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Profiles of Computer Programmers in the Executive Branch of the Federal Government

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
Institute for Computer Sciences and Technology
Center for Programming Sciences and Technology
Washington, DC 20234

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ABSTRACT

This report is a detailed programmer survey compiled from interviews with eight selected organizations and an OPM data base. The survey includes staffing, hardware, programming activities and languages, contract support, programmer recruiting, quality control, personnel profile, and programmer activities. The OPM data base is summarized by age, grade, and education for the Computer Specialists job series in the Washington Metropolitan Area. Observations from the data received indicate that technical information should be geared towards individuals with substantial practical experience and a high school education augmented by technical training; a very high percent of the programming in the selected organizations is done in COBOL; more effective tools are needed to assist in software quality; the emphases needed in the production of standards and technical guidance are practicality and simplicity.

KEYWORDS: computer programmers; computer specialists; Federal civilian organizations; OPM data base; profile of computer programmers

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I. Introduction

The Institute for Computer Sciences and Technology (ICST) carries out the following responsibilities under P.L. 89-306 (Brooks Act) to improve the Federal government's management and use of ADP:

- o develops Federal automatic data processing standards;
- o provides agencies with scientific and technological advisory services relating to ADP;
- o undertakes necessary research in computer science and technology.

In partial fulfillment of Brooks Act responsibilities, ICST issues Internal Reports (IR). The purpose of this report is to present descriptive data of selected computer organizations in the Federal Government and their programming personnel to assist the staff of the Institute for Computer Sciences and Technology in the development of programming standards and in the preparation of technical guidance.

II. Observations

The requirements for this report do not include conclusions or recommendations. However, the following observations are believed to be of particular importance to this purpose and are, therefore, highlighted here:

A. The preparation of technial information intended for use by programmers/analysts in the Federal Government should be geared for individuals with substantial practical experience but not so complex that it cannot be effectively used by someone with only a high school level formal education. However, the average user can be expected to have had the high school education augmented by technical training. These potential customers are, more likely, GS-12's or higher and over 30 years of age. Probably a great many will be over 40.

B. A very high percentage of programming in the selected organizations is being done in COBOL and in support of what are characterized as business-type applications. The majority of this work is either for the development of new systems or for the maintenance of existing systems.

C. When software quality was discussed with two of the managers, FIPS PUBS were mentioned as being

valuable standards. The FIPS PUBS 31 and 64 were singled out as being particularly good while FIPS PUB 38 was termed useful but in need of updating. One manager labeled FIPS PUB 49 as inadequate. More effective tools are needed to assist in software quality and special mention was made of the need for expert guidance in computer performance management.

D. The emphases needed in the production of standards and technical guidance are practicality and simplicity.

III. Organization of the Data

A. The report is supported by data collected during the Spring of 1981 from the following:

1. Individual Programmer Profile

A copy of this survey form is included as Appendix 2. Its purpose was to expedite the collection of data describing certain characteristics of Federal computer programmers in the 334 series (Computer Specialists) and their jobs. A copy of this form was completed by each programmer surveyed.

2. Description of Activity of Organization

A copy of this survey form is included as Appendix 3. Its purpose was to expedite the collection of data describing the individual organization for which the programmers work and the more pertinent activities of that organization. The survey form was reviewed during interviews with managers of the selected organizations and was subsequently completed by them.

B. The data collected through the survey forms were tabulated, organized and reviewed. Summaries of the results for each selected organization are included in this report and consist of three major parts: organization description, individual programmer profiles and tabulation of programmer profile data. Additional statistical summaries from OPM data, September, 1980, are included as Appendices and have been prepared to assist in the interpretation of the data. Only limited analysis is included in this report because the main objective is to present the data for direct interpretation.

IV. Selection of Organizations for Study

The following criteria for organizational selection were:

1. Civilian organizations in the Executive Branch of the Federal Government;

2. Located in the Washington Metropolitan area as defined by the Standard Metropolitan Statistical Area(SMSA) as defined by the Bureau of the Census (District of Columbia; Arlington, Fairfax, Loudon, and Prince William counties and Alexandria, Fairfax, Manassas,Manassas Park and Falls Church cities in Virginia; and Charles, Montgomery and Prince Georges counties in Maryland.); and

3. Ten or more computer programmers on the staff.

Within the surveyed organizations, participants were selected to provide a representative sample of typical functions and personnel with particular attention paid to:

1. Type of programming

2. Size of programming staff

3. Type of applications

4. Levels of education, GS range and age span of the programming staff

V. Summary of Descriptive Data of Selected Computer Organizations

A. Staff

Of the eight organizations surveyed, five have staffs with total strengths of 60-70 people; three have total strengths of 40-50 people.

B. Hardware

In each case, the mainframe hardware used is that of the respective agency-level headquarters. The equipment listed as in-house consists of remote terminals and printers. In four of the organizations,

over two-thirds of programmer input is submitted through interactive terminals.

C. Programming activities

The managers of four organizations have characterized the programming as in support of business-type applications. In each case, almost one-half of the programming is for new development, with maintenance an important second activity. The other four organizations support statistical, graphics, and computer systems functions.

D. Programming languages

In four of the organizations, COBOL is the principal language used. In fact, it is used for over 90% of the work. FORTRAN, ALGOL, PL-1 and EASYTRIEVE were also mentioned. One of the organizations uses Assembler as the principal language; two use FORTRAN principally; one uses COBOL or FORTRAN depending on the application.

E. Contract support

The levels of contract assistance reported were low in each case. Practically none of the programming is accomplished through contract.

F. Programmer recruiting

The principal sources for recruitment are college recruitments and the Office of Personnel Management system PACE and the supporting registers. One organization reported no recruiting. It is particularly interesting to note that Organization B concentrates its recruitment at the GS-5 level and looks primarily for applicants with aptitude rather than experience. This is reflected in its higher percentage of lower graded employees (30% at the 5-7 level) than in the other organizations. The manager at Organization C made the observation that it was difficult to find mid and senior-level programmers, and that it was almost impossible to find programmers with experience with Burroughs hardware as opposed to IBM hardware. Several organizations reported recruiting difficulties at Universities due to severe competition from private industry and the lower pay scale of the Federal Government.

G. Qualiy Control

Six of the eight organizations reported the existence

of programs for quality control. They reported the development and use of internal standards and guide lines as well as the use of FIPS PUBS. See the individual organizational summaries for details. It is interesting to note that organizations D and G reported a comprehensive procedure for quality assurance but listed only FIPS PUBS and an editor as specific means of accomplishing quality assurance. There appears to be a misconception about the meaning of quality assurance.

VI. Summary of Programmer Profile Data

A. The detailed statistics for each organization are given with the individual organization. Comparative percentages (Chart 1) are summarized following the reports on the individual organizations. The statistics used for the Office of Personnel Management on the charts are from the Central Personnel Data File of OPM, September, 1980. These OPM statistics are for all agencies of the Executive Branch (excluding the military departments) in the Washington Metropolitan area. They are also for the entire 334 series (computer specialists) which includes analysts as well as programmers.

B. The following observations are made in reference to the charts:

Age Groupings

In general, the staffs have fewer people in the 30-39 and 40 and over age groupings than the OPM statistics show. However, three of the eight staffs are close to the OPM percentage for the 40 and over age group; for the 30-39 age group, three organizations are near the OPM percentage.

Grade Groupings

The grade structure in the groups surveyed does not match the OPM statistics. There are generally less staff members in grades 13 and over and more in grades 9 through 12.

Time-in-agency Groupings

Half of the organizations have the largest percentage in the 3-8 year category. The other half have the largest percentage in the 1-3 year category. No data on time-in-agency was extracted from the OPM file.

Levels of Education

Two of the eight organizations conform to the OPM statistics which indicate that about one-half of the programmers have not received a bachelor's degree. The remaining six organizations have a higher percentage of personnel who have earned a bachelor's degree. For the master's degree, four of the organizations are under the OPM percentage of 9% and four are over the OPM percentage. There is one programmer with a doctorate in the eight organizations and only 1% of the total computer specialists in the OPM file have attained that level.

The following eight sections contain the detailed statistics for each organization surveyed. It should be noted that the information presented for an organization under general description may differ from that presented under the individual profiles as different people completed the data collection forms.

VII. Organization A

A. Summary of Organization Description

1. Staff:

Office of Director	5
Application Systems	10
Financial Systems	11
Management Systems	17
Special Applic. Systems	14
Total	57

2. Hardware: Large mainframe

   Internally has intelligent terminals and low-speed terminals.

3. Programming activities:

   Approximately 40 systems analysts/computer specialists programmers do both analysis and programming of primarily COBOL systems using batch up-date through intelligent terminals with output both batch and interactive. All programming is in support of business-type applications. About one-half of the programming is for new applications and one-half for maintenance.

