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australia processes its 1976 census

Note: Census Newsletter Editor Elizabeth Gould has taken a year's leave of absence from the East-West Population Institute, but she continues to pursue her interest in Asian and Pacific census activities. During a recent visit to Australia, she spoke to staff members of the Australian Bureau of Statistics (ABS) in Canberra and toured the census processing center in Sydney.

by Elizabeth B. Gould

The most recent census in Australia was held 30 June 1976, when householders had to cope with a form consisting of 41 individual and 12 dwelling questions. Processing the mass of information collected began 1 July 1977 in a modern building in downtown Sydney, where an army of coders and checkers has been assembled to deal with the tons of schedules. Why the year's delay between enumeration and processing? It was one of the compromises accepted by the Australian Bureau of Statistics as the price for conducting any census at all in 1976.

Politics and the Australian census

When the Labor Government was abruptly removed from office in late 1975, the new Liberal Government, an opponent of big centralized government and champion of individual rights and freedoms, began looking for ways to make cuts in government spending. The census, then about half a year away, was an irresistible target. Politicians proposed cancelling the census entirely, thereby saving millions of dollars without causing unemployment and at the same time sparing Australians the anguish and resentment that inevitably accompany the quinquennial census. Many Australians feel that the census is an unnecessary intrusion of "big government" into their personal lives (see page 4).

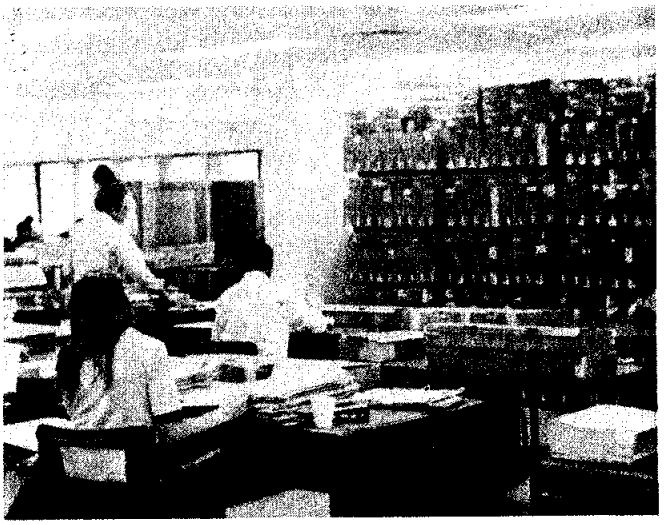
"We almost lost the 1976 Census," one census official told me. By agreeing to delay processing for a year, the ABS got to keep the census and the politicians were able to point to a paper saving of $7 million (Australian). The money was not saved, of course; it was simply transferred into the next year's budget, when costs of labor and materials were even higher. One argument to prevent cancellation of the census that the politicians understood was the need for population figures on which to base redrawing of electoral districts. If the census were not held as scheduled, the areas with large population increases since the last census could justifiably accuse the government of attempting to deny representation to their voters.

Budget cutting is not the only way that the Australian government gets into the census act. Both houses of Parliament must approve the census schedule, and members may propose additional—and untested—questions for inclusion.

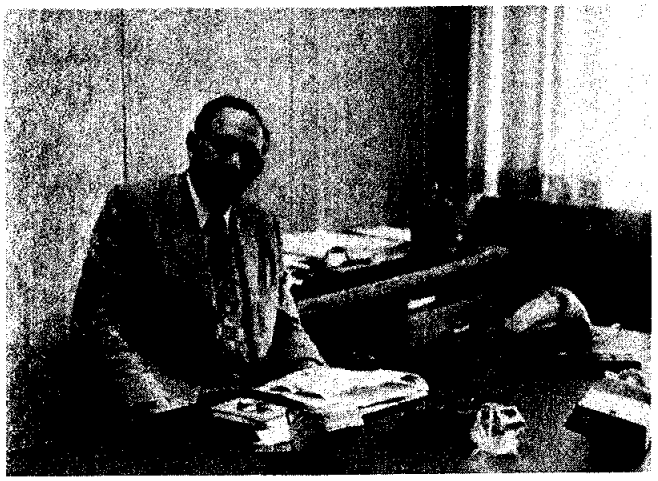
Delaying processing was just one compromise made for the 1976 Census. Early this year a further attempt to save money resulted in the decision to process only half the schedules. All institutional forms are being processed, but individual forms are separated into two piles: every other form, or 50 percent, goes to the coders; the other half goes directly to the pulping machines.

Processing the census

Although the main offices of the ABS are in Canberra, Australia's capital city, the processing operation is located in Sydney. About 1,500 temporary workers are hired (as coders, checkers, and so forth), and only Sydney has a labor pool big enough to meet these needs. Several floors of a new office building, St. Andrew's House in Sydney Square, have been leased for the work, and the schedule of opera-



Census schedules begin their journey through the processing center in the sample selection area, where they are checked and sorted. Only half the individual forms from the 1976 Census are being processed; the other half are destroyed after being sorted out here.



Keith Watson, Assistant Statistician for the Population Census, guides the Census Branch from this office in Canberra. Newsletter readers will remember him as one of the originators of the Family Coding System, a scheme for classifying families by type (vol. 2, no. 1, August 1975).

tions, planned to the day, is presided over by Graeme Gardiner, Supervisor of Processing. When the lease runs out next June, the processing must be finished. "There's no way we can get behind schedule," said Gardiner.

Planning the actual processing operations means anticipating the thousand and one needs and details of a huge operation, from making certain that all census forms are kept confidential to providing enough teapots for the workers' tea breaks (a firmly entrenched Australian institution). When Frank Parsons, Director of the ABS Processing and Field Organization, took me on a tour of the offices, I began to appreciate what was involved. The tour began in the basement, where the census schedules are stored in banks of shelves awaiting processing. Alterations had to be made to the basement walls to ensure that the forms could be locked up, and a private elevator is used to transport forms upstairs to the processing area. Confidentiality has been an issue in Australian censuses, and the ABS has been careful to maintain tight security in areas where forms are stored or worked on. Each employee or visitor must wear a badge, and guards check everyone who goes in or out.

Special equipment for specific tasks had to be designed and acquired for the processing. Metal carts that could be picked up by forklifts were built to transport the forms. The carts also had to have rubber wheels so they could be pushed through the carpeted offices. Another specially designed piece of equipment was pencils. Lead pencils need sharpening, and sharpening wastes workers' time. The ABS uses pencils that have nine lead cartridges inside a hollow tube. When the point gets dull, the cartridge is removed and put in the top of the pencil, and a new lead falls into position. (Of course, since the pencils were ordered before the 50-percent processing decision was made, the ABS now has twice as many pencils as it expects to use.)

Flow of forms

When the census schedules arrive from the basement, they are first sent to the sample selection area, where the forms to be processed are separated from those to be destroyed. The 1976 Census schedule contained 16 questions that require special coding. Coders are trained to become experts in one question or set of questions, and the coders sit at banks of desks while the forms are moved from section to section. Coding is done in the following order: family and internal migration; educational institutions and qualifications; occupational status and occupation; and industry and place of work. Coders are hired and trained in successive waves, each group working on forms and passing them along to the next group. The morning I visited the processing center was the first day of work for the coders of place of work and industry. Graeme Gardiner spoke to the new recruits, telling them something about the census as a whole—what it cost, why it was important, and what their job would be.

Giving its temporary employees the feeling that they are part of a "team" is an important job of the ABS. A newsletter, "Stats Chat," is distributed to the staff in Sydney every two weeks. Employees are kept up to date about the progress of each stage and are encouraged to submit questions they may have.

(continued on page 4)

This group in Sydney are writing instructions for editing and balancing. They are (left to right) *John Haydon, Group Leader of Editing and Balancing; Michael Lewis, Senior Group Leader of Service Processes; and John Whitely, Assistant Supervisor of Processing Operations.*

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JAPAN

- Correspondent Shotaro Yanagawa sent a progress report on the publication of data from the 1975 Population Census of Japan. Vol. 1: *Total Population* and Vol. 2: *Whole Japan,* both containing results of the basic tabulation, were published in September. Vol. 4, No. 1: *Commutation,* also based on the complete count, is scheduled for publication in January 1978. This volume will contain data on the number, direction, and economic characteristics of daily commuting workers and students. The results will be used to calculate the daytime and nighttime population in each locality.

- In preparation for the 1978 Housing Survey, which will cover one-seventh of all households in Japan, two pilot surveys have been carried out to evaluate the adequacy of the field enumeration method and the questionnaire design. The first pilot survey was conducted in 20 enumeration districts in both Utsunomiya City of Tochigi Prefecture and Sakai City of Osaka Prefecture in June. The second survey was taken in Shinagawa Ward and Fuchu City of the Tokyo Metropolitan Area in October. All the households residing in all the dwelling and nondwelling structures in 17 enumeration districts selected from those designated for the 1975 Population Census were surveyed at each pilot site. Mark-sheet type questionnaires were distributed and later collected by enumerators. Results of the second survey are currently being analyzed.

