

NAME OF SYSTEM:

The FOSDIC SS

ORIGINATOR:

Bureau of the Census

Suitland, Maryland 20233

OBJECTIVE. To develop the techniques and to operate an advanced information handling and processing system that will result in greater efficiency and economy in the processing of the 1970 census.

BACKGROUND. The Census Bureau "provides basic statistics about the people and the economy of the Nation in order to assist the Congress, the executive branch, and the public generally." The best known task performed by the Census Bureau is the "census of the population and housing taken every ten years."

The art of census taking has changed greatly since the original hand tallies that began in 1790 and continued through the 1880 count. However, by 1890 the challenges of improving the manner of recording the results of the decennial census were becoming apparent. In that year the Bureau experimented with the punched card and had a degree of success. In 1951 it installed UNIVAC I, which greatly assisted in reducing the large backlog of punched cards resulting from the 1950 tally. In that census it took over 3,000 keypunch operators to process the millions of cards of census information.

For the 1960 census the Bureau designed a new system in conjunction with the National Bureau of Standards. The key to that system was called FOSDIC, which stood for Film-Optical Scanning Device for Input to Computers. This original FOSDIC application reduced the input information handling time from 200,000 man hours for the 1950 census to 28,000 man hours for the 1960 census. In total, the FOSDIC capabilities are estimated to have saved \$6 million in input costs over the 1950 system performance.

Still not fully satisfied with the 1960 results, this year's information handling procedures will again depend on new innovations and technological advancements, largely developed by the Census Bureau's Engineering Development Laboratory.

THE NEW METHOD. The 1970 population census input consists of two types of forms—a so-called 100 percent short version uncoded form to be filled out by all households, and a pamphlet-type sampling form to be completed additionally by about 1/5th of all the households. In total about 65 million of the shorter version forms will be processed and about 14 million of the pamphlet type.

The actual fully automated processing of the completed form questionnaires will be accomplished through the integration of two specially designed systems. The first, Camera 3, developed by the Engineering Development Laboratory, will include 40 separate microfilm units. The other system encompasses the FOSDIS SS model, redesigned for the 1970 census in the Engineering Research Branch. It basically consists of a computer scan unit, a console, and two servos. Six such FOSDIC units will be used to meet the tight processing schedule. The final equipment in the series of automated actions are UNIVAC computers, three of which will be used—two model 1108's and one model 1107.

The processing program calls for the uncoded type form to be fully processed prior to the pamphlet-type household form, which needs some manual coding prior to being machine processed. The 100 percent use form will require about 130 million microfilm frames (images) for the total program, which means a daily production of about 1.1 million frames.

The input sequence of the 100 percent form starts with the Camera 3 processes. First the forms are placed face up on the special vacuum feed belt that brings the document into position for microfilming. A photocell technique insures proper positioning for the camera exposure of about 100 frames per

minute. The film is then developed in negative film form, as this method allows the questionnaire form's marks and filled-in circles to show as clear spots on the film.

The developed film then moves to the FOSDIC operation where it is converted to magnetic tape. The film is first carried through an aperture where a "flying spot scanner" records the relative film shadings of dark, gray, and clear, including the marked answers on the questionnaire. These resultant electrical impulses are transferred to the FOSDIC computer section where they are converted to binary-coded, input magnetic tape. In the final step the computers convert the compatible magnetic tape information into human-readable form. The output product is a statistical summary printout of the questionnaire answers.

The magnetic tape records are then indexed and filed in an appropriate arrangement. The printout information is converted into statistical summaries for use by the Census Bureau and other Government agencies. After proper analysis and interpre-

tation, the results will be disseminated to the nation through a variety of Government publications and other communication media.

REMARKS. This FOSDIC SS, CIM (computer input microfilm) System is a prime example of the technological breakthroughs in automated, information processing capabilities that have occurred since the taking of the last census. In 1960, for example, the system transferred the equivalent of 8 hours of punched card data into magnetic tape in 1 minute. The 1970 system performs this same function in 12 seconds. In addition to the reduced processing time, the automatic features of document handling and information extraction insure error-free printouts of census results.

The sophistication, costs, and processing capabilities of this unique system may now be beyond the requirements of most information handling activities. However, as beneficial innovations reach the market place these CIM characteristics and automated document handling features will become more feasible for use on less demanding applications.

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