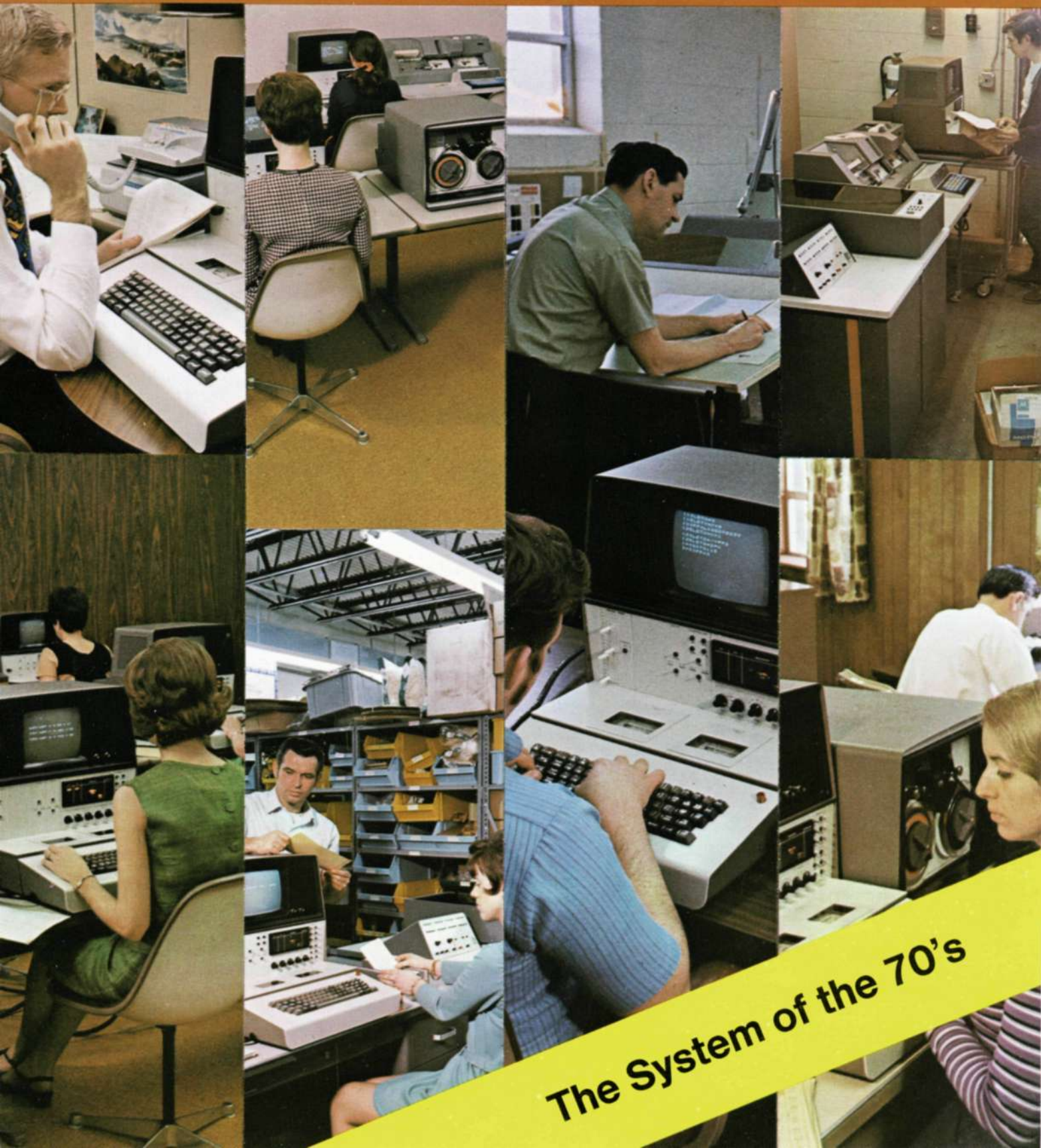# VIATRON

The System of the 70's

The System of the 70's
THE NEW REALITY

VIATRON Mass production—you can buy a System 21 terminal for as little as $1,872.

VIATRON Multimedia terminals produce tape, cartridge, card and on-line input.

VIATRON Microprocessors let you perform many computer functions off-line.

VIATRON Zero-defect computer tape input system lets you record data anywhere—without environmental controls.

VIATRON Black and white, and color video displays provide fill-in-the-blanks formatting so anyone can prepare and verify computer input.

VIATRON Desk-top printing robots prepare formatted hard copies from tape, card, cartridge or computer input.

VIATRON Batch-transmission and unattended operation features allow automatic polling of remote locations.

VIATRON Low-cost VIATAPE Banks provide digital filing systems with automatic search and retrieval—can be used anywhere.

VIATRON Under-$5,000, general-purpose, 4-K, terminal-oriented computer provides low-cost processing power wherever it's needed; 8-K version sells for under $10,000.

VIATRON LSI/MOS reliability.

Distributed Data Processing
AND ITS SIGNIFICANCE

The applications detailed on the next few pages would not be practical if it weren't for Distributed Data Processing, the new technology developed by VIATRON.

Present-day data management systems are oriented to the giant central processing unit in the computer room. This orientation has precluded using computer logic for everyday data communications, management and processing.

The new technology has created data stations and computers that everyone can use. That can be placed in any environment. And, that you can afford to put on every desk where data originates or is used. With this new technology you can build systems that parallel — rather than divert — the channels through which information must flow to make decisions and keep records.

These new systems are something that people can touch, see and work with to handle the problems that are on their desks.

Distributed Data Processing

Distributed Data Processing, as the name implies, distributes computer logic to those places where it is needed instead of trying to funnel everything through a remote computer room.

Data is processed as it is gathered through the use of logically programmed System 21 terminals. Inexpensive System 21 computers add the middle management dimension to the system, freeing the central processing unit for the big jobs it was designed to do.

The hierarchial approach of Distributed Data Processing is completely flexible. Like a human organization it can be built a part at a time — organized to reflect the characteristics of a particular business.

You can start today.

Your VIATRON dealer can show you how you can build the Systems of the 70's today. He has a staff of highly-trained and experienced systems analysts who can show you how System 21 can not only cut your data processing costs but produce an immediate, measurable return on investment.

So why wait until tomorrow? Look at the specific applications suggested here, study the detailed descriptions of the components and configurations made possible by the new technology and then give your dealer a call.

MANUFACTURING

RECEIVING
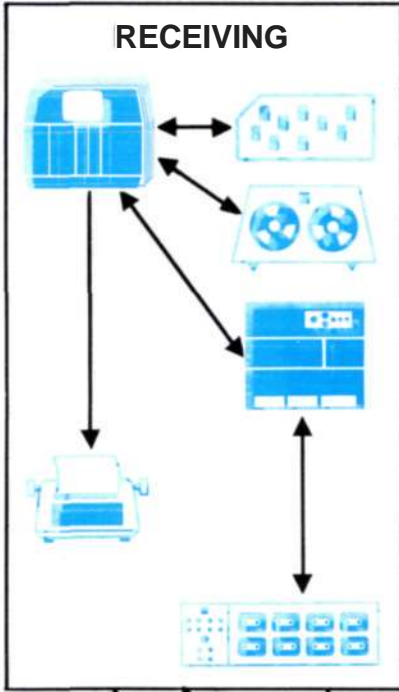
INCOMING INSPECTION
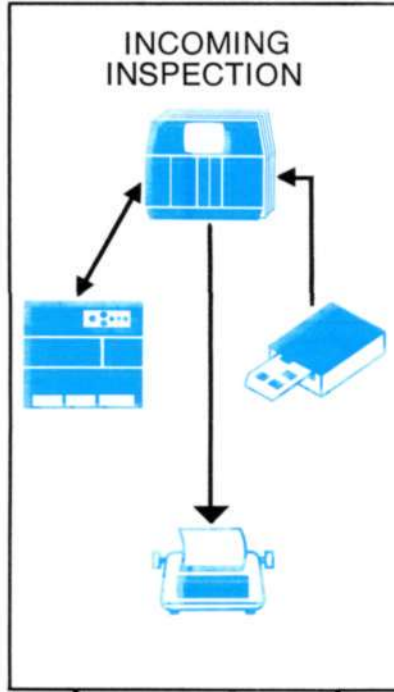
STOCKROOM
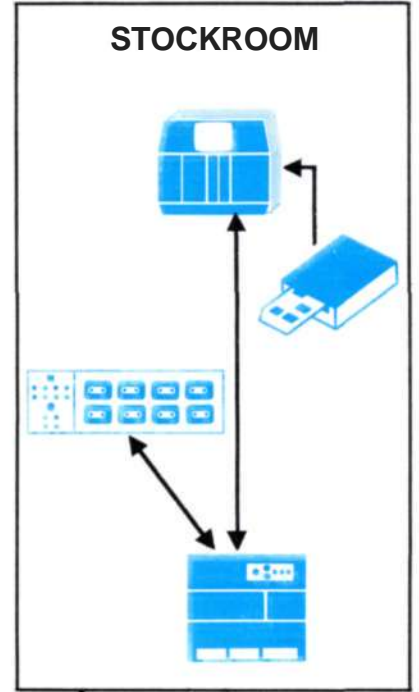
PURCHASING
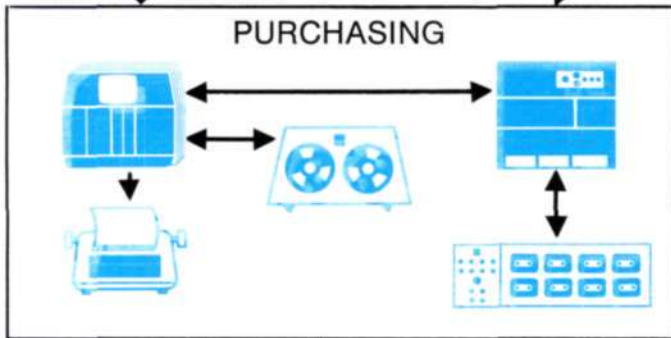
FACTORY DATA COLLECTION
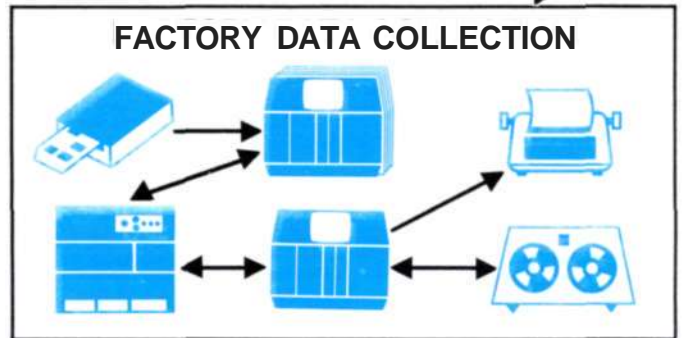
ENGINEERING

