

UNIVAC 1050 versus Honeywell 200 and IBM 1401 -

A Comparison

The following is a comparison of the salient features of the UNIVAC 1050 and its chief competitors.

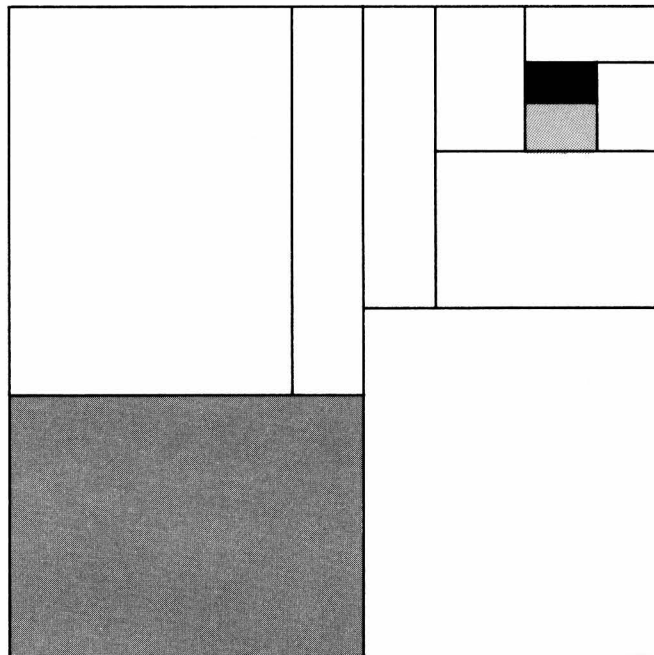
Basic hardware specifications are only part of the good news. The balance of the system, its ability to grow with the customer's needs, and effective throughput must also be considered as further enhancements.

As shown by this comparison, the UNIVAC 1050 system is superior to its competition. However, the competition will stress only those points that reflect in their favor. The successful salesman must anticipate the competitors' sales pitch and carefully lay the ground work which will educate the prospect such that your competitor will find himself on the defensive. At the same time you will be building towards a successful UNIVAC 1050 installation. For these reasons, take the time to study the enclosed manuals and this report.

The left-hand column of this report shows basic hardware specifications. The right-hand column suggests methods of presenting the specification to display the advantages of the UNIVAC 1050 System.

The power, modularity, and competitive pricing of the UNIVAC 1050 System provide you with entry into many new accounts. We will help on special sales situations. GO SELL 1050


J. Doerschuck



COMPANY CONFIDENTIAL

Specification

Analysis

1. The Central Processor

A. Cycle Time

UNIVAC 1050 Model III Processor 4.5 us/character

UNIVAC 1050 Model IV Processor 2 us/2 characters (effective 1.5 us/character or better depending on field length)

Honeywell 200
2 us/character

IBM 1401
11.5 us/character

1. 4.5 us/character - - - Economy
For card processing - this processor provides more than 580 instructions per card, at 900 cards/minute. Most card systems are input-output limited. Increasing the internal speed of the central processor will not improve the system's throughput. The Model III Processor is more than adequate for card oriented applications. The faster Model IV Processor can be installed when the customer's growth warrants it.

2. 2 us/2 characters - - - Speed
This processor provides an effective cycle time of 1.5 us/character or better depending upon field length. This faster memory when coupled with such features as automatic program interrupt - by channel - makes the throughput of the UNIVAC 1050 superior to that of any present competition.

B. Core Storage Capacity

UNIVAC 1050 Model III Processor
Min. 4,096 characters
Max. 32,768 characters
Increment 4,096 characters

UNIVAC 1050 Model IV Processor
Min. 8,192 characters
Max. 65,536 characters
Increment 8,192 characters

1. Since we are program compatible between Model III Processor and the Model IV Processor, the customer may actually expand up to 65K with the UNIVAC 1050 System.

