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ELECTRONIC DATA PROCESSING IN CENSUSES OF POPULATION
AND HOUSING IN THE UNITED STATES OF AMERICA*

by

Charles B. Lawrence, Jr., Assistant Director
for International Statistical Programs
United States Bureau of the Census

* Prepared for presentation at the "Seminar on the Organization and Conduct of Censuses of Population and Housing" in Santiago, Chile, May 20-31, 1968, under the auspices of the United Nations (Economic Commission for Latin America, Statistical Office and Office of Technical Co-operation) under the regional technical assistance programme, with the collaboration of the Inter-American Statistical Institute, the Latin American Demographic Centre and the United States Bureau of the Census.

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INTRODUCTION

Procedural History of the 1960 Censuses of Population and Housing of the United States. In its 387 double column pages, the census procedural history published in 1966, presents comprehensive information about such items as: census organization, legislation, planning, budget and cost allocations, pretesting, sampling and estimating, quality controls, geographic concepts and mapping, publicity, forms, supplies, equipment, logistics, training, enumeration, payment procedures, data processing, announcement of census results, publications, evaluation and research, and final costs by class of expenditure and activity or capital outlay. The Procedural History contains extensive bibliographic references to publications, unpublished papers presented at conferences, and instructional manuals giving detailed background information on the censuses.

Copies of the Procedural History have been made available to national statistical offices, ministries, government and university

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libraries, and research organizations located in 129 countries with which the U. S. Bureau of the Census through its International Statistical Programs regularly exchanges statistical publications and related technical materials.

Purpose of this Paper. Because of the widespread availability of the Procedural History, this paper is directed only to certain aspects of Census Bureau experience in the use of electronic data processing systems in censuses of population and housing. It summarizes processing steps of the 1960 censuses; identifies changes in data processing equipment and techniques planned for the 1970 censuses; and discusses some problems that have been important to the U. S. Bureau of the Census and that may also be of some interest to other census and statistical organizations using or planning to use computers.

The Census Bureau's early entrance into the computer field forced it to develop its own staff of electronic data processing experts. There were none available for hire when the first data processing computer was put to work by the Bureau. As a result, starting with all of the benefits of inexperience, the Bureau has discovered and explored many ways, both productive and unproductive, of planning and conducting computer operations and of relating them to major census objectives.

This paper contains a liberal sprinkling of opinion concerning the efficacy of various policies, and practices as they have been developed or discarded in the U. S. Bureau of the Census. Such opinions are not intended as advice to others. They do, however, represent a residue of experience, in this new technological field in which experience is still a scarce commodity, and may be of interest to others.

Early Use of Computers. Because the art of processing data in electronic equipment is so new, only a few countries have used computers to process their censuses. The first electronic data processing computer, Univac I, Model No. 1, was built to meet performance specifications developed cooperatively by the U. S. Bureau of the Census and the National Bureau of Standards. It was put into service in March of 1951, too late to do more than a few tabulations for the 1950 U. S. Censuses of Population and Housing. Subsequently, the 1960 Censuses of Population and Housing were processed on computers and benefitted greatly from the experience gained in early computer experimentation and in computer operations during the 1954 and 1958 economic censuses. The data processing systems now in use by the Census Bureau are varyingly classified as belonging to the 3rd or 4th computer generation.

It may be worth recalling, for those who are now planning to install new electronic computers, that the introduction and the initial operations of the first computer in the U. S. Bureau of the Census did not immediately revolutionize any data processing techniques nor solve any data processing problems of the Bureau. On the contrary, the Bureau's initial use of the computer had to be regarded for some period of time as expensive experimentation undertaken because of the computers potentialities for:

1. improving the quality of processed data,
2. increasing the productivity of statistical operations,
3. decreasing the elapsed time between data collection and the availability of statistics,

4. making available more information in greater detail and in more analytically useful form, and,
5. reducing per unit costs.

The Training Component. These potentialities are now being increasingly realized in the current use of improved computers, however, all computer users know that these potentialities are not realized quickly and that their realization depends on trained computer specialists. Computer users learn that a staff untrained in computer operation is no asset. On the contrary it almost certainly results in waste and frustration and even in loss of prestige.

Computers follow instructions rapidly, faithfully, tirelessly, and productively when the tasks of preparing such instructions and of administering and controlling computer operations, are in the hands of trained personnel. The success of computer operations lies in the quality of the plans for computer utilization. The preparation of such plans requires capable, technically trained computer specialists who are so located in the organization that they have ready access to top management decision makers and are kept intimately familiar with program objectives and policies.

When the U. S. Bureau of the Census started working with the first electronic data processing computer, there were no trained specialists. There were no trainers. There was no experience with electronic data processing. A new field of specialization had to be developed. The process of learning, doing and improving was stimulating but never easy or inexpensive. Now, of course, there is experience. There are trainers available from computer manufacturers and from universities and tech-

nical schools. Few, however, have had experience in processing a census with its special problems of:

1. massive inputs,
2. computer editing, coding, imputing, and correcting,
3. coverage, consistency, and disclosure controls,
4. massive outputs in publication formats, in documented machine readable and other form,
5. the development of statistical systems involving extensive record matching, data retrieval, and reuse.

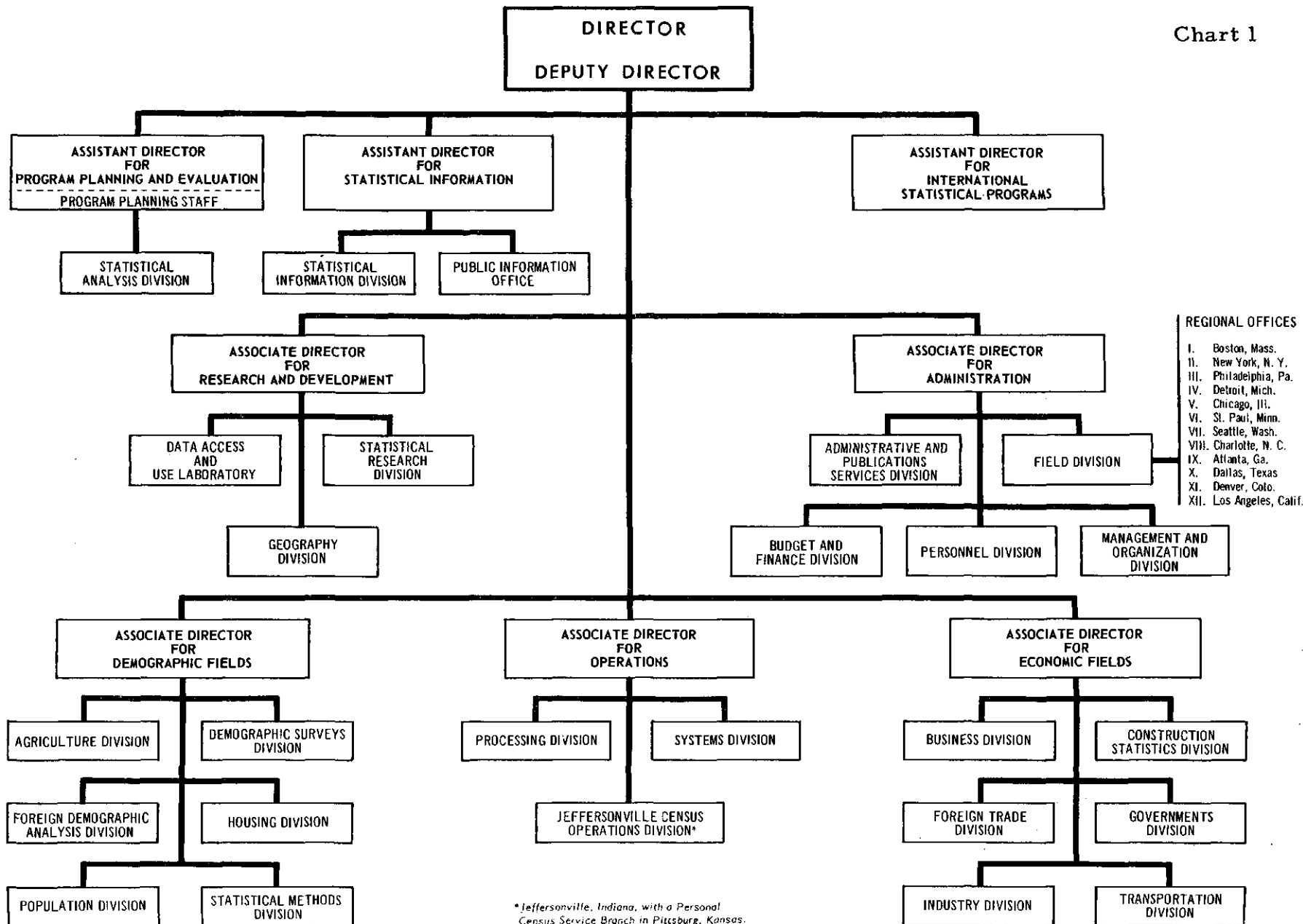
Attention to such problems and to many others is given by the U. S. Bureau of the Census in its own training facilities not only for its own computer experts but also for technicians from other countries. Depending upon individual circumstances and timing, such training at the Census Bureau may be available through grants and fellowships from the U. S. Agency for International Development, the United Nations, interested foundations, or the countries proposing that their technicians be trained.

ORGANIZATION OF THE U. S. BUREAU OF THE CENSUS (See Chart 1)

Functional Organization. The Census Bureau is organized along functional lines, not by projects. An examination of Chart 1 on the organization of the Bureau will show that the Census of Population is not solely identified with any one organizational unit; it is handled by various organization units that deal with a specific subject matter field or with functional areas involving planning, statistical standards, sampling, quality control, geographic delineations and mapping, data collection, data processing, publication, administration, etc. These organization

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

Chart 1



*Jeffersonville, Indiana, with a Personal Census Service Branch in Pittsburg, Kansas.

units plan and service the hundreds of large and small projects undertaken by the Census Bureau.

In 1790 when the United States took its first Census of Population, a staff was organized specifically to plan and take the census; then, following completion of the census, the staff was disbanded. The practice of organizing specifically for each decennial census was observed during the 19th century. In 1902, however, the Census Bureau was created as a permanent organization and was given continuing responsibility for several statistical programs that had developed by that time.