COMPUTATION

DRAWING FILES

Cards or Keypunch

System 21 in the 70's

SALES OFFICE

SYSTEMS AND PROGRAMMING

MANAGEMENT INQUIRY

SELECTOR CHANNEL

DATA PROCESSING

CENTRAL COMPUTER

TELE-PROCESSING

FINANCE

ACCOUNTING

PAYROLL

WAREHOUSE
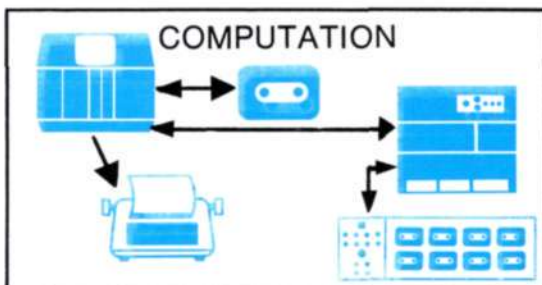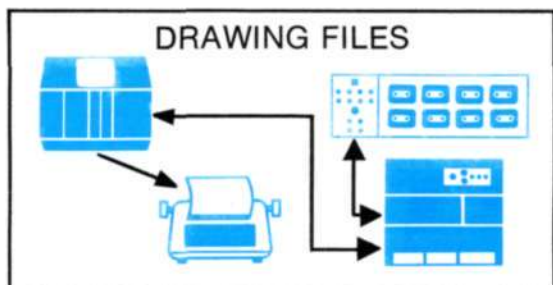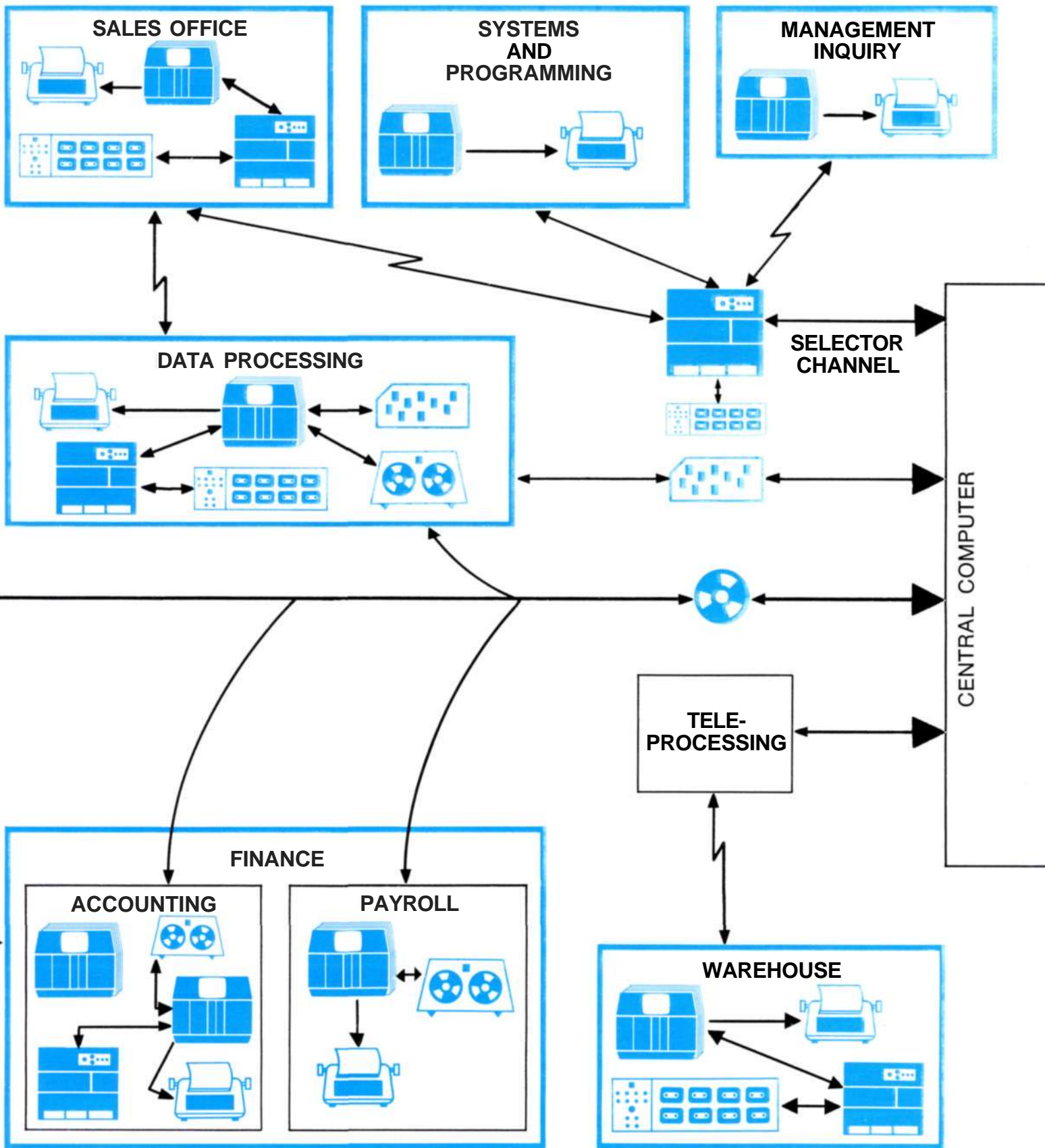
Terminal	Printing Robot	Unit card reader	VIATAPE	Computer-compatible tape recorder	General-purpose Computer	VIATAPE bank
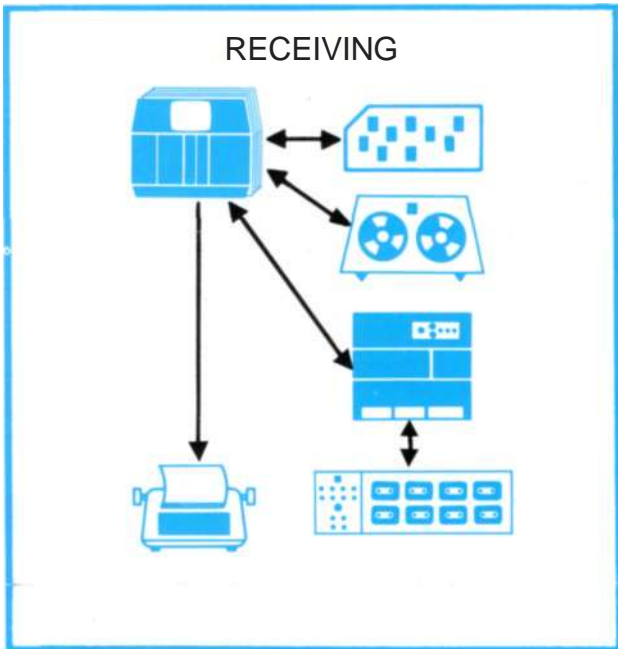
RECEIVING

The receiving system of the 70's

The man on the receiving dock is faced with feast or famine. Either there are no trucks coming in or all the docks are filled and other trucks are waiting their turn.

