

INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications Order processing, engineering surveys,
production scheduling, sales reporting,
bill of material processing

Type of Industry Community Antenna Television Sales and Service

Name of User Jerrold Electronics Corp.
Philadelphia, Pa.

Equipment Used IBM System/360 Model 30 Data Processing System
Mohawk Data Recorders
Service Bureau Corp. Time Sharing Service

Synopsis

The Jerrold Corp., a manufacturer of components and systems for Community Antenna Television (CATV) depends heavily on data processing for engineering, accounting, marketing, inventory and production functions. The company's engineers have access to an in-house IBM System/360 Model 30, and a time shared IBM 7044 owned by Service Bureau Corp. Besides traditional accounting functions, Jerrold's EDP center in Philadelphia is responsible for maintaining inventory for five warehouse locations, producing sales reports, and maintaining the order entry system.

BACKGROUND

Data processing is used to handle a wide variety of functions at the Philadelphia, Pa., headquarters of the Jerrold Corp. Applications range from marketing to manufacturing and inventory control. Management looks upon the computer as more than just an operations tool. Consequently, the company's engineers have access to the firm's IBM System/360 Model 30 as well as an IBM 7044 System time shared through Service Bureau Corp., a wholly owned IBM subsidiary.

The Jerrold Corp. produces a complete line of electronic equipment for the CATV (Community Antenna Television) systems market. A subsidiary of General Instrument Corp., Jerrold, besides being a manufacturer, owns in whole or part 26 CATV operations scattered throughout the country and designs CATV systems for private investors.

The corporation is a product of the electronic age. Founded in 1948, the company made significant strides in the 1950's and was instrumental in the founding and building of the CATV industry. Today there are more than 2,000 CATV stations on the air. Another 3,500 communities already have been granted or are awaiting franchises. In all, CATV has more than 3 million subscribers, and Jerrold represents a significant portion of that business. Annual revenues exceed \$50 million. The company employs some 1,800 persons.

Jerrold's activities cover the full range of the CATV business. Heavily oriented to new advances in communications technology, the firm's engineers utilize the full resources of the company in its total turnkey operations.

Basically, Jerrold's turnkey approach entails complete responsibility for a CATV system from signal survey to grand opening. The service includes a signal survey, cable routing, design and construction along with technical training, financing and promotional assistance.

ENGINEERING DATA PROCESSING

The computer has brought the engineering operation and the company's marketing arm closer together. The design and installation of a CATV operation is a necessarily intricate job, surrounded with not only a number of engineering problems but also government regulations.

Perhaps the most important computer operation handled by the engineering department is the signal survey, which serves as both a sales tool and a starting point for the installation of a CATV system.

The salesman in the field generates a request for the survey either by mail or telephone to the Supervisor of Antenna Systems. Based on the information the supervisor gets, either he, or a member of his staff, punches three cards. The first contains the name of the town and the date, the second the approximate longitude and latitude and the third a radius card to call up information on all television stations within either an 80 mile-, a 100 mile- or any other radius of that longitude and latitude, as specified on the card.

Basically, the survey provides a relatively clear indication of the signal environment in the survey area. The program is run on an IBM System/360 Model 30 computer with 32,000 characters of core storage. Jerrold stores all pertinent information on every television station in the United States, Canada, Mexico and Puerto Rico on disc, including type of antenna, power levels, and channel number. Data on all stations within a close radius of the proposed CATV site is pulled from discs and processed. Several propagation equations are performed to determine the strength of the signal, then some design equations to determine feasibility of reception and types of equipment needed.

Formerly, the computations were performed manually. The engineer would select a few stations near to the proposed site for study. He consulted maps for distances, manuals for power output, then used aeronautical maps with latitude and longitude markings to measure angles and grids. He then used a special slide rule to work through the equations. After this was accomplished, he had to write a report and have it typed. Now the same operation can be performed for several hundred stations, instead of a few, and a report can be printed out within minutes.

The salesman in the field uses the report to show the client what stations his CATV system would be likely to pick up, which stations would probably cause interference, and the general type of antenna(s) necessary for optimum performance. With it, too, a rough estimate of costs can be worked out, and the potential competitive situation evaluated.

