Honeywell Bull

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HONEYWELL BULL INTRODUCES NEW RANGE CALLED

SERIES 60 COVERING 10 COMPUTER MODELS

PARIS, 23 April 1974 -- Honeywell Bull today introduced a new series
of computers, which, the company said, clears the way for unlimited
growth by computer users for the next decade.

The new family of systems, called Series 60, consists of ten different
computer models grouped into four levels, with each optimized for
a specific set of user needs. Special hardware and software facilities
permit programs written for present Honeywell Bull products to operate
on the new series. This feature provides clear growth path opportunities.

The models span a price range of from $ 1, 000 to in excess of $ 100, 000
monthly rental.

The various levels within Series 60, in ascending order of power, are
designated Levels 61, 62, 64 and 66. There are from two to four models
of systems within each level. The entry Level 61 builds its architecture
and logic system on the heritage of the highly successful Honeywell Bull
Model 58 system. The upper end of the spectrum, Level 66, builds on the
powerful Honeywell Bull Series 6000 systems.

According to Jean-Pierre Brulé, Président Directeur Général of Compagnie
Honeywell Bull, the Series 60 will be the major element

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in the company's technical evolution over the next decade, and these models are the first of many systems within the Series 60 family to be developed. The hardware and software standards utilized within the Series 60, he noted, comprise the framework for all future Honeywell Bull computer systems.

The operating systems used at each level of functionality in Series 60 have been developed from proven "GCOS" design concepts, and they adhere to a common set of advanced programming standards which insure upward growth within the series.

In response to growing concern among computer users, legislators and the general public over the security of computerized records, the Series 60 incorporates many security features designed to prevent unauthorized access to computer files.

Mr. Brulé called the introduction "the major accomplishment of the corporate merger of 1970" -- a reference to the partnership agreement between Companie des Machines Bull and Honeywell.

Honeywell Bull engineers, in cooperation with their counterparts throughout the world, played a significant part in the development of the new series.

The various levels will be manufactured in France, Italy, United Kingdom and the United States. Their peripherals will be manufactured in the same countries plus Western Germany.

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FACT SUMMARY LEVEL 61   **Series 60 Entry System**

LEVEL 61 BUILDS ON POPULAR MODEL 58 SMALL COMPUTER

PARIS -- April 23, 1974 - The smallest member of the new Honeywell Bull Series 60 is the Level 61, which builds on one of the world's most popular computer developments, the Series 50.

Level 61, developed and manufactured in France, is specifically designed for small and medium sized firms and for decentralized operations of large organizations. It encompasses two types of systems which cover different needs :

- The 61/58 oriented towards "traditional" batch processing with additional direct access capabilities.

- The 61/60 multiaccess system giving several independent users (up to 16) dialogue simultaneously with the information contained in the computer. An original concept on a system of this size.

Both models run under the GCOS Operating System and are open to large teleprocessing networks. Like all Series 60 systems, Level 61 models will offer the new COBOL 74. Their versatility and performance is largely due to their unique architecture built around a hierarchy of specialized memories.

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At the entry level, the 61/58 offers various data entry media such as punched cards, marked cards, punched tape, visual display terminals, keyboard printers, storage on disks, magnetic tapes and editing on printers.

On the 61/58, a multiline controller provides connection for up to four local or remote terminals and a single line controller enables it to be connected to a large host system for use as an intelligent satellite capable of processing all local tasks and corresponding with the main office for transmitting and receiving data.

The highly versatile model 61/60 includes basically :

1. - A Front End Processor which manages the communications between the terminals and the central processor in a multi-programming mode ;

2. - Up to 16 terminals, used simultaneously, dispersed throughout the user's organization ;

3. - Network integration possibilities via an optional link to a host computer

The transactional processing ability of the 61/60 will carry along a number of major benefits to the user :

. Responsibility stays where it belongs. For example, the stock-clerk himself updates his inventory items file from his terminal. Like-wise, the bookkeeper records the payment directly from his desk to the computer. Both of them keep the entire responsibility for the whole operation ;

. Priority to terminal's users to cope with real-time requirements.

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. Easy integration within the user's company without major change
either in the organization or in the work procedures.

The use of a Front End Processor also means :

. Higher performances : the central computer is completely relieved
from the management of communication lines and terminals thus
allowing high data throughput rate ;

. Flexibility : the system is capable of handling various types of
terminals and communications procedures ;

. Security : the Front End Processor provides message checking
and inexpensive recovery routines.

