

COMPUTER SCIENCE & TECHNOLOGY:



**COMPUTERS IN THE
FEDERAL GOVERNMENT:
A COMPILATION OF STATISTICS-1978**



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Reports on Computer Science and Technology

The National Bureau of Standards has a special responsibility within the Federal Government for computer science and technology activities. The programs of the NBS Institute for Computer Sciences and Technology are designed to provide ADP standards, guidelines, and technical advisory services to improve the effectiveness of computer utilization in the Federal sector, and to perform appropriate research and development efforts as foundation for such activities and programs. This publication series will report these NBS efforts to the Federal computer community as well as to interested specialists in the academic and private sectors. Those wishing to receive notices of publications in this series should complete and return the form at the end of this publication.

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COMPUTERS IN THE FEDERAL GOVERNMENT:
A COMPILATION OF STATISTICS - 1978

ABSTRACT

This report presents data on the status of computer technology in the Federal Government. It is an extension and update of "Computers in the Federal Government: A Compilation of Statistics" (NBS SP-500-7), June 1977. The report contains a combination of existing statistics from Federal Government and computer industry sources and original statistics based on these sources. Data is included on numbers of computers installed in the Federal Government, dollar value of computers installed, numbers of computers installed by agency, Federal ADP costs by agency, Federal computers by acquisition date, and Federal ADP work-years. A detailed analysis is presented for Federal computers classifying the computers into three major categories, general purpose computers, special computers and minicomputers. Federal computers are compared with U.S. computers in the same categories.

KEY WORDS: Federal Government Computers; Statistics; ADP Costs; Federal Minicomputers; Federal ADP Statistics; Federal acquisition dates; Federal ADP work-years

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Summary of Findings

- o As of year-end 1977 there were over 11,000 computers in the Federal Government and over 325,000 computers in the United States.

- o The dollar value of the computer systems in the Federal Government was \$4.45 Billion in FY77.

The dollar value of the computer systems in the U.S. was approximately \$49.7 Billion as of year-end 1977.

- o Over the last eight fiscal years the number of Federal computers has increased over 11 percent annually while the dollar value has increased less than 7 percent annually.

- o Currently Federal Government computers consist of 55 percent minicomputers, 30 percent general purpose computers and 15 percent special computers.

U.S. computers consist of 66 percent minicomputers, 18 percent general purpose computers and 16 percent special computers.

- o Over the last six calendar years the number of U.S. computers has increased by over 25 percent annually while the number of Federal computers has increased by less than 11 percent.

- o The largest increase in U.S. and Federal general purpose computers was in the size class representing the largest and most expensive computers.

- o The largest increase of any segment of the U.S. computers was minicomputers with an increase of 39 percent.

The largest increase of any segment of Federal computers was minicomputers with an increase of 27 percent.

- 0 Federal Government computers represented 4 percent of the total number of U.S. computers, 3 percent of the U.S. minicomputers and 24 percent of the largest size class of U.S. general purpose computers.
- 0 By agency, DOD accounts for 45 percent of the total Federal computers, 55 percent of the ADP costs and 55 percent of the total ADP work-years.
- 0 Currently, the largest number of ADP work-years are devoted to services and support, and equipment operation.
- 0 As of FY77 less than 20 percent of the Federal computers have acquisition dates prior to FY68.

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I. Introduction

The Institute for Computer Sciences and Technology serves as a Federal Government focal point for computer technology activities. The Institute programs are designed to provide standards, guidelines and technical advisory services to improve the effectiveness of computers and computer applications in the Federal Government. Appropriate research provides the foundation for these activities.

In the process of conducting its program, the Institute collects data from a variety of sources on the status of computer technology, the extent of computer use in the government and private sectors and the projected trends in the technology and applications areas. This data is analyzed from a number of points of view in order to support ICST efforts in development of standards and guidelines and in providing technical advisory services. The analyzed data and resulting graphs and charts have proved most useful to ICST personnel.

In the light of its own experience with the utility of this data and analyses, ICST prepared a publication "Computers in the Federal Government: A Compilation of Statistics," (NBS SP-500-7) published in June 1977. Since that time, further data has been collected to support the ADP standards program. Much effort was expended to do more detailed analysis of the size and types of computers in the Federal Government, to ascertain the specific areas which require standards attention. Because of the response to the past publication, ICST decided to make available these further statistical analyses. This version of the compilation of data on computers in the Federal Government will, it is believed, continue to be of general interest within and outside the Federal Government computer community.

