About This Manual

This manual describes the functions of the different modules which comprise the UNIVERS system. The functions described in this manual are the ``hard-coded'' functions, meaning they cannot be modified by the user. For descriptions of the tables and procedures which were developed specifically for your jurisdiction by Cole-Layer-Trumble, refer to your jurisdiction's Application Guide.

Note

The screens in this manual are for example purposes only. The Card Types and Item Numbers displayed may not necessarily be equivalent to those in your particular UNIVERS system.

Manual Organization

This manual is divided into eight sections. Each section describes a different part of the UNIVERS system. The sections are roughly organized to correspond to the UNIVERS menu structure:

- Section 1, ``Introduction to UNIVERS,'' gives an overview of the UNIVERS system and its menu structure.

- Section 2, ``Factor Tables,'' describes how to create and modify the structure of the Factor Tables in UNIVERS.

- Section 3, ``Action Tables,'' describes how to create, modify, debug and execute the Action Tables in UNIVERS.

- Section 4, ``Selfil Tables,'' describes how to create, modify, and execute Selfil Tables in UNIVERS.

- Section 5, ``Valuation,'' describes the options on the UNIVERS Valuation Menu, including the Valgen Modules and the Comparable Sales Module.

- Section 6, ``Regression,'' describes the options on the UNIVERS Regression Menu which enable you to perform Multiple Regression Analysis in order to calculate Market Values.

- Section 7, ``Utilities,'' describes how to use the options on the UNIVERS Utilities Menu.

- Section 8, ``Reports,'' describes how to use the various reporting options on the UNIVERS Reports Menu.

Appendix

In addition to the sections outlined above, there is an Appendix which describes the IPTE Commands which are used to create Action Tables in UNIVERS.

Conventions

The following conventions are used throughout this manual for data entry instructions:

- Special keys appear in brackets and small caps.

    Example: [ENTER]

- The instruction **Press** means to press the designated key.

    Example: Press [ESCAPE].

- The instruction **Enter** means to type the designated entry and press [ENTER].

    Example: Enter the Card Type.

- Actual values which must be entered appear in bold.

    Example: Enter **1**.

- Menu items which are to be selected appear in bold.

    Example: Select **Execute Action Tables** from the UNIVERS Main Menu.

Section 1: Contents

Section 1: Contents

The UNIVERS Menus (cont.)

UNIVERS Unlock

Design of UNIVERS

The UNIVERS data base structure is best explained by comparing it to an office filing system. In an office filing system, there is filing cabinet which stores many individual folders. Each folder pertains to a specific entity, such as a client or project. Any information about a specific entity is stored in that entity's folder.

UNIVERS uses the same concept. The entire data base is like a filing cabinet. Within the filing cabinet are folders. In UNIVERS, a folder is equivalent to a record. A record can represent any entity you choose, but typically a record will represent an individual parcel. All information pertaining to an individual parcel will be stored in that parcels record.

Factors

Establishing your data base involves determining the data elements you will need to adequately define all parcels within your jurisdiction. Each bit of information, such as the owner name, is called a factor. You build your data base by defining factors. Not all factors may be relevant for every parcel. However, if it will be used once, it must be defined. Each factor is assigned a three-digit Factor Number, also called Memory Storage (MS) Location. Factors are referenced in UNIVERS by this three-digit number.

Card Types

Each factor defined in your data base must be assigned to a Card Type. You can have up to 50 different Card Types in your UNIVERS data base. Card Types allow you to logically group factors together. For example, one card could contain all the dwelling data, while another could contain all the land data.

Card Types are established and referenced by number, Card Type 1, Card Type 2, etc. Card Type 1 is reserved by UNIVERS as the Base Card. You can define Card Types 2-50. These are secondary Card Types. Each Card Type can contain up to 254 factors, as long as the total number of characters does not exceed 2048. The number of characters a factor uses depends on its definition.

Series Cards

If data for a particular Card Type exceeds the size of a single card, a second card of the same type can be created to hold the balance of the information. Using more than one card of a particular Card Type is called using multiple or series cards. UNIVERS allows up to 255 cards per Card Type within a single parcel record.