2. The base of 2,048 characters in the H-200 and 1,400 characters in the IBM 1401 is too small to be practical. The base of 4,096 characters in the UNIVAC 1050 is sufficient for basic card operations. Experience indi-

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Honeywell-200

Min. 2,048 characters

Max. 32,768 characters

Increment 4,096 characters

IBM 1401

Min. 1,400 characters

Max. 16,000 characters

Increment 4,000 characters

2. cates that the small memories are sold and then expanded before delivery. Consider the IBM 1401 system; announced with the 1,400 character memory, shortly thereafter the expansion to 16,000 characters was announced. How many 1401's are in the field today with the 1400 character memory? The small memory of the IBM and Honeywell is basically a pricing device - - they are not sufficient for any practical data processing.
3. The H-200 control memory with the 500 nanosecond cycle time, is not directly addressable by program. The functions performed by this control memory are accomplished by circuitry within the UNIVAC 1050 and IBM 1401 computers. The only value of this feature is to increase the processing speed, and since the UNIVAC 1050 with the Model IV Processor is faster than the H-200, this feature is not necessarily significant to the customer. It is a sales "gimmick" but not a real benefit.

C. Internal Operations

1) Addressing

UNIVAC 1050 - Single
Address Instructions

Honeywell 200 - Double
Address Instructions

IBM 1401 - Double
Address Instructions

1. UNIVAC instructions are single address as opposed to two address logic of IBM and Honeywell. They will claim that we need more instructions and therefore more memory. The UNIVAC 1050 requires 2 more character positions per instruction pair than the equivalent double address instructions. However, only part of the core memory is devoted to

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1. instructions - Data and Constant storage is equivalent. The UNIVAC 1050 does not use word marks and therefore does not require instructions for word mark manipulation, etc. which reduces both instructions and program testing.
2. Single address logic is easier to use and learn.
3. The UNIVAC 1050 has some very powerful instructions that serve to reduce the total number of instructions required to accomplish a function. Among these powerful instructions are: Block Transfer, Translate, Jump Loop, Edit, and others. These replace whole subroutines in other computers.
4. In order for the H-200 to realize the full potential of simultaneity and peripheral overlap, it will be necessary to place "test" instructions in their programs. These act like buffer tests on the Solid-State and cause control to transfer to a processing subroutine whenever an I/O device needs attention. In the UNIVAC 1050 this is accomplished by automatic program interrupt. This saving in instructions, execution time (and the many problems of program testing) is very significant to the customer. The availability of software to handle the peripheral operations for the H-200 is not apparent in their present literature.

2. Arithmetic

UNIVAC 1050 - Decimal and Binary

Honeywell 200 - Decimal and Binary

IBM 1401 - Decimal only

1. In general, the systems are equivalent. The UNIVAC 1050 multiply and divide option is less expensive.
2. Binary arithmetic is generally faster and provides for storage of larger operands within less memory space. Also this feature can save space by indicating the condition such as: Active-Inactive or Male-Female, by assignment of 1 and 0 to the alternate conditions.
3. IBM may claim that a binary addressing scheme is harder to use and that this is the real reason for binary arithmetic. This would be partly right. However, reduced cost through more efficient use of memory in conjunction with increased speed more than justify the use of binary addressing. The use of an assembly system makes binary addressing simple.

3. Indexing and Index Registers

UNIVAC 1050 - 7 Index registers standard

Honeywell 200 - 6 Index registers optional - extra cost

IBM 1401 - 3 Index registers optional - extra cost

1. Index registers are standard in the UNIVAC 1050 and greatly enhance the basic efficiency of the system.
2. The use of index registers reduces the amount of coding necessary to process items. A simple change of an index register permits a series of instructions to be reused referencing a different item in memory.
3. The time for indexing will be approximately 3 cycles for

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3. Honeywell and IBM systems.
The UNIVAC 1050 Model III Processor will require 3 cycles, and the Model IV Processor will require 2 cycles.

4. Indirect Addressing

UNIVAC 1050 - No

Honeywell 200 - Yes

IBM 1401 - No

1. Indirect addressing serves a purpose similar to index registers. It is not generally as useful as indexing.
2. Indirect addressing is most useful to software writers as it allows them to fix the addresses for the interface between the program and software even though the software may be subject to change. This can also be done by recompiling, or by careful control and coordination among the software writers.

