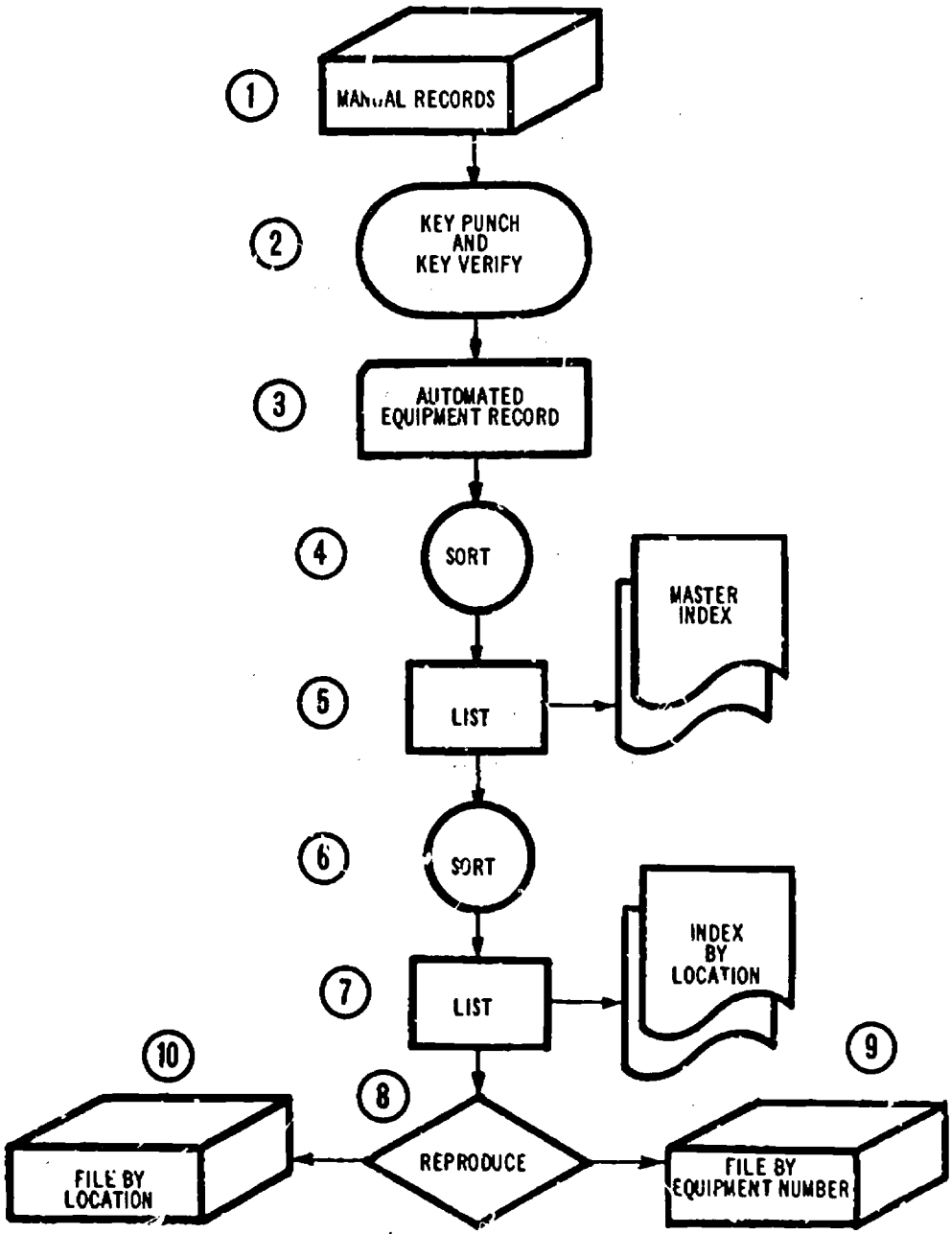
3. Machine Methods

The flow charts with attendant functional description on the following pages show those basic procedures necessary to establish and maintain equipment records.