Today's receiving problems

In periods of feast, receiving dock personnel are a harried lot. They must match the truckers' shipping papers to copies of purchase orders sent to them by the purchasing department.

One truck may contain material that is covered by many purchase orders.

Part numbers on the purchase order must be checked against the received material. The quantity ordered must be checked against the quantity stated on the shipping papers which in turn must be checked against the actual quantity received.

Getting the job done

Even if everything is in order, the job isn't done. Paper work has to be generated to notify purchasing and accounts payable. Partial shipments require additional paper work. Finally a travel card must be prepared before the material can be moved. All this time things are beginning to back up. And, if receiving personnel try to work faster, errors increase.

There are several possible solutions. Add more receiving docks and more people. Attempt to schedule the arrival of vendor trucks. Or, reduce the amount of work required to receive material.

The benefits to you

System 21 reduces work load and errors by automatically matching shipping papers and purchase orders, by generating travel cards, and by automatically producing the data required for accounts payable and purchasing.

The incoming inspection system of the 70's

Incoming Inspection has the responsibility for testing material received from vendors to make sure that it meets the specifications required by manufacturing. Each of the thousands of different parts received has its own test procedures. Finding the correct test procedure, per-

forming the necessary mathematical calculations, and determining what to do next requires most of the inspector's time. This limits the amount of material he can inspect and therefore raises the cost of inspection.

Cutting control costs

The 2150 Incoming Inspection System performs those routine tasks for the inspector.

All procedures are recorded on VIATAPE. The proper one is selected by the computer upon entry of part number from the travel card.

INCOMING INSPECTION
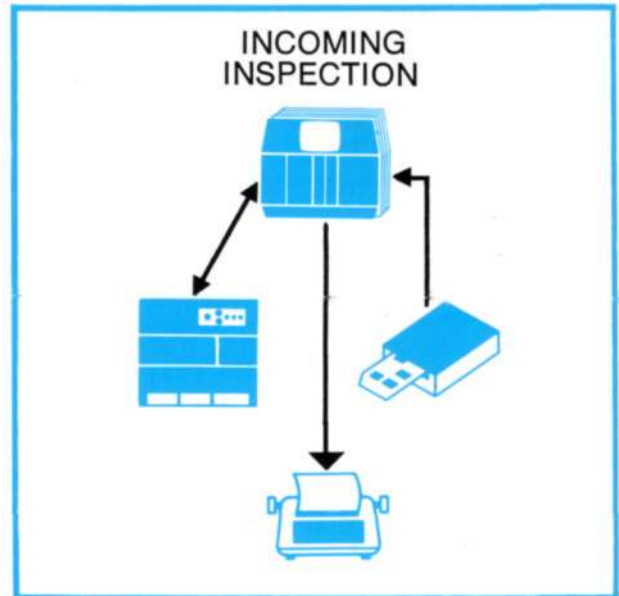
Sampling methods

In tests using statistical sampling procedures, the inspector enters the part number and the quantity received. The 2150 specifies test lot size, tells the inspector how to select samples, and leads him through the test.

If a part fails, the computer notifies the inspector and prints out a rejection notice for the purchasing department on the printing robot.

If calculations are required, test data is entered through the keyboard by the inspector. Results are displayed on the terminal.

Printed results

As the computer is leading the inspector through the procedure, it is also generating a VIATAPE recording of each test. Test history reports are generated by the computer and printed for quality assurance engineers.

Failure rates by part number and vendor, shortcomings of the testing procedures, and adherence of the inspector to the procedures are easy to check.

New test procedures can be installed instantly by distributing new VIATAPES to replace the out-dated procedures.

The stockroom system of the 70's

Stockrooms simply cannot justify the use of expensive data processing systems to keep track of inventories. What's needed is a low-cost, easy-to-operate system that involves a minimum amount of work.

Verified transaction records

VIATRON provides a system that allows simple transaction entry with verification, immediate updating of balances, inquiry processing and automatic reordering.

Incoming stock is posted by reading the punched travel card that accompanies it. The stock clerk then adds the transaction code and storage location. The travel card is
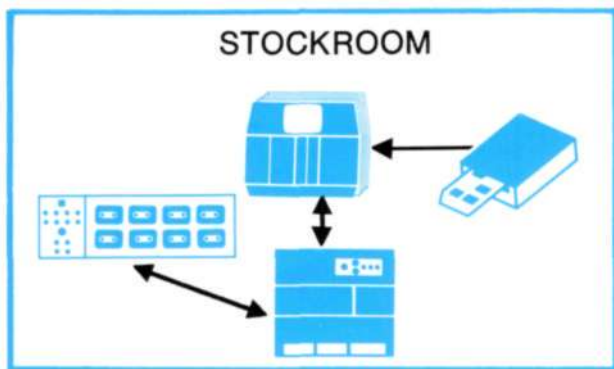
STOCKROOM

saved for use in subsequent transactions, such as file inquiry and inventory withdrawals.

The job to be done

The 2150 is dedicated to performing four stockroom functions:

1. File update: receipts and withdrawals.
2. File inquiry.
3. Reordering.
4. Inventory reporting.

Work load reduction

Stockroom paper work is eliminated. Real time operations are made possible without adding a teleprocessing front end to the central computer. At the same time, the load on the central computer is reduced since it is no longer used to handle day-to-day stockroom inventory problems.
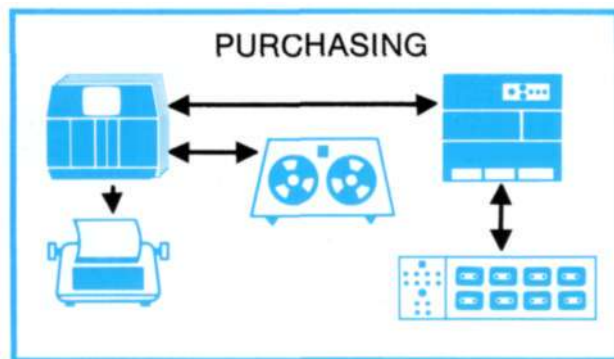
PURCHASING

The purchasing system of the 70's

System 21 allows purchasing agents to remain in complete control of all data for which they are responsible—control which extends from the keying of input to the automatic preparation of purchase orders and transaction tapes to be used by other departments.

Control of paper

All decision-making is left to the purchasing agent. System 21 is simply a tool which helps control the massive flow of paper work associated with the purchasing operation. It files and reports data, and it frees the purchasing agent to do the job he was hired for—make decisions which save you money.

Operations sequence

The operation begins with the receipt of material requests. Departments, like manufacturing, having a large number of requests may submit them on VIATAPES prepared on their own System 21 units. Other requests may be submitted on paper forms.

In the purchasing department a System 21 robot lists all material requests received on VIATAPE producing multiple copies for distribution to all purchasing agents.

Each agent takes the list and selects the items for which he is responsible. To those items he adds the vendor code, shipping instructions, payment terms, billing instructions, requisition number and other needed information.

Purchase order presentation

The list is then given to a System 21 operator who prepares the purchase order. She enters the vendor code and the additional information required. Fixed vendor data is extracted from the vendor file stored on VIATAPE. The 2150 computer inserts the appropriate control characters to format the printout. Upon command from the operator the entire purchase order is printed.

FACTORY DATA COLLECTION

The factory data collection system of the 70's

The key to production control is knowing what's happening on the floor. What jobs have been completed. What jobs are being worked on. What jobs are on schedule. What jobs are behind.

Until now, scheduling of production has been hampered by the lack of timely input.

Data collection at its source

Most of the data collection and feedback equipment that has been tested on a factory floor to date has been unsuccessful for several reasons. It has been difficult to use, too expensive, too delicate for the factory environment. System 21 offers an excellent solution for factory data collection. It overcomes all the problems listed above—it is easy to use, it is very inexpensive, and it is designed to operate in a factory environment.

The unit card reader enables production workers to pick up job numbers, part numbers and other data from the **travel card that** accompanies jobs through the production cycle.