Character of Work. Although the U. S. Censuses of Population and Housing are the biggest of the Census Bureau's data collection and data processing projects, they represent only two of several hundred statistical projects including:

1. a dozen periodic national censuses (agriculture, irrigation, manufacturers, mining, wholesale trade, retail trade, service trades, construction, transportation, governments, population and housing) taken at 5 or 10 year intervals, scheduled over the decade to minimize peak work loads, with an annual average employment of approximately 2250 man years;
2. current statistical programs:
 - a. monthly foreign trade statistics of the U. S. involving a million customs declarations per month,
 - b. numerous economic and social surveys conducted annually, semi annually, quarterly, monthly, or weekly, some of them using postal services and others using the Bureau's continuing staff of 1300 enumerators in its 12 regional offices;

3. reimbursable statistical services:

- a. about 400 special population censuses per year for state and local governments that reimburse the Census Bureau for its services in supplying them with data they need between decennial censuses,
- b. hundreds of other projects for other federal and non federal agencies on reimbursable bases involving more funds than the Census Bureau's annual appropriation for salaries and expenses.

Volume of Work. The volume of computer activity represented in all these programs requires a large and flexible base of trained personnel and facilities, a base on which periodic census work can be built.

The volume of work in the Bureau's current programs and in the reimbursable services it furnishes to other agencies, has increased to a level that is now approximately double the average workload of all the periodic censuses. This expansion of the Bureau's current and service programs has brought with it reasonable stability in the volume of work but not in the work's composition which is characterized by a constantly changing mix of programs and projects. As a result, specialization has developed along functional lines and has been encouraged by organizational groupings that bring scarce skills and facilities together for maximum utilization.

Various aspects of the population census, therefore, are handled in different organization units that also handle similar aspects of other Bureau programs. The Field Division through its organization of

enumerators collect data for censuses, surveys and other projects.

The Processing Division specializes in processing the data collected by the Field Division in accordance with instructions prepared by the Systems Division.

Population and Housing Censuses. The Associate Director for Demographic Fields is responsible to the Director for overseeing the development and conduct of the Censuses of Population and Housing. The Population Division and the Housing Division, which report to him, give special attention to ascertaining: a. what statistics are needed by the users and potential users of census data, b. what statistics should the Census plan to publish or make available in other form, and, c. what questions should be asked in the census in order to provide the kinds of information needed. They also review tabulations and write the text of reports. Representatives of these subject matter divisions, however, work in a team arrangement, under a coordinator, with representatives of all the other divisions concerned in planning, organizing and conducting a major program. A Coordinator, for the population and housing censuses, establishes in consultation with all interested divisions a census time schedule, reviews plans of divisions for the accomplishment of their responsibilities, requires progress reports, expedites needed decisions and actions, and informs the Associate Director for Demographic Fields of progress and problems needing attention. Work, however, flows from one division to the next in accordance with plans that all divisions have approved. The flow is constantly monitored by the Coordinator using the reporting system, conferences, inspections, evaluation studies, and measures of cost and quality control that are a part of every census.

DATA PROCESSING EQUIPMENT AT THE U. S. BUREAU OF THE CENSUS

Computers. As workloads have increased and as programs have been transferred from mechanical to electronic equipment, the Census has purchased, leased, or rented time on a succession of computers. Following its 1951 acquisition of Univac I, it purchased a second Univac I in 1955 and then two Univac 1105's in 1958. It contributed to the purchase of two additional Univac 1105's at the University of North Carolina and at the Armour Research Foundation in Chicago in 1959 as a means of reserving time on those computers during the 1960 Censuses of Population and Housing. An additional Univac 1105 was leased and installed in 1962 and used for two and one-half years. Two IBM 1401's were also procured in 1962; one, with Univac tape drives permitting conversion between IBM and Univac tapes, was purchased; and the other, a card machine, was leased. In 1963 two Univac 1107 systems were purchased and installed, bringing the Census computer inventory to eleven at that time. In addition to these, the Census had and still has contractual arrangements with other computer centers to rent time on their computers when needed during peak periods. By now, of course, Univac I has been accepted by the Smithsonian Institution in recognition of its historic record in the development of computer science. In 1967, a Univac 1108 was added to the census computer inventory and the last of the 1105's was retired.

Table 1 identifies the computers and peripheral equipment used by the Census Bureau during the period of the 1960 censuses of population and housing, and also the equipment planned for use by the Bureau during the period of the 1970 censuses of population and housing.

Table 1. COMPARISON OF ELECTRONIC COMPUTER CONFIGURATIONS USED FOR THE 1960 US CENSUSES OF POPULATION AND HOUSING WITH THOSE PLANNED FOR THE 1970 CENSUSES

1960

Cameras 27 (manual)

2 Univac I's
1000 Word Mercury Tank Memory
10 Uniservo I's
1 Typewriter

2 Univac 1105's (Census)
1 Univac 1105 (UNC)
1 Univac 1105 (ARF)
8 K Word Core Memory
16 K Word Drum Memory
18 Uniservo IIA Tape Units
1 Paper Tape Punch
1 Paper Tape Reader
1 Flexowriter

4 Fosdics
(Film Optical Sensing Device
for Input to Computers)

Auxiliary Equipment:

3 Unitypers
3 High Speed Printers
2 Card-to-tape Converters
3 Flexowriters

1970

Cameras 40 - 45 (automated)

1 Univac 1108 Computer
131K Word Core Memory
2 FH 880 Drums (1,572,864
words)
3 Fastrand Units (66,020,096
words)
14 Uniservo IIIA Tape Units
2 Uniservo VIIIC Tape Units
4 Uniservo IIA Tape Units
1 Punched-Card Reader
1 Paper-Tape Reader
1 Paper-Tape Punch
1 High Speed Printer
1 Console Printer
1 Remote Teleprinter

2 Univac 1107 Computers
128 Word Thin Film Memory
65K Word Core Memory
2 FH-880 Drums (1,572,864
words)
3 Fastrand Unit (66,020,096
words)
14 Uniservo IIIA Tape Units
4 Uniservo IIA Tape Units
2 Uniservo IVC Tape Units
1 Punched-Card Reader
1 Paper-Tape Reader
1 Paper-Tape Punch
1 High Speed Printer
1 Console Printer
1 Remote Teleprinter
1 Label Printer

(more)

Table 1. COMPARISON OF ELECTRONIC COMPUTER CONFIGURATIONS USED FOR THE
1960 US CENSUSES OF POPULATION AND HOUSING WITH THOSE PLANNED FOR THE
1970 CENSUSES--Continued

		<u>1970 (Continued)</u>
6	SPD 813 (Synchronizer for Peripheral Devices)	Auxiliary Equipment
	24 Bit Word Size	4 Univac High Speed Printers Off-Line
	<u>8K</u> Word Core Memory	IIA Input
	<u>1</u> A Register	
	<u>3</u> I/O Channels	1 Stromberg-Carlson SC-441 (Computer Document Recorder)
	1 Fosdic Scan Unit (Film Optical Sensing Device for Input to Computers)	IVC Input Microfilm Output
	2 MARK II Uniservos	Translates up to 4 pages (76 lines of 132 characters each) per second
	1 Ferranti Reader	
	1 Paper-Tape Punch	
	1 Flexowriter	DATAMEC D 3029 (tape Unit)
		41,700 CPS transfer rate 556 BPI Density

In keeping with its experience, the Census believes that any data processing operation can be improved. Evaluations of equipment needs are, therefore, made periodically. Out of these analyses of processing requirements and of advances in the state of the data processing arts, have come some guidelines for selecting, replacing, and modernizing computing systems. Some of these stated informally indicate that:

1. The Census does not rely on one computer, however large or powerful, to process all of its work. The economic and political importance of issuing certain reports on regular fixed time schedules requires that alternative processing devices be available in cases of equipment failure or of conflicting priorities.
2. Major computing systems are selected for use over periods of at least 10 years. However, major systems reviews are conducted every 5 years and computing systems are selected and installed for roughly half the computing workload, thereby avoiding a complete changeover at any one time. This leapfrog approach has provided a two-system operation, with each system having a life expectancy of about 10 years.
3. Compatibility between operating systems becomes increasingly important. As program and data files accumulate, compatibility must be considered in the selection of any new system. Selection of a new system that is not compatible with the most recent Census system is to be considered only if there is clear evidence that the measurable expense and time of converting computer programs from one system to another and of training computer-related personnel will be fully recoverable from the advantages of the new noncompatible system.

4. Arrangements for use of accessible back-up computing activities at other installations are preferred to the amassing of total inhouse systems capacity adequate to handle all peak loads with the extra continuing expense that such capacity would involve.
5. Systems capacity should be based on a 3-shift, 5-day week, leaving weekends for emergency situations, special priority projects, and uneven work schedules. Growth is to be considered in determining the capacity and the timing of acquisition of a new computing system recognizing that requirements always tend to reach capacity at rates accelerated beyond anticipations.

The question of whether to purchase or rent computers was given an early answer by the Census. Following a management and accounting practice established during the operation of its machine tabulation system, the Census has charged every minute of equipment time directly to using projects. Repeated analysis of these charges have shown that, at its levels of operation, the Census saved during its first 15 years of experience with computers, \$15 million by purchasing rather than leasing its electronic computing equipment.

Top level attention in Census operations has been directed toward equipment maintenance. From the days of its first computer, the Census started training its own computer maintenance engineers and technicians. Notable difficulties were experienced initially in meeting higher outside wage scales for trained computer personnel, and not all trainees stayed with the Census; but gradually a permanent and highly successful Census electronic computer maintenance force was established--a force which, if not unique in federal civilian agencies, is at least not widely duplicated.

In comparison with contract maintenance, the Census in its first 15 computerized years realized savings of \$6.5 million in its out-of-pocket maintenance programs. Rigorously enforced, regularly scheduled equipment maintenance has benefited Census production and regularized high priority dates. It will remain a factor in Census planning and operations.

Punch Cards. Prior to acquiring computers, the Census Bureau used over a thousand general and special purpose machines for punch card processing. The Bureau first used punch cards about 80 years ago; it still employs about 250 card punch operators. Herman Hollerith, the inventor of punch card machines, was a former census employee who, acting on a suggestion made by Dr. John S. Billings, Chief of the Census Vital Statistics Division, developed his punch card machines and had them used in the 1890 census. Subsequently, the census machine laboratory became internationally known for its continuous improvements and innovations in data processing techniques and equipment.