The 61/60 Model exists in two versions : with or without card console.
This last version eliminates completely cards and classical batch approach
and brings EDP closer to human organization. This is particularly
attractive when decentralized responsibility is a must in large, medium
or small organizations.

System capabilities are adaptable to the company's specific operations,
manufacturing, distribution, accounting or a purely service-oriented
industry, the 61/60 can be tailored to the application.

The flexible high performance, easy-to-use 61/60 model offers all
features of tomorrow's computers.

Last, but not the least, these features are totally field retrofitable to
the present installed 58's throughout the world for which the
61/60 will represent a natural growth path. The choice of the number
61/58 and 61/60 has been intended to clearly underline this continuity.

DATA SHEET 61/60 TRANSACTIONAL SYSTEM

HARDWARE

I - CENTRAL PROCESSOR

a. - Microprogrammed ROM (Read Only Memory) : 10 K bytes ; access time 350 nanoseconds

b. - Processing memory : 10 K bytes ; basic cycle 1.2 microseconds

c. - Optional Extended Memory Store : 16 to 64 K bytes access time 1 millisecond / 288 bytes word

d. - Control and arithmetic unit

II - INPUT/OUTPUT CHANNELS

A. - External Input/Output Subchannels connecting :

- Disk subsystem :

. DSS 178 (2) :   46 MB ; expandable to 92 MB
. DSS 162 (2) : 5.7 MB ; expandable to 23 MB
            (double capacity is an option)
. DSS 070 (3) : 6.9 MB ; expandable to 9.2 MB

- Printer

. 100 and 200 lpm ;   96 or 128 print positions
. 400 and 800 lpm ; 136 or 160 print positions ;
optional double paper feed

- MTS 050 magnetic tapes (2 or 4 units - optional)

B. – Internal Input/Output Channels connecting :

- Optional Card Console Elements

. card reader : 100/200/300 cpm

. alphanumeric keyboard

. numeric pad

. buffered 6 (or 10) position numeric display

. optical mark reader : option on card reader

- Paper tape system (reader and/or punch)

- Card punch

III – FRONT END PROCESSOR

A. – Processor Unit

- MOS memory for communications management : 8, 12 or 16 K

- Input/output channel for connections with up to 16 terminals and to a host computer

- Alphanumeric keyboard

- Numeric pad

- Control keys

- CRT display screen : shows terminal status/programs under execution

- 2 cassette drives

When the central unit does not have the optional card console, the front end processor is always used for controlling the system.

B. - Desk Unit (MTI)

   - Multiport adaptors

      . asynchronous transmission

      . ASCII code

      . 8 buffered channels

      . 3 possible transmission speeds to be selected between 110 to 4,800 bauds

      . standard line interface CCITT V 24 (RS-232C) provides direct connection or telegraph/telephone connection of terminals

   - Synchronous channel adaptor

      . synchronous transmission

      . ASCII code

      . error detection : automatic CRC generation

      . selective automatic answer feature for automatic connection to host computer

      . transmission speed up to 4,800 bauds

      . standard line interface CCITT V 24 (RS-232C)

      . communication via telephone line : 2-wire switched or 2- or 4-wire dedicated

III - TERMINALS

A. - Teleprinters

      TTY 33   :   receiver/transmitter ; 8 bit ASCII code, 110 bauds ; optional paper tape punch

K33 RT/TS : receiver/transmitter with paper tape punch/ reader ; 8 bit ASCII code ; 110 bauds

TN 300 : impact printer ; receive/transmit ; 8 bit ASCII code ; 110, 150 or 300 bauds

B. - CRT displays

DTS 7200 : CRT screen with 25 lines of 72 characters ; 8 bit ASCII code ; 110 to 2,400 bauds

7513 : CRT screen with 25 lines of 80 characters ; 8 bit ASCII code ; 300, 1200, 2400, 4800 bauds

SOFTWARE

GCOS (General Comprehensive Operating System) Level 61 is the operating system for all Level 61 models.

