

## UNIVAC<sup>®</sup> 1108 Data-Processing System

### For the Business That Can't Wait

The UNIVAC 1108 Data-Processing System is being announced as *"... for the business that can't wait ..."* There are several reasons for this.

1. Immediate delivery on all available software. No waiting. The programming-language-oriented user can get operative immediately, using the programs he currently has. Special emphasis is laid on FORTRAN IV and COBOL.
2. Sooner delivery on hardware. UNIVAC 1108 hardware is scheduled for delivery a full ten months sooner than the hardware for the smaller end of the System 360; 22 months sooner than the hardware for the larger end of that line.
3. Full real-time capabilities. The 1108 can be equipped with a full complement of on-site and remote equipment necessary for full-scale real-time operation; unequalled speed and facility in concurrent processing operations.
4. Current and immediate compatibility with a full "family" of Univac computers from the relatively small 1004 configurations right on through the UNIVAC 1107. In terms of FORTRAN IV and COBOL, this systems compatibility carries over to the IBM 7000 Series, a prime market for 1108 potential.
5. Unmatched application flexibility. The 1108 is truly a general-purpose computing system, equally at home in business, scientific, engineering and governmental installations. No waiting. Switch from one application to the other, or, just as easily, handle many at one time.

## ANNOUNCING THE NEW UNIVAC 1108 DATA PROCESSING SYSTEM

### I. The Hardware:

#### A. Central Processor

##### 1. Control Store

The most advanced storage on the market today – used for arithmetic and index registers, for input/output access control, for other special controls and for auxiliary storage.

125 nanosecond cycle time.

##### 2. Core Store – word size – 36-bit plus parity in modules of 32,768, 65,536, or 131,072 words in two separately accessed banks.

750 nanosecond cycle time; dual bank operation provides 375 nanosecond effective cycle time.

add time = 750 nanoseconds.

##### 3. Externally Specified Index (ESI)

The UNIVAC 1108 provides all the real-time know-how embodied in the UNIVAC 490, the world's first commercial real-time system.

ESI incorporated in each I/O channel.

##### 4. Internal Function Command

A series of four new instructions intended for exclusive use by the Executive Routine for controlling multiprogramming operations. The purpose of the Internal Function Command is to provide several types of memory-bank switching. Also, the internal function register holds transitory information (such as arithmetic overflow and carry conditions) peculiar to a given program at the time of interrupt, (causing a program switchover).

##### 5. Load Memory Lockout

The 1107 memory lockout feature has been augmented in the 1108 to allow lockout selection in gradations of 1024 words. The expanded memory capacity of 131K words has been taken into account here. For those 1108 systems employing less than the maximum memory configurations, a memory lockout on the void memory locations is wired in.

##### 6. Double Precision – Floating Point Hardware. 1-bit sign, 11-bit characteristic, 60-bit mantissa. Built into the 1108 are 15 double precision instructions. Typical time of some of the instructions:

– Floating Add Double Precision – 3.38  $\mu$ s. (micro)

– Floating Multiply Double Precision – 4.125  $\mu$ s. (micro)

This is a fully normalized form of floating point; i.e., after an operation, the answer is always formed with the most significant bit shifted into the first (left-most) position of the 60 bit mantissa. The instructions that utilize this format are floating double precision add, subtract, multiply, divide, pack and unpack. The remaining double precision instructions are all fixed point. That is full, 72-bit, parallel arithmetic is performed. The format for the double precision fixed point employs at least one leading sign bit with all the remaining bits being significant bits. There is no sign bit prefixing the least

significant half of the double precision operand. It takes its sign bit from the most significant word.

7. Other New Instructions
  - a. Alphanumeric Compares
  - b. Left Shift Commands
  - c. Load B-register increment

Every instruction in the 1107 will be found in the 1108, with an execution time of about 5.3 times faster than in the 1107. In all there are 26 new instructions.

8. Complete program compatibility with the UNIVAC 1107
9. I/O Logic and Control

The I/O logic of the 1108 is the same as that of the 1107, with the following additional advantages:

  - a. An input/output transfer rate capacity of 5.3 times greater than the 1107.
  - b. Incorporation of ESI in the I/O to allow a full line of multiplexed communication and transaction devices to be operated on line.

The ESI I/O access control words are located in main memory, thus accomodating a very large number of multiplexed devices.
10. Guard Mode – a protective switch.