The printout is generated in two distinct parts:

1. Stations within a radius indicated on the radius cards.
2. A listing of all stations within a 400 mile radius.

It rates the potential severity of interference, from negligible to light, to medium, to heavy.

In addition to being a valuable tool for the salesman, the report serves as a starting point for the engineer when designing the receiving antenna arrays. The material contained in the surveys once took as much as two days of engineering time to work up. Now the data is available in less than an hour. The survey also serves as a starting point for field research teams which go into the proposed area to measure the exact signal levels of stations currently reaching the community.

The next step is preparation of a systems design and the submission of a bid. In order to even be able to come up with a bid figure, it is necessary to design a CATV system.

Most of Jerrold's engineers have experience in Fortran programing and are given access to an IBM 7044 owned by Service Bureau Corp. The systems engineering group uses three terminals, two IBM 1050's and a 2741, extensively.

Bill of Materials Processing

The bill of materials program is designed basically to enable the engineer to keep track of the materials he needs to design a CATV system, and enable Jerrold to make estimates on labor costs and material costs. Additionally, the bill of materials printout is used by the salesman when submitting a bid to the potential customer. Use of the computer in this operation has speeded things up considerably. A job that once took several days just handling paperwork can be processed in 10 minutes.

Formerly, the list of materials used in system design was forwarded to the estimating department which totaled the cost of items available in-house, items available elsewhere, labor costs and engineering costs, to come up with a job bid.

Today, using the engineering drawings, an estimator in the bill of materials department punches a card for each CATV system component. The cards are then batched with a group of control cards and used as input to the 7044 via 1050 terminal. The computer is programed with all of the parameters contained in a specific job, including labor costs for the potential installation area, price schedules, discount schedules, and any extras that may be needed.

The output is a printed bill of materials showing itemized cost per unit, labor costs and a total installation cost. Based on the bill of materials, a typist prepares a customer proposal which is forwarded to the salesman. At the present time the bill of material printout is being used basically as vehicle to speed completion of proposals. However, Jerrold's management sees its use being logically extended, and the printout functioning for billing and as a picking list in the warehouse.

Additionally, the Systems Engineering Department uses its time sharing service in a number of other problem solving areas. They include:

- Mathematical probabilities of the effect of temperature changes on the performance of a CATV distribution system.
- Optimization of tapping CATV feeder lines.
- Dynamic analysis of the cyclic behavior of group delay -- simulating a form of amplifier distortion.
- Electronic Circuit Analysis -- used in the development of circuit design.
- Correlation of CATV system cost with design parameters.

DAY TO DAY OPERATIONS

The day-to-day operations of Jerrold's integrated business are handled by the company's in-house data processing department. Operations cover seven major areas:

1. Order entry
2. Inventory control
3. Production
4. Payroll, accounting and general financial
5. Sales statistics
6. CATV company accounting (for Jerrold-operated CATV systems)
7. Engineering programing operations support

Besides the IBM 360/30 central processor, Jerrold's configuration includes three IBM 2311 disc drives, two tape drives and an IBM 1403 printer, capable of printing 1,100 lines per minute. The company is also using Mohawk Data Recorders equipped with typewriters for tape-to-tape transmission from warehouse locations for inventory control and order entry. Warehouses are maintained in five cities -- Philadelphia, Kansas City, Mo.; Atlanta, Dallas and Redwood City, Calif. The Mohawk data recorder/typewriter configuration can be used to produce hard copy simultaneously with magnetic tape encoding.

Jerrold salesmen forward their orders to the regional warehouses. Typists, at the Mohawk data recorders, type the customers name, address, purchase order number, the order date, any special instructions and the items ordered -- by stock number, name, quantity and price -- onto a five-part order form. At the same time the typist is producing the form, the information is being recorded on magnetic tape.

