INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications	Inventory Control, Order Processing, Purchasing Activity, Shipping, Billing, Material Control, Sales Analysis				
Type of Industry	Electronic Parts and Accessories Manufacturing and Distribution				
Name of User	Radio Corp. of America Deptford, New Jersey				

Equipment Used

RCA 301 computer

Synopsis

A management information system designed to provide decisions, not reports, is the basis of RCA's parts and accessories operation. The operation is responsible for providing replacement parts for all the commercial (non-government and non-military) equipment built and distributed by the other RCA divisions and for merchandising accessories for use with the equipment. These parts and accessories are distributed through the same channels as the parent equipment. Functions of the system include order processing, purchasing, shipping, billing, material control and sales analyses. Routine decisions are made by the computer system and human errors are held to a minimum through use of automatically generated pre-punched data wherever possible.

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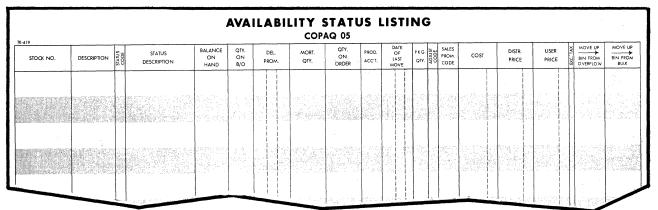
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Orders for parts and accessories at the Deptford, N.J., plant are received from over 8,000 customers at the rate of about 300 orders each day. These orders average 10 items each and are filled from an inventory of over 70,000 stock parts, representing an investment of approximately \$10 million. The management information system, operating for several years, is providing all of the benefits that were originally projected at costs less than originally estimated.

The system was not designed to generate reports which would go to clerks or analysts for manual review in order for decisions to be made. This is based upon the belief that there were very few decisions made by these clerks and analysts that couldn't be programed, no matter how complex, no matter how unique and no matter how varied these decisions were.

The necessary logic for decision-making is incorporated in the system so that, instead of giving a report to an inventory control analyst enabling him to determine which items and what quantities are to be ordered, this type of work is now performed in the computer system. Decisions are reviewed by analysts on an exception basis and, from time to time, the computer's decisions are revised by a human being who is "on-line."

But basically, the routine decisions are being successfully made by the computer system. The computer in use is an RCA 301 with a 40K memory. Reports were designed to include only those items which required specific action by someone. Comprehensive status listings and other reports of a detailed nature are also produced; however, these are intended for reference and audit trail purposes only and are not distributed to operating personnel for routine day-to-day decision-making purposes. For example, there is a complete listing of all items on open order distributed to the purchasing group. This listing is issued both in part number sequence and in purchase order number sequence and also grouped by specific buyer and vendor.



THE AVAILABILITY STATUS LISTING IS GENERATED FOR AUDIT TRAIL PURPOSES.

ACTION REPORTS

One of the specific group of reports which indicate any action to be taken by the purchasing department is the purchasing follow-up report which lists only those items which require some sort of routine or expedited follow-up action. Under normal conditions, the buyers have no need to refer to the open purchase order listing at all unless some question arises which necessitates review. The follow-up people are concerned only with those orders requiring action at that time and the purchasing follow-up report is the only tool they need. The report tells them not only what items require follow-up, but also what degree of action is required. Much of this follow-up, however, is already automated and additional amounts of the activity are being automated at the present time, so that letters and wires will be initiated and produced on the computer for forwarding to the vendor.

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In addition to the action reports generated in the system and the audit trail or reference reports, there is a third category of reports. These reports go to management to give them overall or summary information.

As a general rule, the system attempts to reduce to an absolute minimum those situations where warehousing or clerical personnel can diminish the effectiveness of the system by submitting bad input data. Of course, the system has the normal quota (or more) of internal controls such as hash totals, etc., to detect errors; but to avoid expensive corrective action, the best approach is to prevent errors before they can occur. The way RCA has chosen to do this is the use of automatically generated "turnaround" input data, or prepunched data, wherever possible instead of handwritten or typed data. Obviously, this also reduces data acquisition costs.