  In order to study the advisability of adopting the Optical Character Recognition (OCR) system for the processing of censuses and surveys, the Bureau of Statistics conducted a field test using OCR type Housing Survey questionnaires in Shizuoka City in September. The capacity for reading figures entered by household respondents and the reading speed of OCR are being determined.

NEW ZEALAND

- Processing of the 1976 New Zealand Census results is seven months ahead of the 1971 Census timetable, reports correspondent Michael A. Moore. This improvement in timeliness is due to the use of an Optical Character Reading system, an increase in clerical resources, and an earlier commencement of data editing, using the Department of Statistics' own ICL 2903 computer. A series of regional bulletins containing statistics for each individual local authority and providing analyses at subdivision level within each defined main urban area has been produced. The 20 tables in each bulletin present data on age groups, marital status, ethnic origin, birthplace, labor force, income, education, household types, dwelling types, and home heating and insulation. These bulletins were printed directly from computer print-out, using a Reprographic offset method. The remaining tables, 329 on a national basis and 107 on various regional areas, will be contained in the normal census subject matter volumes. Volume 1 is discussed by Alice Harris in her column on page 15.

  Several postcensus checks have been conducted in New Zealand instead of a postenumeration survey. The types of checks made included a comparison of the household survey updating lists with the census subenumerator record book in which address records were cross-checked; a check of New Zealand residents temporarily residing in hotels, motels, and hospitals to determine the level of duplication of census questionnaires and the standard of response to the question on absent persons at the respondent's usual residential address; and a check of birth registration forms of infants born between 1 February and 23 March 1976 against census questionnaires.

  Following the completion of coding of census questionnaires, a national street listing by meshblocks, approximately 32,000 of which cover New Zealand, was undertaken. This computerized listing will be regularly updated from various sources.

  Another recent development in New Zealand has been an investigation of an arrangement whereby an agency of central or local government can obtain ad hoc tabular statistics processed from a hierarchy of samples of unit-record data from the 1976 Census of Population and Dwellings. A systematic sample and further subsamples will be selected from the full edited New Zealand file of households and associated personal and dwelling unit-records to create the 10, 5, 2, 1, 0.5, and 0.1 percent sample files. The commissioning department will be required to write its own computer program in a user-oriented survey analysis language, select the appropriate data sample size, and test the program using supplied test data before submitting it to the Department of Statistics for production running. The accuracy of sample size, the program, and the testing will be solely the responsibility of the requesting department. Processed statistics breaching any confidentiality provision will not be supplied however. Appropriate standard deviation data will be printed to assist users and to place on them the responsibility for the correct use of the data.

INDIA

- Assistant Registrar General K.K. Chakravorty writes that the following publications on the 1971 Census of India are now available: *All India Life Tables,* Paper I of 1977 (US$0.72); *All India Social and Cultural Tables,* Part II-C(ii), containing data on education by single year of age (US$2.13); and *All India Economic Tables,* Part II-B(i), providing population distribution by broad age group and industrial category for towns (US$4.32).

- Ongoing preparations for the 1981 Census of India include sampling and other methodological studies, a November seminar on computerization of 1981 Census data organized by the Indian Association for the Study of Population in collaboration with the Office of the Registrar General, and a conference of data users planned for January 1978.

- Mr. Chakravorty also reports that Mr. P. Padmanabha assumed the position of Registrar General and Census Commissioner of India in October.

PAKISTAN

- Assistant Director of the Census and Registration Organization Syed Azad Ali reports that Director Abdul Rashid participated in the UNESCAP Regional Workshop on Computer Edit of Censuses and Surveys held in Bangkok 16–22 August, and that Brigadier Abdul Latif, former Director General, Census and Registration Organization, Government of Pakistan, and newsletter correspondent, retired from government service in October.

Ann Tonks is performing on-line error corrections at the Visual Display Unit while Supervisor of Processing Graeme Gardiner offers suggestions.

(continued from page 2)

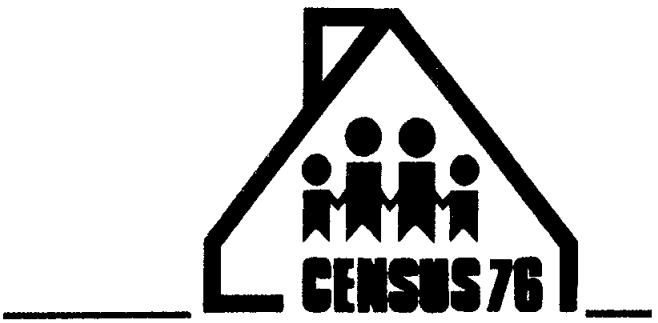
John Halford, who is in charge of management services, oversees production of the newsletter and keeps records on employees. He also sees to myriad other details, from making sure that the boxes of census forms stacked in piles on the floor do not exceed the floor's load-bearing capacity to being in the secure area of the basement when the building's maintenance crew needs to perform some early-morning task there.

Quality control

Each stage of the processing is subject to methods of quality control. The performance of each coder and checker is evaluated by an elaborate system that monitors the speed and error rate. Coders know that if they perform well they may be transferred to more challenging and interesting work. The progress of each stage of the processing is watched carefully and checked against estimates made earlier that have to be maintained if processing is to be finished on schedule.

1981 Census

Long before processing has been completed on the 1976 data, testing will be done for the 1981 Census. The ABS is getting its earliest testing start yet, and it has visions of going to machine-readable forms for the next census. It will also try to involve the public more in developing the census, and newspaper advertisements asking for suggestions from the public will be run early next year. □



Many census organizations and bureaus of statistics in Asia and the Pacific have a logo. This is the logo used in the 1976 Census of Australia.

WHAT AUSTRALIANS THINK ABOUT THEIR CENSUS

by Elizabeth B. Gould

An image less savory than that of the Taxation Department? A remote and somewhat feared organization with masses of information about individuals stored in computers? Those were some of the opinions that the Australian Bureau of Statistics learned about itself from a research study conducted before the 1976 Census. *Public Attitudes Towards the Census: Its Form and Function* is a 230-page report prepared by Masidan Research Pty. Ltd. on behalf of the ABS in January 1975. In-depth interviews with opinion leaders and group discussions with a cross-section of Australians were techniques used to learn what Australians think about their census and to aid in developing a communication program that would overcome objections and ensure the greatest possible cooperation in the 1976 Census.

The report says "the Bureau lacked any really interesting character identification for the vast bulk of people. . . . The most obvious clear-cut finding from this research is the great necessity for education about the Census so that it becomes more familiar and worthwhile, less distant and unnerving in the public eye."

Public objections

Two of the main objections to the census were the invasion of privacy and the fear that the information supplied could make a person vulnerable to some kind of retribution. There was a lack of knowledge about what actually happened to the information once it was collected. Most people assumed that the data would go "into a computer" and would be linked to a person's name. There was a general feeling that an individual's answers to all the questions were "somewhere in the files." "Otherwise, why would they ask for your name?" said one person. There was a cynicism about the

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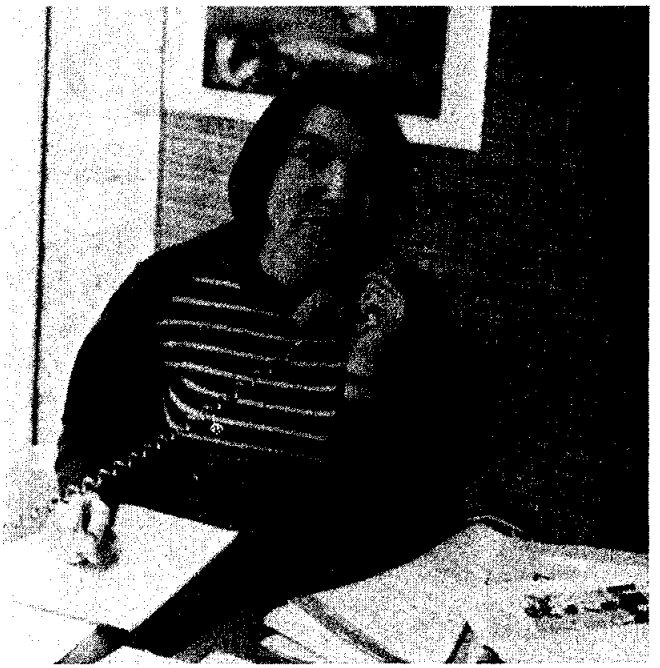


Margaret Timpson is in charge of user contact and dissemination. She spends much of her time on the telephone listening to users' questions and suggestions and supplying statistics on Australia's population.

