

## CHAPTER V. MANAGEMENT

The purpose of this section is to provide a checklist and very brief discussion of the principal management elements in the processing plan of the 1960 censuses, by mentioning a few of the major policy issues that arose and indicating how they were resolved, and by listing many of the specific problems and indicating how they were solved.

### ORGANIZATION AND PLANNING

#### Objective

The Decennial Operations Division's main objective, concisely stated, was the following:

"To convert the raw material collected by the local enumerators into a useful set of statistical tabulations for publication and to do this as quickly as possible, meeting standards of high quality of output, within fixed budgetary limitations, and conforming to all established rules, regulations, limitations, policies, and procedures that govern the conduct of the Bureau of the Census."

#### Organization

An organizational structure deemed appropriate to accomplish these objectives was devised and adopted before the job was started, and the staff was then obtained by transfer of personnel from elsewhere in the Bureau of the Census or by new recruitment. The organization charts in appendix C indicate the major units established. The first chart is included to show the relationship of the Decennial Operations Division (the principal processing group) to other parts of the Bureau. The remaining charts indicate the organizational structure of the data-processing offices.

#### Personnel

Probably the most important single element in the success of the processing operations was the nucleus of key personnel with previous decennial census experience. This group was quite small in relation to total employment by Decennial Operations Division, was concentrated in the higher pay bracket, and was located chiefly in the central Washington office. Of the 52 persons with previous decennial experience, 9 had been through two previous censuses, 1 through three censuses, and 1 was working on her fifth decennial census.

#### Budget and Costs

The early budget projections assumed that improved processing methods (the microfilm-FOSDIC-computer system), more extensive use of sampling, and the application of production standards would enable the processing work to be done for about 40 percent of the cost of processing the 1950 censuses, after adjustments for increases in population and salary rates. The fiscal projections provided about \$7 million less than the total spent for processing the 1950 censuses.

The processing budget consisted of three primary and separate elements. They were the basic census processing job (a total of about \$11.2 million); the Components of Change and Survey of Residential Financing (SCARF) processing work (about \$700,000); and the Puerto Rico census processing (\$400,000). The costs of these programs were distributed over 4-1/2 fiscal years (fiscal 1959 through the first half of fiscal 1963) with peak expenditures estimated to occur in fiscal year 1961.

The two largest items in the processing budget were to cover (1) the cost of time on the computers and high-speed printers, which was estimated at over \$2.5 million, of which \$2.4 million was for the basic census processing and \$150,000 for the SCARF work, and (2) manual editing and coding of selected items on the sample questionnaires. The latter activity cost almost \$2.5 million--a unit cost of about 5-1/2 cents for each of the 45 million persons in the sample. The third most costly element was computer programming, monitoring, work scheduling, and record-keeping by the Decennial Operations Division staff; these activities cost almost \$1.6 million. (See appendix B.)

The cost of "personal services," or direct salaries for Decennial Operations Division employees in Washington and Jeffersonville, accounted for nearly 75 percent of the total budget. Some of the larger expenditures for non-personal service requirements were the following: Over \$500,000 for the purchase of 22,000 reels of computer tape; \$257,000 for 58,000 reels of microfilm and microfilm development; \$90,000 for the rental of microfilm cameras; \$159,000 for the purchase of mobile bins and steel shelving for use in Jeffersonville (in addition to the steel shelving already government-owned); and \$15,000 for microfilm viewers. A list of supplies and equipment used in the Jeffersonville operations is given in appendix E.

Insofar as possible, budget plans for Decennial Operations Division were developed on the basis of production standards data, and cost controls were integrated into the overall progress reporting plan so that the consolidated reports permitted a continuing review of work completed, staff time invested, and costs incurred. The Division budgets were kept consistent with the Operation Work Schedules (see section on "Control Records and Progress Reports" in chapter II).

Fiscal project accounts were developed on a major activity basis, i.e., with separate allotments provided for major activities such as receipt and distribution of enumeration books, coding, microfilming, review of computer diaries, and the like. Fiscal reviews and budgetary revisions were undertaken as necessary based upon the latest information contained in the official Bureau monthly cost statements, special biweekly machine tabulations of personal service charges by activity, and changes in procedures, methods, productivity, or work priorities.

In summary it may be said that--

1. The 1960 census processing costs were very substantially reduced from equivalent 1950 costs by changes in methods and other innovations.