The form's parts include:

1. Customer acknowledgment, which is mailed before the order is shipped.
2. Bill of lading
3. Packing slip
4. Picking list
5. File copy for the sales department

If the goods are in the warehouse, shipment is made and the picking list is given to a typist to be added to the order data on magnetic tape. This data is then transmitted to Philadelphia for input to the computer and updating of inventory files, stored on discs, open order files, and sales statistics files.

If the goods are not in the warehouse, that information also is encoded on magnetic tape, using the Mohawk units, and transmitted to the Philadelphia office. For goods not shipped, the computer generates a back order. Invoices are produced for goods shipped. In addition, the computer determines whether the inventory shortage is temporary (in which case the warehouse will maintain responsibility for ultimately filling the order) or if the goods should be shipped from the main warehouse in Philadelphia. The computer additionally can determine optimum shipping points from other warehouses when stock runs short in a location.

All customer billing on the order entry system is handled from the Philadelphia EDP center. When the order entry data is transmitted to Philadelphia, four important areas of the disc files are automatically updated:

1. Inventory records
2. Unfilled orders
3. Month to date sales
4. Year to date sales

Printouts of this information are provided to the marketing department.

The order entry system enables Jerrold to have a complete history of every transaction including when and how shipped, the charges and exactly what was shipped, should a question arise.

A special billing run is made for turnkey installations by inserting a billing code into the program. The computer accumulates the warehouse shipping data to generate one bill, rather than to bill the customer each time a product is shipped.

Three important reports are spun off the order entry system, which in essence, is the keystone to nearly all of Jerrold's operational systems. They are:

1. A backlog report -- indicating the backlog of all orders in house. It is used by marketing and production.
2. Unfilled orders report -- used by the production department to adjust production estimates.
3. Backorder report by customer -- used by the customer service department to answer customer inquiries. It shows the status of all orders -- and whether or not the goods are in stock.

SALESMAN'S COPY						
OFFICE FILE						
ORDER DEPT.						
BOOKKEEPING						
REMITTANCE COPY						
CUSTOMER'S INVOICE						
JERROLD ELECTRONICS CORP.						
HOME OFFICE: 401 WALNUT STREET, PHILADELPHIA, PENNA. 19105						
S O L D T O		S H I P T O				
DATE OF ORDER	YOUR ORDER NO.	* TERMS		INVENTORY LOCATION	INVOICE DATE	
SHIPPED VIA	PACKING SLIP/ORDER NO.		NO. CARTONS	WEIGHT	SHIPPING DATE	
STOCK NUMBER	MODEL NO./DESCRIPTION	QUANTITY			UNIT PRICE	TOTAL PRICE
		ORDERED	SHIPPED	BACK ORDERED		

ONCE THE ORDER IS SHIPPED FROM THE FACTORY AND THE HOME OFFICE IS NOTIFIED (THROUGH THE USE OF ON-LINE DATA RECORDERS), THE BILLING FUNCTION IS TRIGGERED. JERROLD GENERATES A PRINTOUT OF ALL ORDERS SHIPPED, THEN SENDS THE PRINTOUT TO THE KEYPUNCHING DEPARTMENT WHERE THE HEADER INFORMATION ON THE ORDER IS USED TO KEYPUNCH A FINDER CARD. THE FINDER CARDS ARE THEN RUN THROUGH THE COMPUTER WHICH OUTPUTS A CUSTOMER BILL, UPDATES ACCOUNTS RECEIVABLE, UPDATES THE COST OF SALES FILE FOR ACCOUNTING AND PREPARES ANOTHER PACKING LIST IF ANY GOODS ARE TO BE BACKORDERED. THE CUSTOMER IS ONLY BILLED FOR GOODS RECEIVED. THE LOOP BETWEEN ORDER PROCESSING, THE PRODUCTION OF A NEW BILL AND THE SHIPPING OF BACKORDERS IS CONTINUED UNTIL THE CUSTOMER HAS RECEIVED ALL OF HIS GOODS.

Inventory Control System

Data on all of the 2,063 items manufactured by Jerrold is stored on disc by stock number, description and cost. The decision to produce an item is made by the production control manager based on sales forecasts generated by the sales department. The production control manager sends a report to EDP indicating the total number of a certain item to be produced and how many are to be produced each week. The information is keypunched and processed and a production schedule report is printed out.