4. Programming languages:

   Principal: COBOL
   Other: Fortran and EASYTRIEVE

5. Contract support:

   a. Level of effort: 6 man-years/yr.
      $350,000/yr.

   b. Functions: Data input - $100,000
      Hardware & software support - $250,000
      (to be phased out)

6. Programmer recruiting:

   Source: Personal reference

7. Quality control: No data submitted

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 23

2. Age summary:

	No.	%
40 and over	9	40
30 - 39	12	52
25 - 29	1	4
20 - 24	1	4

3. Grade summary:

13	10	43
12	5	22
11	5	22
9	1	4
5 - 7	2	9

4. Time-in-agency summary:

Over 12 years	1	4
8 - 12 years	5	22
3 - 8 years	9	40
1 - 3 years	6	26
6 - 12 mos.	1	4
Under 6 mos.	1	4

5. Education summary:

Master's degree	1	4
Bachelor's deg.	10	44
High school grad.	12	52

6. Computer system used: large mainframe for 100% of time

7. Average reported input method for programming:

Batch: 48%
Interactive: 52%

8. Type of programming activity: (order of area in which most time is reportedly spent)

Code
Test
Design
Maintenance
Documentation

9. Average reported time spent by phase of application programming:

New development	40%
Conversion	16%
New versions of old programs	14%
Maintenance	27%
Miscellaneous	3%

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	13	8 - 12 yrs.	B
40+	13	3 - 8 yrs.	B
40+	13	3 - 8 yrs.	B
40+	13	3 - 8 yrs.	HS
40+	13	1 - 3 yrs.	M
40+	13	Less than 6 mos.	HS
40+	12	8 - 12 yrs.	HS
40+	11	Over 12 yrs.	B
40+	11	1 - 3 yrs.	B
30 - 39	13	8 - 12 yrs.	B
30 - 39	13	3 - 8 yrs.	HS
30 - 39	13	3 - 8 yrs.	HS
30 - 39	13	1 - 3 yrs.	B
30 - 39	12	3 - 8 yrs.	HS
30 - 39	12	6 - 12 mos.	B
30 - 39	12	8 - 12 yrs.	B
30 - 39	11	3 - 8 yrs.	HS
30 - 39	11	1 - 3 yrs.	HS
30 - 39	9	3 - 8 yrs.	HS
30 - 39	5 - 7	1 - 3 yrs.	B
30 - 39	5 - 7	1 - 3 yrs.	HS
25 - 29	12	8 - 12 yrs.	HS
20 - 24	11	3 - 8 yrs.	HS

Note: Codes for education: M Master's Degree
B Bachelor's Degree
HS High School Graduate

VIII. Organization B

A. Summary of Organization Description

1. Staff:

Office of Chief	3
Planning & Standards	5
Program Systems	22
Administrative Systems	24
Total	54

2. Hardware: Large Mainframe

3. Programming activities:

Staff does all phases of systems analysis, design and programming. Majority of programming is in support of business-type applications. About 45% of programming is for new development, 45% for maintenance and 10% for conversion.

4. Programming languages:

Principal: COBOL (95%)
Other: PL-1 and FORTRAN

5. Contract support:

a. Level of effort: 5% of programming

b. Functions: Programming

6. Programmer recruiting:

a. Sources: PACE - 90%; Other - 10%

b. Means of contact: OPM register & public announcement

c. Special programs: Upward mobility & student work program

d. Comments: Hire at GS-5 level & look for applicants with aptitude as opposed to experience.

7. Quality control:

a. Standards used: FIPS PUB. 38 Level III
COBOL X3.23 1974
FORTRAN X3.9 1968

b. Guidelines used:

structured programming techniques & structured design techniques, internal guidelines

c. Tools used:

test data generation, statistical analysis, management of files and data, documentation and reporting

d. Comments:

Comprehensive procedures are used for quality control, assurance and testing. Extensive in-house and outside training in "best" methods's provided. Guidance in additional language standards is needed.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 36

2. Age summary:

	No.	%
40 and over	5	14
30 - 39	15	42
25 - 29	13	36
20 - 24	3	8

3. Grade summary:

13	3	8
12	15	42
11	5	14
9	2	6
5 - 7	11	30

4. Time-in-agency

Over 12 years	3	8
8 - 12 yrs.	6	17
3 - 8 yrs.	14	39
1 - 3 yrs.	12	33
6 - 12 mos.	0	0
Under 6 mos.	1	3

5. Education summary:

Master's Degree	1	3
Bachelor's Degree	31	86
High school grad.	4	11

6. Computer system used: Large Mainframe

7. Average reported input method for programming:

   Batch: 73%
   Interactive: 27%

8. Type of programming activity: (order of area in which most time is reportedly spent)

   Test
   Design
   Maintenance
   Code
   Documentation

9. Average reported time spent by phase of application programming:

New development	33%
Conversion	15%
New versions of old programs	17%
Maintenance	33%
Other	2%

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	13	8 - 12 yrs.	B
40+	12	8 - 12 yrs.	B
40+	12	Over 12 yrs.	B
40+	12	Over 12 yrs.	B
40+	11	8 - 12 yrs.	B
30 - 39	13	Over 12 yrs.	B
30 - 39	13	Less than 6 mos.	B
30 - 39	12	3 - 8 yrs.	M
30 - 39	12	8 - 12 yrs.	HS
30 - 39	12	3 - 8 yrs.	HS
30 - 39	12	8 - 12 yrs.	B
30 - 39	12	8 - 12 yrs.	B
30 - 39	12	3 - 8 yrs.	B
30 - 39	12	3 - 8 yrs.	B
30 - 39	11	3 - 8 yrs.	B
30 - 39	9	3 - 8 yrs.	B
30 - 39	5 - 7	1 - 3 yrs.	HS
30 - 39	5 - 7	1 - 3 yrs.	HS
30 - 39	5 - 7	1 - 3 yrs.	B
30 - 39	5 - 7	1 - 3 yrs.	B

C. Tabulation of Programmer Profile Data (continued)

Age	Grade	Time-in-agency	Education
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	11	3 - 8 yrs.	B
25 - 29	11	3 - 8 yrs.	B
25 - 29	11	3 - 8 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
20 - 24	9	1 - 3 yrs.	B
20 - 24	5 - 7	1 - 3 yrs.	B
20 - 24	5 - 7	1 - 3 yrs.	B

Notes: Codes for education:
M Master's Degree
B Bachelor's Degree
HS High school graduate

All but three programmers listed specialized computer education, however, only one majored in computer science.

IX. Organization C

A. Summary of Organization Description

1. Staff:

Software Development	37
Production Management	14
Quality Assurance	9
Total	60

2. Hardware: Large Mainframe

3. Programming activities:

Staff of 37 involved in programming. Responsible for maintenance and enhancement of large (about 600 programs) logistics system. Majority of programming is in support of business-type applications. About 50% of programming is for new development, 20% for conversion, 20% for maintenance and 10% for other.

4. Programming languages:

Principal: COBOL (94%)
Other: FORTRAN (1%); ALGOL (5%)

5. Contract support:

About $50,000 per year spent for consulting services. No actual programming done under contract.

6. Programmer recruiting:

a. Sources: In-house (trainees)
OPM (PACE & registers)
Word-of-mouth

b. Special Programs: Career intern development system

c. Comments: Easy to recruit trainees; difficult to find mid to senior level programmers; not so hard to find IBM experience; impossible for ALGOL experience; now a sellers market.

7. Quality control:

a. Standards used: FIPS PUBS 38 & 64
Internally developed standards

b. Tools used: Documentation generator

c. Comments:

Used procedures for quality assurance and testing. A new Quality Assurance Organization is currently being established. Some training, both in-house & outside, in "best" methods is provided.

d. Quality of standards and needs:

FIPS PUB 38 is viewed as in need of updating while FIPS PUB 64 is considered excellent and will be incorporated intact as the agency internal standard. FIPS PUB 31 is thought to be good but FIPS PUB 49 is considered inadequate. There is a need for expert guidance in computer performance management.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 33

2. Age summary:

	No.	%
40 and over	14	43
30 - 39	15	45
25 - 29	4	12

3. Grade summary:

Over 13	3	9
13	6	19
12	15	45
11	2	6
9	7	21
5 - 7	0	0

4. Time-in-agency summary:

Over 12 years	6	18
8 - 12 years	8	24
3 - 8 years	14	43
1 - 3 years	3	9
6 - 12 mos.	1	3
Under 6 mos.	1	3

5. Education summary:

	No.	%
Master's Degree	2	6
Bachelor's Degree	12	36
High school grad.	19	58

(four have an associate degree in ADP and two have degrees in ADP.)

6. Computer system used: large mainframe

7. Average reported input method for programming:

Batch: 30%
Interactive: 70%

8. Type of programming activity: (order of area in which most time is reportedly spent)

Test
Code
Maintenance
Design
Documentation

9. Average reported time spent by phase of application programming:

New development	46%
Conversion	11%
New versions of old programs	11%
Maintenance	29%
Other	3%

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	Over 13	Over 12 yrs.	HS
40+	13	Over 12 yrs.	HS
40+	13	Over 12 yrs.	HS
40+	Over 13	3 - 8 yrs.	B
40+	13	3 - 8 yrs.	B
40+	13	8 - 12 yrs.	HS
40+	13	8 - 12 yrs.	HS
40+	12	3 - 8 yrs.	B
40+	12	Over 12 yrs.	HS
40+	12	8 - 12 yrs.	B
40+	12	8 - 12 yrs.	HS
40+	12	Over 12 yrs.	HS
40+	12	8 - 12 yrs.	HS
40+	9	1 - 3 yrs.	HS

C. Tabulation of Programmer Profile Data (continued)

Age	Grade	Time-in-agency	Education
30 - 39	Over 13	3 - 8 yrs.	M
30 - 39	13	8 - 12 yrs.	B
30 - 39	12	3 - 8 yrs.	M
30 - 39	12	3 - 8 yrs.	HS
30 - 39	12	Over 12 yrs.	HS
30 - 39	12	8 - 12 yrs.	B
30 - 39	12	3 - 8 yrs.	HS
30 - 39	12	8 - 12 yrs.	B
30 - 39	11	3 - 8 yrs.	HS
30 - 39	11	3 - 8 yrs.	HS
30 - 39	9	3 - 8 yrs.	HS
30 - 39	9	Less than 6 mos.	B
30 - 39	9	3 - 8 yrs.	HS
30 - 39	9	3 - 8 yrs.	B
30 - 39	9	1 - 3 yrs.	HS
25 - 29	12	6 - 12 mos.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	9	1 - 3 yrs.	HS

Note: Four of the programmers with only a high school degree have an associate degree in ADP.