The information you need

Upon completion of a particular job, the travel card is read into the System 21 terminal and displayed on the video. Variable information, such as employee number, quantity produced, and quantity scrapped, is entered through the keyboard. After visual verification, the data is transmitted to a 2150 computer.

System flexibility

An advantage of the VIATRON System 21 is that it allows each terminal to operate independently. In the event of a system failure, each terminal can be placed in a standby mode—there's no need for a backup system.

The foreman or operator would follow the usual procedure, but instead of sending data to the computer, he would record it on VIATAPE. When the system is restored, the data stored on VIATAPE is batch transferred to the 2150. The computer then edits all the transactions on a batch basis and responds to the transmitting terminal, telling the operator which entries must be corrected.

Keeping on schedule

The VIATAPE recorder that's part of the terminal also serves to record both the data on the travel card and the data entered on each job so the foreman has a complete transaction record at the end of the day. This enables him to check the completed jobs against schedules issued to him by production control.
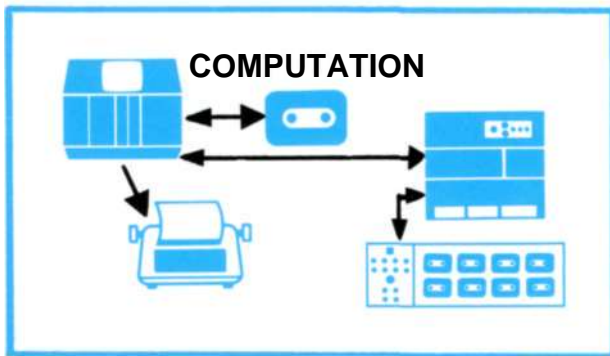
COMPUTATION

The engineering computation system of the 70's

The engineer is faced with a constant need for computation. Slide rules are inaccurate and slow, centralized computers are inaccessible, time sharing is too expensive.

A personalized computer

The answer is his own computer that is fast, accurate, and less costly than time-sharing. The answer is a System 21 computer.

It has a powerful instruction set. Triple word precision arithmetic—up to 48 bits long. Inexpensive mass storage. Input/output 10 times the speed of paper tape, and the ability to support multiple System 21 terminals located throughout the engineering department. With video displays, hard copy, and tape storage capabilities.

Program preparation

The engineer prepares his source program at a System 21 terminal operating in an off-line mode and records it on VIATAPE. When the program is complete, the engineer inputs his program to the 2150 computer where it is compiled and assembled to produce an object program VIATAPE.

Data output

To execute a program, the object VIATAPE is loaded into core and the engineer uses his terminal in an interactive mode to input data and receive output on his display or on VIATAPE.

If hard copy is desired, a System 21 printing robot can be interfaced with the terminal to produce completely formatted reports and graphs.

DRAWING FILES

The drafting records control system of the 70's

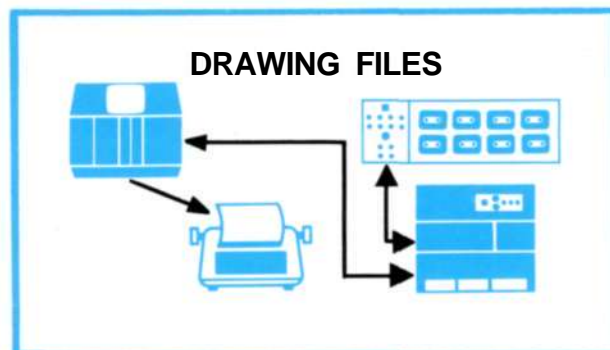It's a fact that duplicate drawings are constantly being created in the drafting departments of most businesses. Why? Because it's easier, and faster, to create a new drawing than to find an old one. Cross index filing systems are almost impossible to maintain manually. Consequently,

drawings are usually filed by drawing number or date sequence that has no relationship to the part. This filing system results in duplicate drawings and the assignment of new part numbers to items that are already used in the business. So, the drawing file grows and costs mount—for filing space, for drafting labor, and for duplicate inventories resulting from the same part being assigned multiple part numbers.

Save by cutting out duplication

System 21 solves these problems and lowers costs with a 2150 computer and System 21 terminals. Drawing numbers and commodity codes are recorded and cross-indexed on VIATAPES.

To review drawings of stainless steel bolts, for example, the draftsman or designer keys in the appropriate commodity code and the computer retrieves drawing numbers **and** descriptions for all existing bolt drawings. The draftsman then pulls the selected drawings to see if one is appropriate.

All-around filing system

System 21 is also used to store where-used files so that an engineer can quickly measure the impact of proposed design changes.

Keeping track of engineering change notices is also simplified with System 21. A periodic listing of impending engineering changes sorted by their effective dates is an automatic by-product of the system.
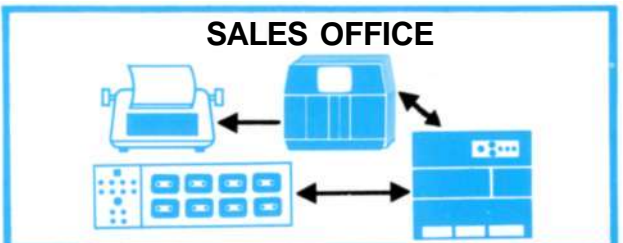
SALES OFFICE

The sales Inquiry and order system of the 70's

Sales orders and inquiries originate in the field—not in the home office. But information must get back to the home office, accurately and quickly. Therefore, the sales inquiry and order system must be data entry and communication oriented.

Speeding up the data (low

System 21 provides both capabilities at affordable **prices.** A VIATRON 2150 computer with a bank of VIATAPES and with System 21 terminals is a powerful order entry and communication system. The VIATAPES contain customer names, shipping addresses, billing addresses and other fixed data.

Handling purchase orders

As purchase orders are received, a clerk at one of the terminals keys the customer identification and the variable data from the order. The 2150 automatically searches the VIATAPES to obtain fixed customer and product data and then generates on the printing robot a written confirmation statement for the customer. A transaction record for each order is stored on VIATAPE.

Ease of communications

At the end of the day, the order records are batch transmitted to the home office over standard telephone lines. The orders are received by the home office computer or by a System 21 terminal with a zero-defect computer-compatible tape recorder.

Inquiry response

Customer inquiries would be handled by System 21 terminals equipped with communication adapters. When an inquiry is received, the salesman or sales clerk dials the home office computer and enters the appropriate inquiry. The response is immediately displayed on his terminal.
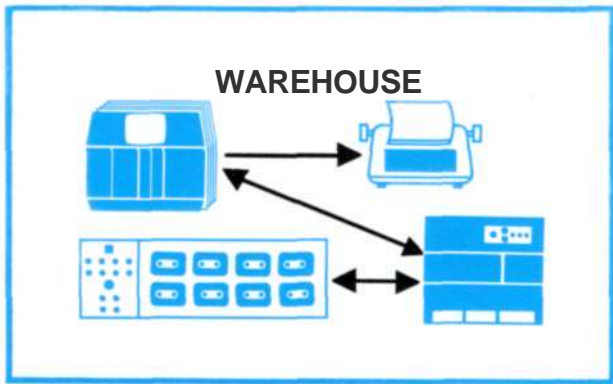
WAREHOUSE

The warehouse inventory system of the 70's

The critical data management problem in a warehouse is keeping the information system current with the physical system. All records and files should reflect actual inventory.

Keeping up with inventory turnover

When the information system falls behind the physical system, additional inventories must be carried in order to avoid out-of-stock conditions.

Easy-to-use System 21 terminals allow warehousemen and stock clerks to record transactions when and where they happen.

Input flexibility

Transaction records stored on VIATAPE are collected periodically from each terminal and converted to either punched cards or computer-compatible tape for processing by the central computer. If the warehouse is located on the same premises as the computer center, the magnetic tape or cards can simply be hand carried to the computer. If the warehouse is in a remote location, a System 21 terminal is equipped with communication capabilities so that it can transmit the day's transactions back to the computer center using standard telephone lines.

MANAGEMENT INQUIRY

Corporate management system of the 70's

There's a lot of information about sales, production, project status, budget performance, and financial statements in the corporate data base—information that is needed by top management to make daily business decisions.

