UNIVAC®
1004 III
SYSTEM

1. CONTENTS

2. INTRODUCTION

This publication introduces the UNIVAC 1004 III data processing system. The UNIVAC 1004 series is a recognized leader in the field of small scale data processing equipment. Now the unique power and versatility of UNIVAC 1004 data processing is augmented by the addition of magnetic tape storage and greatly increased speeds.

The UNIVAC 1004 III system offers a growth margin which is both practical and comfortable. It eliminates the need for massive card storage, expensive conversions, site preparation, and the inconveniences long accepted as a part of the expansion to tape systems. The UNIVAC 1004 III system offers compatibility: with Non Return to Zero tape systems recording at 200, 556, or 800 characters per inch (CPI); or with UNIVAC Return to Zero systems recording at 50, 125, or 250 CPI.

The UNIVAC 1004 III system can function as a fully self-contained data processing system, ideally suited for integrated processing, report generation, and data communications. Or, through its compatible tape formats, the system can be a versatile peripheral online to a large scale system. It displays tremendous power equally well offline for report preparation, editing, and formatting; freeing larger systems for more efficient processing utilization.

With powerful logical and arithmetic capabilities, compatibility with larger systems, and the ability to expand through additional equipment to meet new demands, the UNIVAC 1004 III system offers flexibility, power, and economy unmatched by any other system available today.

1

3. UNIVAC 1004 III SYSTEM

The UNIVAC 1004 III system consists of a processor, printer, and card reader in a central unit, and a separate magnetic tape unit (Fig. 1). A variety of optional input/output units is available including: card punch, read/punch, auxiliary card reader, paper tape reader, paper tape punch, the UNIVAC 1001 Card Controller and data communications devices.
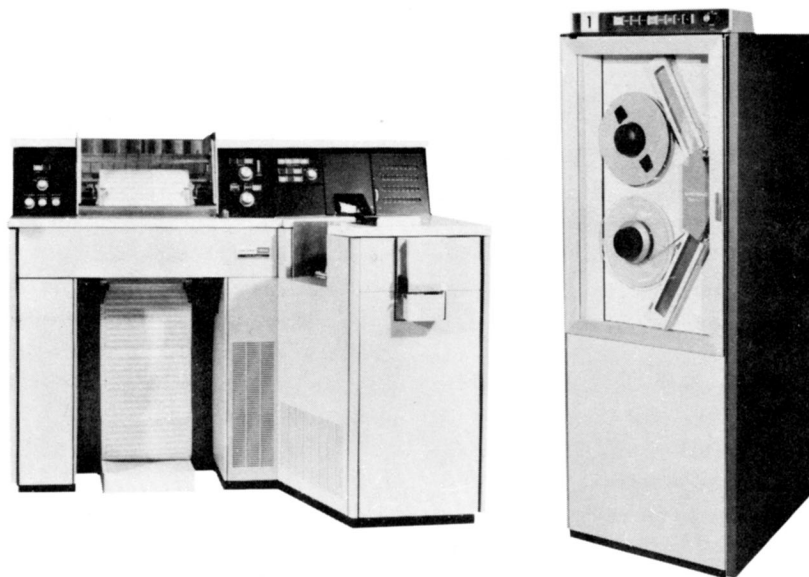

Figure 1. UNIVAC 1004 III System

PROCESSOR

The processor of the UNIVAC 1004 III system utilizes a magnetic core store containing 961 locations. An additional 961 locations can be added to increase core storage capacity to 1922 locations. Each location is capable of storing any one of 64 six bit characters. Any single location is directly addressable, and any number of adjacent locations is directly addressable as a single data unit. Portions of storage are allocated for input/output. These areas may be used freely as working storage when not in use for input/ output operations.

Programs proceed in segments called "steps". Several operations can be combined on a single step; up to 62 steps are available. It is possible to vary the operations performed on a given step during the program. Any step may include both processing and input/output operations. The processor automatically performs addition and subtraction (absolute and algebraic), comparison (absolute, algebraic, and alphanumeric), and transfers, which include a variety of editing operations. Characters or individual bits may be tested or arbitrarily inserted or superimposed in any storage location. Program branching is completely flexible.

UNIVAC 1004 III programs are wired on the 1004 Connection Panel. Programs wired for other models of the UNIVAC 1004 can be run without modification on the UNIVAC 1004 III system.

CHARACTERISTICS

CORE STORAGE — 961 or 1922 locations. Each location can store any one of 64 characters.

Full storage available for input, output, constants, intermediate results. No storage capacity required for instructions.

ADDRESSING — Any number of adjacent locations, from one location to entire storage, is addressable as a single data unit.

PROGRAMMING — Programming performed by Connection Panel wiring. Both processing and I/O operations can be performed on one program step.

SIMULTANEITY — Processing can occur simultaneously with card or paper tape punching, printer form advance, read/punch card reading, and read/punch card punching.

SPEED — 6.5 microsecond access time.