INITIAL INPUT

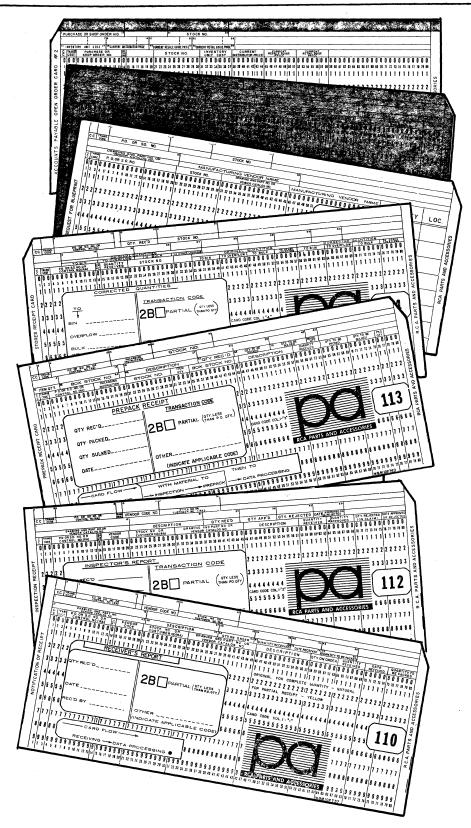
Customers' orders in written form, whether received in the mail or written by one of the telephone order takers, are put through a preliminary screening. For the most part, this screening is an automatic by-product of the opening and distribution of mail by the mail clerks and, therefore, does not represent a separate operation. This screening identifies the orders that are not ready to enter the machine system. These are orders which require some additional identification or interpretation to identify stock numbers or some special requirements. It also includes those orders on which the customer has specified some special condition or extraordinary handling. After editing, identification and interpretation, all orders are forwarded to an order processing activity where prepunched name and address cards pulled from header tub files are attached to the order.

This last operation could be performed by establishing a name and address file within the computer system; however, it has been shown to be more efficient to maintain the data on prepunched cards because of certain specific requirements of the business. These include the need for a clerical review of all orders to determine customer eligibility to purchase certain products, a review to determine if the customer is a known bad credit risk (in which case his order will be kept out of the system) and a review to determine whether or not the address, either billing or shipping, specified on the customer's order is the customer's standard address.

Because of the large size of the parts and accessories customer file, the amount of file maintenance which would be required to keep it up-to-date and the large percentage (up to 40 percent) of non-standard addresses which must be keypunched anyway, it was decided to maintain this information in prepunched cards. The order processing clerks could then automatically perform the preliminary credit check, the customer eligibility review and the billing and shipping address review as automatic by-products of the one simple card-pulling operation.

After the customer information cards are attached to each order, they are forwarded to the keypunching activity where individual line-item cards are keypunched for each item on the customer's order. The only information keypunched at this point is the part number and the quantity required in each card. After verification of the cards, the original orders are forwarded to the file room and the cards are fed into the computer.

