

System 21 is NOW!

The Concept

System 21 is unique. You saw the ads that introduced this low cost system to prepare, communicate, input, process, retrieve, output, display and print data. Anywhere. Anytime. A system that would greatly increase your data processing capabilities. A system that would put data processing within the reach of every business. A system that wasn't too expensive or too complex for people to use.

Mass production and delivery

System 21 components are now being mass produced. Initial deliveries to customers have begun. The schedule for city-by-city expansion of deliveries is printed below.

Pricing

You can rent or buy VIATRON System 21 data processing equipment for half, a third — a quarter of what you're presently paying for equipment with similar capabilities.

Marketing

To bring System 21 to businesses from coast-to-coast VIATRON is establishing a nationwide dealer organization that can provide on-the-spot local service and systems support to everyone who needs data processing capabilities.

Sale and rental options

Your local VIATRON dealer can arrange delivery on terms to suit your needs — you can purchase System 21 outright, buy it on time, rent it by the month or rent it and then buy it outright with a portion of your rentals credited against purchase price.

You can determine the sale price of any System 21 configuration simply by multiplying the monthly rental of the configuration by 48.

Your dealer can help you select the plan that best meets your needs — help you choose the service plan that you require to go with it.

Depot servicing

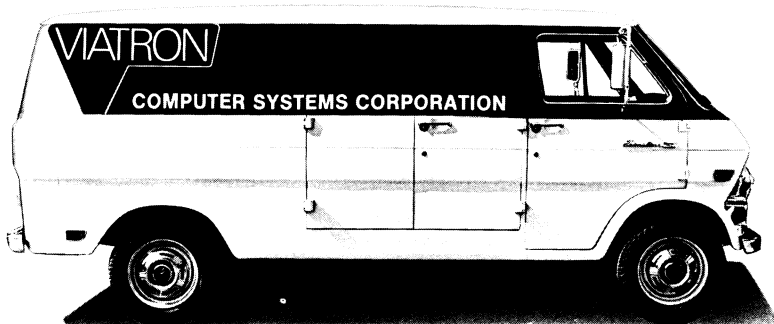
VIATRON uses the concept of replacement rather than repair service as the basis for normal maintenance. When we deliver equipment to you there will be a local service depot to provide the kind of service you need.

Emergency Service

In addition to normal maintenance available at the depot, VIATRON will provide immediate on-site repair or replacement under the VIATRON Emergency Service Plan. You don't have to pay for service you don't need. Emergency service will be available 24-hours a day.

Distribution

Initial System 21 deliveries are scheduled in the following cities where customer support and service facilities are being established.

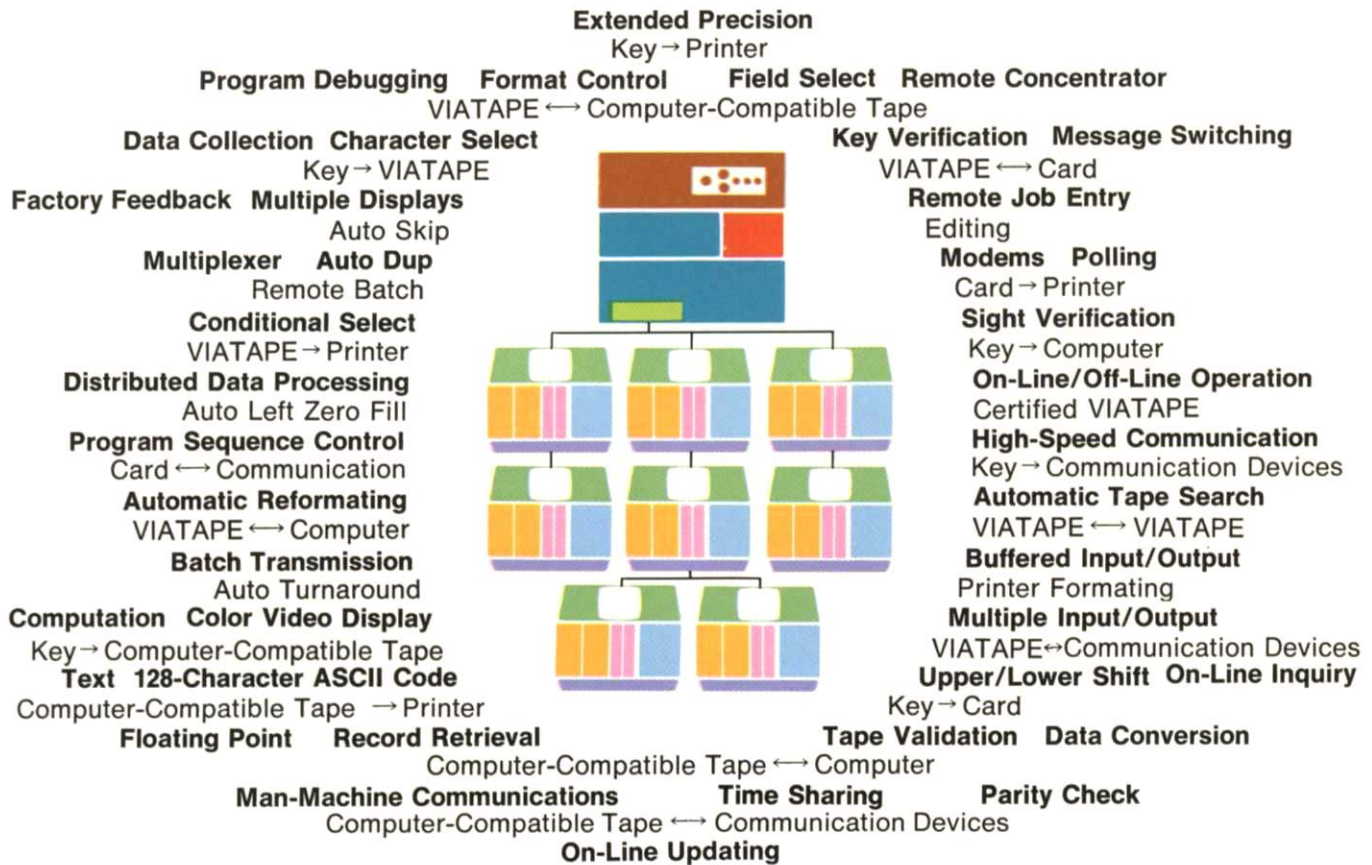


Wherever System 21 goes — immediate On-Site Service goes too.

DELIVERY SCHEDULE

CITY	DATE	CITY	DATE
Akron	December 1969	Houston	March 1970
Atlanta	February 1970	Kansas City	March 1970
Baltimore	January 1970	Los Angeles	December 1969
Boston	September 1969	Miami	February 1970
Buffalo	February 1970	Minneapolis	March 1970
Chicago	November 1969	New York	October 1969
Cincinnati	January 1970	Philadelphia	January 1970
Cleveland	December 1969	Pittsburgh	January 1970
Dallas	February 1970	Rochester	February 1970
Dayton	January 1970	St. Louis	February 1970
Denver	March 1970	San Francisco	December 1969
Detroit	November 1969	Seattle	March 1970
Fort Worth	February 1970	Washington	January 1970

The Perfectly Balanced System



System 21 Terminals — Now
System 21 Computers — Spring 1970

General Purpose Computers

The VIATRON Models 2140 and 2150 are the first of a family of general purpose computers using fourth generation LSI/MOS technology. VIATRON computers offer the flexibility and power normally found in much more expensive computer hardware. They are designed and priced to be placed wherever a general purpose computer is needed — in the office, the factory, the warehouse, the school, the laboratory, or anywhere — to satisfy a multitude of applications.

MODEL 2140 \$99 a Month

The VIATRON Model 2140 uses an LSI/MOS Central Processing Unit and 4,096 16-bit words of core memory. It offers extensive computational and data manipulation capabilities through 85 powerful instructions.

Arithmetic operations may be single, double, or even triple precision (16, 32, or 48 bits) using three 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.

