

DIVISION OF
PLANNING COORDINATION
OFFICE OF THE MAYOR
CITY OF HOUSTON
TEXAS



TRANSFERABLE HOUSING PLANNING TECHNOLOGY

AUGUST, 1979
HOUSING CALCULATION
TOOL USER'S MANUAL

FILE COPY

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HOUSING CALCULATION TOOL
USERS' MANUAL

AUGUST, 1979

Submitted by:
DIVISION OF PLANNING COORDINATION
OFFICE OF THE MAYOR
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PREFACE

This report contains operating procedures for use of the Housing Calculation Tool. It is designed to provide step-by-step instruction in the use of the Housing Calculation Tool.

Development of the manual draws upon considerable experience in operation of the Housing Calculation Tool by City personnel. The manual was prepared by the Division of Planning Coordination with the support of The Assistance Group Incorporated, Silver Spring, Maryland, consultants to the project.

HOUSING CALCULATION TOOL
USERS MANUAL

I. INTRODUCTION

This manual has been prepared as part of an overall effort by the City of Houston to explore various growth options for the City and the impact of such options on the housing market and requirements for City services. Key to the development and testing of growth options is the creation of various analytic tools. One such tool is a housing calculation tool. The housing tool is a series of interrelated computer programs which generate data on City housing population and household characteristics. To facilitate use of the housing tool, user procedures have been developed which allow City staff to operate the computer programs with a minimum of background and experience in computer programming. English language prompts or instructions have been developed and placed in the computer. These prompts are a series of steps which guide the user through a process of: (1) assumption setting; (2) execution of various modules of the tool; and (3) preparation of summary reports of the output generated by the various modules on a computer.

In support of potential users, this manual describes the computer-based instructions and their application. As such, the manual should be treated as a complement to the instructions built into the computerized housing calculation tool. The manual is organized to provide:

- an overview to the Department of Housing and Urban Development contract supporting the development of the housing tool;
- a review of the emerging growth planning methodology which the housing tool is designed to support;
- a users guide on housing tool operation.

II. CONTRACT OVERVIEW

In December, 1977, the City commenced a twelve month study of how the city could develop transparent, useful approaches to identifying alternative growth scenarios for the City and their likely impact on the local housing market and requirements for City services. This is a continuation of work initiated by the City under a DHUD capacity building contract. Under this previous contract, the City established a Policy Planning Division in the Office of the Mayor. This unit, since named the Division of Planning Coordination, over time was charged with responsibilities for developing various policies to guide operational planning, budget formulation, capital improvements programming, legislative analysis, and inter-agency coordination.

Given the responsibilities of this unit, it was apparent that a clearly stated, well developed urban growth policy would be necessary to guide upcoming City planning/programming decisions.

As a first step, the City developed and began implementing an integrated work program utilizing City and Federal funds to address the issues related to urban growth:

- EPA (Sec. 201/208) funds were used to develop population and land use forecasts;
- FHWA (Sec. 112) funds were used to establish an accurate land use base;
- EDA (Title III) funds were utilized to develop more accurate employment projections;
- UMTA (Sec. 9) funds were used to develop various growth options and policy sets to implement these options; and
- Local funds were used in all of the preceding studies to provide integration and consistency among the end products.

As part of the capacity building contract, various working committees of City staff were created to consider how growth planning should be approached. Various planning responsibilities were reviewed (e.g., wastewater, transit, capital improvements) to determine the nature and type of urban growth policy planning which would be useful as a guide to these functional area planning decisions. Based upon these reviews tentative decisions were made as to what type of urban growth planning would be appropriate. These decisions were incorporated in an overall urban growth work program of which one component is the HUD contract.

The objectives for the current contract focus principally on the development of a methodology and related calculation routines for expressing and evaluating various growth options in terms of their impact on various sectors of the housing market, and the capital/operating costs of the City. Specific objectives are as follows:

- Refine and integrate existing calculation tools and procedures in the City of Houston to assess urban growth patterns in terms of potential impact on private and public investments;

- Develop refinements to the Housing Calculation Tool to allow: (1) testing and impact of alternative housing policies on sectors of the housing market; and (2) generating data to support preparation of Housing Assistance Plans;
- Develop documentation and a detailed description of the Housing Calculation Tool to enable local officials in other municipalities to determine the Tool's applicability for their locale;
- Design and test procedures making it easier for users to understand and use the Housing Calculation Tool;
- Plan for improving the data base for planning and analysis in Houston; and
- Define and test a method for framing and evaluating growth pattern options.

The approach being taken toward development of the growth planning methodology/calculation routine is to expand and/or adapt existing analytic tools of the City. In recent years the City has developed a water model, wastewater load/flow calculation tool, various transportation models, growth share allocation routines, and a Housing Calculation Tool. The growth share allocation methodology, recently developed by the Division of Planning Coordination, coupled with an expanded Housing Calculation Tool will be used to create a calculation process for expressing growth options as a series of five year land use, employment, housing unit, household, and population projections at the Census tract level. The water, sewer, transportation, and housing tools will be used to conduct the evaluation of various options in terms of their impact on the housing market and requirements for various City facilities and services.

The Division of Planning Coordination, Office of the Mayor, is responsible for development of the growth methodology and its implementation. Contract performance has been structured to yield products which will support current efforts by the City staff and an Advisory Committee representing private sector interests convened by the Mayor to develop an overall urban policy for Houston. The projections provided by this contractual effort will provide alternative futures to be discussed in the context of developing such an urban policy.

III. REVIEW OF THE GROWTH PLANNING METHODOLOGY

Development of the growth planning methodology is being guided by a series of design assumptions. These assumptions and the resultant design structure are described below.

A. Design Assumptions -- Efforts to develop a methodology for expressing and evaluating growth options are being guided by the following design assumptions:

1. The methodology should be user oriented. Both the forecasts and the processes for generating and evaluating the forecasts should be oriented to allow staff control over the content.
2. The methodology should be structured to function as a calculation tool rather than a model. Of interest to the City staff is a methodology composed of a series of calculation routines which are transparent. Thus, forecasts would be the product of a series of readily identifiable calculation processes, driven by a series of externally derived, explicit assumptions about various components or factors in urban growth (e.g., labor force participation rates, birth and death rates, inflation rates, housing unit demolition rates, conversion rates, inflation rates, vacancy rates, etc.). Further, the calculation routines should allow the user to isolate the effects of any one assumption on the resultant growth forecasts.
3. The methodology should provide for forecasts incorporating a high level of detail to foster effective evaluations. More precisely, the forecasts should be framed to provide the following level of detail:
 - Time period frequency -- Five year intervals
 - Geographical detail -- Census tract level, census tract aggregates, and City totals
 - Unit forecast detail -- Units by tenure, age, value/rent and size classes
 - Household forecast detail -- Households by ethnicity, size, and income classes, and, where feasible, sex and age of head of household
 - Population forecast detail -- Age, sex, race
4. The methodology should be able to accomodate changes in the geographic area of the City over time through annexation/deannexation.
5. The methodology should be structured to ensure that all forecasts for any time period are consistent. The employment, land use, housing unit, household and population forecasts should constitute a logical set in both their aggregated and disaggregated forms.

6. The methodology should be sufficiently modular to allow improvements to be made in various portions of the methodology or calculation routines without jeopardizing the overall design.
7. The methodology should allow the City staff to pose City policies/programs as assumptions within various modules of the methodology and to be able to ascertain the effect of these policies or programs on the amount and type of growth to occur in future time periods.
8. The evaluation portion of the methodology should allow assessment of the impact of alternative options. Each option will be evaluated using the same evaluation criteria related to the housing market and the requirements for City services.
9. The methodology should provide for assessment of the housing market impact of an alternative, giving particular emphasis to that portion of the housing market related to low and moderate income households.
10. The housing market evaluation should be designed to be consistent with existing DHUD requirements for estimating needs for assisted housing.
11. The methodology for evaluating the impact of various options on the costs of City facilities/services should provide for the projection of multi-year costs and revenues. Thus at a minimum the methodology should be able to highlight possible changes in advalorem tax rates and the implications concerning sales tax and user fee rates.
12. Forecasts should be adequately supported by an audit trail of all assumptions used in the calculations.
13. Provision should be made for use of alternative assumptions for any time period and for any module.
14. The methodology should be convertible to a series of computer routines for performing all necessary calculations.

B. Resultant Design Structure -- Given these underlying assumptions, the methodology which has emerged for expressing growth options utilizes the following modules:

- Population and Household Module
- Locational Preference Module
- Census Tract Share of Growth Module
- Unit Forecast Module
- Tract Level Household and Population Module

Their interrelationships are depicted in Exhibit 1 and each module is briefly described below:

1. Population and Household Modules -- A series of routines for estimating households by age, race, and sex in five year increments for the period 1970 through 2000. County level employment projections are used to generate estimates of associated population using labor force participation rates. Population forecasts are disaggregated by age, race, and sex characteristics based upon City derived assumptions about the components of net natural increase and net immigration. Resultant population projections are converted to associated household forecasts using headship rates as a basis for conversion. Households are disaggregated by type (i.e., race, size, and income) using City generated, exogenous assumptions. These forecasts are performed at the County level and factored down to correspond to the land area associated with current City boundaries and areas of possible annexation.
2. Locational Preference Module -- A series of routines for estimating residential locational preferences of households. Estimates are made for each five year forecast of previous period households displaced through demolition and/or conversion of units, the net new households resulting from in-migration, and net natural household formations. These households are defined as the households to be housed during the forecast period.

Households' locational preferences are related to household size, income, race, and density preference characteristics. Each Census tract's previous period household race, size, income, and density characteristics are used to create a set of tract clusters exhibiting similar characteristics. Households to be housed are allocated to clusters based upon the cluster's share of total City households by type (i.e., race, size, income) and its residential density characteristics.

3. Census Tract Growth Share Module -- A calculation process for allocating growth to tracts based upon the relative weightings of tracts as to their relative attractiveness for growth. Each tract is rated on a number of common characteristics such as proximity to schools, land costs, proximity to major places of work, etc. These ratings/weightings are used to create a cumulative attractiveness index for each tract by time period which in turn is used to allocate household growth to tracts.
4. Unit Forecast Module -- A calculation routine for estimating changes in the housing supply from period to period. Preceding period unit forecasts are reduced by use of separate demolition rates and conversion assumptions for each unit type (i.e., tenure, age, value/rent, size). Remaining units are revalued based on rehabilitation assumptions, and the entire stock is then aged five years. New units are added based upon new construction assumptions developed by users. All units are adjusted by five

year inflation rates which are the differential rates between that of household income and housing unit value/rents, presently assuming value/rents inflate faster than incomes.

All of the above transitions are performed tract by tract. It is also possible to introduce estimates of occupied units in the tract level based upon City supplied vacancy rate assumptions and estimates of substandard units using City generated suitability assumptions by unit type.

5. Tract Level Household/Population Module -- A series of calculations designed to estimate tract level households by characteristic (i.e., size and income) as a function of the tract level housing unit forecasts.

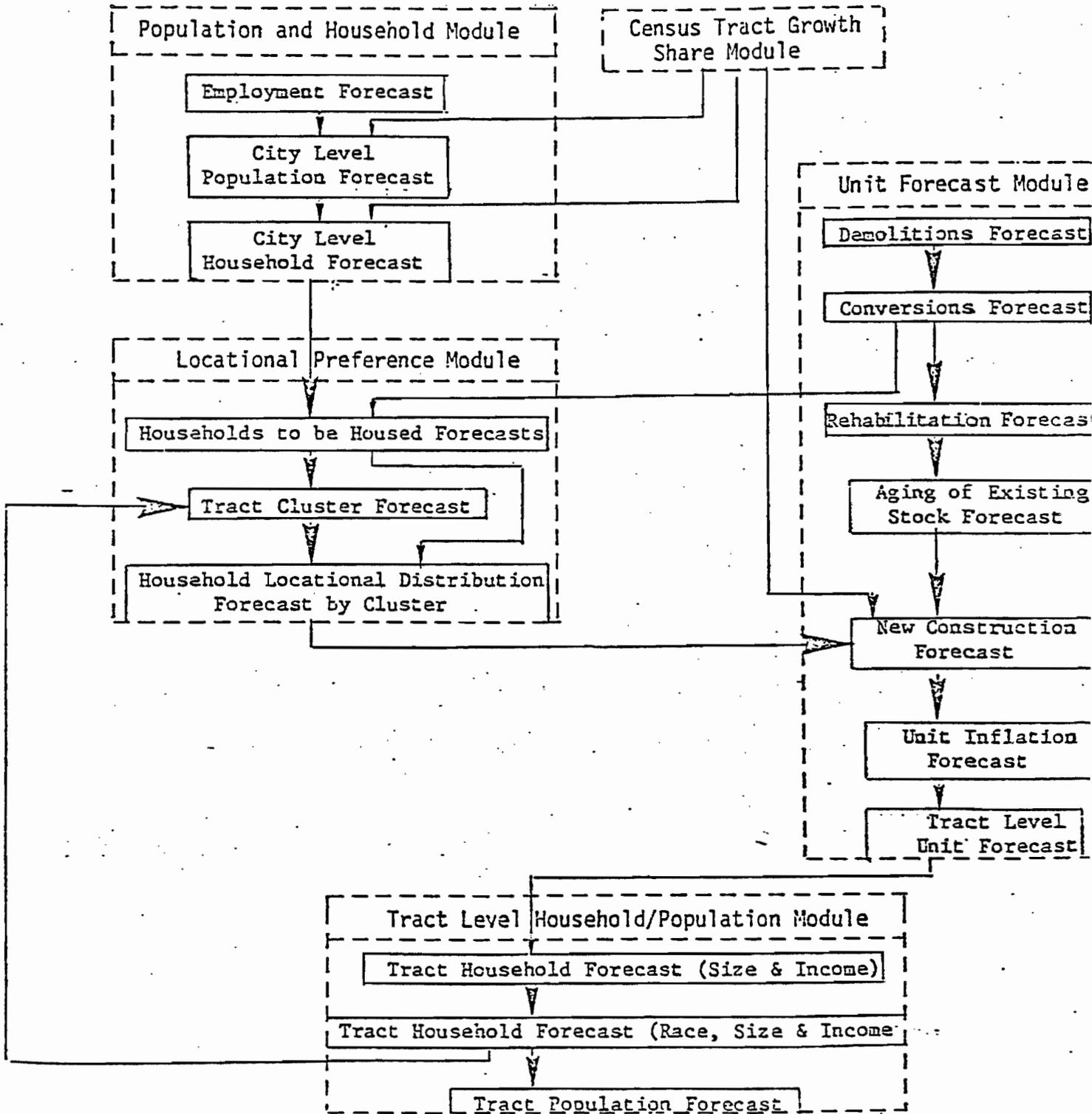
The tract level household forecast created in this module is a disaggregated forecast; that is, an estimate of households initially disaggregated by size and income. By contrast, the growth share allocation routine allocates numbers of households without specifying their characteristics.

The tract level households are further disaggregated by race. The tract level count of households (by size and income created from the unit forecast) are first distributed by race using the preceding period race distribution. Then, the City level household forecast created in the population/household module is compared with the City sum of the tract level households by race developed in this module. To the extent that any one race is understated in the tract level forecast a reallocation is performed to achieve conformance between the two household forecasts.

The reallocation is performed through use of transition tracts. Those tracts which are predominantly Anglo, but likely to exhibit a trend toward increasing minority residency are specially designated and are used to modify the tract level race distributions. The race allocation process is based upon an assumption that preceding period race distributions will not adequately reflect moving patterns or changes in race distributions based upon differing birth and death rates among population groups. Thus, City staff for each time period establish assumptions about what percent of the minority increase should be allocated to the specially designed tracts and what percent will be allocated to remaining tracts in the City. A tract ceases to be specially designated whenever the percentage of minority households in the tract is equal to or exceeds the percent minority for the City as a whole.

To derive the tract population, average person per household assumptions are developed as a function of race. These assumptions will be City wide and allowed to vary period by period. They are consistently applied to tract level household forecasts by race. The result is a tract level population forecast by race.

EXHIBIT ONE
HOUSING CALCULATION TOOL MODULES
FOR GROWTH OPTION GENERATION



The specific calculation steps used by the methodology are summarized in Exhibit 2. Given the considerable complexity of the methodology brought on by the number of calculation steps and the level of detail required of the various forecasts, computerization is required. The calculation steps shown in Exhibit 2 have been developed into a series of computer programs. Using assumptions supplied by the City the computer programs perform the calculations and put on file the resultant forecasts. Report generation routines exist which can be used to produce reports on population, households, or units at various levels of geographic detail.

Even though the level of data manipulation is quite high, the computer system has been designed to run on a minicomputer, an IBM 5110 computer with floppy disks, and a 64,000 byte processor. A complete five year run for all modules can be completed in eight hours. This is an acceptable run period; thus, precluding the need for access to a large, mainframe computer.

User procedures exist for creating, altering, or selecting assumptions for any module, for any time period. Standardization report formats have been designed as well as assumptions documentation routines for auditing the assumptions used to generate any given forecast, for any period, for any module.

For purposes of this contract the City envisions expressing two growth options using the computerized routines. These options are:

- Trends Option, using assumptions relating to changes in population, households, units, land use, and employment based upon prevailing trends. This option generally will tend to allocate growth into outlying areas, creating a pattern of continuing sprawl.
- Inner City Growth Option, which will reflect possible private sector actions and public programs which contribute to increased concentration of development in inner city areas.

Based upon the experience developing these two growth scenarios utilizing the growth planning calculation routines, modifications will be made to the methodology as required. Consideration will then be given to using the methodology to express other options, such as a multi-modal development option, corridor development option, and possibly an "energy crisis" option.

The evaluation portion of the methodology will be conducted as two separate and relatively independent assessments--impact on the housing market and requirements for City services. The evaluation methodology pertaining to requirements for City services will be principally tied to tract-level population and units counts. Using generally accepted standards or performance criteria for specific services and improvements, City staff will develop assumptions relating to service levels and unit cost estimates for services and improvements. These will be used to create cost and level of provision estimates for the City by period by option. This methodology will be described as part of a separate project report.

The evaluation of the impact of growth options on the housing market will use the same methodology being used by the City to estimate needs for assisted housing in the Housing Assistance Plan. Household forecasts and unit forecasts for a given period will be matched by characteristics to determine the relative ability of the housing stock to accommodate forecast households without violating an operational definition of ill-housed (i.e., living in substandard unit, overcrowded unit, or paying rent in excess of a defined percent of income). Those households who cannot be accommodated by the stock without violating these criteria will be considered to be ill-housed. Growth options will be compared to determine relative performance of the options in suitably accommodating the forecast households. This methodology is more extensively described in a separate project report outlining the use of the evaluation methodology for housing assistance needs estimation in Housing Assistance Plan preparation.

EXHIBIT 2
GROWTH OPTION GENERATION METHODOLOGY

Study Area Population/Household Module

1. Develop a place of work employment force forecast for all projection periods.
2. Develop a conversion ratio from place of work to place of residence employment.
3. Apply the conversion ratio to the work place employment forecast to obtain resident employment.
4. Define unemployment/employment rate assumptions for all periods.
5. Apply unemployment rates to resident jobs to determine total civilian labor force for the County.
6. Define labor force participation rates.
7. Apply the labor force participation rates to the civilian labor force to derive a total County population forecast 16-and-over.
8. Develop the under 16 population ratio (from national census projections applied to local base).
9. Apply the under 16 population ratios to derive a forecast of total County population.
10. Evaluate the population projection for accuracy.
11. Develop a ratio of the study area's population to the County total population for each time period.
12. Apply the appropriate ratio to the County population total to generate the study area population projection.
13. Obtain population distributions by race, age, and sex for each five year period.
14. Apply the population distribution assumption to population projections for the study area.
15. Develop birth and death rates for use in development of a net natural increase population.
16. Develop a net natural increase forecast based upon the preceding period forecast and the specified birth/death rate assumptions.
17. Develop an in-migration population projection from the net natural and total projections.

18. Develop household control count for the same period related to the population projections.
19. Develop assumptions about household characteristics such as household size and income distributions.
20. Apply assumptions to household control projections to create a household forecast disaggregated by the characteristics specified above.
21. Develop household formation assumptions.
22. Develop net natural household projection disaggregated by specified characteristics.
23. Develop a net migration household forecast disaggregated by specified characteristics.

Location Preference Model

24. Develop a count of previous period housing units surviving demolition and conversion during the current period.
(Performed as part of the Unit Forecast Module.)
25. Develop an assumption which can be applied to an estimate of housing units to derive an estimate of the related characteristics of households living in the units.
26. Apply the assumption to the estimate of surviving units (Step 24) to obtain an estimate of households already housed (i.e., surviving households).
27. Subtract surviving households by characteristics (from 26) from total households by characteristics (Step 20) to obtain an estimate of households to be housed (i.e., newly created households, displaced, and net immigrant households).
28. Develop an assumption as to residential density preferences of households as a function of other household characteristics on a total tracts basis.
29. Apply the assumption to the estimate of total households to be housed (Step 27) to yield a count of total households to be housed by characteristics including residential density preference.
30. Apply tract cluster designations generated from the preceding period to the Step 29 result to obtain a distribution of households to be housed among the clusters.