Typical arithmetic speeds:

Add two 8 digit fields:

0.130 milliseconds

Multiply 6 digit field by 4 digit field:

3.77 milliseconds

Compare two 6 digit fields:

0.104 milliseconds

Divide 6 digit field by 4 digit field for 3 digit quotient:

3.26 milliseconds

3

PRINTER

The printer is attached to the left of the processor (Fig. 2). Printing speeds up to 600 lines per minute may be obtained, with a maximum of 132 print positions per line. Character spacing is ten to the inch horizontally, with an option to the operator of six or eight lines to the inch vertically. Any one of sixty-three characters may be printed at each of the 132 print locations. Paper travel through the printer is controlled by a paper tape carriage control loop that may be punched in one or more of three channels. Paper tape carriage control loops are easily created and stored, and can be utilized for a variety of forms. Forms from 4 to 22 inches in width may be handled by the carriage. Forms up to 22 inches long can be controlled by the paper loop mechanism. Longer forms may be handled by programming.

CHARACTERISTICS

|			
PAPER STOCK	Forms from 4 to 22 inches wide may be accomodated by the carriage.	SPEED	Up to 600 lines per minute.
PROGRAMMED OPERATIONS	Print, print and space; page ejections.	SIMULTANEITY	Printing, punching and reading may all occur simultaneously.
PRINTABLE CHARACTERS	10 numeric; 26 alphabetic, and 28 special characters including space.	OUTPUT AREA	Assigned area in core storage, any part of which may be used as working storage when not in use for output.
DATA FORMAT	132 print positions per line, 10 characters per inch. Standard vertical spacing is 6 or 8 lines per inch with operator option.	REPRODUCTION SYSTEM	Hammer stroke against an etched drum.
		MAXIMUM NUMBER PER SYSTEM	One
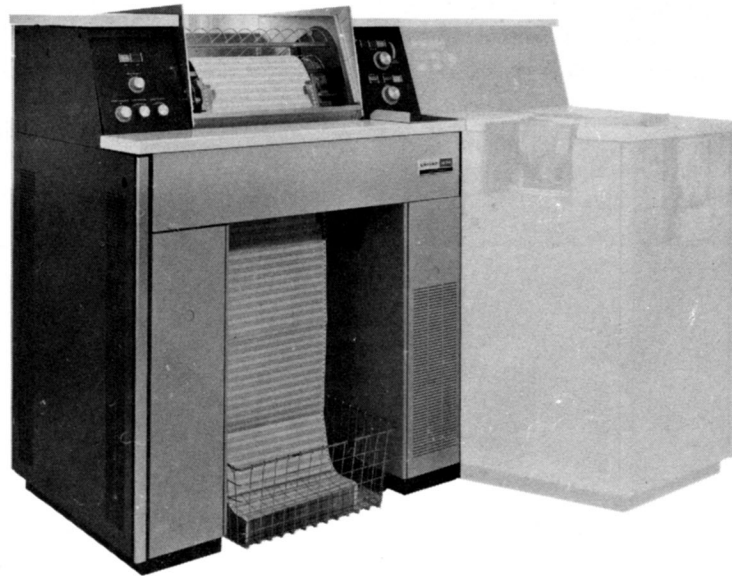
Figure 2. Printer
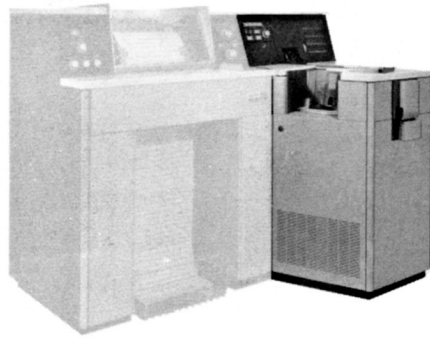
Figure 3. Card Reader

CARD READER

The card reader is located at the right front of the processor (Fig. 3). Cards are read serially at the rate of 615 cpm on a demand basis. The cards are read as they pass the read station made up of 12 photo cells. During reading, the card image is transferred to a section of the core storage assigned to card reading. This area of storage is referred to as read storage.

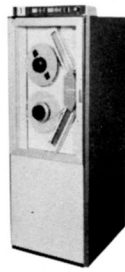The input magazine at the front of the read section has a capacity of approximately 1200 cards and is angled toward the centrally located operator controls for easy access. The card stacker, located above and to the rear of the input magazine, holds approximately 1,500 cards. A card is fed to the wait section where the direction of travel is altered to allow the cards to pass under the photo cells serially. After the card is read it is deposited "on end" in the card stacker.