Software available with the 2140 and 2150 will be upwards compatible with future VIATRON computers. The software includes a 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 wide band High Speed Data Channel, which may be used for data communications. System 21 Terminals may, of course, be configured to support any of the peripherals in the System 21 product line, adding extensive data input, data storage, data display, and data print-out 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 \$199 a Month

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

More Memory

8,192 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 is 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

CORE MEMORY

	Model 2140	Model 2150
Cycle Time (Full Cycle)	2 μ sec	2 μ sec
Capacity	4096 words	8192 words
Word Length	16 bits	16 bits

INSTRUCTIONS

Arithmetic	12
Logic	9
Load	13
Store	13
Branch	11
Shift	13
Modify Memory	1
I/O	1
Operate	12
TOTAL	85
Number of 8 bit operations	12
Number of 16 bit operations	61
Number of 32 bit operations	8
Number of 48 bit operations	4
TOTAL	85

INSTRUCTION FORMATS: Short and Extended

SHORT (S)

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

EXTENDED (E)

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

DATA FORMAT

16, 32 or 48 bit Arithmetic
 Positive Numbers: Sign and Magnitude
 Negative Numbers: 2's complement

ADDRESSING MODES

Extended Format Direct addressing of up to 32,768 locations
 Instructions: Indirect and Indexable
 Short Format 256 Locations relative to Program Counter
 Instructions: Indexable

INDEX REGISTERS	3	3
GENERAL REGISTERS	3	3
INPUT/OUTPUT	Up to 8 terminals (local or remote)	Up to 24 terminals (local or remote)
	High-Speed Data Channel	High-Speed Data Channel
INTERRUPT LEVELS	2	4
SOFTWARE	Assembler DDL-1 (Multi-User language)	Assembler DDL-1 (Multi-User language) FORTRAN IV

All programs stored on removable VIATAPE cartridges

POWER REQUIREMENTS: 115 V AC, 60 cycle, 350 watts

Software

INTRODUCTION

The VIATRON Programming System (VPS) uses VIATAPE, compact and reliable pocket-sized cartridges of magnetic tape, for storage and distribution of system and user programs.

The VPS programs use advanced programming techniques, including relocatable subroutines, highly compressed format for data and programs, and flexible input and output command structures, which facilitate data conversion and manipulation.

VPS consists of five components stored on VIATAPE cartridges:

- DDL-I Distributed Data Language-I
- FORTRAN IV Compiler
- Assembler Language with Compressor
- Subroutine Library
- Utility Program Library

The VIATRON Programming System provides the user with:

- Easy program preparation via the System 21 Data Management Terminal.
- Higher level language translators to aid the user in adapting his problem statement to the computer.
- A complete subroutine library to eliminate the necessity for programming of routine and repetitive functions.
- A utility library which provides programs to assist in organizing and maintaining user written object modules.

Computer configurations supported by the VIATRON Programming System are:

- Model 2140 CPU with 4K of core storage
 - .. Automatic Polling Controller
 - .. Up to 8 System 21 Data Management Terminals
 - .. High-Speed Data Channel
- Model 2150 CPU with 8K of core storage
 - .. Automatic Polling Controller
 - .. Up to 24 System 21 Data Management Terminals
 - .. High-Speed Data Channel

DISTRIBUTED DATA LANGUAGE — I (DDL-I)

The Distributed Data Language is the first of a family of unique VIATRON languages. It provides a processing sequence which begins at the System 21 Data Management Terminal, is continued at a higher level on the System 21 computer, and may extend to another computer system. DDL-I is highly flexible, and easy to use. Programs may be specified in DDL-I, which will accommodate multiple interactive users simultaneously sharing the computational resources of the computer.

DDL-I Programs are defined through the use of specification sheets similar to those used for the familiar report program generators available on most large scale computers. These specification sheets, once recorded on a VIATAPE cartridge, are translated into machine language instructions. Storage areas, buffers, and constants are automatically dimensioned and assigned. The compiled program contains the linkages to the data management and functional routines required. Data management provides input/output control, decision capability, and editing. Functional operations include arithmetic, data manipulation, and program logic control.

FORTRAN IV

The VIATRON FORTRAN IV Compiler enables the engineer, scientist, or student to utilize the computer for problem solving without requiring extensive knowledge of the computer itself. This one pass compiler conforms to the basic USASI standards and is compatible with other FORTRAN IV Compilers. The FORTRAN program is a set of statements composed of expressions and operations which, when recorded on a VIATAPE cartridge, can be translated by the compiler into an object program.

ASSEMBLER

The Assembler program accepts symbolic language and translates it into binary machine language. The symbolic language provides mnemonic operation codes, special charac-

ters, and other symbols to aid the programmer. Linkage to the Subroutine Library is provided through macro instructions, which work in conjunction with the system loaders. The Assembler produces a relocatable binary output tape suitable for processing by the Compressor program, which consolidates the binary output to improve loader efficiency.

SUBROUTINE LIBRARY

The Subroutine Library for the VIATRON Programming System is a package of commonly used routines for data input/output, data conversion, and arithmetic functions. Only the subroutines required for the operation of an object program are selected by the linkage loader or linkage editor program when the object program is being processed.

Included in the Subroutine Library are:

Input/Output Subroutines

Terminal Master Control Package
Communications Adapter Control Package

Mathematical Function Subroutines

Trigonometric sine/cosine
Trigonometric arctangent
Square root
Natural logarithms
Exponentials

Arithmetic Subroutines

This group includes subroutines designed to augment the CPU arithmetic instructions. The subroutines perform the functions of floating-point operations (single and extended precision) for add, subtract, multiply, and divide.

Conversion Subroutines

This group includes subroutines to convert data transferred between memory and the I/O devices that can be attached to the computer through High-Speed Data Channel and the Automatic Polling Controller.

UTILITY PROGRAM LIBRARY

The Utility Program Library includes the following:

Dump Routines

These are used to output the contents of core memory to a System 21 Terminal. The output may be in either decimal or hexadecimal form.

Load Routines

The Linkage Editor and Linkage Loader accept the binary output of the Compressor and language translators. The Linkage Loader loads the compiled object program and the required subroutines directly to core storage for execution. The Linkage Editor creates a self-loading core-image tape containing the compiled program and the required subroutines. This facility enables repeated program loadings without further requirement for reference to the Subroutine Library.

Subroutine Library Manager

The Subroutine Library Manager allows the user to build, edit, and maintain library tapes.

LOCAL SUPPORT

VIATRON's growing dealer organization will be available to provide economical and comprehensive systems and programming support for users of the Model 2140 and 2150 computers. Each VIATRON authorized dealer is a software specialist, located near the customer, and well trained to provide local support on a professional basis.

Dealer services include professional consultation, training, systems design, programming assistance, and completely programmed packages. Whatever your requirements may be, they stand ready to help you get started and to help you keep going once your applications are underway.

Standard software provided by VIATRON will be supplied and supported by VIATRON at no additional cost. On a contract basis, the Dealer will extend or modify the standard software to further tailor it to your specific use.

Your VIATRON Dealer will help you optimize the use of System 21 computers and terminals to achieve the lowest cost solution to your application requirements. And with his widespread experience, he will help integrate System 21 into your overall data processing plans.

System 21 lets you do your thing



Shown here is a production unit of the System 21 terminal and a design model (subject to change before delivery) of the System 21 2140/2150 computer.

System 21 terminals and computers will let you build application-oriented systems to solve your data input, communications, and processing problems.