2. The processing was accomplished at all times within preallotted resources.

3. Fiscal controls were exercised in such a manner as to permit a continuous evaluation of money spent in relationship to work accomplished.

The costs of some of the major clerical activities, and the personnel time involved, are described in the paragraphs that follow. A summary of data-processing costs by major objects of expenditure and by fiscal year is shown in appendix B.

Receipt and check-in of enumeration books.--The first enumeration books were received and checked in on April 22, 1960, and the check-in of all 344,553 stage-I, 100-percent, enumeration books was completed by the end of August 1960. The entire stage-I check-in operation required 163 clerical man-weeks at a total cost of \$11,739. The stage-II, sample, check-in operation, involving 469,379 books, began April 29, 1960, required 162 man-weeks of labor, cost \$11,705, and was also completed by the end of August 1960.

Breaker sheet preparation and verification.--A total of 348,597 breaker sheets were prepared for enumeration books containing 100-percent data, at a cost of \$19,043 and 271 man-weeks of labor. A total of 478,898 breaker sheets were prepared for enumeration books containing sample data, at a cost of \$31,417.

Breaker sheet verification for stage-I, 100-percent, enumeration books, began April 29, 1960, and was completed by mid-August 1960. This operation cost \$28,456 and required 419 man-weeks of labor. Breaker sheet verification for stage-II, sample, enumeration books, was completed by April 21, 1961, at a cost of \$28,164 and 382 man-weeks of labor.

Coding and verification.--General coding started in late May 1960 and was completed in April 1961. Peak employment on general coding reached 335 in late August 1960. On the average, each clerk coded 1,309 persons per day. Cost of the general coding operation was approximately \$778,000. In addition to the coding cost, the verification of the general coding employed approximately 25 people at a cost of about \$207,000.

Industry and occupation coding started late in May 1960, when the first schedules became available from the general coding sections, and was completed in April 1961. At the peak of operations in October 1960, there were approximately 365 people engaged in industry and occupation coding. Total cost of all industry and occupation coding was approximately \$855,000. The average population coded per clerk-day of work was about 1,300. In addition to the clerks engaged in industry and occupation coding, approximately 70 people were required for the sample verification of the coding, which cost about \$271,000. A further cost of \$59,000 was incurred in 100-percent dependent verification and correction of work rejected as unsatisfactory by the quality control system.

Microfilming.--Microfilming the 100-percent enumeration schedules required 11,112,995 exposures. This operation cost \$103,239 and consumed 1,515 man-weeks of labor. The initial round of microfilming the stage-II schedules containing the sample data was completed on April 28, 1961. It required 27,128,788 exposures, at a cost of \$187,625 and 2,377 man-weeks of labor. About 3,000 of the reels containing the sample data, or 1,350,000 exposures, had to be remicrofilmed as a result of the

review of computer output. For the entire period of data processing, a total of 947 miles of microfilm was used.

Diary review.--The Washington diary review unit had a peak employment of about 50, while the Jeffersonville diary review unit reached a maximum employment of 95. The total cost of the diary review operation for both stage I and stage II was estimated at \$540,000.

Quality control.--The cost of the quality control program varied widely from one operation to another, depending in part on how critical the operation was and in part on the type of operation and type of verification activity developed. The quality control and verification activities for the coding operation required an estimated 25.3 percent of the total budget expenditures for the coding (\$555,000 of \$2,195,000). For breaker sheet preparation, the verification operation cost about half of the total budget for the operation, or about \$57,000 of \$107,000 (the cost of verification alone is not known since the \$57,000 includes the cost of inserting breaker sheets into the books and of sealing blank pages to the backs of books). Assuring exceptionally high quality of output of this operation was necessary because a single error on a breaker sheet required costly corrections at subsequent data-processing operations.

Production standards.--Substantial amounts of time and money were invested in the preparation of production standards records and reports. The staff of standards technicians ranged from 2 to 6 employees. Approximately 15 employees were engaged full time in preparing and maintaining the production standards data. Some additional costs of the program were fragmentary and diffused throughout the organization, e.g., the cost of the employees' preparation of individual daily time and production reports.

#### Methods, Procedures, and Systems

As soon as a decision was reached regarding a policy, procedure, definition, explanation, or instruction, it was written down. Manuals of procedures, each dealing with one broad aspect of operations, were prepared. The manuals were maintained on a loose-leaf basis so that revised pages could be inserted easily, and also so that brief sections devoted to single subjects could readily be reproduced in such quantities that each clerk could have a copy of the section pertaining to his work without having to be supplied with the entire volume. The table of contents of the Decennial Operations Division manuals, in appendix D, illustrates the nature of the principal procedural and technical materials issued and kept current. The manuals were supplemented by series of memoranda.