Unit Forecast Module

31. Develop a count of previous period housing units surviving demolition.
32. Develop a count of units surviving demolition which also survive conversion to a non-residential use.
33. Develop an assumption as to the level of rehabilitation expected to occur during the five year period.
34. Apply the rehabilitation assumption to the stock to derive a redistribution of housing units by housing condition and value.
35. Age all surviving units five years.
36. Develop assumptions as to new unit characteristics by tract cluster.
37. Apply the assumption to the total new units added by clusters as estimated in the Growth Share Module to obtain a count of total new units by type for each cluster.
38. Develop new unit assumptions for each tract to allocate new units by type from clusters to tracts.
39. Apply the tract level assumption to the Step 37 estimate to obtain an estimate of new units by type for each tract.
40. Add the new unit counts to the count of surviving units by tract to obtain a total unit count.
41. Develop estimates of unit value/rent inflation.
42. Apply the inflation assumptions to the unit forecasts to create a redistribution of units by value/rent.
43. Develop vacancy rate assumptions by unit type.
44. Apply the vacancy rate assumptions to obtain a forecast of occupied units.

Tract Level Household/Population Module

45. Apply the assumption developed in Step 25 to the Step 42 unit forecast to obtain a forecast of tract level households by characteristics (size, income, tenure).
46. Apply the preceding period's household ethnicity distribution for each tract to obtain a tract level households forecast by characteristic including ethnicity.
47. Sum resultant tract level ethnic counts for all tracts from Step 46 to obtain a total tract ethnic distribution.

48. Compare the Step 47 distribution to the same distribution in the Step 20 total tracts household forecast to determine relative consistency of the tract level distribution in the tract level forecast and the need for adjustment of the racial distributions at the tract level (i.e., which races were underestimated).
49. Define a list of transition tracts to receive a proportion of the reallocated households by ethnicity, using a fixed number of tracts to start and allowing tracts to become non-transition when ethnicity composition exceeds the city ethnic proportion.
50. Define as an assumption the proportion of residual households by ethnicity to be allocated to all non-transition tracts.
52. Allocate the assigned proportion of residual households to the non-transition tracts on a proportional basis (using the ethnicity distribution of the tracts as a basis for comparison).
53. Apply the transition tract proportion defined in Step 50 to the Step 48 result to determine the number of residual households by ethnicity to be allocated to the transition tracts.
54. Distribute resultant Step 53 households to transition tracts based on preceding period ratios of households by ethnicity for each transition tract to the total transition tracts.
55. Develop an average persons per household assumption by ethnicity.
56. Apply the assumption to the tract level household forecasts to obtain population by race for each tract.

Tract Cluster Forecast (Portion of Locational Preference Module)

57. Determine tract density for the period using the growth share module output.
58. Determine the median household income for each tract.
59. Define the prevailing household size and prevailing ethnic distribution for each tract.
60. Using the density class assignments, and household size, race and income assignments created in Steps 57, 58, and 59 create tract clusters of like characteristics.
61. Calculate the proportion of each cluster's household to the total City households by type and density preference.

IV. USER PROCEDURES FOR OPERATION OF THE HOUSING TOOL

A. Use of the Tool on a Computer System -- The Housing Calculation Tool has been developed as a set of computer programs designed to be run on an IBM 5110 mini-computer. All input, forecasting, and reporting programs are written in an IBM version of a programming language called APL. It is theoretically possible for the Housing Tool to be run on other machines or in another language; however, conversion to another machine would require considerable cost. Conversion to another language is even less practical. APL was selected as a programming language principally because of its ability to easily handle data arrays of several dimensions. The features of APL and the IBM 5110 are outlined below.

APL is a relatively new language. "APL is a language for describing procedures in the processing of information. It can be used to describe mathematical procedures having nothing to do with computers, or to describe (to a human being) how a computer works. Most commonly, however, at least at this time, it is used for programming in the ordinary sense of directing a computer how to process numeric or alphabetic data."¹

"The language was invented by Kenneth E. Iverson while at Harvard, and was described in a 1962 Wiley book appropriately titled A Programming Language."² Time sharing is the process whereby many users access a computer simultaneously. "A number of universities and at least one public school system (Atlanta) are using APL on a wide scale for student instruction, and several universities and computer manufacturers are currently producing implementations for various computers. APL is clearly gaining acceptance at this time as a computer programming language."³

The IBM 5110 is a mini-computer introduced by IBM in 1978 and designed to support a wide variety of commercial and problem-solving applications. It is designed to be an interactive machine; the user, through a keyboard, can enter programs, test programs, enter data, and create files or generate reports. Data are stored on diskettes with up to 4.8 megabytes of capacity, and the machine can be programmed in either APL or BASIC. A printer and console screen can be used for production of report outputs. The processor can be configured from a 16,000 byte capacity to a 64,000 byte capacity.

The specific machine configuration used for the Housing Calculation Tool operation is a 64,000 byte processor, supporting APL as the programming language, a dual diskette drive with up to 2.4 megabytes in storage capacity, and sort feature; plus a 120 character per second printer.

As configured, the 5110 is a self-standing computer capable of supporting the Housing Calculation Tool plus a wide variety of other applications the user may require such as other forecasting models, information systems, accounting systems, payroll, and the like. It is also possible for the computer to be used as a terminal or input device to a larger machine. The

¹From APL - An Interactive Approach (Wiley, 1976), used with permission of the authors.

²Ibid.

³Ibid.

Housing Calculation Tool is designed to operate on the 5110 operating as a self-standing system. For more technical specifications see Appendix I to this Manual.

B. Use of the IBM 5110 Computer — Satisfactory operation of the Housing Calculation Tool on the IBM 5110 can occur only if the IBM 5110 is configured as outlined in the previous subsection. The processor, printer, and disk drive must all be operational and the user should also have a supply of floppy disks which are two-sided, double density (2D) and initialized at 512 bytes per sector. As a general guide, it is wise to have at least 50 diskettes to initiate operations.

Operators should become familiar with the IBM 5110 keyboard, use of the disk drive and printer before attempting to run the Housing Calculation Tool. The hardware manufacturer typically provides this training at no cost. It is not necessary for the user to know APL or how the machine works internally in order to run the Housing Calculation Tool. All routines are supported by various prompts which appear on the screen identifying either the next step, what diskette is to be placed in the drive, when to turn on the printer, and the like.

1. Starting the System*

The IBM 5110 is started by a simple on/off switch. No codes or other security devices are required to turn on the system. Be sure the disk drive is on and if printing will be required, the printer as well. For running the Housing Tool, also check to be sure the APL switch is on.

Once the system is switched on, the system will perform a series of internal checks on the machine performance. As this occurs, a series of rapidly changing numbers will appear in the upper left-hand corner of the screen. When complete, a message called CLEAR WS will appear on the screen. Attempt no entry until this message is received.

There is also a restart switch. This switch restarts the system operation. When it is pressed, the system performs internal checks and becomes ready in 15 to 20 seconds. The message CLEAR WS is displayed when the system is ready. If the system does not display the message after 20 seconds, press RESTART again. If the system does not become ready after several attempts, call your service representative.

The primary uses of this switch are to restart the system operation after a system malfunction has occurred and to change the language in operation on dual-language machines.

*The remainder of this section draws from the IBM 5110 APL Reference/APL User's Guide. Consult this manual for a more extensive description of how the computer is operated.

2. Display Screen Control

The following switches are used to control how the information on the display screen is displayed.

a. L32 64 R32

The three-position switch (positions 64, L32, and R32) operates as follows:

- 64 - Characters are displayed in adjacent positions, and up to 64 characters can be shown on each line.
- L32 - Characters are displayed in alternate positions (blanks between); only the left 32 characters of the 64-character lines are shown.
- R32 - Characters are displayed in alternate positions (blanks between); only the right 32 characters of the 64-character lines are shown.

b. Reverse Display

This switch determines whether the display screen will display light characters on a dark background or dark characters on a light background. The brightness control may have to be adjusted when the switch setting is changed.

c. Display Registers

This switch is for the service representative's use when servicing the 5110. When you use your 5110, this switch must be in the NORMAL position.

3. Use of the Keyboard

The 5110 keyboard (Figure 3) has alphameric keys. The alphameric keys are grouped together and are similar to those on a typewriter keyboard. When the keys are pressed, the characters being entered appear in the input line (one of the bottom two lines) on the display screen. The top row of alphameric keys can be used to enter numbers; however, numbers can be conveniently entered via the numeric keys on the right side of the keyboard. The arithmetic symbols located on the top row of the alphameric keyboard can also be entered via keys to the right of the numeric keys.

When the system power is first turned on, the system is in standard APL character mode. In standard APL character mode, you can enter uppercase alphabetic characters (without using the shift key), the APL symbols (using the shift key), and the APL system command keyword (above the top row of numeric keys) and special character combinations (engraved on the front of the keys) using the CMD key.

NOTE: For combined APL/BASIC systems, there is also a BASIC statement keyword engraved on the alphabetic keys. The BASIC statement keywords are above the special APL character combinations on the keys.

3. Use of Specific Keys

The keyboard contains some keys that perform operations other than those performed by a typewriter.

a. Attention Key

Pressing ATTN (attention) when entering information from the keyboard erases everything from the cursor to the end of line 0.

Pressing ATTN when entering information using shared variables to the display screen erases everything from the cursor position to the end of the specified input area.

When ATTN is pressed (weak interrupt) during execution of any expression or user-defined function, the system stops operation at the end of the statement currently being processed. To restart the execution of a user-defined function, enter $\rightarrow \square LC$.

Output that was being generated before the system operation stopped may not be displayed because there is a delay between the execution of the statement that causes the output and the actual display of the output.

When the shift key is held and ATTN is pressed (strong interrupt) during the execution of a statement (either inside or outside a user-defined function), the execution of that statement stops as soon as possible. Also, the message INTERRUPT, the statement, and a caret (>) that indicates where the statement was interrupted are displayed. In this case, the intermediate results might be lost, and restarting the function using $\rightarrow \square LC$ might give incorrect results.

b. Hold Key

When pressed once, HOLD causes all processing to stop; when pressed again, it allows processing to resume. The primary purpose of HOLD is to permit reading rapidly changing display information during an output operation or to change from one character mode (standard APL or lowercase alphabetic) to the other character mode.

c. Execute Key

When this key is pressed, the input line(s) of information on the display screen is processed by the system. This key must be pressed for any input to be processed.

d. Command Key

In standard APL character mode, when this key is pressed and held, pressing an alphameric key in the top row causes the APL command keyword or character above that key to be entered in the input line. Also, pressing the other key causes the special character combination engraved on the front of the key to be entered in the input line.

e. Positioning the Cursor and Information on the Display Screen

The following keys are used to position the cursor and information on the display screen.

(1) Forward Space Key

When this key is pressed once, the cursor moves one position to the right. When this key is held down, the cursor continues to move to the right. When the cursor reaches the last position on one input line (line 1 or 0), it wraps around to the first position on the other input line.

When the CMD key is held down and the forward space key is pressed once, the characters at and to the right of the cursor position (flashing character) are moved to the right one position, and a blank character is inserted at the cursor position. The cursor does not move. For example:

Flashing Character
↓
Before the insert operation: 1234567

After the insert operation: 123_4567

When these data keys are both held down, the characters continue to move to the right and blank characters continue to be inserted.

(2) Backspace Key

When this key is pressed once, the cursor moves one position to the left. When it is held down, the cursor continues to move to the left. When the cursor reaches position 1 on one input line (line 1 or 0), it wraps around to the last position on the other input line.

(3) Delete Key

When the CMD key is held down and the backspace key is pressed once, the character at the cursor position

(flashing character) is deleted and all characters to the right are moved over one position to the left to close up the space. The cursor is not moved. For example:

Flashing Character
↓

Before the delete operation: 1234456

After the delete operation: 123456

When these keys are both held down, the characters at the cursor position continue to be deleted and all the characters to the right are moved to the left.

(4) Scroll Up Key

When this key (located above the numeric keys) is pressed once, each displayed line is moved up to the next line. As the lines are moved up, the top line is lost as it is moved off the display screen. When this key is held down, the lines continue to move up.

When you are doing input/output operations to the display screen using an APL shared variable, the cursor is moved up one line when this key is pressed. When this key is held down, the cursor continues to move up until the top line is reached.

When the system is in the hold state (the HOLD key has been pressed once), holding down the shift key and pressing this key cause the system to be in standard APL character mode.

(5) Scroll Down Key

When this key (located above the numeric keys) is pressed once, each displayed line is moved to the next lower line. As the lines are moved down, the bottom line is lost as it is moved off the display screen. When this key is held down, the lines continue to move down.

When you are doing input/output operations to the display screen using an APL shared variable, the cursor is moved down one line when this key is pressed. When this key is held down, the cursor continues to move down until the bottom line is reached.

When the system is in a hold state (the HOLD key has been pressed down once), holding down the shift and pressing this key causes the system to be in lowercase alphabetic character mode.

(6) Copy Display Key

When the CMD key is held down and this key is pressed once, all the information presently on the display screen is printed. COPY DISPLAY is operational even when the system is in the hold state (the HOLD key has been pressed once).

f. Indicator Lights

The 5110 has two indicator lights.

(1) Process Check

When on, the PROCESS CHECK light indicates that a system malfunction has occurred. When the Housing Tool is being used, do not attempt to restart the system or any other operation. Do not turn the machine off. Call IBM immediately.

(2) In Process

The IN PROCESS light is on when the system is processing data and the display screen is turned off during the execution of a user-defined function.

4. Workspaces and Files

Programs used for running the Housing and Population Tool are stored in workspaces. The data used by the program is stored in files. Both workspaces and files have names such as *REPORTS* and *ASSUMPTIONS*, but the similarity stops there. As noted above, there is a difference in what is stored in each of the two types of storage areas. The user of the Housing and Calculation Tool is not concerned with files as far as running forecasts is concerned. In other words, only programs have to be chosen and thus the workspace in which those programs reside; files do not need to be referenced by their name as workspaces do. Files are used automatically by the programs in the workspaces.

If, for example, the user wanted to print a report out on the results of a certain forecast, the user would enter:

```
)LOAD REPORTS
```

The user would now invoke the programs within the *REPORTS* workspace to print out the required reports. All the files necessary for this will be accessed automatically by the programs.

5. A Note on Examples Used in This Manual

During the course of explaining how to use the programs in the various workspaces, it will be necessary at some points to list out the options which can be used when running the programs. Sometimes

this will involve a list of names and numbers, enclosed within brackets, which you can choose from, such as:

[*CITY*
NAT CITY
INM CITY]

At other times, the list of possible choices of a certain type are so lengthy or repetitious that listing them would be impossible. In this case, the "name" of the choice will appear in lower case, underlined. For example, there are six possible time periods that can be chosen in the Housing Calculation Tool: 1975, 1980, 1985, 1990, 1995, and 2000. Instead of listing these numbers out every time a choice of time period was to be shown in an example, the word period would appear. For example:

PERIOD period

This example shows that the PERIOD program requires one of the six possible time periods as an argument.

- *TRACT DENSITIES*

The persons household per acre estimates for each tract by each time period.

2. Variable Assumptions

Variable assumptions are the mechanisms by which the user operates the housing calculation tool. Assumptions can be used to express policy/program initiatives likely to be taken by the City. Changing demographic characteristics can be expressed through altered population and household assumptions. Behavior of developers/builders can be expressed through various unit assumptions. Therefore, the procedures for setting assumptions are crucial to effective use of the model. The types of variable assumptions are summarized below:

a. Employment and Population Assumptions -- Whenever the user is developing a population forecast, based upon employment forecasts for the Houston area, the following assumptions must be made for each five-year period forecast to be run:

- Number of Harris County jobs
- Percent of total jobs held by Harris County residents
- Unemployment rate
- Labor force participation rates
- Ratio of 16 and over population to 15 and under population
- Distributions of population by sex and race (a 3X2 array)

The assumptions are entered by loading the *PREPOP* workspace. The program in *PREPOP* called *STEP1*, when run, requests the assumptions to be entered. They are not kept in files after being used; thus a record of these assumptions should be kept as part of the population forecast documentation.

Whenever population forecasts are needed which estimate the net natural increase from a preceding period population forecast and an estimate of net immigration, several additional assumptions must be utilized. They are created, modified, and deleted in the *POPASS* workspace. These assumptions are:

- BIRTH -- An assumption defining the percent of mothers by race and age cohort expecting to have a male child and the percent expected to have a female child during the forecast period.

- DEATH -- The percent of any age, race, sex cohort likely to die in a five-year period.
 - IPOP -- An estimate of the net immigrants to the study area for the five-year period, by age, race, and sex cohort.
- b. Household Assumptions -- Whenever the user has run an employment-based population forecast and desires to develop a related household forecast, the *PREPOP* workspace should be used. Execute the *STEP2* function. You will be preempted for the following assumptions:

- Population Forecast -- The population forecast set number to be used as the basis for the household forecast.
- Number of Households -- The number of households to be used as a control total for the forecast.

You will then be asked to run a household forecast based on the expected increase in the preceding period household forecast. This will be followed by a request to run *STEP3* in the *PREPOP* workspace. Development of the household forecast will entail use of the *HHASS* workspace to create, modify, replace, or delete the following assumptions:

- HEADSHIP -- The percent of each population cohort likely to be head of household.
- HHSIZE -- Household size distribution
- HHINC NAT -- Household income distributions for base households
- HHINC IMM -- Household income distribution for immigrants
- INCINFL -- Five-year income inflation rate by income class

- c. Unit Assumptions -- The assumptions used to forecast future period housing stock are found in the *UNITASS* workspace. The assumptions which must be set include:

- ODEMO -- Percent of owner units surviving demolition and fire loss
- RDEMO -- Percent of rental units surviving demolition and fire loss
- OREHAS -- The count of owner units to be rehabilitated by tract

- *RREHAB* -- The count of renter units to be rehabilitated by tract.
- *OCNV* -- Percent of owner units by value class in each cluster surviving conversion
- *RCONV* -- Percent of renter units by rent class in each cluster surviving conversion
- *OTCONST* -- Owner unit tract construction counts
- *RTCONST* -- Rental unit tract construction counts
- *OCCONST* -- Owner unit cluster construction counts
- *RCCONST* -- Rental units cluster construction counts
- *VALINFL* -- Five-year value inflation rate
- *RENTINFL* -- Five-year rent inflation rate
- *OSUIT* -- Percent of owner units in suitable condition
- *RSUIT* -- Percent of rental units in suitable condition
- *OVAC* -- Percent of occupied owner units
- *RVAC* -- Percent of occupied rental units

C. Assumption Setting Procedures

At any one time you may have up to six versions, or sets, of each type of variable assumption. For example, the City may want to test some policy options on new construction within the City. They may have four sets of counts of new construction, which originated from four sources of data used for this purpose. These four sets of counts can be separately entered. All four would fall under the same assumption name (*OCCONST*, for example), but each would have its own unique assumption set number. When the City wants to run a Unit Forecast, it would have to specify which *OCCONST* set it wanted to use.

Even if you have only one set of a particular assumption, it must still be referenced by an assumption set number. Assumption set numbers are unique within each type of assumption, not between them. Every time a new assumption set is created for a certain assumption, a new assumption set number is assigned to it which is one greater than the number assigned to the last assumption set created for that assumption.

The following operations may be performed on all of the variable assumptions:

SHOW assumptionname assumptionsetnumber

The *SHOW* operation, on a specified set for a specified type of assumption, prints out the assumption sets.

CREATE assumptionname NEW

The *CREATE NEW* operation allows creation of a completely new assumption set for the specified assumption.

CREATE assumptionname FROM assumptionsetnumber

The *CREATE FROM* operation allows a currently existing assumption set to be modified, and a completely new assumption set to be created out of the modified old assumption set. The old assumption set remains as it was.

REPLACE assumptionname assumptionsetnumber

The *REPLACE* operation, on a specified set for a specified type of assumption, works exactly like the *CREATE NEW* operation, except that the specified old assumption set is replaced with the newly created assumption set.

MODIFY assumptionname assumptionsetnumber

The *MODIFY* operation, on a specified set for a specified type of assumption, works exactly like the *CREATE FROM* operation, except that the specified old assumption set is replaced with the modified old assumption set.

DELETE assumptionname assumptionsetnumber

The *DELETE* operation, on a specified set for a specified type of assumption, deletes that assumption set from the system.