Scientific Computation

General Mathematical Analysis
Statistical Evaluation of Data
Engineering Design
Laboratory Experiment
Evaluation
Time-Shared Problem Solving

Business Data Processing

Credit Checking
Material Management
General Accounting
Production Control
Operations Research

Data Acquisition

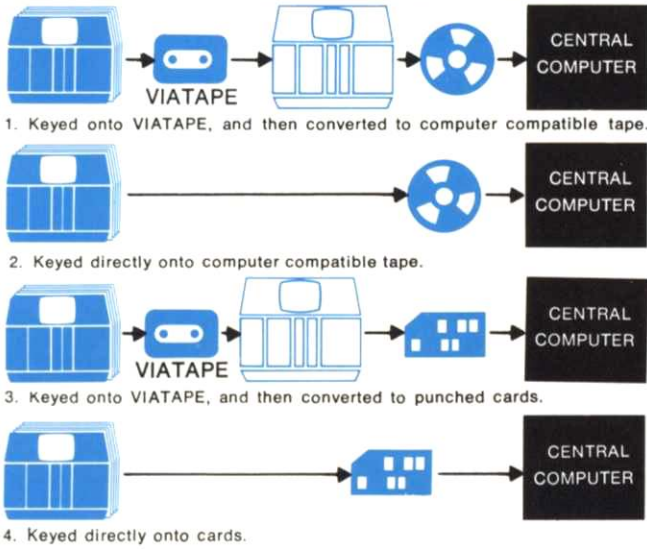
Order Entry
Remote Job Entry
On-Line Unit Record
Preparation
Information Retrieval
Media Conversion

Education

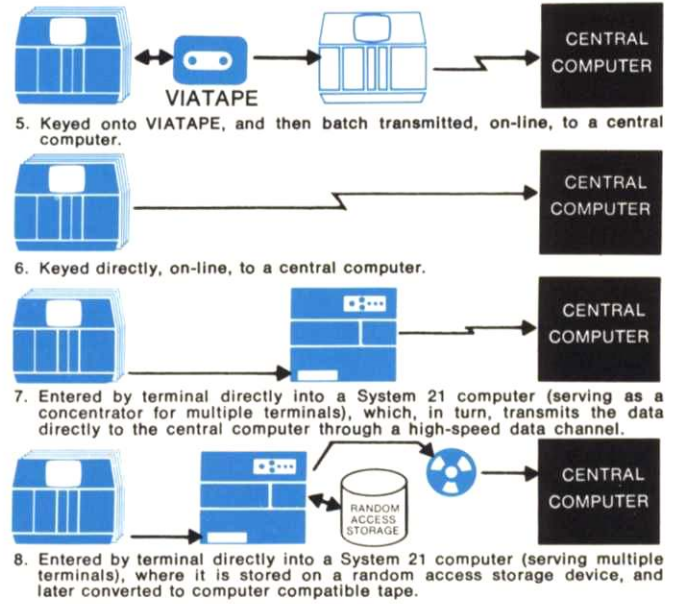
Classroom, Student, and
Instructor Scheduling
Computer Programmed
Instruction
Career Counseling
Student Computation Aid
Computer Training

DATA ENTRY

Information entered at a System 21 data management station can be recorded, converted or transmitted in several ways for



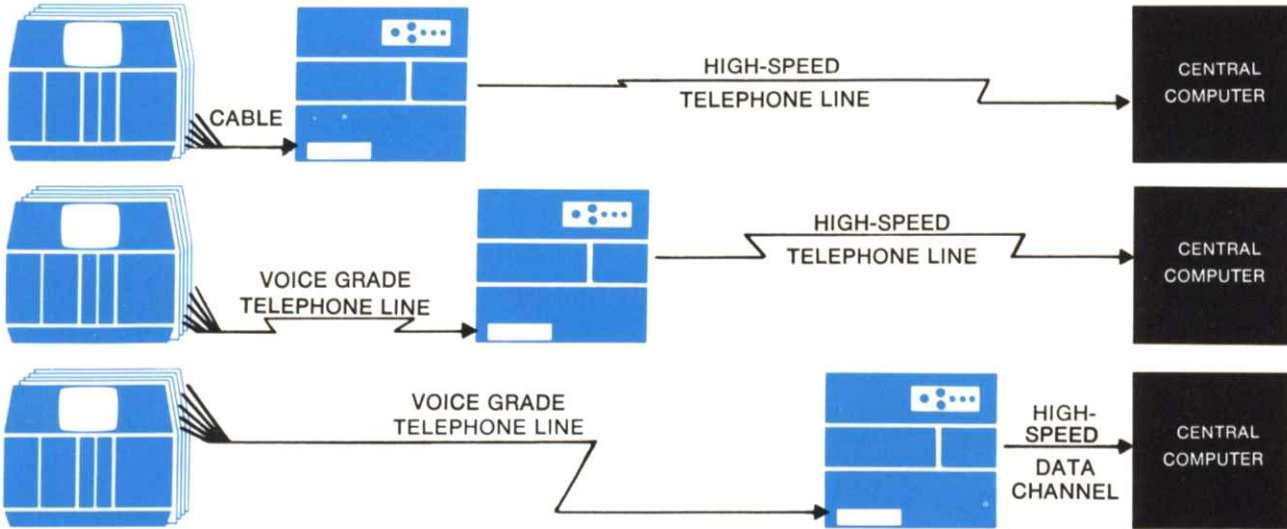
subsequent processing by a central computer.



TIME SHARING

A System 21 computer, acting as a concentrator or line controller, can minimize data communication costs in a time sharing network by reducing line charges and by reducing the

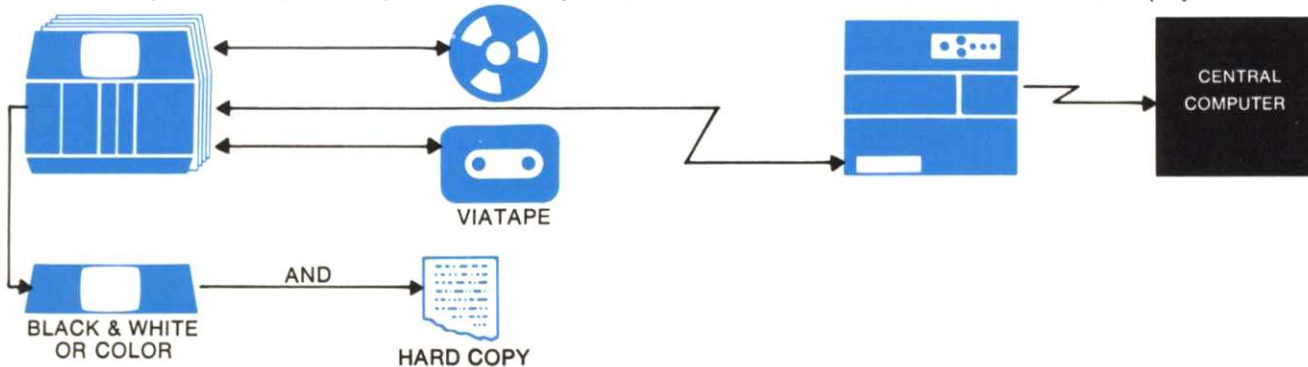
number of I/O channels required on the central time-shared computer.



REMOTE BATCH

Data or programs may be recorded off-line on VIATAPE or computer compatible tape, and then batch transmitted to the central computer. After processing, the results may be batch

transmitted back to the System 21 terminal and recorded on VIATAPE or computer compatible tape for subsequent print-out, or for black and white or color display.



Computer Architecture

INTRODUCTION

The VIATRON approach to computer architecture required harmonious coordination of design philosophy with present-day LSI technology. The resultant computer organization uses the simplicity of Read Only Memories for controlling the flow of data between memory, the central processing unit and Input/Output, while still retaining the capability for performing complex operations.

Within the central processors of the 2140 and 2150 (which are identical) there will be two data buses, a read only control memory and two arithmetic units (I and II) each operating independently.

CENTRAL PROCESSOR

Arithmetic Unit I: Registers A, B, C, & D

In the first arithmetic unit, there are three general accumulator registers (A, B, & C), each with identical capabilities.

The A, B, & C Registers can perform arithmetic operations such as addition and subtraction with memory. Any of the three can be masked with memory, merged with memory, or exclusive OR-ed with memory. They can transfer data to or from memory in 16 bit or 8 bit byte format. Data can be moved from any register to any other register. Any of the three registers can be used as a shift register. Carry and Overflow tests can be performed on all three. Multiply and Divide are performed in conjunction with the extended accumulator (Q), which is in arithmetic unit II.

The D Register can be used as an operand buffer which holds data from memory or from the other arithmetic unit.

The arithmetic unit operates in two modes: In one mode, registers A, B, or C can be uniquely modified, and in the other mode they perform a joint operation on an operand in the D Register.

Arithmetic Unit II: Registers P, Q, R, & E

In the second arithmetic unit, both arithmetic and addressing operations are performed.

The P Register can be used as a program counter which contains the current program address.

The Q Register can be used for extended arithmetic operations. These include double-length (32 bit) operations such as add, subtract, store and load. Triple-length (48 bit) operations are performed with A and B as the high order registers and Q as the lower order register. Q is also the Multiplier/Quotient register in the conventional sense.