Three fully compatible versions are available, the most sophisticated – GCOS Level 61-3 – running on 61/60 models :

1. - GCOS Level 61-3 is based on :

- Multiprogramming system – time-sharing technique using swapping method

- Simultaneity between processing, peripherals and transmission to/ from terminals

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- priority given to conversational terminal programs ; batch processing handled last

- automatic recovery procedure

- Automatic management of data files and program files

- Unlimited memory space available for each program handled in simultaneity

2. - Software functions divided between central processor and the front end processor

The front end processor handles terminal messages and waiting queue management freeing the central unit for importance tasks.

3. - Programming languages :

MiniCOBOL
ANSI COBOL 68
ANSI COBOL 74
FORTRAN
BASIC
GSAL

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FACT SUMMARY LEVEL 62   Series 60 small/medium system

MOVING UPWARD WITH THE NEW HONEYWELL BULL LEVEL 62 SYSTEM

PARIS -- 23 April 1974 -- Level 62 of the Series 60, introduced world-
wide by Honeywell Bull provides a new data processing system for medium
sized firms requiring compact yet sophisticated information processing
capabilities.

Developed and manufactured in Italy, the Level 62 is presented in two
models, the 62/40 and 62/60. They feature new hardware with state-of-
the-art MOS technology and extensive use of firmware, providing users
with a wide range of power and functionality unusual for a computer of
this size.

The new technology built into Level 62 has paved the way for some
revolutionary design improvements. Included is integrated circuitry
that is smaller and more efficient, and MOS memory that is more dependable
and easier to maintain.

Another advance is the use of firmware, simply defined, a hybrid of
software plus hardware -- the functionality of a software routine accessed
and executed at the speed of hardware -- which delivers to GCOS the full
power inherent in the Level 62 central processors and their extensive range
of peripherals

WORKING ENVIRONMENT :

Another important aspect of Level 62 is that the entire working environment

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is quieter and more confortable. Many components that formerly required separate cabinets, cable and floor space are grouped into a single desk size cabinet forming a compact, easy-to-manage system control center.

On the operator's console, there is an innovative tape cassette unit which can be used for a variety of purposes.

DISTINCTIVE SOFTWARE ACCOMPLISHMENT

Large teams of engineers, mathematicians and other technical experts with extensive background in medium systems software development and support worked for years to develop the Level 62. The GCOS concepts of the Series 6000 system was harmonized by their efforts with the compact hardware design of the Level 62.

GCOS Level 62, based upon the key concepts of activity streams, multi-programming, dynamic memory management, and fail soft operations, insures the best use of system resources, and increases throughput. Activity priority scheduling ensures that user's highest priority job is given the resources it needs, avoiding "traffic jams" that can slow or even halt processing.

Dynamic memory management together with peripheral device independance insure maximum utilization of system resources. Fail soft operations insure continued normal processing even if certain system resources fail. In addition both models of Level 62 have an integrated I/O control unit. This means that up to six input/output operations can be executed simultaneously while pro-grams are running in main storage.

Another Level 62 system feature is in the method of handling data commu-nications. An integrated data communications controller permits building of a communications network, driven with simple COBOL statements.

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DATA MANAGEMENT :

Data management techniques are becoming more important for integrating related information and for retrieving data quickly and efficiently. Level 62, using high-capacity, fast-access disk devices, lets the user employ any of three different file retrieval methods, an orientation ably supported by the fast internal processing speed of Level 62.

Data processing systems have become increasingly important in recent years. Company success depends more and more on the availibility of the results of information processing. This increasing independance demands that the system perform accurately and be available when needed.

Reliability was a major design objective for Level 62 systems.

They have built-in features to assure high up-time and virtually error-free performance. The arithmetic operations plus many of the internal logic operations are run through parallel circuits ; results of the twin executions are compared for accuracy. Also, the GCOS system automatically protects against programming errors and hardware failures, and it reconfigures the system to work around a failed memory module or peripheral with minimum intervention.

For data security, GCOS limits the access to data so that the data on mass storage files will not be destroyed through error and unauthorized people will not have access to sensitive data. In addition, Level 62 systems automatically re-enter data in the event of input/output errors.

PERIPHERAL FLEXIBILITY :

The wide variety of peripheral equipment connectable to Level 62 enables the user to configure a system which exactly matches his requirements.

PERIPHERAL DEPENDABILITY :

All of the peripherals available with Level 62 incorporate the same high
standards of reliability, integrity and maintainability. All moving parts
are easily accessible for preventive maintenance and specially designed
hardware allows anticipatory diagnostics to be performed. In addition,
devices can continue to operate after detecting and reporting most errors
while the unit's high quality components and design techniques insure a
very long mean time between failures.