The main source of statistical information on computers in the Federal Government is the General Services Administration (GSA). Routinely GSA makes some information

available in their publications, "Inventory of Automatic Data Processing Equipment in the United States Government for Fiscal Year 19xx" and "Summary of Federal ADP activities in the United States Government as of the end of Fiscal Year 19xx." The fiscal year figures in this report were generally taken from these publications. In order to make possible a more detailed comparison of Federal and U.S. computers, data for Federal computers on a calendar year basis was required. These figures for Federal computers installed as of year-end 1972 - 1977 were obtained from GSA by special request. Since these figures are not part of GSA's published statistics, and have therefore not received the same amount of scrutiny as the fiscal year figures, they are to be considered estimates of the year-end installed computers in the Federal Government. They are the figures that appear on GSA's data tapes for computers installed as of December 31, 1972, January 31, 1974, December 31, 1975, December 31, 1976, and December 31, 1977. (The January 31, 1974 data tape was the closest data that was available for a year-end figure for 1973. For the purpose of this report these January 31, 1974 figures will be considered year-end 1973 figures.)

The source of statistics on computers in the United States is International Data Corporation (IDC). In the Annual Review and Forecast issue of "EDP Industry Report" IDC publishes a census of computer models in the U.S. and the total number of computers for past, present and future years. Other U.S. figures in this report were obtained from IDC by special request or taken from IDC special reports.

II. Classification System

In the June 1977 report, "Computers in the Federal Government: A Compilation of Statistics," (NBS SP-500-7) Federal computers were categorized by a management classification scheme to identify systems operated under a wide variety of operational environments. This system of classification is still used by the General Services Administration in their publications. The general management classification identifies systems which are used in a general utility environment, whereas the special management classification identifies systems used in control, classified and mobile environments. International Data Corporation, on the other hand, classified U.S. computers into two categories, general purpose computers and dedicated-application computers. The computers included in the general purpose category comprised "the bulk of digital computers (by value) in operation." They were "byte or character oriented-- except for large-scale scientific computers that have large words--and are primarily programmed in higher-level languages." The computers in the dedicated-application category were "those commonly referred to as mini-computers, plus certain larger systems designed primarily for one application such as process control, data communications, or data entry." This classification scheme was used by IDC until 1977.

In the Annual Review and Forecast issue of "EDP Industry Report," for April 22, 1977, IDC announced the establishment of more meaningful computer categories, general purpose computers, minicomputers and small business computers. General purpose computers were divided into six size classes numbered 2 through 7. The definition of general purpose computers remained as listed above except that small business computers formerly in size class 1 were eliminated from the general purpose category. Minicomputers were defined as "...general purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEM's and usually discounted in volume buys; and are part of a family that has at least one product in the \$2,000-\$25,000

price range and comes with at least 4K RAM." Small business computers (SBCs) were defined as "...those small general-purpose computers marketed by the major mainframers and their competitors to small business and first time users. They include offerings from the major mainframers...; products...from the minimakers aimed at commercial first time users; offerings from firms that manufacture only SBCs; and offerings from companies that assemble systems from other's minis..."

The April 22, 1977 issue of "EDP Industry Report" also included a model-by-model census for all three categories of computers as of year-end 1976. IDC utilized this same breakout of computers again in their Annual Review and Forecast issue of the "EDP Industry Report" for May 19, 1978, and included a model-by-model census for the three categories of computers as of year-end 1977. Since by definition, small business computers include some minicomputers, the census for small business computers repeats some of the computers in the minicomputer census. The total number of U. S. computers given by IDC is the total of all general purpose computers, minicomputers, small business computers and "other" systems with the double counting of small business and minicomputers eliminated. Thus this total number is smaller than the sum of the number of general purpose, mini and small business computers listed on the censuses.