The R Register can be used both as an operator's console buffer and as an auxiliary register for generating effective addressing.

The E Register can be used as a buffer for data which operates on P, Q, or R.

Control

Two control units handle all data flow through the buses. The CPU control unit consists primarily of Read Only Memory which contains all the micro programs for controlling processor operations. The I/O controller handles all I/O interrupts and data flow between memory and I/O. It is given a higher priority than the CPU control so as to facilitate data flow between peripherals and memory.

The other components of the computer system include the core memory and the operator's console.

The Core Memory is organized into 4,096 words of 16 bits each. The 2140 contains a single 4,096 word unit, while the 2150 contains two units with a total of 8,192 words.

The Operator's Console for the 2140/2150 provides the necessary indicators and switches for control and monitoring

of the system. The operator control switches are designed for simplicity of operation. Provided on the panel are switches which control initial program load, single step of instructions, automatic run control, and stop.

The Console Display contains sixteen indicators which may selectively monitor one of three accumulators (A, B, C), the quotient register (Q), the carry/overflow status (S), the program counter (P), and the console address register (R). In addition, the contents of sequential core memory location (M) and the next instruction (I) may be examined by the operator.

For **Console Data Entry**, data or address information may be entered selectively into one of three accumulators (A, B, C), the quotient register (Q), the carry/overflow register, the program counter (P), and the console address register (R) via sixteen entry toggles. In addition, the operator may enter data into sequential core memory locations.

INPUT/OUTPUT CONTROL

An integral part of the 2140 and 2150 is an I/O Controller, which manages all data transfers between the peripheral devices and the computer memory. These data transfers are performed as 8 bit or 16 bit parallel operations on a request/acknowledge basis. The I/O is capable of transferring data to memory independent of the central processor, i.e., the CPU may perform operations while cycle steal transfers between memory and the I/O Controller are taking place. Since memory is not tied directly to the CPU, the CPU and the I/O Controller must request memory with the I/O Controller having the higher priority.

There are two types of data transfers available in the Models 2140 and 2150, namely, single-word transfers and block transfers.

Single-word Transfers are accomplished via the Automatic Polling Controller (APC). Up to eight System 21 Data Management Terminals can be attached to one APC. The APC continually scans the request lines of each of the terminals until a terminal requires service. When a service request is made, the APC stops scanning and transfers data under program control between the computer memory and the terminal. Once the data transfer is complete, the APC resumes scanning.

Block Transfers (up to 16 bits per transfer) are accomplished on a cycle-stealing basis via the high-speed channel. This channel can execute up to 330,000 transfers per second. The high-speed channel may be used for connection to high-speed communications equipment or other customer supplied equipment.

Interrupt Levels are associated with each APC and high-speed channel. In both the 2140 and 2150, the high-speed channel has the highest priority interrupt level. The Model 2140 has one APC and one high-speed channel while the Model 2150 has three APC's and one high-speed channel. Thus, the 2140 has two interrupt levels and the 2150 has four interrupt levels.

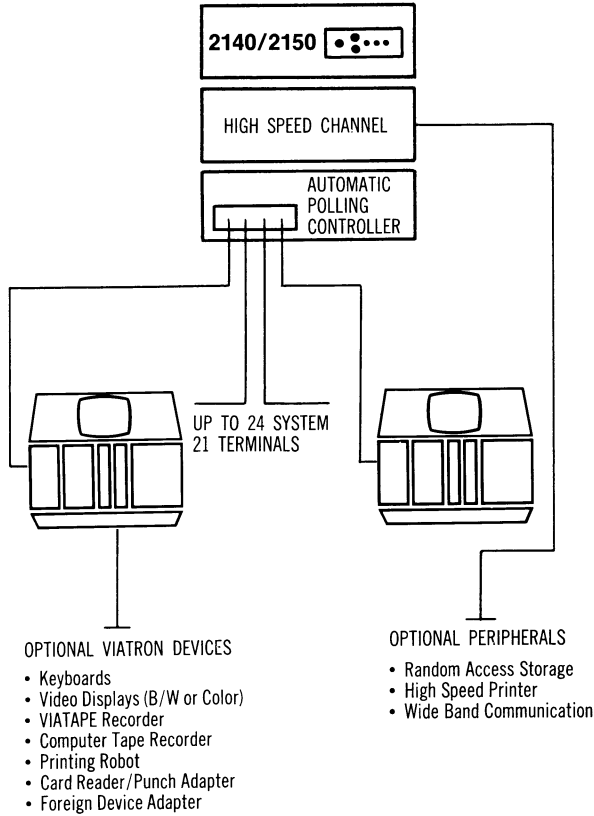
PERIPHERALS

The entire current System 21 line of equipment may be attached to the Model 2140 and Model 2150 computing systems. This line includes —

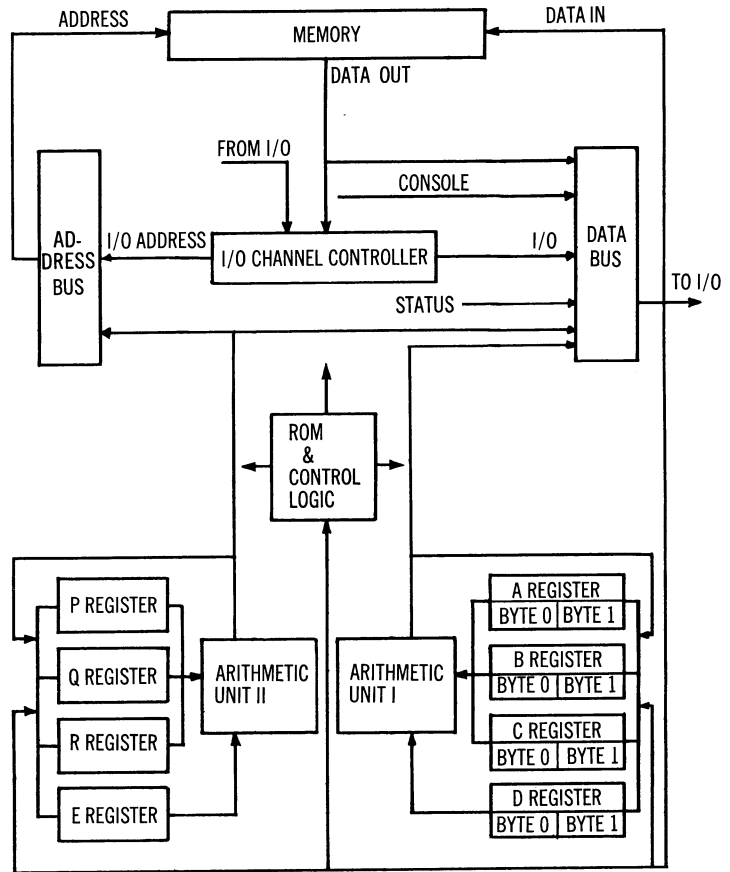
- VIATAPE Recorder
- Computer Compatible Tape Recorder
- Robot Printer
- Card Reader/Punch
- Color or Black and White Displays
- Keyboard
- Unit Card Reader

VIATRON has a company commitment to supply the System 21 user with the largest range of peripherals compatible with high-volume, low-price production. Additional peripherals will be announced shortly.

