INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications:	Order Processing, Shipping, Invoicing, Inventory Control
Type of Industry:	Laboratory Equipment and Apparatus Supplier
Name of User:	Van Waters & Rogers Div. VW&R United Corp. San Francisco, Calif.

Equipment Used:	IBM System/360 Model 40 (2)
	IBM 2780 Remote Terminals (2)
	IBM 2314 Disc Storage Unit
	IBM 2260 Display Units (20)

Synopsis

Van Waters & Rogers Div. in San Francisco, Calif., is headquarters for a computer network linking the three warehouse-sales offices which make up the nucleus of the organization. Orders are received from some 23 locations via phone or mail and are prepared as input to the central computer system at the San Francisco headquarters. Salesmen can use data display units to access inventory records for each of the three warehouses and rapidly tell customers if merchandise is available. Administrative and inventory reports are generated at San Francisco. The computer system is planned to eventually link all of the division's area offices, and will extend to other division functions, such as accounts receivable. The system is programed to provide 14 sales reports for management and a daily back-order report for the purchasing department.

Background and history

The Van Waters & Rogers Div. lists some 52,000 catalog items in the laboratory supplies and apparatus department alone. The products range from test tubes, corks and filter paper to complex optical and electronic systems for control and analysis procedures. The division, which has annual gross sales exceeding $140 million, sells lab supplies and apparatus to over 15,000 customers in the Western U.S. and in Canada. The firm does not manufacture any of the 52,000 items that they supply. About 30,000 items are maintained in stock at three major warehouses in San Francisco, Los Angeles and Seattle. The three-shift, six-day-a-week computer center employs nine operators, seven programers, one systems engineer and 15 keypunchers.

The company became involved with computers during the first generation of hardware. An IBM 402 was operating at VW&R in 1959, and six years later a 1401G with a 4K memory was functioning. The steady progress in processing needs led next to a System/360 Model 30, and the organization is now using a brace of System/360 Mod 40's plus an array of advanced peripherals. The 2260 CRT's were chosen for three primary reasons: they are silent in operation, the type of information required is not historical and does not require hard copy output; and the CRT itself was a good way to involve non-data processing members of the VW&R staff with the computer.

The system

The data processing system network employs two large-capacity System/360 Model 40's as the central processing system. On-line disc storage, shared by the two CPU's, is provided by a 2314 direct access storage facility. One 1443 printer and one 1403 N1 printer are available to the system as well as a 2501 card reader and a 2540 card/read/punch. A 2701 data adapter unit links 2260 display units and 2780 data transmission terminals at the remote locations of the VW&R network. This configuration provides complete backup for the on-line order processing function. Moreover, it provides the necessary capacity for the planned expansion of data processing activities over the next three to five years. Additional 2780 units will be added to the network as other offices are assimilated into the system.

The Model 40's are employed in a full duplex environment with complete switching ability, servicing two remote IBM 2780's and 17 IBM 2260 data display units. The 2780's, which are 1443 printers with card/read/punch attachments, are used for data collection and dissemination. The 2260's provide sales and purchasing personnel with immediate visual access to inventory and order data maintained on the central computer's disc files. The 2780 was designed as a "slave" input/output device to be linked to a parent computer. It communicates with the larger computer via tab cards or printer. Previously, VW&R had System/360 Model 20 computers at San Francisco, Los Angeles and Seattle. These will be displaced by 2780 terminals in Los Angeles and Seattle, thus providing a substantial reduction in operating costs for the offices, according to the firm.