By turning on the guard mode the set guard mode instruction along with the I/O instructions and the memory lockout are rendered inoperative to the program. An attempt to execute any of these inviolate instructions will cause an interrupt back to the Executive Routine and also turn off the guard mode, thus allowing only the Executive Routine to use these commands.

## II. The Software

All elements of UNIVAC 1107 software will run on the 1108 without user modification. This is due to 1107-1108 compatibility rather than some software translation or interpretation routines.

The software items to be available are:

### A. Executive System

1. Real-Time capability
2. Multiprogramming capability
3. Control Card and Console keyboard control
4. Communication based software
5. Dynamic allocation of facilities
6. Hardware reliability testing

### B. Peripheral Symbionts

A full set of peripheral symbiont routines are provided for control and buffering of the card and printer subsystems.

- C. Program Library System  
The UNIVAC 1108 Library System is based on the field-proved features of the UNIVAC 1107 Exec II Program Complex File. Relocatable elements of coding resulting from assembly and/or compiler language may be combined into segmented programs.
- D. Assembler  
A powerful machine-oriented assembly language is provided with the 1108, interpreting a procedure language considerably more flexible than most macro languages.
- E. Compilers
  - 1. FORTRAN – The Fortran Processor provided with the 1108 interprets the Fortran IV language and generates a relocatable binary element, which can be combined with other relocatable binary elements. A listing is produced of the Fortran statements and the corresponding generated machine code expressed in pseudo assembly language. Extensive self-explanatory diagnostics appear on the listing when appropriate. Great care is taken to produce a highly efficient object code. A separate processor called LIFT is available for converting Fortran II programs to Fortran IV programs.  
Compile speed of thousands of statements a minute combined with the efficient object code make this the finest compiler available today with any system.
  - 2. COBOL – The 1108 COBOL Processor generates relocatable binary elements from the COBOL – '61 language as defined by CODASYL. Many electives are implemented as well as extensions. A listing of the source language vs. the object code produced is provided. The object code portion is expressed in pseudo assembly language. Diagnostic messages are produced on the listing. Compile speed of several thousand statements per minute make 1108 COBOL truly competitive.
- F. SORT/MERGE – The UNIVAC 1108 Sort/Merge program sequences an unlimited number of data items according to specified keys. Any of the present or new types of magnetic tape units or Fastrand may be utilized as the sorting media.
- G. Subroutines – mathematical, input/output, diagnostic, and miscellaneous subroutines useful in most computer installations will be furnished.
- H. Application Programs
  - 1. Pert/ Cost – The Pert/ Cost Programs are designed within the framework of the DOD/ NASA guide as interpreted by the United States Air Force Systems Command. This system will handle approximately 12,000 activities or events with provision for entering condensed sub-networks. A modular design allows report preparation without executing superfluous phases. To provide additional flexibility the runs comprising the interface with the user are written in COBOL to permit simplified user tailoring.
  - 2. Linear Programming – The Linear Programming package accepts an interpretive command language with full logical capability and the ability to prescribe "macro"

commands. the 1108 L.P. system uses the staged-pivot, product-form algorithm which, combined with the mass drum store, produces extremely rapid results. No intermediate tapes are required for saving partial results.

3. APT III Processor

A generalized APT - Language compiler with an extensive postprocessor library designed for automatic programming of numerically controlled machine tools, drafting machines and inspection machines.

The UNIVAC 1107 software is fully operational and completely available with the delivery of an 1108. Program testing and checkout for new users can begin on an 1107 at one of our Regional DPC 1107 Centers. Users can start operations at system turnover date.

III. Input/Output

- A. The standard 1107 peripheral subsystems are used with the 1108. These systems are listed on your current price list.
- B. Added to the 1108 line of peripheral equipment is the UNIVAC Standard Communication Subsystem now available with the 490.
- C. New Peripheral Subsystems available with the 1108:
  - 1. UNISERVO IVC - 90KC compatible tape units
  - 2. TACUS - 36 bit interface - R/W/C for IV UNISERVOS
  - 3. Tape Power Supply for 6 servos
  - 4. Fastrand II - twice the capacity of Fastrand
  - 5. 418 Satellite System

During the next 60 - 90 days additional new peripheral subsystems will be announced for the UNIVAC 1108.

IV. The Market Area

The UNIVAC 1108's total thruput power and speed at a highly competitive price combined with the operational software provides the most versatile computing system available today. The 1108 is equally suited to the business, scientific and military application.