System Configurator



Computer Architecture



Instruction Set

Instruction	ARITHMETIC	Format
Add to A		
Add Double (AQ)		
Sub A		
Sub Double (AQ)		
Add to B		
Sub B		
Add to C		
Sub C		
Add Triple (ABQ)		
Sub Triple (ABQ)		
Multiply		
Divide		

Instruction	LOGIC	Format
And A		
Or A		
Excl Or A		
And B		
Or B		
Excl Or B		
And C		
Or C		
Excl Or C		

Instruction	REGISTER LOAD	Format
Load A		
Load Double (AQ)		
Load Index		
Load Status of A, B, & C		
Load B		
Load C		
Load Triple (ABQ)		
REGISTER BYTE LOAD		
Load A (Byte 0)		
Load A (Byte 1)		
Load B (Byte 0)		
Load B (Byte 1)		
Load C (Byte 0)		
Load C (Byte 1)		

Instruction	REGISTER STORE	Format
Store A		
Store Double (AQ)		
Store Index		
Store Status of A, B, & C		
Store B		
Store C		
Store Triple (ABQ)		
REGISTER BYTE STORE		
Store A (Byte 0)		
Store A (Byte 1)		
Store B (Byte 0)		
Store B (Byte 1)		
Store C (Byte 0)		
Store C (Byte 1)		

SHIFT A REGISTER		
Shift A Left		
Shift AQ Left Double		
Shift A Right		
Shift AQ Right Double		
Shift A Left & Count		
Shift AQ Left Double & Count		
Rotate AQ Right		
SHIFT B REGISTER		
Shift B Left		
Shift B Right		
Shift B Left & Count		
SHIFT C REGISTER		
Shift C Left		
Shift C Right		
Shift C Left & Count		

MODIFY MEMORY		
Modify Memory Word		
And Skip On Test		
(Increment, decrement, add or subtract to memory location)		
I/O		
Execute I/O		
Operation		

BRANCH		
Skip on Register A Condition		
Skip on Register B Condition		
Skip on Register C Condition		
Branch on Register A Condition		
Branch on Register B Condition		
Branch on Register C Condition		
Branch Unconditional		
Branch Unconditional (Relative to Program Counter)		
Branch & Store Program Counter		
Branch & Store Program Counter Conditional		
Add to Index Register & Skip On Test		

OPERATE		
Increment Register (A or B or C)		
Decrement Register (A or B or C)		
Ones Complement Register (A or B or C)		
Negate Register (A or B or C)		
Move A (To B or C)		
Move B (To A or C)		
Move C (To A or B)		
Move Console Switches (To A or B or C)		
Increment & Skip on Test (A or B or C)		
Clear Register (A or B or C)		
Wait		
No Operation		

The System 21 Terminal

new styling, new features, new performance

Data Channel Attachments

Two peripheral devices can be attached simultaneously to the data channels of the 2101 and 2111 microprocessors. These peripherals currently include a System 21 Printing Robot, a Card Reader Punch, a Communication Adapter and a Foreign Device Attachment. The system illustrated is equipped with a Printing Robot and a Communication Adapter.

PRINTING ROBOT drives an IBM Selectric® typewriter to provide formatted or unformatted hard-copy printout.

EXECUTE Switch. LIST mode provides 80-character listing of data records. "A" and "B" provide formatted output by interpreting control characters in the data record. These characters are carriage return, line feed, back space and tabulate.

Diode Pin Matrix allows selection of "tab begin" positions without requiring the use of control characters within the data record.

COMM DEVICE allows the transmission or receipt of standard ASCII characters over voice-grade lines operating in a half-duplex mode at speeds ranging up to 1200 bits per second. Panel switches allow: 1. Speed selection as dictated by the modem used. 2. Synchronization in transmission between System 21 terminals. 3. Attended or unattended operations.

Card Reader-Punch allows direct data transfer to and from an IBM 29 card punch. Data from the microprocessor can be punched on cards, or data on cards can be read into the microprocessor memory on a single-record or batch basis.

Mode Switch allows you to (1) read cards, (2) punch cards, or (3) disengage.

Record Length Switch. In the "short" position, this switch allows the release of a card when fewer than 80 characters are punched.

Foreign Device Attachment (Not Illustrated)

Tape Channel Attachments

There are two channels to which VIATAPE and Computer Compatible Tape Recorders can be attached. The system illustrated has one of each.

VIATAPE Recorder reads and records 80-character records on VIATAPE.

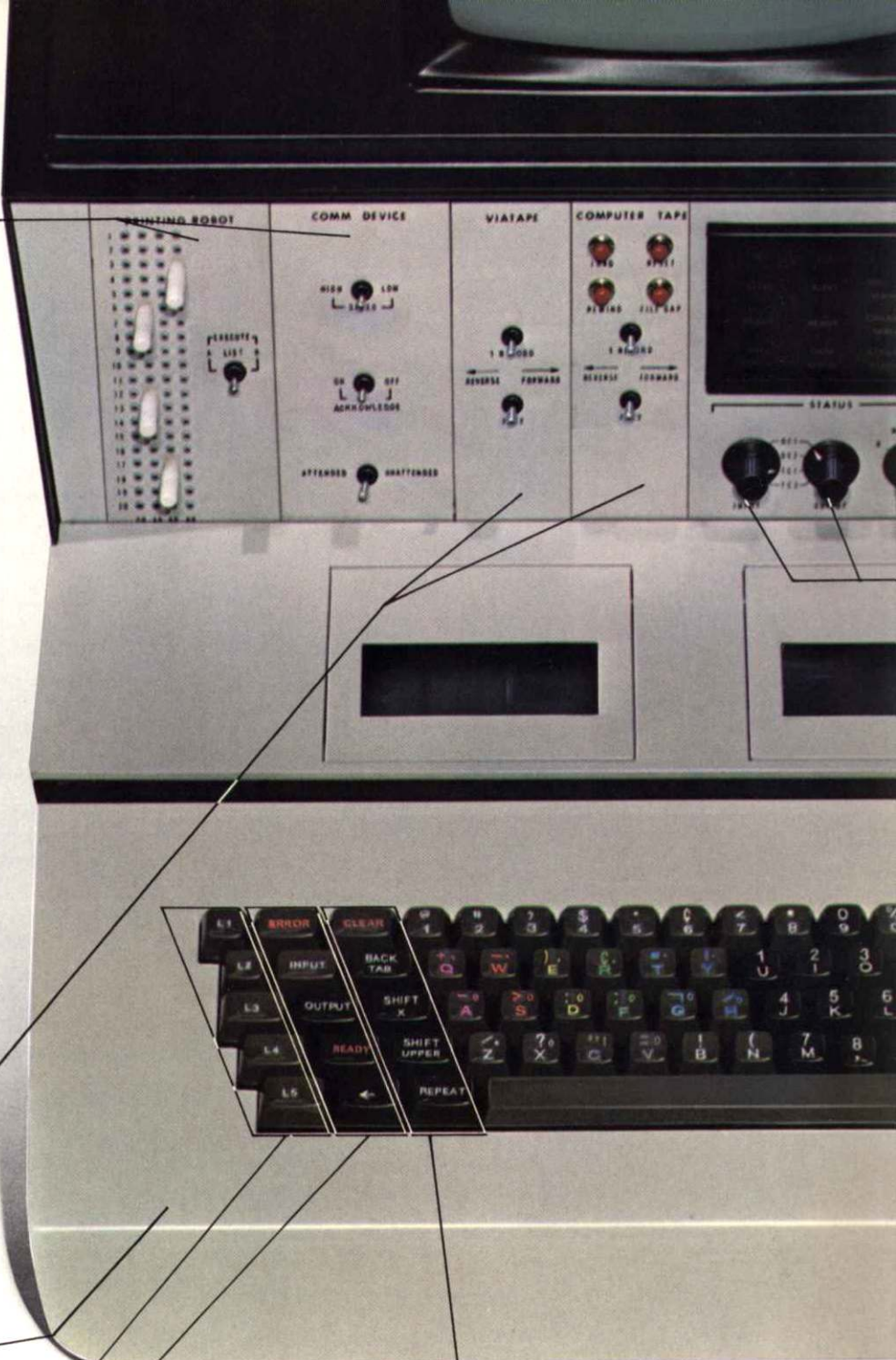
1 RECORD/FAST Switches permit tape movement forward or backward.

COMPUTER TAPE Recorder also has standard LOAD, RESET, REWIND and FILE GAP controls.

Keyboard

Typewriter and keypunch keyboard with color coding characters.

- L-5 — Position 1 (2111)**
Moves the key entry cursor to position 1.
- L-4 — Go (2111)**
Starts program execution after a programmed halt.
- L-3 — Delete (2111)**
Removes the character at the cursor position and closes up the remaining characters in the same field (optional).
- L-2 — Field Select (2111)**
Moves the key entry cursor to the first position of the field indicated by one numeric key stroke following (optional).
- L-1 — Position Select (2111)**
Moves the key entry cursor to the numeric position indicated by two numeric key strokes following (optional).



ERROR — Releases a keyboard lock resulting from an error condition.

INPUT — Initiates input to the microprocessor from the device selected by the STATUS *Input* rotary switch.