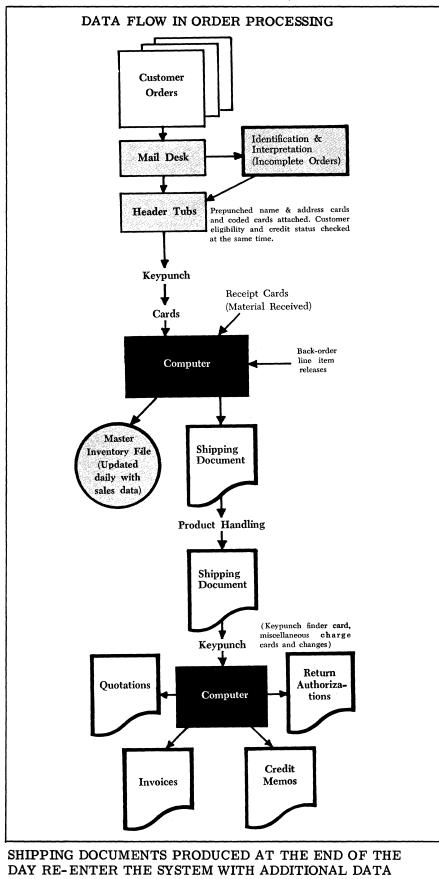
These cards enter the system in a batch at the end of each day, at approximately 5:00 p.m. Because the great percentage of each day's mail is received very early in the day, it is possible to have all orders received on any given day processed through order processing and keypunching by the day's end. These are processed through the computer system during the night and shipping documents are forwarded to the warehouse the next morning. Since the parts are generally shipped from the warehouse on the same day the shipping documents are received, under normal conditions a customer's order received one day will be processed through the office that same day, through the computer system that night, and shipped the following day. This means next-day service for routine orders, which is more than acceptable in the replacement parts business and exceeds the original objectives of the system.



CARDS PASSING THROUGH THE SYSTEM INCLUDE CUSTOMER TRANS-ACTIONS AND VARIOUS INVENTORY ADJUSTMENTS.

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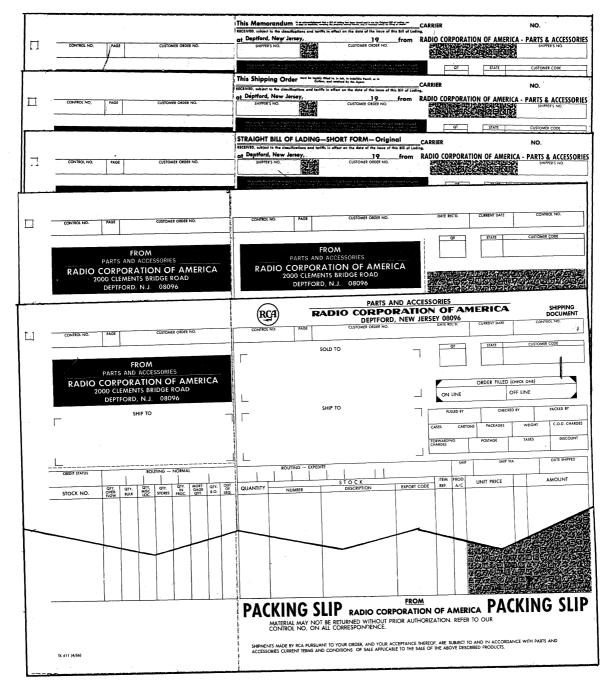
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THE NEXT DAY.

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In the series of computer runs which take place each night, transactions other than orders are also processed. These include all types of customer transactions such as requests for quotation and proforma invoices and adjustment requests, which include requests for return authorizations and for credit memorandum. At the same time, all other transactions affecting inventory are processed through the same system. These include information regarding receipt and flow of material through inspection, pre-packing, and stores and other locations in the warehouse; inventory adjustment data from the perpetual inventory group; new stock number assignments which are additions to the master file and master item file changes; price changes and changes to other information, such as sales history, ordering information, standardizing data, etc.



THE SHIPPING DOCUMENT INCLUDES A PREPRINTED BILL OF LADING, PACKAGE LABELS, PACKING SLIPS, AND TEAR-OFF SECTION WITH INVENTORY INFORMATION.

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OUTPUT AND UPDATES

The major printed output of the daily customer order processing system is the shipping document, which goes to the warehouse to effect shipment of a customer's order and which includes a preprinted bill of lading, package labels, packing slips, and a tear-off section which includes inventory information for the benefit of the voucher filler and order checker. This information covers availability of material at locations in the warehouse other than the orderpicking area, and the status of the stock items with respect to their future superseding, discontinuance, etc. This information is used by the order filler to locate parts which are not immediately available in the order-picking bins and to expedite the movement of material from other areas in the warehouse when required to fill customers' orders. Other documents produced from the daily system are return authorizations; credit memos; customer invoices; quotations; accounting transaction registers; accounts receivables summary listings; updated customer order register listings (for customer service analysts to identify the status of any customer order received, in response to inquiries). Also, updated availability-status reports of all items in inventory; transaction audit trail listings; marketing reports; and, within the system, sales and accounting entries are generated to be accumulated on weekly, monthly and quarterly bases for input to additional reporting and decision-making programs.

