

# CYBER 170 Series 800 Computer Systems

**GD**  
CONTROL  
DATA

## Architectural Overview



## The Individual Models

### The Model 825

The model 825 is a compact, air-cooled machine. The central processor is micro-coded and is a serial processor (that is, it has a unified arithmetic unit, and instructions are executed one at a time). It contains instruction lookahead registers that can hold up to two instruction words beyond the current instruction.

Central memory consists of 64K MOS chips. Sizes range from 262,144 words to 1,048,576 words available in increments of 262,144 words (initial increment) and 524,288 words (subsequent increment). It is organized in four independent banks. Memory can be partitioned into central memory and unified extended memory.

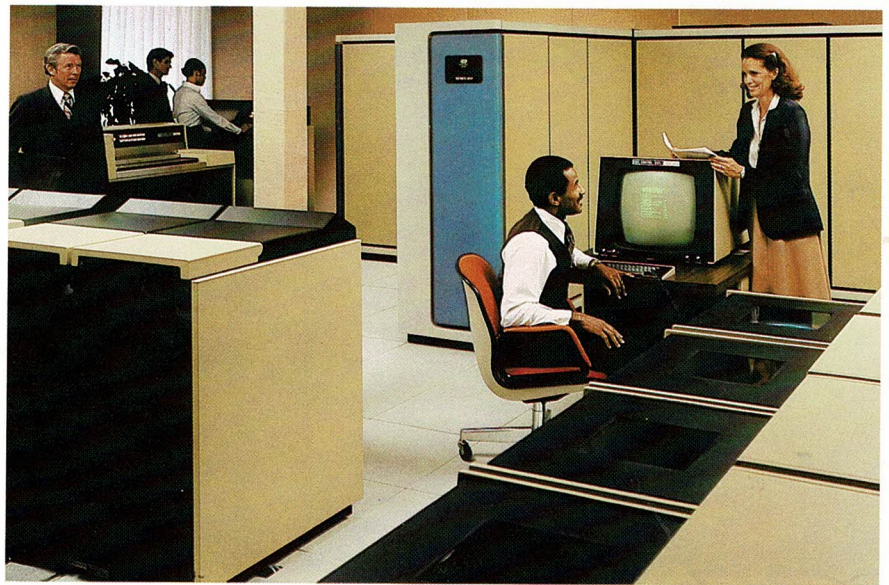


Model 825

### The Model 835

The model 835 is a liquid-cooled machine approximately two and a half times faster than the model 825. The central processor is microcoded and is a serial processor (that is, it has a unified arithmetic unit, and instructions are executed one at a time). It contains instruction lookahead registers that can hold up to three instruction words ahead of the current instruction in the regular program sequence and two instruction words in a branch sequence. It also contains a 2048- or 4096-word cache memory that holds the most recently accessed central memory words.

Central memory consists of 16K MOS chips. Sizes range from 524,288 words to 2,097,152 words available in increments of 524,288 words. It is organized in eight independent banks. Memory can be partitioned into central memory and unified extended memory.



Model 835



Model 855

### The Model 855

The model 855 is a liquid-cooled machine approximately seven times faster than the model 825. The central processor is microcoded and is a serial processor (that is, it has a unified arithmetic unit, and instructions are executed one at a time). It contains instruction lookahead registers that can hold up to six instruction words ahead of the instructions contained in the current word in execution. If a branch condition occurs, the assumption is made that the branch will be taken, and lookahead proceeds accordingly. The central processor also contains a 2048- or 4096-word cache memory that holds the most recently accessed central memory words.

Central memory consists of 16K MOS chips. Sizes range from 524,288 words to 2,097,152 words available in increments of 524,288 words. It is organized in eight independent banks. Memory can be partitioned into central memory and unified extended memory.



Model 865 (Single Central Processor)

### The Model 865

The model 865 is a liquid-cooled machine approximately eleven times faster than the model 825. The central processor is a parallel processor; that is, it has nine functional units, each with separate logic, that can work simultaneously. Therefore, it is possible for the central processor to execute multiple instructions at the same time. The functional units perform Boolean arithmetic, floating-point arithmetic, 60-bit integer arithmetic, normalize operations, shift operations, population counts, and increment operations. As an example, in a parallel processor, a multiply operation may be started and, one clock period later, an add may be started. The central processor contains an instruction stack that can hold up to 12 instruction words. The stack can be reread and thus supports small program loops.