5. Column Binary Read Capability

UNIVAC 1050 - Standard

Honeywell 200 - Optional - extra cost

IBM 1401 - Optional - extra cost

1. A very useful feature that can mean savings in card volumes and processing time.

To illustrate: The UNIVAC PAL Assembly system will punch the object program out in binary at a rate of about 22 instructions per card. This means that a tray of single instruction per card instructions would make a deck about 1" thick. Think of the savings in storage, operator handling, read time, and punch time.

D. Internal Organization

1. Data Format

1. Variable by character or by bit in the UNIVAC 1050. Variable by character only in the 1401.

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| <p>D. 1)</p> <p>(continued)</p> <p>UNIVAC 1050 - Variable</p> <p>Honeywell 200 - Variable</p> <p>IBM 1401 - Variable</p> | <p>2. Length of fields must be indicated by word mark in the IBM 1401 and H-200. In the UNIVAC 1050 system the word length is indicated by the instruction that processes it. This is easier and more efficient.</p> |
| <p>2. Character Format</p> <p>UNIVAC 1050 - 6 Data Bits 1 Parity Bit</p> <p>Honeywell 200 - 6 Data Bits 1 Parity Bit 2 Punctuation Bits</p> <p>IBM 1401 - 6 Data Bits 1 Parity Bit 1 Punctuation Bit</p> | <p>1. The essential ingredients (6 data bits - 1 parity bit) are the same.</p> <p>2. Punctuation bits cost the customer in handling time, etc.</p> <p>3. The extra bits in the Honeywell 200 memory are equivalent to about 28% of its data storage capability - and the user pays for this inefficiency. The punctuation bits in the H-200 are not the result of advanced thinking but they are the direct result of Honeywell's interest in capturing a part of IBM's 1401s. UNIVAC offers the customer more - not just yesterday's techniques speeded up.</p> |
| <p>3. Instruction Format</p> <p>UNIVAC 1050 - fixed 5 character</p> <p>Honeywell 200 - Variable 1 to 8 character (Avg. = 6 character)</p> <p>IBM 1401 - Variable 1 to 8 character (Avg. = 6 character)</p> | <p>1. The fixed instruction format in the UNIVAC 1050 makes coding and program testing easy.</p> <p>2. Remember that in these computers essentially 3 character positions are required to reference a memory address; therefore, any two address instruction must contain 6 characters for address and at least 1 character for the function</p> |

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2. code - so the two address instruction must be at least 7 characters long and many will be 8 characters long. Instructions less than 5 characters are not used very often by the programmer.

Therefore, if we assume that one Honeywell two address instruction is equivalent to two UNIVAC 1050 instructions, the UNIVAC 1050 will require two extra characters per pair. However, this is offset by not having to deal with word marks, etc.

3. The single address instructions are more flexible. The UNIVAC 1050 has more, and more powerful instructions than either the H-200 or IBM 1401.

4. Channelization

UNIVAC 1050III - 3 Input-
Output channels standard
5 Channels - optional -
extra cost

Honeywell 200 - 3 Input-
Output channels standard -
1 optional - extra cost
(The channels tie into Input-
Output trunks. There may
be a maximum of 8 trunks
on a Honeywell 200
system.)

IBM 1401 - 1 Input-
Output channel standard

1. IBM's 1401s single channel is a source of many of their interlock problems.

2. Honeywell supplies fixed channels which can by program direction be associated with any one of the I/O trunks. The trunks are fixed to the peripheral devices. In this manner they are able to connect several subsystems to their basic three channels. There are situations where this can be an advantage such as the periodic use of the punch for error cards. However, only one subsystem may operate through a channel at a time so the time of subsystems that share the same channel can not be overlapped.

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3. To attain maximum utilization of the simultaneity in the Honeywell 200, with program assigned channel and trunk relationships, will be a significant programming problem. There is no evidence of any software to help the programmer with channel manipulation. Most Honeywell-200 programs will run with a fixed channel-trunk assignment which becomes the equivalent to straight channel connection and reduces simultaneity.
4. The UNIVAC 1050 with its system of fixed channel to peripheral assignments reduces programming problems and greatly improves the amount of simultaneity in the system.