PERIPHERAL CONTINUITY :

Many of the peripherals available with Level 62 are connectable to the
other performance levels of Series 60 ... just another aspect of Level 62,
designed to protect the user's data processing investment, should long
term growth requirements take him up to the next level of Series 60
functionality.

MASS STORAGE DEVICES :

Available on both Level 62 models, the smaller of the two disk units provides
an easy low-priced entry into disk processing together with the potential
for quick efficient growth. It provides a basic on line storage capacity of
17.4 million bytes and has a transfer rate of 312,000 bytes per second. It
can be easily upgrated on site to above 46 million bytes. The larger disk
unit, available on the model 62/60, provides a basic capacity of 58.4 million
bytes which can be expanded to a total on line storage capacity of 116 million
bytes.

Designed for flexibility and software compatibility, the recording format
used on the smaller unit is identical to that used on the larger device.

MAGNETIC TAPE UNITS :

The cluster family of magnetic tape units supports data on half inch
seven or nine track magnetic tape. These drives, available on the model
62/60, offer two recording methods : Phase Encoded (PE) at 1600 bits
per inch and Non-Return-to-Zero (NRZ) at 200, 556 and 800 bits per
inch. Data can be read or written at speeds up to 60,000 bytes per
second.

LINE PRINTERS :

One or more line printers can be connected to a Level 62 at the speeds
of 400, 600 or 800 lines per minute each, and their full productivity is
reached by the "System Output", a software feature than insures high
performance in a multiprogramming environment.

PUNCHED CARD DEVICES :

Level 62 punched card devices for 80 column cards provide a reading
capability of either 600 or 1050 cards per minute and a punch capability
of 100 cards per minute.

PAPER TAPE EQUIPMENT :

Supplied as a free-standing paper tape reader or a combined reader/punch,
Level 62 paper tape equipment makes available reading speeds of 600 or
1000 characters per second and a punch speed of 110 characters per second.

COMMUNICATIONS :

Level 62's controllers communication give the potential for controlling
up to 9 communication lines in any mix of synchronous and asynchronous
modes of transmission.

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SUMMARY OF LEVEL 62 CHARACTERISTICS

	MODEL 62/60			MODEL 62/40		
Central Processor						
Main storage capacity (KB)	64 - 128			64 - 88		
Main storage cycle (uS)	1.0			1.0		
Bytes fetched/cycle	2			2		
Storage type	MOS			MOS		
Control memory type	ROS			ROS		
I/O channels	6			6		
Maximum I/O rate (MB/sec)	1.8			1.8		
Data communication controllers						
– integrated	4 lines			4 lines		
– additional	5 lines			–		
Console printer (CPS)	30			30		
Mass storage	MSU011X	MSU0310		MSU011X		
Capacity/drive (MB)	11.6	29.2		11.6		
Drives/system	2 or 4	2 or 4		2 or 4		
Transfer rate (KB)	312	312		312		
Magnetic tape	MTU0100	MTU0200				
Type	CLUSTER	CLUSTER				
Recording method (type)	PE/NRZI	PE/NRZI				
Recording density (bpi)	200 to 1600	200 to 1600				
Transfer rate (KB)	30	60				
Drives/system	2 or 4 or 6	2 or 4 or 6				
Printers	PRU0400	PRU0600	PRU0800	PRU0400	PRU0600	PRU0800
Speed (lpm)	400	600	800	400	600	800
Type	DRUM	DRUM	DRUM	DRUM	DRUM	DRUM
Print positions	120/132	120/132	120/132	120/132	120/132	120/132

	MODEL 62/60			MODEL 62/40		
Card equipment	CRU0600	CRU1050	PCU0120	CRU0600	CRU1050	PCU0120
Function	READ	READ	PUNCH	READ	READ	PUNCH
Speed (CPM)	600	1050	100	600	1050	100
Columns	80	80	80	80	80	80
Tape cassettes						
Capacity (KB)		600			600	
Transfer rate (Bytes/sec)		700			700	
Drives/system	1 standard 1 optional			1 standard 1 optional		
Paper tape	PTU0600	PTU1000	PTU0110	PTU0600	PTU1000	PTU0110
Function	READ	READ	PUNCH	READ	READ	PUNCH
Speed (CPS)	600	1000	110	600	1000	110

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NEW LEVEL 64 COMPUTERS FOR SMALL SYSTEM USERS SEEKING

EXPANSION

PARIS -- 23 April 1974 -- Among the wide range of computer equipment
presented in the Series 60, introduced today by Honeywell Bull, the Level
64 systems are particularly suited for small system users with an eye
for expansion.