80 Column, 90 Column or code image cards may be read.

CHARACTERISTICS

CARDS	80 Column, 90 Column, or code image cards (optional).	DATA PROTECTION	A light-dark photocell test is employed. The light test is automatically made between the reading of each card. If all photocell positions are not simultaneously reading (sensing light) during the card gap, an error condition is indicated and the processor is automatically stopped.
PROGRAMMED OPERATIONS	Cards are read serially and transferred into storage until program specified column is read. Data is available as it is entering storage and may be tested for control.		The dark test is also automatically made at the end of each card gap time, immediately following the light test. If at the end of card gap time all photocell positions do not indicate a dark condition resulting from the sensing of the leading edge of the next card, an error condition is indicated and the processor is automatically stopped.
SPEED	Up to 615 cards per minute.		
READ SYSTEM	Photoelectric reading. Demand basis; always a card at wait station to be read.		
SIMULTANEITY	Reading, printing and punching may occur simultaneously.		Checks for card misfeed as well as an empty input magazine and full stacker are also provided.
INPUT AREA	Assigned area in core storage, any part of which may be used as working storage when not in use for input.	INPUT MAGAZINE	1200 card capacity.
		STACKER	1500 card capacity.

a. UNISERVO VIC Magnetic
   Tape Unit.

b. UNISERVO A Magnetic
   Tape Unit.

Figure 4. Magnetic Tape Units

MAGNETIC TAPE UNITS

The UNIVAC 1004 III System is equipped with one of two types of magnetic tape unit: the UNISERVO A Magnetic Tape Unit, or the UNISERVO VIC Magnetic Tape Unit. Both units are available in single or dual models. Choice of unit and model will depend on user requirements.

Magnetic tape is used for permanent or temporary storage of large files. One 2400 ft. reel of UNIVAC 1004 III Magnetic tape is 10½'' in diameter, and holds data that would fill up to 160,000 cards, recorded on the UNISERVO VIC tape unit, and up to 65,000 cards, recorded on the UNISERVO A tape unit.

Magnetic tape reading and writing operations are controlled by the program. Input/Output areas may be any portion of core storage designated by the programmer. All magnetic tape operations can

be performed simultaneously with card (or paper tape) punching. Data checking includes character parity, automatically performed by both tape units. Necessary reformatting, processing, code conversions, etc., are performed by the program.

UNISERVO VIC Magnetic Tape Unit

The UNISERVO VIC Magnetic Tape Unit (Fig. 4a) provides the UNIVAC 1004 III system with the capability of reading and writing IBM compatible tapes at densities of 200, 556, and 800 CPI. No conversion on other equipment is required. When the dual model is used, it is possible to read or write any six level code at a given density on one unit, and another code at a different density on the other unit. Seven tape tracks are read and written; one parity and six data tracks.

CHARACTERISTICS

TAPE	Plastic tape in reels up to 2400 .		DATA TRANSFER SPEEDS	200 CPI	8,540 chars. per sec.
				556 CPI	23,741 chars. per sec.
TAPE SPEEDS	Read/Write Speed	42.7 inches per second.		800 CPI	34,160 chars. per sec.
	Rewind Speed	Less than 3 minutes.			
START/STOP TIMES	Read Start	15.1 ms.	DATA FORMAT	Variable blocks of 6 bit characters. Inter-block gap of 3/4''.	
	Read Start after Backspace	10.9 ms.			
	Read Stop	10.9 ms.*	PROGRAMMED OPERATIONS	Read forward, write forward, backspace one block, data ignore, erase before write, transport select, and rewind.	
	Write Start	9.3 ms.			
	Write Check	5.8 ms.			
	Write Stop	10.9 ms.*			
	Backspace Start after Read or Write	10.9 ms.	DATA CHECKING	Character parity, longitudinal parity, read after write.	
	Backspace Stop	10.9 ms.*			
	Transport Selection	6.0 ms.*	I/O AREA	Any area of storage designated by programmer.	

* *Indicates Processor is not interlocked.*

UNISERVO A Magnetic Tape Unit

The UNISERVO A Magnetic Tape Unit (Fig. 4b), used with the UNIVAC 1004 III System, is provided for users requiring compatibility with any UNIVAC system having the capability of reading and writing tape on the UNISERVO IIA tape unit.

Tape is read and written at densities of 125 or 250 characters per inch (CPI). The unit can also read tape written by a Unityper at a density of 50 CPI. The UNIVAC Return to Zero mode of recording is utilized to write 8 tape tracks: six data tracks, one parity track, and one sprocket track.

CHARACTERISTICS

TAPE	Plastic tape in reels up to 2400´.			DATA TRANSFER SPEEDS	50 CPI	5,000 chars. per sec.
	Metal tape in reels up to 1500´.				125 CPI	12,500 chars. per sec.
					250 CPI	25,000 chars. per sec.
TAPE SPEEDS	Read/Write Rewind Speed: 100 inches per second.			DATA FORMAT	6 bit characters. Block length and inter-block gap variable, depending on application.	
		125 CPI	250 CPI	PROGRAMMED OPERATIONS	Read forward, read backward, write forward, data ignore, transport select, and rewind.	
START/STOP TIMES	Start Time	20.25 ms.	13.50 ms.			
	Stop Time	18.00 ms.**	11.00 ms.**	DATA CHECKING	Character parity, block length check.	
	Tape Loop Reversal	600 ms.	600 ms.	I/O AREA	Any area of storage designated by programmer.	