TRANSITION FROM MANUAL TO AUTOMATED EQUIPMENT RECORDS

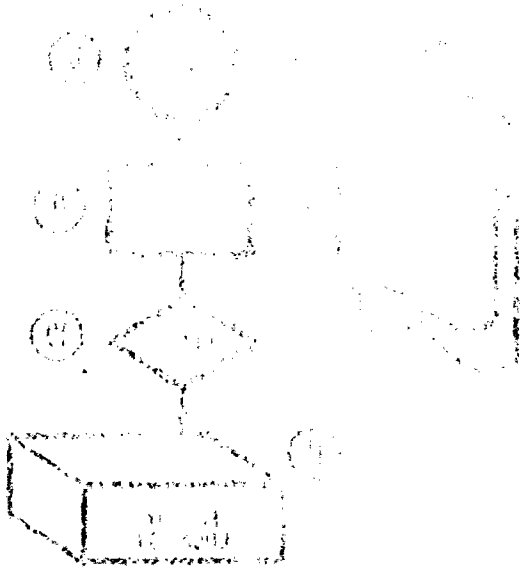
1. The source documents, which in this case are existing records manually maintained, should be in as much an up-to-date condition as possible.
2. The source documents are key punched and key verified into machine inventory cards.
3. A deck of machine inventory cards is thereby created from the manually maintained cards or lists of equipment.
4. Cards are sorted by property identification number.
5. A master index is created by listing the equipment by equipment number in numerical sequence.
6. Cards are sorted by custody or location sequence.
7. Information is listed in numerical sequence by custody or location.
8. Reproduce to provide additional decks of cards.
9. Deck of cards filed by equipment number sequence.
10. Deck of cards filed by location or custody sequence.