PROGRAMMING THE HP-25 CALCULATOR: PART I

by Griffith Feeney

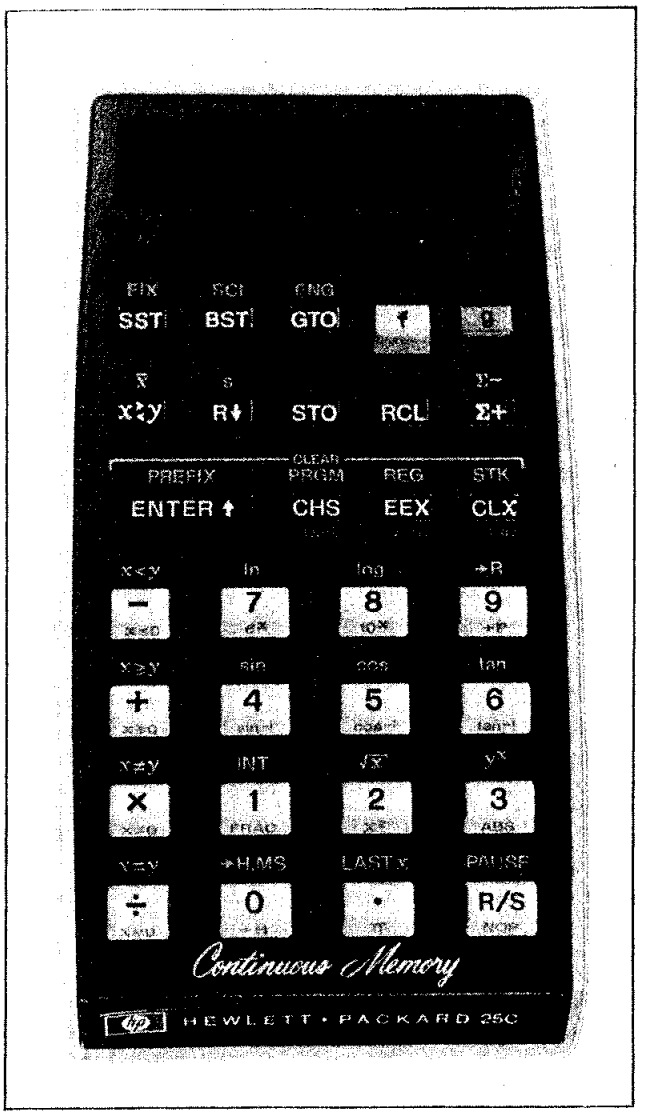
Introduction

This note describes the capabilities of the recently developed "programmable" calculators by discussing one particular machine, the HP-25 (or the HP-25C) manufactured by the Hewlett-Packard Company. No familiarity with programming or with programmable calculators is assumed. The objective is to provide the reader as quickly and effortlessly as possible with an appreciation of the significance of the programming capability of the machine. Details of operation of the calculator are introduced only insofar as they are essential to achieving this objective, and in this sense the exposition complements the presentation in the *Owner's Handbook* produced by the manufacturer. If possible this note should be read with the machine in hand, so that the reader may test the statements in the text at every step. The exposition has been laid out with lecture presentation in mind and should prove useful in training groups in the use of the machine.

Before proceeding it may be useful to say a few words about the broad significance of programmable calculators. They are truly amazing devices by the standards to which we are accustomed, and it is unlikely that we have begun to fully appreciate and exploit them. They may obviously be used by relatively highly trained technical personnel to do more work in less time with less effort, and one supposes that this is at present their principal employment. There are, however, a number of other possibilities which have just begun to be explored.

Teams of statistical clerks equipped with programmable calculators and supervised by statisticians skilled in programming these calculators represent a computational resource which may compare favorably with a large-scale computer installation for many kinds of work done in statistical offices and research organizations. Large-scale computer installations have taught us to "think big" when it comes to computation, and it may seem odd, even bizarre, to think of programmable calculators as serious competitors of big machines for *any* computational tasks. For tasks involving hundreds or thousands (not millions) of numbers, however, they may hold several advantages. The capital investment necessary to acquire them is, by comparison with any increment to a large-scale system, negligible. Their effective utilization requires no new personnel resources and minimal training of existing personnel. They avoid the bottlenecks that frequently occur around large computer installations by decentralizing small-scale computational tasks. They simplify data entry by bypassing keypunching, verifying, and checking of both programs and data. By keeping people directly involved in the computations, programmable calculators bypass the notorious dumbness of computers and the consequent necessity in programming them of anticipating every conceivable contingency. In sum, they suggest a mode of carrying out computational work which combines in new proportions the remarkable capabilities of electronic computation and the equally remarkable capabilities of human beings.

The potential pedagogical value of programmable calculators is considerable. The learning that comes from working through a statistical technique with numbers, preferably real numbers, is of a very different order from that which



comes from seeing an exposition at the blackboard in symbols. Courses in statistics frequently acknowledge this difference by combining a course of lectures with a series of statistical laboratories. This separation of lecture and statistical laboratories has been necessitated in the past by the bulk and expense of calculating machines and in part by the time absorbed in working through examples by the mechanical and pedagogically useless tasks of writing down numbers and punching keys on the calculator. Programmable calculators hold out the possibility of including elements of the statistical laboratory session in every lecture. With a calculator in hand, the student can abandon the essentially passive role of "listening to the lecture" for the active role of applying and testing what the instructor presents at each step. The student exercises his mind actively on the material as it is presented, rather than hours later when the freshness of the perception has worn off. This results in a better grasp of the material presented. When a problem arises, the instructor can give immediate feedback for clarification. Students can readily be taught the essentials of operation of the machines, and the instructor can bring a stock of programs for use during each class meeting.

A third area of application is in professional development programs for executives, managers, and others who need to communicate effectively with computer specialists but who cannot master the technical details of large computer installations. Communication difficulties between computer specialists and laypeople are legion and to a considerable extent due to the explosion of innovations that has occurred in the computer field in the last two decades. It is not usually feasible or desirable for management level personnel to learn the details of computers or programming. The field is too vast and the maxim that a little learning is a dangerous thing probably holds good. Nonetheless, it is hardly open to question that effective communication is impossible without some appreciation of or "feeling for" computers and programming. Programmable calculators may provide an avenue for developing the appreciation without mastering a maze of detail and with, therefore, a modest investment of time and effort. Programmable calculators *are* electronic computers in the fullest sense of the word, albeit ones of very modest computation power, and a clear understanding of their operation therefore develops by analogy a sense of how other computers work. At the same time, the programmable calculator is simple enough to enable one to master its operation with relatively little effort.

The machine

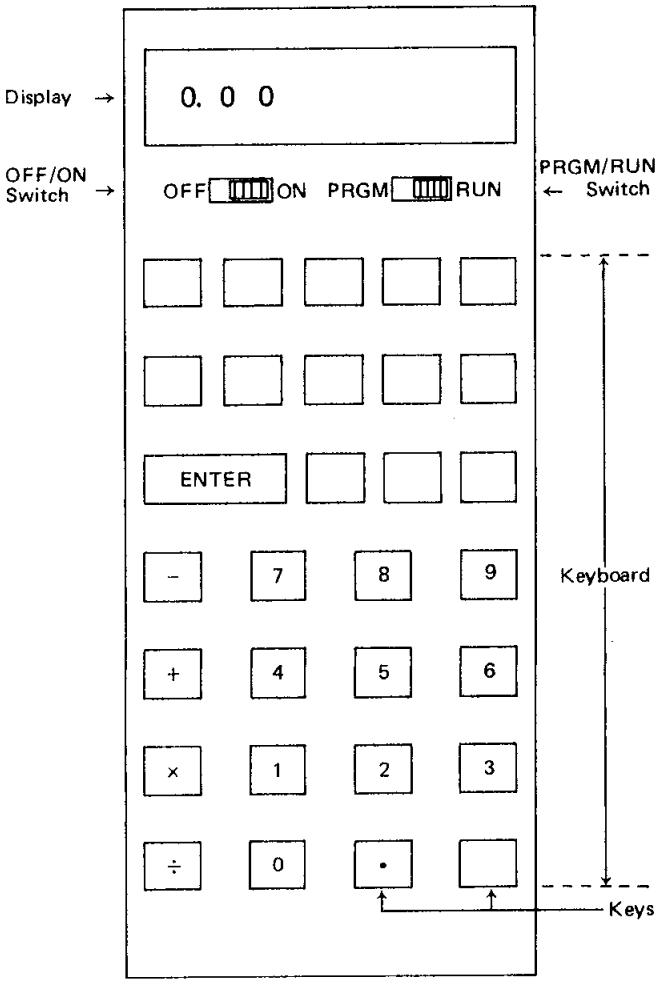


Figure 1 The HP-25 programmable calculator (some key labels suppressed)

Figure 1. To use the machine turn the OFF/ON switch to ON and the PRGM/RUN switch to RUN. If 0.00 does not appear in the display, the battery is insufficiently charged and must be charged before work can begin. If the battery runs down while the machine is in use, the display will flicker and a string of dots will appear along the bottom.