To facilitate the comparison of U. S. and Federal statistics, special year-end listings of all Federal CPUs by model number were matched with IDC's model-by-model census for U.S. general purpose computers (size class 2 through 7) and minicomputers, assigning IDC's categories and size classes to the Federal CPUs. For purposes of this report, the terms "CPU" and "computer" are used in agreement with GSA's definitions that "...the term computer is synonymous with central processing unit (CPU)." "Computer" should not be confused with "computer system," defined by GSA as "a configuration of ADP equipment which includes one or more CPU's." All other U.S. computers and Federal CPUs except a small number of old general purpose computers were placed in the special category. Using the general purpose, mini and special categories in this manner eliminated the double counting of minis experienced by IDC.

III. Explanation of Computer Categories

General Purpose Computers

In the May 19, 1978 issue of "EDP Industry Report," Annual Review and Forecast issue, page 13, IDC describes general purpose computers as follows: "General-purpose computers . . . comprise the bulk of digital computers by value. They are primarily character or byte oriented and programmed in higher-level language." These general purpose computers are divided into six size classes. IDC describes the size classes as follows, "Instead of being pegged to constantly shifting average values, size classes are based on currently marketed IBM products and other manufacturers' models that compete with them, e.g., a computer in size Class 7 would compete with an IBM 3033 or 168." The size classes are listed for all of the current U.S. computers in the general purpose computer census on page 13 and 14 of the same source quoted above. The average main memory capacity and average monthly rentals are based on currently marketed models in the size classes. In addition to the six classes of IDC, size classes 2 through 7, we added size class 1 for Federal use only. The size classes are defined as follows.*

Size class 1 contains Federal computers of historical interest only. Older computers still in the Federal inventory were placed in this separate size class since they are not really comparable to current computers.

Size Class 2 contains the smallest general purpose computers. They are usually the lowest cost machines and are considered entry level equipment. They have relatively limited I/O channels and limited software. In general the main memory capacity is from 16-64K bytes. The average monthly rental of these machines is approximately \$1,250-

*Certain commercial products are identified in this section in order to cite relevant examples. In no case does such identification imply recommendation or endorsement by the National Bureau of Standards.

\$2,500. Examples of computers in this category are: the IBM System 3 Models 4, 6, 8, and 10; Honeywell H-61 Models 58 and 60; Univac 9200; NCR Century 50 and 75; and Singer 10.

Size class 3 computers are generally considered small-scale computers, although some models do approach what is considered to be medium-scale. Some members of this size class are the smallest model of a family of larger computers or the largest member of a small business data processing computer family. The main memory capacity is generally 32-128K bytes, although some size class 3 computers have main memory as large as 256K bytes. The average monthly rental is \$2,500-\$9,000. Examples of this size class are: NCR Century 100, 101, and 151; Burroughs B-1800 and B-500; Univac 90 Models 25 and 30, and 9300; Honeywell H-Level 62, and H-2020; and IBM 370/115, System 3 Models 12 and 15, and 360/20.

Size class 4 computers are considered medium scale computers. The average main memory capacity is 64-512K bytes. The average monthly rental for size class 4 computers is approximately \$8,000-\$20,000. Examples of computers in this category are: IBM 370/125, 135, 138, and 360/30 and 40; Honeywell H-2040, 2050, 1200; Univac 90/60; Burroughs B-2500/2700/2800 and B-3500/3700/3800; NCR Century 200, 201, 250; CDC Cyber 71, 171; DEC 10/40 and 50; and Xerox Sigma 5 and 6.

Size class 5 computers are also considered medium scale computers but usually have a much larger main memory capacity of 128K - 2M bytes, with some models having memory which exceeds 4M bytes. The average monthly rental of a size class 5 computer is \$21,000 - \$45,000. Representatives of this size class are: IBM 370/145, 148, and 360/50; Honeywell H-66/10, 17, 20, 27, and H3200; Univac 90/70, 9700, 1100/ 10 and 20 and Spectra 70/45 and 46; Burroughs B-4500, 4700, 4800; NCR Century 300, 8580, 8590; CDC Cyber 72, 3200, 3500, DEC 10/60 and 70; Itel AS/4; and XDS Sigma 7.

Size class 6 computers are generally considered large scale computers. Some of the models have main memories as large as 8M bytes. This size category has small members of new families of large computers and the largest members of some old families of computers. The average monthly rental of these computers is \$45,000-\$95,000. Examples of size