A more detailed explanation of how these six operations are used starts below:

1. The *SHOW* Operation

Here is an example of how the *SHOW* operation would be used:

```
SHOW OCCONST 3  
ALIGN PAPER:
```

After entering the command, the computer requested that the paper be aligned. Roll the paper down by hand until the small plastic guide on the printer is on the paper crease. Then press execute.

Some of the assumption printouts are multi-page; the printer handles pagination automatically.

2. The CREATE NEW Operation

Here is an example of how the *CREATE NEW* operation would be used:

```
CREATE CCONST NEW  
[request for input]
```

All assumptions consist of numbers of one type or another. Each separate type of assumption (and all sets within each) is composed of only one type of number. These types are as follows:

Count	As in Net Immigrant Population Count. These can be any non-negative integer, i.e., 0, 5, 109.
Rate	As in Five-Year Birth Rate. These can be any non-negative number, i.e., 0, 0.87, 1.25, 2, 2.3.
Distribution	As in Household Size Distribution. These can be any number between zero and one inclusive. However, as the name implies, the sum of a certain set of numbers must equal one. In <i>HHSIZE</i> , for example, for a given household size, the sum of the percents of households preferring units by specific size class must equal one.
Percent	As in Percent of Owner Units Surviving Demolition and Fire Loss. These can be any number between zero and one inclusive. <u>Please note that percent assumptions entered in the REALLOC workspace require integer entries.</u>

After entering in the command to create a new assumption, the computer will request the data for the new assumption. What is asked for depends on the assumption being worked with.

For example, in the use of the death assumption, the rates for all age, race, and sex cohorts are requested. This would entail 84 data entries, so be careful which assumptions you choose; it can get tiring!

When data entry is complete, the program prints out the new assumptions' set number.

3. The CREATE FROM and MODIFY Operations

The *CREATE FROM* and *MODIFY* operations are similar in that they start with a previously entered assumption set and allow modification on it. However, the difference is in what is done with the result of the modification. *CREATE FROM* creates a completely new assumption out of the modified old assumption; *MODIFY* replaces the specified older assumption set with the newly created assumption set.

The reason for using *CREATE FROM* and *MODIFY* as opposed to *CREATE NEW* and *REPLACE* is that the user does not have to go through the long process of entering a completely new assumption set. The user only has to modify those parts of an already existing assumption set which need to be changed. Then the user can either replace the old assumption set with the modified one, or leave the old one and create a new one.

What is asked depends on the assumption being worked with. More complicated assumptions require more complicated prompts to determine what segment of the assumption to modify. After identifying what you want to change, you will be asked for the new data. After entering this, you are asked again to identify what other part of the assumption to change. This process is repeated until you simply press return without entering anything. The program will then take the modified assumption and file it away according to the command you gave. You will be told what the new assumption set number is if you used the *CREATE FROM* operation. If you used the *MODIFY* operation, you will be told that the old assumption set has been deleted, and the assumption set number of the new assumption that took its place.

There may be as many as four prompts required to determine what portion of an assumption you want to modify, for some assumptions. An example would be the Household Income Distribution (*HHINCINAT* and *HHINCINM*) assumptions, which request identification of the race, sex, age, and household size group to modify.

There are a total of 12 different prompts which request identification of the segment of the assumption to modify, for the variable assumptions. Following is an explanation of the possible responses to those prompts:

AGE: Enter a number from 1 to 14
identifying one of the 14 age

groups.

RACE: Enter the single letter W, B, or S, which stand for White, Black, or Spanish American.

SEX: Enter the single letter M or F.

NON-ELDERLY OR ELDERLY: Enter the single letter N or E.

HOUSEHOLD SIZE: Enter a number from 1 to 6 identifying one of the six household size groups.

INCOME: Enter a number from 1 to 8 identifying one of the eight household income groups.

TRACT NO: Enter one of the 196 tract numbers.

RENT: Enter a number from 1 to 8 identifying one of the eight unit rent groups.

UNIT AGE: Enter a number from 1 to 7 identifying one of the seven unit age groups.

UNIT SIZE: Enter a number from 1 to 5 identifying one of the five unit size groups.

VALUE: Enter a number from 1 to 7 identifying one of the seven unit value groups.

4. The REPLACE Operation

The *REPLACE* option works exactly like the *CREATE NEW* operation, except that the old assumption set is replaced as with the *MODIFY* operation. Here is an example of how to enter a *REPLACE* command.

REPLACE BIRTH 4

5. The DELETE Operation

Upon entry of this command you will be informed that the requested assumption set has been deleted. This command is irreversible; use it carefully. Here is an example of how to *DELETE* an assumption set for a particular assumption:

DELETE BIRTH 2
SET 2 DELETED

6. List of Variable Assumptions in the System

The *CURRENTASS* program prints out a list of all variable assumptions that are available in the system. It gives the assumption name and all referenceable assumption set numbers available for each assumption. An example appears on the next page.

7. A Note on Assumption Set Numbering

Each time a new assumption set number is assigned for a given assumption, it is one higher than the highest number previously assigned for that assumption. For example, if assumption set two is created for *OTCONST*, the next time an *OTCONST* set is created the set number will be three. Even if set two is deleted before another set is created, the next set number will still be three.

The exception to the rules is assumption set one, for all assumptions. Assumption set one cannot be deleted with the *DELETE* operation. In addition, set number one is not reassigned when *REPLACING* or *MODIFYING* assumption set one for any assumption. It retains its identifying number 1. The reason for this is that assumption set one is used as the "default" assumption set when specifying assumption sets for use in forecasts. This will be explained in greater detail.

8. Error Messages

A number of error messages may result from invalid entries made in the programs in the *ASSUMPTIONS* workspace. The page after next is a list of these messages, and their meaning. All error messages are preceded by three stars. If the error message occurred after you answered a prompt within one of the programs, you are re-prompted.

Assumptions
 Sep 27, 1979 10:00

IPOP	1	2				
BIRTH	1	2	3	4		
DEATH	1					
HEADSHIP	1					
HHSIZE	1	2				
HHINCINM	1					
HHINCINM	1					
INCINFL	1	3	4	5	6	
TENPREF	1					
USIZEPREF	1					
VALUEPREF	1					
RENTPREF	1					
VALINFL	1	2				
ODEMO	1	2	3			
RDEMO	1	2	3			
OTCONST	1	2	3	4	5	
RTCONST	1	2	3	4	5	
OCCONST	1	2	3	4	5	
RCCONST	1	2	3	4	5	
VALINFL	1	2				
RENTINFL	1	7				
OSUIT	1	2	3			
RSUIT	1	2	3			
OVAC	1	2	3	4		
RVAC	1	2	4			
OCONV	1	2	3	4		
RCONV	1	2	3	4		
CLUSTERS	1	2	3	4	5	7
OREHAB	1					
RREHAB	1					

*** SET n NOT FOUND

There is no assumption set number n for the assumption you specified.

*** 6 SETS ALREADY IN EXISTENCE

Six sets of the assumption you specified have already been created. You can delete one of the six existing sets if you wish, and then re-enter the *CREATE NEW* or *CREATE FROM* command.

*** assumptionname ASSUMPTION SET 1 CANNOT BE DELETED

[see the section 2g, A Note on Assumption Set Numbering]

*** n ELEMENT DISTRIBUTION PLEASE

A distribution consisting of n elements, whose sum is one, is required.

*** n NON-NEGATIVE INTEGERS PLEASE

*** n RATES PLEASE

*** n PERCENTS PLEASE

Enter n numbers of the proper type (see section 2b, The CREATE NEW Operation).

If you encounter any of the following errors, it will be the result of responding incorrectly to one of the prompts shown in section 2c, The CREATE FROM and MODIFY Operations. Consult this section when any of these errors occur:

- *** 1 THRU 14
- *** N OR E
- *** 1 THRU 19
- *** 1 THRU 6
- *** 1 THRU 8
- *** W, B, OR S
- *** NOT A TRACT
- *** M OR F
- *** 1 THRU 7
- *** 1 THRU 5

3. Program to Cross-Check Construction Assumptions

The tract and cluster level construction count assumptions are related in that the sum of the counts in all tracts in a particular cluster, contained in the tract level assumption, should be equal to the sum of the counts for a particular cluster in the cluster level assumption.

The *CHECKCON* program prints out a report which allows comparison of the two types of assumptions. The counts for owner units should be equal between the owner tract and cluster level assumptions; the counts for rental units should be equal between the rental tract and cluster level assumptions.

Should the counts differ, the assumptions should be modified so the counts do equal each other; a recheck of the source data that went into making the assumptions in the first place should also be checked.

To use the program, enter *CHECKCON*. You will be asked for the assumption set numbers for the owner and rental tract and cluster level assumptions you wish to compare. After entering these four numbers, the program will print out the count comparisons.

C. Example

On the next few pages are example of the use of the programs in the various *ASSUMPTION* workspaces.

LOAD POFASS

CREATE IPOCP NEW

*** 6 SETS ALREADY IN EXISTANCE

REPLACE IPOCP 6

DATA FOR WHITE MALES (ALL AGES): 103 92 14 300 64 201 99 55 450 30 110 334 93 30

DATA FOR BLACK MALES (ALL AGES): 34 128 99

*** 14 NON-NEGATIVE INTEGERS PLEASE

DATA FOR BLACK MALES (ALL AGES): 34 128 99 180 32 140 45 12 290 10 60 240 30 12

DATA FOR SPANISH AMERICAN MALES (ALL AGES): 10 20 30 40 50 60 70 80 90 100 110 120 130

DATA FOR WHITE FEMALES (ALL AGES): 1 2 3 4 5 6 7 8 9 10 11 12 13 14

DATA FOR BLACK FEMALES (ALL AGES): 15 16 17 18 19 20 21 22 23 24 25 26 27 28

DATA FOR SPANISH AMERICAN FEMALES (ALL AGES): 14 13 12 11 10 9 8 7 6 5 4 3 2 1

IPOCP ASSUMPTION 6 DELETED * IPOCP ASSUMPTION 7 CREATED

DELETE IPOCP 7

*** ASSUMPTION SETS FOR THIS ASSUMPTION CANNOT BE DELETED

MODIFY IPOCP 7

RACE: B

SEX: M

AGE: ABOUT 32

*** 1 THRU 14

AGE: 7

DATA: 123

RACE: B

SEX: F

AGE: 10

DATA: 91

RACE:

IPOCP ASSUMPTION 7 DELETED * IPOCP ASSUMPTION 8 CREATED

SHOW IPOCP 7

*** SET 7 NOT FOUND

SHOW IPOCP 8

ALIGN PAPER:

CITY OF HOUSTON - OFFICE OF THE MAYOR
HOUSING AND POPULATION DATA

NET IMMIGRANT POPULATION COUNT ASSUMPTION 8
MAR 2, 1977 10.58

	<u>AGE</u>	<u>WHITE</u>	<u>BLACK</u>	<u>SP-AMER</u>	<u>TOTAL</u>
<u>MALE</u>	0-4	103	34	10	147
	5-9	92	128	20	240
	10-14	14	99	30	143
	15-19	300	180	40	520
	20-24	64	32	50	146
	25-29	201	140	60	401
	30-34	99	123	70	292
	35-39	55	12	80	147
	40-44	450	290	90	830
	45-49	30	91	100	221
	50-54	110	60	110	280
	55-59	334	240	120	694
	60-64	93	30	130	253
65+	30	12	140	182	
<u>TOTAL</u>		1,975	1,471	1,050	4,496
<u>FEMALE</u>	0-4	1	15	14	30
	5-9	2	16	13	31
	10-14	3	17	12	32
	15-19	4	18	11	33
	20-24	5	19	10	34
	25-29	6	20	9	35
	30-34	7	21	8	36
	35-39	8	22	7	37
	40-44	9	23	6	38
	45-49	10	24	5	39
	50-54	11	25	4	40
	55-59	12	26	3	41
	60-64	13	27	2	42
65+	14	28	1	43	
<u>TOTAL</u>		105	301	105	511
<u>TOTAL</u>	0-4	104	49	24	177
	5-9	94	144	33	271
	10-14	17	116	42	175
	15-19	304	198	51	553
	20-24	69	51	60	180
	25-29	207	160	69	436
	30-34	106	144	78	328
	35-39	63	34	87	184
	40-44	459	313	96	868
	45-49	40	115	105	260
	50-54	121	85	114	320
	55-59	346	266	123	735
	60-64	106	57	132	295
65+	44	40	141	225	
<u>TOTAL</u>		2,080	1,772	1,155	5,007

Assumptions
 Sep 27, 1979 10:00

IPOP	1	2				
BIRTH	1	2	3	4		
DEATH	1					
HEADSHIP	1					
HHSIZE	1	2				
HHINCINAT	1					
HHINCINM	1					
INCINFL	1	3	4	5	6	
TENPREF	1					
USIZEPREF	1					
VALUEPREF	1					
RENTPREF	1					
VALINFL	1	2				
ODEMO	1	2	3			
RDEMO	1	2	3			
OTCONST	1	2	3	4	5	
RTCONST	1	2	3	4	5	
OCONST	1	2	3	4	5	
RCONST	1	2	3	4	5	
VALINFL	1	2				
RENTINFL	1	7				
OSUIT	1	2	3			
RSUIT	1	2	3			
OVAC	1	2	3	4		
RVAC	1	2	4			
OCONV	1	2	3	4		
RCONV	1	2	3	4		
CLUSTERS	1	2	3	4	5	7
OREHAB	1					
RREHAB	1					

CITY OF HOUSTON - OFFICE OF THE MAYOR
HOUSING AND POPULATION DATA

OWNER UNIT TRACT CONSTRUCTION COUNTS ASSUMPTION 1
MAR 2, 1977 11.05

<u>TRACT</u>	<u>UNITS</u>								
121	9	239	176	326	40	420	98	511	32
122	20	240	1,401	327	42	421	30	512	33
123	9	241	220	328	95	422	732	513	17
124	17	242	75	329	116	423	71	514	44
125	4	243	53	330	25	424	56	515	32
126	24	244	321	331	26	425	223	516	41
201	75	245	518	332	190	426	17	517	109
202	35	246	52	333	21	427	319	518	46
203	76	247	253	334	92	428	12	519	132
204	21	248	66	335	417	429	13	520	66
205	106	249	1,094	336	527	430	16	521	60
206	45	250	40	337	11	431	8	522	71
207	86	251	220	338	85	432	7	523	104
208	66	253	254	339	37	433	339	524	27
209	9	254	160	340	170	434	1,562	525	578
210	58	301	31	341	20	435	234	526	63
213	400	302	25	342	34	436	2,848	527	256
214	120	303	15	343	406	437	603	528	81
215	200	304	66	344	18	438	2,719	529	382
216	46	305	29	345	161	439	502	530	1,150
217	83	306	16	346	125	442	55	531	1,028
218	135	307	35	347	20	443	222	532	294
219	36	308	26	359	808	444	366	533	1,019
220	118	309	19	361	4	445	212	534	760
221	53	310	19	367	17	446	763	535	153
222	221	311	32	370	538	447	532	536	1,228
223	220	312	35	371	2,110	448	58	537	683
224	927	313	49	401	12	449	617	538	2,070
225	148	314	24	402	96	450	269	539	756
226	619	315	14	403	86	451	313	540	1,835
227	48	316	14	404	68	501	6	541	773
228	304	317	65	405	47	502	54	542	573
229	132	318	65	406	43	503	59	543	49
230	1,334	319	49	407	252	504	14	544	9
231	25	320	84	412	37	505	39	545	1,186
232	20	321	37	413	72	506	36	551	939
233	94	322	35	414	6	507	92		
236	516	323	51	415	30	508	40		
237	102	324	114	416	37	509	51		
238	298	325	24	419	22	510	56		

TOTAL CONSTRUCTION FOR THE CITY: 50,640 UNITS

CREATE CTCCNST FROM 1
TRACT NO: 238
DATA: 102

TRACT NO: 325
DATA: 98

TRACT NO: 419
DATA: 50

TRACT NO: 590
*** NOT A TRACT
TRACT NO: 510
DATA: 33

TRACT NO:

CTCCNST ASSUMPTION 2 CREATED

DELETE CTCCNST 1
*** CTCCNST ASSUMPTION SET 1 CANNOT BE DELETED

DELETE CTCCNST 2
SET 2 DELETED

CREATE INCINEL NEW
*** 6 SETS ALREADY IN EXISTANCE

REPLACE INCINEL 6
RATE FOR EACH INCOME: 1.1 1.2 1.3 1.4 1 1.6 1.7 1.8
*** 8 RATES PLEASE
RATE FOR EACH INCOME: 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8

INCINEL ASSUMPTION 6 DELETED * INCINEL ASSUMPTION 7 CREATED

SHOW INCINEL 7
ALIGN PAPER:

CITY OF HOUSTON - OFFICE OF THE MAYOR
HOUSING AND POPULATION DATA

FIVE YEAR INCOME INFLATION RATE ASSUMPTION 7
MAR 2, 1977 11.28

<u>HOUSEHOLD INCOME</u>	<u>INFLATION RATE</u>
LESS THAN \$2,000	1.100
\$2,000 - \$2,999	1.200
\$3,000 - \$4,999	1.300
\$5,000 - \$6,999	1.400
\$7,000 - \$9,999	1.500
\$10,000 - \$14,999	1.600
\$15,000 - \$24,999	1.700
\$25,000 OR MORE	1.800

CREATE CCCONST NEW

DATA FOR CLUSTER 1 WITH 1 AND 2 ROOMS (ALL VALUES): 10 20 30 40 50 60 70

DATA FOR CLUSTER 1 WITH 3 ROOMS (ALL VALUES): 1 2 3 4 5 6 7

DATA FOR CLUSTER 1 WITH 4 ROOMS (ALL VALUES): 8 9 10 11 12 13 14

DATA FOR CLUSTER 1 WITH 5 ROOMS (ALL VALUES): 7 6 5 4 3 2 1

DATA FOR CLUSTER 1 WITH 6 OR MORE ROOMS (ALL VALUES): 14 13 12 11 10 9 8

DATA FOR CLUSTER 2 WITH 1 AND 2 ROOMS (ALL VALUES): 101 102 103 104 103 102 101

...
...
...

DATA FOR CLUSTER 19 WITH 6 OR MORE ROOMS (ALL VALUES): 1 2 3 4 5 6 7

CCCONST ASSUMPTION 2 CREATED

CREATE CCCONST FROM 2

CLUSTER NO: 3

VALUE: 3

UNIT SIZE: 2

DATA: 121

CLUSTER NO: 17

VALUE: 7

UNIT SIZE: 6

*** 1 THRU 5

UNIT SIZE: 5

DATA: 33

CLUSTER NO:

CCCONST ASSUMPTION 3 CREATED

REPLACE INCINFL 1

RATE FOR EACH INCOME: .1 .2 .3 .4 .5 .6 .7 .8

INCINFL ASSUMPTION 1 DELETED * INCINFL ASSUMPTION 8 CREATED

VI. EXECUTION OF FORECASTS

A. Introduction

Forecasts result from the combination of data on population, households, and units, with assumptions on the growth and spacial distribution of that population and housing stock in the City.

The Housing Calculation Tool contains three bases of information, or databases, population, households, and housing stock. These databases are the "starting points" for the 1975 population, household, and unit forecasts. Assumptions are applied to them which produce population, households, and unit forecasts for 1975. The 1975 forecasts then become the new starting points for the 1980 forecast. Forecasts can be done for 1975, 1980, 1985, 1990, 1995, and 2000.

As can be seen, forecasts for the 1980 time period could not be made until the appropriate forecasts for 1975 had been computed. Each time period forecasts needs "base" information from the previous time period forecast. The 1975 forecasts use the original 1970 databases mentioned above, which are the result of combinations of Census tabulations for 1970.

In Section V, it was shown that up to six sets for each type of assumption could exist at one time. For forecasts, up to three sets (forecasts) may exist in the active files at the same time, for each module, within each time period. With five forecast modules and six time periods, up to 90 sets of different forecasts can exist in the active computer files at one time.

Allowing three sets of forecasts for each module within each time period allows a selection of which forecasts become the new starting points for the subsequent time periods. These sets are known as output sets, and are numbered sequentially for each period-module as assumptions are.

In addition to the requirement for previous time period forecasts being available, certain modules require input from other modules for the same time period. For example, to create a 1980 household forecast, a 1980 population forecast would be needed, as well as a 1975 household forecast.

B. Preparing to Run a Forecast

Before a forecast is actually run, you must instruct the system as to what assumptions will be used to prepare the forecast. These are identified by using the *STATE* workspace. Once the assumptions are set for the appropriate forecast, called "setting the state", then a separate workspace will be called to actually run the forecast. The only exception to this procedure is the use of a workspace called *HAPPREP* to set assumptions used in running an evaluation of needs for assisted housing (*HAP*). Use of the *HAPPREP* workspace will be separately described.

To develop population, household, and unit forecasts, use the following procedures for setting up the run.