Even though the Census Bureau is now fully computer oriented and places its highest priorities on the development of electronic devices, it still uses punch cards for some purposes. Data collected in the economic and agricultural areas tend to take multidigit form representing numerical answers to questions about the value or quantity of goods produced or sold, the number of workers employed in industry, or the number of acres planted in corn or wheat, etc. The answers to such questions often involve several digits that are typed or manually written on the census questionnaires, then punched into cards and finally converted from cards to magnetic tape for computer processing.

On the other hand, questionnaires for the collection of demographic data, especially in the population and housing censuses, often use pre-coded locations for answers. For example, respondents or enumerators, by checking appropriate boxes on the questionnaire can indicate the sex of an individual as male or female. Similarly, a check mark may be used to identify the relationship of an individual to the head of the household, or to indicate whether the individual is employed, going to school, keeping house, etc. The locations of such check marks on the questionnaire can be read electronically in a FOSDIC system that transfers information to magnetic tape without recourse to card punching.

FOSDIC. To avoid dependence on slow manual mechanical punch-card techniques in preparing computer input, the Census together with the National Bureau of Standards studied various devices and possibilities during the 1950's and then developed FOSDIC (Film Optical Sensing Device for Input to Computers). Four production models were built later in the Census laboratory for the 1960 Censuses of Population and Housing.

The FOSDIC system uses a questionnaire in any size up to 14 x 20 inches with a capacity of 13,000 positions for the marking of answers. Microfilm copies of the questionnaires are scanned by FOSDIC, which transfers their information to magnetic tape. Internally FOSDIC, operating under program control, passes an electron beam from a cathode ray tube through the clear spot answers in a negative film image to a photo cell. FOSDIC circuitry then identifies and encodes the answers and records the appropriate characters on magnetic tape.

In the 1960 censuses, 25 microfilm cameras and four FOSDIC's were used to read questionnaires with their records for 180 million

persons and 55 million housing units. The cameras, operating on two shifts to photograph questionnaires, produced approximately 950 miles of microfilm which the FOSDIC's, working on three shifts, scanned at rates equivalent to 1000 punch cards per minute--a volume that a punch-card operator might be expected to produce in a day. The combined camera-FOSDIC system employed less than 100 camera and machine operators, maintenance engineers, camera loaders, quality controllers, and record clerks for a total of about 28,000 man-days to prepare the magnetic tape for the 1960 censuses. In the 1950 census, which had 30 million fewer persons and 10 million fewer housing units, 200,000 man-days were required for card punching, with a peak of 3,000 operators.

Although punch-card techniques greatly extended Census ability to cross-tabulate information and to produce more valuable statistics, the close time schedule for reporting the apportionment counts required by the Constitution never permitted the substitution of punch-card techniques for the time-honored methods of progressively summarizing hand tallies from the field. Not until 1960 were the apportionment counts produced by other than manual methods. Then the FOSDIC computer complex made history and gave testimony to the speed of electronic data processing by not only producing and reporting apportionment counts on schedule but also producing a great many other statistics at the same time.

FOSDIC developments since the 1960 censuses have been centered on expanded memory with capacity for testing and organizing data, storing programs internally, and achieving higher-density recording of output on magnetic tape. Improvements in tape handling mechanisms and the use of solid state components to increase reliability and reduce

maintenance requirements have also been incorporated. These developments have already resulted in a threefold increase in FOSDIC's throughput and a similar boost in the computer input speed of FOSDIC tapes.

Optical Character Recognition. FOSDIC has also been used to read certain high-speed printer symbols uniquely identifying respondents, and facilitating Census mail check-in and follow-up procedures. Some experimentation with handwritten characters has also been undertaken, but FOSDIC at present is essentially a position reader rather than a character recognition device. The Census, however, is also interested in high-speed optical recognition of typewritten alphabetic and numeric characters in a variety of type fonts. It has undertaken studies of several different types of scanners and now has formally requested proposals from industry for a document-reading system to handle customs declarations for foreign trade statistics. It is expected that a contract to meet Census requirements can be written and that another line of experience profitable to the government can be opened.

Automation of Microfilming. In microfilming the 1960 censuses, in preparation for FOSDIC scanning, camera operators manually turned the questionnaires to be photographed. Since then automation of microfilming has been achieved for certain projects and has clearly indicated the possibilities for broader development not only for the handling of one-sided or double-sided single sheets, but also for book-type schedules where automatic page turning can reduce personnel requirements, operating time, operator error, and project costs. A prototype

automatic page turner has now been developed and is being tested for use in the 1970 Censuses of Population and Housing.

High-Speed Printing and Microfilm Output. In contrast to the popular flashing-light cartoon conception of computer output, the data processing function of computers produces a veritable Everest of output. The Census has several off-line high-speed printers and on-line printers that produce millions of lines of printing each week. Part of this is accounted for in mailing lists, reporting forms, and double-pass statistical tables in a completed format ready for photography and offset reproduction. Much of the rest consists of reference-file material, program printouts, memory dumps, and statistical tables for unpublished data which need not be reproduced in printed form. As might be expected, with faster computers the volume has shown no inclination to diminish. However, an alternative to high-speed printing for reference and intermediate-use files is the conversion of information from magnetic tape to alphanumeric form on microfilm, a process that the Census is finding to be not only cheaper but also faster than high-speed printing. It has been serving Census purposes effectively in recent months. As Census experience grows, further advantage will more than likely be taken of what seems to be a very efficient process.

Map Area Computer. To compute population density both population counts and area measurements are needed but only the population estimates have been regularly updated for the United States. The areas of the thousands of political jurisdictions of the United States, although continually changing, have not been reported since 1940 when an expenditure

of approximately a half-million dollars was required to make them available. Current measurements using the same or similar methods would now cost two or three times as much. To produce these data at one-fifth their earlier costs, the Census has developed a new device for measuring areas of maps. The device, known as the Map Area Computer, applies sampling methods and electronic techniques to measure the surface of any thin insulating material that has been cut to the desired shape. The computer eliminates the need for hand recording and manual manipulation of figures that have characterized past area measurement processes. The computer uses the latest decennial census maps available.

Data Transmission. There are periods when the time schedules of major censuses have exerted accordion-like pressures for expansion and contraction of Bureau personnel. As a result, data processing activities of the Census Bureau are not concentrated in one location. The Jeffersonville, Indiana, Census Operations Office, for example, acts as a document receipt and data preparation office for most censuses. Prior to the 1963 Economic Censuses, cards punched there were flown to Washington for input to the centrally located computer system. However, under current practices, information from approximately 35 million cards has been transferred automatically at night by an IBM data transmission system (1013/7702) across some 500 miles of leased telephone wire from a card reader in Jeffersonville to a magnetic tape terminal in Washington. Cost reductions accompanying the change from manual to automatic data transmission have been matched by improved reliability and simpler control procedures. The Census need no longer contend with the problems of fog bound airports and of retrieving punch-cards from Boston because they couldn't be landed in Washington.

PROCESSING THE CENSUS

Planning. Censuses differ in their objectives, content, enumeration techniques, facilities, and personnel. As they differ, their approaches to data processing also differ. Planning the steps in processing a census, therefore, is affected by and directly affects the entire planning process of a census.

Planning for the 1960 U. S. Census of Population and Housing took into account factors that were not present in the 1950 Censuses. The introduction of electronic data processing computers and of FOSDIC (Film Optical Sensing Device for Input to Computers) changed the character of the census questionnaire and automated the process of transforming data from eye-readable to machine-readable form. This change eliminated the card punching operation. By using microfilm and the FOSDIC system, data were transferred from the questionnaire to magnetic tape without the intervention of card punching and without the errors that card punching generates. To accomplish this change, the FOSDIC system with its improved computer input had to be planned and developed in conjunction with the planning of the content and design of the questionnaire and enumeration procedures.

Planning for the 1970 U. S. Censuses is emphasizing integrated consideration of census content, enumeration procedures, and data processing. Table 2 presents a comparison of subject items planned for the 1970 Censuses with those in the 1960 U. S. Census of Population and

Table 2. SUBJECT ITEMS PLANNED FOR 1970 US CENSUSES OF POPULATION AND HOUSING
 COMPARED WITH THOSE IN THE 1960 CENSUSES

Population items	Sample Size	
	1960	1970
Relationship to head of household.....	100%	100%
Color or race.....	100	100
Age (month and year of birth).....	100	100
Sex.....	100	100
Marital status.....	100	100
State or country of birth.....	25	25
Years of school completed.....	25	25
Number of children ever born.....	25	25
Activity 5 years ago.....	--	25
Employment status.....	25	25
Hours worked last week.....	25	25
Weeks worked last year.....	25	25
Last year in which worked.....	25	25
Occupation, industry, and class of worker.....	25	25
Income last year:		
Wage and salary income.....	25	25
Self-employment income.....	25	a25
Other income.....	25	b25
Country of birth of parents.....	25	20
Mother tongue.....	25	20
Year moved into this house.....	25	20
Place of residence 5 years ago.....	25	20
School or college enrollment (public or private).....	25	20
Veteran status.....	25	20
Place of work.....	25	c20
Means of transportation to work.....	25	20
Occupation-industry 5 years ago.....	--	5
Citizenship.....	--	5
Year of immigration.....	--	5
Marital history.....	25	5
Vocational training completed.....	--	5
Presence and duration of disability.....	--	5

- a Single item in 1960; two-way separation in 1970 by farm and nonfarm income.
- b Single item in 1960; three-way separation in 1970 by Social Security, public welfare, and all other receipts.
- c Item will be expanded to include street address if the appropriations for the 1970 census include an allotment for this purpose.