X. Organization D

A. Summary of Organization Description

1. Staff: five branches with total of 2Ø computer specialists

2. Hardware: large mainframe
small mainframe

3. Programming activities:

2Ø computer analysts/programmers responsible for administrative systems, e.g. payroll, inventories, accounting, budget and management information systems.

4. Programming languages:

Principal: COBOL (99%)
Other: FORTRAN and EASYTRIEVE

5. Contractor support: None

6. Programmer recruiting:

Primarily from colleges and by transfers from other government agencies.

7. Quality Control:

a. Standards used: ASCII character set
COBOL

b. Guidelines used: None

c. Tools used: text editor

d. Comments:

A comprehensive procedure for quality assurance is available.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 18

2. Age summary:

	No.	%
40 and over	5	27
30 - 39	3	17
25 - 29	7	39
20 - 24	3	17

3. Grade summary:

13	4	22
12	5	27
11	3	17
9	3	17
5 - 7	3	17

4. Time-in-agency:

Over 12 years	4	22
8 - 12 years	1	6
3 - 8 years	4	22
1 - 3 years	9	50

5. Education summary:

Bachelor's Degree	13	72
High School Grad.	5	28

6. Computer system used: large mainframes
small mainframes

7. Reported input method for programming:

Batch: 51%
Interactive: 43%

Note: Does not add to 100% because of incomplete reporting.

8. Type of programming activity: (order of area in which most time is reportedly spent)

Design
Code
Test
Maintenance
Documentation

9. Average reported time spent by phase of application programming:

New development	41%
Conversion	6%
New versions of old programs	19%
Maintenance	28%
Other	6%

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	13	Over 12 yrs.	B
40+	13	Over 12 yrs.	HS
40+	13	Over 12 yrs.	HS
40+	12	3 - 8 yrs.	HS
40+	12	Over 12 yrs.	B
30 - 39	13	8 - 12 yrs.	B
30 - 39	9	1 - 3 yrs.	B
30 - 39	5 - 7	1 - 3 yrs.	HS
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	HS
20 - 24	9	1 - 3 yrs.	B
20 - 24	9	1 - 3 yrs.	B
20 - 24	5 - 7	1 - 3 yrs.	B

XI. Organization E

A. Summary of Organization Description

1. Staff: 6 programming branches with 10-12 programmers in each.

2. Hardware: interactive terminals
   microprocessor
   minicomputer

3. Programming activities:

   All applications programming including editing, weighing, tallying and displaying statistics.

4. Programming languages:

   Principal: FORTRAN (98%)
   Other: ALGOL

5. Contractor support: None

6. Programmer recruiting: None reported

7. Quality control:

   a. Standards used: Internally developed

   b. Guidelines used: None reported

   c. Tools used: None reported

   d. Comments: No procedure used for quality assurance.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 57

2. Age summary:

	No.	%
40 and over	12	21
30 - 39	17	30
25 - 29	18	32
20 - 24	10	17

3. Grade Summary:

	No.	%
Over 13	5	9
13	8	14
12	20	36
11	10	17
9	7	12
5 - 7	7	12

4. Time-in-agency:

Over 12 yrs.	12	21
8 - 12 yrs.	7	12
3 - 8 yrs.	15	26
1 - 3 yrs.	17	30
6 - 12 mos.	6	11

5. Education summary:

Master's Degree	6	11
Bachelor's Degree	43	75
High School Grad.	8	14

6. Computer system used: large mainframe
minicomputer

7. Reported input method for programming:

Batch: 35%
Interactive: 65%

8. Type of programming activity: (order of area in which most time is reportedly spent)

Design
Code
Test
Maintenance
Documentation

9. Average reported time spent by phase of application programming:

New development	47%
Conversion	6%
New versions of old programs	23%
Maintenance	12%
Other	12%

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	Over 13	8 - 12 yrs.	M
40+	13	8 - 12 yrs.	B
40+	13	Over 12 yrs.	HS
40+	13	8 - 12 yrs.	B
40+	13	Over 12 yrs.	B
40+	12	Over 12 yrs.	B
40+	12	Over 12 yrs.	HS
40+	12	Over 12 yrs.	HS
40+	12	Over 12 yrs.	HS
40+	12	3 - 8 yrs.	M
40+	12	8 - 12 yrs.	B
40+	12	Over 12 yrs.	B
30 - 39	Over 13	8 - 12 yrs.	B
30 - 39	Over 13	8 - 12 yrs.	B
30 - 39	Over 13	Over 12 yrs.	B
30 - 39	Over 13	Over 12 yrs.	B
30 - 39	13	8 - 12 yrs.	B
30 - 39	13	3 - 8 yrs.	M
30 - 39	13	1 - 3 yrs.	B
30 - 39	12	3 - 8 yrs.	B
30 - 39	12	3 - 8 yrs.	HS
30 - 39	12	Over 12 yrs.	B
30 - 39	12	3 - 8 yrs.	B
30 - 39	12	Over 12 yrs.	B
30 - 39	12	Over 12 yrs.	HS
30 - 39	11	1 - 3 yrs.	M
30 - 39	9	3 - 8 yrs.	HS
30 - 39	9	1 - 3 yrs.	B
30 - 39	5 - 7	1 - 3 yrs.	B
25 - 29	13	3 - 8 yrs.	M
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	11	3 - 8 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	9	1 - 3 yrs.	B
25 - 29	9	1 - 3 yrs.	B

C. Tabulation of Programmer Profile Data (continued)

Age	Grade	Time-in-agency	Education
25 - 29	5 - 7	6 - 12 mos.	B
25 - 29	5 - 7	6 - 12 mos.	M
25 - 29	5 - 7	6 - 12 mos.	B
20 - 24	11	1 - 3 yrs.	B
20 - 24	11	1 - 3 yrs.	B
20 - 24	11	6 - 12 mos.	B
20 - 24	11	1 - 3 yrs.	B
20 - 24	9	1 - 3 yrs.	B
20 - 24	9	1 - 3 yrs.	B
20 - 24	9	1 - 3 yrs.	B
20 - 24	5 - 7	6 - 12 mos.	B
20 - 24	5 - 7	1 - 3 yrs.	B
20 - 24	5 - 7	6 - 12 mos.	B

XII. Organization F

A. Summary of Organization Description

1. Staff:

Graphics Software Branch	15
Data Base Management Systems Branch	13
Generalized Software Development Branch	12

2. Hardware:
   - mainframes
   - CRT terminals
   - graphics terminals
   - hard copy terminals

3. Programming activities:

They cover the full range of programming for graphics and photocomposition, data base management and generalized software for scientific applications.

4. Programming languages:

	Gen. Software	Graphics	Data Base
Principal:	COBOL	FORTRAN	COBOL
Other:		ALGOL	FORTRAN Assembly

5. Contractor support:

Data Base support	$150,000/yr. & 3 man-yrs.
Graphic procedure supp.	$150,000/yr. & 3 man-yrs.

(5% of programming for data base done by contractors)

6. Programmer recruiting:

Uses regular OPM and agency personnel support and procedures. College recruiting is accomplished with the aid of special programs.