OUTPUT — Initiates output from the microprocessor to the device selected by the STATUS *Output* rotary switch.

READY — Prepares the microprocessor for input from keyboard or any external device.

← (Back Space) — Back-spaces cursor one character.

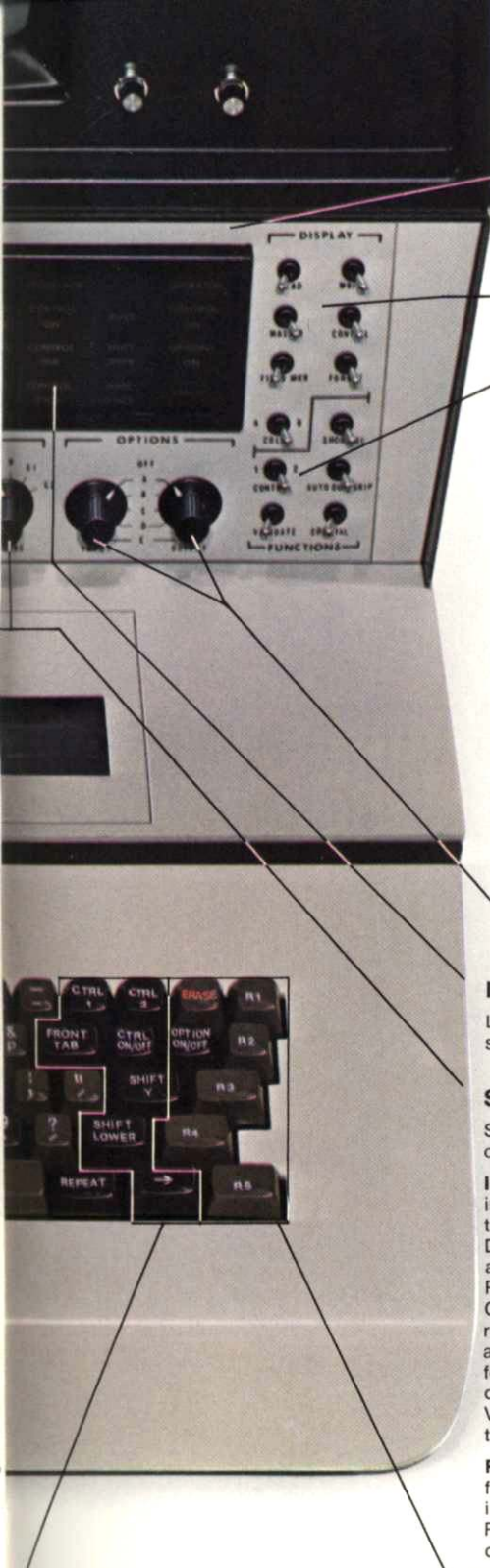
REPEAT — When this key and any other key are held down, the other character is repeatedly entered into the microprocessor.

SHIFT UPPER — Selects characters shown.

SHIFT X — Allows generation of standard ASCII communication control characters.

BACK TAB — When in "Program Control", this key moves the cursor back to the previous "Field Begin" character. In "Manual Control" the cursor is moved to the first position of the record.

CLEAR — Sets the microprocessor to initial conditions.



Microprocessor Control Panel —

This panel contains STATUS, FUNCTION, DISPLAY and OPTION controls and the processor status indicator panel. This panel is essentially the same on both the 2101 and the 2111 microprocessors.

FUNCTIONS Controls

allow the operator to call up control programs and initiate control and special functions.

CONTROL switch allows the selection of either of two control programs stored by the user in the microprocessor.

AUTO DUP/SKIP When this switch is "on", the microprocessor will automatically execute the control program instructions for duplication and skipping.

VALIDATE When "on", the microprocessor automatically validates the contents of VIATAPE cartridges by performing a hardware "read-after-write" operation as each record is entered. (Available on 2111 microprocessor.)

SHORT REC When "on", records of less than 80 characters can be transmitted by generating the carriage return or line feed code (optional on the 2101/2111).

Indicator Panel

Lights show the operator the current status of the system.

STATUS Controls

Select the input and output channels and the memory record which the operator wishes to use.

INPUT, OUTPUT switches. There are four channels in the microprocessor for the connection of external devices. These are Data Channel 1 (DC 1), Data Channel 2 (DC 2), Tape Channel 1 (TC 1), and Tape Channel 2 (TC 2). The INPUT and OUTPUT switches allow the selection of channels. Data Channels permit the attachment of System 21 peripherals such as a printing robot, a card reader adapter, a communication adapter or, through a foreign device attachment, any ASCII or Hollerith device. Tape Channels allow the attachment of VIATAPE and/or VIATRON's computer-compatible tape recorders.

RECORD switch allows the selection of one of the five 80-character areas of memory to be used for input or output. These areas correspond to the READ, WRITE, MASTER and two CONTROL areas of the display.

R5 — Special function (on the 2101)

R-5 — Position 81 (2111)

Moves the key entry cursor off the screen to the right to prevent key entry.

R4 (Carriage return/line feed) — Generates ASCII carriage return or line feed character.

R3 (Program Sequence Load) — Manual load of one control record and associated master record from Tape Channel 1. (2101)

R-3 — Insert

Inserts a space into the key entry record, at the cursor position, moving the existing characters to the right (2111).

DISPLAY Controls

The 3001 video subsystem displays the contents of four of the five 80-character memory areas in the 2101/2111 microprocessor. Each memory area is divided into four lines of 20 characters. These areas are called READ, WRITE, MASTER and CONTROL.

READ, WRITE, MASTER and CONTROL switches control the display or suppression of the individual areas.

FIELD MKR allows the display of markers which locate the beginning of the data fields within the 80-character area being entered.

FORMAT switch interleaves the four lines of the MASTER area with the four lines of the WRITE area. The MASTER area usually functions as a form. This control lets the operator fill in the blanks on the interleaved WRITE area.

COLOR — In stations equipped with color displays, COLOR A allows the operator to select any of 8 colors. They may be used for either characters or background in any combination. COLOR B assigns 4 fixed colors to all (1) upper case, (2) lower case, (3) numeric and (4) communication control characters.

OPTIONS Control

Switches allow automatic input or output to or from selected channels.

INPUT A — Automatic input from selected channel. (optional on the 2101, standard on the 2111)

INPUT B — Automatic input of one program and associated format from Tape Channel 1 (optional on the 2101/2111)

INPUT C — Automatic input of two programs and associated format from Tape Channel 1 (optional on the 2111)

OUTPUT A — Automatic output to selected channel. (standard on the 2101/2111)

OUTPUT B — Automatic output to Data Channel 1, then Tape Channel 2. (optional on the 2101/2111)

OUTPUT C — Automatic output to Data Channel 1, then Data Channel 2. (optional on the 2101/2111)

OUTPUT D — Automatic output to Data Channel 1, then Data Channel 2, then Tape Channel 2. (optional on the 2101/2111)

R2 (Duplication) — Duplicates characters from the READ record into the selected record.

R1 (Master Duplication) — Duplicates characters from the MASTER record into the selected record.

OPTION ON/OFF — Turns selected input/output options on or off.

ERASE — Clears the memory area selected by the STATUS Record rotary switch.

CTRL1, CTRL2 — With Control On, allows the operator to shift to either of the two control programs residing in the microprocessor. When the record is completed, control reverts to the program selected by the FUNCTIONS Control Switch.

FRONT TAB — When in "Program Control", this key moves the cursor forward to the next "Field Begin" character. In "Manual Control" the cursor is moved forward and off the display.

CTRL ON/OFF — Turns program control on or off.

SHIFT Y — Allows generation of lower case alphabetic characters some of which are used to control color selection.

SHIFT LOWER — Selects characters shown.