Table 2. SUBJECT ITEMS PLANNED FOR 1970 US CENSUSES OF POPULATION AND HOUSING
 COMPARED WITH THOSE IN THE 1960 CENSUSES--Continued

Housing items	Sample Size	
	1960	1970
Number of units at this address.....	--	d100
Telephone.....	25	e100
Access to unit.....	100	100
Kitchen or cooking facilities.....	100	--
Complete kitchen facilities.....	--	100
Condition of housing unit.....	100	--
Rooms.....	100	100
Water supply.....	100	100
Flush toilet.....	100	100
Bathtub or shower.....	100	100
Basement.....	25	100
Heating equipment.....	25	100
Tenure.....	100	100
Commercial establishment on property.....	f100	100
Value.....	f100	100
Contract rent.....	f100	100
Vacancy status.....	100	100
Months vacant.....	25	100
Components of gross rent.....	25	25
Year structure built.....	25	25
Number of units in structure and whether a trailer.....	25	25
Farm residence (acreage and sales of farm products).....	g25	25
Land used for farming.....	h25	--
Source of water.....	g20	20
Sewage disposal.....	g20	20
Bathrooms.....	20	20
Air conditioning.....	5	20
Automobiles.....	i20	20
Stories, elevator in structure.....	j20	5
Fuel--heating, cooking, water heating.....	5	5
Bedrooms.....	5	5
Second home.....	--	5
Clothes washing machine.....	5	5
Clothes dryer.....	5	5
Dishwasher.....	--	5
Home food freezer.....	5	5
Television.....	5	5
Radio.....	5	5

d To be collected only for coverage check purposes; will not be tabulated.

e Required on 100% basis for field followup purposes in mail areas.

f 100% in places of 50,000 or more, 25% elsewhere.

g Omitted in places of 50,000 or more.

h For renter-occupied and vacant-for-rent units outside places of 50,000 or more.

i 20% in places of 50,000 or more, 5% elsewhere.

j Collected only in places of 50,000 or more.

Housing. It may be noted that the question on "Place of Work" appears in both the 1960 and 1970 censuses. However, because of technological advances in the use of computers, answers to this question can now include precise addresses capable of being coded through use of a computerized "address coding guide" at much less expense than through a manual operation. However, the cost of collecting, coding, and tabulating the information for this question, if undertaken in the detail desired by city planners, transportation specialists, and housing and urban redevelopment officials, may require \$5 million dollars in additional appropriations for the 1970 censuses. Tests made by the Census Bureau show that the data can be obtained and effectively processed in direct response to the needs of these users of data for small geographic areas. Determining whether this should be included in census plans, and at what costs, has required subject matter statisticians, and data processing experts to work closely together in developing their feasibility studies.

Another broad planning question involving the data processing staff is the change in data collection plans contemplated for the 1970 censuses. In 1960, enumeration was conducted in two stages. The Stage I enumerator was responsible for finding and listing all living quarters in his enumeration district and obtaining complete lists of people living in them. The listing of addresses provided a control on necessary callbacks where no one was at home on the first visit, a record of the order in which residences

were canvassed, a basis for designating the sample households to receive a second and more detailed questionnaire, and also a guide for the Stage II enumerator to use in locating the sample households. In the 1970 censuses a mail out/mail back census is planned for the larger metropolitan areas and some adjacent counties that receive city delivery service from the Post Office Department. Approximately, 65% of the total U. S. population will be covered under the mailing procedure. In the rest of the country, the usual door-to-door canvassing procedure will be followed, supplemented (as in 1960) by the distribution to all households shortly before Census Day of a questionnaire containing the questions asked of all the people in the population and housing censuses. Enumerators will followup on incomplete returns and non response cases.

The success of the mailing procedure depends on computerized coded and controlled mailing lists. Such lists are assembled with the aid of a commercial mailing company and are verified and up-dated by the Post Office Department. About 40 million individual addresses will be computer printed from magnetic tape to labels. These will be placed on cards and given to the appropriate Post Office letter carriers who will check them for accuracy under quality control procedures. Corrections will be transferred to magnetic tape and processed through a computerized "address coding guide" that supplies for each address a series of geographic codes for block, tract, ward, city, county, etc. Census field control codes will also be added.

While mail out/mail back procedures are heavily dependent on the computer, they also rely importantly on the census geography and mapping program. The census metropolitan maps have been used in the construction of the census address coding guide, the system of geographic coordinates for approximately 1.3 million urban blocks, and the code references for those blocks and their 6.5 million block faces. The use of the carefully developed, controlled and coded mailing list should help to improve census coverage while at the same time permitting a reduction of possibly 25% in the more than 100,000 field workers that would otherwise be needed for door-to-door canvassing in areas where the mail system will be used. The number of enumerators in other areas will, of course, not be affected.

The above references to content and to mailing procedures planned for the 1970 censuses of population and housing do not touch upon many other problems; however, they serve to indicate the necessity for computer specialists to participate in census planning at all levels. The savings in time and costs and the enrichment of the programs that are becoming more and more possible because of computers, require that those responsible for computer utilization have ready access to top management decision makers. Another way of saying this is that an electronic computer system, under innovative guidance, is not simply a faster tabulating machine, it is instead a tool for improvements in practically

every aspect of statistics, including management.

However, the planning of computer operations must be started years in advance of any major census if the advantages of computer capacities are to be exploited. Therefore, a general revision in the time schedule for planning and conducting censuses is a practical necessity in computer management. The traditional census time schedule must be redrawn once a computer is contemplated. Censuses using conventional EAM equipment have always had to plan their sorts and runs for various series of tables in order to minimize regroupings and to maximize the possibilities for further use of each sort or table. Nevertheless, EAM staffs have not customarily felt pressed to complete all data processing plans prior to the collection of the data. Because of the time involved in EAM processing, planning and processing have often preceded more or less concurrently, with planning of tabulations only slightly preceding actual machine processing. However, with the introduction of computers and optical scanners, the speed of processing is greatly increased and plans can be used without waiting for the manual editing, coding and card punching operations that used so much time in EAM systems.

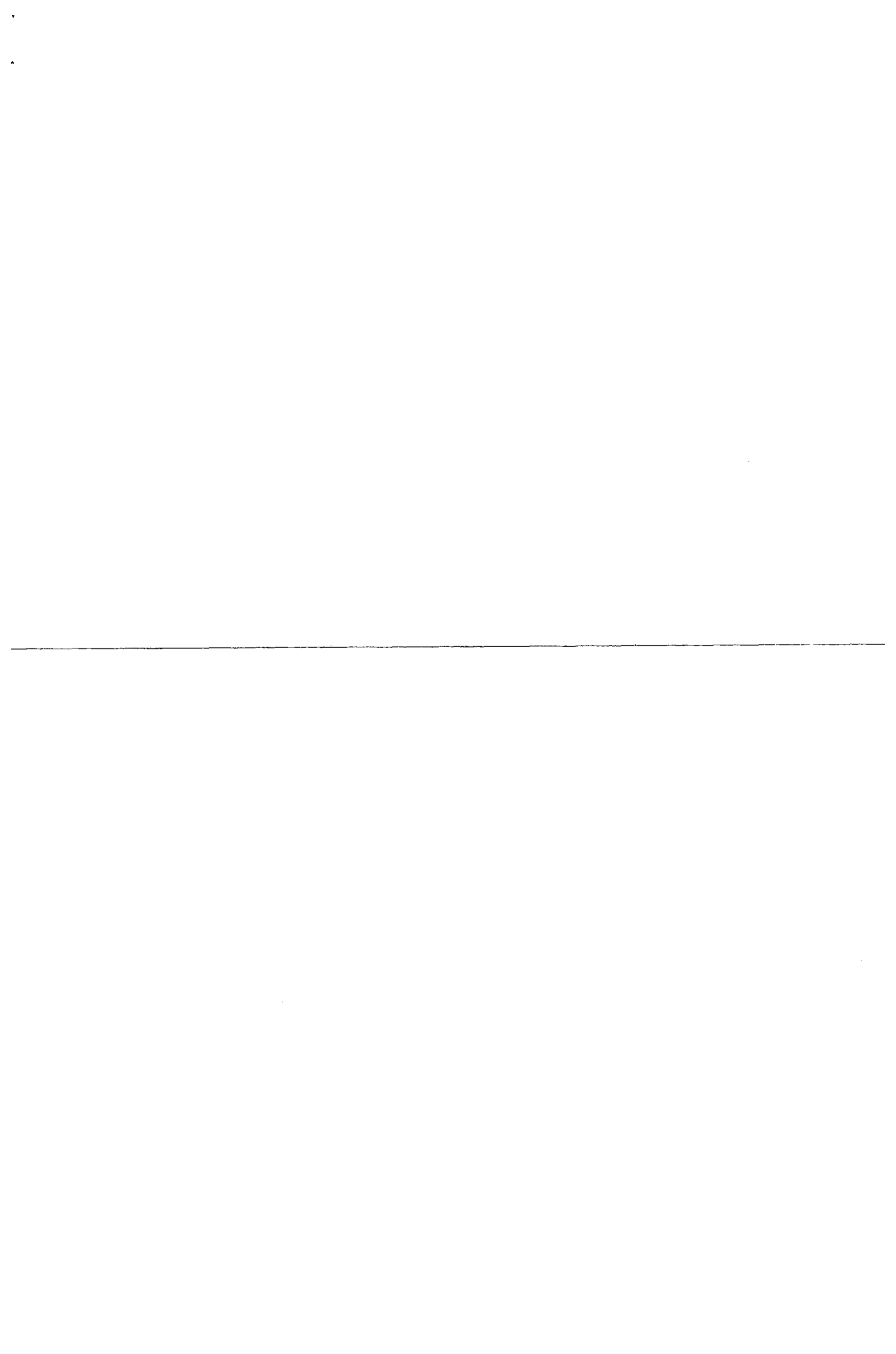
Delay in the preparation of plans for computer utilization are directly measurable in delays in publication. Therefore, special attention needs to be devoted to that basic census planning device, the census time schedule, by which specific dates are set for decisions

and for the starting and completion of actions required to meet census targets.

When computers and optical scanners are to be used in a census, the time needed for planning, systems analysis and programming in advance of data collection is several times longer than the time needed to plan the processing by conventional equipment. The increase in early planning time, however, is more than offset by the decrease in processing time. In the United States, with its present approach to census planning, the day after the taking of a census marks the beginning date of the planning of the next census; in fact, a good deal of informal planning or looking ahead is done even earlier than that. Chart II shows the time schedule for certain major activities of the 1960 censuses of population and housing.

Operations. Processing the data of the 1960 censuses of population and housing of the United States involved several major steps,

1. Receiving from the census field offices, enumeration books containing the schedules filled in by the enumerators.
2. Checking enumeration books against control records.
3. Coding on the sample schedules to which there could be so many different responses that enumerators had been instructed to write the answers in longhand on the schedules.
4. Microfilming the schedules--first those containing data collected on a 100 percent basis--then those containing the sample data.