7. Quality control:

a. Standards used: ASCII, FORTRAN, and COBOL; FIPS standards and structured programming techniques are generally used.

b. Guidelines used: Same as a.

c. Tools used: Interactive editor, language procedure libraries, and document processor

d. Comments: Use procedures for quality assurance at module level; need tools for better documentation of individual programs.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 25

2. Age summary:

	No.	%
40 and over	8	32
30 - 39	8	32
25 - 29	8	32
20 - 24	1	4

3. Grade summary:

13	6	24
12	8	32
11	4	16
9	6	24
5 - 7	1	4

4. Time-in-agency summary:

Over 12 yrs.	1	4
8 - 12 yrs.	1	4
3 - 8 yrs.	7	28
1 - 3 yrs.	10	40
6 - 12 mos.	6	24

5. Education summary:

Master's Degree	5	20
Bachelor's Degree	15	60
High School Grad.	5	20

6. Computer system used: Large mainframe
Minicomputer

7. Reported input method for programming:

Batch: 10%
Interactive: 90%

8. Type of programming activity: (order of area in which most time is reportedly spent)

   Design
   Code
   Documentation
   Maintenance
   Test

9. Average reported time spent by phase of application programming:

New development	52%
Conversion	5%
New versions of old programs	17%
Maintenance	26%
Other	Ø

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	13	1 - 3 yrs.	B
40+	13	1 - 3 yrs.	B
40+	13	1 - 3 yrs.	B
40+	13	8 - 12 yrs.	M
40+	13	3 - 8 yrs.	B
40+	9	Over 12 yrs.	HS
40+	9	6 - 12 mos.	B
40+	9	1 - 3 yrs.	HS
30 - 39	12	3 - 8 yrs.	B
30 - 39	12	3 - 8 yrs.	M
30 - 39	12	3 - 8 yrs.	B
30 - 39	12	1 - 3 yrs.	HS
30 - 39	12	1 - 3 yrs.	B
30 - 39	11	6 - 12 mos.	HS
30 - 39	9	1 - 3 yrs.	M
30 - 39	5 - 7	6 - 12 mos.	HS
25 - 29	13	1 - 3 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	6 - 12 mos.	B
25 - 29	12	1 - 3 yrs.	M
25 - 29	11	3 - 8 yrs.	B
25 - 29	11	6 - 12 mos.	B
25 - 29	9	6 - 12 mos.	M
25 - 29	9	1 - 3 yrs.	B
20 - 24	11	3 - 8 yrs.	B

XIII. Organization G

A. Summary of Organization Description

1. Staff:

Operating Systems Branch	7
Peripheral Systems Branch	7
Programming Assistance and Languages Branch	10
User Training and Info. Branch	14
Management and staff support	11

2. Hardware: large mainframes
   small mainframe

3. Programming activities:

   Operating System (OS) and system support software

4. Programming languages:

   Principal: Assembly
   Other: FORTRAN and COBOL

5. Contractor support:

   About 2% of programming done by contractor.

6. Programmer recruiting:

   Only comment given that universities are primary sources of new employees.

7. Quality control:

   a. Standards used: FIPS

   b. Guidelines used: FIPS when possible

   c. Tools used: No comment

   d. Comments: There is a comprehensive procedure for quality assurance.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 8

2. Age summary:

	No.	%
40 and over	1	13
30 - 39	3	37
25 - 29	3	37
20 - 24	1	13

3. Grade summary:

	No.	%
12	3	37
11	3	37
5 - 7	2	26

4. Time-in-agency summary:

Over 12 yrs.	1	13
8 - 12 yrs.		
3 - 8 yrs.	3	37
1 - 3 yrs.	2	25
6 - 12 mos.	2	25

5. Education summary:

Master's Degree	1	13
Bachelor's Degree	4	50
High School Grad.	3	37

6. Computer system used: large mainframe
small mainframe

7. Reported input method for programming:

Batch: 22%
Interactive: 78%

8. Type of programming activity: (order of area in which most time is reportedly spent)

Code
Maintenance
Test
Design
Documentation

9. Average reported time spent by phase of system programming:

New development	24%
Conversion	11%
New versions of old programs	24%
Maintenance	41%
Other	0

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	5 - 7	1 - 3 yrs.	B
30 - 39	12	Over 12 yrs.	HS
30 - 39	12	3 - 8 yrs.	B
30 - 39	11	6 - 12 mos.	M
25 - 29	12	3 - 8 yrs.	HS
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	3 - 8 yrs.	HS
20 - 24	5 - 7	6 - 12 mos.	B

XIV. Organization H

A. Summary of Organization Description

1. Staff:

Administration	3
Programming Branch 1	18
Programming Branch 2	1Ø
Programming Branch 3	15

2. Hardware:
   large mainframes
   remote terminals
   printers
   word processors

3. Programming activities:

   Entire staff involved in information processing associated with statistical surveys. Programming defined as applications support.

4. Programming languages:

   Principal: FORTRAN
   Other: ALGOL

5. Contractor support: None

6. Programmer recruiting:

   Emphasis is on college recruitment for graduates in computer science or math. Low pay scale and competition from the private sector have combined to make such recruiting difficult.

7. Quality control:

   a. Standards used: ASCII FORTRAN

   b. Guidelines used: Internal controls for mnemonics, specifications, documentation, etc.,

   c. Tools used: Various software developed by vendors and in-house staff.

   d. Comments: Comprehensive procedures ae used for quality assurance. Easy-to-use on-line program debugging/analysis routines are needed.

B. Summary of Individual Programmer Profiles

1. Total number surveyed: 31

2. Age summary:

	No.	%
40 and over	5	16
30 - 39	9	29
25 - 29	13	42
20 - 24	4	13

3. Grade Summary:

Over 13	3	10
13	6	19
12	4	13
11	5	16
9	8	26
5 - 7	5	16

4. Time-in-agency summary:

Over 12 yrs.	5	16
8 - 12 yrs.	2	6
3 - 8 yrs.	8	26
1 - 3 yrs.	14	46
6 - 12 mos.	2	6

5. Education summary:

PhD	1	3
Master's Degree	5	16
Bachelor's Degree	22	71
High School Grad.	3	10

6. Computer system used: large mainframe

7. Reported input method for programming:

Batch: 28%
Interactive: 72%

8. Type of programming activity: (order of area in which most time is reportedly spent)

Design
Maintenance
Code
Test
Documentation

9. Average reported time spent by phase of application programming:

New development	47%
Conversion	10%
New versions of old programs	19%
Maintenance	24%
Other	Ø

C. Tabulation of Programmer Profile Data

Age	Grade	Time-in-agency	Education
40+	Over 13	Over 12 yrs.	HS
40+	13	1 - 3 yrs.	B
40+	13	Over 12 yrs.	B
40+	12	8 - 12 yrs.	B
40+	11	3 - 8 yrs.	PhD
30 - 39	Over 13	1 - 3 yrs.	M
30 - 39	Over 13	Over 12 yrs.	B
30 - 39	13	8 - 12 yrs.	B
30 - 39	13	Over 12 yrs.	B
30 - 39	13	Over 12 yrs.	M
30 - 39	12	3 - 8 yrs.	B
30 - 39	11	3 - 8 yrs.	HS
30 - 39	9	3 - 8 yrs.	B
30 - 39	5 - 7	1 - 3 yrs.	B
25 - 29	13	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	12	3 - 8 yrs.	B
25 - 29	11	1 - 3 yrs.	B
25 - 29	11	6 - 12 mos.	B
25 - 29	9	6 - 12 mos.	M
25 - 29	9	1 - 3 yrs.	M
25 - 29	9	1 - 3 yrs.	B
25 - 29	9	1 - 3 yrs.	B
25 - 29	9	3 - 8 yrs.	B
25 - 29	9	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
25 - 29	5 - 7	1 - 3 yrs.	B
20 - 24	11	1 - 3 yrs.	B
20 - 24	9	1 - 3 yrs.	B
20 - 24	5 - 7	1 - 3 yrs.	B
20 - 24	5 - 7	1 - 3 yrs.	M

Chart 1

Tabulations of Percentages from Computer Programmer Profile Statistics.

Organization

A. Ages — Percentages by Age Groupings

	40 & over	30-39	25-29	20-24
A	40	52	4	4
B	14	42	36	8
C	43	45	12	0
D	27	17	39	17
E	21	30	32	17
F	32	32	32	4
G	13	37	37	13
H	16	29	42	13

B. Grades — Percentages by Grade Groupings

	Over 13	13	12	11	9	5-7
A	0	43	22	22	4	8
B	0	8	42	14	6	30
C	9	19	45	6	21	0
D	0	22	27	17	17	17
E	9	14	36	17	12	12
F	0	24	32	16	24	4
G	0	0	37	37	0	26
H	10	19	13	16	26	16

C. Time-in-agency — Percentages by Time-in-agency Groupings

	>12 yrs.	8-12 yrs.	3-8 yrs.	1-3 yrs.	<1 yr.
A	4	22	40	26	8
B	8	17	39	33	3
C	18	24	43	9	6
D	22	6	22	50	0
E	21	12	26	30	11
F	4	4	28	40	24
G	13	0	37	25	25
H	16	6	26	46	6

D. Education — Percentages by Levels of Education

	PhD	M.A.	B.A.	High School
A	0	4	44	52
B	0	3	86	11
C	0	6	36	58
D	0	0	72	28
E	0	11	75	14
F	0	20	60	20
G	0	13	50	37
H	3	16	71	10

STATISTICS FROM THE GENERAL PERSONNEL DATA FILE OF THE OFFICE OF PERSONNEL MANAGEMENT

1. The Office of Personnel Management (OPM) was requested to provide personnel statistics pertinent to this study of computer programmers from their September 1980 data base. The Work Force Information Division of OPM assisted in the preparation of the detailed request that was submitted for computer retrieval from the Central Personnel Data File. The following criteria were used for data selection:

   a. Occupational code:
      Data only from records that have occupational code of 334 (Computer Specialist) which includes computer programmers, computer systems analysts, computer equipment analysts, and combinations of these skills.

   b. Work schedule code:
      Data only from records where this code is full-time employees

   c. Standard Metropolitan Statistical Area:
      Data only from records where the code for this element is for the Washington Metropolitan area which includes the District of Columbia; Arlington, Fairfax, Loudoun and Prince William counties, and Alexandria, Fairfax, Manassas, Manassas Park and Falls Church cities in Virginia; Charles, Montgomery and Prince Georges counties in Maryland.

   d. Agency code:
      Exclude records where this code represents one of the military departments

   The criteria were later expanded to include the occupational code of 330 (Digital Computer Systems Administration), although this data were kept separate in the statistical summaries and have not been analyzed for this study.