TRANSITION FROM MANUAL TO AUTOMATED EQUIPMENT RECORDS

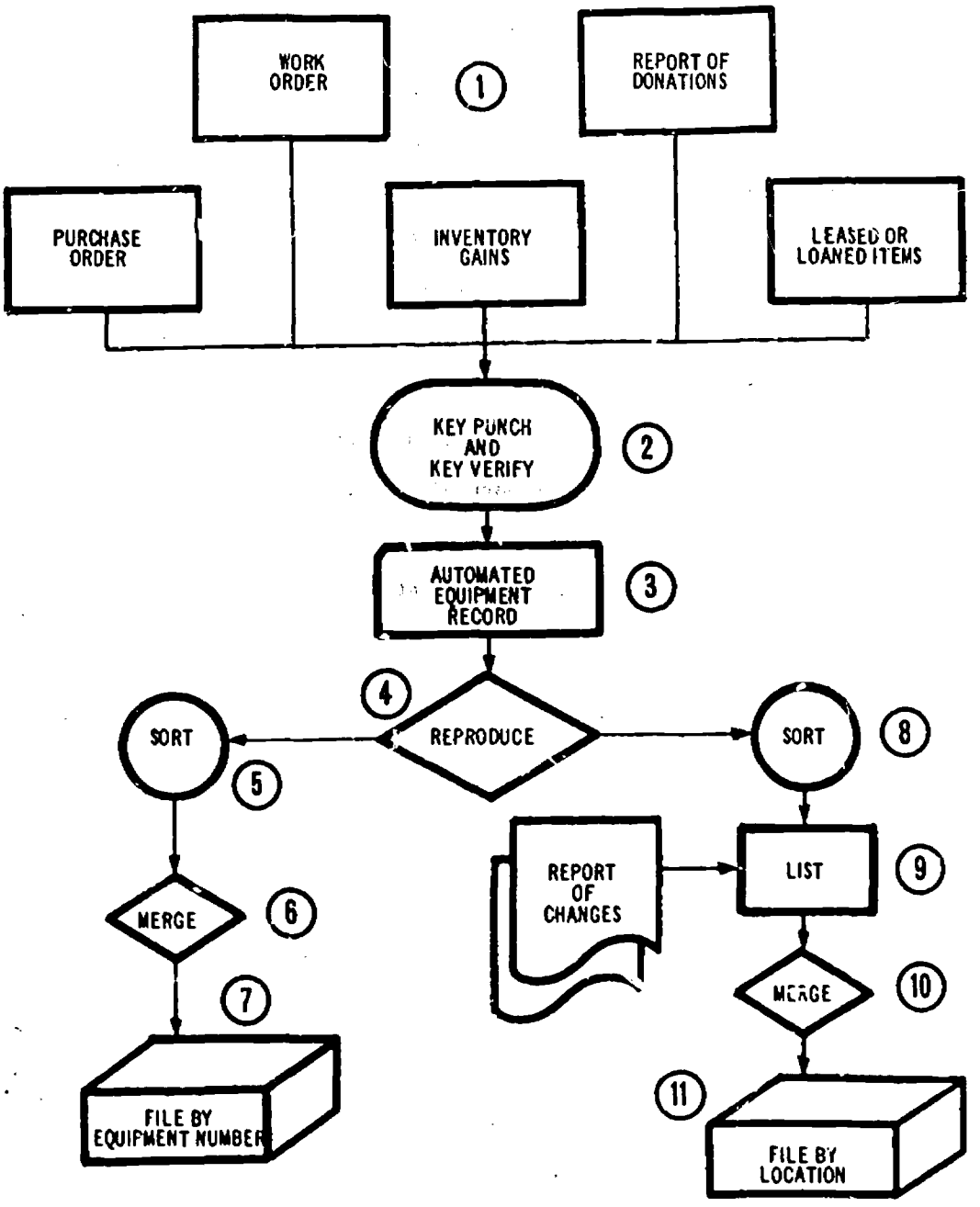


ACQUISITION OF EQUIPMENT

1. Source documents reporting new items of equipment.
2. Information is coded, key punched and verified.
3. Master automated equipment record is created.
4. Desired number of cards reproduced.
5. Cards are sorted by school district identification number.
6. New cards are merged into existing master deck.
7. Master file of equipment records by school district identification number is updated.
8. Duplicate set of cards are sorted by location code.
9. Information is listed creating a report of changes.
10. Cards are merged into file by location code.
11. Master file of equipment by location is updated.