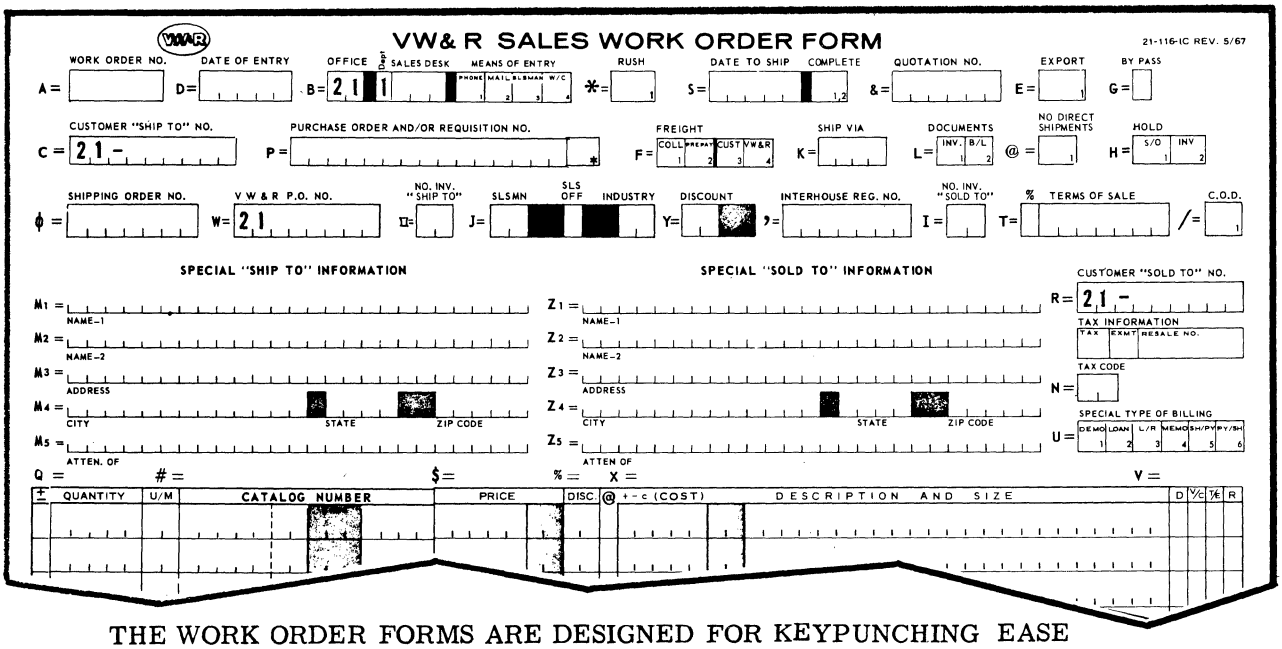
Order Inquiry

When a customer inquires about availability or price of any inventory item, the inside salesman on the order desk turns to the nearby 2260 display station and, using its typewriter-like keyboard, enters the item's 8-digit catalog number. As he enters the number, it automatically appears on the CRT screen. After checking his entry for accuracy, he depresses a button which causes the inquiry to be transmitted directly to the Model 40 in San Francisco. Instantly the computer extracts all data concerning the item from its magnetic disc files, and transmits it back to the 2260 where it is projected on the display screen.

The salesman can clearly see the quantity of the item on hand at each of the three warehouses, as well as its current selling price. The visual message indicates if the item is one that is not regularly maintained in warehouse stock, and shows the lead time for shipments from the manufacturer.

With this information available, the salesman can give an answer to the inquiry while the customer is still on the phone. In most cases, an affirmative reply can be made to the question, "Can you ship it immediately?" even if the item is out of stock at his location. If a salesman in San Francisco discovers the local warehouse is temporarily out of a certain item, for example, the display screen advises him if it can be shipped immediately from either Los Angeles or Seattle. The instant ordering ability serves to decrease the lead time.

The message on the display screen also provides the salesman with other possibilities for saving a sale, even though items may not be available from warehouse stock. In many categories of scientific equipment sold by VW&R, for example, several units usually are set aside as demonstrators. The number of such available units is shown on the screen enabling the salesman to offer the customer the alternative of purchasing one of these units immediately, or using it as a demonstrator while awaiting delivery of a new machine.



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Order Processing

Orders are received at the three offices (Los Angeles, San Francisco and Seattle) either by telephone or mail. The order data is entered on specially designed work order forms which call for a minimum amount of identifying information, such as customer identification, shipping instructions, an 8-digit catalog number for each item and quantities ordered. The work orders are conveyed on a belt to the keypunch area at the local sales office where the data is punched into cards. All keypunched cards are machine-verified at each location prior to transmission. Cards are batched four times daily for transmission

to the computer. The four cycles are at 10 a.m., 12 noon, 2 p.m. and 10 p.m. An average of 350 work-orders are received for each processing cycle. The San Francisco work-order cards are hand carried to operations, since they share the same facility. The IBM terminals at L.A. and Seattle read the work-order cards and transmit them to the San Francisco computer at 600 characters per second over telephone lines. The orders are recorded on magnetic tape by the computer for later processing.