JERROLD ELECTRONICS CORP.

DAILY STOCK STATUS REPORT FOR 11/05/68										COMPANY CONFIDENTIAL			PAGE 002
PRODUCT	SALES FORECAST	* NOV. PRODUCED	NOV. SHIPPED	NOV. ORDERS IN PROGRESS	* QUANTITY / NOV. IN STOCK	QUANTITY SHIPPED / TOTAL	TOTAL UNFILLED ORDERS	AVAIL-ABLE	ON HAND	ON HAND	QUANTITY	ORD. COD	
								PHILA	TACO				
0014	ACC-218	R O S						86	86			P	
1014	ACC-6AMK	50		400								P	
0015	AHB-1	R O S						4683	4683			P	
0966	AHB-2A	11000						29181	29127		4	P	
0865	AHB-3	300		29				4867	4857		490	P	
1087	AHB-4	100						1292	617		675	P	
0008	AIR-218	42		2	764	2		2	638		640	P	
0016	AJ-106	25						5	164		169	P	
0017	AMA-50	5						36	36			P	
	AMH							4	4			P	

BASED ON THE REPORTS OF SHIPMENTS FROM THE WAREHOUSE, JERROLD PRODUCES A DAILY STOCK STATUS REPORT. A WEEKLY VERSION OF THIS REPORT IS SENT TO THE WAREHOUSE, AND USED TO DETERMINE WHETHER OR NOT GOODS ARE IN STOCK TO FILL INCOMING ORDERS. THE FORM CONTAINS 14 FIELDS.

(1) STOCK NUMBER. (2) PRODUCT DESCRIPTION. (3) SALES FORECAST -- HOW MANY MARKETING EXPECTS TO SELL DURING THE YEAR. (4) AMOUNT PRODUCED IN A GIVEN MONTH (400 IN NOVEMBER). (5) AMOUNT SHIPPED IN A GIVEN MONTH. (6) NUMBERS OF ORDERS IN A GIVEN MONTH. (7) QUANTITY CURRENTLY IN PRODUCTION. (8) NUMBER OF NEW ORDERS RECEIVED. (9) NUMBER MOVED INTO STOCK (ON LINE ONE, 400 HAVE BEEN PRODUCED, BUT NOT YET MOVED INTO STOCK). (10) TOTAL NUMBER OF UNFILLED ORDERS. (11) TOTAL NUMBER AVAILABLE (THE DIFFERENCE BETWEEN COLUMN 10 AND COLUMNS 12 AND 13). (12) TOTAL AVAILABLE IN PHILADELPHIA -- THE MAIN WAREHOUSE. (13) TOTAL AVAILABLE FOR TACO -- (TACO IS A JERROLD SUBSIDIARY HANDLING SOME OF THE SAME PRODUCTS). (14) ORDER CODE. BY COMPARING PRODUCTION WITH SALES AND QUANTITY AVAILABLE, MARKETING CAN MAKE EVALUATIONS OF PRODUCT PERFORMANCE AND PRODUCTION SCHEDULING CAN MAKE SURE GOODS ARE BEING MANUFACTURED TO MEET DEMAND.

The production schedule report lists each item by stock number, the total number to be produced, and how many are to be produced each week. The schedule is then compared with a computer-generated daily stock status report which indicates actual sales and shipments, and the production control department can readjust production upward or downward -- depending on need. Production schedules are revised weekly, and used in the factory to schedule production.

As the goods are produced, the factory ships them to the various warehouses, and sends a "move from production" slip to the data processing department. The information contained on the slip -- quantity, stock number, description, date, and the location to which the goods have been shipped -- is punched and input to the 360 to update current on-the-shelf inventory position for each warehouse.

The new production is then matched against the backorder file which is queued by priority and date of order. When goods are produced that will meet the need for unfilled orders, shipping papers are generated. The data from these orders is then converted to magnetic tape, by a data recorder operator, and the taped data is transmitted to the appropriate warehouses. At the warehouse, shipping papers are printed and the order is then processed like a normal order.