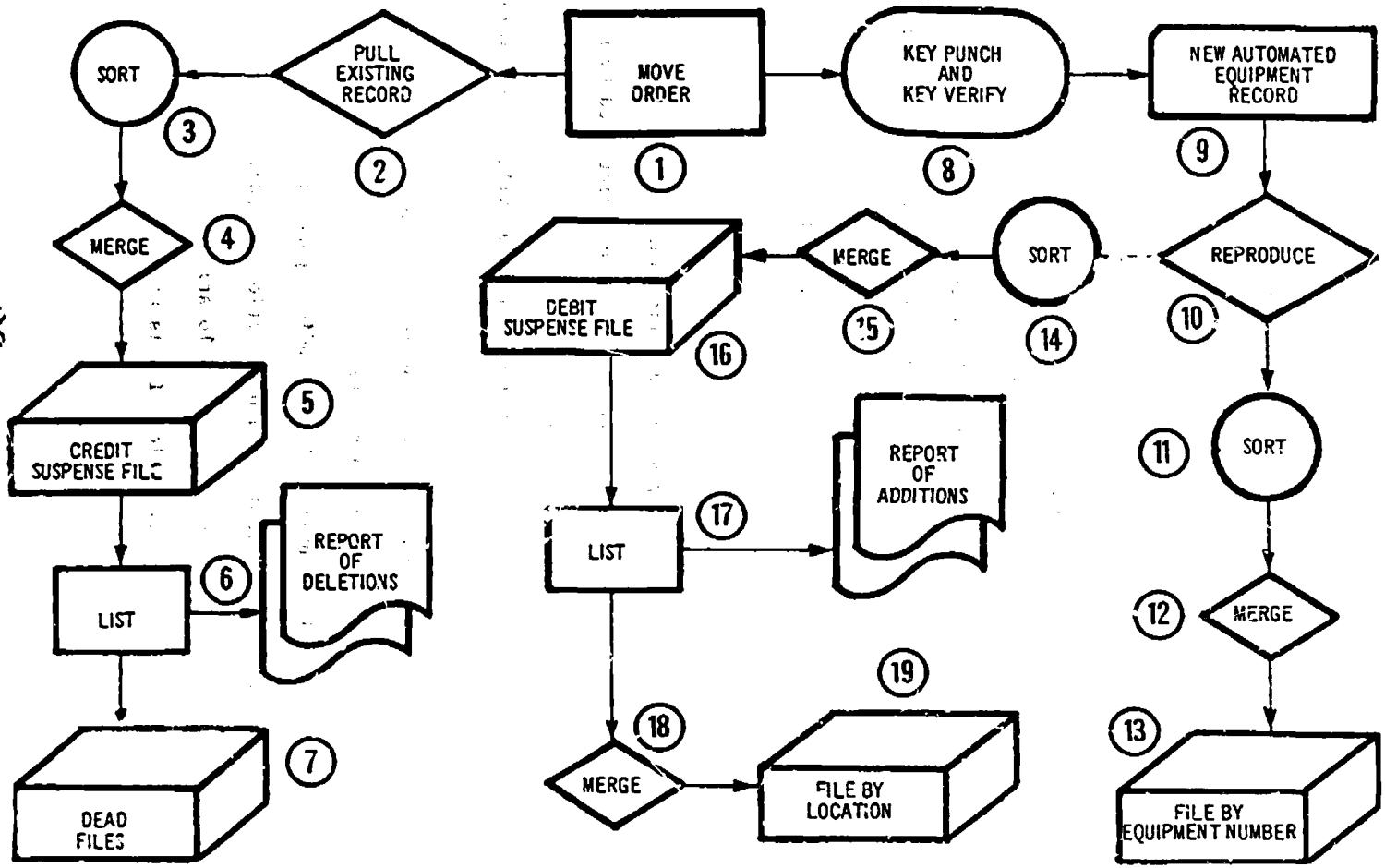
FLOW CHART OF ACQUISITIONS



CHANGING THE LOCATION OF EQUIPMENT

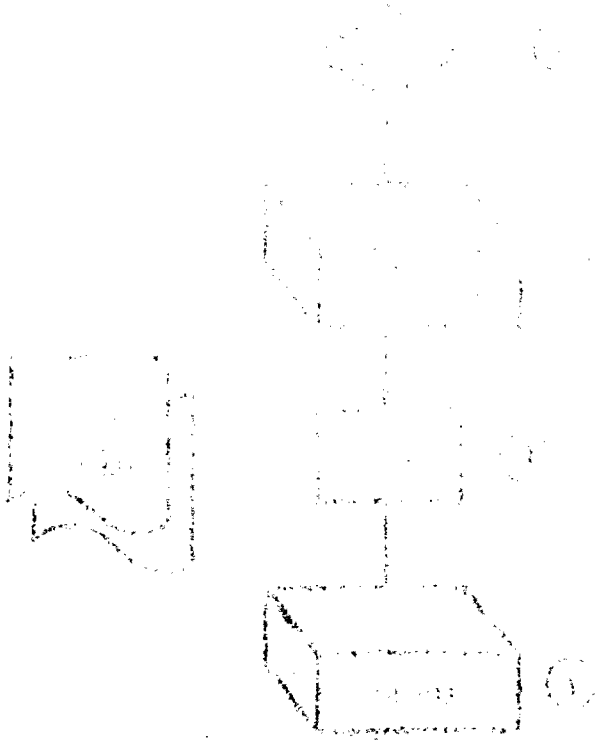
1. Source document report movement of equipment.
2. Old records are removed from master files.
3. One set of records is sorted by location code.
4. Records are merged into suspense file.
5. Suspense file is maintained for periodic reporting.
6. Periodic listing is made to report deletion of items at certain locations.
7. Cards are retained in dead files.
8. Current information is key punched and verified.
9. New equipment record is created.
10. Desired number of cards is reproduced.
11. One set of cards sorted by school district identification number.
12. Cards are merged into master file of equipment maintained by school district identification number.
13. Master file of equipment by school district identification number is updated.
14. Second set of new cards is sorted by location code.
15. Cards are merged into suspense file.
16. Suspense file is maintained for periodic reporting.
17. Periodic listing of items added by location is made.
18. Cards are merged into master file by location.
19. Master file of equipment by location is updated.