A computer program checks for errors which the computer will not correct and a "sales order preliminary edit" by location is produced. All work-orders are listed if OK'd by the pre-edit. All work orders with errors are also listed and the list is transmitted back to each user so that he may correct bad cards and re-input them in the next order processing cycle. All OK'd work-orders are written to a disc file, to become input to order entry editing.

Order entry editing, a second edit, is performed to capture certain errors to be placed on an error listing tape to be transmitted back to each remote location. An error correction file is created to allow the user, during the next order cycle, to input error correction cards through an error correction program.

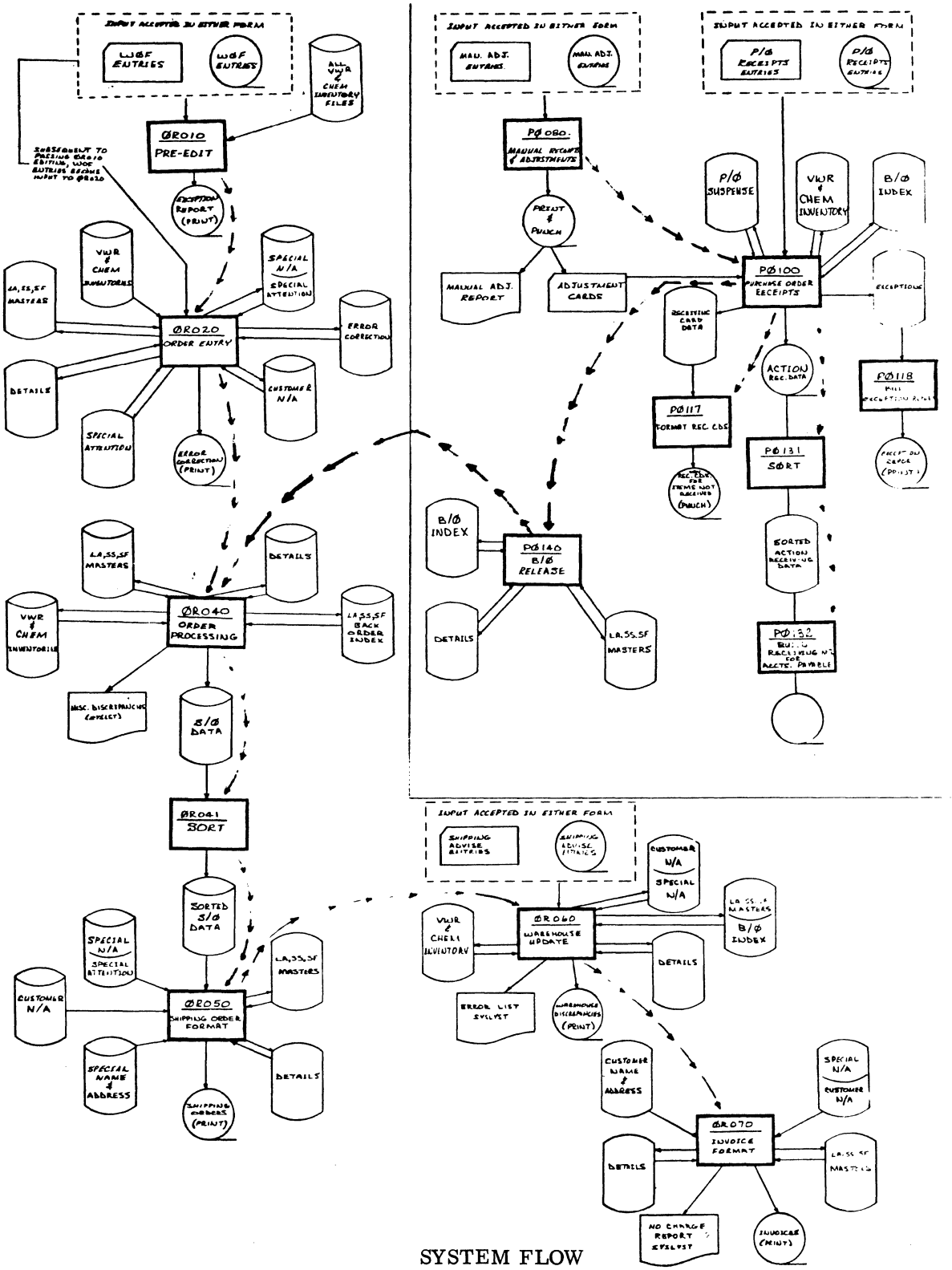
Master suspense records are created at this time in a new disc file from the information on the work-order form above the special information section. Three detail records are created in the detail's disc file, one for each line item. No special attention records or special name/address records are created unless the order requires them. The inventory file is not yet updated.