** Processor interlock removed 1 ms. after last character is read or written.

4. PERIPHERAL EQUIPMENT

The UNIVAC 1004 III system can be expanded through the use of a wide variety of optional input/output equipment (Fig. 5). Eight different units are available, providing over sixty possible system configurations to meet exactly the requirements of the individual user. In addition to expanded card handling capacity, complete paper tape and data communication capabilities are available with the UNIVAC 1004 III system. All peripheral equipment is under control of programs wired on the standard UNIVAC 1004 Connection Panel.
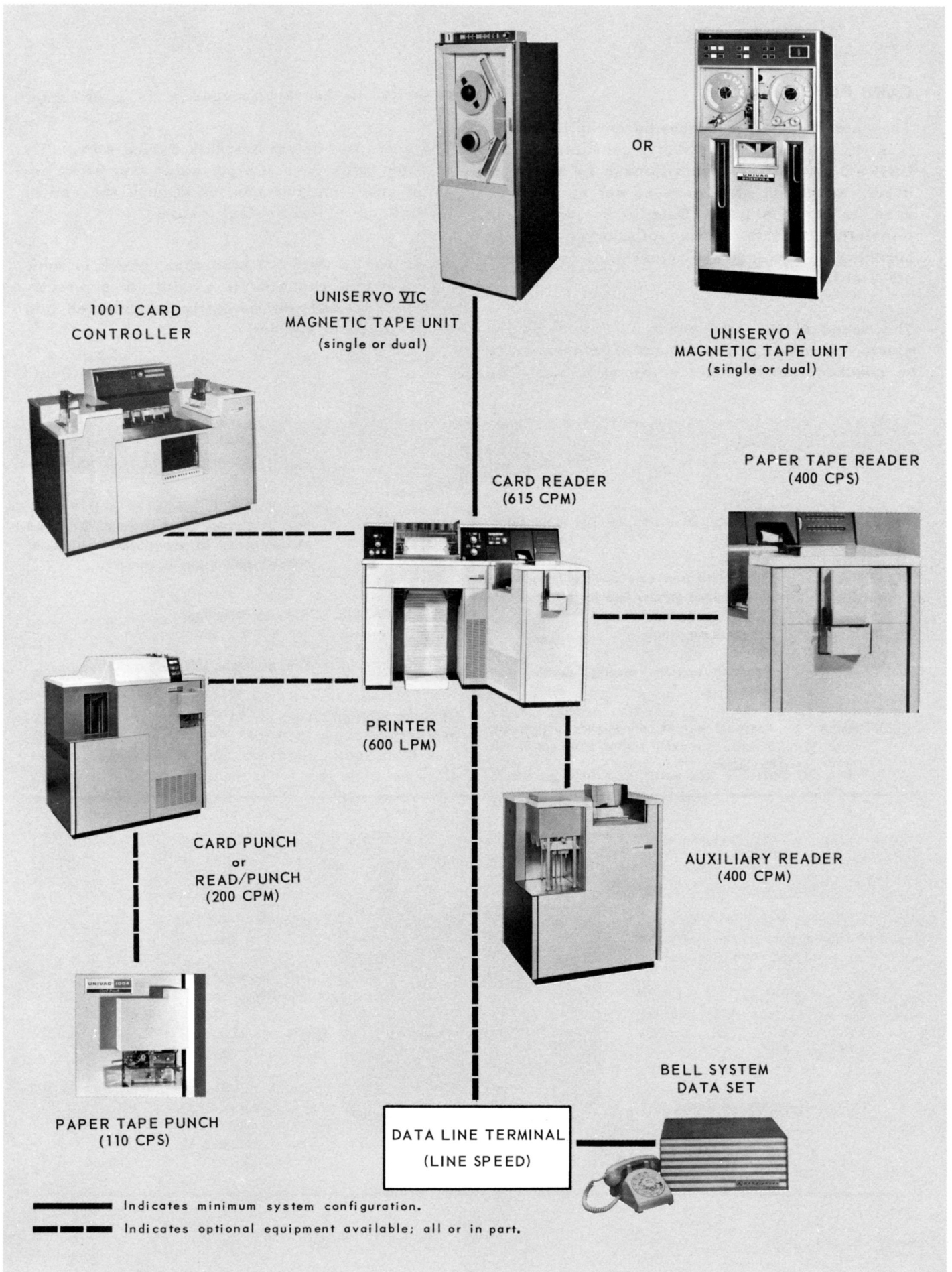
UNISERVO VIC
MAGNETIC TAPE UNIT
(single or dual)

OR

UNISERVO A
MAGNETIC TAPE UNIT
(single or dual)

1001 CARD
CONTROLLER

PAPER TAPE READER
(400 CPS)

CARD READER
(615 CPM)

PRINTER
(600 LPM)

CARD PUNCH
or
READ/PUNCH
(200 CPM)

AUXILIARY READER
(400 CPM)

PAPER TAPE PUNCH
(110 CPS)

BELL SYSTEM
DATA SET

DATA LINE TERMINAL
(LINE SPEED)

━━━━━ Indicates minimum system configuration.