5. Putting the microfilm through FOSDIC which converted the marks on the microfilm into magnetic signals on computer tape.
6. Feeding these tapes, together with instruction tapes known as computer programs, into an electronic computer which edited and tabulated the data.
7. Running the tapes containing the tabulated data through the computer with tapes containing the requisite historical data and with instructions to the computer. The computer arranged the data in publication format. The tables were then printed on a high-speed electronic printer, for offset reproduction.

The last three steps were performed on the high-speed electronic equipment in Washington or at other installations. However, the first four steps were conducted in Jeffersonville, Indiana at the Census Operations Office there. The steps in Jeffersonville all required large clerical staffs. Employment there jumped from 113 on March 30, 1960, the day before the census, to 192 in April, 702 in May, 1090 in June, 1249 in July, and 1353 in August, after which there were gradual reductions through the end of that year and then a more rapid tapering off. Clerical employment in data processing for the 1960 censuses was much lower than in 1950 when the employment of card punch operators alone, although representing only one class of work, was over 3,000.

Anticipated advances in computerizing, editing and coding are expected to reduce the personnel requirements for data processing in the 1970 censuses despite the increased population at that time.

Programming. The data processing steps listed above did not include programming, although it is essential to the operations of the electronic computers. However, like planning or systems analysis, it is not in the direct flow of production activity. Programming moves forward from systems analysis within the general framework of planning. Its output is a set of instructions to the computer either in a common computer language like Fortran or Cobol that can be used on a number of different makes of computers, but not on all of them; or in an assembly language developed for a specific computer make or model. These instructions are used to transfer, add, subtract, compare or otherwise manipulate segments of data stored in the computer. They may result in tabulations, listings, answers to complex computations, or other temporary or permanent forms of computer output.

The inputs to programming are the specifications for the job to be programmed. These specifications may be in a variety of forms. They may be headings and stubs for tables to be filled in by the computer. If that is all the programmer receives in the way of specifications, then obviously he must already have or be able to get information about the sources of data to be used; about the definitions of the source data and the items in the table headings and stubs; about the quality

of the data; about any editing and correcting required; about codes or recodes and their comparability with other coding systems; about the formulas or needs for computing, comparing, matching, sampling, weighting, estimating, or indexing; about geographic delineations or time references; about in other words, the purposes, subject matter concepts and methodology of the project. Some programmers may have all this information, but most do not; nor are they generally expected to have it. Programmers cannot always be statisticians, sociologists, economists, demographers, accountants, or engineers. They may need, therefore, better specifications than are shown in a simple set of table headings and stubs.

The adequacy of specifications is of great importance to the efficiency and effectiveness of the programming process. Oral specifications are almost always subject to misinterpretation. Narrative documentation has communication problems, including omissions and inconsistencies. Flow charts, block diagrams and decision logic tables accompanied by item codes or recodes are favored by many programmers because they identify specifically what is wanted. They also provide a record that can be quickly reviewed, corrected or evaluated.

The U. S. Bureau of the Census has had extensive experience with the problem of communications between subject matter and computer specialists. Often several people are involved, including for example, statisticians, systems analysts, programmers, coders, and those who

test and compile the programs. The possibilities for misunderstanding complicated concepts or ambiguous phrasing are multiple. A responsibility for finding solutions to the problems of preparing clear specifications and of communicating them clearly has been assigned to a research staff in the Bureau's Systems Division. One approach is to train subject matter specialists in programming, especially in Fortran, in order that they may be better able to interpret the needs of the programmers; another approach is to rotate programmers into subject matter divisions. The development and use of decision logic tables has proven to be effective for some types of programs. The 1964 census of agriculture was programmed completely from decision tables which have the advantage of being precise, easy to review and correct, and excellent in accounting for all cases. In fact, under certain conditions the computer can convert the decision logic table into a computer program.

The use of decision tables, block diagrams, or flow charts does not prevent a programmer from talking with a subject matter statistician. He can and does maintain sufficient oral communication to insure his understanding of what is wanted and to indicate to his counterpart how modifications in the specifications might improve the results or save computer time and expense.

Concurrent Operations. In the 1960 censuses of population and housing in the United States, programs were run serially, one after

another. However, the 1107 Univac computers installed after the 1960 censuses are capable of processing several programs through the computer during the same time span. The central processing unit of the computer operates with such speed that few programs operating on the computer by themselves can keep the central processor busy more than a relatively small fraction of the time needed by the computer to perform all of the work including the handling of inputs and outputs. As a result the Bureau and Univac have developed an ability to run several programs concurrently and by so doing utilize more of what would otherwise be unutilized central processor time. The Bureau now, as a regular practice, schedules a mix of production runs, assemblies and tests during the same elapsed time period. An Executive routine that acts as an auxiliary job monitoring program controls all of the input and output operations of the computer, including the loading of operating programs. It assigns the required central and peripheral computer facilities to as many programs as the computer system can accommodate; it loads the programs and starts the first of them. When that program needs to perform input or output operations that don't fully utilize the processor's time, the Executive routine brings in another program that is ready to utilize the central processor and lets it share the time with the first program. In this manner several programs may share time of the central processor together.

The current use of this system has greatly increased the Bureau's

productivity. It is now operative on both the 1107's and 1108. It requires some constraints on the size of job programs, but these may actually simplify some aspects of programming. The Bureau has learned from its experience in running programs one at a time on the 1107, and on earlier computers, that concurrent processing increases the through-put of the computer and represents a significant increase in the efficiency of the entire data processing activity. For example, one recent report shows that the Processing Division during a typical month made about 9,000 different runs on each of the Bureau's two 1107 systems. The work occupied each of the systems for about 600 hours of elapsed time, but used only about 240 hours of central processing time, thereby, giving a ratio of elapsed time to central processor time of about 2.5 to 1. One of the reasons why a 1 to 1 ratio is not achieved is that it would require a new program going into the machine every 1-2/3 minutes! And since, in census type of work, each new run requires finding, mounting, labeling, dismounting and refiling three or four reels of tape, such a performance rate is hardly to be expected hour after hour. Reduction in labor has been achieved to some extent by acquiring 66 million words of additional drum storage, some of which is used to hold some 3,000 active computer programs so that the production personnel no longer have to handle program tapes along with their truck loads of data tapes. But this has not enabled the Bureau to keep pace with current progress, for it has just put into service an 1108

computer whose arithmetic unit is six times as fast as those of the 1107's. Effectively utilizing that kind of speed is not possible with serial operations.

Costs. The cost of the 1960 Population and Housing Censuses of the United States was approximately \$102 million. Costs directly attributable to data processing amounted to approximately \$13 million, about 75% of which was accounted for by the cost of personal services. In addition, capital outlays for the purchase of electronic data processing equipment, parts and magnetic tape, and for the construction of FOSDIC added another \$4.5 million, giving a total of \$17.5 million for data processing services and equipment. This is not a fully stated cost figure because it includes neither its share of the general expenses of administering the census nor a calculation of the costs of tabulation planning necessary for the development of specifications for computer programming. In addition, the Population and Housing Divisions detailed some technical personnel to assist in the processing work and the full costs of those details are not shown. On the other side however, the capital outlay for computers shown here is attributed solely to the 1960 census. The computers had lives longer than the census and performed other work. The largest items in the processing budget were: (1) the cost of operating the computers and high-speed printers for the censuses of population and housing, \$2.85 million, (2) clerical coding of selected items on the sample questionnaires, \$2.5 million - a unit cost of about 5-1/2 cents for each of the 45 million

persons in the sample, and (3) computer programming, monitoring, work scheduling, and record keeping, \$1.7.

An unpublished supplement to the Procedural History is attached to this report. It includes the following tables showing all costs for the 1960 censuses of population and housing of the United States:

Table 2A -- Cost of the 18th Decennial Census by Major Classes:
1958 to 1963

Table 2B -- Capital Outlay: 1958 - 1963

Table 2C -- Cost of U. S. Population and Housing Censuses by
Activities, 1958 to 1963

Table 2D -- Cost of Puerto Rico Population and Housing Censuses
and Censuses of Other Outlying Areas, 1958 to 1963

Table 2E -- Cost of Survey of Components of Change and Residential
Finance, 1958 to 1963

Table 2F -- Cost of 1959 Agriculture, Irrigation, and Drainage
Censuses, United States and Puerto Rico, 1958 to
1963

21/2-10/100. 2/10. 17

Unpublished Supplement to 1960 Censuses of Population and Housing:
Procedural History

DETAILED TABLES ON COST OF
EIGHTEENTH DECENNIAL CENSUS

The attached tables contain more detailed figures on cost of the Eighteenth Decennial Census than appear in the corresponding tables 2A-2F in the published 1960 Censuses of Population and Housing: Procedural History. They are final figures which were omitted because they were prepared primarily for internal use and appeared unlikely to be of interest outside the Census Bureau.

Table 2A.--COST OF EIGHTEENTH DECENNIAL CENSUS BY MAJOR CLASSES: 1958 to 1963
(Years ending June 30. In thousands of dollars. Figures may not add exactly because of rounding)

Major class	Total	1958	1959	1960	1961	1962	1963
Appropriation.....	127,935						
Allowance for depreciation ¹	963						
<u>Total cost of Eighteenth Decennial Census</u>	128,898	2,141	7,641	89,639	18,764	7,393	3,321
<u>Shared costs</u> ²	12,533	897	3,846	3,939	2,365	1,025	461
General administration ^{2 3}	5,950	212	569	2,246	1,839	790	294
General research (excluding pretests and Evaluation and Research Program for (1) population and housing censuses—see tables 2C and 6, and (2) for agriculture census) ²	914	86	112	134	238	203	141
Capital outlay (see table 2B) ² ..	5,669	599	3,165	1,559	288	32	26
<u>U.S. Population and Housing Censuses (see table 2C)</u> ²	91,362	1,012	2,845	68,568	11,509	4,807	2,621
Planning (including tabulation planning and publication planning).....	6,061	695	1,047	1,107	1,532	1,181	499
Geographic work.....	4,454	288	1,273	1,867	894	110	20
Field enumeration.....	63,980	10	33	62,982	881	67	7
Data processing.....	13,015	19	476	1,946	6,846	2,341	1,388
Publication program.....	1,890	-	16	36	567	741	530
Evaluation program.....	1,846	-	-	583	767	367	129
Miscellaneous.....	116	-	-	47	22	-	48
<u>Puerto Rico population and housing censuses and censuses of other outlying areas</u> ² (see table 2D).....	1,184	-	17	706	361	96	4
<u>Survey of Components of Change and Residential Finance</u> ² (see table 2E)	2,840	-	243	1,592	553	333	120
<u>1959 agriculture, irrigation, and drainage censuses, U.S. and Puerto Rico</u> ² (see table 2F).....	20,978	232	690	14,834	3,976	1,132	115

See footnotes at end of table 2F.