→ **(Advance)** — Advances cursor one position.

price list

MODEL FEATURE NUMBER CODE	DESCRIPTION	MONTHLY RENTAL
2101	MICROPROCESSOR <ul style="list-style-type: none"> • 512-word, Read-Only Memory • 400-character Read/Write Memory • Two Tape Channels • Automatic Skp • Automatic Duplication • Automatic Left Zero Fill • Automatic Upper and Lower Shift Control • Automatic Output to selected data or tape channel 	\$20
101	AUTOMATIC MULTIPLE INPUT feature <ul style="list-style-type: none"> • One record from Selected Channel or medium • One master and one control record from Tape Channel #1 	\$9
102	AUTOMATIC MULTIPLE OUTPUT feature <ul style="list-style-type: none"> • 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 	\$4
103	SHORT RECORD feature <ul style="list-style-type: none"> • Automatic input or output of a record less than 80 characters 	\$10
2111	MICROPROCESSOR <ul style="list-style-type: none"> • 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 	\$36
102	AUTOMATIC MULTIPLE OUTPUT feature <ul style="list-style-type: none"> • To Data Channel 1 and Tape Channel 2 • To Data Channels 1 and 2 • To Data Channels 1 and 2, plus Tape Channel 2 	\$4
103	SHORT RECORD feature <ul style="list-style-type: none"> • Automatic input or output of a record less than 80 characters 	\$10
104	AUTOMATIC MULTIPLE INPUT feature <ul style="list-style-type: none"> • One master and one control record from Tape Channel 1 • One master and two control records from Tape Channel 1 	\$9
105	FIELD AND POSITION SELECT feature <ul style="list-style-type: none"> • Direct Access to selected field or character position 	\$5
2140	GENERAL PURPOSE COMPUTER* <ul style="list-style-type: none"> • 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 	\$99
2150	GENERAL PURPOSE COMPUTER* <ul style="list-style-type: none"> • 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 	\$199

MODEL FEATURE NUMBER CODE	DESCRIPTION	MONTHLY RENTAL
	<ul style="list-style-type: none"> • Wideband Communications channel • Software, Utility subroutines, FORTRAN compiler, Assembler, and MACRO languages 	
3001	VIDEO DISPLAY SUBSYSTEM <ul style="list-style-type: none"> • Allows the attachment of several types of video displays to a micro-processor 	\$5
301	BLACK & WHITE VIDEO DISPLAY <ul style="list-style-type: none"> • 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.) 	\$8
302	RECORD SUPPRESS feature <ul style="list-style-type: none"> • Permanent suppression of any combination of 80-character records on local or remote displays 	\$2
303	SELECTED DATA DISPLAY feature <ul style="list-style-type: none"> • Allows selective distribution of data to local or remote displays 	\$4
304	COLOR VIDEO DISPLAY <ul style="list-style-type: none"> • 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 	\$26
305	BLACK & WHITE RF MODULATOR <ul style="list-style-type: none"> • 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 	\$2
306	BLACK & WHITE RF VIDEO DISPLAY	\$8
KEYBOARDS		
(prices include Parallel Data Channel at \$1/month)		
4001	KEYBOARD <ul style="list-style-type: none"> • Standard typewriter characters • Standard card punch characters • Microprocessor control characters • Communications Control characters 	\$6
4002	KEYBOARD <ul style="list-style-type: none"> • Standard typewriter characters • Standard card punch characters • Microprocessor control characters • Communications Control characters • 40-character card reader 	\$13
4099	KEYBOARD <ul style="list-style-type: none"> • Microprocessor control characters 	\$4
TAPE RECORDERS		
5001	VIATAPE CARTRIDGE RECORDER <ul style="list-style-type: none"> • Capstan-free tape recorder using magnetic tape cartridges • 7-level ASCII code • Bit read/write rate of 1250 bps 	\$4
5002	COMPUTER-COMPATIBLE TAPE RECORDER <ul style="list-style-type: none"> • 9-track, 800 bpi • 6-inch minireels of computer-compatible tape • 2200 cps synchronous read/write rate • Complete blocking capability 	\$60
5003	COMPUTER-COMPATIBLE TAPE RECORDER <ul style="list-style-type: none"> • 7-track, Selectable density 800 bpi or 556 bpi • 6-inch minireels of computer-compatible tape • 2200 cps synchronous read/write rate • Complete blocking capability 	\$60
DATA CHANNEL ATTACHMENTS		
(prices include Serial Data Channel at \$1/month)		
6001	CARD PUNCH/READER ADAPTER <ul style="list-style-type: none"> • Transmits any of the card punch's standard 64 characters 	\$37

MODEL FEATURE NUMBER CODE	DESCRIPTION	MONTHLY RENTAL
	<ul style="list-style-type: none"> • Punches an 80-character record in 4.5 seconds • Card punch may be disengaged and operated independently 	
601	RECORD TRANSFER BUFFER <ul style="list-style-type: none"> • 80-character buffer permitting simultaneous microprocessor operation and card punch operation 	\$18
602	SHORT RECORD feature <ul style="list-style-type: none"> • 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 	\$2
603	SPACE INSERTION feature <ul style="list-style-type: none"> • In punch mode, adapter spaces over an illegal character instead of punching a question mark 	\$3
6002	PRINTING ROBOT <ul style="list-style-type: none"> • For IBM Selectric®, 13" or 15" 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 	\$25
601	RECORD TRANSFER BUFFER <ul style="list-style-type: none"> • 80-character buffer permitting simultaneous microprocessor operation and printing robot operation 	\$18
6003	COMMUNICATIONS ADAPTER <ul style="list-style-type: none"> • 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 	\$11
604	AUTOMATIC ANSWER feature	\$5
605	MODEM 110-247 BAUD	\$10
606	ACOUSTIC COUPLER <ul style="list-style-type: none"> • Data transmission up to 300 bps • Includes modem 	\$15
6004	COMMUNICATIONS ADAPTER <ul style="list-style-type: none"> • 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 	\$11
604	AUTOMATIC ANSWER feature	\$5
607	MODEM 600-1200 BAUD	\$20
6005	COMMUNICATIONS ADAPTER <ul style="list-style-type: none"> • 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 	\$21
6006	FOREIGN DEVICE ATTACHMENT <ul style="list-style-type: none"> • Allows the input and output of ASCII code foreign devices to the micro-processor • Parallel transfers to and from foreign device 	\$18
6007	FOREIGN DEVICE ATTACHMENT <ul style="list-style-type: none"> • Allows the input and output of Hollerith code foreign devices to and from the microprocessor • Parallel transfers to and from foreign device 	\$23
6008	UNIT CARD READER <ul style="list-style-type: none"> • Hollerith code 	\$25
6009	COMPUTER ADAPTER, Model 2140 & 2150	\$12

* Planned for delivery in the spring of 1970

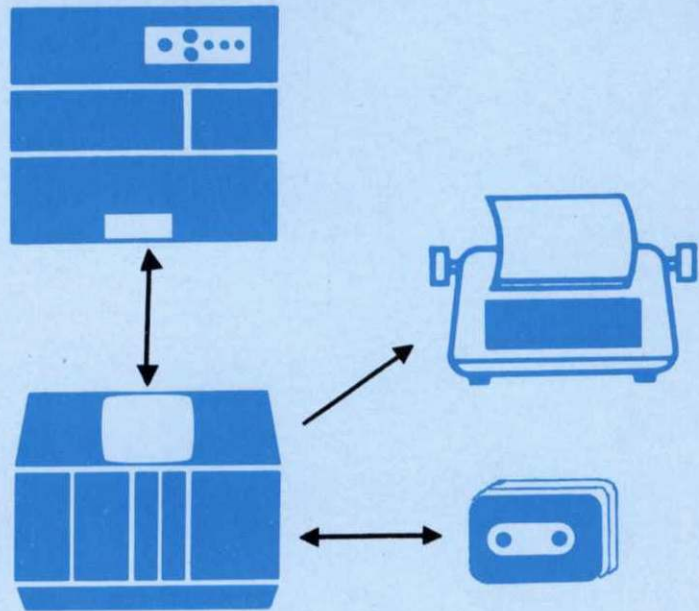
VIATRON



Total Computer Systems from VIATRON

A total computer system ready to use

- 1 2140 computer
- 1 2112 master terminal
- 2 VIATAPE recorders
- 1 color display
- 1 keyboard
- 1 printing robot



Total cost: \$10,608

The 2140 computer

- general purpose
- 4K, 16 bit data word storage
- 8K bytes
- 8 I/O channels for terminals
- 5 general purpose registers
- 3 index registers
- hardware multiply/divide
- basic USASI FORTRAN
- assembler
- subroutine library
- utility program library

The 2112 terminal:

- hardwired microprogram—1024 words
- 4 I/O channels
- 400 character dynamic memory
- programmable format control