2. The data requested from the qualifying records were as follows:

   a. Agency and Sub-agency
   b. Date of birth
   c. GS equivalent
   d. Salary
   e. Sex
   f. Supervisory or non-supervisory
   g. Academic education level

3. The OPM was also requested to prepare three statistical summaries for each Sub-agency code, using the same criteria as previously listed.

These were:

a. Age: (numbers by groupings)

Under 20
20 - 24
25 - 29
30 - 39
40 and over

b. GS equivalents: (numbers by groupings)

5 - 7
9
11
12
13 and over

c. Highest academic level: (numbers by groupings)

High school
Bachelor's degree
Master's degree
Doctorate

The tables submitted as attachments to this enclosure present the highlights from these statistical summaries. It is emphasized that these statistics are for the Washington Metropolitan area only, as defined by the Standard Metropolitan Statistical Area. Both military and civilian members of the military departments are excluded. The data, as obtained from OPM, are as of September 30, 1980.

4. The following observations concerning the computer specialists are offered as a result of reviewing the statistics in each table:

a. Over 80% are 30 years of age or older;

b. Almost one-half are at the grade level of GS-13 or over;

c. Almost one-half have only a high school education and about two-fifths have a bachelor's degree;

d. The Treasury Department (with the largest number in its employ) has a younger staff than other agencies, with about one-fourth from 25-29 and only about one-fourth 40 or over. The average for these age groups among all agencies, as shown on Table 1, are 14% and 38%, respectively. Conversely, the age level in the Department of Housing and Urban Development is usually high, i.e. 6% and 47% for these two age groupings.

e. The Treasury Department has a higher percentage of lower grades than the average of all agencies. Almost three-fourths of the computer specialists in the Department of Energy and Housing and Urban Development are GS-13's or higher.

f. The levels of education are remarkably similar among the twelve agencies employing over 2% of the total. However, the General Services Administration has an unusually high percentage with only a high school education.

g. Almost one-half of the total number of computer specialists are employed by the three departments of Treasury, Commerce and Health and Human Services. The organizations with unusually high numbers in these departments are as follows:

Treasury:	Internal Revenue Service	777
HHS:	National Institutes of Health	291
Commerce:	Nat. Oceanic & Amos. Admin.	234

List of Tables:

The following organizational abbreviations are used in Tables 1-8

AID:	Agency for International Development
BEA:	Bureau of Economic Analysis
CAB:	Civil Aeronautics Board
CPSC:	Consumer Product Safety Commission
CSA:	Community Services Administration
DoC:	Commerce, Department of
DOE:	Energy, Department of
DoI:	Interior, Department of
DoL:	Labor, Department of
DOT:	Transportation, Department of
EDA:	Economic Development Administration
EPA:	Environmental Protection Agency
FAA:	Federal Aviation Administration
FBI:	Federal Bureau of Investigation
FCC:	Federal Communications Commission
FDA:	Food and Drug Administration
FDIC:	Federal Deposit Insurance Corporation
FHA:	Federal Highway Administration
FHLB:	Federal Home Loan Bank Board
FTC:	Federal Trade Commission
GSA:	General Services Administration
HHS:	Health and Human Services, Department of
HUD:	Housing and Urban Development, Department of
ICA:	International Communication Agency
ICC:	Interstate Commerce Commission
IDCA:	International Development Cooperation Agency, U.S.
IRS:	Internal Revenue Service
MBD:	Minority Business Development Agency
NASA:	National Aeronautics and Space Administration
NBS:	National Bureau of Standards
NIH:	National Institutes of Health
NLRB:	National Labor Relations Board
NOAA:	National Oceanic and Atmospheric Administration
NRC:	Nuclear Regulatory Commission
NSF:	National Science Foundation
NTIS:	National Technical Information Service
OPM:	Office of Personnel Management
SBA:	Small Business Administration
SEA:	Science and Education Administration
SEC:	Securities and Exchange Commission
SSA:	Social Security Administration
USDA:	Agriculture, United States Department of
VA:	Veterans Administration

Tables 5-8 are alphabetical by agency according to the standards used in automated interchange (FPM Supplement 292-1), e.g. USDA is alphabetized by Agriculture, IDCA is alphabetized by United States International Development Cooperation Agency.

TABLE 1. Number and Percentage of Computer Specialists (Series 334) by Age, Grade and Education.

Age	20 or less	21-24	25-29	30-39	40 and over	Total
Number	5	184	869	2678	2273	6009
Percent	-	3	14	45	38	100

Grade	5	7	9	11	12	13 and over	Total
Number	230	440	473	591	1494	2718	5946
Percent	4	7	8	10	25	46	100

Education	High School	B.A.	M.A.	PhD.	Total
Number	2832	2435	541	31	5839
Percent	48	42	9	1	100

Note: The totals in the three areas differ. These are the figures as submitted by OPM and no attempt has been made to reconcile the data. The differences are not great enough, however, to affect the analysis.

TABLE 2. Number and Percentage of Computer Specialists by Age in Those Agencies Employing Over 2% of Total Number.

Agency	Age					
	20 or less	21-24	25-29	30-39	40 & over	Total
Treasury						
Number	1	45	277	528	285	1136
Percent	-	4	24	47	25	100
DoC						
Number	0	52	160	355	372	939
Percent	0	5	17	38	40	100
HHS						
Number	1	13	65	320	329	728
Percent	-	2	9	44	45	100
USDA						
Number	0	7	44	198	134	383
Percent	0	2	11	52	35	100
DoL						
Number	0	10	52	141	118	321
Percent	0	3	16	44	37	100
Justice						
Number	1	11	38	154	107	311
Percent	-	4	12	50	34	100
VA						
Number	0	6	31	111	99	247
Percent	0	2	13	45	40	100
GSA						
Number	1	4	27	113	99	244
Percent	-	2	11	46	41	100
DOT						
Number	0	5	35	98	92	230
Percent	0	2	15	43	40	100
DOE						
Number	0	0	14	99	88	201
Percent	0	0	7	49	44	100
HUD						
Number	0	1	12	86	88	187
Percent	0	-	6	47	47	100
DoI						
Number	0	4	12	74	73	163
Percent	0	2	8	45	45	100

TABLE 3. Number and Percentage of Computer Specialists by Grade in Those Agencies Employing Over 2% of Total Number.

Agencies	Grades						
	5	7	9	11	12	13 & over	Total
Treasury							
Number	113	151	101	84	276	419	1144
Percent	10	13	9	7	24	37	100
DoC							
Number	21	63	82	116	252	410	944
Percent	2	7	9	12	27	43	100
HHS							
Number	16	33	63	82	199	330	723
Percent	2	5	9	11	28	45	100
USDA							
Number	5	23	30	34	85	181	358
Percent	1	6	8	10	24	51	100
DoL							
Number	11	34	31	48	96	105	325
Percent	3	10	10	15	30	32	100
Justice							
Number	7	23	21	26	63	172	312
Percent	2	7	7	8	20	56	100
VA							
Number	9	21	16	11	53	139	249
Percent	4	8	6	4	21	57	100
GSA							
Number	3	16	21	27	101	81	249
Percent	1	6	8	11	41	33	100
DOT							
Number	16	9	28	21	42	113	229
Percent	7	4	12	9	18	50	100
DOE							
Number	0	3	5	19	26	144	197
Percent	0	2	2	10	13	73	100
HUD							
Number	1	3	2	12	29	140	187
Percent	-	2	1	6	16	75	100
DoI							
Number	0	6	7	20	48	83	164
Percent	0	4	4	12	29	51	100

TABLE 4. Number and Percentage of Computer Specialists by Education in Those Agencies Employing Over 2% of Total Number.

Agency	Education				
	High School	B.A.	M.A.	PhD.	Total
Treasury					
Number	523	559	53	2	1137
Percent	46	49	5	-	100
DoC					
Number	389	435	91	9	924
Percent	42	47	10	1	100
HHS					
Number	343	283	76	2	704
Percent	49	40	11	-	100
USDA					
Number	166	143	46	3	358
Percent	46	40	13	1	100
DoL					
Number	156	124	27	2	309
Percent	50	40	9	1	100
Justice					
Number	156	119	32	3	310
Percent	51	38	10	1	100
VA					
Number	121	102	19	1	243
Percent	50	42	8	-	100
GSA					
Number	150	78	18	0	246
Percent	61	32	7	0	100
DOT					
Number	116	93	20	0	229
Percent	51	40	9	0	100
DOE					
Number	106	62	26	4	198
Percent	54	31	13	2	100
HUD					
Number	80	53	16	0	149
Percent	54	36	10	0	100
DoI					
Number	64	73	20	2	159
Percent	40	46	13	1	100

TABLE 5. Number and Percent of Computer Specialists by Agency.