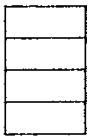
There are 30 keys on the machine. Each key has a label in white or black lettering on top (30 labels), all but nine keys have an additional label in blue lettering on the inclined front edge of the key (21 more labels), and all but four keys have yet another label in yellow lettering immediately above them (another 26 labels). To avoid being intimidated or discouraged by this profusion we focus attention on one group of labels at a time. Figure 1 shows labels whose use is discussed in the next few sections.

The stack

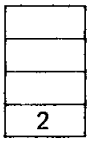
How do we calculate 2 + 3? The procedure is indicated in the following diagram. The command issued by the user is indicated on the left, the subsequent image in the calculator display on the right. We call this a *command/display diagram.*

Command	Display
2	2.
ENTER	2.00
3	3.
+	5.00

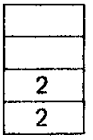
What is going on? The machine has a "stack" of four registers in which numbers may be stored. We may imagine these registers as a column of four enclosed spaces on a blackboard in which numbers may be written and erased. The stack may be visualized like this.



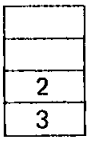
Depressing the 2 key enters the number 2 into the lowest stack register, so that the stack looks like this.



Because the contents of the lowest stack register are normally displayed, this register is referred to as the "display register." When the ENTER key is depressed, the machine copies the number in the display register into the next higher register, so that the stack looks like this.



The reason the calculator display shows "2.00" instead of "2" will be explained in the section "The machine again." Depressing the 3 key enters the number 3 into the display register, overwriting the 2.



Finally, depressing the + key adds the numbers in the lower two stack registers and enters the sum in the display register.

Note that the numbers added have disappeared from the stack. Only the sum remains in the display register.

Movies of the stack

We have been looking at a series of "pictures" of the contents of the stack registers. If we put them side by side and label each picture with the keyboard entry which preceded it, we get a "movie."

2	ENTER	3	+
	2	2	
2	2	3	5

Movies of the stack are a useful visual device for explaining how the machine works.

Automatic ENTER

We now proceed to a more difficult problem, to calculate (2×3) + 4.

Command	Display
2	2.
ENTER	2.00
3	3.
×	6.00
4	4.
+	10.00

What happened at the 4 command? In the last example the number entered on the keyboard overwrote the number in the display register. Why wasn't the previous value of the display register, 6, overwritten? Evidently it was not, for we did obtain the sum 6 + 4 = 10 at the end. A movie beginning at × explains what happened.

×	4	+
	6	
6	4	10

When 4 was keyed in, the 6 in the display register was pushed up into the next register in the stack. It is as if we had commanded ENTER and then 4, instead of just 4. The calculator has automatically executed an ENTER command before executing the 4 command we issued, providing the phrase *automatic* ENTER. Automatic ENTER occurs whenever a number is entered on the keyboard following the execution of a −, +, ×, or ÷ command (and in some other situations as well, which we need not deal with here).

Floating numbers in the stack

How do we calculate (2×3) + (4×5)?

Command	Display
2	2.
ENTER	2.00
3	3.
×	6.00
4	4.
ENTER	4.00
5	5.
×	20.00
+	26.00

A movie beginning at the first × shows what is happening.

×	4	ENTER	5	×	+
		6	6		
	6	4	4	6	
6	4	4	5	20	26

When ENTER is issued, the 4 in the display register is copied into the next higher register. This much we have seen before and expect. But the 6 which was previously in the next to lowest register is not lost, but is pushed up into the next higher register in the stack. When the second × command is issued, the numbers in the two lowest registers (4 and 5) are multiplied and the product placed in the display register. This much, again, we have seen before and expect. But see how at the same time the 6 falls down into the next to lowest register in position to be added to 20 by the final + command. The 6 *floats* in the stack on top of the numbers below it, floating up following ENTER commands (manual or automatic) and floating down when operations are executed.

The machine again

Having mastered the essentials of simplest arithmetic, we pause to tie up some loose ends. To save the reader long and frustrating seconds searching for labels on the keyboard (Where is $1/x$, for example? How long did it take you to find it?) it is useful to use the keyboard coordinates shown in Figure 2. The + key is located at (5,1), for example, and the . (decimal point) key at (7,3). Figure 2 also shows some of the commands used in following sections.

With this bit of mechanics in hand we may explain and bring order to the apparent confusion of 30 keys and 77 labels. The number keys and the decimal point key are used to enter numbers into the display register of the stack. The minus sign key at (4,1) is *not* used to enter negative numbers. To enter a negative number we enter the number ignoring the sign and then depress the CHS (for "change sign") key at (3,2).

Most of the remaining labels on the keyboard represent commands which the user may issue to the machine. The commands labeled with white or black lettering are issued

by depressing the key on which the label appears. Commands labeled with blue (or yellow) lettering are issued by first depressing the blue (or yellow) key and then depressing the key on or above which the label appears.

The registers in the HP-25 allow for 10 digits, and calculations are carried out to or near this level of precision. What we see in the calculator display is not the number in the bottom stack register, but that number rounded to two decimal places. (Exception: immediately after keying in a number, we see all the digits that have been keyed in.) The number of decimal places displayed may be set by using the FIX command at (1,1), issued by depressing the yellow key, the key at (1,1), and a number key between 0 and 9 inclusive. The following diagram illustrates these points.

Command	Display
[ON]	0.00
3.141593	3.141593
ENTER	3.14
FIX 6	3.141593
FIX 4	3.1416
[OFF]	
[ON]	0.00

The entry [ON] or [OFF] signifies turning the machine on or off; the brackets serve to alert the reader that these are not keyboard labels.

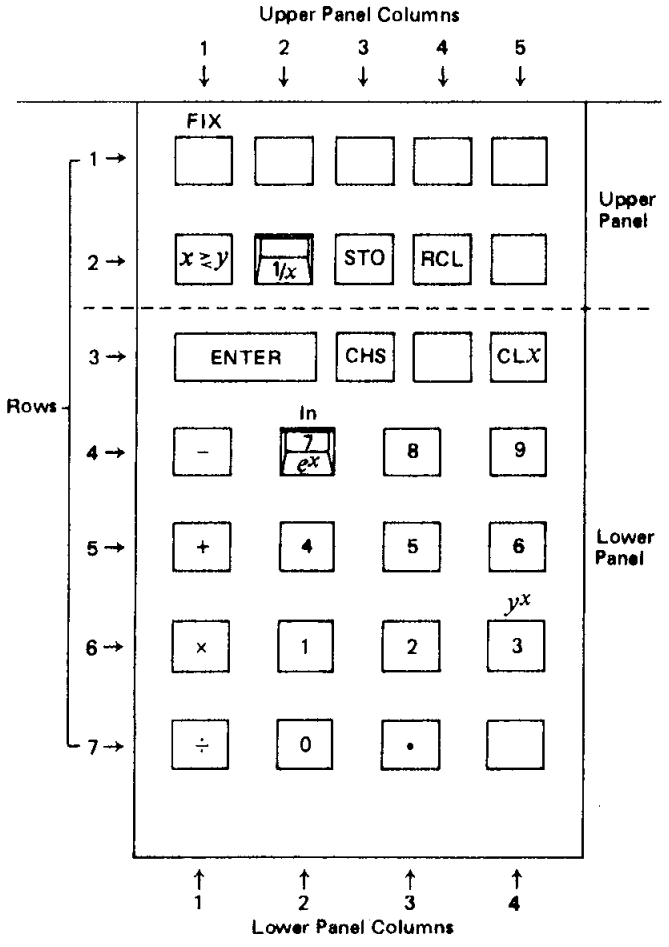
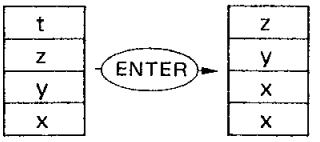


Figure 2 Keyboard coordinates and some new key labels

Before-and-after diagrams

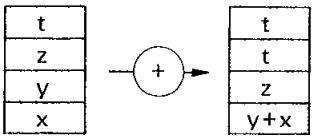
Frequently the best way to explain the response of the machine to a command is to show pictures of the stack before and after the command is issued. We use symbols to represent the numbers contained in the stack register. The before-and-after diagram for the ENTER command, for example, is as follows:



Observe that the number in the top stack register is lost.

Arithmetic

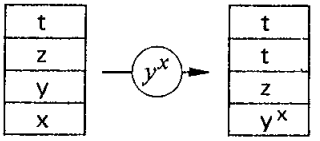
The before-and-after diagram for addition looks like this.