The model 865 offers, as an option, a second central processor. It is similar in operation to the first central processor but totally separate with individual access to central memory and the capability of executing the entire instruction set.

Central memory consists of 16K MOS chips. Sizes range from 262,144 words to 1,048,576 words available in increments of 262,144 words. It is organized in eight independent banks. Extended memory, if used, can be a partition of central memory and/or extended semiconductor memory (ESM) up to 2 million words. The model 865 supports the DEMA subsystem with ESM and high-performance 885-42 disk storage units.



Model 865 (Dual Central Processor)

## The Model 875

The model 875 is a liquid-cooled machine approximately 15 times faster than the model 825. The central processor is a parallel processor; that is, it has nine functional units, each with separate logic, that can work simultaneously. Therefore, it is possible for the central processor to execute multiple instructions at the same time. The functional units perform Boolean arithmetic, floating-point arithmetic, 60-bit integer arithmetic, normalize operations, shift operations, population counts, and increment operations. As an example, in a parallel processor, a multiply operation may be started and, one clock period later, an add may be started. The central processor contains an instruction stack that can hold up to 12 instruction words. The stack can be reread and thus supports small program loops.

The model 875 offers, as an option, a second central processor. As in the model 865, the second processor operates in a manner similar to the first processor but totally separate with individual access to central memory and the capability of executing the entire instruction set.

Central memory consists of 4K bipolar memory. Sizes range from 262,144 words to 1,048,576 words available in increments of 262,144 words. It is organized in sixteen independent banks. Extended memory, if used, can be a partition of central memory and/or ESM up to 2 million words. The model 875 supports the DEMA subsystem with ESM and high-performance 885-42 disk storage units.



*Model 875 (Single Central Processor)*



*Model 875 (Dual Central Processor)*

## Peripheral Equipment

The Series 800 computer systems offer a wide range of peripheral equipment. With the exception of ESM and the 885-42 disk storage subsystem, the following devices are supported by every model.



7040 Extended Semiconductor Memory

### 7040 Extended Semiconductor Memory

Extended semiconductor memory (ESM) is a cost-effective extension to central memory available on the models 865 and 875 only. ESM improves performance through faster turnaround, better response to remote terminals, and increased storage capacity for large programs. ESM is available in sizes up to 2 million 60-bit words. Direct 60-bit connections between central memory and ESM provide transfer rates up to 10 million words per second.

ESM can be shared between mainframes and, in such configurations, functions as a high-speed link device for shared mass storage. The DEMA (direct extended memory access) subsystem requires ESM. (DEMA is described under Extended Memory in the section, Memory.)



885-11/12 Disk Storage Subsystem

### 885-11/12 Disk Storage Subsystem

The 885-11/12 Disk Storage Subsystem consists of 885-11 and/or 885-12 Disk Storage Units and associated controller(s). The 885-11 can be accessed by one controller and the 885-12 unit can be accessed by two controllers. Controllers can be connected to the same mainframe, or to different mainframes. Each unit contains two nonremovable head/disk assemblies that are accessed independently. Each head/disk assembly has a capacity of 692 million 6-bit characters, giving a total capacity of 1.38 billion characters per unit. The burst data transfer rate to or from a head/disk assembly is 9.58 million bits per second; the average data transfer rate for large blocks is 7.40 million bits per second.

### 885-42 Disk Storage Subsystem

The 885-42 Disk Storage Subsystem, available on the models 865 and 875 only, consists of one or more 885-42 Disk Storage Units and associated controller(s). The 885-42 unit is a four-head parallel disk unit that can be accessed by two controllers. Each unit contains two nonremovable head/disk assemblies that are accessed independently. Each head/disk assembly has a capacity of 692 million 6-bit characters, giving a total capacity of 1.38 billion characters per unit. The burst data transfer rate to or from a head/disk assembly is 38.3 million bits per second; the average data transfer rate for large blocks is 29.6 million bits per second.

The 885-42 subsystem combines with ESM and special software to make up the DEMA (direct extended memory access) subsystem (described under Extended Memory in the section, Memory).