CHANGING THE LOCATION OF EQUIPMENT

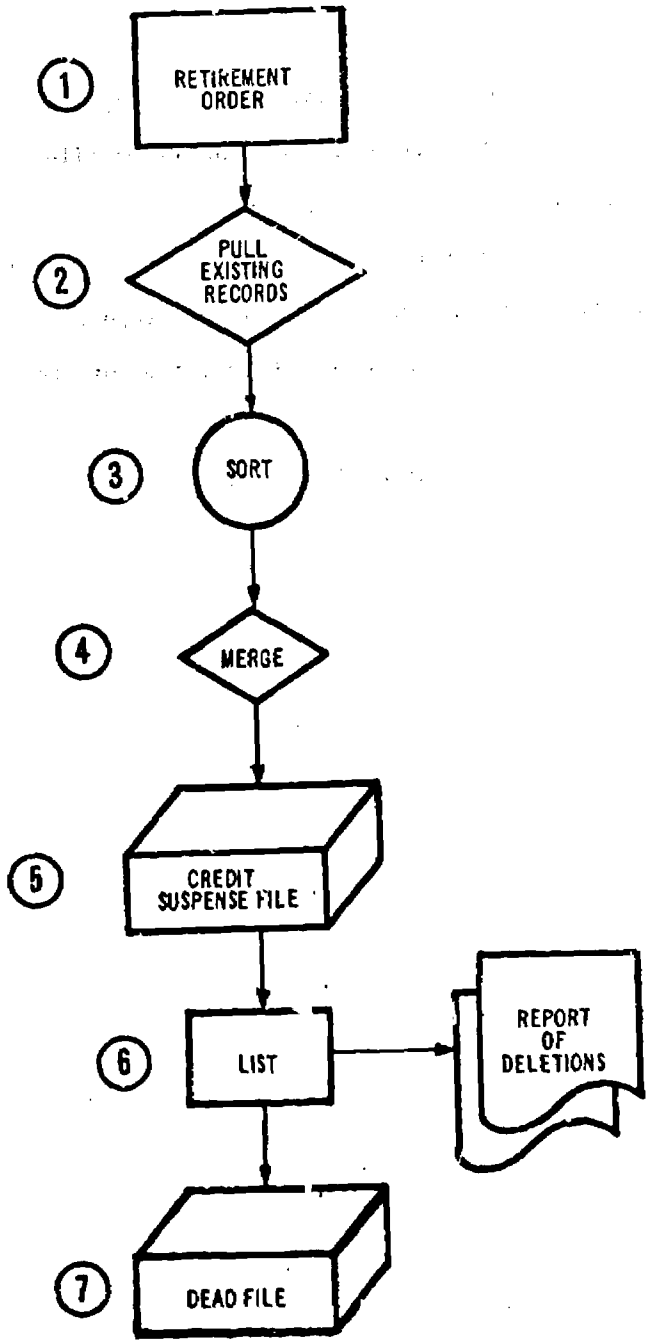


RETIREMENT OF EQUIPMENT

1. Source document reporting the retirement of equipment.
2. Existing records must be removed from the active file.
3. Cards pulled are sorted by location code.
4. Cards are merged into suspense file for periodic reporting.
5. A suspense file is maintained until periodic reports are due.
6. Listing of items is made to report the deletion of items by location code.
7. One set of cards is maintained in dead files.



RETIREMENT OF EQUIPMENT



F. Book Inventory

Good school business practice requires the establishment of book records and accounting controls. A complete system of school district accounting controls should include records accumulated in a form that will facilitate management decisions as well as provide traditional book controls.