The estimated total cost of the 1960 Population and Housing Censuses (including the Puerto Rico population and housing censuses and the censuses of other outlying areas and the Survey of Components of Change and Residential Finance, and including an estimate of the proportionate share of the costs shared by these censuses and the agriculture censuses) is \$106.2 million. The estimated total cost of the 1959 Censuses of Agriculture, Irrigation, and Drainage is \$22.7 million. See footnote 2 at end of table 2F.

Table 2B.--CAPITAL OUTLAY: EIGHTEENTH DECENNIAL CENSUS

(Years ending June 30. Thousands of dollars. Figures may not add exactly because of rounding. Does not include payments in 1960 totaling \$1,471,190 to two universities to assist in the purchase of 1105 systems compatible with the Bureau of the Census computer systems. Although these were fixed payments entitling the Bureau to fixed fractions of the available time on the two computer systems, they were treated as prepayment of rent. In the accounts and in these tables, this payment is distributed throughout the costs for computer time--see table 2C)

Activity	Total	1958	1959	1960	1961	1962	1963
TOTAL.....	5,669	599	3,165	1,559	288	32	26
Two 1105 computers and replacement parts, purchase.....	2,792	126	2,648	18	(-Z)	-	-
Installation of computers.....	234	187	14	21	12	(-Z)	-
Magnetic computer tape, purchase....	548	-	19	373	135	21	-
FOSDIC construction and installation (parts and labor) ⁴	578	196	318	64	-	-	-
General operating, leave, benefits ⁵	85	36	45	4	-	-	-
Payments to personnel:							
Salaries.....	177	78	90	9	-	-	-
Travel.....	(Z)	-	(Z)	-	-	-	-
Purchases.....	125	55	70	-	-	-	-
Contract services.....	108	27	31	50	-	-	-
Other.....	84	1	82	1	-	-	-
Auxiliary equipment for use with computers, FOSDIC (e.g., test equipment, tape storage facilities, etc.), purchase.....	294	90	55	141	8	-	-
Other electronic equipment, purchase	5	-	-	1	-	-	4
Univac I, Serial 13, purchase ⁶	170	-	-	170	-	-	-
Other purchases: office furniture and equipment (other than field office), etc.....	805	-	46	599	127	11	22
Office furniture, machines, and equipment (other than field office).....	388	-	-	255	113	11	9
Mechanical data-processing equipment.....	-2	-	-	-2	-	-	-
Machine Development Laboratory equipment.....	15	-	-	15	-	-	-
Motor vehicles.....	26	-	-	-	14	-1	13
Other.....	378	-	46	331	-	1	-
Construction and modification of equipment (parts and labor).....	66	-	-	58	8	-	-
General operating, leave, benefits ⁵	12	-	-	10	2	-	-
Payments to personnel:							
Salaries.....	30	-	-	26	4	-	-
Travel.....	1	-	-	1	-	-	-
Other.....	23	-	-	21	2	-	-
Census of Agriculture capital acquisitions.....	178	-	63	115	-	-	-

See footnotes at end of table 2F.

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963

(Years ending June 30. Thousands of dollars. Figures may not add exactly because of rounding. Cost of the 1960 population and housing censuses excluding the censuses of Puerto Rico and the other outlying areas (see table 2D), excluding the Survey of Components of Change and Residential Finance (see table 2E), and excluding those expenses shared by these censuses and by the 1959 Censuses of Agriculture, Irrigation, and Drainage (see table 2A). An estimate of the total cost of the 1960 population and housing censuses including these elements is given at the foot of table 2A)

Activity	Total	1958	1959	1960	1961	1962	1963
TOTAL.....	91,362	1,012	2,845	68,568	11,509	4,807	2,621
PLANNING.....	6,061	695	1,047	1,107	1,532	1,181	499
Population census planning (excluding pretests) and preparation (including tabulation and publication planning) ⁷	3,801	315	536	802	1,084	719	345
General operating, leave, benefits ⁵	1,090	107	173	209	309	221	71
Payments to personnel:							
Salaries.....	2,341	191	331	470	645	459	245
Travel.....	88	12	11	24	35	6	(Z)
Postal services.....	29	-	(Z)	-	10	10	9
Miscellaneous procurement.....	65	-	1	58	4	2	(Z)
Transportation of things.....	71	1	(Z)	4	62	3	1
Rents and utilities.....	11	(Z)	(Z)	2	7	(Z)	(Z)
Other.....	106	4	20	34	13	17	18
Housing census planning (excluding pretests) and preparation (including tabulation and publication planning).....	1,906	174	376	292	448	462	153
General operating leave, benefits ⁵	535	58	131	105	107	103	31
Payments to personnel:							
Salaries.....	1,236	105	226	149	318	330	108
Travel.....	68	9	10	25	16	6	2
Printing.....	14	1	3	2	3	3	2
Postal services.....	15	-	(Z)	-	2	6	7
Other.....	40	(Z)	6	12	2	15	4
Pretests ⁸	352	205	133	14	-	-	-
General operating, leave, benefits ⁵	64	38	25	1	-	-	-
Payments to personnel:							
Salaries.....	183	107	72	4	-	-	-
Travel.....	47	26	20	1	-	-	-
Other.....	58	35	15	8	-	-	-
GEOGRAPHIC WORK.....	4,454	288	1,273	1,867	894	110	20
Research, development, planning....	331	84	184	-	(Z)	44	19
General operating, leave, benefits ⁵	178	36	79	-	-	44	19
Payments to personnel:							
Salaries.....	88	41	47	-	-	-	-
Travel.....	33	2	31	-	-	-	-
Other.....	32	5	27	-	(Z)	-	-

See footnotes at end of table 2F.

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
GEOGRAPHIC WORK--Continued							
Preparatory work establishing statistical areas.....	356	89	266	(Z)	-	(-Z)	-
Census county divisions.....	132	70	62	-	-	-	-
General operating, leave, benefits ⁵	35	21	14	-	-	-	-
Payments to personnel:							
Salaries.....	70	32	38	-	-	-	-
Travel.....	20	12	8	-	-	-	-
Other.....	6	4	2	-	-	-	-
Census tracts.....	76	11	65	(Z)	-	-	-
General operating, leave, benefits ⁵	19	3	16	-	-	-	-
Payments to personnel:							
Salaries.....	51	5	46	(Z)	-	-	-
Travel.....	3	2	1	-	-	-	-
Other.....	3	(Z)	2	(Z)	-	-	-
Urbanized areas.....	54	1	54	(Z)	-	(-Z)	-
General operating, leave, benefits ⁵	13	(Z)	13	-	-	-	-
Payments to personnel:							
Salaries.....	36	(Z)	35	-	-	-	-
Travel.....	2	(Z)	2	(Z)	-	-	-
Other.....	4	(Z)	4	(Z)	-	(-Z)	-
Unincorporated places.....	93	8	86	(-Z)	-	(-Z)	-
General operating, leave, benefits ⁵	23	3	20	-	-	-	-
Payments to personnel:							
Salaries.....	60	5	55	-	-	-	-
Travel.....	1	-	1	-	-	-	-
Other.....	9	(Z)	9	(-Z)	-	(-Z)	-
Preparation of maps for enumeration.	2,953	114	822	1,683	334	(-Z)	-
Collection of maps and boundary data.....	318	90	227	(Z)	-	-	-
General operating, leave, benefits ⁵	80	30	50	-	-	-	-
Payments to personnel:							
Salaries.....	193	51	142	-	-	-	-
Travel.....	17	5	12	-	-	-	-
Other.....	28	4	23	(Z)	-	-	-
Map compilation and drafting....	210	24	185	1	-	-	-
General operating, leave, benefits ⁵	39	2	37	-	-	-	-
Payments to personnel:							
Salaries.....	124	3	120	-	-	-	-
Travel.....	(Z)	(Z)	(Z)	-	-	-	-
Purchases.....	31	18	13	1	-	-	-
Printing.....	11	(Z)	11	(Z)	-	-	-
Other.....	4	(Z)	4	(Z)	-	-	-

See footnotes at end of table 2F.

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
GEOGRAPHIC WORK--Continued							
Preparation of maps for enumeration--Continued							
Preparation of base maps.....	2,126	-	151	1,642	334	(-Z)	-
General operating, leave, benefits ⁵	603	-	35	456	112	(-Z)	-
Payments to personnel:							
Salaries.....	1,285	-	115	971	199	(-Z)	-
Travel.....	37	-	1	31	5	(-Z)	-
Rents and utilities.....	37	-	-	37	(Z)	(-Z)	-
Printing.....	27	-	-	27	1	(Z)	-
Procurement.....	96	-	-	93	3	(-Z)	-
Other.....	41	-	(Z)	27	13	(Z)	-
Designation of ED's.....	111	-	84	27	-	-	-
General operating, leave, benefits ⁵	20	-	20	-	-	-	-
Payments to personnel:							
Salaries.....	63	-	63	-	-	-	-
Contract services.....	27	-	-	27	-	-	-
Other.....	1	-	1	-	-	-	-
Block numbering.....	24	-	24	-	-	-	-
General operating, leave, benefits ⁵	6	-	6	-	-	-	-
Payments to personnel:							
Salaries.....	18	-	18	-	-	-	-
Other.....	(Z)	-	(Z)	-	-	-	-
Reproduction of maps.....	147	-	137	10	-	-	-
General operating, leave, benefits ⁵	8	-	8	-	-	-	-
Payments to personnel:							
Salaries.....	45	-	45	-	-	-	-
Purchases.....	86	-	78	8	-	-	-
Other.....	7	-	5	2	-	-	-
Other.....	17	-	14	3	-	-	-
Preparation of maps for publication.	815	-	1	184	560	68	1
General operating, leave, benefits ⁵	243	-	(Z)	41	179	22	(Z)
Payments to personnel:							
Salaries.....	480	-	1	118	324	37	-
Travel.....	1	-	-	(Z)	(Z)	-	-
Printing.....	55	-	-	17	33	4	1
Purchases.....	15	-	-	7	6	1	(-Z)
Other.....	21	-	-	1	17	3	(Z)
FIELD ENUMERATION.....	63,980	10	33	62,982	881	67	7
Printing for enumeration (schedules, manuals, training materials, administrative forms, etc).....	1,719	10	29	1,680	-	-	-

See footnotes at end of Table 2F.