The diagrams for subtraction, multiplication, and division are the same as the diagram for addition except for the substitution of the −, ×, or ÷ sign for the + sign. Observe that the number in the next to lowest stack register appears on the *left* of the operation sign. The order does not make any difference for + and ×, but it does for − and ÷. To divide 4 by 2, for example, we key in the 4 first.

Functions

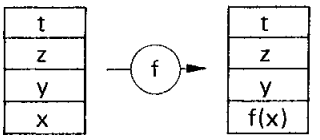
The exponentiation command y^x at (6,4) works just like the arithmetic functions.



To calculate 2^3, for example, we proceed thus:

Command	Display
2	2.
ENTER	2.00
3	3.
y^x	8.00

Functions of a single argument, like ln, log, e^x, and $1/x$, are even simpler. The commands for these functions simply replace the number in the display register with the value of the function at that number and leave the rest of the stack unchanged. If f denotes the function symbolically, the before-and-after picture is as follows:



Application to the Brass relational model life table families

The Brass relational model life table families are defined by

$$\ell_x(A,B) = \phi^{-1}\{A+B\phi\ell_x^s\}$$

where ℓ_x^s denotes the probability of survival from birth to age x in a given life table, called the "standard"; where A and B are parameters; where $\phi(x)$ is the function defined for $0<x<1$ by

$$\phi(x) = 0.5 \ln\left[\frac{1-x}{x}\right]$$

and where ϕ^{-1} is the inverse function of ϕ, defined for all numbers y by

$$\phi^{-1}(y) = [1+e^{2y}]^{-1}$$

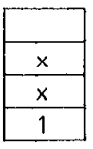
For notational convenience we write $\phi\ell_x^s$ instead of $\phi(\ell_x^s)$. These values are referred to as the "logit values" of the standard life table. In this section we consider how to calculate $\phi(x)$ for a given value of x and how to calculate $\phi^{-1}(y)$ for a given value of y.

To calculate $0.5 \ln\left[\frac{1-x}{x}\right]$ we shall first have to calculate $\left[\frac{1-x}{x}\right]$, and we certainly do not want to have to key in the value of x twice. Let us suppose that x = 0.8499. Here is a procedure that does the job.

Command	Display	Comment
[ON]	0.00	
FIX 4	0.0000	← We will want the display to four decimal places.
.8499	0.8499	
ENTER	0.8499	
ENTER	0.8499	
1	1.	
$x\gtrless y$	0.8499	← The label is white at (2,1). This command exchanges the contents of the lower two stack registers.
−	0.1501	
$x\gtrless y$	0.8499	
÷	0.1766	
ln	−1.7338	← The label is yellow at (4,2).
2	2.	
÷	−0.8669	

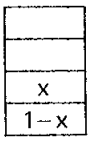
How does one arrive at such a procedure? The process is creative rather than mechanical, but we can nonetheless suggest the sort of thoughts that go on in one's head.

- The problem lies in calculating $\left[\frac{1-x}{x}\right]$.
- To calculate $\left[\frac{1-x}{x}\right]$ we shall need two copies of x.
- We can get up to four copies of x in the stack by repeated use of ENTER.
- Since we shall need a 1 and two x's for the calculation, let us try to get these into the stack all together.
- We can get the stack to look like this:



by keying in x, issuing ENTER twice, and keying in 1.

- We want to calculate $1-x$, but the 1 and the x are upside down to do this.
- We can get them right side up by using the exchange command $x\gtrless y$ at (2,1) and then subtracting, leaving the stack like this:



- Now we have x and $1-x$ and are ready to try to get $\left[\frac{1-x}{x}\right]$.
- The $(1-x)$ and x values are upside down for this division, but this problem is old hat by now; we simply execute $x\gtrless y$ and then divide.

The use of the exchange command to get numbers "into position" for subsequent operations is particularly noteworthy.

The calculation of $[1+e^{2y}]^{-1}$ for a given value of y poses no particular difficulty. We begin by calculating 2y and then work outwards, getting in succession e^{2y}, $1+e^{2y}$, and the final result. Let us suppose $y = -0.8669$. This is the value of $\phi(0.8499)$ obtained in the last paragraph, and since we are calculating the value of the inverse function of ϕ, we should obtain

$$[1+e^{2x(-0.8669)}]^{-1} = 0.8499$$

We shall not in the future indicate the switching on of the machine or the decimal place (FIX) setting of the display, these events being inferable from context.

Command	Display	Comment
.8669	0.8669	
CHS	−0.8669	(3,2)
ENTER	−0.8669	
2	2.	
×	−1.7338	
e^x	0.1766	Blue at (4,2)
1	1.	
+	1.1766	
$1/x$	0.8449	Blue at (2,2)

Observe the use of the CHS command to enter the value −0.8669 into the machine.

Programming procedure

We now reconsider the calculation of $[1+e^{2y}]^{-1}$ for $y = -0.8669$ with a view toward programming, insofar as possible, the various steps involved.

Command	Display
.8669	0.8669
CHS	−0.8669
ENTER	−0.8669
2	2.
×	−1.7338
e^x	0.1766
1	1.
+	1.1766
$1/x$	0.8499

The entry of the value of y for which $[1+e^{2y}]^{-1}$ is to be calculated cannot, of course, be programmed, but all subsequent steps can, including the CHS command. We begin like this.

Command	Display	Comment
[PRGM]	00	
CLEAR PRGM	00	Yellow at (3,2)

The notation [PRGM] serves to indicate that we switch the PRGM/RUN switch (just beneath the display on the right, opposite the OFF/ON switch) from RUN to PRGM. The machine is now ready to receive program steps.

Command	Display		
CHS	01		32
ENTER	02		31
2	03		02
×	04		61
e^x	05	15	07
1	06		01
+	07		51
$1/x$	08	15	22

What is going on in the display register? The numbers on the left of the display register index the "steps" of the program. The numbers on the right are codes for keystrokes. The code is formed by running the keyboard coordinates together to form a single two-digit number. Where a command involves two keystrokes, the code for the first key appears to the left of the code for the second key.

We conclude program entry with

Command	Display		
GTO 00	09	13	00
[RUN]	0.00		
R/S	0.00		

The GTO 00 command (GTO stands for "go to") is issued by depressing the GTO key at (1,3) and then depressing the 0 key twice. The R/S key is at (7,4). The meaning of "R/S" will be discussed below.

The machine will now automatically execute the nine commands listed every time the R/S key is depressed.

Command	Display
.8669	0.8669
R/S	0.85
FIX 4	0.8499
1	1.
R/S	0.8808

We get the same result for one-eighth the effort!

What have we learned? By *programming* the machine we can cause it to execute a series of commands with a single depression of the R/S key. The programming procedure consists of three steps.

(1) Switch the PRGM/RUN switch to PRGM and issue the CLEAR PRGM command.

(2) Issue the commands to be programmed.

(3) Issue a GTO 00 command, switch the PRGM/RUN switch back to RUN, and depress the R/S key.

The machine again

The machine has three modes of operation. In *manual execution mode,* which we used exclusively until the last section, commands are executed as they are issued. Switching the PRGM/RUN switch to PRGM transfers the machine to *program mode.* In program mode, commands are stored in the machine for later execution. There are 49 program storage registers, each capable of storing one command. Digits and decimal places count as commands in this context. Programming the constant 2.5, for example, requires three program storage registers.

Switching the PRGM/RUN switch back to RUN returns the machine to manual execution mode. When the R/S key is depressed, the machine automatically executes the commands stored in the machine in the order in which they were entered in program mode. (Exceptions to this rule occur in advanced programming.) The display flickers, and the machine will not respond to the keyboard while automatic execution is taking place. This is the third mode of machine operation, *program execution mode.* Transfer of the machine back to manual execution mode will occur automatically when the stored program steps have been executed. Depressing the R/S key while the machine is in program execution mode interrupts the automatic execution of stored program commands and returns the machine to manual execution mode.

The jargon of electronic computers has created a peculiar use of the verb "run." To "run" a program means to initiate the computer's automatic execution of the program steps; while this is happening one says that the program is "running." This is the source of the R/S key label. When depressed in manual execution mode, it commands the machine to "run" the program, and when depressed in program execution mode (that is, when the program is running) it commands the machine to "stop." Hence, R/S stands for run/stop.

Make the machine do the work

We should never miss the opportunity to make the machine do our work, provided the effort of programming does not outweigh the savings effected by using the program. In the program for calculating $0.5 \ln [\frac{1-x}{x}]$, for example, we can save ourselves the trouble of depressing the decimal point key every time the program is to be run. If we are entering four digit numbers, like 0.8499, we program the machine to receive 8499 and divide by 10,000. Such mundane devices help us get the same job done with fewer keystrokes, which means less time and less effort devoted to an unpleasant task.