The CDC 1600 and 3600 series users; the IBM 7000 series users are excellent UNIVAC 1108 prospects. Our COBOL Compiler and fast internal speeds with partial word operation provide exceptionally competitive advantages to the business user. The UNIVAC 1108 is a general purpose system not at all restricted to the complex scientific applications in which it excels. Don't overlook the trend to larger, on-line, real-time systems. UNIVAC offers experience in real-time, not just experimentation. The UNIVAC 1108 has the total system capability. Call on every 7000 user in your territory and present the UNIVAC large-scale system story.

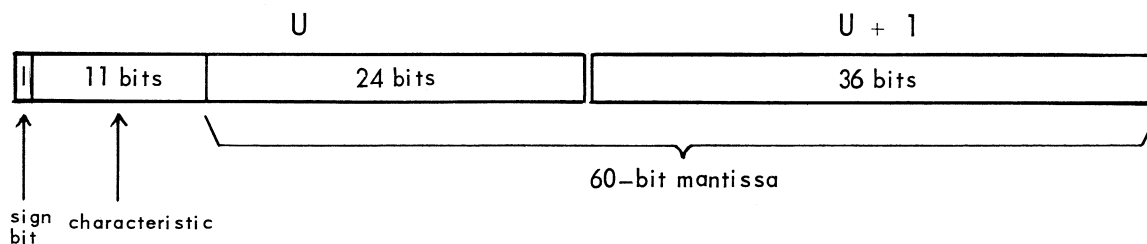
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Please see that for price information.

## Double Precision Arithmetic

Some of the most significant features of the UNIVAC 1108 are the 15 double precision instructions. These include both fixed and floating point operations. The double precision fixed point arithmetic operations are addition and subtraction in a full 72-bit form. This format requires at least one leading sign bit with all of the remaining bits being significant. Thus the range of double precision fixed point arithmetic is from  $+10^{21}$  to  $-10^{21}$  or, said another way, fixed point double precision on the 1108 yields up to 21 significant digits.

The double precision floating point arithmetic operations are addition, subtraction, multiplication, and division, with each operation employing two full 72-bit 1108 words. The double precision floating point format is a leading sign bit, an eleven bit characteristic and a 60-bit mantissa, organized as follows:



Note that there is no sign bit in the right-most (or least significant) word. This word has 36 data bits, contiguous with the 24 data bits of the high-order word.

The eleven-bit characteristic yields an exponential range of  $+1024 \leq K \leq 1024$ . The 60-bit mantissa has a range greater than  $+10^{18}$  to  $-10^{18}$  or, the double precision floating point yields up to 18 significant digits.

The double precision floating point operations are fully normalized; that is, the mantissa resulting from each operation is shifted left until the most significant bit is in the leftmost position. The entire mantissa is shifted and, for every position the mantissa is shifted left, the characteristic is reduced by one.

### **E.S.I. (Externally Specified Index)**

When multiple remote devices are multiplexed into the UNIVAC 1108 in a real-time mode, it is necessary to identify the devices involved, and it is preferable to make this distinction by circuitry rather than by a programmed routine. To accomplish this, the UNIVAC 1108 utilizes Externally Specified Indexing, better known as E.S.I., a design concept proved-in-use in the UNIVAC 490 Real-Time System. Each input-output channel on the UNIVAC 1108 will be equipped with E.S.I. thus allowing the Standard Communications Subsystem to be used.

When communication is desired between a remote device and the 1108, the external device involved determines the Index to be used. The Index specifically identifies a main memory buffer area to be used in the data transfers. With each device specifying a particular Index and with the E.S.I. access control words being located in main memory, data transfers are initiated, continued and terminated with a minimum of program interference.

## TO BE ANNOUNCED

During the next 60 – 90 days, a full list of Printers, Card Readers/Punches, Magnetic Tape Systems and additional Mass Storage will be announced.

## SUMMARY

Univac now enjoys its greatest opportunity to capture an appreciable percentage of the large-scale market.

The 1108 hardware is competitive in thruput and price – an unbeatable combination when added to fully operational software.

The UNIVAC 1108 packs the secret of controlled growth, smooth change and application flexibility. That secret is software. And software is what the 1108's got; an encyclopedic library of fully tested, fully de-bugged, fully operational software; the most comprehensive such library in the industry today, and that software is available now, immediately...

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