1. Preparing to Run a Population Forecast:

You have two options for how a population forecast can be run. One option uses employment forecasts as a basis for projection. The other uses cohort survival and immigration assumptions related to a previous period forecast. Consult Appendix II concerning the running procedures for option 1. In the cast of option 2, use the following guidelines.

Step 1: Load the *STATE* workspace.

Step 2: Select the type of forecast to be run by entering:

MODULE POP

From this point on, the computer recognizes subsequent selections (such as assumption sets) as relating to a population forecast; the computer would reject any attempt to identify, for example, an assumption set used for a household forecast.

Step 3: Select a time period for which the forecast will be run by entering:

PERIOD period

Where period is any one of the six five-year time periods from 1975 to 2000.

Step 4: Select a previous period population output set to be used as a basis for projection by entering:

OLDPOP FROM n

where n is the output set number of the previous time period output set (forecast) to be used as the base for the specified population forecast. If, for example, you are running a 1980 population forecast and you previously created a 1975 population forecast which was marked as output set 2, you would enter the command:

OLDPOP FROM 2

If you have two or three 1975 population sets to choose from, such as 2, 4, and 5, you would have to choose among the three. If no 1975 population forecasts were run, or if those that were run have been deleted, there would be no way a 1980 population forecast could be run.

For a 1975 forecast, no selection of the population base is necessary since there is only one set of 1970 population which is the 1970 Census. However, for forecasts 1980 and beyond, the previous time period output set to be used must be made known.

Step 5: Select assumption sets. You must select appropriate assumptions for birth rates, death rates, and immigrant populations by entering:

BIRTH	<u> n </u>
DEATH	<u> n </u>
IPOP	<u> n </u>

where n is the assumption number you wish to use in the forecast. Whether you have one, two, or six *IPOP* sets, you must specify by assumption set number which you intend to use. The *CURRENTASS* program, described in Section V, is also available in this workspace and can be used to determine what assumption sets are available. Selection of an *IPOP* assumption set is made with the *IPOP* program, as in:

IPOP 1

In this case, assumption set 1 for *IPOP* has been chosen for the forecast.

Before actually running the population forecast, you can list out all the selections you have made by entering the command *STATE*:

```
MODULE POP
PERIOD 1975
IPOP 1
STATE
```

```
SELECTION
PERIOD 1975 MODULE POP
```

```
INPUT
OLDPOP FROM (1970 CENSUS)
```

```
ASSUMPTIONS
IPOP      1
BIRTH    3
DEATH    2
```

If you wish to have your selections verified before execution of the forecasts, enter the command *CHECK*. *CHECK* will print out error messages if there are problems encountered in the selections you have made. For example, you may have specified an assumption set which does not exist. If nothing is wrong, *CHECK* prints "READY TO RUN".

When you have made your selections and are satisfied that everything is ready, you can execute the command *RUN*. *RUN* also performs a *CHECK* and if errors are found, the forecast will not be performed.

RUN prints out a short summary of the selections (the module and period selected), checks the selections, saves the selection status for later reference (see Saving the State, later), and asks you for your name. Enter something short, like your initials. This will later print out on reports resulting from the forecast. Do not try just pressing return; the computer is rather insistent. After you have successfully entered your name to the computer's satisfaction, execution of the forecast begins.

Once these steps are completed, you are ready to run a population forecast.

2. Preparing to Run a Household Forecast

As in the case of the population forecasts, you have two basic options for running a forecast, one tied to employment forecasts and the other derived through use of previous period household forecasts as a base. To exercise option 1, see Appendix II. The following procedures relate to option 2.

Step 1: Load the *STATE* workspace.

Step 2: Select the type of forecast to be run by entering:

MODULE HH

Step 3: Select a time period for which the forecast will be run by entering:

PERIOD period

where period is any one of the six five-year time periods from 1975 to 2000.

Step 4: Select a previous period household output set to be used as a basis for projection by entering:

OLDHH FROM n

where n is the preceding period household forecast output set number. A household forecast for any time period other than for 1975 requires the household base from the previous time period to be specified. For a 1975 forecast, the 1970 Census households are automatically used. In this example, the user is running a 1980 household forecast, and is specifying the 1975 forecast to be used as the base:

PERIOD 1980
OLDHH FROM 2

Step 5: Select a population forecast for the same time period as the household forecast to be run. Specify the forecast by entering:

POP FROM n

where n is the population forecast output set number.

Step 6: Select the geographic level of household to be run by entering:

HMOD n

where n can equal *CITY* which means for all 196 study area tracts or *TRACTS* which is a tract level household forecast option using a proportionate share allocation technique. This latter option should not be run in normal circumstances.

Step 7: Select the preferred household forecast assumption by entering the following:

HEADSHIP n
HHSIZE n
HHINC NAT n
HHINC INM n
INC INFL n

where n is the assumption set number. As with a population forecast (or any type of forecast) you can list out your selections with the *STATE* program, and check their validity with *CHECK* and/or *RUN*.

3. Preparing a Unit Forecast

The unit forecast preparation entails the following steps:

Step 1: Load the *STATE* workspace.

Step 2: Select the type of forecast to be run by entering:

MODULE unit

Step 3: Select a time period for which the forecast will be run by entering:

PERIOD period

where period is any one of the six five-year periods from 1975-2000.

Step 4: Select the type of unit forecast to be run by entering:

UNITMOD n

where n can be either *ALL* which is the entire unit forecast, *CONV* which stops the unit forecast is after calculation of unit survivors or *FINISH PERIOD OUTPUT SET NO*, which completes a unit forecast previously run through demolition and conversion. For example, *UNITMOD FINISH 1985 2*.

Step 5: Select preceding period unit forecast to be used as the base by entering:

OLDUNITS FROM n

where n is the preceding period unit forecast output set number.

Step 6: Select the required assumptions by entering:

CLUSTERS	<u> n </u>
ODEMO	<u> n </u>
RDEMO	<u> n </u>
OCONV	<u> n </u>
RCONV	<u> n </u>

for a forecast run just through conversions. For a total forecast or completion of a forecast run through conversions only, also enter the following assumption selections:

OREHAB	<u> n </u>
RREHAB	<u> n </u>
OTCONST	<u> n </u>
RTCONST	<u> n </u>
OCCONST	<u> n </u>
RCCONST	<u> n </u>
VALINFL	<u> n </u>
RENTINFL	<u> n </u>
OSUIT	<u> n </u>
RSUIT	<u> n </u>
OVAC	<u> n </u>
RVAC	<u> n </u>

where n is the preferred assumption set number to be used.

Once the assumptions have been entered, you should execute *CHECK* and *RUN* to ensure all preparations are accurate. If everything checks, you are ready to run the forecast.

C. Running Forecasts

Once you have prepared to run a forecast, actual execution is a very simple process. Follow these steps for the three types of forecasts:

Population

- Step 1: Load the *POPMOD* workspace.
- Step 2: Follow the prompts which will automatically appear.

Households

- Step 1: Load the *HHMOD* workspace.
- Step 2: Follow the prompts which will automatically appear.

Units

- Step 1: Load the *RUNITMOD* workspace.
- Step 2: Follow the prompts which will automatically appear.

At the conclusion of the forecast, a message is printed indicating the assigned output set number. This is the number you use to reference this particular forecast in the future.

After you receive the output set number notification, you are free to use the programs in any of the workspaces available in the Housing Calculation Tool, by use of of the *)LOAD* command.

D. Default Assumption Setting

In Section V it was noted that assumption set 1 for all assumptions could not be deleted with the *DELETE* operation. The reason for this will be made clearer.

Assumption sets one assumption sets were constructed from information known about the City in 1970 and, in some cases, information gathered between 1970 and 1975. Therefore, these assumption sets are considered a basic, or default, set of assumptions. This is why they are not allowed to be deleted, at least directly. If you *MODIFY* or *REPLACE* any of these assumptions, the assumption set number remains one so that they remain identifiable as the default assumption set.

The *DEFAULT* program may be used to set the assumption set choices for any module to the default set (one for all assumptions).

The *DEFAULT* program does nothing more than specify assumption set one for all assumption sets, for any module you may choose. Be aware that the *DEFAULT* program clears any module and/or time period specification you have made up to that point. For example, you should first invoke *DEFAULT*, and then invoke the *MODULE* and *PERIOD* programs, as well as any supporting information needed (such as base information).

E. Automatic Saving of the State

After selecting a module, a time period, base inputs and assumptions, the *STATE* program is used to see what selections have been made, or to see "the state" of things. Sometimes it takes a while to get the state to a point where you are ready to execute a forecast.

As mentioned earlier, the state is saved when the *RUN* program is invoked. "Saved" means the settings you have specified are stored away on a file. When you reload the *STATE* workspace later (the same day or weeks or months later), the last saved state is automatically read off the file and back into the workspace. In other words, after loading the *STATE* workspace the *STATE* program would show the selections made the last time the state was saved, the state used in executing the last forecast run. The message *STATE READ* which prints upon loading the workspace indicates that this has been done.

F. List of Forecasts on the System

Because so many forecasts may be generated, it is hard to keep track of all the output set numbers associated with each forecast. The *CURRENTOS* program prints out a list of all forecasts and their associated output set numbers currently in the system. For every time period and module, the program shows the output set numbers of the forecasts which are in the system. On the next page is an example of the output of the *CURRENTOS* program.

Note that the listing is divided into five parts, one for each module. Within each module there are six time periods. Up to three forecasts (output sets) may exist within a time period for each module.

The printout on the next page shows that there are two 1975 population forecasts on the system (numbered 7 and 8), one 1975 household forecast numbered 13, one unit preference forecast numbered 5, one 1975 housing unit forecast numbered 2, one 1980 unit forecast numbered 1, and one 1975 match forecast numbered 4. The numbers 7, 8, 13, 5, 2, 1, and 4 are the output set numbers assigned to those forecasts. The number 8, in one of the 1975 population forecasts, indicates that seven 1975 population forecasts were run before that one, one of which is still on the system (number 7). 1975 population forecasts 1 through 6 must have been deleted from the system since they were created. Deleting forecasts is covered next.

G. Deleting Forecasts No Longer Needed

The data files which contain the results of the various forecasts which are performed, take up space as long as those files remain on the computer system. Retention of a large number of forecasts will require a substantial number of diskettes to be available; thus only forecasts known to be needed should be retained.

Removing forecasts files from the system means erasing the storage taken in the files where the forecast results are stored. You may have absolutely no future need for a forecast, in which case the *DELETE* program described below is used.

CURRENTOS

OUTPUT SETS
Sep 27, 1979 10:00

POPULATION	1975-33	1975-35	1975	1980-4	1980-5
	1980-7	1985-2	1985-3	1985	
	1990-2	1990	1990	1995-2	1995
	1995	2000-2	2000	2000	
HOUSEHOLDS	1975-32	1975-34	1975	1980-3	1980-4
	1980-5	1985-2	1985-3	1985	
	1990-2	1990	1990	1995-2	1995
	1995	2000-2	2000	2000	
PREFERENCES	1975	1975	1975	1980	1980
	1980	1985	1985	1985	
	1990	1990	1990	1995	1995
	1995	2000	2000	2000	
UNITS	1975-21	1975-22	1975	1980-5	1980-6
	1980-7	1985-2	1985-3	1985	
	1990-2	1990	1990	1995-2	1995
	1995	2000-2	2000	2000	

The *DELETE* program in the *STATE* workspace is used to delete forecasts from the computer system. It requires the forecast module name, time period, and output set number of the forecast you wish to delete. Here is an example:

```
UNIT DELETE 1975 2
DELETE 1975 UNIT FORECAST 2? YES
DELETED
```

As can be seen, the program requests confirmation before destroying the forecast.

Deleting a forecast means it is no longer available for use, either in terms of printing out its results or using it as input for future forecasts. For example, although you may no longer have a direct need for a particular population forecast, future population and household forecasts may need it as input.

H. File Storage Cleanup

The *CURRENTOS* program tells you what forecasts are available on the computer system. When forecasts are run, the storage areas where the results are kept are slowly filled up. Only when a forecast is completed is it marked as a "completed forecast".

Forecasts which are interrupted in some manner cannot be restarted from the middle. You must reload the *STATE* workspace and re-execute the forecast. But what would happen if you never re-executed the forecast, never intended to complete it, or just forgot? The result would be a partially completed forecast residing in the data files, with no way to access it. It cannot be deleted using the *DELETE* program because the file has not yet been marked as a completed forecast; nor will it show up in the *CURRENTOS* report. There should be a way of deleting this inaccessible storage, that which *CURRENTOS* does not acknowledge but which is taking up space.

The *CLEAR* program is used for this purpose. *CLEAR* looks at each forecast file and determines whether it is a completed forecast. If it is not, it erases the storage taken by the associated files. A message is printed for each file which is being erased--the numbers which are printed are unimportant.

You should not have to run *CLEAR* very often; once a month is probably often enough. *CLEAR* may actually find nothing to erase, in which case no messages stating that a forecast has been erased will print out.

To invoke the *CLEAR* program, simply enter *CLEAR* in the *STATE* workspace.

I. Error Messages

A number of error messages may result from invalid entries made in the programs in the *STATE* workspace. On the next few pages is a list of these messages, and their meaning. All error messages are preceded by three stars. If the error message was received after you answered a prompt within one of the programs, you are re-prompted.

*** VALID PERIODS ARE: 1975 1980 1985 1990 1995 2000

Specify a valid period.

*** VALID MODULES ARE POP, HH, PREF, UNIT, AND MATCH

Specify a valid forecast module.

*** VALID LEFT ARGUMENTS ARE POP, HH, PREFS, UNITS, OLDPOP,
OLDHH, AND OLDUNITS

Specify a valid left argument to the FROM program.

*** RIGHT ARGUMENT MUST BE A SINGLE POSITIVE INTEGER

Specify a valid (existing) output set number as the right argument to the FROM program.

*** SET RUN PERIOD FIRST

*** SET MODULE FIRST

The period and module must be selected before using the FROM program to designate previous time period and module inputs.

*** 1970 CENSUS DATA IS USED FOR 1975 FORECAST

There is no need to specify previous time period input when performing any 1975 forecast.

*** NOT FOR THIS MODULE

*** NOT FOR MODULE module

You tried to set an assumption not used by the module you selected, or you tried to set a previous time period or module input not needed for the module you selected. Select only those assumptions and inputs needed for the time period and module you selected.

*** SPECIFY A SINGLE POSITIVE INTEGER

Output sets and assumption sets can only be identified with positive non-fractional numbers.

*** FORECAST NOT IN SYSTEM

You have specified an output set to DELETE which is not in the system. Make sure to check what sets are available with the CURRENTOS program.

*** Y OR N

Answer with the single letter Y or N (for YES and NO).

The following errors may be generated as the *CHECK* or *RUN* programs are executed:

*** *RUN PERIOD MUST BE SELECTED*

*** *MODULE MUST BE SELECTED*

Select the module and time period you want.

*** period [*OLDPOP|OLDHH|* *OLDUNITS*] *OUTPUT SET MUST BE SELECTED*

*** period [*POP|HH|* *UNITS*] *OUTPUT SET MUST BE SELECTED*

Select required previous time period and module inputs, for the given time period.

*** period [*OLDPOP|OLDHH|* *OLDUNITS*] *OUTPUT SET n DOES NOT EXIST*

*** period [*POP|HH|* *UNITS*] *OUTPUT SET n DOES NOT EXIST*

You have specified a previous time period or module input which does not exist. Check the *CURRENTOS* program to find out what forecasts have been run and are in the system.

*** *OUTPUT ROOM MUST BE MADE AVAILABLE FOR THE period module FORECAST*

The allotment of three output sets for the specified period and module is used up. You will have to use the *DELETE* program to delete certain forecasts to make room for the new forecast.

*** *THE FOLLOWING ASSUMPTION SETS DO NOT EXIST:*

[list of assumption names and assumption set numbers]

You have specified assumption sets not found in the currently available assumptions. Check the *CURRENTASS* program to find out what assumption sets are available.

VII. REPORT GENERATION

A. Types of Reports

There are three main programs which generate reports on forecasts. They are found in the *REPORTS* workspace. They are:

<i>POPREPORT</i>	For population forecasts
<i>HHREPORT</i>	For household forecasts
<i>UNITREPORT</i>	For housing unit forecasts.

All the report programs require specification of a time period and output set number, in the form of an argument to the program when typing the program name in.

When printing reports on the 1970 Census data bases (the same programs are used), specification of an output set number is not required.

When printing any actual forecast (1975 to 2000), there is an indication of the assumption sets which were used in the forecast at the top of each page for each report.

More detailed coverage of how to use each report program and the options available with each will now be covered.

1. The POPREPORT Program

The *POPREPORT* program, found in the *POPRT* workspace, can be called with the following choice of arguments:

1970 *POPREPORT CITY*

or

period outputsetnumber *POPREPORT* [*CITY*
NAT CITY
INM CITY]

The *NAT CITY* option produces a population report for base city population; the *INM CITY* option for the immigrant portion; the *CITY* option is the total of the base and net immigrant populations.

Only the *CITY* option may be used when printing a report on the 1970 Census population. Any of the three options may be used for the 1975-2000 forecasts.

The population report is one page long. The page starts with the standard heading, two lines long. The next line is the title of the report, with an indication of period, race, and option chosen. If the report is on a 1975-2000 forecast, the output set number is also shown. The next print line will be explained later.

The next line indicates when the forecast was run, when the report was printed, and who ran the forecast. This line does not print if the report is on the 1970 Census population.

The last heading line shows which previous time period population output set was used, and which *IPOP* assumption set was used. This line does not print if the report is on the 1970 Census population.

The body of the report is broken out by race, sex, and age.

The report on the next page was generated with the command:

1980 2 POPREPORT CITY

This report is on the second population forecast generated for the time period 1980.

City of Houston - Office of the Mayor
Housing and Population Data

1980 Population * Set 5
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 3, 1979 * Prepared by ALAN F ACKMAN
OLDPOP FROM 35 * IPOP 1 * BIRTH 3 * DEATH 1

Sex	Age	White	Black	Sp Amer	Total
Male	0-4	49,045	37,502	21,166	107,713
	5-9	53,949	33,654	20,282	107,885
	10-14	51,928	30,242	19,617	101,787
	15-19	55,280	31,942	18,872	106,094
	20-24	56,574	28,010	15,413	99,997
	25-29	51,353	22,616	12,851	86,820
	30-34	55,612	20,350	13,396	89,358
	35-39	49,876	17,938	12,197	80,011
	40-44	43,618	14,534	8,482	66,634
	45-49	37,996	12,882	7,277	58,155
	50-54	34,555	11,347	6,412	52,314
	55-59	33,058	9,054	4,357	46,461
	60-64	28,652	7,171	3,124	38,947
	65+	32,294	11,930	4,224	48,448
	Total		633,782	289,172	167,670
Female	0-4	47,310	30,091	16,659	94,060
	5-9	49,369	28,066	15,518	92,953
	10-14	46,898	30,572	18,822	96,292
	15-19	50,155	32,871	17,419	100,445
	20-24	52,296	30,256	15,227	97,779
	25-29	54,536	27,122	14,350	96,008
	30-34	61,085	27,580	14,780	103,445
	35-39	46,550	21,046	10,776	78,372
	40-44	37,197	16,829	8,526	62,552
	45-49	35,950	15,501	7,049	58,500
	50-54	34,965	13,857	6,144	54,966
	55-59	34,159	10,741	4,361	49,241
	60-64	30,832	8,464	3,005	42,301
	65+	52,481	18,084	5,391	75,956
	Total		633,763	311,080	158,027
Total	0-4	96,355	67,593	37,825	201,773
	5-9	103,318	61,720	35,800	200,838
	10-14	98,826	60,814	38,439	198,079
	15-19	105,435	64,813	36,291	206,539
	20-24	108,870	58,266	30,640	197,776
	25-29	105,889	49,738	27,201	182,828
	30-34	116,697	47,930	28,176	192,803
	35-39	96,426	38,994	22,973	158,393
	40-44	80,815	31,363	17,008	129,186
	45-49	73,946	28,383	14,326	116,655
	50-54	69,520	25,204	12,556	107,280
	55-59	67,189	19,795	8,718	95,702
	60-64	59,484	15,635	6,124	81,248
	65+	84,775	30,014	9,615	124,404
	Total		1,267,545	600,252	325,697

2.

The HHREPORT Program

The HHREPORT program found in the HHRPT workspace can be called with the following choice of arguments:

```
1970 HHREPORT          [CITY
                        TRACT tractnumber
                        CD
                        610]
```

or

```
period outputsetnumber HHREPORT [CITY
                                    NAT CITY
                                    INM CITY
                                    TRACT tractnumber
                                    CD
                                    610]
```

The NAT CITY option produces a household report for base city population; the INM CITY option for the immigrant portion; the CITY option is the total of the base and net immigrant populations. The TRACT tractnumber option produces a report for a single specified tract. The CD option produces a report on the sum of all households in all community development tracts. The 610 option produces a report on the sum of all households in all tracts inside the 610 loop.