System 21—the same system that helped create the data base, and keeps it up-to-date—gives managers immediate access to all information. The same information that first-line management is using—not watered-down or disguised summary reports prepared when it's too late to take effective action.
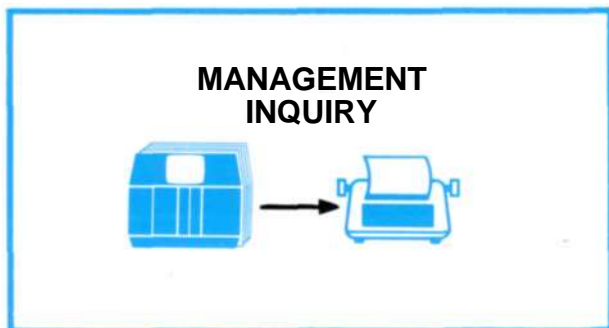
Getting data where it's needed

System 21 terminals can be placed on the desk of every manager giving them a direct line to the corporate data base. Better yet, the terminal may be placed on the secretary's desk and a remote display placed on the manager's desk. Now she initiates computer inquiries just as she would a phone call, and the responses appear on the manager's display in color. If hard copy is needed, it can be produced automatically on the secretary's typewriter.

System 21 helps take the guesswork out of decision-making. It's the modern management tool—the standard of the 70's.
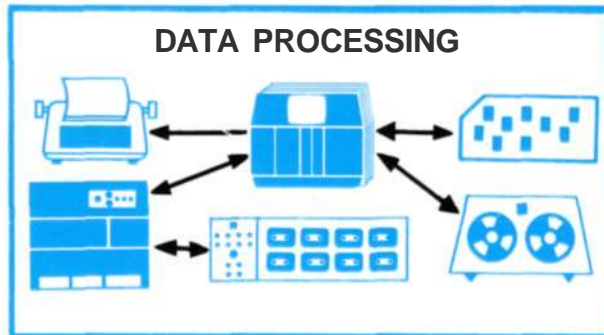
DATA PROCESSING

Data processing in the 70's

THE OPERATIONS LIBRARY

The security and integrity of data stored on tape and disk volumes is of vital concern to the management of corporations using data processing equipment. The task of cataloging and controlling the distribution of such volumes is monumental. It requires 100% accuracy. If the wrong tape or disk is used for a particular processing task, the consequences are catastrophic.

More for your money

A 2111 data management terminal with printing robot and unit card reader is a low-cost, highly effective tool for preventing such a catastrophe.

The unit card reader reads fixed data such as serial number and volume number from a library card. The keyboard lets the library clerk enter the borrower's name, due date and other variables.

Updating card files

The printing robot creates labels and volume assignment and inventory lists. The card reader/punch adapter is used to produce new library cards.

THE SYSTEM 21 ROOM

In the modern counterpart of the tab room, System 21 saves you money, time and noise in your key entry and media conversion operations.

Faster data throughput

The 2111 terminal performs all the functions of the keypunch and key verifier, offering you more throughput, visual verification, key verification and error-free recording on VIATAPE. With System 21 you can produce error-free computer-compatible tapes and punched cards automatically.

Support for the central system

In addition, System 21 performs the functions needed to support a total data processing system. The 2150 computer with a bank of VIATAPES is used to duplicate format and program tapes needed throughout the corporation. A 2111 is used to pool VIATAPES from remote terminals on to error-free, computer-compatible tape. The printing robot is used to generate reports from VIATAPES prepared at remote locations. The 2111 and the unit card reader are used to convert readable documents to VIATAPE, cards, or computer-compatible tape.

Financial systems of the 70's
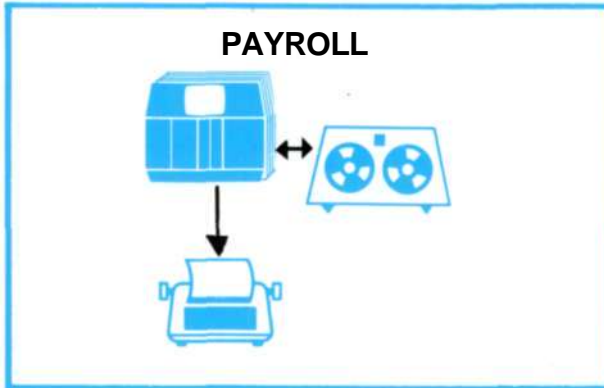
PAYROLL

PAYROLL

When you think of payroll, you think of your weekly check. But issuing checks is a routine job for today's computers. The problem facing the payroll department is how to keep the information in the computer up to date so that checks are issued correctly.

The old way

In the 60's this meant filling out form sheets for changes in employee records such as address, pay rates, number of dependents, and department. The form sheets were then sent to the keypunch center for punching and key verification, then to the tab room for sorting. Unfortunately, this multiple handling of the data caused errors and delays in updating the computer files. Result—inaccurate checks.

A system for today

But, now it's the 70's and System 21 has changed all that. No more form sheets, no more keypunch, nor key verification, no more tab room—no more delays.

Using System 21 data management stations in the payroll department, changes are entered and visually verified by a payroll clerk who understands the information — not by a keypunch operator who doesn't. Data is then recorded on computer-compatible tape ready for processing by the computer.
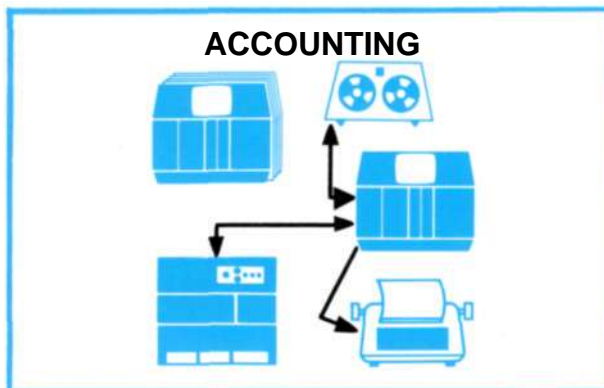
ACCOUNTING

ACCOUNTING

Each accounting entry must be prepared by an accountant, coded by a clerk, keypunched, key verified, sorted, and finally sent to the computer.

No duplication of input

System 21 eliminates this multiple preparation cycle and its inherent delays by permitting the clerk who understands the data to record it directly on error-free VIATAPE. Transactions are entered through the System 21 keyboard using the fill-in-the-blanks technique which displays all format words and keyed data on the System 21 screen. After visually verifying her entry, the clerk records the transaction record on VIATAPE.

The VIATAPES are then automatically converted to punched cards or computer-compatible tape for processing by the computer.

On-line calculations

System 21 computers provide computational capability for the many calculations required in accounting. For example: the 2150 computer can calculate return on investment, perform cash flow analyses, compute depreciation schedules, or determine interest payments. Results of these and other calculations are displayed on the System 21 terminal and printed by the printing robot when hard copy is desired.

SYSTEMS AND PROGRAMMING
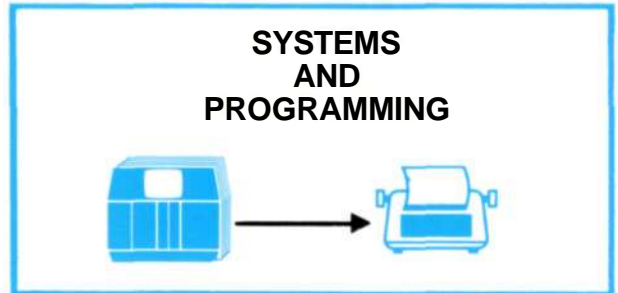
Programming in the 70s

Getting computer time is the programmer's biggest problem. System 21 terminals bring the computer room to the programmer's desk by giving him direct access to a large computer through the 2150s selector channel interface.

Program preparation and editing is done without tying up the central computer. When the programmer is satisfied with his source program, he initiates remote job entry through the 2150 to the central computer where an on-line debugging system permits compilation and testing of the program.

He obtains current listings using his System 21 printing robot. His programs can be stored on VIATAPE cartridges in his own desk drawer. There are no cards to carry around or drop. No source data to be clobbered by an operations error. And, no time lost waiting for keypunching and machine shots.

The applications for the system of the 70's are limited only by your imagination

Advertising Media Analysis
Traffic Control
Security Systems
Law Enforcement
Retail Sales Systems
Medical Records Systems
Personnel Records Systems
Teaching Aids
Cost Analysis
Estimating
Insurance Planning
Hospital Billing Systems
Income Tax Collection
Service Bureau Communications
Utility Billing Systems
Brokerage Record Maintenance
Ticket and Reservation Systems
Mail Order Processing
Dispatching
Mail Order List Maintenance
Subscription Processing
Educational Records
Voting List Maintenance

SYSTEM 21-The hardware of the 70's
The 2111
Microprocessor

The 2111 Microprocessor is an LSI/MOS component which provides the storage and control logic functions for the expanded System 21 data management station—a desk-top station capable of performing the many routine batch processing tasks which currently overburden your central computer.

The 1024 12-bit word Read-Only Memory houses hard-wired microprograms equivalent to a general-purpose computer's software. The microprograms initiate automatic input and output operations and interpret data entry, reformatting, editing, error correction, visual and key verification, tape searching, and peripheral control programs.