Developed by the Paris engineering staff and manufactured in France,
Level 64 features permit users of Honeywell Bull Series 100 and
Series 200 to transfer all present programs and files immediately while
building a large data base, telecommunications networks and reactive,
event-driven processing systems for future needs.

The Level 64 includes two models of processing systems : the 64/20
and the 64/40.

These state-of-the-art systems are the result of a well-balanced combi-
nation between successfully implemented concepts derived from the Series
6000 large systems and new concepts developed by R & D teams.

The user can enter smoothly into the environment of the new Level 64
operating system through the use of program modes which permit the
Level 64 systems to assume multiple identities. In addition, powerful
conversion tools are available.

Integrated peripheral processors function independently of the central
processor to control communications lines, unit record devices and
mass storage. The result is maximum throughput and a significant decrease
in central processor workload.

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A large number of high performance peripherals enables the user to process information on all type of data supports.

Built-in diagnostics, duplicate circuitry, isolation test routines, main memory reconfiguration, error checking and correction are the guarantee of a maximum system integrity.

Primary benefits of the Level 64 are speed, reliability and ease of use. Productivity, another major benefit of Level 64 systems, is obtained by the extensive use of firmware which goes well beyond the traditional role of microprogramming. The management of processing by firmware routines, for example, avoids software overheads in a multiprocessing environment. Firmware also plays a key role in distributing intelligence to the peripheral processors.

The GCOS Level 64 operating system, designed in tandem with the new units, permits the development of new applications, making full use of a comprehensive integrated data base. The software's data communication capability will also be able to bring information processing to key personnel wherever they are located.

Level 64 systems within Series 60 represent a long term commitment to the user to safeguard his information system development.

COMMON CHARACTERISTICS :

The user receives the benefits of advanced concepts immediately but they are visible to the user only when he needs them. These features include :

- Automatic dispatching and synchronization of processes

- Segment relative addressing

- LSI MOS memory with a cycle time of 1 microsecond per four bytes

- Fast read-only control store with an access time of 175 nanoseconds per four bytes

- Central processor circuitry capable of five simultaneous operations

- Three or four 1.25 million bytes per second input/output channels

- Integrated but logically independent peripheral processors to control mass storage and unit record devices

- An optional, independent processor to control magnetic tape devices

- Optional control of up to 14 communications lines

MEMORY SUBSYSTEM :

Both the Model 64/20 and Model 64/40 use large-scale-integrated metal-oxyde semiconductor technology throughout the memory subsystem. This modern technology makes the memory fast, compact and reliable. The memory subsystems of both models have a cycle time for a read or full-write operation of one microsecond per four-byte word.

The basic memory size is 64 K bytes on the 64/20 (K 1024) and 96 K bytes one the 64/40.

In each case, the memory is expandable above the basic size in modules of 32 K bytes.

To ensure data integrity at all times, extensive use is made of auto-correction bits throughout the memory subsystem. Every time information is fetched into or out of the memory subsystem, the validity of the data is checked. A byte with a single-bit error is automatically corrected. If there is a double-bit error, the hardware retries the operation before notifying the software.

If a hardware failure is detected in the memory subsystem, the 32 K-bytes containing the failure can be bypassed by re-initializing the system.

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CENTRAL PROCESSOR :

On the Model 64/20 and 64/40, the central processor is one of several processors which together control the total system. The functions of the central processor include :

- Addressing the memory subsystem

- Storing information in the memory subsystem and retrieving it

- Arithmetic and logical processing of data

- Sequencing instructions in the desired order

- Initiating communications between the memory subsystem and other parts of the system

The central processor is byte-oriented but can handle a variety of data formats : bytes, half-word, word, double-word and four-word.

CONTROL STORE :

All the central processor functions are achieved by microprograms. Most of the microprograms reside in a very fast, bipolar memory – the control store – with an access time of 175 nanoseconds per four bytes.