The computer program that processes all work orders updates all inventory files now that all errors have been screened out. All master suspense records are tagged as having been processed. The same is done for detail records. If no stock exists, back orders are created and written into a disc file. A discrepancy report tape is created for later transmission to remote locations. Special considerations are listed on the discrepancy report tape such as item numbers coded "DWS": Discontinued with stock down to zero." This allows the user to contact the customer for a substitute item. The rest of the order is shipped as ordered. All good details are written to the detail-work disc files, to become input to the next program, which creates shipping orders. Shipping order tapes (a separate tape for each remote location) are transmitted as part of the order cycle four times daily.

Prior to this program, the detail-work file is sorted by catalog number within shipping-order-number within office-location-number. This ensures that shipping orders are produced by location and within any particular shipping order, that the line items are in warehouse-picking sequence. The packing-list sequence as recorded originally on the work-order form is preserved in the way the customer submitted the item. The order of line items as they appear on the warehouse side of the shipping order depends on how the inventory is arranged in the warehouse, not on how items were ordered over the telephone.

All special handling shipping orders are so tagged by the sales coordinator prior to sending the orders to the warehouse. He searches for will-calls, credit-check-needed, Greyhound-shipment, C.O.D. orders, clinical orders, export orders and the like.

The items listed on each shipping order are picked and packed at the warehouse. Shipping then receives the order and routes it to the customer. The picking side of the shipping order is forwarded to the remote location's keypunch section so that a record of what was packed can reach the computer. This is called the "shipping advise" card. The central computer accepts all shipping advise cards in preparation for running the warehouse update program. All inventory files are updated if there has been an over- or under-shipment--which is also indicated on a warehouse update report. A back order is created for under shipments if no back order exists. The invoicing program is run daily and updates all files. Control totals are accumulated for later verification in a daily sales summary and batch balance control programs. Extensions are only shown for shipped items but all items ordered by the customer are printed on the invoice.



SYSTEM FLOW

ORDER ENTRY - PROCESSING

A report summarizing the invoices produced for that day giving sales, cost, tax and accounts receivable totals is used by the accounting department to balance control totals against hash totals developed in the invoicing program.

The data is held in San Francisco, because there is no capacity at Los Angeles or Seattle for on-line storage. Sales orders originating in the San Francisco sales office are processed in a similar manner, except that the punched card data is input directly into the local Model 40.