The VIATAPE recorders

- reusable cartridges
- 416, 80 character records
- 100 characters/sec read/write
- certified digital tape

The color display

- 8 character colors
- 8 background colors
- 2 color modes
- 320 character display
- scrolling capability

The keyboard

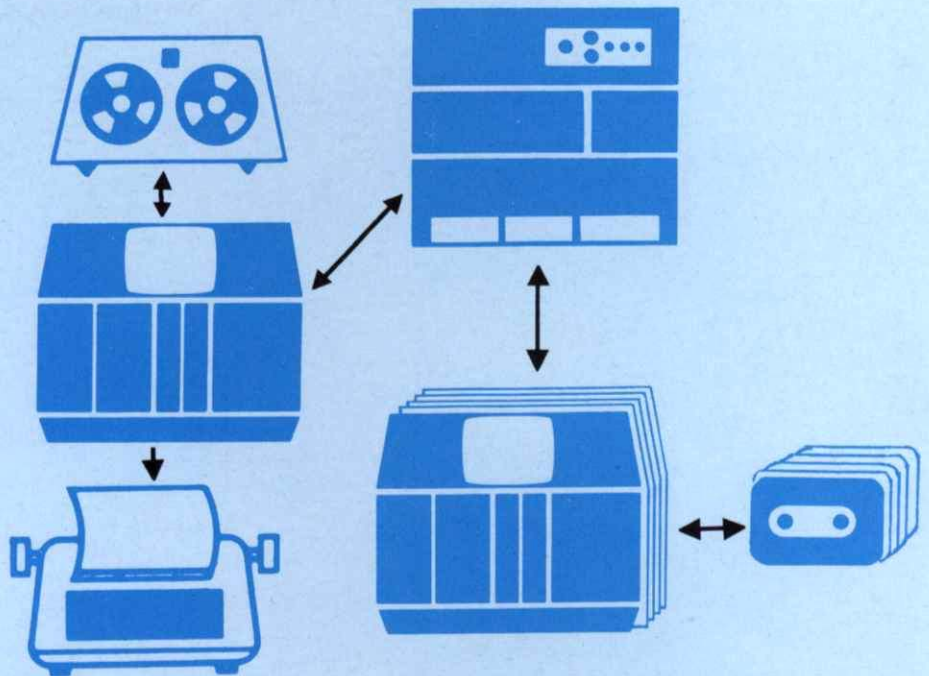
- 128 ASCII character set
- typewriter/keypunch compatible
- communications and control keys

The robot printer

- upper and lower case
- full format control
- up to 130 character line
- continuous forms
- multiple copies

A 24-user on-line multiprogramming total computer system ready to use

- 1 2150 computer
- 1 2112 master terminal
- 23 2111 user terminals
- 47 VIATAPE recorders
- 1 computer tape recorder
- 1 color display
- 23 black and white displays
- 24 keyboards
- 1 printing robot



Total cost per user: \$3,858

The 2150 computer

- general purpose
- 8K, 16 bit data word storage
- 16K bytes
- 24 I/O channels for terminals
- 5 general purpose registers
- 3 index registers
- hardware multiply/divide
- FORTRAN IV
- DISTRIBUTED DATA LANGUAGE I
- assembler
- subroutine library
- utility program library

The 2112 terminal

- hardwired microprogram—1024 words
- 4 I/O channels
- 400 character dynamic memory
- programmable format control

The 2111 terminal

- hardwired microprogram—1024 words
- 4 I/O channels
- 400 character dynamic memory
- programmable format control
- automatic tape search
- automatic tape validation
- key verification

The VIATAPE recorders

- reusable cartridges
- 416, 80 character records
- 100 characters/sec read/write
- certified digital tape

The computer tape recorder

- 7 or 9 track
- 556 or 800 BPI
- zero defect recording

The color display

- 8 character colors
- 8 background colors
- 2 color modes
- 320 character display
- scrolling capability

The black & white displays

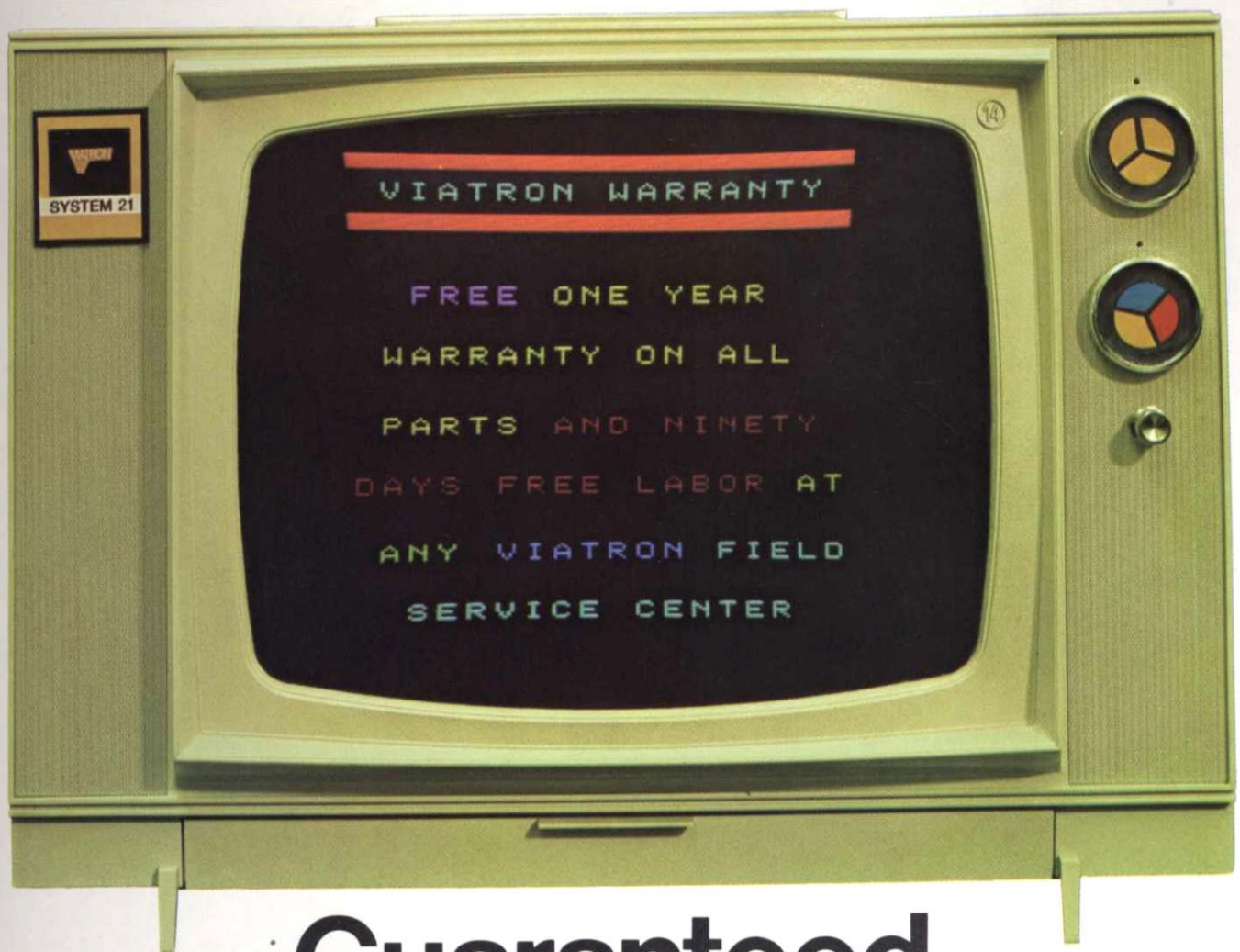
- 320 character display

The keyboard

- 128 ASCII character set
- typewriter/keypunch compatible
- communications and control keys

The robot printer

- upper and lower case
- full format control
- up to 130 character line
- continuous forms
- multiple copies



Guaranteed to keep you sold

For more information

Your local VIATRON dealer can give you the complete cost/performance story. For the name of the dealer nearest you, write VIATRON Computer Systems Corporation, Dept. D-14, Crosby Drive, Bedford, Massachusetts 01730. Telephone (617) 275-6100.



The standard of the 70's