Three other very essential procedural tasks of administration that are discussed elsewhere in this publication are (1) the control records and reports system, (2) the production standards system, and (3) the quality control system. While each of these is important in its own right, perhaps the most necessary and most useful in the daily management and administrative control of the operations was the reporting system that told all levels of supervisory personnel where the work for which they were responsible stood in relation to established production schedules, budgets, and objectives.

#### Physical Facilities

The availability of adequately heated, lighted, and, for some operations, air-conditioned space was, of course,

important; and equally important was adequate equipment—tables, chairs, desks, filing cabinets, microfilm cameras, adding machines, calculators, etc. Many months were devoted to planning and estimating requirements, laying out floor plans, and devising special racks, mobile bins, and other equipment. Some idea of the extent of physical facilities, equipment, and supplies required for census processing activities can be gained from the table below on space requirements, and by reference to appendix E, which lists the furniture, equipment, and supplies used in the Jeffersonville office.

SPACE REQUIREMENTS OF DECENNIAL OPERATIONS DIVISION

Operation	Sq. ft. of floor space
<u>Washington headquarters</u>	
General administration.....	2,500
Procedures staff.....	1,500
Microfilm processing and storage.....	1,500
Computer programing staff.....	3,500
Diary review activities.....	2,500
Electronic processing equipment: FOSDIC, computers, high-speed printer.....	10,000
Total.....	21,500
<u>Jeffersonville</u>	
<u>Decennial Operations Branch</u>	
Receipt and check-in (including storage and enumeration book files).....	108,000
Breaker sheet preparation and verification.....	7,000
Coding.....	36,700
Microfilming.....	10,600
Total.....	162,300
<u>Puerto Rico Operations Office</u>	
Receipt, coding, and clerical operations...	4,000
Card punching.....	4,000
Machine tabulation.....	2,000
Total.....	10,000
<u>Chicago</u>	
Operations Unit.....	700
Electronic computer.....	1,000
Total.....	1,700
<u>Chapel Hill</u>	
Operations Unit.....	600
Electronic computer.....	1,000
Total.....	1,600
<u>Rome</u>	
Operations Unit.....	300
Electronic computer.....	1,000
Total.....	1,300
Total, all areas.....	198,400

are required as the basis for reapportionment of representatives in Congress. To obtain these counts, the 100-percent data were processed before the sample data.

Difficult choices must be made among conflicting demands. The need for early data on characteristics of housing units by city blocks, for instance, may be competing with the need for distributions of the population by age, sex, and race for each State and major city.

In general, the priority order for publication of the 1960 census results was as shown below. Population and housing data processing were concurrent. For those series undertaken before July 1, 1961, the date of publication of the first report is shown.

POPULATION

1. Preliminary Reports.--Preliminary counts of the total number of inhabitants for larger places, standard metropolitan statistical areas, counties, and States (prepared manually from field counts). First report was issued May 1960.
2. Advance Reports.--Selected final figures issued in advance of their publication in the detailed Final Reports for volume I. The Advance Reports for each series were followed by the Final Reports for that series before the Advance Reports for the next series were issued. First Advance Report in PC(AL) series was issued August 1960.
3. Final Reports:

Volume I, Characteristics of the Population.--Four series of reports, for each of the 50 States and the District of Columbia, Puerto Rico, Guam, Virgin Islands, American Samoa, and Canal Zone, and the United States as a whole:

Series PC(1)-A, Number of Inhabitants. 100-percent data. First report was issued September 1960.

Series PC(1)-B, General Population Characteristics. 100-percent data. First report was issued November 1960.

Series PC(1)-C, General Social and Economic Characteristics. Sample data.

Series PC(1)-D, Detailed Characteristics. Sample data.

Volume II, Series PC(2), Subject Reports.--Approximately 35 reports devoted to detailed cross-relationships for the United States and regions for such subjects as national origin and race, fertility, families, marital status, etc. The first reports prepared were to be based on the 25-percent sample, and later reports on smaller samples selected during previous processing operations.

Volume III, Series PC(3), Selected Area Reports.--Two reports, based on sample data, to show selected characteristics of the population, one for State Economic Areas and one by size of place.