The 2111 also provides a 400-character dynamic storage which is divided into five directly accessible areas.

The Read Record holds previously processed data output from the microprocessor.

The Write Record is used for data entry and processing. As data is output to a tape or data channel, the contents of the Write Record are transferred to the Read Record.

The Master Record displays fixed information and format words which assist the operator in data entry and processing.

Control Records 1 and 2 contain program control functional specifications referenced by the microprocessor.

FUNCTIONAL CAPABILITIES

Microprocessor functions can be controlled either manually through the keyboard and control panel or automatically by the microprocessor control record. The control characters recognized by the microprocessor are listed below:

U — the keyboard is set in the upper shift position
L — the keyboard is set in the lower shift position
D — the field from the Read Record is duplicated into the selected record
M — the field from the Master Record is duplicated into the selected record
S — the cursor is skipped to the beginning of the next field
Z — the numeric field thus identified is right-justified through the insertion of leading zeroes
I — the next record is input immediately without output of the record currently being processed
O — the record currently being processed is output immediately
R — the output sequence specified by the OUTPUT OPTIONS rotary is initiated immediately. If options are OFF, the microprocessor is halted.
C — selected fields are compared in accordance with program functions currently being executed
NUMERICS—reformatting functions are initiated in response to numeric specifications

HIGHLIGHTS

Automatic input/output under program control — provides true batch processing for: record updating, key verification, and tape search. After a record is input from the selected tape or data channel, the cursor is returned to position one. If Program Control is "ON", automatic interpretation of the control program begins; otherwise, the cursor remains in position one—awaiting operating action. As soon as the record is completely processed, it is output to the selected tape or data channel.

Reformatting within record and field — records are reformatted on a character-by-character basis. Fields and data within fields can be rearranged and eliminated as desired. A single character can be copied into as many positions as desired thus providing the ability to duplicate fields. This is especially useful when source data is presented in an order quite different from that expected by a receiving computer or when there is little room for blanks between fields — thus making visual verification almost impossible. Computer output can be reformatted for terminal operations. Data recorded on VIATAPE or computer-compatible tape can be rearranged for listing by the printing robot.

Tape search — makes it possible to retrieve a specific record or series of records. A search argument is entered into the Master Record in those positions where it is expected to appear in the records on the file being searched. File records are read into the Write Record and the microprocessor initiates a compare operation.

When a match is encountered, the record can be processed and output to a selected tape or data channel. Alternately, unmatched items may also be sent to a selected channel. Search operations can be performed on multiple fields or on the entire record.

Character deletion and insertion — the DELETE and INSERT keys provide powerful error correction capabilities. Extraneous characters can be deleted and missing characters inserted. Resultant contraction and expansion of fields can be performed under program control. Shifting of characters occurs to the right of the cursor except in left-zero fields, where it occurs to the left.

Key verification — insures the accuracy of previously keyed data. After a record is read into the Master Record, the operator re-keys the original data into the Write Record. The microprocessor compares each character as it is entered and locks the keyboard if there is a discrepancy. The operator can then correct the data in either record. The operator cannot proceed beyond the point of error until a correction resulting in an equal compare is made.

Tape validation — in all operations involving VIATAPE or computer-compatible tape, the validation feature can be used to guarantee error-free data transfer to and from tape. When the VALIDATE switch is "ON", the microprocessor checks the validity of each read and write operation. If a data error is detected during input, the microprocessor will re-read the record. If the error is detected again, the CHANNEL ERROR and OPERATOR ERROR indicators will light and the read operation will be halted.

During output, after a record has been written, the tape will be backspaced and the record will be read back into the microprocessor, where it will be compared to the original record which still resides there (read-after-write check). If an error is detected, the record will be rewritten and rechecked. After three attempts have been made to validate a record, the failing area of the tape is spaced over, and the record is written in the next good area.

OPTIONAL CAPABILITIES

Automatic input options — permit the operator to select one of the following input sequences:
1. load new format with its associated program record from tape channel 1
2. load new format with two associated program records from tape channel 1
3. batch-transfer of records from a selected input channel to a selected output channel (required for unattended batch communication)
4. load Master Record from the selected input channel (required for batch reformatting)

Automatic output options—permit the operator to select a combination of tape and/or data channels for automatic output:
1. to data channel 1, and tape channel 2
2. to data channel 1, and data channel 2
3. to data channel 1, data channel 2, and tape channel 2

Field and character selection — provides two additional cursor movement keys: POSITION SELECT, and FIELD SELECT. The POSITION SELECT key provides immediate access to any position in the record. The FIELD SELECT key provides immediate access to the first nine fields specified in the active control record.

Short record feature — allows the user to input or output a record that is less than 80 characters to any device attached to a data channel. Used in a communication environment, the short record adapter provides minimum transmission time. The microprocessor that is equipped with the short record feature will employ a line feed or carriage return symbol (specified by user) to signify end of record. In an input transmission when the microprocessor detects the line feed or carriage return symbol, it automatically fills the remaining positions of that record with blanks. In an output transmission, when the microprocessor detects a line feed or carriage return, the trailing blanks are stripped from the record.

VIATAPE Bank and Controller

The VIATAPE Bank and Controller provide the 2140 and 2150 computers with over one million bytes of on-line storage. The storage medium is the VIATAPE cartridge. VIATAPE cartridge recorders are mounted in banks of eight; each controller is capable of supporting up to four such banks. The controller and its associated banks are interfaced to the computer through the 2140/2150 wideband channel. The computer can address each recorder independently and directly and can initiate both read and
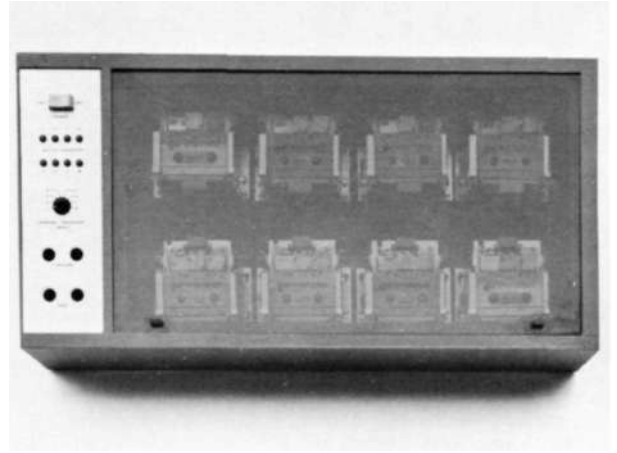
write operations. The VIATAPE bank control panel indicates which VIATAPE cartridge is being referenced by the current operation. Tape and operational characteristics are identical to those of the VIATAPE cartridge recorder.

Computer-Compatible Tape Recorder

Computer tapes are designed to work in environments where temperature, humidity and dust levels are carefully controlled. However, computer tape is being used on non-computer devices such as key-to-tape machines. When these devices are moved out from the computer room the results are not really surprising. Computer tape does not function reliably outside antiseptic environments.

VIATRON's zero-defect, computer-compatible tape system, is designed to operate outside the computer room—in the factory, the warehouse, the boiler room—with the same reliability that you expect and receive from your computer's tape drives.

How did VIATRON do it? Simple. The tape hardware records each individual character five times. The probability that at least three of the characters are correct is very high. Application of a simple majority logic test ensures the accuracy of the data read from the tape. This error detection and correction technique reduces errors caused by dirt, temperature and humidity to one in ten million. On tapes using single character recording techniques, there is nothing to check the character against. You never know if the character is recorded correctly or not.

Technical specifications

The System 21 computer-compatible tape recorder uses the ASCII code to comply with U. S. Government specifications on information interchange. Three models are available: 9-track, 800 bpi; 7-track, 556 bpi; and 7-track, 800 bpi.

Input/output and code conversion processing are provided through free software packages which perform the data checking that ensures zero-defect computer input. Packages currently available are written in COBOL, FORTRAN IV, and BAL. Pooling, blocking and editing capabilities are available with the FORTRAN and COBOL versions which are used as stand-alone programs. The BAL version, which also performs blocking, is available both as a stand-alone program and as a callable sub-routine.

Card Reader/ Punch Adapter

The Model 6001 Card Reader/Punch Adapter provides the System 21 microprocessor with a cable interface to the IBM 029 Keypunch. The adapter operates in three modes. In the READ mode, cards are read into the microprocessor from the 029. Conversely, in the PUNCH mode, data from the microprocessor is sent to the 029 for the punching of cards. In the DISENGAGE mode, the 029 can be operated as a keypunch independently of the microprocessor. The adapter is normally used for batch conversion of VIATAPE to punched cards, or vice versa.

The punch time for an 80-character record is 4.5 seconds.