Only the CITY, TRACT tractnumber, CD, and 610 options may be used when printing a report on the 1970 Census households. Any of the six options may be used for the 1975-2000 forecasts.

The household report is eight pages long; a page for each race and sex, and a total race section. The format of the heading of each household report is similar to that of the population reports, as well as most other reports, so the example on the next page should suffice as to the information which is provided.

The report on the next page was generated with the command:

```
1975 1 HHREPORT CITY
```

Only the first page of the report is shown, and underlined characters indicate where the household counts are printed.

City of Houston - Office of the Mayor
Housing and Population Data

1980 All Races - Male - Total tracts Households * Set 4 (HHMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHH FROM 32 * POP FROM 5 * HEADSHIP 1 * HHSIZE 2
HHINCAT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	6,951	8,403	4,810	3,839	2,305	3,349	29,657
\$2,000 - \$2,999	3,106	3,889	2,195	1,784	1,055	1,496	13,525
\$3,000 - \$4,999	8,882	11,755	7,254	5,982	3,637	5,257	42,767
\$5,000 - \$6,999	10,830	16,078	10,643	9,080	5,585	7,669	59,905
\$7,000 - \$9,999	17,131	29,040	20,501	19,618	11,128	12,720	109,138
\$10,000 - \$14,999	19,200	37,533	27,734	27,287	15,538	13,704	140,996
\$15,000 - \$24,999	10,935	22,736	16,588	17,361	9,509	6,715	83,844
\$25,000 or More	3,817	7,224	4,516	4,731	2,547	1,500	24,335
Total	80,852	136,658	94,261	88,682	51,304	52,410	504,167

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	2,266	2,644	1,463	1,116	693	1,005	9,187
\$2,000 - \$2,999	1,252	1,698	919	708	406	502	5,485
\$3,000 - \$4,999	2,414	3,384	1,836	1,381	803	981	10,799
\$5,000 - \$6,999	1,697	2,472	1,391	1,087	614	684	7,945
\$7,000 - \$9,999	1,799	2,717	1,564	1,232	656	717	8,685
\$10,000 - \$14,999	1,514	2,586	1,490	1,284	679	575	8,128
\$15,000 - \$24,999	879	1,562	882	794	397	303	4,817
\$25,000 or More	538	907	432	359	169	110	2,507
Total	12,351	17,970	9,977	7,961	4,417	4,877	57,553

City of Houston - Office of the Mayor
Housing and Population Data

1980 All Races - Female - Total tracts Households * Set 4 (HHMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHM FROM 32 * POP FROM 5 * HEADSHIP 1 * HHSIZE 2
HHINCNT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	8,253	8,975	4,986	3,698	2,242	3,148	31,302
\$2,000 - \$2,999	3,305	3,537	1,925	1,388	754	1,167	12,076
\$3,000 - \$4,999	6,313	7,133	3,945	2,880	1,611	2,095	23,977
\$5,000 - \$6,999	5,525	6,415	3,297	2,402	1,200	1,335	20,174
\$7,000 - \$9,999	5,592	6,748	3,558	2,674	1,346	1,349	21,259
\$10,000 - \$14,999	3,556	4,621	2,431	1,951	947	844	14,350
\$15,000 - \$24,999	1,476	1,934	967	760	378	283	5,790
\$25,000 or More	587	663	231	197	84	52	1,814
Total	34,607	40,026	21,332	15,950	8,554	10,273	130,742

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	4,181	4,064	2,101	1,607	928	1,158	13,959
\$2,000 - \$2,999	1,339	1,231	551	307	169	232	3,829
\$3,000 - \$4,999	2,343	2,404	1,220	836	407	549	7,759
\$5,000 - \$6,999	1,982	2,028	904	606	269	295	6,084
\$7,000 - \$9,999	1,973	2,223	1,089	793	347	394	6,819
\$10,000 - \$14,999	1,286	1,621	864	712	377	321	5,181
\$15,000 - \$24,999	539	783	405	396	217	153	2,493
\$25,000 or More	212	259	111	116	60	35	793
Total	13,775	14,613	7,245	5,373	2,774	3,137	46,917

City of Houston - Office of the Mayor
Housing and Population Data

1980 White - Male - Total tracts Households * Set 4 (HHMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHM FROM 32 * POP FROM 5 * HEADSHIP 1 * HHSIZE 2
HHINCINAT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	3,720	4,640	2,161	1,789	897	627	13,834
\$2,000 - \$2,999	1,694	2,187	986	840	390	255	6,352
\$3,000 - \$4,999	4,707	6,300	3,098	2,563	1,280	847	18,795
\$5,000 - \$6,999	5,980	9,066	4,972	4,331	2,258	1,444	28,051
\$7,000 - \$9,999	11,199	19,545	12,187	11,335	6,105	3,824	64,195
\$10,000 - \$14,999	15,439	30,454	21,189	21,183	11,392	6,764	106,421
\$15,000 - \$24,999	9,814	20,314	14,365	15,240	8,158	4,538	72,429
\$25,000 or More	3,678	6,766	4,151	4,392	2,320	1,236	22,543
Total	56,231	99,272	63,109	61,673	32,800	19,535	332,620

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	1,100	1,400	616	465	249	158	3,988
\$2,000 - \$2,999	715	1,092	512	405	193	114	3,031
\$3,000 - \$4,999	1,666	2,377	1,149	853	431	279	6,755
\$5,000 - \$6,999	1,258	1,890	966	716	368	220	5,418
\$7,000 - \$9,999	1,408	2,180	1,118	883	421	255	6,265
\$10,000 - \$14,999	1,309	2,216	1,230	1,047	532	295	6,629
\$15,000 - \$24,999	806	1,384	756	671	320	162	4,099
\$25,000 or More	511	869	396	339	157	92	2,364
Total	8,773	13,408	6,743	5,379	2,671	1,575	38,549

City of Houston - Office of the Mayor
Housing and Population Data

1980 White - Female - Total Tracts Households * Set 4 (HHMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHH FROM 32 * POP FROM 5 * HEADSHIP 1 * HMSIZE 2
HHINCNAT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	3,843	4,258	1,830	1,304	595	308	12,138
\$2,000 - \$2,999	1,567	1,731	700	441	154	78	4,671
\$3,000 - \$4,999	3,670	4,116	1,822	1,242	537	255	11,642
\$5,000 - \$6,999	4,138	4,685	2,053	1,472	618	288	13,254
\$7,000 - \$9,999	4,394	5,139	2,367	1,761	774	348	14,783
\$10,000 - \$14,999	3,057	3,861	1,855	1,471	668	314	11,224
\$15,000 - \$24,999	1,371	1,756	811	658	311	143	5,050
\$25,000 or More	556	620	215	174	79	37	1,681
Total	22,596	26,166	11,653	8,523	3,736	1,771	74,445

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	2,390	2,382	1,016	733	348	203	7,072
\$2,000 - \$2,999	842	822	301	144	59	31	2,199
\$3,000 - \$4,999	1,726	1,751	726	485	190	83	4,961
\$5,000 - \$6,999	1,631	1,664	677	436	167	74	4,649
\$7,000 - \$9,999	1,700	1,873	829	598	228	126	5,354
\$10,000 - \$14,999	1,155	1,447	713	573	284	159	4,331
\$15,000 - \$24,999	502	720	349	348	187	99	2,205
\$25,000 or More	208	248	103	108	55	29	751
Total	10,154	10,907	4,714	3,425	1,518	804	31,522

City of Houston - Office of the Mayor
Housing and Population Data

1980 Black - Male - Total tracts Households * Set 4 (HHMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHH FROM 32 * POP FROM 5 * HEADSHIP 1 * HNSIZE 2
HHINCINAT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	2,798	3,068	1,987	1,506	969	1,841	12,169
\$2,000 - \$2,999	1,215	1,396	914	699	463	838	5,525
\$3,000 - \$4,999	3,411	4,159	2,853	2,253	1,446	2,635	16,757
\$5,000 - \$6,999	3,837	4,966	3,608	2,896	1,904	3,502	20,713
\$7,000 - \$9,999	4,466	6,381	4,908	4,121	2,742	4,784	27,402
\$10,000 - \$14,999	2,596	4,121	3,362	2,920	1,896	3,288	18,183
\$15,000 - \$24,999	756	1,254	996	833	524	887	5,250
\$25,000 or More	55	122	95	76	43	75	466
Total	19,134	25,467	18,723	15,304	9,987	17,850	106,465

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	1,043	1,120	710	543	365	678	4,459
\$2,000 - \$2,999	481	545	322	248	174	289	2,059
\$3,000 - \$4,999	655	830	537	398	266	505	3,191
\$5,000 - \$6,999	376	445	310	240	149	287	1,807
\$7,000 - \$9,999	315	401	299	235	142	276	1,668
\$10,000 - \$14,999	137	191	133	114	64	139	778
\$15,000 - \$24,999	51	77	38	31	17	41	255
\$25,000 or More	3	6	4	2	1	2	18
Total	3,061	3,615	2,353	1,811	1,178	2,217	14,235

City of Houston - Office of the Mayor
Housing and Population Data

1980 Black - Female - Total tracts Households * Set 4 (HMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHH FROM 32 * POP FROM 5 * HEADSHIP 1 * HHSIZE 2
HHINCAT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	4,028	4,171	2,668	2,007	1,303	2,287	16,464
\$2,000 - \$2,999	1,611	1,639	1,089	821	543	933	6,636
\$3,000 - \$4,999	2,262	2,533	1,695	1,314	806	1,412	10,022
\$5,000 - \$6,999	1,115	1,313	910	695	442	759	5,234
\$7,000 - \$9,999	970	1,245	873	654	418	689	4,849
\$10,000 - \$14,999	363	522	359	286	145	294	1,969
\$15,000 - \$24,999	70	118	79	49	21	72	409
\$25,000 or More	8	13	4	2	1	3	31
Total	10,427	11,554	7,677	5,828	3,679	6,449	45,614

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	1,533	1,429	984	700	464	737	5,767
\$2,000 - \$2,999	459	385	227	154	104	183	1,512
\$3,000 - \$4,999	531	547	366	254	145	310	2,153
\$5,000 - \$6,999	284	304	169	125	68	148	1,098
\$7,000 - \$9,999	215	256	162	123	67	153	976
\$10,000 - \$14,999	76	105	79	68	43	76	447
\$15,000 - \$24,999	22	34	28	19	11	20	136
\$25,000 or More	1	3	2	2	1	2	11
Total	3,121	3,065	1,937	1,445	903	1,629	12,100

City of Houston - Office of the Mayor
Housing and Population Data

1980 Spanish American - Male - Total tracts Households * Set 4 (HHMOD CITY)
Non-City Portion Included
Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLDHM FROM 32 * POP FROM 5 * HEADSHIP 1 * HHSIZE 2
HHINCNT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	433	695	662	544	439	881	3,654
\$2,000 - \$2,999	197	386	295	245	202	403	1,648
\$3,000 - \$4,999	764	1,296	1,303	1,166	911	1,775	7,215
\$5,000 - \$6,999	1,013	2,046	2,083	1,853	1,423	2,723	11,141
\$7,000 - \$9,999	1,466	3,114	3,406	3,162	2,281	4,112	17,541
\$10,000 - \$14,999	1,165	2,958	3,183	3,184	2,250	3,652	16,392
\$15,000 - \$24,999	365	1,168	1,227	1,288	827	1,298	6,165
\$25,000 or More	84	336	270	263	184	189	1,326
Total	5,487	11,919	12,429	11,705	8,517	15,025	65,082

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	123	124	137	108	79	169	740
\$2,000 - \$2,999	56	61	85	55	39	99	395
\$3,000 - \$4,999	93	177	158	130	106	197	853
\$5,000 - \$6,999	63	137	115	131	97	177	728
\$7,000 - \$9,999	76	136	147	114	93	186	752
\$10,000 - \$14,999	68	179	127	123	83	141	721
\$15,000 - \$24,999	22	101	88	92	60	100	463
\$25,000 or More	16	32	32	18	11	16	125
Total	517	947	881	771	568	1,085	4,769

City of Houston - Office of the Mayor
Housing and Population Data

1980 Spanish American - Male - Total tracts Households = Set 4 (HHMOD CITY)

Non-City Portion Included

Run Oct 3, 1979 * Printed Oct 17, 1979 * Prepared by ALAN F ACKMAN
OLD'IN FROM 32 * POP FROM 5 * HEADSHIP 1 * HHSIZE 2
HHINCINAT 1 * HHINCINM 1 * INCINFL 1

Non-Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	433	695	662	544	439	881	3,654
\$2,000 - \$2,999	197	306	295	245	202	403	1,648
\$3,000 - \$4,999	764	1,296	1,303	1,166	911	1,775	7,215
\$5,000 - \$6,999	1,013	2,046	2,083	1,853	1,423	2,723	11,141
\$7,000 - \$9,999	1,466	3,114	3,406	3,162	2,281	4,112	17,541
\$10,000 - \$14,999	1,165	2,958	3,183	3,184	2,250	3,652	16,392
\$15,000 - \$24,999	365	1,168	1,227	1,288	827	1,290	6,165
\$25,000 or More	84	336	270	263	184	189	1,326
Total	5,487	11,919	12,429	11,705	8,517	15,025	65,082

Elderly

<u>Household Income:</u>	<u>Household Size</u>						<u>Total</u>
	<u>1 Person</u>	<u>2 Person</u>	<u>3 Person</u>	<u>4 Person</u>	<u>5 Person</u>	<u>6 or More Person</u>	
Less Than \$2,000	123	124	137	108	79	169	740
\$2,000 - \$2,999	56	61	85	55	39	99	395
\$3,000 - \$4,999	93	177	150	130	106	197	853
\$5,000 - \$6,999	63	137	115	131	97	177	720
\$7,000 - \$9,999	76	136	147	114	93	186	752
\$10,000 - \$14,999	68	179	127	123	83	141	721
\$15,000 - \$24,999	22	101	88	92	60	100	463
\$25,000 or More	16	32	32	18	11	16	125
Total	517	947	881	771	568	1,085	4,769

4. The UNITREPORT Program

The *UNITREPORT* program can be called with the following choice of arguments:

```
1970 UNITREPORT      [CITY
                      TRACT tractnumber
                      CD
                      610]

or

period outputsetnumber UNITREPORT [CITY
                                       DEMO CITY
                                       OCC CITY
                                       SATOCC CITY
                                       UNS CITY
                                       CONV CITY

                                       TRACT tractnumber
                                       DEMO TRACT tractnumber
                                       OCC TRACT tractnumber
                                       SATOCC TRACT tractnumber
                                       UNS TRACT tractnumber
                                       CONV TRACT tractnumber

                                       CD
                                       DEMO CD
                                       OCC CD
                                       SATOCC CD
                                       UNS CD
                                       CONV CD

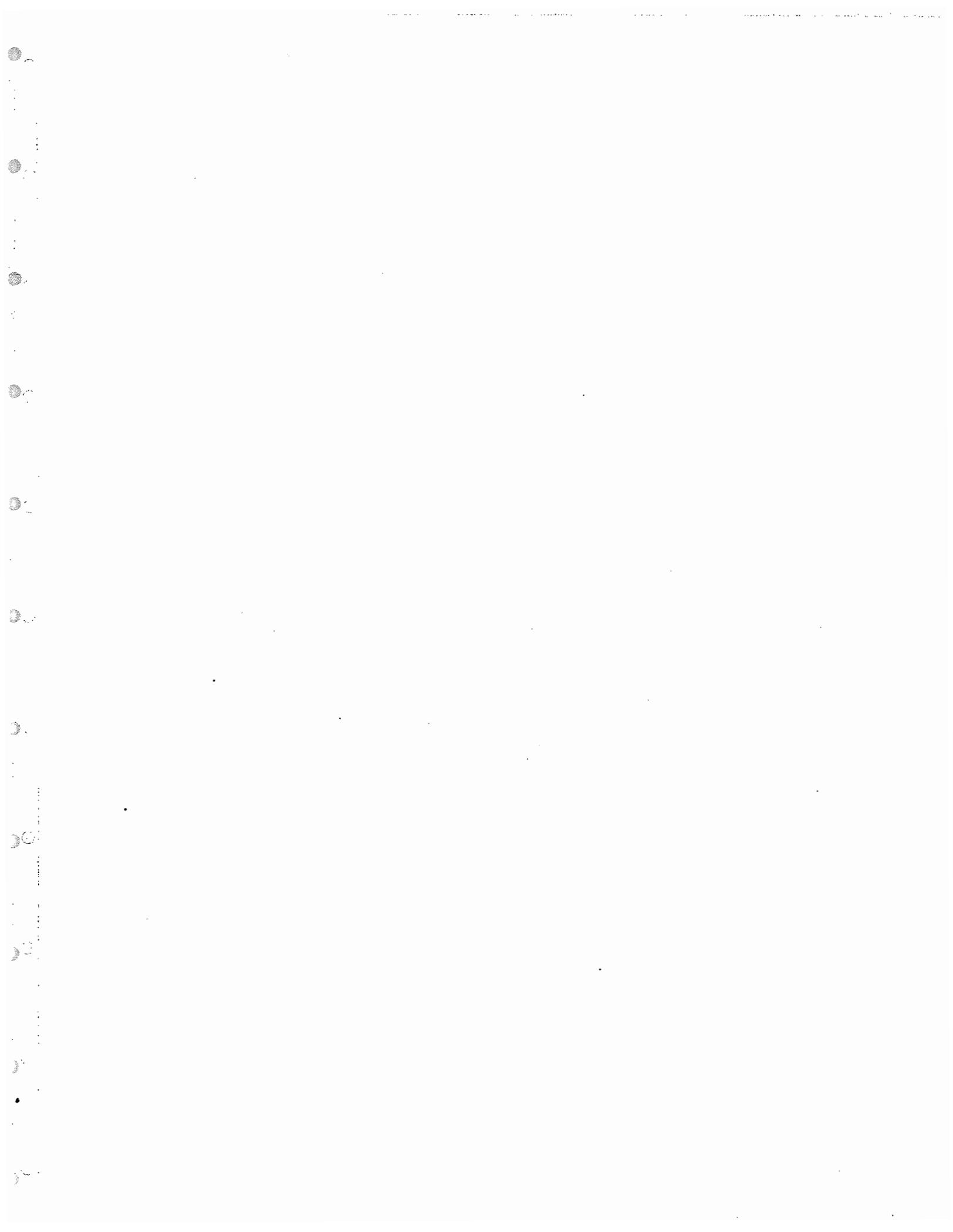
                                       610
                                       DEMO 610
                                       OCC 610
                                       SATOCC 610
                                       UNS 610
                                       CONV 610]
```

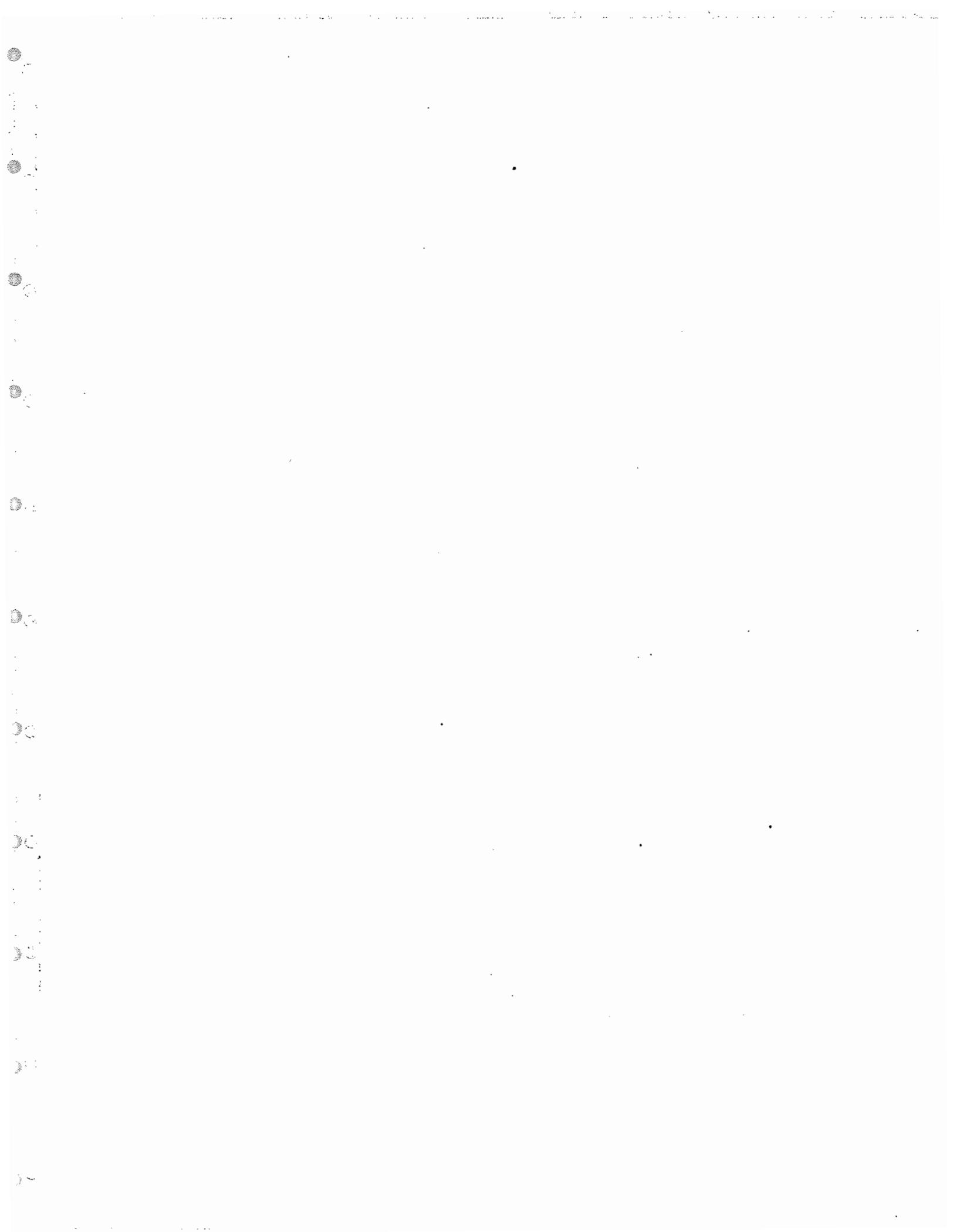
There is quite a list of options for this report! However, notice that there are the familiar four major options seen in other report programs: *CITY*, *TRACT* tractnumber, *CD*, and *610*. Their meaning is the same as in other report programs.