Librarians and school administrators are faced with the need for information that cannot be readily provided from traditional library records. Types of information that can be made available through the use of electronic data processing equipment include:

1. Control of state adopted textbooks.
2. Control of supplementary textbooks.
   (a) Titles in use.
   (b) Frequency of use.
   (c) Location and quantity control.
   (d) Quantity on hand.
3. Analysis of circulation statistics.
   (a) Accumulation of information on requests that cannot be supplied.
   (b) Focusing attention to general areas not frequently used.
4. Aids in current acquisitions and plans for future orderings.
5. Produces a catalog in tabular form to be used outside the library.
   (a) Books
   (b) Audio-Visual resources
6. Control of library books.
7. Produces library cards.
8. Produces lists of overdue books.

The above is an outline of the major steps that should be taken to establish automated equipment records. Each school district having special problems will need to modify the format and procedures to cover the specific aims and purposes of that particular district.

G. Reports

1. Data Processing issues reports which are invaluable to a purchasing operation making information speedily available -- A good starting point to illustrate this is the daily receiving report which updates stores inventory showing orders and receipts.

   (a) This report lists the buying group number, stores catalog #, units (each doz., rm., etc.), purchase order #, quantity of the order, the order value, and shows that the order has been processed. In addition, it lists all of the above and shows the amount received on orders, partial receipt, or receipt equals order.

   This tool is used for current inventory stock knowledge and is used for follow up on partial shipments and is an aid for processing invoices.

   (b) The next report is a stores invoice recap of out of stock, partial, and discontinued items. This print out is received weekly and contains the following: stores catalog number, buying group number, description of item, Budget Classification, requested quantity, issue quantity, inventory number if applicable, and date and month. Items which fall into a group number, ie are purchased by 1 clerk are consolidated on one or more pages.

Valuable check point on a clerk's efficiency and stock control and alerts for earlier reorder.

(c) Another valuable report is a stores minimum balance report reflecting again the catalog #, group buying number, description of item, the unit of measure, unit price, beginning quantity, minimum quantity, order quantity, requisition quantity, and balance on hand. This report is used to reflect reorders when stock is reduced to minimum quantity level previously established by purchasing department. Issued bi-monthly.

(d) Other reports furnished are - initially a chart of accounts with budget dollars by school and district and a monthly budget control report which reflects salaries, supplies and capital expenditures by the Purchasing Department. Perhaps there are revisions and condensations which can be made in these forms and other could be added, such as a purchase order and bills before the board reporting. However, data processing has proven to accelerate information for purchasing purposes and will prove to be a valuable tool for school districts not as yet involved in data processing. Other forms will follow - automatic reorder.

(e) Stores Invoice - Computer generated output (4) copy document resulting from action taken on requisitions for stock. The (key) Stock Inventory record is maintained on a perpetual basis and stored on magnetic disk files. This master file is accessed every time a stock transaction takes place as an imput to the Stores System. No items from Stores Inventory are

issued by the warehouse without a stores invoice copy, except emergency issues, which require transaction by the warehouse to data processing.

Stores Invoices contain:

(1) Date prepared

(2) Budget classification charged

(3) Routing information

(4) Stock number and description

(5) Reference numbers to Credit memos, paper requisitions

(6) Quantity issued and extensions

(7) Message ie "out-of-stock", "discontinued"

(8) Sales tax and total invoice amount

(9) Consecutive invoice number (audit control)

Routing:

Copy 1. Accounting

2. Budget copy to requesting department

3. & 4. Warehouse and delivery copy

As the invoice is credited, computer programs generate input to the district general fund for total expenditure by invoice and budget classification as a by-product of the Stores System.

III CONCLUSIONS

EDP is a fast, efficient and reliable system geared to handle large-volume items. Routine, repetitive, high-volume jobs are an area in which it will pay big dividends. If properly employed, EDP can perform myriad functions for the purchasing operations. Each day the list of things it can do grows longer. The Purchasing Agent should be aware of the capabilities of EDP to relieve him of some of the routine work, to help him make decisions by providing comparative data, and free him for more important duties.

The many advantages of data processing are now available to any school district, regardless of size. Large districts enrolling 30,000 students or more can justify the establishment of their own computer centers with a full array of educational and business applications.

Medium-sized districts (10,000 to 30,000 students) can profitably handle many of the simpler operations on punch card equipment and supplement this with the services of an outside computer service.