MAJOR POLICY DECISIONS

Establishing Priorities

In a decennial census in the United States, first priority is given to obtaining preliminary estimates of the total population for major political entities, such as counties and large cities, and for the United States. Shortly thereafter, final, official population counts for each State

HOUSING

1. Preliminary Reports.--A report for each State, the District of Columbia, Virgin Islands, Guam, and Puerto Rico, and the United States as a whole, giving the preliminary totals of housing units in each place of 10,000 inhabitants or more (prepared manually from field counts). The first Preliminary Report appeared in May 1960.

2. Advance Reports.--Selected final figures, based on 100-percent and sample data, issued in advance of their publication in the detailed Final Reports of volume I. The first Advance Report appeared in November 1960.

3. Final Reports:

Volume III, Series HC(3), City Blocks.--421 reports, one for each city with 50,000 inhabitants or more in 1950 or in a subsequent special census conducted by the Bureau, and reports covering 200 additional cities that requested to be included in the block statistics program. 100-percent data. The first report was issued April 1961.

Series HC(S1), Special Reports for Local Housing Authorities.--139 reports, one for each participating locality, made at cost for local housing authorities and other agencies, on characteristics of housing classified as substandard by Public Housing Administration and characteristics of the occupants. 100-percent data. The first report was issued May 1961.

Series PHC(1), Census Tracts.--180 reports with both population and housing data for each of the tracted areas in the United States and Puerto Rico. Each report was to include both 100-percent and sample data for both population and housing characteristics.

Volume I, Series HC(1), States and Small Areas.--A report for each State, the District of Columbia, Virgin Islands, Guam, Puerto Rico, and a U.S. Summary. 100-percent and sample data.

Volume VII, Housing of Senior Citizens.--To be based on sample population and housing data.

Volume II, Series HC(2), Metropolitan Housing.--202 reports, one for each standard metropolitan statistical area with 100,000 inhabitants or more, one for the United States, and one for each of the nine geographic regions. To be based on sample data.

Volume IV, Components of Inventory Change.--Part I, 1950 to 1959, in two reports: A, 1950 to 1959 Components; B, Inventory Characteristics. Part II, Series HC(4), 1957 to 1959, in 10 reports, one for each of 9 selected metropolitan areas and a report for the United States by regions. Results of a sample survey taken as part of the Census of Housing.

Volume V, Residential Finance.--In two parts, one on homeowner properties and one on rental and vacant properties. Results of a sample survey taken as part of the Census of Housing.

Volume VI, Rural Housing, Economic Subregions.--To be based on sample data.

Although modern methods permit simultaneous tabulation of a much wider variety and volume of data than was possible during any preceding census, it was still necessary to determine the specific items and general types of information that would be required first and then gear the processing system to meet these priorities.

The sequence and approximate duration of work on each of the principal data-processing operations is shown in the chart in appendix A.

#### Supplemental Projects

After publication priorities were established, they could not be changed except for demands of the most urgent kinds,

because preparation of special tabulations, and scheduled tabulations prepared out of normal sequence, could quickly have resulted in serious disruption of established processing operations and in higher costs.

Under the system of electronic data processing used in the Bureau, the time required between the date of final determination of the exact contents of any given series of statistical tables and the date by which computer programs could be written, tested, and tried out varied from 6 months to 1 year or more. The necessity for a long period of planning made imperative (1) firm decisions on content of tabulations, and (2) early determination of priorities.

However, the data processing of the 1960 population and housing censuses included some supplemental projects which were recognized as fulfilling important needs, and a technical staff of four persons spent full time on planning, preparing computer programs, preparing cost estimates, and otherwise directing a program of special projects. Some of the more significant supplemental data-processing projects (in addition to research and evaluation studies which were carried out separately) were the following:

1. Tabulation of data on citizenship for the State of New York
2. Tabulation of additional data on race for Hawaii and Alaska
3. Listing of all ED's by area name with selected geographic codes, for users of special tabulations
4. Tabulations making available unpublished data for 100-percent and sample population characteristics for urban places and minor civil divisions in areas in which census tracts had not been established
5. Mortality Survey for the National Office of Vital Statistics.--Match of death certificates issued during May-August, 1960, to census records, to obtain and tabulate population characteristics of the deceased persons
6. Mental Health Survey for Maryland and Louisiana.--Match of mental patient records against census data, to obtain and tabulate population characteristics for these persons
7. Tabulation of data on housing unit vacancies in six cities in upstate New York
8. Processing data for a special national sample of 600 ED's through all 100-percent and sample operations, to obtain advance information on population and housing characteristics at the national level, primarily for use by the Bureau staff for planning publications
9. Local Housing Survey.--Tabulations based on the census data in the regular program plus supplemental data on substandard housing obtained for 139 local housing authorities by a special field enumeration
10. Hand tally of the number and characteristics of persons and couples 65 years of age and over in selected income classes in the State of California
11. Hand tally of place of work, means of transportation to work, and class of worker, for residents of Falls Church, Va.
12. Preparation of duplicate computer tapes to be used by a private data-processing organization in preparing cross-classifications for market, economic, and social research purposes, providing data on approximately 40 different personal, household, and housing characteristics for each county, SMSA, and State in the United States and for the United States as a whole

The problem from the point of view of the data-processing staff was to keep the number of such special projects down to manageable proportions, to schedule them so that they caused only a minimum amount of interference with the processing of the data for the census publications, and to maintain budgetary and administrative controls to make sure that these special-purpose jobs were accomplished within the funds available.

#### PROBLEMS AND SOLUTIONS

The following were among the most bothersome problems that had to be dealt with in the course of the data processing.

##### Adjustments for Errors in the Field Work

The most common situations resulting from inadequate enumeration and requiring time-consuming and costly rectification during data-processing operations are described below.

Missing or incorrect designation of block numbers.—A program for publication of characteristics of housing units by city blocks for each of 466 cities was made more difficult because some of the enumerators failed to indicate block numbers properly. If the enumerator had failed to enter a block number, or had entered the same number for all blocks in his ED, or had entered numbers that were different from those assigned in advance by the Bureau, the computer identified the errors and noted them on the diary printout. Corrective action required a time-consuming clerical comparison of the addresses and block numbers shown on the original schedules with those indicated on the enumerators' maps, correction of erroneous entries, and retabulation.

Occupied housing units with no population.—For roughly one-half of 1 percent of all households enumerated, but for a much larger proportion in certain ED's, it was found in the early stages of the processing that on the schedule there was complete information indicating the existence of an occupied housing unit but no marking that could be read by FOSDIC in the population section of the schedule to indicate that there were persons in the housing unit. After a great deal of study, a revision of the standard computer program was written to provide for allocation of the population characteristics of another household recorded elsewhere, in such situation. A precautionary step was introduced, however, that provided that if more than a very small proportion of such allocations were made by the computer in any one ED, this fact was to be noted on the diary, and a careful clerical review was made during diary-review operations. Such a review included examination of hand-written entries on the schedule, which FOSDIC and the computer could not read, and also included examination of entries in the enumerator's listing book. Usually it was possible to determine whether, in fact, the enumerator had correctly enumerated an occupied housing unit and failed to get information about the occupants, or whether the housing unit was in fact vacant even though perhaps fully furnished. In the case of ED's where this problem was important, every reasonable effort was made to determine the correct information, have the schedules corrected if necessary, and have the entire ED remicrofilmed and reprocessed on FOSDIC and the computer.

Failure to observe ED boundaries.—Occasionally an enumerator failed to appreciate the importance of following ED boundaries, and enumerated some households of one

ED in the enumeration book for a different ED, or enumerated two or more ED's in the same enumeration book, or redefined boundaries of one or more ED's and unwittingly violated standard geographic rules. Any of these and numerous similar variants could result in incorrect population and housing counts for places and minor civil divisions. Corrective action could sometimes be taken by matching addresses on the schedules with those on listing books and matching them with the ED maps and with city directories, to discover the correct ED for each address shown. The data were then transcribed to a new set of enumeration books which were properly labeled and identified and then reprocessed. It was necessary also to expunge the original, erroneous data from the record, if they had been processed before the errors were found.

Inadequate enumeration of sample households.—The existence of underenumeration in a book of sample schedules for an ED could be most easily determined by comparing the sample population count on the enumeration book label with the population count for the same ED as previously determined from the count of the 100-percent schedules. Since a 25-percent sample was being used, the sample count should have approximated one-fourth of the official 100-percent count. If it was substantially below this fraction, there was a strong presumption of underenumeration, and a check of the sample enumeration book in such cases usually revealed a number of households for which the only information which appeared had been transcribed from the 100-percent schedules.