Use simple programs

In many applications, short, simple programs will be more valuable than long and complex ones. To take what is perhaps the simplest example of all, consider the problem of calculating the proportional distribution of a given series of numbers. We have to divide each number in the series by the total, and one of the remarkable deficiencies of the HP-25 as a calculator is that this requires, in addition to entry of the numbers and their total, at least two keystrokes for each proportion calculated—twice as many as ought to be required.

The most direct way to handle division by a constant is to key in the constant at each step. To calculate the proportional distribution of 20, 30, 50, sum 100, for example, we may proceed as follows.

Command	Display
20	20.
ENTER	20.00
100	100.
÷	0.20
30	30.
ENTER	30.00
100	100.
÷	0.30

and so forth. This procedure requires a ghastly four keystrokes where one should be required and provides a good example of a program which is at once extremely simple and extremely valuable.

Command	Display		
[PRGM]	00		
CLEAR PRGM	00		
ENTER	01		31
1	02		01
0	03		00
0	04		00
÷	05		71
GTO 00	06	13	00
[RUN]	0.00		
R/S	0.00		

Now we can get the desired proportions for one keystroke apiece.

Command	Display
20	20.
R/S	0.20
30	30.
R/S	0.30
50	50.
R/S	0.50

Storage registers

In addition to the four stack registers and the 49 program storage registers, the machine has eight storage registers, numbered 0 through 7, available for storing numbers in either manual or program execution mode. The numbers associated with each register may be referred to, using an amusing and suggestive analogy, as the "address" of that register. The STO and RCL (for "store" and "recall") commands at (2,3) and (2,4) are used to gain access to the storage registers. The command STO 7 copies the value in the display register of the stack into storage register number 7, and the command STO + 7 adds the value in the display register of the stack to the value in storage register number 7 and records the sum in the latter register. The command RCL 7 copies the number in storage register number 7 into the display register of the stack, after executing an automatic ENTER, so that the value formerly in the display register is available in stack register number 2. The CLEAR REG command at (3,3) assigns the value 0 to all storage registers. The following diagram illustrates.

Command	Display	Comment
CLEAR REG	0.00	
RCL 7	0.00	
1	1.	
STO 7	1.00	
CLx	0.00	(3,4)
RCL 7	1.00	
STO + 7	1.00	
RCL 7	2.00	

Other storage registers are manipulated in the same way (number 7 register is convenient for "default" purposes because the 7 key is closest to the STO and RCL keys), and −, ×, or ÷ may be substituted for + in the STO + 7 command with appropriate effect.

Example of a simple but useful program

It is a nuisance to have to use the programming feature of the machine to accomplish such a simple task as repeated division by a constant. Having done the programming, however, we discover an opportunity which more than makes up for the inconvenience. In practice we shall often want to check the calculation of the percentages, and this means keying them in, a terrible chore. We may amend the program to calculate the sum of the proportions cumulatively as they are calculated using the "register arithmetic" capability represented by the STO + 7 command.

Command	Display			
[PRGM]	00			
CLEAR PRGM	00			
ENTER	01			31
1	02			01
0	03			00
0	04			00
÷	05			71
STO + 7	06	23	51	07
GTO 00	07		13	00
[RUN]	0.00			
R/S	0.00			

In consequence of adding this step to the program, storage register number 7 will contain, at the end of the calculation of any series of proportions, their sum plus the value initially in the register. Since we are interested in the sum of the proportion, we must take care to see that the value initially in the register is 0. Returning to the previous example of calculating the proportional distribution of 20, 30, and 50, sum 100, the calculation proceeds just as before.

Command	Display
CLR REG	0.00
20	20.
R/S	0.20
30	30.
R/S	0.30
50	50.
R/S	0.50

But we may now inspect the value in storage register number 7 to see whether the proportions just calculated sum to one as they should.

Command	Display
RCL 7	1.00

They do, in this case. It is of course essential not to forget to clear the storage registers at the beginning of the calculation.

Improved command/display diagrams

Here is a procedure to calculate

$$\tfrac{1}{4}(s+33-x)^4 - 11(s+33-x)^3 + 98826.75$$

for given values of s and x, a task which occurs in connection with demographic estimation problems. In this example s = 12 and x = 15.

Command	Display	Comment
12	12.	Store s = 12 in storage register 0
STO 0	12.00	
15	15.	Calculate s+33−x and store in storage register 1
CHS	−15.	
ENTER	−15.00	
33	33.	
+	18.00	
RCL 0	12.00	
+	30.00	
STO 1	30.00	
4	4.	Calculate $\frac{1}{4}(s+33-x)^4$
y^x	810000.00	
4	4.	
÷	202500.00	
RCL 1	30.00	Calculate $11(s+33-x)^3$
3	3.	
y^x	27000.00	
11	11.	
×	297000.00	
−	−94500.00	Calculate final result
98826.75	98826.75	
+	4326.75	

This procedure may be programmed from the CHS command onward, so that the indicated quantity may be calculated for any value of x by simply entering the value in the display register and touching the R/S button. Having programmed the machine thus, we get, for example,

Command	Display
15	15.
R/S	4326.75
16	16.
R/S	7368.00
17	17.
R/S	11018.75

at a tremendous savings of labor.

The main point of the example, however, is the unsatisfactory nature of the command/display diagram. The purpose of these diagrams is to communicate conveniently and accurately what we have to do to make the machine do some computational task. Long vertical strings of symbols make inefficient use of page space, make it too easy to get lost in the middle of the string, and, worst of all, fail to provide any visual support for keeping the problem at hand sensibly organized in one's mind. (How long did it take you to get the above program entered correctly?) The main problem with the diagrams is that they are too long, and this may be remedied by putting more than one command on the same line.

Command	Display
15	15.
CHS	−15.
ENTER	−15.00
33 +	18.00
RCL 0 +	30.00
STO 1	30.00
4 y^x	810000.00
4 ÷	202500.00
RCL 1	30.00
3 y^x	27000.00
11 × −	−94500.00
98826.75 +	4326.75

The device of following numbers with operations on the same line is consistent with the logic of the machine, shortens the diagram, and suppresses some of the display information, all to good advantage. The diagram is still long, however (and it is only 29 of a possible 49 program steps), and gives no visual aid in breaking the problem into its constituent parts. Both problems are solved by grouping commands in adjacent columns and suppressing display entries.

15	4 y^x	RCL 1	98826.75 +
CHS	4 ÷	3 y^x	
ENTER		11 × −	
33 +			
RCL 0 +			
STO 1			

The diagram has lost the tight disciplined look we started with, and there is considerable virtue in maintaining some display information to check whether one is keying correctly. The following format answers both these issues and adds notes to explain what is going on.

(1)	(2)	(3)	(4)
15 CHS ENTER 33 + RCL 0 + STO 1	4 y^x 4 ÷	RCL 1 3 y^x 11 × −	98826.75 +
30.00	202500.00	−94500.00	4326.75
(1) Calculate s+33−x and store in register 1. (2) Calculate first term. (3) Calculate second term and subtract. (4) Add 98826.75.			

We now have an effective format for communicating what has to be done to make the machine carry out a computational task.

The process of putting several commands on each line may be carried to the logical extreme for short procedures by placing all the commands in sequence on a single line and eliminating the headings and the display component. Thus, for example, instead of

ENTER
$2\times$
e^x
$1+$
$1/x$

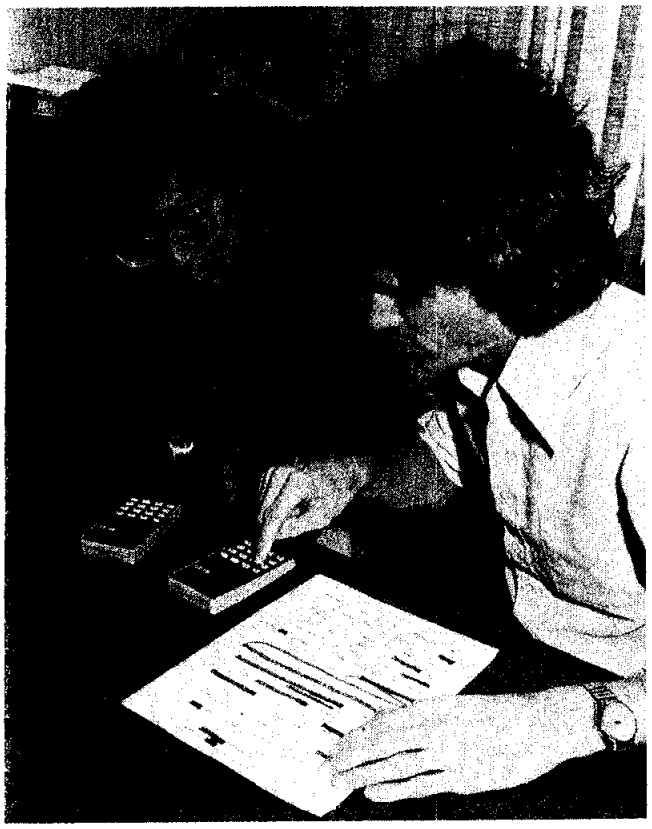
we may write ENTER$2\times e^x 1+1/x$. This sort of display takes a bit of getting used to, but it has obvious typographical advantages and is surely better than putting the same symbols into text separated by commas, like this:

ENTER, 2, $\times$, e^x, 1, +, $1/x$

The commas are supposed to help us distinguish the symbols, but we do not really need them and in the end they only clutter up the picture and distract us.