━ ━ ━ Indicates optional equipment available; all or in part.

Figure 5. UNIVAC 1004 III System Configurations

9

CARD PUNCH

The card punch is available as an optional unit (Fig. 6). The punch is directly connected to the UNIVAC 1004 III processor through an electrical cable. A section of storage is set aside to be used as punch storage. Data to be punched is transferred to this section of storage prior to punching. Punching and processing may take place at the same time.

The speed of the card punch is 200 cards per minute regardless of the amount of information to be punched into the card a row at a time. The capacity of the input magazine is 1000 cards.

There are two output stackers having a capacity of 1000 cards each. Output cards can be segregated under program control through the use of the optional stacker select feature.

An automatic weighted hole count check is made on all cards punched. If a card is incorrectly punched, it will automatically be selected into the output error stacker.

CHARACTERISTICS

|			
CARDS	80 column, 90 column, or code image cards (optional).	DATA PROTECTION	Post punch hole count is made. Error card is transported to select stacker. Operator option to halt processor on error.
PROGRAMMED OPERATIONS	Punch data from core storage into cards. Select output stacker (optional).		
SPEED	200 cards per minute.	INPUT MAGAZINE	1000 card capacity.
SIMULTANEITY	Punching overlaps reading, printing and processing.	STACKERS	Two, each with 1000 card capacity.
OUTPUT AREA	Assigned area in core storage, which may be used as working storage when not in use for output.	MAXIMUM NUMBER PER SYSTEM	One.
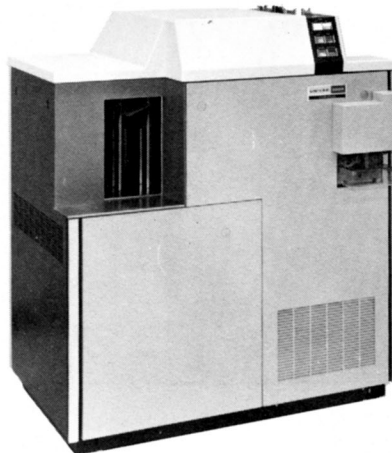
Figure 6. Card Punch
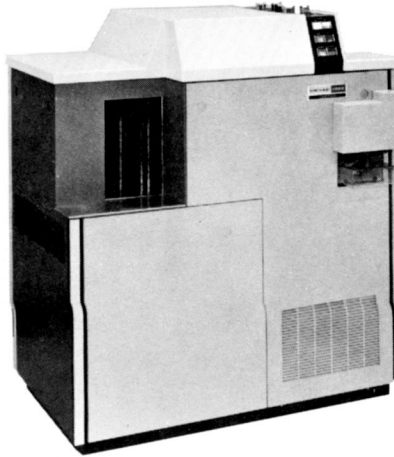
Figure 7. Read/Punch

READ/PUNCH

The read/punch unit (Fig. 7) reads input data from 80 or 90 column cards at a speed of 200 cards per minute, and punches output data into the same cards. The processor may also read 615 cards per minute concurrently, giving an overall card reading capability of up to 815 cards per minute.

Reading and punching are verified by a weighted hole-count check feature.

CHARACTERISTICS			
CARDS	80 column, 90 column or code image cards (optional).	INPUT/OUTPUT AREAS	Assigned areas in core storage, which may be used as working storage when not in use for input/output operations.
PROGRAMMED OPERATIONS	Read input data from, and punch output data into the same cards. Select output stacker.	DATA PROTECTION	Reading and punching are verified by weighted hole count at the post punch station.
SPEED	200 cards per minute while reading and punching.		
SIMULTANEITY	Read/Punch functions do not interlock processor; both reading and punching can overlap printing, processing and reading by the processor.	INPUT MAGAZINE	1000 card capacity.
		STACKERS	Two, each with 1000 card capacity.
		MAXIMUM NUMBER PER SYSTEM	One.

AUXILIARY CARD READER

The auxiliary card reader is a free-standing unit which can be cable-connected to a UNIVAC 1004 III processor (Fig. 8).

The maximum card feeding rate is 400 cards per minute, reading 80 or 90 column cards serially. The auxiliary card reader has an input magazine capacity of 1000 cards and three program selectable output stackers, each with a capacity of 1000 cards.

When the auxiliary card reader is used in conjunction with the read/punch unit, 3 input stations are available; processor reader, auxiliary reader and read/punch unit. The capability of reading cards in three different input stations provides the UNIVAC 1004 III system with power and processing capabilities unobtainable in many large scale data processing systems.