A system was devised by the Bureau's sampling experts, and put in effect by the data-processing staff, whereby in ED's in which five or more households were found with no sample data, the 100-percent data already entered for such households were canceled from the sample, and both 100-percent and sample data for a household of the same size in the same ED were substituted. Such cases were also identified at three different stages in the standard data-processing operations—during general coding, during breaker sheet preparation, and during diary review. The percentage of sample households requiring substitution was, in general, extremely small. However, in a few cities there were some areas where the percentage was fairly high and represented a rather substantial processing job.

The identification, cancellation, and replication necessary to correct for bias in size of household, where it appeared that the enumerator for some unknown reason had included an inordinately large number of either very large or very small households in the sample, were considerably more complex, and were done by sampling statisticians.

##### Correction of Preliminary and Final Population Counts

One necessary data-processing activity is that of correcting mistakes in figures after they have been issued.

This type of error was most frequently uncovered after local officials first received preliminary announcements of the population of their municipalities.

The most common causes of errors in population counts, in addition to failure to observe ED boundaries during enumeration, discussed above, are listed below. Although some of these were not processing errors, their correction was an integral part of the processing operation.

1. Failure to include an ED among those totaled to obtain the total count for the place. This resulted either

from faulty listings of ED's by place or from clerical failure to adhere to the correct listings

2. Failure to enumerate a small geographic area such as an entire city block, or apartment building. This was rarely identified as a source of difficulty

3. Failure of local officials to notify the Bureau of the Census of one or more recent annexations of territory to a municipality

4. Processing system errors, such as--

- a. Failure of FOSDIC to recognize the beginning of a new ED, with the result that data for that ED were combined with those for the preceding ED
- b. Substitution of the data on a supplementary ICR-ED in place of the regular ED (instead of their being added to the regular ED) because of computer control tape errors
- c. Erroneous identification labels which resulted in accidental substitution, for instance, of data for an ED in South Carolina for the South Dakota ED of the same number
- d. A fault in the computer program used
- e. Failure to microfilm several pages of an enumeration book or, in a few cases, even an entire book

A number of the types of error mentioned involved problems of boundaries. The total process of getting a final set of correct geographic areas for publication of results required as many as 25,000 corrections, modifications, and revisions to the geographic identifications established prior to the census or resulting from errors made during the census.

The processes required to correct the errors varied according to the type of error and the status in the processing of the ED affected. In some cases minor clerical changes were required, but in other instances the simplest and easiest method to correct an error was a complete new computer run of all tables for an entire State.

#### Coding Problems for Industry and Occupation Items

Early in the industry and occupation coding operation, it became apparent that the backlog of coding problems which required the attention of coding specialists was building up to proportions which would interfere with the

flow of completed work to the next operation, the micro-filming. The problem was attacked in two ways:

1. By speeding up the processing of referrals in the Problem Referral Pool. This was accomplished in part by issuing instructions to limit the extent of research work done and the extent of reference sources used. Other actions were taken to reassign some of the more routine work to less skilled personnel who could, for example, mark the FOSDIC circles after the appropriate codes had been assigned by the Technical Assistants.

2. By limiting the number of problem referrals sent to the Problem Referral Pool for solution. Coding supervisors were assisted by roving Technical Assistants in on-the-spot resolution of problems. Selected non-qualified coders with good records were assigned to "judgment coding sections" to which only qualified coders had previously been assigned. Revised rules were issued to coding clerks to code as "NA" (not available) a selected list of vague occupation entries, since the Technical Assistants, after review of these problems, could not assign a more accurate code to these cases.

The prompt remedial actions described above, plus the rapid qualification of coders early in the operation and a relatively small loss of trained coders until much later in the coding operation, avoided any further serious accumulation of the coded enumeration books prior to microfilming.

In the course of the qualification of the industry and occupation coders, it was found that the error rate for the operation was well above the anticipated level. Analysis of the causes of these high error rates established the fact that this was partially due to the inclusion of errors which did not affect the outgoing quality (because the coder had referred the case as a problem, or because in cases where the coders failed to enter the NA code, blanks were treated as NA's by the computer).

To reduce the impact of the high industry and occupation coding error rates on relatively small tabulation areas, a system was introduced to locate "bad lots" of coded work so they could be reverified. The weekly error rates were reviewed to identify coders with high error rates. Of the ED's processed by these coders, the ones with errors were reviewed on a 100-percent basis and all errors found were corrected. If many errors were found, the other ED's processed by the same coder were also verified and corrected on a 100-percent basis. The enumeration books for the corrected ED's were remicrofilmed and the data were put through FOSDIC and the computer again.