Conclusion

This note provides an introduction to the recently developed programmable calculators and a glimpse of their power and versatility. Part II will present a series of examples of the development of programs for a variety of problems encountered in demographic analysis.



EWPI Research Associate Dr. Griffith Feeney, known to newsletter readers from his previous notes, demonstrates the use of the HP-25 calculator for Elizabeth Q. Bulatao, a research intern from the Philippines.

Acknowledgment

Most of this material was presented during the course of a seminar on child survivorship estimation held at the Centro Latinoamericano de Demografia (CELADE) in Santiago, Chile, 22–26 August 1977. The seminar provided a valuable opportunity to test and develop the presentation, and it is a pleasure to acknowledge the contribution of CELADE and of the seminar participants to this note. I am grateful to the Newsletter staff, who have prepared this note for publication with calculator in hand and have corrected many minor errors in the presentation. □

1980 US CENSUS UPDATE

The quality of decennial statistics in 1970 was found to be lower for minority populations than for the remainder of the population. The black population, the Spanish-origin population, American Indians (Native Americans), and Asian and Pacific Island Americans are included in the minority populations. The Minority Statistics Program was set up to inform members of minority populations of the usefulness to them of statistics provided by the Bureau of the Census, to assist in the use of those statistics, and to obtain their recommendations and support towards improving coverage and quality of data for the 1980 Census.

Three census advisory committees provide an organized and continuing channel of communication between members of minority populations and the Bureau; they meet to discuss such topics as the enumeration of migrants and questionnaire items on race, ethnicity, and language.

The National Services Program, another component of the Minority Statistics Program, develops and maintains channels of two-way communications with members of minority populations through contacts with minority organizations that are national in scope. Bureau representatives attend and participate in national conventions and meetings of minority national organizations including civil rights, economic and welfare rights, religious, media, professional, and business organizations. The 1977 schedule includes participation in more than 55 such meetings.

A third facet is the Community Services Program, which develops and maintains channels of communication with minority groups and individuals at a local level. Operating out of 12 regional offices through a staff of Community Services Specialists, the program implements, facilitates, and supplements, at the grass-roots level, the work of other Minority Statistics Program components. Objectives of the Community Services Program include heightening Bureau credibility by increasing minority citizens' understanding of the content and usefulness of pertinent census data; stressing the importance of an accurate 1980 Census count to such minority communities; seeking suggestions regarding specific ways in which 1980 Census coverage of minority populations can be improved; and soliciting the cooperation of interested community organizations in "spreading the word" to relatives, friends, neighbors, and other associates.

The monthly *Data User News,* which can be subscribed to for US$4.00, provides continuous reporting on plans for the 1980 US Census, applications of census data, new computer programs, technical explanations of census methodology and processing techniques, and information on new publications. A periodic supplement, *1980 Census Update,* reports on the planning and preparatory activities for the next census. These publications may be obtained by writing to Subscriber Services Section (Publications), Bureau of the Census, Washington, D.C. 20233.

(continued from page 4)

ABS's ability to keep census information confidential. "Anything can be bought," was one individual's response. Even the Taxation Department had a better reputation for confidentiality. "You can tell the Taxation Department you're a prostitute and they can't tell the police," said a respondent.

Objections to specific questions on the census form were also raised. Some felt that the census "probed" too much and asked too many questions about private matters (race, religion, and whether the person had taken a holiday were examples cited). Many felt the form was too long and took too much time to complete. Some said that specific questions were trivial or were too vague to provide useful information. Some thought that the questions were redundant and that the information must already exist in another government file. And doubts were expressed about the integrity of census collectors, who might start gossip about individuals in their collection districts.

Some individuals questioned in the study were uneasy about the use of income information. They thought that the answers given to census questions might be linked, again by the omniscient computer, to a person's credit rating and result in credit blacklisting. There was also some resistance to the de facto census: "It's none of their business . . . who was present and who was absent in your house" on census night, said one person.

Benefits from the census

The research study found an enormous lack of understanding of the benefits of the census and said there is considerable scope for education in this area. "The very people most likely to benefit from Census information were the most ill-equipped to comprehend its uses and how they might derive some advantage," said the report. Respondents made no distinction between the responsibility of the Bureau to collect information and the responsibility of others to act upon it. Said one: "So you ask me to say that I live in a converted garage. Great. And then what? You reckon that the government's going to come along and build me a house? Like hell."

Recommendations

The remoteness of the ABS could be overcome by a publicity campaign, says the report. It recommends that opinion leaders be involved in discussions that would help them appreciate the Bureau's dilemmas; that press conferences be held; and that Bureau representatives participate in radio call-in programs (a popular type of show in Australia) so that the Bureau would become better known to the public and criticisms would not go unanswered.

Director of Evaluation and User Service Brian Doyle (right) *confers with Michael Smith, Supervisor of Development and Evaluation, about plans for the 1981 Census.*

Objectives for a communication campaign should be "to make the Bureau more familiar and to overcome fear and resentment generated by its current remoteness; to generate greater interest and involvement among the public; and to demonstrate the benefits that would enable people to identify personally with the census and encourage cooperation." Popular books with "interesting" statistics could be issued for the public at large and especially for school children. Said one respondent, "Their books could replace the *Guinness Book of Records* if they did it properly." Other suggestions were that the Bureau issue its own press releases so that the public would know the source of information in newspaper articles and that an imaginative and entertaining documentary film on the Bureau be produced for television.

An expenditure of $2 million (Australian) was recommended for a publicity campaign. For the 1976 Census the Bureau got $50,000. The critics of the census will soon be dusting off their objections to use against the 1981 Census, and the Bureau will probably be trying once more to brighten its tarnished image with virtually no support. The quality of census data depends heavily on public understanding and cooperation. Unless the Bureau finds a way to acquire a more positive image, Australians will continue to regard their census with suspicion. □

(continued from page 16)

EWPI staff member writes population textbook for Hawaii

One of the more important uses of census information is to make the general public aware of the problems of population growth. More and more policymakers in Asia and the Pacific are aware of the need to communicate demographic knowledge to people in an interesting but authoritative way. Social studies curricula at all levels from elementary through higher education are being redesigned to provide ecological and demographic input. However, both policymakers and educators find suitable textbooks hard to locate. Materials for use in population education must be able to interpret demographic facts accurately, but at the same time they must capture the reader's attention. Ms. Eleanor C. Nordyke, an East-West Population Institute staff member with a background in the demographic history of Hawaii, has succeeded in doing both by blending the colorful story of *The Peopling of Hawaii* with the hard facts of what uncontrolled population growth can do to a finite island microcosm. Through the use of photographs, maps, diagrams, and tables, she has illustrated the book so that it will be useful for schools as well as for the general reader.

Nordyke is the coauthor with Robert Gardner of an earlier EWPI paper, *The Demographic Situation in Hawaii* (Honolulu, 1974). The population projections done for the earlier monograph appear in *The Peopling of Hawaii,* which is available from The University Press of Hawaii, Honolulu, Hawaii 96822, for $4.95. This book makes its appearance in bookstores at a time when Hawaii—like many other states and countries—is in the process of formulating population policy. □

publications that count . . .

by Alice D. Harris

Japan keeps census reports coming

Ever since the taking of its most recent Population and Housing Census on 1 October 1975, the Japanese Bureau of Statistics has processed and published an impressive array of statistical data. Beginning with the *Preliminary Count of Population* published in December 1975 and the *Prompt Report* (One-Percent Tabulation) released in March 1976, the Bureau has remained on its schedule for getting the census tabulations done. It published Volumes 1 and 2 in September, and it is now completing the separate reports for the 47 prefectures that make up Volume 3.

The East-West Population Institute has recently received the *Prompt Report of the Basic Findings for Prefectures and Municipalities* (Result for the Twenty-Percent Tabulation). The *Prompt Report* appears in six volumes, each covering the prefectures, *shi, ku, machi,* and *mura* within one division. Twelve tables give for each subdivision such basic population characteristics as age and sex by five-year groups, Japanese and alien population counts, marital status, labor force status, industry and employment status, household members and type, and housing statistics. Text and tables are in Japanese and English. Statistics on fertility, family size, and education will be published in the *Results of Detailed Tabulations* by September 1978. A list of the available census reports and their prices may be obtained by writing to the Government Publications Service Center, All Japan Official Gazette, Inc., 2-1 Kasumigaseki 1-chome, Chiyoda-ku, Tokyo 100, Japan.