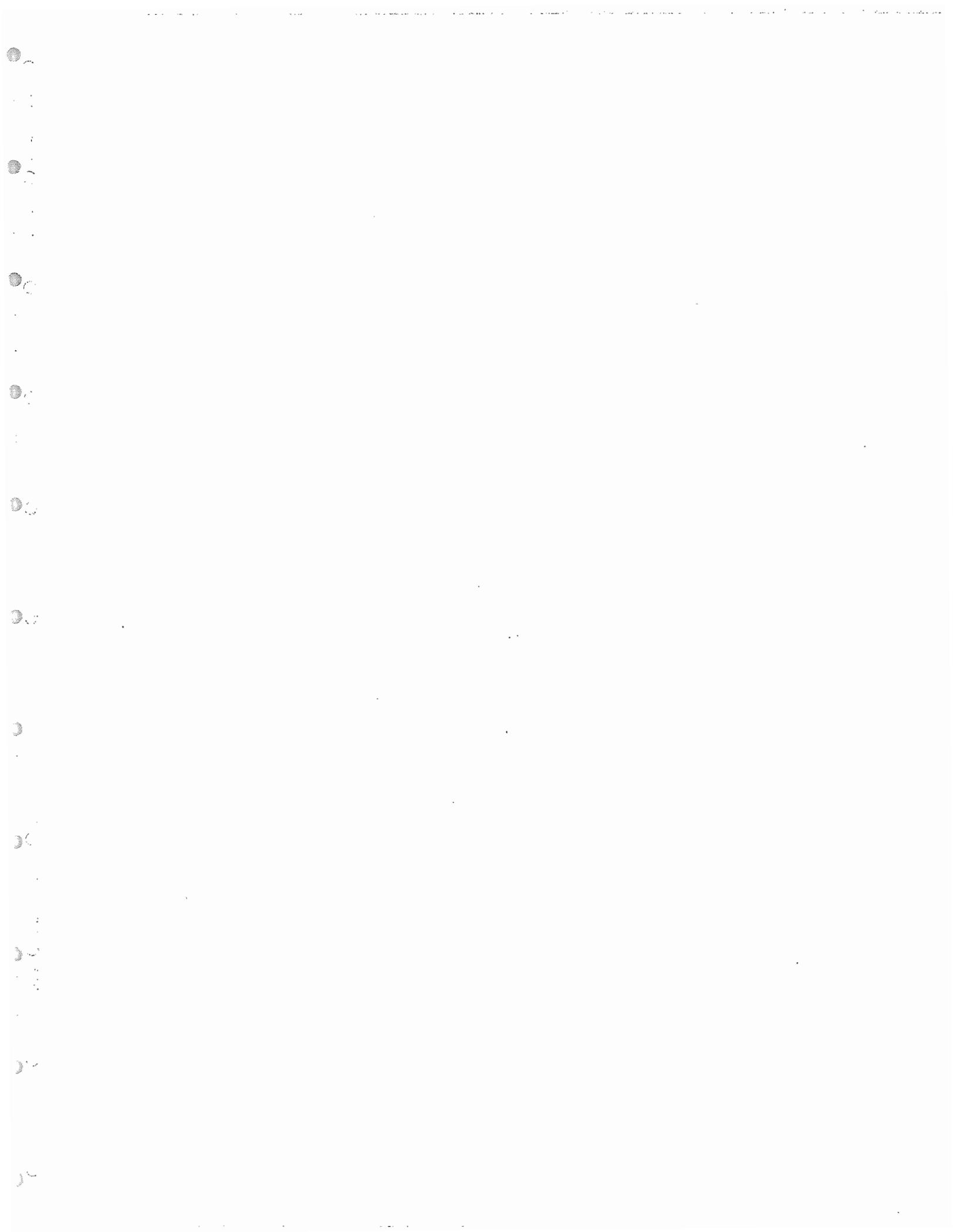
There are six operations, or options, which can be performed for each of the above major options.

First, all resulting units for each type of major option can be printed. This requires no prefix qualifier, such as *DEMO*, which is explained next.

The first qualifier is *DEMO*. For the major option selected, units which remain after demolition and fire loss are shown.







The second qualifier is *OCC*. For the major option selected, units which remain after a reserve for vacant units are subtracted from the unit forecast is shown.

The third qualifier is *SATOCC*, which is similar to *OCC* but shows units which are in satisfactory condition as well as being occupied.

The fourth qualifier is *UNS* which shows units which are in unsatisfactory condition.

The fifth qualifier is *CONV* which shows the number of units left after conversion of certain units to non housing stock.

Only the *CITY*, *TRACT* tractnumber, *CD*, and *610* options may be used when printing a report on the 1970 Census units. Any of the other options may be used for the 1975-2000 forecasts.

The unit report is one page long. The format of the heading of each unit report is similar to that of the population reports, as well as most other reports. The unit report does give an indication of what option was chosen.

The report on the next page was generated with the command:

1975 1 UNITREPORT CITY

Underlined characters indicate where the unit counts are printed.

City of Houston - Office of the Mayor
Housing and Population Data

1980 Housing Unit Forecast * Set 6
Total Tracts Forecast Units
Non-City Portion Excluded

Run Oct 4, 1979 * Printed Oct 17, 1979 * Prepared by KENNETH L AUSTIN
OLDUNITS FROM 21 * ODEMO 1 * RDEMO 1 * OTCONST 1 * RTCONST 1
OCCONST 5 * RCCONST 5 * VALINFL 2 * RENTINFL 7
OSUIT 2 * RSUIT 2 * OVAC 3 * RVAC 4 * OCONV 4 * RCONV 4
CLUSTERS 3 * OREHAB 1 * RREHAB 1

Tenure and Value/Rent	Unit Size					Total
	1 and 2 Rooms	3 Rooms	4 Rooms	5 Rooms	6 or More Rooms	
<u>Owner</u>						
Less Than \$3,000	104	281	907	672	369	2,333
\$5,000 - \$9,999	217	817	4,274	6,047	3,582	14,937
\$10,000 - \$14,999	166	869	6,002	12,720	9,186	28,943
\$15,000 - 19,999	116	482	4,118	14,723	15,222	34,661
\$20,000 - \$24,999	70	278	2,043	12,190	17,185	31,766
\$25,000 - \$34,999	53	892	4,903	18,729	40,391	64,968
\$35,000 or More	70	1,966	6,551	16,396	124,383	149,366
Total Owner Units	796	5,585	28,798	81,477	210,318	326,974
<u>Rental</u>						
Less Than \$40	1,001	1,775	1,290	577	369	5,012
\$40 - \$59	1,554	3,093	3,226	1,371	523	9,767
\$60 - \$79	3,605	7,066	9,117	4,634	1,662	26,084
\$80 - \$99	3,400	6,249	9,671	6,539	2,638	28,497
\$100 - \$149	4,551	9,260	9,739	6,331	3,244	33,125
\$150 - \$199	8,516	19,337	14,935	6,135	3,606	52,529
\$200 or More	8,754	37,159	54,365	31,181	13,778	145,237
No Contract Rent	603	794	1,121	1,039	1,181	4,738
Total Rental Units	31,984	84,733	103,464	57,807	27,001	304,989
Total Units	32,780	90,318	132,262	139,284	237,319	631,963

B. Data Reported on Areas In and Outside of the City

One line in the heading of most of the reports printed so far has as yet gone unexplained. It reads *NON-CITY PORTION EXCLUDED*. What this means is that only those areas in the 196 tracts which are within the City boundaries have data reported on them. For example, if a certain tract was half within the City and half outside, then the results printed for that tract would be one half the result for the total tract area. See the map on the next page for the Housing Calculation Tool study area.

You may elect, for most options and most reports, to see data for the total 196 tract area, whether the area is within the City or not. The command for this is:

INCLUDE NONCITY

From this point on, while you are in the *REPORTS* workspace, you will see data printed for total tracts, whether for individual tracts, *CD*, or *610 tracts*, or the entire *CITY*. Also, the line *NON-CITY PORTION INCLUDED* will print.

To return to the non-City portion excluded for the other reports, enter the command:

EXCLUDE NONCITY

or just reload the *REPORTS* workspace. The *EXCLUDE NONCITY* command is in effect when you load the workspace; the *INCLUDE NONCITY* command is not saved between successive loads of the workspace.

C. Error Messages

A number of error messages may result from invalid entries made in the program in the *REPORTS* workspace. The following is a list of these messages, and their meaning. All error messages are preceded by three stars. If the error message was received after you responded to a prompt within one of the programs, you are re-prompted.

*** *NOT A TRACT*

Enter one of the 196 possible tract numbers.

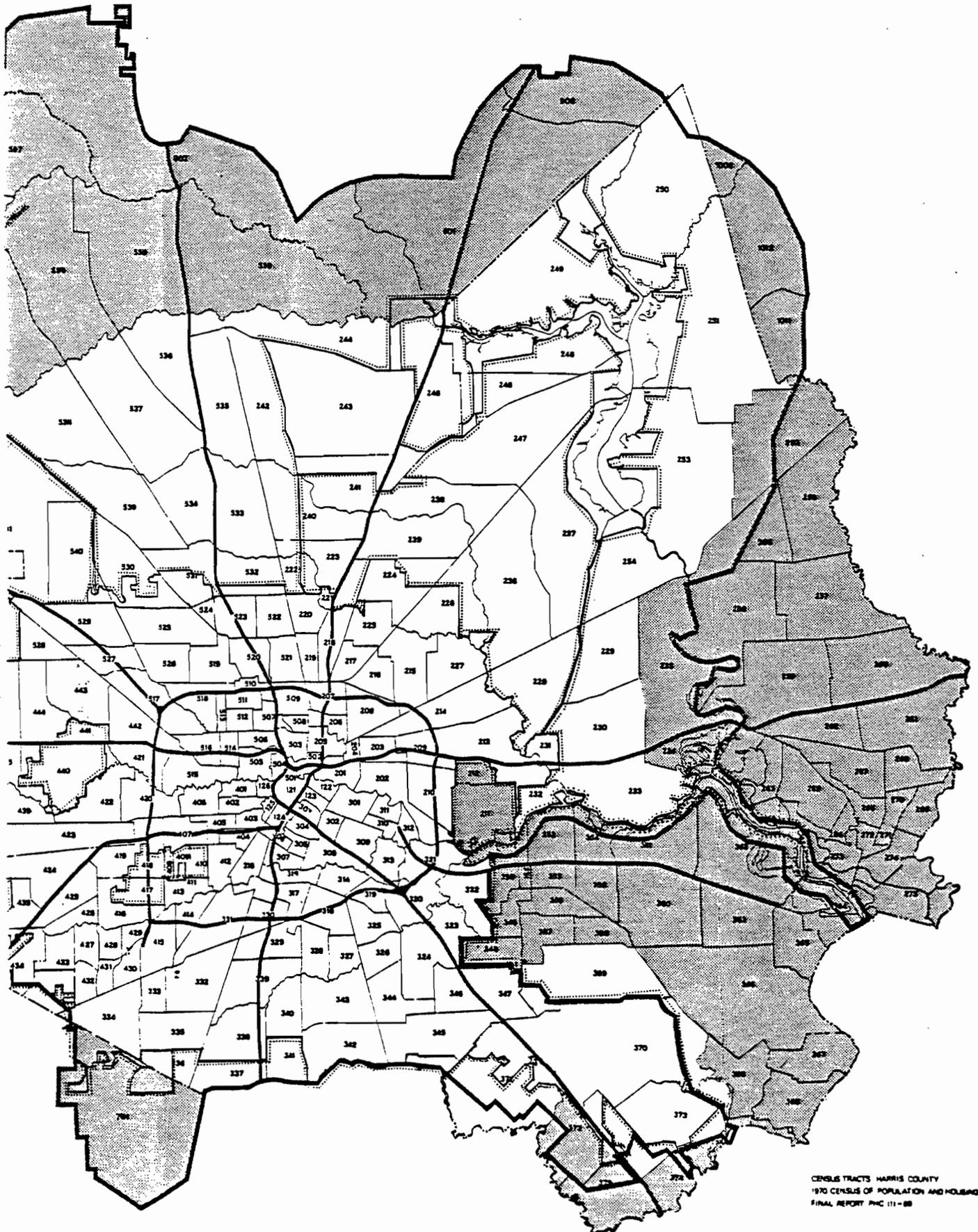
*** *Y OR N*

Enter the single letter Y or N, for yes and no.

*** *FORECAST NOT IN SYSTEM*

The output set number you specified does not exist for the given module and time period.

*** *<EXCLUDE NONCITY> NOT SUPPORTED FOR <NAT CITY> OR <IMM CITY>*



CENSUS TRACTS, HARRIS COUNTY
1970 CENSUS OF POPULATION AND HOUSING
FINAL REPORT PHC (1)-88

VIII. EVALUATION OF GROWTH OPTION IMPACT ON THE HOUSING MARKET

A. Introduction

Whenever a user wishes to explore the consequences of various estimates of population, households, and units on the housing market, the Housing Calculation Tool can be used to match forecasts of households and units for the same time period. Results of the match routine define the extent of needs for assisted housing by low and moderate income households. In this section, procedures are described for running a match, and reporting its results.

B. Preparing a Match Forecast

The *HAPPREP* workspace is used to prepare household and unit forecasts for a match for a given time period. Any five-year time period can be selected between 1970-2000. Any household or unit forecast can be used. The procedures for selection of the time period and appropriate household and unit forecasts are as follows:

- Step 1: Load *HAPPREP* workspace.
- Step 2: Select the *HAP* report name and number to be generated. You have up to 20 characters.
- Step 3: Enter which growth option you will be evaluating. Select from among:
1. Trend
 2. Energy Crisis
 3. Inner City Growth
 4. Multiple Activity Centers
 5. Corridors Development
 6. Other
- Step 4: Select the appropriate forecast year. Enter any one of the following options:
- | | |
|------|------|
| 1975 | 1990 |
| 1980 | 1995 |
| 1985 | 2000 |
- Step 5: Select the household forecast type to be used. Select between one of the two following options:
1. Population-based
 2. Unit-based tract aggregate
- Step 6: Select the housing unit forecast to be used. Indicate the forecast year and the unit forecast number.
- Step 7: Select option for printing Table One. In this case, determine whether or not you want to print a summary of housing units by condition in the format used for the Housing Assistance Plan. See next page for a sample.

TABLE ONE

City of Houston - Office of the Mayor
Housing and Population Data

Housing Assistance Plan
Survey of Housing Conditions
Printed Apr 18, 1979

RUN 12

Number of Housing Units

Status and Condition of All Housing Units	Year of Estimate	All Units		Owner		Rental	
		Total	Subtotal Suitable for Rehab	Total	Subtotal Suitable for Rehab	Total	Subtotal Suitable for Rehab
1. Occupied Units - Total	1980	639,564	142,426	264,775	61,071	374,789	81,355
A. Substandard	1980	102,378	142,426	39,033	61,071	63,345	81,355
B. Standard	1980	537,186		225,742		311,444	
2. Vacant Units - Total	1980	31,407	7,232	5,960	1,621	25,447	5,611
A. Substandard	1980	5,461	7,232	992	1,621	4,469	5,611
B. Standard	1980	25,947		4,968		20,979	
3. All Units - Total	1980	670,971	149,658	270,735	62,692	400,236	86,966
4. Vacancy Rate	1980	4.681	4.832	2.201	2.586	6.358	6.452

STEP2
OWNER UNITS BEFORE VACANCY REDUCTION: 270735
RENTER UNITS BEFORE VACANCY REDUCTION: 400236

OWNER UNITS AFTER VACANCY REDUCTION: 264775
RENTER UNITS AFTER VACANCY REDUCTION: 374789

Once these steps have been completed, the computer will prepare the selected household and unit forecasts for use in the matching routine. Vacancy assumptions will be applied to the unit forecast to create a count of occupied units. The unit forecast will also be reduced by the estimate of structurally unsound units for the time period. Household forecasts will be organized into the household characteristics pertinent to the matching routine: age, race, sex, size, and income.

C. Running a Match Forecast

This is an automatic process. Once the *HAPPREP* process is complete, load the *HAPRUN* workspace. Follow all instructions appearing as prompts on the computer console.

D. Running a Match Report

After a match result has been created, you can obtain a report on the results by loading the *HAPRPT* workspace. You will be asked to select whether or not the report should be run for all households or low income households only. Typically, you should select low income households only. After this selection you will be prompted to select from one of the following options:

1. Print this report
2. Choose another report to print
3. Print a list of all *HAP* results on file
4. Stop program

Based upon this selection, follow any prompts which appear on the console.

See the following pages for an example of the report which is generated.

City of Houston - Office of the Mayor
Housing and Population Data

Housing Assistance Plan
Housing Assistance Needs of Lower Income Households
Printed Apr 18, 1979

RUN 12

Number of Households

All Households	Total	Elderly	Family	Large Family
Owner Households	80,864	18,733	45,961	16,170
Rental Households	106,546	12,139	73,618	20,789
Total Housing Assistance Needs	187,410	30,872	119,579	36,959
Percent of Total	100.00	16.47	63.81	19.72

All Female Headed Households

All Female Headed Households	Total	Elderly	Family	Large Family
Owner Households	37,709	9,078	22,178	6,453
Rental Households	60,933	7,883	42,227	10,823
Total Housing Assistance Needs	98,642	16,961	64,405	17,276
Percent of Total	52.63	9.05	34.37	9.22

All Minority Households

All Minority Households	Total	Elderly	Family	Large Family
Owner Households	40,968	5,941	23,263	11,764
Rental Households	57,677	3,782	37,984	15,911
Total Housing Assistance Needs	98,645	9,723	61,247	27,675
Percent of Total	52.64	5.19	32.68	14.77

City of Houston -- Office of the Mayor
Housing and Population Data

Housing Assistance Plan
Housing Assistance Needs of Lower Income Households
Printed Apr 18, 1979

RUN 12

Number of Households

White Households	Total	Elderly	Family	Large Family
Owner Households	39,896	12,792	22,698	4,406
Rental Households	48,869	8,357	35,634	4,878
Total Housing Assistance Needs	88,765	21,149	58,332	9,284
Percent of Total	47.36	11.28	31.13	4.95

Black Households

Black Households	Total	Elderly	Family	Large Family
Owner Households	31,358	5,138	18,209	8,011
Rental Households	45,012	3,283	30,586	11,143
Total Housing Assistance Needs	76,370	8,421	48,795	19,154
Percent of Total	40.75	4.49	26.04	10.22

Spanish American Households

Spanish American Households	Total	Elderly	Family	Large Family
Owner Households	9,610	803	5,054	3,753
Rental Households	12,665	499	7,398	4,768
Total Housing Assistance Needs	22,275	1,302	12,452	8,521
Percent of Total	11.09	.69	6.64	4.55

IX. MISCELLANEOUS INFORMATION

A. Escaping From an Input Prompt

Some programs which require information in the form of responding to input prompts may need many lines worth of input. The most notable of these are some of the assumption programs in the *ASSUMPTIONS* workspace, when using the *CREATE NEW* or *REPLACE* option.