LOGIC UNIT :

The microprograms, made-up of microinstructions, are executed by group of separate units mutually connected by a four-byte-wide bus. These units, together called the logic unit, each perform a distinct part of the overall processing function. This design allows a number of processing operations to take place simultaneously. Up to five microinstructions can be executed in parallel in a total time of 500 nanoseconds.

Data integrity is the paramount consideration in processing. Every time access is made to a store or information is transferred from one unit to another, the parity of the data is checked. Whenever the system is initialized, special firmware routines test the logical operation of all parts of the central processing unit.

CHANNEL BUFFERING UNIT :

A channel buffering unit provides 16-byte buffers between each of the input/output channels and the central processor. The channel buffering unit obtains maximum possible throughput from the input/output channels and allows all input/output channels to operate simultaneously.

PERIPHERAL CHANNELS AND PROCESSOR :

Each group of peripherals attached to a Model 64/20 or 64/40 system is controlled by its own microprogrammed processor. These processors have their own read-only memory, read/write memory, and arithmetic unit, allowing the execution of microprogrammed functions at peripheral subsystem level. This structure considerably reduces the amount of time spent on input/output operations by the central processor and allows peripheral operation to be completely simultaneous with central processing.

Connecting the peripheral processors to the central processors are high-speed channels, each capable of operating at 1.25 million bytes per second. The peripheral processors combine with the channel buffering unit of the central processor to multiplex data over these channels.

PERIPHERAL SUBSYSTEMS :

A peripheral subsystem consists of a peripheral processor, the peripheral devices and attachments. Two peripheral subsystems, the mass storage and the unit record subsystems are always present on a Level 64 system. A magnetic tape subsystem is optional.

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MASS STORAGE SUBSYSTEM :

The mass storage devices on a Level 64 system are controlled by
the mass storage processor, integrated within the central system.

The Integrated Mass Storage Processor can control a number of
different types of mass storage unit.

UNIT RECORD SUBSYSTEM :

Peripheral devices in the unit record subsystem of a Level 64
system include data communication lines as well as such devices
as card equipment, printers, paper tape equipment and a console.
These devices are controlled by the Integrated Unit Record
Processor, a processor integrated within the central subsystem.

PERIPHERALS :

Among a wide variety of peripheral devices available, are
the PRU1200 and PRU1600 Line Printers both use a print belt,
mounted in a lightweight, interchangeable cartridge. The flexibility
of the character support on these belts overcomes the smearing
effect common to many high-speed printers and gives good quality
print at all times. Print cartridges are available in a variety of
character sets and arrangements, and a standard feature of the
printer allows the user to select different cartridges for different
applications.

When using a 48-character set, the PRU1200 has a rated speed of
1200 lines per minute and the PRU1600 has a rated speed of 1600
lines per minute. The standard line width of 136 print positions can
be increased to 160 print positions by adding an optional feature.

Both these printers are designed to ensure a pleasant operating environment. Features such as the fully motorised stacker, clearly illustrated operating instructions and internal lighting make them convenient and simple to operate.

COMMUNICATIONS HARDWARE :

Series 60 data communications philosophy is that message processing software should be independent of the communications control function : thus decreasing the data communication overhead of the central processor system and increasing the overall throughput. To this end, the Level 64 systems use an independent control element to handle data communications networks.

This control element, the DCC4100 Communication Controller, controls up to fourteen communications lines in any mix of synchronous and asynchronous modes of transmission and at speeds of from 45.5 to 19,200 bits per second. It comprises processing hardware, communications hardware, and special communications firmware.

MAGNETIC TAPE SUBSYSTEM :

On both the Model 64/20 and Model 64/40 systems, the magnetic tape subsystem is optional but a magnetic tape addressing channel is integrated with each central system. A type MTP0200 (64/20 and 64/40) or MTP0300 (64/40 only) Magnetic Tape Processor can be attached to it.

The magnetic tape processor can have a number of optional features attached : to read and write tapes in Series 100 or 200 formats, to control seven-track tape units as well as the standard nine-track tape units, and to control tape using the non-return-to-zero (NRZ) mode, as well as those using the standard phase encoding (PE) mode. The MTP0300 provides two levels of access to the magnetic tape units.