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
FIELD ENUMERATION--Continued							
Preparatory operations.....	2,076	-	-	2,076	-	-	-
General operating, leave, benefits ⁵	30	-	-	30	-	-	-
Payments to personnel:							
Salaries.....	265	-	-	265	-	-	-
Travel.....	1	-	-	1	-	-	-
Transportation of things.....	259	-	-	259	-	-	-
Rents and utilities.....	57	-	-	57	-	-	-
Miscellaneous procurement.....	281	-	-	281	-	-	-
Postal services.....	1,042	-	-	1,042	-	-	-
Other.....	141	-	-	141	-	-	-
Collection of furniture for field offices ⁹	114	-	4	116	(Z)	-1	-5
General operating, leave, benefits ⁵	1	-	(Z)	2	-	-	-1
Payments to personnel:							
Salaries.....	19	-	(Z)	18	-	-	-
Travel.....	7	-	(Z)	7	-	-	-
Transportation of things.....	69	-	4	71	-	-1	-4
Other.....	18	-	(Z)	17	(Z)	-	-
Field equipment.....	77	-	-	77	-	-	-
Regional Offices and Washington headquarters expenses for field enumeration.....	3,214	-	-	2,696	469	43	6
General operating, leave, benefits ⁵	209	-	-	112	76	19	2
Payments to personnel:							
Salaries.....	1,540	-	-	1,178	325	33	5
Travel.....	253	-	-	245	18	-10	(-Z)
Printing.....	202	-	-	199	3	(Z)	-
Postal services.....	504	-	-	504	-	-	-
Communications.....	103	-	-	83	20	(Z)	(-Z)
Rents and utilities.....	79	-	-	60	19	1	-
Miscellaneous procurement.....	245	-	-	243	2	(-Z)	-
Other.....	77	-	-	73	5	(Z)	(-Z)
District Offices and enumeration....	56,380	-	-	55,979	400	1	(Z)
General operating, leave, benefits ⁵	1,724	-	-	1,702	21	(Z)	(Z)
Payments to personnel:							
Salaries and, for enumerators, piece-rate payments:							
District Office.....	3,755	-	-	3,736	19	-	-
Crew Leaders.....	8,495	-	-	8,430	65	(Z)	(Z)
Enumerators.....	35,439	-	-	35,220	219	1	(Z)
Travel.....	4,452	-	-	4,431	21	(-Z)	(Z)
Rents and utilities.....	645	-	-	612	33	(Z)	-
Communications.....	647	-	-	636	11	(Z)	(-Z)
Other.....	1,223	-	-	1,212	11	(Z)	(Z)

See footnotes at end of table 2F.

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
FIELD ENUMERATION--Continued							
Post Office allocation of "Individual Census Records" to ED's.....	200	-	-	200	-	-	-
Enumeration time and cost study: Planning, preparatory work, enumeration, data processing, and analysis.....	199	-	-	158	12	23	5
General operating, leave, benefits ⁵	15	-	-	5	2	7	2
Payments to personnel:							
Salaries.....	153	-	-	130	8	12	3
Travel.....	13	-	-	12	1	-	-
Other.....	16	-	-	10	1	5	1
DATA PROCESSING.....	13,015	19	476	1,946	6,846	2,341	1,388
Administration.....	3,226	-	343	932	1,187	529	236
General operating, leave, benefits ⁵	425	-	66	196	115	28	20
Payments to personnel:							
Salaries.....	1,086	-	235	315	443	81	12
Travel.....	94	-	1	21	52	18	2
Other.....	1,623	-	42	401	576	402	202
Maintenance of Jeffersonville Branch of Decennial Operations Division (transportation, installation and maintenance of equipment; rent; etc.).....	463	-	107	11	290	55	-
Receipt and control of enumeration books, listing books, etc.....	309	-	-	93	202	12	2
General operating, leave, benefits ⁵	54	-	-	10	41	3	(Z)
Payments to personnel:							
Salaries.....	255	-	-	83	162	9	1
Other.....	(Z)	-	-	(Z)	-	-	-
Coding.....	2,431	-	-	136	2,295	-	-
General operating, leave, benefits ⁵	476	-	-	16	461	-	-
Payments to personnel:							
Salaries.....	1,954	-	-	121	1,834	-	-
Other.....	(Z)	-	-	(Z)	-	-	-
Microfilming (including breaker-sheet preparation).....	784	-	-	151	619	20	-6
General operating, leave, benefits ⁵	77	-	-	8	66	3	(-Z)
Payments to personnel:							
Salaries.....	345	-	-	67	270	8	-
Procurement.....	221	-	-	35	182	6	-2
Rents and utilities.....	70	-	-	16	54	(Z)	-
Contract services (nongovernmental).....	68	-	-	25	45	3	-4
Other.....	2	-	-	(Z)	2	1	(-Z)

See footnotes at end of table

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
DATA PROCESSING--Continued							
FOSDIC maintenance and operation....	495	-	25	153	297	20	(-Z)
General operating, leave, benefits ⁵	80	-	3	25	50	3	(-Z)
Payments to personnel:							
Salaries.....	315	-	7	106	196	7	(-Z)
Electronic parts and supplies...	39	-	-	14	25	-	-
Electronic equipment time and paper used.....	29	-	-	1	20	9	-
Miscellaneous procurement.....	12	-	1	7	4	1	-
Other.....	19	-	15	1	3	(Z)	(-Z)
Computer programing and control by Decennial Operations Division (except for Population Census Vols. II and III).....	1,469	-	-	260	647	523	39
General operating, leave, benefits ⁵	306	-	-	39	124	133	11
Payments to personnel:							
Salaries.....	1,144	-	-	220	514	381	29
Other.....	19	-	-	2	9	8	(-Z)
Computer programing and control by Data Processing Systems Division...	206	-	-	31	114	61	-
General operating, leave, benefits ⁵	41	-	-	5	24	12	-
Payments to personnel:							
Salaries.....	165	-	-	26	90	49	-
Computer and high-speed printer time (except for Population Vols. II and III).....	1,620	-	-	7	544	910	159
100-percent data; joint population and housing (basic processing and tabulation).....	143	-	-	7	136	-	-
100-percent data, population (preparation of final tabulations).....	73	-	-	-	73	-	-
100-percent data, housing (preparation of final tabulations).....	20	-	-	-	20	-	-
100-percent data, block statistics (preparation of final tabulations).....	36	-	-	-	26	10	-
Sample data, joint population and housing (basic processing and tabulation).....	375	-	-	-	288	87	-
Sample data, computer weighting	159	-	-	-	-	159	-
Sample data, population (basic processing and tabulation and preparation of final tabulations).....	492	-	-	-	1	378	114
100-percent and sample data, population and housing; census tracts (basic processing and tabulation, and preparation of final tabulations).....	135	-	-	-	-	135	-

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
DATA PROCESSING--Continued							
Computer and high-speed printer time--Continued							
Sample data, housing (basic processing and tabulation, and preparation of final tabulations).....	95	-	-	-	(Z)	49	46
Housing Vol. I, 100-percent and sample data (basic processing and tabulation, and preparation of final tabulations).....	92	-	-	-	-	92	-
Computer programing and control and computer and high-speed printer time for Population Vols. II and III.....	1,211	-	-	-	-	69	1,142
General operating, leave, benefits ⁵	163	-	-	-	-	13	150
Payments to personnel:							
Salaries.....	174	-	-	-	-	27	147
Other.....	874	-	-	-	-	29	846
Review of computer output ("diary review") and reconciliation.....	591	-	-	12	471	108	-
General operating, leave, benefits ⁵	124	-	-	2	95	27	-
Payments to personnel:							
Salaries.....	467	-	-	10	376	80	-
Other.....	(Z)	-	-	-	(Z)	(Z)	-
Table compilation and review for data-processing errors.....	114	-	-	9	53	35	17
General operating, leave, benefits ⁵	25	-	-	1	11	8	5
Payments to personnel:							
Salaries.....	89	-	-	8	43	26	12
Other.....	(Z)	-	-	(Z)	(-Z)	(Z)	(Z)
Supplemental programs.....	218	-	-	96	121	(Z)	-
General operating, leave, benefits ⁵	36	-	-	12	24	-	-
Payments to personnel:							
Salaries.....	181	-	-	84	97	-	-
Other.....	1	-	-	1	-	(Z)	-
Unallocated ¹¹	-122	19	-	54	6	-	-201
PUBLICATION PROGRAM.....							
Printing all population and housing census reports.....	1,890	-	16	36	567	741	530
General operating, leave, benefits ⁵	1,452	-	-	3	483	609	357
Payments to personnel:							
Salaries.....	199	-	-	-	100	82	17
Travel.....	461	-	-	-	230	174	57
Other.....	1	-	-	-	(Z)	(Z)	-

See footnotes at end of table 2F.