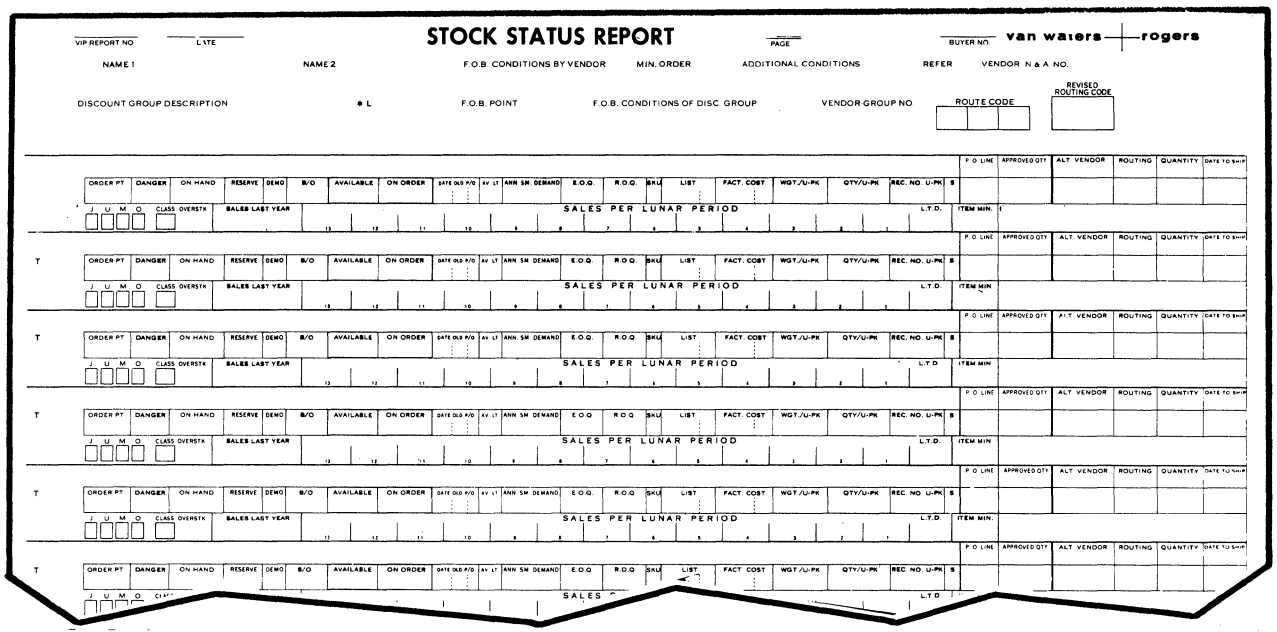
As part of the invoicing cycle, the computer uses current price data maintained on its magnetic disc file and then extends prices, figures the applicable taxes, and computes the total amount due. Any on-line data can be changed by a manual entry on the work order form. As with order processing, the formatted data is transmitted back via the remote 2780 terminals for local printing and mailing of invoices. The invoicing is done locally because of the complications of forms, possible short shipments and the diversity of accounts.

Accounts receivable are not computerized. Presently, they are maintained with Burroughs sensitronic magnetic ledger cards and magnetic tape. Cards are prepared after each day's transactions. Billing is done the following day.

Inventory control

Twice each week, the computer produces a stock status report using the inventory file data, for use by the purchasing department. The stock status report is structured according to vendors' assortment groups so that maximum advantage can be taken of available assortment along with all other items in the assortment group. It shows year-to-date sales on each item by four-week periods, as well as total sales for the previous year.

Buyers use the stock status report as a worksheet for issuing purchase orders by entering buying data in blanks provided on the form. A daily back order listing report is produced for the purchasing department to review new back orders by vendor. The buyer evaluates the customer's needs and may create a purchase order for direct shipment to the customer for faster service.



THE STOCK STATUS REPORT IS PRODUCED TWICE EACH WEEK, AND IS USED ALSO FOR A WORKSHEET FOR ISSUING PURCHASE ORDERS

Results and future plans

Since the display station network became operational, the service level in supplies and apparatus has risen sharply (approximately 20 percent), sales have increased, and back orders have been reduced. In addition to the obvious benefit of improved customer service, Van Waters & Rogers has experienced a significant reduction in its order processing cycle since the computer network went into effect. When orders were processed with conventional tabulating equipment, it took an average of two working days from the time an order was received until it could be shipped from the warehouse. That time has now been cut to four hours or less.

Hardware will be upgraded as necessary. The desire to keep current was one of the factors which led to the recent creation of a divisional executive computer committee. The committee attempts to forecast the long range goals and objectives of the computer center. It meets monthly and includes two group vice presidents, the vice president of administration and the corporate manager of the computer services center. Other divisional vice presidents are brought into the meetings if their areas of operation will be affected by the committee's deliberations. The controller and other financial officers of the division are also available for consultation.

The company plans to expand its teleprocessing network with the addition of 2260 display stations at its Portland sales office and at two additional offices in Los Angeles and Seattle. Eventually, the entire company will be included in the teleprocessing network. In addition to order processing and invoicing for the apparatus department and general accounting work further expansion of the system is planned to accommodate the entire diversified product line of VW&R.