You may find that you need to interrupt the entry of data in a program, i.e., get out of the program immediately, sign off, and leave. You may do this by typing the single word *STOP*, when you are being requested for input of any kind. for example:

```
                MODIFY HEADSHIP 1
RACE:  W
SEX:   M
AGE:   STOP
```

The program does not procede to ask for the data, which would have been the next step. The program is exited immediately. In addition, if you have entered a good deal of input up to the point where *STOP* was entered, all this input will be lost. After typing *STOP* and pressing return, you are free to sign off, start another program, etc.

B. Backup of Program and Data Diskettes

Effective operation of the Housing Calculation Tool requires routinized procedures for copying data files and programs. A machine or software malfunction could cause the loss of hours or weeks of work unless copies of forecasts, assumptions, or programs exist. Copying program and data diskettes is a simple, cheap process. Diskettes cost \$5 to \$6 and can be used over and over.

Suggested guidelines for back up of the Housing Calculation Tool are as follows:

1. Keep two copies of the current workspaces and control and assumptions diskette. One copy should reside in the office, and another off-site.
2. Copy the control and assumptions diskette preferably after each day of use of the Tool. In no event less than every two or three days of use of the Tool. The control and assumptions diskette is the most important file in the Housing Calculation Tool operation. It provides the directory of all past work and location of all current forecasts.
3. Copy important forecasts or data bases as needed. Not every forecast needs to be copied. If lost, it can be rerun using the same assumptions. Therefore, always produce a printout of a forecast report. This provides a copy of all assumptions used to run the forecast.

Some forecasts are time-consuming to run (e.g., unit forecasts, or tract level households). In such cases, extra copies of such forecasts should be made. Also, extra copies of the 1970 data base should be kept. It cannot be easily recreated if lost.

The procedures for copying a diskette are as follows:

- Step 1: Turn the machine on.
- Step 2: Take a new two-sided, double-density diskette and initialize to 512 byte sector size, if not already a 512 sector disk.
- Step 3: Place IBM Utilities diskette in Drive 1.
- Step 4: Enter command *LINK DDCOPY* and hit execute.
- Step 5: Respond to the following prompt:

DISKETTE TO DISKETTE COPY FUNCTION

OPTIONS ARE:

- 1. COPY ONE FILE*
- 2. COPY ALL FILES*
- 3. COPY A GROUP OF FILES*

SELECT OPTION, PRESS EXECUTE

by entering 2 and hitting execute.

- Step 7: Respond to the following prompt:

HOW MANY DISKETTE DRIVES WILL YOU BE USING

OPTIONS ARE:

- 1. ONE DISKETTE DRIVE*
- 2. TWO DISKETTE DRIVES*

SELECT OPTION, PRESS EXECUTE

by entering a 2 and hitting execute.

- Step 7: Respond to the following prompt:

*INSERT DISKETTE BEING COPIED FROM
INTO SELECTED DISKETTE DRIVE*

ENTER DRIVE NUMBER, PRESS EXECUTE

*INSERT DISKETTE BEING COPIED TO
INTO SELECTED DISKETTE DRIVE*

ENTER DRIVE NUMBER, PRESS EXECUTE

by inserting the diskette being copied from in drive 1, enter 1, and hit execute. Insert the diskette to be copied to in drive 2, type 2, and hit execute.

Step 8: When complete, the following display will appear:

DISKETTE COPY COMPLETED

OPTIONS ARE:

- 1. RESTART COPY FUNCTION*
- 2. RETURN TO THE SYSTEM*

ENTER OPTION, PRESS EXECUTE

Enter 2 and hit execute. You can now proceed to other tasks.

C. Disk Initialization

The Housing Calculation Tool must use diskettes for storing forecasts. Diskettes must be prepared to accept the forecast. Each must be formatted to accept the forecast generated by the various forecast routines. This entails a two-part process in which part one may not be required.

Part One: Initialize the Diskette to the Correct Sector Size.

Follow the steps outlined below only if the diskettes you purchased were not initialized at 512 bytes per sector. Be sure to specify 512 bytes per sector at the time of purchase. Also specify that the diskette is two-sided and double density.

If the diskettes are two-sided, double density, but initialized at a sector size other than 512 bytes, follow these steps:

Step 1: Load the IBM Customer Support Diskette in Drive 1.

Step 2: Type *)LINK INITIAL*

Step 3: Respond to the prompt:

DISKETTE INITIALIZATION FUNCTION.

OPTIONS:

- 1. DESCRIPTION OF FUNCTION*
- 2. RETURN TO SYSTEM*
- 3. ENTER INITIALIZATION COMMAND*

ENTER OPTION NUMBER IN POSITION ONE AND PRESS EXECUTE TO CONTINUE

with a 3.

Step 4: Respond to the prompt:

INIT VOL-ID, OWNER-ID, FORMAT, SEQUENCE NUMBER

ENTER APPROPRIATE INITIALIZATION COMMAND AND PRESS EXECUTE

INIT -

by typing after the word *INIT* the first initial of your last name, the year as a single digit, the month as two digits, and the day as two digits followed by a comma, then the word *FORECAST* followed by a comma, then the number 8, and hit execute. For example:

INIT A91028, FORECAST, 8

Step 5: Respond to the prompt:

ADDITIONAL FILE LABELS CAN BE PLACED ON THIS DISKETTE. THE NUMBER OF FILE LABELS CAN BE FROM 71 TO 1007. ENTER ONE OF THE FOLLOWING AT POSITION ONE AND PRESS EXECUTE.

OPTIONS:

<i>BLANK ALLOTS 71 FILES</i>	<i>4 ALLOTS 487 FILES</i>	<i>7 ALLOTS 799 FILES</i>
<i>1 ALLOTS 175 FILES</i>	<i>5 ALLOTS 591 FILES</i>	<i>8 ALLOTS 903 FILES</i>
<i>2 ALLOTS 279 FILES</i>	<i>6 ALLOTS 695 FILES</i>	<i>9 ALLOTS 1007 FILES</i>
<i>3 ALLOTS 383 FILES</i>		

by hitting execute.

Step 6: Respond to the prompt:

INSERT DISKETTE TO BE INITIALIZED IN DESIRED DRIVE. ENTER ONE DIGIT DRIVE NUMBER TO BE USED IN THE FIRST POSITION AND PRESS EXECUTE TO CONTINUE.

by removing the IBM Customer Support Diskette from Drive 1 and inserting the diskette to be reinitialized in Drive 1. Type 1 and hit execute.

Step 7: After the initialization is complete, check to see if the message on the screen is as follows:

DISKETTE INITIALIZATION COMPLETE.

THERE ARE NO DEFECTIVE CYLINDERS ON THIS DISKETTE.

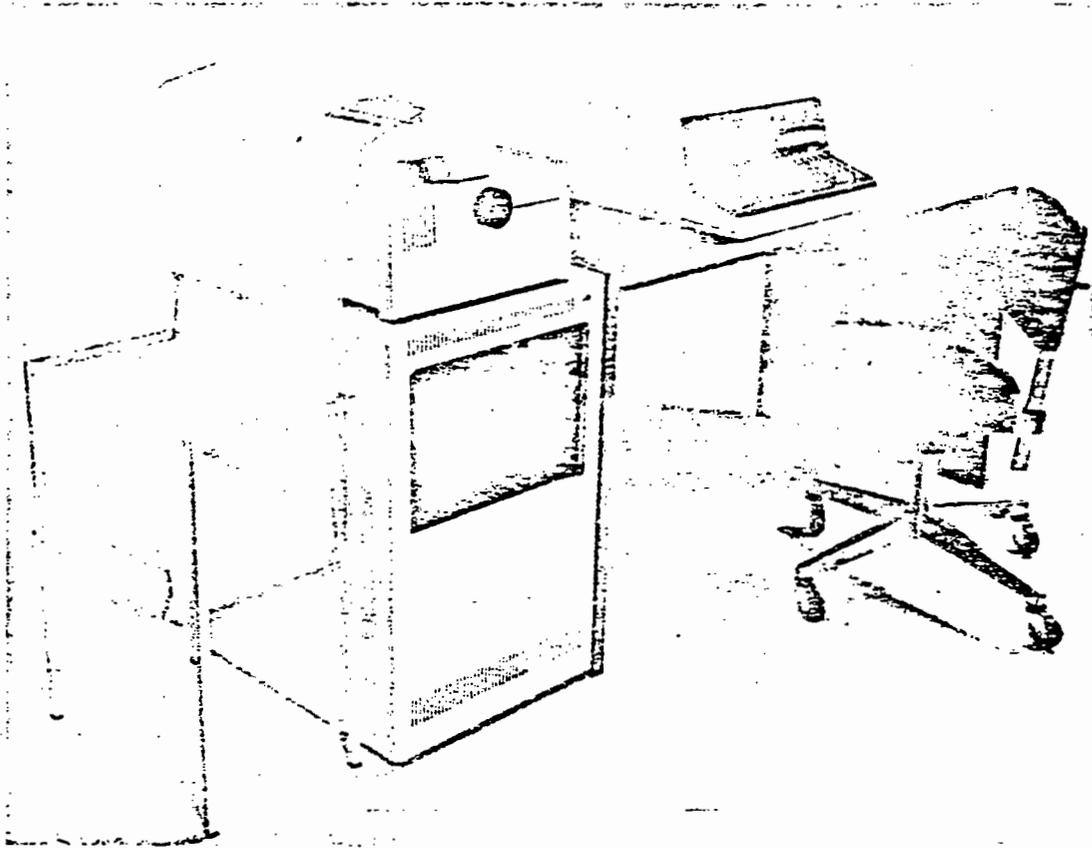
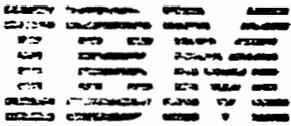
PRESS EXECUTE TO CONTINUE.

If the message says there are defective cylinders, dispose of the diskette, retrieve another diskette and repeat the process.

Part Two: Formatting the Diskette

Follow the steps outlined below to format the diskette(s) to accept a new forecast.

- Step 1: Load the *STATE* workspace.
- Step 2: Type *INIT* and execute.
- Step 3: Select which type of forecast the diskette will be prepared to accept. For example, HH = households; PreF = Preferences; U = units. Ignore preferences.
- Step 4: You will be asked to get one new 512 byte diskette for households and four diskettes for units. Follow the labeling instructions exactly, placing the label on the diskette itself.
- Step 5: Respond to each *)FREE* prompt by typing GO and hitting execute.
- Step 6: Respond to each *)MARK* prompt by typing back in the *)MARK* prompt including the numbers exactly as it appears on the console and hitting execute. Respond to each successive prompt by typing GO and hitting execute until another *)MARK* prompt appears. Type back in the *)MARK* prompt including the numbers exactly as it appears on the screen. Repeat the process until you are instructed the initialization is complete. Pull out the diskette from the drive unit and continue your preparations to run a forecast.



IBM 5110 COMPUTING SYSTEM

Designed to address a wide variety of commercial and problem solving applications in both the small and large business, the IBM 5110, with associated units, is IBM's newest low-price data processing system.

Equipped with high function BASIC and APL languages, direct access diskette, tape cartridge media, and character printer, the IBM 5110 can be programmed for processing many commercial applications such as: payroll, general ledger, and accounts receivable. The interactive language implementation and ease-of-use characteristics make the IBM 5110 attractive for the problem solving requirements of financial analysts, engineers, actuaries, and many other professionals. With its communications options, the IBM 5110 can address the remote requirements of either commercial or problem solving applications.

The IBM 5110 Computer provides significant new functions and enhancements, while retaining the effective ease-of-use and portability features of the IBM 5100 Portable Computer.

Highlights

- Low-Priced data processing system
- Configuration flexibility from 16K to 64K
 - Tape system
 - Diskette system
 - Diskette and tape system
- IBM's newest diskette storage
 - 1.2, 2.4, 3.6 or 4.8 megabyte capacity
- Powerful BASIC and APL language enhancements
 - New file access methods
 - Full screen management
 - Dynamic print formatting
 - Procedure files

THIS INFORMATION IS AN ABSTRACT OF IBM ANNOUNCEMENT MATERIAL. IT IS SUBJECT TO REVISION OR CORRECTION AT ANY TIME. FOR PRICES, CONTRACTUAL TERMS AND CONDITIONS, AND DELIVERY SCHEDULES, CONTACT YOUR GSD MARKETING REPRESENTATIVE.

- Greatly enhanced throughput over the current IBM 5100
 - Update in place: tape (BASIC only) and diskette (APL and BASIC)
 - Diskette direct access
 - High speed diskette data transfer rate (62,500 bytes per second)
 - Record I/O (tape and diskette)
- Diskette Sort Feature
 - Resident in Read-Only Storage (ROS)
- Media exchange capability with other systems supporting standard interchange diskette conventions
- Binary Synchronous Communications Feature
 - 3741 and 2770 line protocol emulation
 - Up to 4800 bps
- Parallel I/O Interface based on IEEE 488-1975
- Audible alarm feature
- Customer support functions
 - Diskette Initialize
 - Diskette Recovery
 - Diskette Compress
 - Diskette Label Display
 - Tape Data Recovery
 - Tape-to-Diskette Copy
 - Tape Header Recovery
 - Diskette-to-Tape Copy
 - Diskette-to-Diskette Copy
 - Tape-to-Tape Copy
 - Generalized Loader
- Bidirectional printer with speeds of 80 or 120 characters/second offering upper/lower case capability
- Asynchronous communications feature with 2741 emulation
- CRT for display of keyboard input, output, and user guidance
- 5106 Auxiliary Tape Unit
- Serial I/O Interface
- Adapter for black and white TV monitor
- Standard EBCDIC National Use Graphics available on all systems

IBM 5100 Portable Computer Compatibility (Equivalent configuration assumed)

- Any APL workspace saved on the IBM 5100 will run on the IBM 5110.
- IBM 5100 BASIC Source programs are syntactically compatible with the IBM 5110; however, some minor modifications may be necessary to produce identical results.
- Conversion of both BASIC and APL IBM 5100 programs may be advantageous to allow use of new IBM 5110 features.

System Components

The IBM 5110 is offered in two model groups: Models A11 through C14 (called Model 1s) include a standard inboard tape cartridge unit and can attach the 5106 Tape Unit and the 5114 Diskette Unit.

Models A21 through C24 (called Model 2s) do not include the inboard or auxiliary tape cartridge unit and are designed to attach the 5114 Diskette Unit for storage media. All other IBM 5110 features pertain to all models within configuration constraints.

All models can attach the 5103 Printer and the 5114 Diskette Unit.

Processing Unit

- Metal Oxide Semiconductor Field Effect Transistor (MOSFET) main storage
- MOSFET Read-Only Storage (ROS) at 96K bits/module and 72K bits/module
- 16K, 32K, 48K, or 64K bytes of main storage
- 530 nanosecond main storage cycle time per two bytes
- Internal parity checking
- Binary floating-point arithmetic internal representation of data

Interactive Languages

- Available in three options:
 - APL and BASIC combined
 - BASIC only
 - APL only
- Implemented in Read-Only Storage (ROS)
- With combination model a combined keyboard is provided
- A switch allows user selection of language
- Enhanced language functions in addition to those provided with the IBM 5100 Portable Computer

APL/BASIC Common Language Enhancements

- Internal computer time improvement (up to three times that of the IBM 5100 depending upon the instruction mix)
- Record input/output for diskette and tape
- Displaying and printing of upper/lower case characters
- Full screen management
- Unattended job streams
- Access to international EBCDIC symbols
- Access to the optional audible alarm feature

BASIC — Greatly enhanced for commercial applications

- Diskette Indexed File Access Method
- Update in place for diskette or tape files
- Dynamic print formatting
- Ascending/Descending Index Sort
- Many other improvements are described in the BASIC User's Guide (SA21-9307)

APL

- Latest level of APL/SV (Release 3.0)
- Additional system commands for diskette I/O
- Multiple record reads and writes
- Printer left margin control
- Many other improvements are described in the APL User's Guide (SA21-9302)

Keyboard

- Keyboard has familiar alphameric typewriter layout, plus a separate numeric pad. Keytops indicate special characters for BASIC and/or APL, depending on the model. Four operator keys located to the right of the numeric pad provide arithmetic functions.
- System control keys, switches, and status indicator lights are readily accessible.
- Insert/delete and scroll capabilities increase user productivity.
- Command keywords appear on the keyfaces (to avoid keying errors).

Display Screen

- Upper/lower case display under program control.
- Programmable full screen management including automatic cursor positioning and CRT on/off control.
- Used to display keyed input, provide operator guidance, and display output.
- Five-inch diagonal CRT (16 lines of 64 characters totaling 1,024).
- Displays all BASIC and APL characters.
- High resolution character generation provides clarity.
- User may select via switch, black characters on white background or white on black.

Tape Cartridge

On Model 1s only, a removable tape cartridge provides up to 204K bytes of storage on 300 feet of 1/4 inch tape.

Black and White TV Monitor Adapter

- Provides for simultaneous display of CRT data on larger screens for viewing by larger audiences.
- Multiple black and white monitors can be serially connected from one IBM 5110.

Special Features

Data Communications

Optional Binary Synchronous Communications capability allows the IBM 5110 to function on a switched, leased, or private communications line as a processor terminal emulating 3741 line protocol or 2770 line protocol in conjunction with BASIC or APL program control.

- Transmission rates up to 4800 bps
- Integrated 1200 bps modems
- Host access support (System/370 via ICA or 3704/3705)
- DB/DC support (CICS/VS, IMS/VS as a 2770)
- RJE support (RES, JES2)
- Multipoint (as a tributary) operation
- Auto answer
- Easy-to-use data communications support functions
- Diskette Input/Output support

Optional Asynchronous Communications capability

- Provides for 2741 compatibility (EBCD or correspondence code) using start/stop discipline
- Transmission speeds of 134.5 bps or 300 bps are supported over switched and non-switched facilities
- Tape and diskette data transfer support
- Audible alarm support

Diskette Sort Feature

- Resident in Read-Only Storage (ROS)
- Full record sorting or record address sorting
- Can be invoked from either BASIC or APL programs
- Sort key can contain up to six sort fields
- Control statements can be stored on diskette or entered from the keyboard via prompting messages

Parallel I/O Adapter

- Interface for external device attachment
- Can attach and control up to 14 external devices
- Based on IEEE Standard 488-1975
- Operates in conjunction with BASIC and APL programs

Serial I/O Adapter

- Interface for external device attachment
- 5-, 6-, 7- and 8-bit transactions
- Based on RS-232-C Interface
- Operates in conjunction with BASIC and APL programs

Audible Alarm

The optional audible alarm is provided to signal the operator that his/her attention is required by way of system control or user program control.

Data Security/Integrity

Responsibility for the protection of data from unauthorized or accidental modification, destruction, or disclosure lies with the customer. However, the IBM 5110 Computing System, in conjunction with programming support, offers built-in characteristics to assist the customer in achieving a level of protection appropriate to his needs.

5114 Diskette Unit

The 5114 Diskette Unit provides for optional additional capacity storage for data and programs.

- Offers direct access processing improving data access times and inquiry capabilities and overall system throughput.
- Each 5114 has one standard diskette drive with a maximum of 1.2 megabytes capacity and a second optional diskette drive with a maximum of 1.2 megabytes capacity.
- A maximum of two 5114 Diskette Units (four drives) can be attached to the IBM 5110 providing a total online storage capacity of up to 4.8 megabytes.
- Provides capability for diskette media exchange with other systems supporting standard interchange diskette conventions.
- Record Input/Output facilitates file updating.
- Multiple open files (maximum of ten) for increased performance and application flexibility.

5103 Printer

Models 11 and 12 of the 5103 Printer are new and attach to the IBM 5110. These models have print speeds of 80 and 120 characters/second respectively. They allow print overlap with other IBM 5110 processing as well as printing of upper/lower case characters.

5106 Auxiliary Tape Unit

A new model of the 5106 (Model 11) allows additional storage to be attached to the IBM 5110 Model 1s. Speed and capacity are the same as previous model.

Transportation Charges . . . All units of the IBM 5110 Computing System will be FOB Plant of Manufacture.

Model Upgrades . . . All model upgrades and features are field installable.

Terms and Conditions

The IBM 5110, 5103, 5106 and 5114 are purchase-only units. The IBM 5100/5110 Purchase Pilot Test Plan will apply for the IBM 5110 Computing System. This plan allows the customer to try the system prior

to purchase. The following IBM contracts apply for the IBM 5110 Computer, the IBM 5100 Portable Computer, the 5103 Printer, the 5106 Auxiliary Tape Unit, and the 5114 Diskette Unit.