5. Simultaneity

UNIVAC 1050 - - Can perform three to six*(depending on the number of channels) peripheral operations simultaneously with computation.

* even more operations may be performed simultaneously with the UNIVAC 1004 on-line.

Honeywell 200 - can perform three or four (depending on the number of channels) peripheral operations simultaneously with computation.

IBM 1401 - Computation is basically interlocked when

1. The UNIVAC 1050 System actually provides more possibilities for simultaneity than the Honeywell 200 System.
2. In the Model IV Processor, the percentage of time available for computations during simultaneous operations will be greater than with the Honeywell 200. (This is particularly true in the case of the card readers.)
3. To gain the maximum benefit of simultaneity, a system should have automatic interrupt and the software to deal with inter-rupts as they occur. The interrupt system informs the central processor of the precise moment when an additional function can

D. 5)

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any I/O operation takes place. Optional extra cost features such as processing overlap are available to mitigate, not eliminate these interlocks.

be processed by the peripheral device. This eliminates any time that might be lost by a misplaced "test" instruction. The software is needed to queue I/O requests and to provide for error detection and correction. Honeywell and IBM have both announced automatic interrupt but they have not defined its operational characteristics and there is no information available about any software that might be provided to handle input-output functions.

4. IBM is weak in this area, because of their single channel operation and because of the extreme amount of time that the peripherals take away from the central processor.
5. In the UNIVAC 1050 with the Model IV Processor, all peripherals may run simultaneously, except the FASTRAND unit, UNISERVO IIIA and UNISERVO IVC. These units may not run with each other but any one of them can run with all other peripheral subsystems. (See simultaneity charts in the UNIVAC 1050 Technical Abstract.)
6. The Honeywell 200 is restricted to three (standard) or four (optional) simultaneous peripheral operations because of their channel limitations. The UNIVAC 1050 with 8 channels is much more flexible and is capable of more simultaneous operations. The limit of simultaneity in the UNIVAC 1050 is

D. 5)

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6. determined by the ability of the central processor to sustain the transfer rates of the peripheral devices. In some cases, we are also limited because a particular type of peripheral utilizes a larger amount of transfer time in one continuous period. However, the UNIVAC 1050IV can, for example, have the reader, punch, printer, UNISERVO VIC read, UNISERVO VIC write, and communications all operating simultaneously with computation.

E. Features

1. Multiply and Divide -
Hardware

Optional, extra cost on the
three systems

1. The UNIVAC 1050 system has a lower price on multiply and divide option.

2. Compare Instruction

UNIVAC 1050 - Standard

Honeywell 200 - Standard

IBM 1401 - Optional, extra
cost

1. In general, the UNIVAC 1050 and H-200 are equivalent in this area.

2. IBM 1401 option is in truth a requirement for data processing.

3. Bit Manipulation

UNIVAC 1050 - Standard

Honeywell 200 - Standard

IBM 1401 - Not available

1. A useful feature when associated with Binary Image reading and punching (see C. 5.).

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| <p>4. Automatic Program Interrupt</p> <p>UNIVAC 1050 - Standard</p> <p>Honeywell 200 - Optional at extra cost</p> <p>IBM 1401 - Optional at extra cost</p> | <ol style="list-style-type: none">1. One of the most important features in modern computers. Without it - communications handling and concurrent programs are almost impossible and certainly impractical for a general purpose computer.2. Without automatic interrupt the programmer must test to see if he can give an I/O command. Consider the problem in the H-200 when using their 800 card/min. card reader.<ol style="list-style-type: none">a) To maintain rated speed, a read order must be given every 65 milliseconds.b) If an order is given before the proper time the computer will stall (wait) until the present I/O is completed.c) If an order is given too late, then the I/O equipment must wait until another card cycle starts to begin this order.d) How does the programmer get around this problem? He uses tests like those used in the Solid-State. They take useful time, useful memory, and are hard to place properly.3. Without automatic interrupt, concurrent peripheral programs are impractical. |
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E. 4)