Agency	No.	% of Total	Agency	No.	% of Total
ACTION	27	0.5	*ICC*	28	0.5
USDA	383	6.4	*Justice*	311	5.2
CAB	24	0.4	*DoL*	321	5.3
DoC	939	15.5	*NASA*	71	1.2
CSA	30	0.5	*Nat. Credit Union Admin.*	13	0.2
CPSC	16	0.3	*NLRB*	16	0.3
EPA	84	1.4	*NSF*	34	0.6
DOE	201	3.3	*NRC*	30	0.5
FCC	59	1.0	*OPM*	112	1.9
FDIC	59	1.0	*Pension Benefit Guaranty Corp.*	31	0.5
Federal Energy Management Agency	24	0.4	*SEC*	28	0.5
FHLB	32	0.5	*SBA*	44	0.7
FTC	22	0.4	*Smithsonian Institution*	19	0.3
GSA	244	4.1	*State*	38	0.6
HHS	728	12.1	*DOT*	230	3.8
HUD	187	3.1	*Treasury*	1136	18.9
DoI	163	2.7	*IDCA*	54	0.9
ICA	23	0.4	*VA*	247	4.1
			TOTAL	6009	100.0

TABLE 6. Number of Computer Specialists by Age Groupings for Agencies and Sub-agencies.

Agency and Sub-agency	Age Summary 20 or less	21-24	25-29	30-39	40 & over	Total
ACTION			1	16	10	27
USDA						
Agr. Marketing Ser.			7	4	3	14
Agr. Stabilization Conservation Serv.				1	6	7
Farmers Home Admin.			1	4	4	9
Foreign Agr. Serv.		1	2	10	5	18
Forest Serv.			1	17	19	37
Soil Conservation Serv.			2	7	6	15
Off. Inspector Gen.				4		4
Food & Nutrition Serv.		1	2	24	13	40
Anm. & Plant Health Inspection Serv.			2	7	3	12
Federal Grain Inspection Serv.			1			1
Food Safety & Quality Service			1	10	6	17
SEA		1	6	26	21	54
Economics, Stat. & Cooperatives Serv.		4	11	40	15	70
Off. of Operations & Finance			7	28	23	58
Total		7	44	198	134	383

TABLE 6. (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
CAB				15	9	24
DoC						
Off. of Secty.			2	16	23	41
EDA			4	6	11	21
BEA		2	8	9	3	22
NOAA		4	33	92	105	234
Internat. & Trade Admin.			1	2	3	6
Maritime Admin.		1	5	9	22	37
Patent Off.		2	5	20	20	47
NBS		4	4	24	43	75
MBD				1	2	3
Nat. Telecom. & Infor. Agency			1	4	2	7
NTIS		1	2	9	7	19
Bureau of Census		38	95	163	130	426
Off. of Federal Stat. Policy & Standards					1	1
Total		52	160	355	372	939
CSA				6	24	30
CPSC				10	6	16
EPA		6	12	35	31	84
DOE			14	99	88	201
FCC		4	12	29	14	59
FDIC	1	5	7	25	21	59

TABLE 6. (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
Federal Energy Management Agency				5	19	24
FHLB		1	6	16	9	32
FTC		1	4	13	4	22
GSA						
Off. of Preparedness				1	3	4
Public Bldg. Serv.			4	15	10	29
Fed. Supply Serv.					2	2
National Archives & Records Serv.			1	1	1	3
Automated Data & Telecomm. Serv.			5	25	25	55
Transport. & Public Utilities Serv.				2	2	4
Off. of Admin.	1	4	17	68	56	146
Off. Of Inspector General				1		1
Total	1	4	27	113	99	244
HHS						
Off. of Secty.			3	52	61	116
Off. of Asst. Secty. for Health	1	1	2	14	25	43
Alcohol, Drug Abuse & Mental Health		2	2	13	15	32
Health Serv. Administration			1	6	8	15
FDA		3	19	73	55	150

TABLE 6. (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
HHS (continued)						
Health Research Administration			4	14	10	28
NIH		7	32	120	132	291
Center for Disease Control				1		1
SSA			1	18	12	31
Off. of Human Devel.				3	7	10
Off. Child Support Enforcement			1	6	4	11
Total	1	13	65	320	329	728
HUD						
Asst. Secty. for Administration		1	10	80	81	172
Asst. Secty. for Comm. Plan. Devel.			1	1	1	3
Fair Housing & Equal Opportunity				1		1
Asst. Secty. for Housing				2	5	7
Other			1	2	1	4
Total		1	12	86	88	187
DoI						
Off. of Secty.				2	1	3
Bur. of Land Mgmt.			1			1
Bur. of Indian Affairs					1	1
Water & Power Resources					1	1
Geological Survey		4	7	53	44	108

TABLE 6. (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
Dol (continued)						
Bur. of Mines			1	8	6	15
National Park Serv.			3	5	4	12
U.S. Fish & Wildlife Serv.				2	12	14
Heritage Conservation & Recreation Serv.				4	2	6
Off. of Surface Mining Reclamation & Enforce.					2	2
Total		4	12	74	73	163
Internat. Commun. Agency			3	8	12	23
ICC		1		16	11	28
Justice						
Offices, Div. & Boards		1	11	60	34	106
FBI	1	6	15	33	27	82
Bur. of Prisons			3	17	10	36
Immigration & Naturalization Serv.		3	2	21	10	36
Bur. of Prisons Industries				2	2	4
Drug Enforcement Administration			4	18	14	36
Off. of Justice Assistance			1	1	10	12
U.S. Marshals Serv.		1	2	2		5
Total	1	11	38	154	107	311

TABLE 6. (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
DoL						
Off. of Secty.				1	1	2
Admin. & Mgmt.			1	20	17	38
Bur. of Inter. Labor Affairs				1	1	2
Employment Std. Administration			4	6	7	17
Employment & Train. Administration				11	12	23
Labor-Mgmt. Serv. Administration			1	3	5	9
Bureau of Labor Stat.		10	30	53	23	116
Mine Safety & Health Administration			6	4	2	12
Other			10	42	50	102
Total		10	52	141	118	321
NASA						
Headquarters				7	9	16
Goddard Space Flight Center			3	15	37	55
Total			3	22	46	71
National Credit Union Admin.			2	6	5	13
NLRB			1	7	8	16
NSF			9	13	12	34
NRC			5	17	8	30
OPM		1	15	51	45	112

TABLE 6. (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
Pension Benefit Guaranty Corp.			5	18	8	31
SEC		1	4	14	9	28
SBA			2	12	30	44
Smithsonian Instit.			1	9	9	19
State		6	7	14	11	38
DOT						
Off. of Secty.			3	15	15	33
U.S. Coast Guard			4	21	19	44
FAA		1	5	28	40	74
FHA		4	19	21	10	54
Fed. Railroad Admin.			1	7	1	9
Urban Mass Transp. Admin.			1	3	3	7
Nat. Highway Traffic Safety Admin.			2	1	3	6
Research & Spec. Programs Directorate				2	1	3
Total		5	35	98	92	230
Treasury						
Off. of Secty.		1	7	34	14	56
Bur. of Govt. Fin. Operations		3	8	59	37	107
Comptroller of the Currency		1	3	11	4	19
U.S. Customs Serv.			1	33	49	83
Bureau of Engraving & Printing				6	6	12

TABLE 6 (continued)

Age Summary

Agency and Sub-agency	20 or less	21-24	25-29	30-39	40 & over	Total
Treasury (continued)						
IRS	1	37	241	344	154	777
Bur. of the Mint				1		1
Bur. of Public Debt		3	15	26	8	52
U.S. Secret Service			1	12	7	20
Bureau of Alcohol, Tobacco & Firearms			1	2	6	9
Total	1	45	277	528	285	1136
U.S. International Devel. Coop. Agcy.						
Off. of Director					1	1
AID			3	23	27	53
Total			3	23	28	54
VA						
Staff			4	18	12	34
Dept. of Data Mgmt.		6	27	84	58	175
Dept. of Veterans Benefits				4	10	14
Dept. of Medicine & Surgery				5	19	24
Total		6	31	111	99	247
Grand Total	5	184	869	2678	2273	6009

TABLE 7. Number of Computer Specialists by Grade Levels for Agencies and Sub-agencies.