Once each week, the master files which have been updated on a daily basis in the customer order processing system to reflect all sales and other inventory adjustments, are reviewed in the inventory management and purchasing system.

Whenever a file has been affected by a transaction during that week, it is reviewed and operated upon in this system. Based on the new sales data in the file and sales data which has been accumulated in the form of history in this same file, the system scientifically computes the new average sales figures for each item. It also determines whether or not the trend of sales is level, upward, or downward and the magnitude of that trend.

With this information, sales forecasts are computed for the balance of the current quarter and for one year in advance.

PURCHASE ORDERS

Using this newly generated information, the system computes a new reorder point for each item, based upon demand forecasts and the delivery cycle for each item in question, as well as the safety stock which has also been computed for each item. This new reorder point is compared to new updated inventory "in-sight" figure. This "in-sight" figure consists of the quantity of material on hand, plus the quantity of material which is already on order, less any material which is allocated to customers' orders. If the "in-sight" figure is equal to or less than the newly computed reorder point, the computer proceeds in this ordering situation to compute the correct reorder quantity using (1) economic order quantity theory and a variation of this theory; (2) economic purchase quantity, which takes into consideration price breaks; (3) inbound transportation discounts and other data.

The system also writes the purchase order for distribution to the material control and purchasing activities. This purchase order is actually a combination of a requisition and a purchase order form. In addition to the part number and the quantity ordered, it also includes, in a separate section which can be torn away, all of the information within the system upon which the computer bases its calculations and ordering decisions. This includes all of the inventory status data, sales history data, purchasing history (the last three purchase orders issued) and any other information in the file relating to the characteristics of the item in question. Purchasing history includes the vendor, the date ordered, the date received, the prices paid, and all other pertinent information about each buy.

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THIS COMBINATION REQUISITION AND PURCHASE ORDER INCLUDES, IN A TEAR-AWAY SECTION, INFORMATION ON WHICH THE COMPUTER IS PROGRAMED TO MAKE CALCULATIONS AND ORDERING DECISIONS. The purchase order is reviewed by material control and, if it meets with their approval, is forwarded to the purchasing activity for release to the vendor. At any point, either material control or purchasing can reject, revise or accept the computer system's decision. When the order is placed, a feedback card is returned to the computer system so that the open order records can be updated with the vendor's name, vendor's code, order quantity (whether it be the same quantity as originally appeared on the purchase order or a revised quantity), negotiated prices, delivery dates and other data.

The system then generates a deck of prepunched receiving and accounts payable cards. The receiving cards are merged into a card file which is maintained in the receiving department and, upon receipt of material, the appropriate card is forwarded from the receiving department to the computer system to enter the receipt in the records. The balance of the card deck is forwarded, with the material, to the inspection department. If the material passes inspection, another card is forwarded to the computer system to record that fact. Then the material is forwarded again, with the balance of the cards, to the pre-pack area where another card is forwarded to the computer after the material has been packaged. The procedure is repeated at each step of the way so that the deck of cards records the flow of material through the warehouse.

Unless there is a change from the original purchase order in the quantity received, or material is rejected, or if the stores activity changes the location from that specified by the computer system, then there is no need for writing, typing or notation of any sort by anyone in the warehouse activity. If there is some change from the information specified in the cards, then a simple code is marked on the card to indicate that some information has been changed and a notation made as to the correct quantity received, packaged, stored, etc. This revised information is keypunched into the card and the computer accepts the revised information rather than the original information.