Smaller districts (10,000 students or less) can enjoy basically the same benefits as the larger districts by contracting for data processing services, or by joining together with other districts to operate a computer center that can service all activities in a given area.

In some parts of the country, the county superintendent of schools' office is providing this service and, in California, regional data processing centers are being developed, utilizing state and federal funds.

Almost every school district can make use of data processing through one or a combination of several approaches. Which approach is most advantageous for your district can be determined by a careful analysis of such factors as comparative

costs, the availability of computer services from an outside source, the capabilities of your own staff, and the interests of neighboring districts in joining together for this service. County or state offices may be able to provide some assistance at no cost to the district, and most manufacturers of data processing equipment have sales representatives who will assist you at no expense to the district.

However you approach the matter, the final decision on how to proceed must be that of the administration and the school officials, and this decision should be based upon the best information and professional advice available.

In summation, the computer can provide the following functions for you:

1. Prepare automatic requests for quotations.
2. Update order records by entering progress information.
3. Handle routine follow-ups.
4. Process requisitions.
5. Check history files and collate data on vendor performance.
6. Record receipts of goods and provide the buyer with a notice of the incoming goods.
7. Maintain price files.
8. Provide a preliminary selection or recommendation of supplies on the basis of the buyer's criteria (probably a combination of quality, price, and service).
9. Prepare cost-control reports.
10. Calculate buying requirements on the basis of usage data.
11. Calculate economical order quantities.
12. Write purchase orders, receive documents, provide inspection reports, requisitions, and accounts payable information, and calculate the

inventory situation at the end of each day.

13. Keep a history of vendors and prepare a vendor evaluation and performance report.

14. Match invoices and orders and prepare the accounts payable checks.

15. Provide follow-up information of various types.

16. Prepare the open-order-status report, which is one of the most valuable reports that a Purchasing Agent can have. This report lists all outstanding orders by vendor so that you can cover items of interest with one phone call--the vendor's code number and name, the purchase order number and date, the item number and description, and any internal project code identifiers for quick identification.

17. Provide materials control.

18. Measure buying performance by compsring previous prices and the standard cost and compiling the price-variance reports.

More specifically, in order for the Purchasing Agent to get the most out of computerized purchasing operations, the following points should be kept in mind:

1. It is extremely important that item descriptions within the EDP system be accurate and complete. In most cases, these descriptions are recorded on "mechanized" traveling requisitions: either edge-punched cards, tape, or tabulating cards. Then, as orders are prepared on semi-automatic typewriters, the data is captured for analysis within the computer. This means that it is the Purchasing Agent's responsibility to prepare accurate item descriptions for all his commodities right at the start.

2. The Purchasing Agent or his buyers must assist in commodity coding, so

that the computer can provide meaningful analyses of purchases by commodity groups. Keep commodity codes as broad as possible.

3. Once the commodity codes for an EDP system have been established, the Purchasing Agent must be scrupulous in coding his orders into the proper categories.

4. The Purchasing Agent must remember to notify the computer whenever he takes any action regarding an order: changing quantities, prices, delivery dates, etc. The computer knows only what it's told, and if it is not kept up to date, its programmed actions will be meaningless.

5. The Purchasing Agent working with a computerized purchasing system should constantly seek ways to make that system more efficient.

There are countless applications for the computer, limited only by the needs and imaginations of the Purchasing Agent. However, you must be aware of one inherent danger; the more the Purchasing Agent converts his work to mechanical routines, the more flexibility he will lose. The computer does not think for itself. It must be carefully fed the correct information to produce the expected and desired results.

The key to the successful use of the computer lies essentially with the Purchasing Agent, for he is the one who must provide the necessary information to start the process. If he fails to do the job well, the computer cannot make up for his deficiencies.

Despite the administrative problems and the complications inherent in the use of electronic data processing, no district can afford to ignore or be bypassed by this growing technology. The potential benefits are too great and the need for improved information systems in our schools too urgent to overlook this new opportunity to improve the efficiency of operation and the ultimate improvement of the educational product.