CHARACTERISTICS

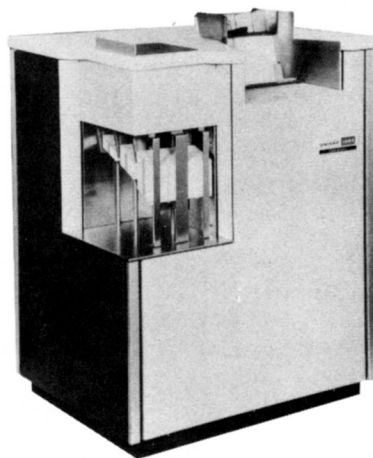|			
CARDS	80 column, 90 column or code image cards (optional).	INPUT AREA	Assigned area in core storage, any part of which may be used as working storage when not in use for input.
PROGRAMMED OPERATIONS	Card reading. Data is entered into core storage. Three program selectable stackers. Number of card columns to be read.	DATA PROTECTION	Light-dark test.
		INPUT MAGAZINE	1000 card capacity.
SPEED	400 cards per minute.	STACKERS	Three, each with 1000 card capacity.
SIMULTANEITY	Reading, punching and printing may occur simultaneously.	MAXIMUM NUMBER PER SYSTEM	One.

Figure 8. Auxiliary Card Reader
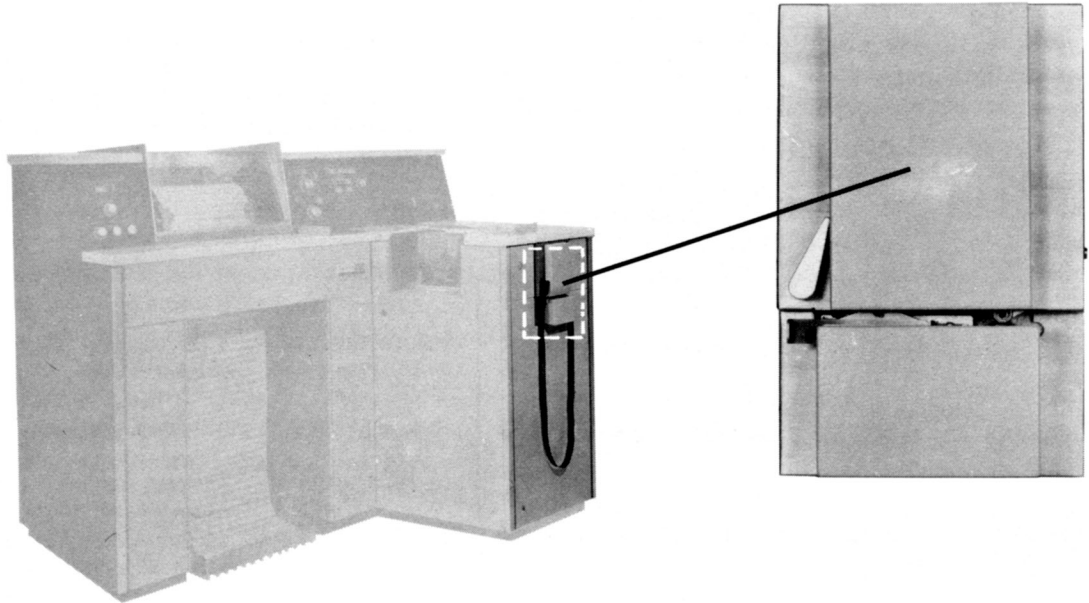
Figure 9. Paper Tape Reader (mounted on card reader)

PAPER TAPE READER

The paper tape reader is available as an optional unit (Fig. 9). It is located adjacent to and in front of the card reader. The unit utilizes a photoelectric read process and reads 5, 6, 7 or 8 channel paper or Mylar* tape. It reads variable length blocks (maximum 961 characters) into magnetic core storage at the rate of 400 characters per second while checking odd parity. Paper tape can be read while printing and punching. Loading paper tape to be read is accomplished by a short movement of a lever. Only chad tape is read. Parity error results in a signal available for corrective action.

CHARACTERISTICS

TAPE	11/16'', 7/8'' or 1'' Mylar* or paper chad tape.	READ SYSTEM	Photoelectric.
DATA FORMAT	5, 6, 7, and 8 level codes. 10 frames to the inch.	INPUT AREA	Assigned area in core storage which may be expanded by programmer. May be used as working storage when not in use for input. Size limited only by storage capacity.
PROGRAMMED OPERATION	Read data into core storage. Data is available for testing as it enters storage.		
SPEED	400 frames per second.	DATA PROTECTION	Parity check.
SIMULTANEITY	Tape reading, punching, and printing may occur simultaneously.	MAXIMUM NUMBER PER SYSTEM	One.

* Trademark of the DuPont Company

PAPER TAPE PUNCH

The paper tape punch (Fig. 10) is available as an optional unit. It is located on the right front of the card punch or read/punch. 5, 6, 7 or 8 level tape can be punched at a speed of 110 characters per second. The punch is manually adaptable for tape widths of 11/16 and 1 inch.