First subject report of New Zealand's 1976 Census

The Government of New Zealand conducted its 26th Census of Population and Dwellings on the night of 23 March 1976. This was almost 125 years after the first nationwide population census carried out in November and December 1851. New Zealand is one of the few nations that has—with only two exceptions in 1931 and 1941—taken its censuses on a quinquennial basis. The results of the latest census are being made available in a series of bulletins and a set of separate subject reports on different population characteristics. The Department of Statistics published the first of the subject reports, *Location and Increase of Population,* Volume 1A, in March 1977. For the first time, Volume 1 will be printed in three parts. Part A contains the main tabular analyses of actual population size and distribution on census night. Part B will incorporate statistics of population for vicinities and localities, plus population densities. The final part will provide an alternative analysis of population distribution based on usual, or de jure, residence on census night.

Volume 1, unlike its earlier counterparts, provides only total population counts. Further analysis—by male or female and Maori or non-Maori—can be found in the provisional results, published in September 1976. The subsequent volumes of the series will contain the counts broken down by sex and ethnicity. Local and administrative districts are defined in the introductory chapter. An alphabetical index to places facilitates the use of the volume. All of the census reports are available from the Government Bookshop, Mulgrave Street (C/ - Private Bag) Wellington, New Zealand.

Alice Harris is Resource Materials Specialist at the East-West Population Institute. She and her staff maintain the Institute's collection of documentation and reference materials, including a sizable body of census publications. Readers and publishers who have new publications of interest to the readers of the census newsletter may send review copies to Ms. Harris at the Resource Materials Collection, East-West Population Institute, 1777 East-West Road, Honolulu, Hawaii 96848.

New United Nations study on fertility trends

The United Nations has just completed the 59th report in its Population Studies series. This new publication, *Levels and Trends of Fertility Throughout the World, 1950–1970,* summarizes the fertility data for the more developed and less developed countries from 1950 to 1973, with particular emphasis on the period after 1960. It updates two earlier United Nations reports which described the fertility levels found in the 1950s and early 1960s.

Whereas the earlier data were for only about three-quarters of the world population, almost the entire world population is included in the 145 countries with a population of 250,000 or more in 1970 examined in the study. The levels and trends of fertility have been determined from the crude birth rates and the gross reproduction rates of these countries. Both the data and the methodology used to analyze the rates represent an improvement over earlier reports and can be accorded reasonable accuracy.

The first chapters present a summary of the principal findings and a description of the measurement techniques. Succeeding chapters present the fertility patterns in the usual United Nations format, by continent, for Africa; Asia; Latin America; and Europe, North America, Oceania, and the Union of Soviet Socialist Republics as a unit. The concluding chapter analyzes differential fertility. Twenty-six maps and 69 tables illustrate the levels and trends of fertility. For this important addition to the population reference collection write to any United Nations bookstore or to the United Nations, Sales Section, New York, N.Y. 10017. The report sells for US$19.00; its order number is Sales No. E.77.XIII.2.

New book on Korea from Seoul National University

Dr. Tai Hwan Kwon, Director of the Population and Development Studies Center, Seoul National University, is the author of a new book on the Korean population during the period 1925–66. The book, *Demography of Korea: Population Change and Its Components 1925–66,* follows two earlier publications by Kwon: *A Study of the Korean Population 1966* (1974, Seoul National University Press) and *The Population of Korea* (1975, Seoul National University Press). The first was an analysis of the Korean population structure using the data obtained in the 1966 Census; the second was a general overview of Korean demographic history written especially as one of the Committee for International Coordination of National Research in Demography monographs for World Population Year. Kwon's newest book is intended to assemble a comprehensive picture of population change in Korea during 1925–66 by a thorough analysis of the components affecting change—fertility, mortality, and migration.

After briefly reviewing the availability of demographic data and evaluating their accuracy, the author devotes the balance of the book to the technical analysis of the three

components listed above. He writes clearly enough so that *the reader can follow* population changes from one period to the next. Kwon concludes with a profile of the present-day Korean population. He suggests that more remains to be done; future research should try to link social and economic factors to population change in Korea. The appendices contain more than 100 pages of tables, and there is a bibliography and an index. *Demography of Korea* is available from Seoul National University Press, Seoul, Korea (price not available).

Urbanization in Asia

Population growth throughout the world has been accompanied by a trend toward increasing urbanization. In 1950 there were only 75 of the so-called "million cities" (those with more than one million inhabitants). Most of the original 75 cities were located in the industrialized nations of Europe and North America. The United Nations now estimates that by 1985 there will be 273 "million cities," and a majority of them will be in developing countries. How can these countries handle the problems of unprecedented urban growth—6 to 10 percent a year? Pollution, migration, unemployment, crowding, and disease are only a few of these problems. Concern about the effects of urbanization has led to an increase in conferences on how to deal with urbanization. The outgrowth of one conference, held at International Christian University, Tokyo, Japan, in 1975, has been a book, *Asia Urbanizing: Population Growth & Concentration—& the Problems Thereof* (Tokyo, The Simul Press, 1976, ¥2,200, about US$8.00). Migration, social welfare, and policies to limit urban growth are topics included in the papers from this conference. There are case studies of Manila and Seoul. A majority of the discussants are Asian themselves, and this seems to augur well for policymaking in Asia's urban future.

On the distaff side

Ever since the World Population Conference in Bucharest in 1974 and International Women's Year in 1975, there have been numerous books, articles, and even statistical yearbooks on all aspects of women and development. During the Eighth Summer Seminar at the East-West Population Institute in Honolulu, 13 June–15 July, a workshop on The Status of Women and Population Policy led to the selection and acquisition of a number of these new documents. They covered such topics as labor force participation and fertility, women's rights, sex roles, and the status of women in different societies. *Women and World Development,* edited by Mayra Buvinić and published by the Overseas Development Council (Washington, D.C., 1976, US$2.50) is a valuable reference for those undertaking research on women. An interesting comparative study of women in several countries, edited by Janet Zollinger Giele and Audrey Chapman Smock, is *Women: Roles and Status in Eight Countries* (New York, Wiley-Interscience, 605 Third Ave., US$17.50). A series of case studies on women in Egypt, Bangladesh, Mexico, Ghana, Japan, France, the United States, and Poland has been produced by a team of social scientists commissioned by the Ford Foundation. Each chapter was written by someone with expertise in a given country according to a framework which provided a common dimension for women in all the countries. The eight countries represent a variety of cultural, political, and economic conditions within geographical regions—for example, industrialized Japan and less developed Bangladesh in Asia. Every chapter presents a comprehensive picture of women's status within a brief space; in each an introductory section describes present conditions in historical perspective. Women are then described by their legal and political positions, the work they do, and their roles in family, health, education, and religious or cultural institutions. A concluding chapter identifies the practical policies that have improved the status of women in various places in the last two or three decades. Although not all of the countries studied fall within the Asian and Pacific region, the book is worth mentioning for those eager to build up collections on women's affairs.

Shorter notices

The Department of Statistics of Malaysia has just issued the 1974 *Vital Statistics, Peninsular Malaysia.* The purpose of the annual volume is to present all available statistics on vital events in Peninsular Malaysia as they are obtained from the registration system. In addition to two sets of population estimates, one based on the 1970 Census count of population, and the other based on the 1970 Census count adjusted for an underenumeration of 4.05 percent shown by the postenumeration survey, the latest register contains age distributions and life tables for each of the major community groups in Peninsular Malaysia. The report can be purchased from the Department of Statistics, Kuala Lumpur, Malaysia, for M$3.00.

What is the current status of family planning programs in Asia and the Pacific? A recent publication from The Population Council, *Family Planning in the Developing World,* contains reports for 34 countries in Asia, Latin America, and Africa and regional overviews. Each country report is written by a person or persons familiar with that country's family planning program. A historical introduction was prepared by the editor, Walter B. Watson. The present review continues and updates the East Asia and the international reviews that appeared in *Studies in Family Planning* from 1971–1975. It can be purchased from The Population Council, 1 Dag Hammarskjöld Plaza, New York, N.Y. 10017, for US$4.50.

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THE EAST-WEST CENTER is a national educational institution established in Hawaii by the U.S. Congress in 1960 to promote better relations and understanding between the United States and the nations of Asia and the Pacific through cooperative study, training, and research. Each year more than 1,500 men and women from many nations and cultures work together in problem-oriented institutes or on "open" grants as they seek solutions to problems of mutual consequence to East and West. For each Center participant from the United States, two participants are sought from the Asian and Pacific area. The U.S. Congress provides basic funding for programs and a variety of awards, and the Center is administered by a public, nonprofit corporation with an international Board of Governors.

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