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
PUBLICATION PROGRAM--Continued							
Printing all population and housing census reports--Continued							
Commerce Dept. and GPO printing and binding.....	705	-	-	3	120	324	259
Other contract services, Federal government.....	1	-	-	-	1	-	-
Other contract services, non-governmental.....	30	-	-	-	13	7	9
Other.....	55	-	-	-	19	22	14
Census documentation, presentation and coordination of publications, etc. ¹²	313	-	16	27	62	74	133
General operating, leave, benefits ⁵	58	-	2	4	12	15	24
Payments to personnel:							
Salaries.....	203	-	13	23	45	54	67
Travel.....	1	-	-	(Z)	(Z)	-	1
Printing.....	19	-	-	-	2	3	13
Electronic equipment time, tape, and paper used.....	26	-	-	-	-	-	26
Other.....	6	-	-	-	2	2	2
Monograph program.....	73	-	-	7	10	17	40
General operating, leave, benefits ⁵	8	-	-	-	-	1	6
Payments to personnel:							
Salaries.....	22	-	-	-	-	4	18
Other.....	44	-	-	7	10	12	16
Unpublished census data program.....	53	-	-	-	12	41	-
General operating, leave, benefits ⁵	6	-	-	-	1	4	-
Payments to personnel:							
Salaries.....	14	-	-	-	5	9	-
Payment for electronic time and paper used.....	33	-	-	-	6	27	-
Other.....	(Z)	-	-	-	(Z)	(-Z)	-
EVALUATION AND RESEARCH PROGRAM.....							
Population and housing census evaluation and research projects.....	1,782	-	-	583	724	350	126
General operating, leave, benefits ⁵	276	-	-	68	117	73	18
Payments to personnel:							
Salaries.....	1,007	-	-	364	417	167	59
Travel.....	252	-	-	105	136	8	3
Electronic equipment time and paper used.....	109	-	-	-	2	73	34
Computer tape handling and use..	6	-	-	-	-	1	6
Other contract services, non-governmental and Federal government.....	49	-	-	3	25	20	1
Other.....	84	-	-	43	27	9	5

Table 2C.--COST OF U.S. POPULATION AND HOUSING CENSUSES BY ACTIVITIES, 1958 to 1963--Continued

Activity	Total	1958	1959	1960	1961	1962	1963
EVALUATION AND RESEARCH PROGRAM--Continued							
Match of Current Population Survey (CPS) and census records.....	64	-	-	-	43	18	3
General operating, leave, benefits ⁵	17	-	-	-	11	5	1
Payments to personnel:							
Salaries.....	43	-	-	-	32	10	1
Other.....	4	-	-	-	(Z)	2	1
MISCELLANEOUS.....	116	-	-	47	22	-	48
Publicity.....	68	-	-	47	22	-	-
General operating, leave, benefits ⁵	-	-	-	-	-	-	-
Payments to personnel.....	-	-	-	-	-	-	-
Contract services (nongovernmental).....	56	-	-	35	22	-	-
Miscellaneous procurement.....	12	-	-	12	-	-	-
Positive copy microfilm of 1960 census schedules.....	48	-	-	-	-	-	48
General operating, leave, benefits ⁵	4	-	-	-	-	-	4
Payments to personnel:							
Salaries.....	10	-	-	-	-	-	10
Travel.....	(Z)	-	-	-	-	-	(Z)
Contract services (nongovernmental).....	31	-	-	-	-	-	31
Other.....	2	-	-	-	-	-	2

See footnotes at end of table 2F.

Table 2D.--COST OF PUERTO RICO POPULATION AND HOUSING CENSUSES AND CENSUSES OF OTHER OUTLYING AREAS, 1958 to 1963

(Years ending June 30. Thousands of dollars. Figures may not add exactly because of rounding. Table 2A shows expenses shared by the 1960 Censuses of Population and Housing, the Survey of Components of Change and Residential Finance, the 1959 Censuses of Agriculture, Irrigation, and Drainage, and the censuses of the outlying areas of the United States. Any estimate of the total cost of the population and housing censuses of Puerto Rico or of the censuses of the other outlying areas should include an estimate of the proportionate share of these expenses)

Activity	Total	1958	1959	1960	1961	1962	1963
TOTAL.....	1,184	-	17	706	361	96	4
Puerto Rico pretest.....	11	-	11	-	-	-	(-Z)
General operating, leave, benefits ⁵	3	-	3	-	-	-	-
Payments to personnel:							
Salaries.....	5	-	5	-	-	-	-
Travel.....	3	-	3	-	-	-	-
Other.....	(Z)	-	(Z)	-	-	-	(-Z)
Puerto Rico, other.....	1,064	-	-	649	317	94	4
General operating, leave, benefits ⁵	93	-	-	32	42	19	1
Payments to personnel:							
Salaries.....	764	-	-	527	186	50	2
Travel.....	76	-	-	52	19	4	-
Other.....	131	-	-	38	71	21	1
Trust Territories of the Pacific ¹³ ..	6	-	6	-	-	-	-
General operating, leave, benefits ⁵	1	-	1	-	-	-	-
Payments to personnel:							
Salaries.....	4	-	4	-	-	-	-
Other.....	1	-	1	-	-	-	-
Other outlying areas.....	103	-	-	57	44	2	-
General operating, leave, benefits ⁵	11	-	-	-	10	1	-
Payments to personnel:							
Salaries.....	21	-	-	-	20	1	-
Other.....	72	-	-	57	14	(Z)	-

See footnotes at end of table 2F.

Table 2E.--COST OF SURVEY OF COMPONENTS OF CHANGE AND RESIDENTIAL FINANCE, 1958 to 1963

(Years ending June 30. Thousands of dollars. Figures may not add exactly because of rounding. Table 2A shows expenses shared by the 1960 Censuses of Population and Housing, the Survey of Components of Change and Residential Finance (SCARF), the 1959 Censuses of Agriculture, Irrigation, and Drainage, and the censuses of the outlying areas of the United States. Any estimate of the total cost of the SCARF program should include an estimate of the proportionate share of these expenses)

Activity	Total	1958	1959	1960	1961	1962	1963
TOTAL.....	2,840	-	243	1,592	553	333	120
General operating, leave, benefits ⁵ .	417	-	65	170	94	66	22
Payments to personnel:							
Salaries.....	1,838	-	152	1,112	359	160	55
Travel.....	214	-	16	174	25	(Z)	-
All other.....	371	-	11	136	75	107	43

See footnotes at end of table 2F.

Table 2F.--COST OF 1959 AGRICULTURE, IRRIGATION, AND DRAINAGE CENSUSES, UNITED STATES AND PUERTO RICO, 1958 to 1963

(Years ending June 30. Thousands of dollars. Figures may not add exactly because of rounding. Table 2A shows expenses shared by the 1960 Censuses of Population and Housing, the Survey of Components of Change and Residential Finance, the 1959 Censuses of Agriculture, Irrigation, and Drainage, and the censuses of the outlying areas of the United States. An estimate of the total cost of the 1959 Censuses of Agriculture, Irrigation, and Drainage including an estimate of the proportionate share of these shared costs is given at the foot of table 2A)

Activity	Total	1958	1959	1960	1961	1962	1963
TOTAL.....	20,978	232	690	14,834	3,976	1,132	115
General operating, leave, benefits ⁵ .	1,896	74	173	911	518	210	10
Payments to personnel:							
Salaries.....	14,265	139	364	10,374	2,645	709	34
Travel.....	2,398	6	46	2,139	186	22	(Z)
All other.....	2,420	13	107	1,410	627	192	71

Footnotes to tables 2A to 2F

- Represents zero.

(Z) Less than \$500.

(-Z) Credit (adjustment for overcharge), less than \$500.

¹This was not an expenditure. It is a total of accounting figures which were added to and are included in the detailed figures for expenditures in these tables to represent the proportionate share of deterioration of equipment used in the Eighteenth Decennial Census. It should be prorated in the appropriate places by anyone using the figures in the tables; most of this allowance for depreciation is in the figures for cost of computer time in table 2C.

²Eighteenth Decennial Census shared costs are for personnel, equipment, supplies, etc., shared by the 1960 Censuses of Population and Housing, the Survey of Components of Change and Residential Finance (SCARF), the population and housing censuses of Puerto Rico and the other outlying areas, and the 1959 Censuses of Agriculture, Irrigation, and Drainage. Estimates of the total cost of (a) the 1960 population and housing censuses (including the censuses of the outlying areas and SCARF and including an estimate of the proportionate share of the shared costs), and (b) the 1959 Censuses of Agriculture, Irrigation, and Drainage are given at the foot of table 2A. Any estimate of the total cost of the Censuses of Population and Housing without SCARF and the outlying areas, or of SCARF alone, or of the censuses of the outlying areas, should include an estimate of the proportionate share of the shared costs.

³Prorated charges for (a) Bureau general expense, i.e., the executive staff and the expenses of certain administrative divisions of Census Bureau which perform services and operations for the other divisions, (b) employees' sick leave and vacations, and (c) employee benefits, e.g., retirement funds (for years after fiscal year 1960).

⁴Prior to fiscal year 1958, approximately \$375,000 was spent for FOSDIC development in fiscal years 1951-57: \$18,000; \$47,000; \$82,000; \$15,000; \$13,000; \$45,000; \$155,000, respectively.

⁵Prorated charges for (a) division general expense (salaries of division chiefs and their immediate central staffs, and supplies and other charges for their functions), (b) employees' sick leave and vacations, and (c) employee benefits, e.g., retirement funds.

⁶Two Univac I computers, serial Nos. 1 and 13, were traded in on the two Univac 1105's for an \$800,000 credit. They were later repurchased: serial No. 13 was repurchased for \$248,000, of which \$170,000 was charged to the Eighteenth Decennial Census; serial No. 1 was purchased for \$120,000 (\$3,000 a month for 40 months), none of which was charged to the Eighteenth Decennial Census.

⁷Includes some items used for both the population and housing censuses.

⁸In the case of a number of special censuses of local areas which also served as pretests, only the additional expense incurred thereby was charged to the Eighteenth Decennial Census.

⁹The temporary field offices were furnished with excess office furniture from other Federal agencies.

¹⁰Includes \$1,876,000 for direct field costs plus \$504,000 for postal services, \$243,000 for miscellaneous procurement, and \$73,000 for miscellaneous costs.

¹¹For convenience of administration and accounting, a uniform hourly charge for electronic data-processing time was assessed regardless of whether the work was for the Eighteenth Decennial Census or some other activity. The hourly rate included, in addition to operating and maintenance costs, an amount for amortizing the capital investment. Because capital outlays for much of the equipment were defrayed from Eighteenth Decennial Census appropriations, there were periodic adjustments of charges for electronic data-processing time which had been assessed against the Eighteenth Decennial Census.

¹²Part of this cost is for the 1959 Census of Agriculture.

¹³This census was conducted by the Bureau of the Census but almost all costs were borne by the Department of Interior.