The punch makes its own sprocket holes, and may be loaded with blank tape in a matter of seconds.

| CHARACTERISTICS			
TAPE	11/16" or 1" paper or Mylar* tape.	SIMULTANEITY	Tape punching overlaps reading, printing and processing.
DATA FORMAT	5, 6, 7 and 8 level codes. 10 frames to the inch.	PUNCH SYSTEM	Die punch, produces chad tape.
PROGRAMMED OPERATIONS	Punches variable length blocks of data into tape.	OUTPUT AREA	Assigned area in core storage which may be expanded by programmer. Area may be used as working storage when not in use for output. Size limited only by storage capacity.
SPEED	110 characters per second.	MAXIMUM NUMBER PER SYSTEM	One.
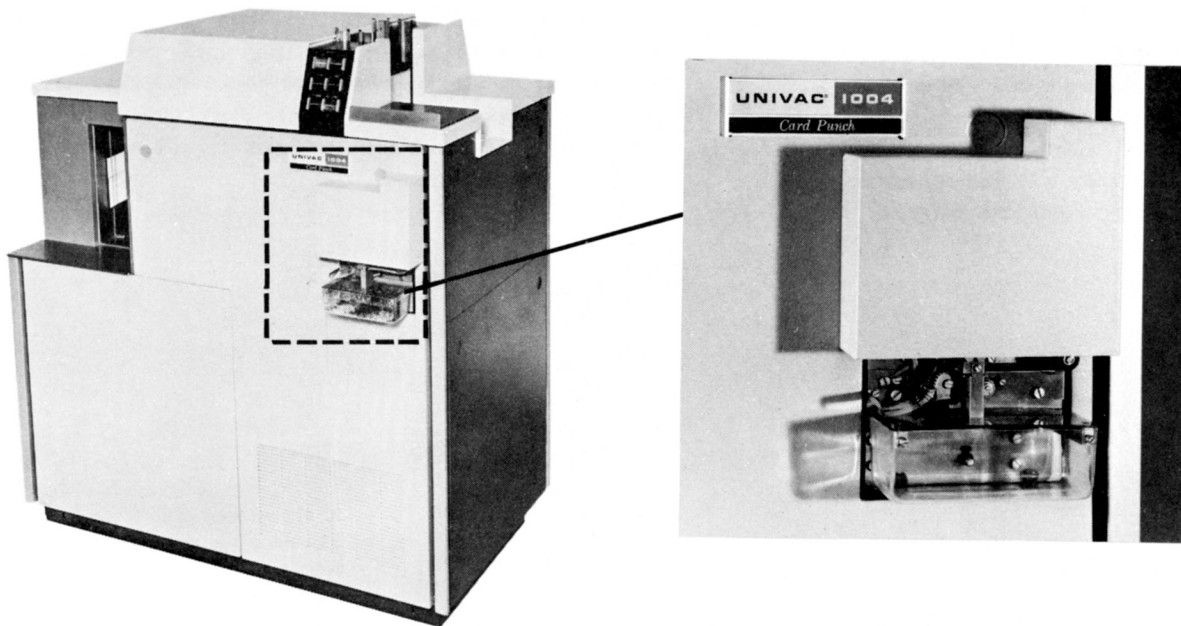
Figure 10. Paper Tape Punch (mounted on card punch)

* Trademark of the DuPont Company

DATA LINE TERMINAL

Type 1

The UNIVAC 1004 Data Line Terminal, Type 1, used in conjunction with a Bell 201A or 201B DATA-PHONE* Data Set (or equivalent), makes possible direct exchange of data between any two UNIVAC 1004 processors so equipped (Fig. 11). Information is transmitted via private or exchange telephone facilities. The communication link is established by ordinary telephone calling procedures, so that any UNIVAC 1004 processor equipped with Data Line Terminal, Type 1, is available to any other in minutes, regardless of location. With the requisite input/output equipment, any of twelve combinations of input and output format are available for the communication of data:

Figure 11. Data-Phone*
used with Data Line Terminal, Type 1

FROM	TO			
	MAGNETIC TAPE	CARDS	PAPER TAPE	PRINTED FORMS
MAGNETIC TAPE	■	■	■	■
CARDS	■	■	■	■
PAPER TAPE	■	■	■	■

Any two or more of these operations can be combined in a single program. Both the local and the remote UNIVAC 1004 systems are fully available for processing, editing, and formatting of communicated data.

Communication links can also be established with an appropriately equipped UNIVAC 490 Real-Time System or UNIVAC 1107 system. Speed of data transmission is approximately 285 characters per second, using exchange facilities and the 201A Data Set, or 342 characters per second using private lines and the 201B Data Set.

The Data Line Terminal, Type 1, consists of a single module attached directly to the frame of the UNIVAC 1004 processor, and a cable for connection to the DATA-PHONE* or equivalent set.

CHARACTERISTICS

DATA FORMAT	7 bit serial: 6 data bits, 1 parity bit.	DATA CHECKING	Character parity, longitudinal parity, message length.
PROGRAMMED OPERATIONS	Transmit, receive, acknowledge.		
SPEED	285 characters/second (exchange) 342 characters/second (private lines)	MAXIMUM NUMBER OF UNITS	One unit per system.
INPUT/OUTPUT AREA	Designated by programmer. May include entire storage, which remains available for use as working storage when not in use for data communication.	SIMULTANEITY	Punching, Read/Punch reading, and printer form advance can occur during message reception or transmission.