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SUMMARY OF LEVEL 64 CHARACTERISTICS

MEMORY SUBSYSTEMS

Sizes	:	64K to 160K on 64/20
		96K to 256K on 64/40
Rated Cycle Time	:	1 microsecond for four-byte-Wide Access
Characteristics	:	Uses Large-Scale Integrated Metal-Oxyde Semiconductor Technology

CENTRAL PROCESSORS

Components	:	Control Store, Logic Unit and Channel Buffering Unit
Characteristics	:	Features Extensive Use of Firmware, to Execute Instructions, Perform Task Dispatching and Synchronize Processing
		Up to Five Firmware Microprograms Can Execute Simultaneously in the Logic Unit
		Channel Buffering Unit Handles Input/Output Initiation

PERIPHERAL CONTROL

Included in both Models	:	Mass Storage and Unit Record Channels and Processors ; Magnetic Tape Channels ; Console/Communications Device Capability
Required on both Models	:	Console with Serial Printer
Available on both Models	:	Single-Access Magnetic Tape Processor

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Available on 64/40   :   Dual-Access Magnetic Tape Processor
                           (Requires Additional Channel)

Characteristics   :   Peripheral Processors Perform All Input/
                           Output Control Except Initiation and Buffering
                           Channels All Rated at 1.25 Million Bytes per
                           Second

PERIPHERALS AVAILABLE

Mass Storage   :   Up to Four (64/20) or Eight (64/40)
                           Series 60 Mass Storage Units Plus
                           Up to Four Selected Series 100 or
                           200 Units

Communications   :   Up to Fourteen Lines

Magnetic Tape   :   Up to Eight Decks

Other   :   Up to Five Ports Available on Unit
                           Record Processor

FACT SUMMARY LEVEL 66   Series 60 Large System

HONEYWELL BULL INTRODUCES FOUR LARGE COMPUTERS MODELS

IN THE SERIES 6000 TRADITION

PARIS -- 23 April 1974 -- Series 60 - Level 66 is the designation given by Honeywell Bull to a range of large system computers introduced today, among the most powerful and advanced which exist in the electronic data processing industry.

The physical structure of the Level 66 information system evolved from the powerful and highly successful Series 6000 line, introduced three years ago, and in world-wide service.

Four new models in Level 66 provide for continuing and compatible upward system expansion by users. These are designated in order of ascending power : 66/20, 66/40, 66/60 and 66/80.

Each model in the Level consists of all new hardware modules, and is controlled by the highly productive GCOS operating system.

The Level 66 features four new central processors with increased computing speeds, a redesigned, high capacity System Controller and new metal oxide semiconductor (MOS) memory, new Input/Output Multiplexer (IOM) with increased modularity, and new peripheral devices and microprogrammed processors for more versatile controls. Two models of the new DATANET 6600 Front-End Network Processor offer cost-effectiveness over a wide range of data communication requirements.

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PROCESSING FOR DIVERSE NEEDS :

The General Comprehensive Operating Supervisor, GCOS Level 66 directs the hardware and operating software to perform their assigned tasks, in concurrent multidimensional processing mode.

Utilizing the same data base, local and remote batch processing, trans- action processing, message switching, time-sharing, direct program access, and management query operating modes are supervised by GCOS. GCOS further controls system diagnostics and preventive maintenance concurrently with processing activities to achieve the best possible system availability.

Level 66 systems also feature high security and protection of information, a basic requirement for this class of system.

SYSTEM COMPONENTS TAILORED TO THE WORKLOAD :

Processing within the Level 66 is handled by the System Controller, Central Processor, Input/Output Multiplexer, Peripheral Processors, and the Front-End Network Processor.

Several of each of these components can be configured in a system. This is a feature by which GCOS dynamically tailors the system to the workload, increases the throughout and availibility, and reduces turnaround time.

SYSTEM CONTROLLER :

The system controller is the principal interface between the other central system components. It provides complete system interrupt control, which regulates communication between components and services all demands on memory under priority control.

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MEMORY UNIT :

The Level 66 MOS memory is configured in memory units of 65,536 words each, with a total cycle time from 1.4 microseconds to 750 nanoseconds, depending on the model. The Level 66 can have four memory units (65,536 words each) per system controller and four system controllers can provide a total capacity of up to 1,048,576 words (4,194,304 bytes).