A record transfer buffer (Feature 601) permits input operations to be performed on the microprocessor during the punch cycle.

If the microprocessor sends a character code other than one of the 64 valid Hollerith codes, a question mark (?) will be punched by the 029. Space insertion (Feature 603) replaces all such question marks with space characters.

Printing Robot

The Model 6002 Printing Robot is a solenoid-operated device which rests on the keyboard of the IBM Selectric® typewriter (13 or 15 inch carriage). The Selectric® is driven at the rate of 12 characters per second. The printing robot may be removed at any time to permit normal typing operations.

The robot may operate in one of three modes: List, Execute A, or Execute B. In List Mode, records are printed one per line followed by an automatic carriage return. Spaces may be automatically inserted in the line, when needed, through use of a tab matrix on the microprocessor control panel. In Execute A mode the robot recognizes the following control characters: backspace, tab, index, and carriage return. The print line can extend to the maximum width of the carriage. The 64 printable characters include upper case alphabetics, numerics, and special characters. Execute B mode operates identically to the A mode and also permits printing of lower case alphabetic characters.

The record transfer buffer (Feature 601) provides the microprocessor with the ability to support simultaneous robot and input operations. This permits the printing of a record while the next record is being entered from the keyboard, from tape, or from another data channel peripheral.

Batch printing of a VIATAPE cartridge or computer-compatible tape is possible through use of the automatic input and automatic output options.

Communication Adapter

The Communication Adapter is used in conjunction with a System 21 terminal to allow for transmission of data over standard, voice-grade telephone lines. The adapter provides a standard EIA RS-232-C interface to a Bell System Dataset®, or its equivalent, for performing half-duplex, asynchronous data communication operations. The adapter uses an 8-level, 11-unit ASCII transmission code for compatability with virtually all types of communications equipment.

Even parity is transmitted in the eighth bit position of each character. Parity errors occurring in the transmission are detected by the receiving microprocessor and a question mark is displayed in place of the erroneous character. The question mark remains a part of the record until corrected.

The following table lists speed characteristics and associated modems for each model.

Adapter Model	Speed (Baud Rate)	Associated Modem
6003	110 or 247.	VIATRON 605, Bell 103A2, or equivalent, or acoustic coupler (Feature 606).
6004	600 or 1200	VIATRON 607, Bell 202C or 202D or equivalent.
6005	Any speed up to 1200	To 300 baud, VIATRON 605, Bell 103A2, or equivalent. From 300 to 1200 baud, VIATRON 607, Bell 202C or 202D or equivalent.

The adapter control panel provides for selection of transmission speed and mode (attended or unattended).

Unit Card Reader

The Model 6008 Unit Card Reader provides the System 21 terminal with the ability to read 80-column punched cards, fed manually, one card at a time. The unit card reader reads Hollerith characters, translates them to ASCII through a data channel, and transmits them to the microprocessor. It is designed for those applications where some or all of the data for a transaction has been previously punched in card form.

General-Purpose Computers
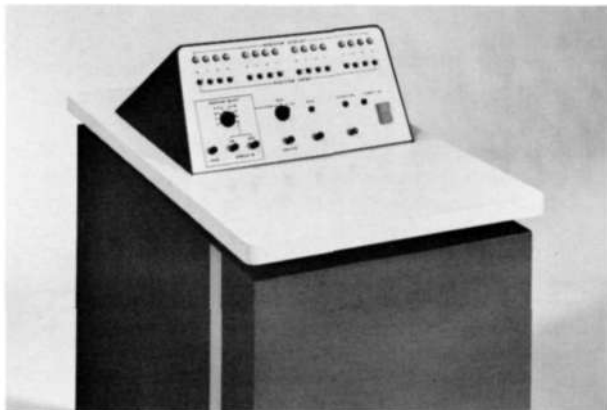
MODEL 2140

The VIATRON Model 2140 is an LSI/MOS Central Processing Unit with a 4096 16-bit word core memory. It offers extensive computational and data manipulation capabilities through 85 powerful instructions.

Arithmetic operations may be single, double or even triple precision using general purpose registers (accumulators) which are available to the programmer. Computational routines may therefore be easily programmed for the simplest or the most complex business or scientific calculations. Load, Store, Move and Test instructions may also be performed in all three registers and may be byte or word oriented.

Software available with the 2140 will be upwards compatible with future VIATRON computers. The software includes a Basic FORTRAN compiler, an assembler, a math subroutine library and utility programs for manipulating data from System 21 Data Management Terminals. In addition, a language for communicating with multiple data management terminals is available in DDL-1 (Distributed Data Language). This gives the user a powerful systems capability by supplying software control of terminals.

The input/output capability is accomplished through an Automatic Polling Controller, which allows the attachment of up to 8 System 21 Data Management Terminals, and a wideband high speed data channel, which may be used for data communications and computer peripherals. System 21 terminals may, of course, be configured to support any of the terminal peripherals in the System 21 product line, adding extensive data input, data storage, data display, and data printout capabilities to the Model 2140 computer.

An operator's control panel, designed for simplicity of operation, is located at desk height on the Model 2140. It allows access to all machine registers for display or for direct storage from the panel.

MODEL 2150

The Model 2150 expands the capability of VIATRON's general-purpose computers to serve more terminals and a wider variety of applications.

More Memory 8192 16-bit words of core memory are standard on the Model 2150, twice the core capacity of the Model 2140. Larger, more complex programs and more on-line data storage are available to the programmer and to the user.

More System 21 Terminals Three Automatic Polling Controllers are standard on the Model 2150, permitting the attachment of up to 24 System 21 Data Management Terminals. With more memory and more terminals, the Model 2150 is ideal for use in large data input centers, in private wire communications networks for message switching, for data transmission to computer centers, and a host of other terminal-oriented application areas.

More Software A FORTRAN IV Compiler is standard on the Model 2150, bringing to the engineer, the scientist, and **the** mathematician a language which is both familiar and easy to use. For the engineer, or group of engineers, who has been concerned by the high cost and inflexibility of commercial time sharing services, or who has been unable to gain access to his centralized batch processing computer, the Model 2150 offers a cost saving, efficient alternative. Put the computer where the problems are for maximum accessibility and utility.

Specifications

- **Type of Circuitry for CPU:** LSI/MOS
- **Memory:** Magnetic Core
- **Memory Capacity:** 2140: 4096 words
  2150: 8192 words
- **Word Length:** 16 bits (Byte addressable)
- **Memory Cycle Time:** 2 microseconds
- **Index Registers:** 3
- **General-Purpose Registers:** 6
- **Register Length:** 16 bits
- **Interrupt Levels:** 2140: 2
  2150: 4
- **Input/Output:** Automatic Polling Controller
  2140: 8 channels for attaching
  System 21 Terminals
  2150: 24 channels for attaching
  System 21 Terminals
  High-Speed Data Channel
- **Data Format:** 8 bit byte — ASCII
  16 bit word
  Arithmetic: 8, 16, 32, or 48 bit numbers
  Positive Numbers: sign and magnitude
  Negative Numbers: 2's complement
- **Instruction Formats:**

Short(S)

0 5	6 7	8 15
6 Bits Op Code	2 Bits Index	8 Bits Relative Address

Extended(E)

0 5	6 7	8 15	16 31
6 Bits Op Code	2 Bits Index	8 Bits Op Code Modifier	16 Bits Address

- **Addressing Modes:**
  Short Format Instructions: 256 Locations relative **to** Program Counter, and Indexable
  Extended **Format** Instructions: Direct (Full Memory) Indirect, and Indexable

- **Instructions:**

Arithmetic:	12	Shift:	13
Logic:	9	Modify Memory:	1
Load:	13	I/O:	1
Store:	13	Operate:	12
Branch:	11		—
		Total	85

- **Software**

2140	2150
Assembler	Assembler
Distributed Data Language—1	Distributed Data Language—1
Basic FORTRAN	FORTRAN IV
Subroutine Library	Subroutine Library
Utility Library	Utility Library

- **Power Requirements:** 115 VAC, 60 cycle, 350 watts

price list

2101   **MICROPROCESSOR** $960
- 512-word, Read-Only Memory
- 400-character Read/Write Memory
- Two Tape Channels
- Automatic Skip
- Automatic Duplication
- Automatic Left Zero Fill
- Automatic Upper and Lower Shift Control
- Automatic Output to selected data or tape channel

   101   **AUTOMATIC MULTIPLE INPUT feature** $432
- One record from Selected Channel or medium
- One master and one control record from Tape Channel #1

   102   **AUTOMATIC MULTIPLE OUTPUT feature** $192
- To Data Channel 1 and Tape Channel 2
- To Data Channels 1 and 2
- To Data Channels 1 and 2, plus Tape Channel 2 feature

   103   **SHORT RECORD feature** $480
- Automatic input or output of a record less than 80 characters.
- A "carriage return" character is used to designate end of record.