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
ACTION	1	2		6	7	11	27
USDA							
Agr. Marketing Serv.		3	3	4	3	1	14
Agr. Stabilization Conservation Serv.					1	6	7
Farmers Home Admin.		1			2	6	9
Foreign Agr. Serv.		1	3		5	9	18
Forest Serv.	1			2	6	28	37
Soil Conservation Serv.	1	3	1	2		8	15
Off. Inspector Gen.						4	4
Food & Nutrition Serv.	1	2	3	5	9	20	40
Anm. & Plant Health Inspection Serv.		3	2	1	2	4	12
Federal Grain Inspection Serv.					1		1
Food Safety & Quality Service			1		8	7	17
SEA		3	5	9	14	23	54
Economics, Stat. & Cooperative Serv.	1	6	9	8	19	27	70
Off. of Operations & Finance	1	1	3	2	15	38	60
Total	5	23	30	34	85	181	358

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
CAB			1	4	2	17	24
DoC							
Off. of Secty.			3	6	3	29	41
EDA	1	3	1	3	5	8	21
BEA		1	5	3	6	7	22
NOAA	5	13	15	32	64	108	237
Internat. & Trade Admin.			1	1	2	2	6
Maritime Admin.		4	2	2	6	23	37
Patent Off.	3	1	2	3	18	19	46
NBS	2	6	8	10	14	35	75
MBD						3	3
Nat. Telecom. & Infor. Agency					3	4	7
NTIS			1	2	9	8	20
Bureau of Census	10	35	44	54	122	163	428
Off. of Federal Stat. Policy & Standards						1	1
Total	21	63	82	116	252	410	944
CSA		2	3	6	8	11	30
CPSC		1		1	7	7	16
EPA	1	9	10	9	11	40	80
DOE		3	5	19	26	144	197
FCC	5	3	7	4	23	17	59
FDIC	2	6	5	4	6	32	55

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
Federal Energy Management Agency		1	1	6	6	11	25
FHLB	2	3		5	8	14	32
FTC		3	1		8	10	22
GSA							
Off. of Preparedness				2	2		4
Public Bldg. Serv.	1	4	4	2	10	9	30
Fed. Supply Serv.				1	1		2
National Archives & Records Serv.			1	1		1	3
Automated Data & Telecomm. Serv.			1	1	20	33	55
Transport. & Public Utilities Serv.					1	3	4
Off. of Admin.	2	12	15	20	66	35	150
Off. of Inspector General					1		1
Total	3	16	21	27	101	81	249
HHS							
Off. of Secty.	2	2	9	13	22	69	117
Off. of Asst. Secty. for Health	1	1	1	4	14	21	42
Alcohol, Drug Abuse & Mental Health	1	2	3	6	6	14	32
Health Serv. Administration	1	1	1	1	7	4	15
FDA	3	7	14	15	36	76	151

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
HHS (continued)							
Health Research Administration	1	1	4	5	7	10	28
NIH	7	17	29	36	84	112	285
Center for Disease Control						1	1
SSA		2		1	17	11	31
Off. of Human Devel.			2		2	6	10
Off. Child Support Enforcement				1	4	6	11
Total	16	33	63	82	199	330	723
HUD							
Asst. Secty. for Administration	1	3	2	11	27	128	172
Asst. Secty. for Comm. Plan. & Develop.					1	2	3
Fair Housing & Equal Opportunity						1	1
Asst. Secty. for Housing						7	7
Other				1	1	2	4
Total	1	3	2	12	29	140	187
DoI							
Off. of Secty.						3	3
Bur. of Land Mgmt.				1			1
Bur. of Indian Affairs						1	1
Water & Power Resources					1		1

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
DoI (continued)							
Geological Survey		6	6	11	30	56	109
Bureau of Mines				2	6	7	15
National Park Ser.				1	6	5	12
U.S. Fish & Wildlife Service			1	3	4	6	14
Heritage Conservation & Recreation Service				2	1	3	6
Off. of Surface Mining, Reclamation & Enforce.						2	2
Total		6	7	20	48	83	164
Internat. Commun. Agency				4	3	16	23
ICC	1			3	9	14	27
Justice							
Offices, Div. & Boards		6	9	10	18	62	105
FBI	5	7	4	10	23	34	83
Bur. of Prisons		1	3	1	12	14	31
Immigration & Naturalization Serv.	1	6	1	3	5	20	36
Bur. of Prisons Industries					1	3	4
Drug Enforcement Administration	1	2	2	2	2	28	37
Off. of Justice Assistance			1			10	11
U.S. Marshals Serv.		1	1		2	1	5
Total	7	23	21	26	63	172	312

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
DoL							
Off. of Secty.					1	1	2
Admin. & Mgmt.			3	4	16	15	38
Bur. of Inter. Labor Affairs					1	1	2
Employment Stds. Administration	1	1	2	2	4	8	18
Employment & Train. Administration				6	7	10	23
Labor-Mgmt. Serv. Administration				2	3	4	9
Bureau of Labor Stat.	5	23	20	18	33	20	119
Mine Safety & Health Administration		1	1	3	5	2	12
Other	5	9	5	13	26	44	102
Total	11	34	31	48	96	105	325
NASA							
Headquarters				2	1	13	16
Goddard Space Flight Center	1	1	3	4	25	21	55
Total	1	1	3	6	26	34	71
National Credit Union Administration		1		2	3	7	12
NLRB			4	2	4	6	16
NSF	2	2	5	2	1	22	34
NRC		1	2	3	5	20	31

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
OPM	1	14	8	11	36	26	96
Pension Benefit Guaranty Corp.	2	1	3	4	6	15	31
SEC	2	2	5		9	11	29
SBA	1	1	1	1	9	1	14
Smithsonian Instit.			1	4	1	13	19
State	7	2	4	3	8	13	37
DOT							
Off. of Secty.		2	2		4	25	33
U.S. Coast Guard	1	3	11	4	8	17	44
FAA		2	4	11	9	48	74
FHA	13		6	5	17	12	53
Fed. Railroad Admin.	1		1	1	1	5	9
Urban Mass Transp. Admin.			2		2	3	7
Nat. Highway Traffic Safety Admin.	1	2	1			2	6
Research & Spec. Programs Directorate			1		1	1	3
Total	16	9	28	21	42	113	229
Treasury							
Off. of Secty.			2	8	17	29	56
Bur. of Govt. Fin. Operations	4	3	12	9	31	48	107
Comptroller of the Currency	1	2		3	7	7	20
U.S. Customs Serv.			1	4	21	57	83

TABLE 7. (continued)

Agency and Sub-agency	Grade Summary 5	7	9	11	12	13 & over	Total
Treasury(continued)							
Bureau of Engraving & Printing				5	3	4	12
IRS	102	135	77	46	175	249	782
Bur. of the Mint				1			1
Bur. of Public Debt	5	10	5	4	19	9	52
U.S. Secret Service	1		4	4	2	9	20
Bureau of Alcohol, Tobacco & Firearms		1			1	7	9
Total	113	151	101	84	276	419	1144
U.S. International Devel. Coop. Agcy.							
Off. of Director					1		1
AID			2	1	17	33	53
Total			2	1	18	33	54
VA							
Staff		2	3	1	7	22	35
Dept. of Data Mgmt.	9	19	12	9	41	86	176
Dept. of Veterans Benefits				1	1	12	14
Dept of Medicine & Surgery			1		4	19	24
Total	9	21	16	11	53	139	249
Grand Total	230	440	473	591	1494	2718	5946

TABLE 8. Number of Computer Specialists by Educational Levels for Agencies and Sub-agencies.

Agency and Sub-agency	Education Summary: High School	College Degree: B.A.	M.A.	PhD.	Total
ACTION	18	8	1		27
USDA					
Agr. Marketing Serv.	6	7	1		14
Agr. Stabilization & Conservation Serv.	2	4	1		7
Farmers Home Admin.	2	7			9
Foreign Agr. Serv.	7	10	1		18
Forest Service	14	15	8		37
Soil Conservation Serv.	7	7	1		15
Off. Inspector Gen.	1	1	2		4
Food & Nutrition Serv.	24	14	2		40
Anm. & Plant Health Inspection Serv.	8	4			12
Federal Grain Inspection Serv.		1			1
Food Safety & Quality Service	12	4	1		17
SEA	29	13	12	1	55
Economics, Stat. & Cooperative Serv.	33	30	6		69
Off. of Operations & Finance	21	26	11	2	60
Total	166	143	46	3	358
CAB	16	7	1		24
DoC					
Off. of Secty.	24	12	4		40

TABLE 8. (continued)

Education Summary

Agency and Sub-agency	High School	College Degree B.A.	M.A.	PhD.	Total
DoC (continuted)					
EDA	10	9	2		21
BEA	10	9	3		22
NOAA	113	93	24	3	233
Internat. & Trade Admin.	2	3			5
Maritime Admin.	24	5	2		31
Patent Off.	30	14	2		46
NBS	33	30	10	2	75
MBD	1	2			3
Nat. Telecom. & Infor. Agency	6	1			7
NTIS	14	6			20
Bureau of Census	121	251	44	4	420
Off. of Federal Stat. Policy & Standards	1				1
Total	389	435	91	9	924
CSA	23	7			30
CPSC	8	7	1		16
EPA	34	32	16	1	83
DOE	106	62	26	4	198
FCC	31	25	3		59
FDIC	31	22	5		58
Federal Energy Management Agency	16	8	1		25
FHLB	17	12	2	1	32

TABLE 8. (continued)

Education Summary

Agency and Sub-agency	High School	College Degree B.A.	M.A.	PhD.	Total
FTC	6	9	6		21
GSA					
Off. of Preparedness	3	1			4
Public Bldg. Serv.	16	10	4		30
Fed. Supply Serv.	1	1			2
National Archives & Records Serv.	3				3
Automated Data & Telecomm. Serv.	25	24	5		54
Transport. & Public Utilities Serv.	2	2			4
Off. of Admin.	100	40	8		148
Off. of Inspector General		1			1
Total	150	78	18		246
HHS					
Off. of Secty.	70	26	10		107
Off. of Asst. Secty. for Health	20	19	3		42
Alcohol, Drug Abuse & Mental Health	15	15	2		32
Health Serv. Administration	13	1	1		15
FDA	55	77	15		147
Health Research Administration	13	11	3		27
NIH	128	118	36	1	283
Center for Desease Control			1		1

TABLE 8. (continued)