In the event of a partial receipt, the computer generates a new deck of receiving cards for the material which is still due and these cards are forwarded again to the receiving department. A deck of cards for each open order is also forwarded into the accounts payable system for future use, to be matched with the computer's open order records and vendor invoice data.

REPORTING

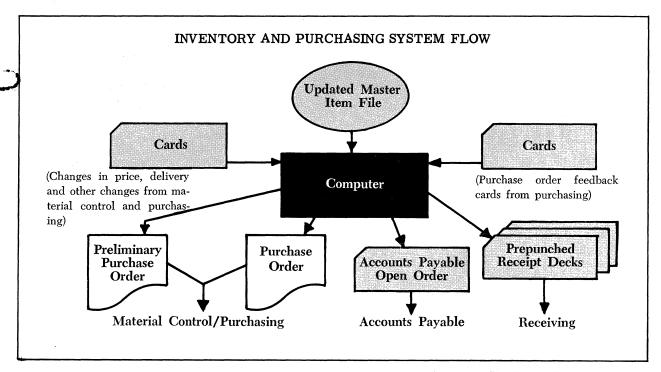
On a weekly and on a monthly basis, all of the accounting transactions which are generated during the daily order processing and weekly ordering system runs are processed to produce the normal accounting reports required in a business. These reports include detailed transaction registers, profit and loss data, balance sheet data, inventory valuation listings, inventory reserve analysis and computation, suspense file and other account analyses reports.

The system also provides for automatic selection of items for perpetual inventory accounting and for semi-annual or annual inventory taking, including count sheets and reconciliation listings. Inventory adjustments resulting from physical counts are computed automatically within the computer system and transaction listings and audit trail data are printed.

Accounts receivable data, both detail and summary, are generated automatically from the computer system and go to the various collection offices which are responsible for dealing with particular groups of customers for RCA.

The system also generates the necessary information required to match accounts payable data and produce accounts payable checks automatically.

A great variety of sales reports are issued from the computer system, using the transaction data generated in the daily order processing and weekly ordering systems.



UPDATED INVENTORY ITEM FILE, PRODUCED IN DAILY CUSTOMER ORDER PROCESSING OPERATION, PROVIDES INPUT TO WEEKLY RUN THAT AUTO-MATICALLY PRODUCES PURCHASE ORDERS AND "TURNAROUND" DOCUMENTS FOR USE WHEN THE ORDERS ARE RECEIVED.

There are many other items in the system which are currently operational, such as field failure analysis reports to assist the quality control group to take corrective action for items which are failing in the field, various cross-refernce listings for product planning purposes, traffic reports and export licensing and documentation information. The latter are used within the customer order processing system to automatically generate export licensing and documentation requirements.

EOQ AND INVENTORY

Within the inventory system, there are some unique features. One of these has to do with the way in which Economic Order Quantity (EOQ) is calculated. In most computerized inventory control systems, EOQ is calculated by using average procurement and average retention costs in order to arrive at the most economic inventory level. There is a great variance in the types of items carried in the RCA parts and accessories inventory and the average procurement and the average retention costs would not necessarily apply to all items, some of which are more difficult or easier to handle or to procure. A unique "sliding scale" EOQ calculation was developed. This was done by building a simulation model which gives the system the ability to compute the specific procurement and retention costs applicable to each inventory item.

Since the MIS went "on the air," the sales of the parts and accessories activity have more than doubled and the number of items in inventory has gone from 70,000 to over 100,000. It is acknowledged by management that the business could not have handled this growth and the accompanying increase in volumes without the new system. It is even more significant to note that inventories are approximately the same or slightly less than they were without the system, even though they support more than twice the sales volume (it is also an accepted fact that the full effect of the system has not yet been felt with respect to increased effectiveness and reduced value of inventory). At the same time, service levels are better than ever. In short, the system has enabled RCA's Parts and Accessories business to provide better service to its customers at less cost, with less inventory investments and with every reason to believe that the benefits will continue to increase in the future.