CENTRAL PROCESSOR :

Many advanced capabilities of the Level 66 are provided by the central processor. It has full program execution capability, and conducts all actual computational processing within the system.

Specific functions in which overlap can occur, provide a high rate of instruction execution.

PROCESSOR ORGANIZATION :

The Level 66 central processor is organized into three functional units in Models 66/20 and 66/40.

1. – The control unit which interfaces between the operations unit and the system controller

2. – The operations unit which performs arithmetic and logical functions

3. – The decimal unit which performs variable length fixed and floating point decimal arithmetic, and bit and byte string instructions (including instructions for processing bytes, BCD characters, packed decimal data, and bit strings).

An additional unit for the 66/60 and 66/80 consists of a high speed processor cache memory as a buffer within the central processor.

Cache memory contains 512 four-words blocks, each of which mirrors the contents of a four-words block of main memory. The cache contents are controlled by a four-level, set-associative address mapping technique, and a first-in-first-out algorithm.

Any address preparation by the central processor of instructions or data located both in main memory and cache memory result in the access of cache rather than main memory. This reduces access time and increases the effective processor speed. Cache memory implemen-tation strategies are transparent to the user program.

INPUT/OUPUT MULTIPLEXER :

The Input/Output Multiplexer (IOM) interfaces peripheral processors and DATANET 6600 Front-End Network Processors, with the system controllers. The IOM can operate many devices of different speeds concurrently. Data transfer between I/O devices and memory is accomplished by the IOM in parallel with program execution.

PERFORMANCE CHARACTERISTICS :

- Peak transfer rate exceeds 4 million characters (2.7 million bytes per second) for the 66/20 and 66/40. (6 million characters and 4 million bytes for the 66/60 and 66/80)

- Peak transfer rate for an individual channel exceeds 1.3 million characters (1 million bytes per second)

- Scratchpad storage for control words (optional on lower end models)

(more)

The IOM offers complete memory protection for all I/O data transfers. Each data channel, under the control of the user program's base address setting, functions independently. Parity is generated/checked on all information passed between the system controller and the peripheral subsystems.

PERIPHERAL PROCESSORS :

The Level 66 uses three peripheral subsystem processors : the Mass Storage Processor, Magnetic Tape Processor, and Unit Record Processor. Peripheral units are radially connected to these processors, thereby providing a high degree of reliability and availibility.

The Mass Storage Processor provides for fast access and large capacity storage required for multidimensional processing.

Two dual channel mass storage processors can be crossbarred to give four simultaneous channels from the IOM to as many as 32 mass storage units. These four simultaneous channels provide high throughout while the built-in backup and program control functions provide high system reliability.

The Magnetic Tape Processor has proven performance features. It handles the automatic translation of ASCII, BCD, EBCDIC, and straight binary code.

The Unit Record Processor multiplexes as many as seven logical channels to separate unit record peripherals through a single channel of the IOM. These peripherals include a card reader, card punch, and two line printer models.

DATANET 6600 FRONT-END NETWORK PROCESSORS :

DATANET 6600 Front-End Network Processors (FNP's) perform the

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remote data communications networking functions for the system. The FNP which interfaces with the IOM uses advanced operating software, the Network Processing Supervisor (NPS). Up to four DATANET 6600 FNP's can be configured on the system.

Honeywell Bull has pioneered and advanced front-end, remote, and free-standing data communications processing for more than a decade. During this time, Honeywell Bull's DATANET Network Processors have successfully served information systems users throughout the world.

SUMMARY OF LEVEL 66 CHARACTERISTICS

	66/20	66/40	66/60	66/80
MOS memory sizes (bytes)	327,880 to 1,048,576	524,288 to 2,097,152	786,432 to 4,194,304	1,048,57 to 4,194,30
Main memory cycle time (microseconds per eight bytes)	1.4	1.4	0.75	0.75
Processors per system	1	1 or 2	1 to 4	1 to 4
1/O throughput (millions of characters per sec.)	3.8	7.6	24	24
High speed buffer (cache memory)	no	no	yes	yes

MASS STORAGE

Units per subsystem	Up to 32
Storage capacity per subsystem (millions of bytes)	63 to 566

MAGNETIC TAPE

Handlers per subsystem	16
Transfer rate (thousands of bytes per second)	Up to 320

COMMUNICATIONS

Communications lines per DATANET 6600 Front-End Network Processor	Up to 380