* Trademark of Bell System

15

Type 2

The Data Line Terminal, Type 2, provides the UNIVAC 1004 processor with the facility for telephone line communication with a remote magnetic tape terminal, the DIGITRONICS Dial-o-verter* Type 520. As with the Data Line Terminal, Type 1, leased lines or exchange facilities may be used. Through the DIGITRONICS D-520 Magnetic Tape Terminal, the UNIVAC 1004 III system is compatible with virtually all computing systems available today.

CHARACTERISTICS

|			
DATA FORMAT	8 bit serial: 6 data bits, 1 parity bit, 1 reference bit.	DATA CHECKING	Character parity, longitudinal parity, message length.
PROGRAMMED OPERATIONS	Transmit, receive, acknowledge.		
SPEED	250 characters/second (exchange) 300 characters/second (private lines)	MAXIMUM NUMBER OF UNITS	One unit per system.
INPUT/OUTPUT AREA	Designated by programmer. May include entire storage, which remains available for use as working storage when not in use for data communication.	SIMULTANEITY	Punching, Read/Punch reading, and printer form advance can occur during message reception or transmission.

Trademark of DIGITRONICS CORP.
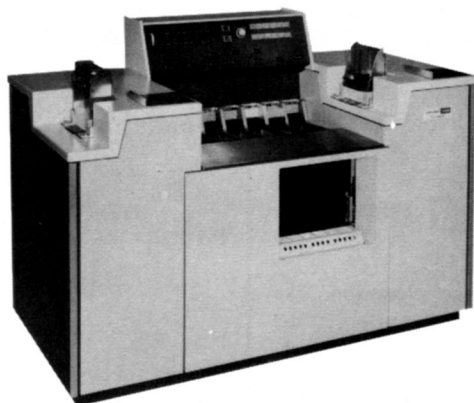
Figure 12. UNIVAC 1001 Card Controller

CARD CONTROLLER

The UNIVAC 1001 Card Controller (Fig. 12) is a high-speed, multi-purpose machine whose principal function is to arrange card files into groups or sequences required for subsequent processing. It is equipped with two card-input magazines, each capable of feeding cards at speeds up to 1000 cpm. Seven output stackers permit a wide selection as well as matching, merging, and other common collating operations.

The Card Controller includes 256 characters of core storage and a variable sequence of program steps. At the option of the user, any or all information in any card may be selectively stored for one or more cycles and compared as required by the specific application. Thus, the user is not restricted to an arbitrary number of available comparing positions nor to a fixed sequence of operations.

In addition to comparing, the Card Controller provides such processes as adding, subtracting, and transferring of the data entered. Thus the input data can be processed and manipulated into the form desired for output.

All operations of the Card Controller — card feeding, comparison, information storage, data processing, and stacker selection — are directed by the user through wiring of a removable connection panel.

With a UNIVAC 1001 Card Controller included in the UNIVAC 1004 III System, the unique abilities of each unit can be shared by the other units toward enhancing the efficiency of a common program. On the other hand, independent programs can be performed by the UNIVAC 1004 Processor and the Card Controller.

■ The Processor, while executing a program not related to that being performed by the Card Controller can call in the Card Controller for a routine or function to supplement the Processor program.

■ The Card Controller, while performing a program not related to that being executed by the Processor, can call in the Processor or any of its peripheral functions or equipment for a routine or function to supplement the Card Controller program.

CARD CONTROLLER

MODELS	80 Column, 90 Column, 80 Column-UNIVAC XS-3 24, 36 and 48 Program Steps.	PROGRAMMED OPERATIONS	Card feeding, stacker selection, comparing, sequence checking, adding, subtracting, transferring.
CARDS	80 Column, 90 Column, code image (optional)	ADDRESSING	Any number of adjacent locations, one location to entire storage, is addressable as a single data unit.
CHARACTERS COMPARED	64 Codes: blanks, 27 special characters, A-Z, 0-9		
CORE STORAGE	256 locations. Each location can store any one of 64 characters. Full storage available for input, output, constants, intermediate results. No storage capacity required for instructions.	PROGRAMMING	Programming performed by connection panel wiring. Both processing and I/O operations can be performed on one program step.
		MULTI-PROGRAM PANEL	Provides standard collating functions without programming.
CARD FEEDING	Two feeds — primary and secondary — 1200 card capacity each. Individual or simultaneous feed.	SPEEDS	Card feeding: 1000 cpm per feed. 2000 cpm simultaneous feed. Storage cycle time: 12 microseconds. Add/Subtract: 24 microseconds per digit. Compare: 24 microseconds per character. Transfer: 24 microseconds per character.
CARD RECEIVING	Seven stackers: three for primary selection, three for secondary selection, one for merging. Capacity 1500 cards each.		

UNIVAC