   106   **SHORT RECORD feature** $480
- Automatic input or output of a record less than 80 characters.
- A "line feed" character is used to designate end of **record.**

2111   **MICROPROCESSOR** $1728
- 1024-word, Read-Only Memory
- 400-character Read/Write Memory
- Two Tape Channels
- Automatic Skip
- Automatic Duplication
- Automatic Left Zero Fill
- Automatic Upper and Lower Shift
- Automatic Output to selected data or tape channel
- Automatic Input from selected data or tape channel
- Automatic Tape Search
- Automatic Tape Validation
- Editing, Automatic Reformatting
- Key Verification

   102   **AUTOMATIC MULTIPLE OUTPUT feature** $192
- To Data Channel 1 and Tape Channel 2
- To Data Channels 1 and 2
- To Data Channels 1 and 2, plus Tape Channel 2

   103   **SHORT RECORD feature** $480
- Automatic input or output of a record less than 80 characters.
- A "carriage return" character is used to designate end of record.

   104   **AUTOMATIC MULTIPLE INPUT feature** $432
- One master and one control record from Tape Channel 1
- One master and two control records from Tape Channel 1
- Automatic Input from selected data or tape channel, followed by Automatic Output to selected data or tape channel.
- Automatic Input from selected data or tape channel to master record, followed by automatic selection of the record area indicated by the Status Record switch.

   105   **FIELD AND POSITION SELECT feature** $240
- Direct Access to selected field or character position

   106   **SHORT RECORD feature** $480
- Automatic input or output of a record less than 80 characters.
- A "line feed" character is used to designate end of record.

2140   **GENERAL PURPOSE COMPUTER** $4752
- CPU—4K words of core memory
- 16-bit words
- 8 Input/Output channels for local or remote attachment of System 21 Data Management Terminals
- Wideband Communications channel
- Software, Utility subroutines, Assembler, and MACRO languages

2150   **GENERAL PURPOSE COMPUTER** $9552
- CPU—8K words of core memory
- 16-bit words
- Hardware Multiply and Divide
- 24 Input/Output channels for local or remote attachment of System 21 Data Management Terminals
- Wideband Communications channel
- Software, Utility subroutines, FORTRAN compiler, Assembler, and MACRO languages

3001   **VIDEO DISPLAY SUBSYSTEM** $240
- Allows the attachment of several types of video displays to a microprocessor

   301   **BLACK & WHITE VIDEO DISPLAY** $384
- 320-character display, divided into four 80-character records
- Suppression or display of any or all records
- Cursor in operational record
- Interleaving capability of Write and Master records
  (No charge for first Black & White Video Display when Feature 304 is not ordered.)

   302   **RECORD SUPPRESS feature** $96
- Permanent suppression of any combination of 80-character records on local or remote displays

   303   **SELECTED DATA DISPLAY feature** $192
- Allows selective distribution of data to local or remote displays

   304   **COLOR VIDEO DISPLAY** $1248
- Requires Selected Data Display feature 303
- 320-character display, divided into four 80-character records
- Suppression or display of any or all records
- Cursor in operational record
- Interleaving capability of Write and Master Records
- Control characters for 8 Data and 8 Background Colors

   305   **BLACK & WHITE RF MODULATOR** $96
- Connection for up to 12 RF displays. Displays may be VIATRON Displays (Feature Code 306) or any commercial television display
- Up to two RF Modulators may be connected to Microprocessor

   306   **BLACK & WHITE RF VIDEO DISPLAY** $384

KEYBOARDS
(prices include Parallel Data Channel at $48)

4001   **KEYBOARD** $288
- Standard typewriter characters
- Standard card punch characters
- Microprocessor control characters
- Communications control characters

4002   **KEYBOARD** $624
- Standard typewriter characters
- Standard card punch characters
- Microprocessor control characters
- Communications control characters
- 40-character card reader

4099   **KEYBOARD** $192
- Microprocessor control characters

TAPE RECORDERS

5001   **VIATAPE CARTRIDGE RECORDER** $192
- Capstan-free tape recorder using magnetic tape cartridges
- 7-level ASCII code
- Bit read/write rate of 1250 bps

5002   **COMPUTER-COMPATIBLE TAPE RECORDER** $2880
- 9-track, 800 bpi
- 6-inch minireels of computer-compatible tape
- 2200 cps synchronous read/write rate

5003   **COMPUTER-COMPATIBLE TAPE RECORDER** $2880
- 7-track, 556 bpi
- 6-inch minireels of computer-compatible tape
- 2200 cps synchronous read/write rate

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   501   **800 BPI DENSITY feature**   N/C

   502   **SPACE INSERTION feature**   N/C
- In write mode invalid characters are replaced by space characters instead of a question mark character.

DATA CHANNEL ATTACHMENTS
(prices include Serial Data Channel at $48)

6001   **CARD READER/ PUNCH ADAPTER** $1776
- Transmit any of the card punch's standard 64 characters
- Punches an 80-character record in 4.5 seconds
- Card punch may be disengaged and operated independently

   601   **RECORD TRANSFER BUFFER** $864
- 80-character buffer permitting simultaneous microprocessor operation and card punch operation

   602   **BUFFER SHORT RECORD feature** $96
- For Buffered Units Only
- Fixed-length short record
- Program card is set up with **a** skip field. Card is released as soon as skip is detected

   603   **SPACE INSERTION feature •** $144
- In punch mode, adapter spaces over an illegal character instead of punching a question mark

6002   **PRINTING ROBOT** $1200
- For IBM Selectric, 13" Carriage
- Includes Format Control
- Printing speed of 12 cps
- Easily removed for normal typewriter operation
- Automatic backspace, tab, carriage return, and index by code detection in data stream
- Three print modes for straight line or formatted printing
- Upper and lower case

   601   **RECORD TRANSFER BUFFER** $864
- 80-character buffer permitting simultaneous microprocessor operation and printing robot operation

   608   **ADAPTER—15" SELECTRIC CARRIAGE**   N/C

6003   **COMMUNICATIONS ADAPTER** $528
- High/Low speed selection 110 and 247 BAUD
- 103A2-Compatible
- Asynchronous communication in half-duplex mode
- 7-level, ASCII code, record synchronization, optional parity check, 15-second time out

   604   **UNATTENDED OPERATION feature** $240

   605   **MODEM 110-247 BAUD** $480

   606   **ACOUSTIC COUPLER** $720
- Data transmission up to 300 bps
- Includes modem

6004   **COMMUNICATIONS ADAPTER** $528
- High/Low speed selection—600 and 1200 BAUD
- 202 C/D-Compatible
- Asynchronous communication in half-duplex mode
- 7-level, ASCII code, record synchronization, optional parity check, 15-second time out

   604   **UNATTENDED OPERATION feature** $240

   607   **MODEM 600-1200 BAUD** $960

6005   **COMMUNICATIONS ADAPTER** $1008
- Single special speed up to 1200 BAUD
- 103A2- or 202 C/D-Compatible
- Asynchronous communication in half-duplex mode
- 7-level ASCII code, record synchronization, optional parity check, 15-second time out

6006   **FOREIGN DEVICE ATTACHMENT** $864
- Allows the input and output of ASCII code foreign devices to the microprocessor
- Parallel transfers to and from foreign device

6007   **FOREIGN DEVICE ATTACHMENT** $1104
- Allows the input and output of Hollerith code foreign devices to and from the microprocessor
- Parallel transfers to and from foreign device

6008   **UNIT CARD READER** $1200
- Hollerith code

6009   **COMPUTER ADAPTER**
     Model 2140 & 2150 $576

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Call your VIATRON dealer for a free demonstration

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Birmingham. Ala. 35205
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Boston, Massachusetts
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209 W. Central St.
Natick. Mass. 01760
Tel: (617) 655-3576

Viatron Programming. Inc.
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Burlington, Mass. 01803
Tel: (617) 272-2345

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(April. 1970)

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Indian Harbor, Fla. 32935

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(April, 1970)

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Indiana Bank Bldg.. Suite 600
Fort Wayne. Indiana 46802
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Greenville, South Carolina
Computer Programming. Inc.
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Greenville. South Carolina 29602
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Hartlord, Connecticut
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Houston. Texas 77058
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Information Systems Design
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Phoenix. Ariz. 85013
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Management Compute) Services, Inc.
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Phoenix. Arizona 85013
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Rochester, New York
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Information Systems Design
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Syracuse, New York
Computers Unlimited
(April. 1970)

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