Agency and Sub-agency	Education Summary: High School	College Degree: B.A.	M.A.	PhD.	Total
HHS (continued)					
SSA	17	11	2		30
Off. of Human Devel.	9		1		10
Off. of Child Support Enforcement	3	5	2		10
Total	343	283	76	2	704
HUD					
Asst. Secty. for Administration	76	48	13		137
Asst. Secty. for Comm. Plan. Devel.			2		2
Fair Housing & Equal Opportunity		1			1
Asst. Secty. for Housing	2	3	1		6
Other	2	1			3
Total	80	53	16		149
DoI					
Off. of Secty.		2	1		3
Bur. of Land Mgmt.		1			1
Bur. of Indian Affairs		1			1
Water & Power Resources	1				1
Geological Survey	38	51	13	2	104
Bureau of Mines	9	6			15
National Park Serv.	5	6	1		12
U.S. Fish & Wildlife Service	6	4	4		14

TABLE 8. (continued)

Education Summary

Agency and Sub-agency	High School	College Degree B.A.	M.A.	PhD.	Total
DoI (continued)					
Heritage Conservation & Recreation Service	4	2			6
Off. of Surface Mining Reclamation & Enforce.	1		1		2
Total	64	73	20	2	159
Internat. Commun. Agency	15	6	2		23
ICC	11	12	4		27
Justice					
Offices, Div. & Boards	49	44	8	2	103
FBI	40	36	6	1	83
Bur. of Prisons	23	7	1		31
Immigration & Naturalization Serv.	14	15	6		35
Bur. of Prisons Industries	2	1	1		4
Drug Enforcement Administration	22	9	6		37
Off. of Justice Assistance	4	5	3		12
U.S. Marshals Ser.	2	2	1		5
Total	156	119	32	3	310
DoL					
Off. of Secty.	1	1			2
Admin. & Mgmt.	27	8			35
Bur. of Inter. Labor Affairs	2				2

TABLE 8. (continued)

Education Summary

Agency and Sub-agency	High School	College Degree B.A.	M.A.	PhD.	Total
DoL (continued)					
Employment Std. Admin.	9	7	1	1	18
Employment & Train. Administration	11	7	1		19
Labor-Mgmt. Serv. Admin.	7	2			9
Bur. of Labor Stat.	46	59	12	1	118
Mine Safety & Health Administration	6	4			10
Other	47	36	13		96
Total	156	124	27	2	309
NASA					
Headquarters	3	6	7		16
Goddard Space Flight Center	39	14	2		55
Total	42	20	9		71
National Credit Union Admin.	2	7	4		13
NLRB	10	2	3		15
NSF	14	13	5		32
NRC	12	8	7	1	28
OPM	60	40	12		112
Pension Benefit Guaranty Corp.	17	12	2		31
SEC	20	7	2		29
SBA	15	14	1		30

TABLE 8. (continued)

Education Summary

Agency and Sub-agency	High School	College Degree B.A.	M.A.	PhD.	Total
Smithsonian Instit.	3	5			8
State	14	8	3		25
DOT					
Off. of Secty.	21	7	5		33
U.S. Coast Guard	21	17	5		43
FAA	53	17	4		74
FHA	10	41	3		54
Fed. Railroad Admin.	6	3			9
Urban Mass Transp. Admin.	3	4			7
Nat. Highway Traffic Safety Admin.	1	4	1		6
Research & Special Programs Directorate	1		2		3
Total	116	93	20		229
Treasury					
Office of Secty.	26	20	10		56
Bur. of Govt. Fin. Operations	56	43	3		102
Comptroller of the Currency	10	6	1	1	18
U.S. Customs Serv.	47	29	4		80
Bureau of Engraving & Printing	10	2			12
IRS	321	437	29	1	788
Bur. of the Mint		1			1
Bur. of Public Debt	34	15	3		52

TABLE 8. (continued)

Education Summary

Agency and Sub-agency	High School	College Degree B.A.	M.A.	PhD.	Total
Treasury (continued)					
U.S. Secret Serv.	12	7			19
Bur. of Alcohol, Tobacco & Firearms	7	1	1		9
Total	523	559	53	2	1137
U.S. International Develop. Coop. Agency					
Off. of Director	1				1
AID	26	20	7		53
Total	27	20	7		54
VA					
Staff	19	12	3		34
Dept. of Data Mgmt.	90	70	11	1	172
Dept. of Veterans Benefits	6	7			13
Dept. of Medicine & Surgery	6	13	5		24
Total	121	102	19	1	243
Grand Total	2832	2435	541	31	5839

COMPUTER PROGRAMMER SURVEY

INDIVIDUAL PROGRAMMER PROFILE

1. Job title (including code):
2. Age:

_____	Under 20	_____	30-39
_____	20-24	_____	40 and over
_____	25-29		

3. GS grade equivalent:

_____	5-7	_____	12
_____	9	_____	13
_____	11	_____	over 13

4. Time in present job (current agency):

_____	Less than 6 mos.	_____	3-8 yrs.
_____	6-12 mos.	_____	8-12 yrs.
_____	1-3 yrs.	_____	over 12 yrs.

5. Education and training:

   a. Highest general academic level:

_____	High school	_____	Master's degree
_____	Bachelor's degree	_____	Doctorate (PhD)

   b. Highest academic level with ADP major:

   _____ Degree

   c. Other (identify and give length of training) types of training (include in-house):

6. Programming languages used:

   a. Most frequently

   b. Others used in past year

7. Computer system used:

   a. Most frequently

   b. Percent work done:

      1) Batch

      2) Interactively

   c. List systems used in past year

8. Types of activities: (by time spent; e.g. Ø - none, 1 - most 2 - next, etc.)

   a. design _____
   b. code _____
   c. test _____
   d. document _____
   e. contract monitor _____
   f. maintenance _____
   g. other (list) _____

9. Type of projects over the past year: (percent of time)

	Applications Programs	Systems Programs	Other
a. New development	_____	_____	_____
b. Conversion of old programs to new systems	_____	_____	_____
c. Creation of new versions of old programs	_____	_____	_____
d. Maintenance of existing systems	_____	_____	_____

Note: State what other is:

10. Type of applications program: (briefly describe and indicate % time spent on each)

a. Business data processing _____

b. Information processing _____

c. Scientific data processing _____

d. Other (list) _____

11. Do you manage other programmers?

_____ No _____ Yes _____ Number

THANK YOU FOR YOUR TIME AND COOPERATION

COMPUTER PROGRAMMER SURVEY

DESCRIPTION OF ACTIVITY OF ORGANIZATION

If additional space is required, use a separate sheet of paper identifying the appropriate items.

A. Name of computer organization (the identity of survey participants will be kept confidential).

B. Internal organizational structure and number of employees in each unit:

C. Inventory of computer hardware:

D. List of software functional activities:

E. Levels of effort in project development in man-years (choose a typical project)

1. Requirements analysis
2. Functional requirements/specifications
3. Design
4. Development
5. Operations
6. Evaluation

F. Programming activities:

1. Type: (show size of staff or man-years & briefly describe work)

a. Systems

b. Applications

1. Business

2. Scientific

3. Other (specify)

c. Other (specify)

2. Phase of programming: (estimate % of time in each area for organization)

a. New development

b. Conversion

c. Maintenance

d. Other

3. Programming languages used: (estimate % of each for organization)

a. Principal

b. Other

4. List computer systems operated and estimate % of programming accomplished for each system:

5. Description of contract support:

   a. Estimate total volume of contract support (man-years & dollars)

   b. Estimate % of total programming done by contract (where appropriate, make estimate by type of programming)

   c. General descriptive information re contract management, including quality control, insurance of timely performance, etc.

6. Programmer recruiting:

   a. Sources

   b. Means of contact

   c. Special programs

   d. General description, including special problems and major difficulties

G. Quality control for in-house software:

1. Standards used (languages and methodologies; FIPS, internal or other)

2. Guidelines used (languages and methodologies; internal or other)

3. Tools used (e.g. design, test coverage analysis, editors) - give name of tool

4. Tools to which you have access but don't use - state reason it is not used, e.g., not helpful, use too much machine time, etc.

5. Is there a procedure for Quality Assurance

comprehensive _____ moderate _____ none _____

6. Is there a procedure for testing (new and maintenance)

comprehensive _____ moderate _____ none _____

7. Is training given in "best" methods

	extensive	some	none
in-house	_____	_____	_____
outside	_____	_____	_____

8. If standards are used, are they:

standard	excellent	good	adequate	bad
---	---	---	---	---

9. Area(s) in which software quality improvement would make the most difference, e.g., tools, training, standard guidelines

10. What type of guidance would you like and in what areas - order by preference

11. If your needs are not covered above - use the space below to list them.

THANK YOU FOR YOUR PARTICIPATION AND COOPERATION

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10. SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)

The report is a detailed programmer survey compiled from interviews with eight selected organizations and an OPM data base. The survey includes staffing, hardware, programming activities and languages, contract support, programmer recruiting, quality control, personnel profile, and programmer activities. The OPM data base is summarized by age, grade and education for Computer Specialists in the Washington Metropolitan Area.

12. KEY WORDS (Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)

computer programmers; computer specialist; Federal civilian organizations; OPM data base; profile of computer programmers

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