885-42 Disk Storage Subsystem

### 844 Mass Storage Subsystem

The 844 Mass Storage Subsystem consists of 844-41 and/or 844-44 Disk Storage Units and associated controller(s). The 844-41 unit can be accessed by two controllers and the 844-44 unit can be accessed by four controllers. Controllers can be connected to the same mainframe or to different mainframes. Each unit contains a removable Model 883 Disk Pack that has a capacity of 237 million 6-bit characters. The burst data transfer rate to or from a disk pack is 6.45 million bits per second; the average data transfer rate for large blocks is 5.55 million bits per second.



844 Mass Storage Subsystem



*Network Access Device*

## **Loosely Coupled Network**

A Loosely Coupled Network (LCN) is a subsystem that uses a coaxial cable to link a CDC mainframe with:

- Other CDC mainframes
- An IBM or IBM-compatible mainframe running MVS/JES2 or JES3
- A DEC mainframe running RSX 11

Control Data mainframes that can be linked are:

- CDC CYBER 170 Series machines
- CDC CYBER 70 Series machines
- 6000 Series machines
- CDC CYBER 205 vector processor

Software support of the LCN subsystem is provided by Remote Host Facility (RHF) software.

An LCN consists of two or more network access devices (NADs), at least one NAD per mainframe, and one or more trunk assemblies. They provide a maximum theoretical transfer rate of 50 megabits per second. A maximum distance of 900 meters (3000 feet) between mainframes is possible.

NADs are microcoded and include a buffer memory that allows integration of many different devices operating at different rates. Memory is 64,000 bytes of storage used by controlware and buffer areas for data transfer operations.



*677 and 679 Magnetic Tape Transports*

## **677 and 679 Magnetic Tape Transports**

The 677 and 679 Magnetic Tape Transports are single-capstan systems featuring automatic reel hub latching, cartridge load, automatic threading, and power-operated windows. The 677 unit supports 7-track tapes recorded at densities of 556 or 800 bits per inch (bpi) in NRZI recording mode. The 679 unit supports 9-track tapes recorded at densities of 800 bpi NRZI, 1600 bpi phase-encoded (PE) recording mode, or 6250 bpi group coded recording (GCR) in read or write recording mode. Tape speeds are 100, 150, and 200 inches per second, allowing transfer rates up to 1,250,000 characters per second (in 6250 GCR mode). Density of 6250 bpi decreases human handling time, reduces physical storage requirements, and reduces tape costs. In addition, units that operate in 6250 bpi GCR mode have automatic gain control, which dynamically adjusts to a variety of tape qualities and results in improved throughput.

## 2551 Series Network Processing Unit

The 2551 Series Network Processing Unit (NPU) is the communications controller between the host computer and all terminals. It includes a communication processor, 98,000 to 128,000 words of memory, and loop multiplexers interfacing to communication line adapters. The 2551 NPU is modular in design and can be configured to support a variety of protocols, line speeds, and network sizes.



2551 Series Network Processing Unit

## 580 Line Printer Subsystem

The three models of the 580 series of line printers offer speeds up to 1200, 1600, and 2000 lines per minute. High speed is achieved by rapid acceleration to and deceleration from maximum skip speed. All of the models print 136 columns and all feature programmable format control. Horizontal character pitch is 10 characters per inch; vertical pitch is six lines or eight lines per inch. The 580 Line Printer requires the removable CDC 596 Train Cartridge.



580 Line Printer Subsystem

## 405 Card Reader

The 405 Card Reader reads 80-column cards at a rate of 1200 cards per minute and 51-column cards at 1600 cards per minute. Using two read stations, each card is read twice to ensure reading accuracy. The hopper and stacker trays each have a capacity of 4000 cards. The 405 reads binary, Hollerith, and ASCII card codes.



405 Card Reader



415 Card Punch

### 415 Card Punch

The 415 Card Punch punches standard 80-column cards at the rate of 250 cards per minute. Each card is punched row by row and then sent to a post-punch read station. The card is read, and the number of holes actually punched is verified against the number specified in the punch operation. The input hopper holds 1200 cards, and the output stacker holds 1500 cards. Punching can be done in binary, Hollerith, and ASCII card codes.



Display Console

### Display Console

The display console consists of an alphanumeric keyboard and a 21-inch cathode ray tube with character and graphic capability. It is the medium through which the system communicates with the system operator, displaying information and accepting commands. The console contains a pushbutton that initiates system operation (assuming power is on) and a rocker switch that determines whether a single display or two reduced-size displays are shown on the screen. In addition, the console contains controls for centering, focusing, and changing the brightness of the display.