- Agreement for Purchase of IBM 5100/5110 Computer Equipment
- Agreement for Lease or Rental of IBM Machines — Purchase Pilot Test Plan — 5110/5110 Computer Equipment
- Agreement for Purchase of Installed IBM 5100/5110 Computer Equipment
- IBM 5100/5110 Computer Equipment Installment Payment Agreement
- Agreement for IBM Systems Engineering Services
- IBM Maintenance Agreement
- Agreement for IBM Licensed Programs
- Composite Signature Agreement — 5100/5110 Computer Equipment

Warranty

The customer performs the initial setup with directions provided with the IBM 5110 Computer. The warranty period extends from shipment from the plant for ten days plus three months.

Customer Setup

The IBM 5110 Computer has been designed with ease of customer setup and relocation in mind. In most cases, step-by-step instructions, packaged in the shipping container, will enable the customer to set up and check out his equipment immediately upon arrival without CE assistance. Relocation is also possible without CE assistance.

Program Testing Allowance

No pre-installation testing allowance will be given. A customer with an on-order IBM 5110 may purchase test time at prevailing rates. This test time must be scheduled by the customer through his IBM Marketing Representative.

Programming Support

Five IBM Problem Solver Libraries enable the professional problem solver to use the IBM 5110 with speed, economy, and convenience. Developed to take advantage of the features of the IBM 5110, these programs are oriented toward the individual solving problems. The libraries are:

- | | |
|---------------------------|----------|
| • Business Analysis/BASIC | 5721-DC5 |
| • Math/BASIC | 5721-DC6 |
| • Stat/BASIC | 5721-DC7 |
| • Print Plot/BASIC | 5721-DC3 |
| • Print Plot/APL | 5721-DC4 |

The Problem Solver Libraries are available in data cartridge or diskette, accompanied by a User's Guide. Each of the Business Analysis, Math, and Scat libraries consists of two data cartridges or a single diskette; each of the Print Plot libraries has a single data cartridge or a single diskette. The customer will need additional cartridges and diskettes for backup and storage.

All the information necessary to operate the system is contained in the User's Guide, including the facilities for editing, error message handling, and recovery from hard failures. The cartridges or diskettes contain the machine readable code to operate on the IBM 5110. They also give the user-prompting messages via the CRT to make it easier to use the routines in the libraries.

Cables

Cables are shipped with the IBM 5110 Computing System and require no cable ordering with the exception of the Parallel I/O feature. Cable lengths are as follows:

	<u>Power</u>	<u>Signal</u>
IBM 5110 Computer	1.8m (6 ft.)	- -
Modem Cable for Asynchronous Communications	- -	1.8m (6 ft.)
Modem Cable for Binary Synchronous Communications	- -	6.0m (20 ft.)
Printer	1.8m (6 ft.)	1.2m (4 ft.)
Auxiliary Tape Unit	1.8m (6 ft.)	.6m (2 ft.)
Diskette Unit	1.8m (6 ft.)	1.2m (4 ft.)

Physical Planning

	<u>Weight</u>	<u>Dimensions</u>
IBM 5110 Model 1	23 kg (50 lbs)	45 x 61 x 20 cm (17½" x 24" x 8")
IBM 5110 Model 2	20 kg (43 lbs)	45 x 61 x 20 cm (17½" x 24" x 8")
IBM 5103	25 kg (55 lbs)	59 x 34 x 19 cm (24" x 14" x 12½")
IBM 5106	9 kg (20 lbs)	31 x 26 x 19 cm (12¼" x 10" x 7½")
IBM 5114 Single Drive	55 kg (120 lbs)	45 x 57 x 74 cm (17½" x 22¼" x 29")
IBM 5114 Two Drive	62 kg (136 lbs)	45 x 57 x 74 cm (17½" x 22¼" x 29")

Additional physical planning information may be obtained by referring to *IBM 5110 General Information and Physical Planning Manual* (GA21-9300).

APPENDIX II

GROWTH OPTION TOOL OPERATIONS SUMMARY

I. INTRODUCTION

This simplified operating summary is designed to be a reference guide for development of growth options using the Housing Calculation Tool. It presumes prior knowledge of the general operating procedures and logic of the Housing Calculation Tool. Running procedures for each module of the Tool are enumerated. All assumptions required to run each module are also identified.

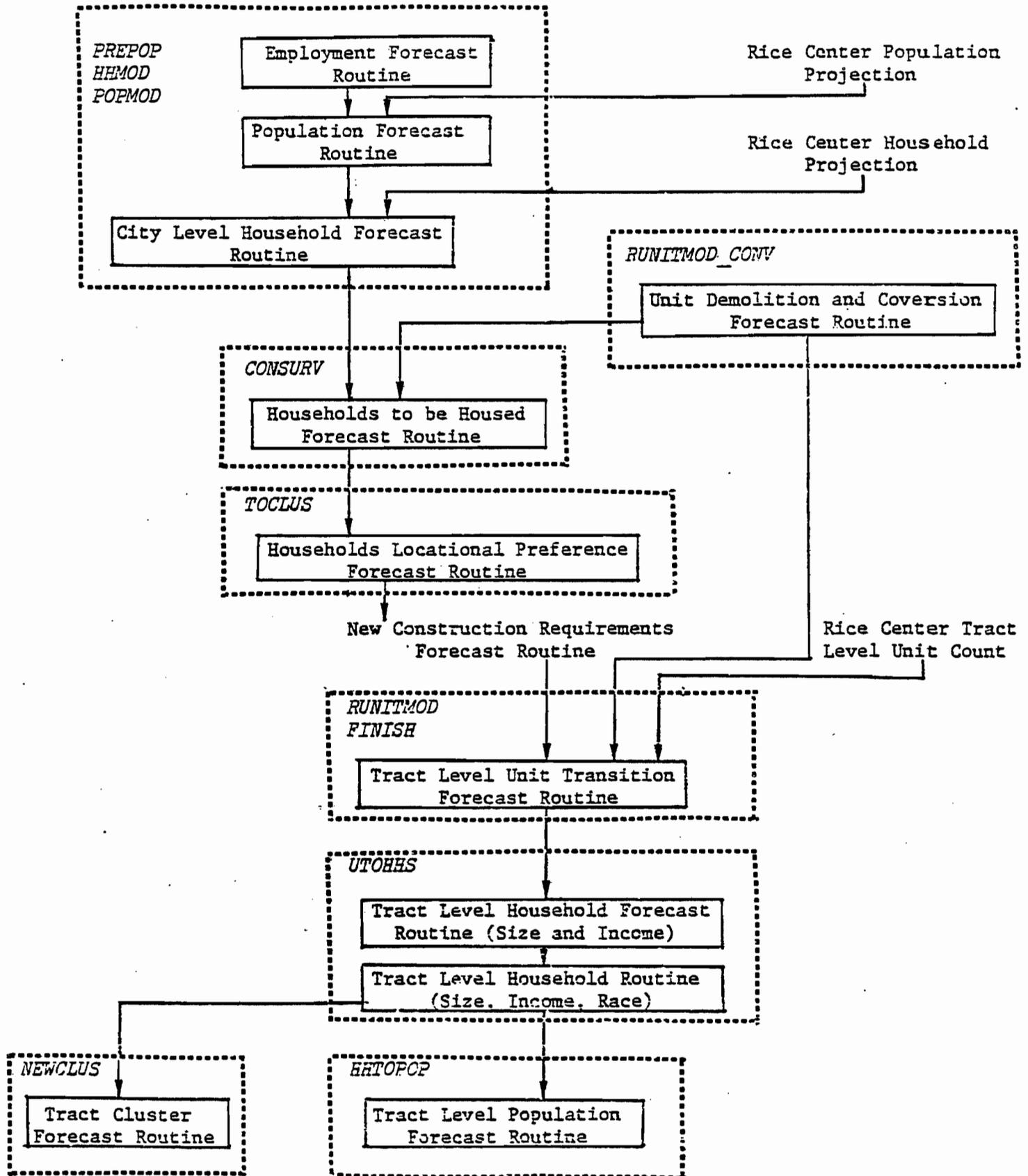
There are seven major housing tool modules which must be used in order for a growth option to be expressed and evaluated. They are:

- Employment/Population and Household Forecast Module
- Locational Preferences Module
- Unit Forecast Module
- Tract Level Household Forecast Module
- Tract Level Population Forecast Module
- Tract Cluster Forecast Module

Operation of each module is outline below. The sequence of description follows the normal sequence for running the module. Figure 1 shows the interrelationships of the modules and also denotes which Housing Calculation Tool workspaces are used to run each module. In Figure 2, a worksheet is provided for users to log progress in running a growth option forecast.

FIGURE 2

GROWTH OPTION
FORMULATION METHODOLOGY



II. EMPLOYMENT/POPULATION HOUSEHOLD FORECASTS

These forecasts are generated through use of a single set of interrelated programs found in four different workspaces:

- *PREPOP*
- *STATE*
- *POPMOD*
- *HEMOD*

The user is guided through these programs by a series of prompts contained in the programs. These steps identified below outline the on sequence of workspaces and programs to be executed. The running sequence will be as follows:

Step 1: Load the *PREPOP* workspace.

Step 2: Execute the *STEP1* function and provide input in response to the following prompts:

*WHICH TIME PERIOD:
 NUMBER OF JOBS:
 % JOBS DONE BY HARRIS CNTY RESIDENTS:
 UNEMPLOYMENT RATE (AS A %):
 LABOR FORCE PARTICIPATION RATE (AS A %):
 PERCENT OF WHICH ARE <16:
 PERCENT IN OUR 196 TRACTS:*

*USE A PREVIOUSLY CREATED POP DIST?
 WHICH TIME PERIOD:*

Step 3: Follow the disk swapping prompts as instructed.

Step 4: Once *STEP1* is complete, load the *STATE* workspace to prepare for a population forecast.

Step 5: Once *STATE* is loaded, select the following assumptions:

<u>Assumption</u>	<u>Type In (And Execute)</u>	<u>Example</u>
● Type of forecast to be run	<i>POP</i>	
● Forecast period	Time Period	<i>1990</i>
● Birth rate	<i>BIRTH</i> and preferred birth rate assumption number	<i>BIRTH 4</i>
● Death rate assumption	<i>DEATH</i> and preferred death rate assumption number	<i>DEATH 1</i>
● In-migration population assumption	<i>IPOP</i> and assumption number	<i>IPOP 1</i>

- Previous period population forecast to be used as base *OLDPOP* from previous period forecast set number *OLDPOP FROM 5*

Step 6: Ready the above assumptions for use in the forecast routine by typing *SAVESTATE*.

Step 7: Check to see if all assumptions have been properly set up by typing *RUN*.

Step 8: If everything checks, load the *POPMOD* workspace which will automatically prepare a population forecast.

Step 9: Once the population forecast is complete, load the *PREPOP* workspace again.

Step 10: Run *STEP2* by typing *STEP2* and execute.

Step 11: Once *STEP2* is complete, load the *STATE* workspace to prepare a household forecast assumption.

Step 12: Prepare the following assumptions:

<u>Assumption</u>	<u>Type In (and execute)</u>	<u>Example</u>
● Type of Forecast to be Run	<i>HH</i>	--
● Period of Forecast to be Run	Run period	<i>1980</i>
● Headship Assumption	<i>HEADSHIP</i> and assumption number	<i>HEADSHIP 1</i>
● Household Size Assumption	<i>HHSIZE</i> and assumption number	<i>HHSIZE 2</i>
● Household Income Distribution for Net Natural Households	<i>HHINCINAT</i> and assumption number	<i>HHINCINAT 1</i>
● Household Income Distribution for Net In-migrant Households	<i>HHINCINM</i> and assumption number	<i>HHINCINM 1</i>
● Household Income Inflation Assumption	<i>INCINFL</i> and assumption number	<i>INCINFL 3</i>
● <u>Population</u> Forecast to be Used as Basis for Forecast	<i>POP FROM</i> and forecast number	<i>POP FROM 5</i>

- Previous Period Household Forecast to be Used as Basis for Forecast *OLDHH FROM* and forecast number *OLDHH FROM 3*
- Type of Household Forecast to be Run (For Tract Sum or Tract by Tract) *HHMOD CITY* --

- Step 13: After entering the assumptions, prepare them for use in the forecast module by typing *SAVESTATE* and execute.
- Step 14: Check whether or not the assumptions have been correctly set by typing *RUN* and execute.
- Step 15: If a forecast has not been prepared the *RUN* check will fail for lack of initialized diskettes. Execute *INIT* for households (*HH*) to prepare a diskette for storage of the forecast.
- Step 16: Load the *HHMOD* workspace which will automatically produce the desired household forecast.
- Step 17: Load the *PREPOP* workspace.
- Step 18: Execute the *STEP3* function. When this step complete, the population and household forecasts will be created for the requested time period.
- Step 19: To see the population forecast, load the *POP RPT* workspace.
- Step 20: Refer to Section VII of the Manual for report preparation instructions.
- Step 21: To see the household forecast, load the *HH RPT* workspace.
- Step 22: Refer to Section VII of the Manual for report preparation instructions.

III. HOUSEHOLDS TO BE HOUSED FORECAST MODULE

This module requires use of several workspaces, namely:

- *CONVSURV*
- *TOCLUS*
- *RUNITMOD*
- *STATE*

To prepare this forecast, follow these steps:

Step 1: Load the *STATE* workspace.

Step 2: Prepare the necessary assumptions to run a forecast of housing units surviving demolition and conversion by preparing the following assumptions:

<u>Assumption</u>	<u>Type In (and execute)</u>	<u>Example</u>
• Type of Forecast to be Run	<i>UNIT</i>	--
• Period of Forecast to be Run	Period	1990
• Assumption as to Owner Unit Survivors of Demolition and Fire Loss	<i>ODEMO</i> and assumption number	<i>ODEMO 1</i>
• Assumption as to Renter Unit Survivors of Demolition and Fire Loss	<i>RDEMO</i> and assumption number	<i>RDEMO 1</i>
• Assumption as to Owner Units Surviving Conversions	<i>OCNV</i> and assumption number	<i>OCNV 4</i>
• Assumption as to Renter Units Surviving Conversions	<i>RCNV</i> and assumption number	<i>RCNV 4</i>
• Assumptions as to Which Tract Clusters Combination Will be Used	<i>CLUSTERS</i> and assumption number	<i>CLUSTERS 1</i>
• Assumption as to Type of Unit Forecast to be Run	<i>UNITMOD CONV</i>	--
• Assumption as to Which Preceding Period Unit Forecast Should be Used as a Base	<i>OLDUNITS FROM</i> and forecast number	<i>OLDUNITS FROM 2</i>

Step 3: Initialize four disks for use in storing the forecast by typing *INIT* and following the prompts.

- Step 4: Prepare the assumptions for use in the forecast routine by typing *SAVESTATE*.
- Step 5: Check whether or not the assumptions have been prepared correctly by typing *RUN*.
- Step 6: Load the *RUNITMOD* workspace and follow the prompts for running the forecast.
- Step 7: When complete, load the *CONVSURV* workspace.
- Step 8: Execute the *SURV* function.
- Step 9: When running the *SURV* function enter the unit forecast number resulting from the forecast of demolition/conversion survivors and the appropriate household forecast number. (Note: Use number of forecast created in STEP 18 in the Employment /Population/Household Module). Be prepared to select assumptions for vacancy and clusters.
- Step 10: Load the *TOCLUS* workspace.
- Step 11: Execute the *RUN* function to allocate households to be housed to their locational preferences. (Note: There is no provision for storage of more than one set of locational preferences on file for any given period). Locational preferences will be automatically printed out cluster by cluster.

IV. UNIT FORECAST MODULE

Complete unit forecasts provide for demolition conversion and aging of the preceding period stock. Then rehabilitation occurs, and new construction is added. This produces a current period forecast. Based on this forecast, estimates of vacant and substandard units are also prepared.

In the previous module, a portion of the unit forecast is run (a forecast run through the estimate of conversions). To complete the forecast, the following workspaces are required:

- *RUNIT MOD*
- *STATE*

The following instructions govern their use:

Step 1: Load the *STATE* workspace.

Step 2: Set assumptions necessary to complete the unit forecast by entering the following:

<u>Assumption</u>	<u>Type In (and execute)</u>	<u>Example</u>
● Type of Forecast to be Run	<i>MODULE UNIT</i>	--
● Forecast Period	Time period	1990
○ Estimate of Rehabilitation of Owner Units	<i>OREHAB</i> and assumption number	<i>OREHAB 1</i>
● Estimate of Rehabilitation of Renter Units	<i>RREHAB</i> and assumption number	<i>RREHAB 2</i>
● Estimate of Tract Level New Construction (Owners)	<i>OTCONST</i> and assumption number	<i>OTCONST 3</i>
● Estimate of Tract Level New Construction (Renters)	<i>RTCONST</i> and assumption number	<i>RTCONST 3</i>
● Estimates of Cluster Level New Construction (Owners)	<i>OCCONST</i> and assumption number	<i>OCCONST 3</i>
● Estimates of Cluster Level New Construction (Renters)	<i>RCCONST</i> and assumption number	<i>RCCONST 4</i>
● Estimates of Unit Value Inflation	<i>VALINFL</i> and assumption number	<i>VALINFL 2</i>
● Estimates of Unit Rent Inflation	<i>RENTINFL</i> and assumption number	<i>RENTINFL 7</i>
● Estimates of Standard Condition Units (Owner)	<i>OSUIT</i> and assumption number	<i>OSUIT 2</i>

- Estimates of Standard Condition Units (Renter) *RSUIT* and assumption number *RSUIT 3*
- Estimates of Vacant Units (Owner) *OVAC* and assumption number *OVAC 4*
- Estimates of Vacant Units (Renter) *RVAC* and assumption number *RVAC 4*
- Type of Unit Forecast to be Run *UNITMOD FINISH* period and forecast number *UNITMOD FINSISH 1990 3*

Step 3: After the assumptions are entered, prepare them for use in the forecast routine by typing *SAVESTATE* and hitting execute.

Step 4: Check the assumptions by typing *RUN* and hitting execute.

Step 5: If all assumptions check out, load the *RUNITMOD* workspace and follow the prompts to complete the forecast.

V. TRACT LEVEL HOUSEHOLD FORECAST MODULE

Preparation of tract level household forecasts will require use of the following workspaces:

- *REVERSE*
- *RUN*
- *ADDRACE*
- *REALLOC*

Very little user interaction is required in this module. The steps used to create this forecast are as follows:

- Step 1: Load the *REVERSE* workspace.
- Step 2: Follow the prompts which appear by first typing *AUTO* and execute. Type *)ERASE AUTO SETUP REVERSE* and hit execute. Finally, type *REVERSE* and hit execute.
- Step 3: When complete, load the *RUN* workspace.
- Step 4: Follow the prompts which appear by first typing *AUTO* and execute. Type *)ERASE AUTO SETUP RUN* and execute. Finally, type *RUN*.
- Step 5: When complete, load the *ADDRACE* workspace.
- Step 6: Follow the prompts which appear by first typing *AUTO* and execute. Type *)ERASE AUTO SETUP ADDRACE* and execute. Finally, type *ADDRACE* and execute.
- Step 7: When complete, load the *REALLOC* workspace.
- Step 8: Follow the prompts which appear by first typing *AUTO* and execute. Type *)ERASE AUTO SETUP REALLOCATE* and execute. Finally type *REALLOCATE* and execute.
[Note: There are prompts requiring responses throughout this module. They include:
 - Period of household forecast.
 - Unit forecast output set number to be used.
 - *RVAC* & *OVAC* assumptions to be used.
 - Clusters assumption to be used.
 - Period and Set No. of city level household forecast to be used.
 - Percent of each race to go to transition tracts (enter as integers!)]].

VI. TRACT LEVEL POPULATION FORECAST MODULE

The running sequence for this module requires use of the following workspace:

- *HHTOPOP*

The generation of the tract level forecast is for the most part automatic. Follow these steps:

Step 1: Load the *HHTOPOP* workspace.

Step 2: Execute the *POP2PRINT* function. This will not only produce the report but prints the forecast as well. [Note: This routine assumes the user will use 1970 based, tract level person/household ratios by race. If the user wishes to use other ratios, the local variable *PER* created in the function *PPH* must be overwritten. Also note *PER* is subsequently factored down in the *POP2* function to take into account the declining household size trends. In short, be careful.]

VII. TRACT CLUSTERS FORECAST MODULE

This forecast is used to establish locational preferences of new households to be housed in the next time period. It is run by using the workspace:

- *NEWCLUS*

The steps for use of *NEWCLUS* are quite simple. They are:

Step 1: Load the *NEWCLUS* workspace.

Step 2: Execute the *NEWCLUS* function.

Step 3: To see the resultant clusters, load the *UNITASS* workspace. Type *SHOW CLUSTERS* and the cluster number shown to be created.

Once these steps are complete, one five-year set of forecasts pertaining to one growth option have been created.

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