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4. In the UNIVAC 1050 system our interrupt system allows the user to gain maximum throughput. After an I/O command is given, the interrupt occurs to indicate when more action need be taken with respect to the peripheral involved.
5. The UNIVAC 1050 system of software provides for the attainment of maximum throughput and concurrency. At present it appears that Honeywell is not providing this type of software so the user has more work to do in using the Honeywell system and is less likely to gain rated speeds.
6. Interrupt logic of this type is not really necessary on a single channel system like the IBM 1401. But on a computer of the power of the UNIVAC 1050 or Honeywell-200, it is necessary if the customer is to attain the full benefit of the hardware features. Automatic interrupt and its associated software must be designed and planned for the system from its inception. This is not logically an add-on feature. The information presently available on Honeywell's automatic interrupt is too sketchy to allow any analysis. However, the automatic interrupt feature without a comprehensive software package will not be a sufficient answer to the problems of peripheral simultaneity. The Honeywell LIBERATOR concept does not offer this peripheral

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simultaneity to the "liberated customers".

5. Editing Instructions

UNIVAC 1050 - Standard

Honeywell 200 - Optional at extra cost

IBM 1401 - Optional at extra cost

1. The UNIVAC 1050 editing commands appear to be more powerful and more flexible than either competitive system.
2. The UNIVAC 1050 provides more at less cost to the user - need we say more.

II. PERIPHERAL EQUIPMENT

A. Card Reader

UNIVAC 1050

800/900 cpm and 600 cpm

Honeywell 200

800 cpm

IBM 1401

800 cpm

1. The UNIVAC 1050 card reader is faster (900 cpm if 72 columns are read).
2. The slower speed card reader is offered to balance with customer's requirements and provide economy.
3. Standard features for the UNIVAC 1050 that are options on competitive subsystems -- again, more performance and less cost.

B. Card Punch

UNIVAC 1050

300 cpm and 200 cpm

Honeywell 200

250 cpm

IBM 1401

250 cpm

1. The UNIVAC 1050 card punch is faster. Software and automatic interrupt allow the customer to attain maximum utilization.
2. The slower speed provides opportunity for economy and balance with customer's data processing need.

C. Printer

UNIVAC 1050

600/750 lpm and 700/922 lpm
63 Printable Characters
128 Print Position Line
Print Buffer Optional, re-
quired with all but 600/750
lpm Printer or 600 cpm
Card Reader

Honeywell 200

900 lpm and 1260 lpm
56 Printable Characters
100 Print Positions Standard
132 Print Positions Optional,
extra cost
Print Buffer Standard

IBM 1401

600 lpm and 1285 lpm
48 Printable Characters
100 Print Position Line
132 Print Positions Optional
Print Buffer Optional, extra
cost

1. The printer will attain 922 lpm or (750 lpm) when printing the full range of alphabetic and numerics. Extensive use of special characters can cause slower speeds.
2. Honeywell's faster printer costs much more. If necessary, two printers can be attached to UNIVAC 1050 to yield a combined rate of 1844 lpm.
3. Larger standard print line and larger range of printable characters.
4. The 1401 is so interlocked that control of the faster printer will be difficult.
5. UNIVAC software and interrupt system make attainment of rated speeds much easier.

D. Punched Paper Tape Reader

UNIVAC 1050

1000 cps and 400 cps
5, 6, 7, & 8 channel tape

Honeywell 200

500 cps
5, 6, 7, & 8 channel tape

IBM 1401

500 cps
5, 6, 7, & 8 channel tape

1. The UNIVAC 1050 provides a much faster rate.
2. UNIVAC 1050 software, and automatic interrupt logic offer significant advantages.

E. Paper Tape Punch

UNIVAC 1050

110 cps
5, 6, 7 & 8 channel tape

1. The UNIVAC 1050 is equal to the H-200 in this area.
2. The 1401 speed is greater; however, this should not be a major consideration.

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Honeywell 200

110 cps

5, 6, 7, & 8 channel tape

IBM 1401

150 cps

5, 6, 7, & 8 channel tape

F. Magnetic Tape Units

UNIVAC 1050 1/2" width
UNISERVO IIIA 100-133 KC
UNISERVO IVC 22.5-62.5-90KC
UNISERVO VIC 8.5-24-34 KC

Honeywell 200 1/2" width
7.2 - 20 KC
16 - 44.4KC (IBM compati-
ble)
24 - 66.7KC
30 - 83.3KC

32KC 3.4" width
64KC (Compatible with
88.8KC other Honeywell
computers)

IBM 1401 1/2" width
729II 15-41.6KC
729IV 22.5-62.5KC
729V 15-41.6-60KC
729VI 22.5-62.5-90KC
Hypertape 34-168KC

1. UNIVAC has the highest transfer rate and packing density.
2. R/W/C is not presently available on UNISERVO IIIA and IVC. However, with the UNIVAC IIIA, our high packing density and speed tend to offset this feature.
3. Economy of the UNISERVO VIC coupled with R/W/C capabilities make this a most attractive tape unit.
4. Again, the availability of automatic interrupt and solid software will permit the user to gain maximum utilization of the tape units.
5. The higher density tapes on the 1401 are only used to attain compatibility in satellite situations. The 1401 central processor is too slow to fully utilize the higher speeds.

G. Random Access Storage

UNIVAC 1050 - FASTRAND
66 million characters/unit
up to 8 units/channel

1. We do not presently have a small modular mass storage unit. Therefore in this area we will be fighting lower priced competition.
2. Our advantage is that when large volume is needed, our

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Honeywell 200 Disc File (Bryant)
4-100 million/character
capacity
Drum File 2 - 21 million,
character capacity

IBM 1401 - 1405 Ramic - 20
million characters

1311 Disc Unit - 10 million
characters

2. cost/unit storage ratio is much cheaper than competition.
3. Check to see if the full needs of the customer are being covered - consider customer growth when several units of competitive modular memory are required - additional costs may make the FASTRAND unit a better bargain.
4. Consider other uses for excess storage, if any, such as substitutes for tape units, the possibility of instruction storage on the FASTRAND unit, etc.

H. Communications

UNIVAC 1050 - Standard
Communications Subsystem
up to 32 Simplex lines -
accepts all facilities pro-
vided by common carriers.

- low speed (up to 300 bps)
- medium speed (up to 1600 bps)
- high speed (2000-4800 bps)

Honeywell 200 - Single Channel
Communications control
(up to 5,100 character/sec.)
- multi-channel communica-
tion control (up to 300
characters/sec. in a single
channel)

IBM 1401 - IBM 1009 Data
Transmission Unit.

- Transmits at 150 character/
sec.

1. UNIVAC has more commercial experience in this area than any other competitor.
2. Both UNIVAC 1050 hardware features - automatic interrupt by channel - and the software are designed to implement processing of real-time communications oriented data processing.
3. Automatic buffering with automatic buffer swap, coupled with parity checking, end of message detection and many other advanced features make the UNIVAC 1050 system an outstanding system for communications processing.
4. Honeywell is new to this field - where and what software do they provide?
5. IBM 1401 is too limited and too costly.

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6. The ability to handle communication data is determined by internal processor speed and memory size - the UNIVAC 1050IV has more speed and memory and therefore more potential.

I. On-Line Satellite Computer

UNIVAC 1050

UNIVAC 1004 Card Processor

Honeywell 200 - None

IBM 1401 - None

1. The UNIVAC 1004 On-Line through an adapter provides the user with a whole new series of peripherals. Enhancements (faster speeds, tapes, etc.) have been made for the UNIVAC 1004 and these will be available to the on-line system.
2. The UNIVAC 1004 off-line will serve its normal functions on a main stay for tabulating functions.
3. The UNIVAC 1004 on-line provides the user with a second set of card and printer peripherals that can be of tremendous benefit - particularly for users with end-of-month processing peaks.
4. The computing capability of the UNIVAC 1004 can be used to relieve the UNIVAC 1050 of much of the work involved in data formatting, input balancing and validation, and print editing.