For example, many jurisdictions use a Card Type for dwelling data. This card contains factors for a single dwelling. If a parcel has more than one dwelling, a separate dwelling card can be created for each dwelling. The parcel would then have a series of dwelling cards.

Data Indexing

UNIVERS provides the capability to create indexes for your data base. An index is a file which contains ``pointers'' which point to parcel records in your data base. These pointers allow UNIVERS to search and sort your data base more quickly and efficiently. There are two types of indexes in UNIVERS, dynamic and static.

Dynamic Index

A dynamic index is updated automatically whenever you modify data in your data base. Dynamic indexes are established by defining factors as ``key fields'' when you setup your data base. UNIVERS automatically creates the first dynamic index called the Permanent Parcel Number (PPN). The PPN is reserved for system control and cannot be changed by the user. It ``links'' the secondary cards in a parcel record to the Base Card. The PPN is assigned to a parcel record when it is created. The first parcel record created is assigned a PPN of 1, the second is assigned a PPN of 2, the third is assigned a PPN of 3, etc.

UNIVERS allows you to create seven additional dynamic indexes. These user-defined indexes should be assigned to factors which are used frequently as search and sort keys for querying your data base and running reports; for example, Parcel ID, Owner Name, or Owner Address. You do not need to define all seven 7 dynamic indexes at once. You can reserve some for later definition. Creating dynamic indexes is discussed in Section 2.

Static Index

A static index is one which is not automatically updated whenever you modify data in your data base. You can define up to 248 static indexes in UNIVERS. A static index can be defined with more than one factor in a hierarchical structure; for example, owner name within city. Once a static index is created it must be executed against the data base. It also must be executed periodically against the data base in order to reflect changes made to the data base. Creating static indexes is discussed in Section 7.

How an Index Works

As stated earlier, each parcel record in your data base is assigned a unique PPN by UNIVERS. An index is a file which contains ``pointers'' which point to the records in your data base using the PPN. For example, the sample data base shown in the table below contains parcel records with three factors: Parcel Number, Property Address, and Owner Name.

PPN	Parcel #	Property Address	Owner Name
1	400	123 Main St.	Smith, John
2	123	49 Center St.	Jones, Tom
3	047	1800 Cardo Rd..	Harris, Robert
4	561	630 Main St.	Donaldson, Emily
5	329	2541 Foot Rd.	Hayes, Kenneth
6	246	138 Virginia Ave.	Dirkson, Janice

If we create an index for this data base sorted by owner name, we would create a file with two fields: Owner Name and PPN. It would look like the following table.

Owner Name	PPN
Dirkson, Janice	6
Donaldson, Emily	4
Jones, Tom	2
Harris, Robert	3
Hayes, Kenneth	5
Smith, John	1

Now we can use this index when we query the data base or create a report based on owner name. For example, if we wanted to search for the property owned by Robert Harris, UNIVERS first looks at the index file to find Robert Harris. It then used the PPN in the index file as a pointer to the record in the data base.

The Advantage of an Index

This example is a simple one and the advantage of an index is not very apparent. However, if our data base had hundreds or thousands of records with hundreds of factors for each record, it would take the computer several seconds (a long time for a computer) to search the data base. The advantage of the smaller index file is then more apparent. It would be much faster for UNIVERS to search the index to find the correct PPN and then go directly to that record in the data base than to search through the entire data base for the correct record.

Dynamic vs. Static Indexes

We can also use the above example to explain the difference between dynamic and static indexes. Suppose Robert Harris sold his property to John Smith. If our index is dynamic, it will be reordered automatically whenever the change is made to the record in the data base. If it is a static index, it is not reordered automatically.

If we run a report sorted by Owner Name against the static index, it would not be in exact alphabetical order. Adding parcels to your data base can cause similar problems with a static index. Therefore, it is important to periodically execute the index against the data base, in order to re-sequence it properly.

Getting Started with UNIVERS

Before you can use UNIVERS it must be properly installed on your personal computer or network. The following description provides information about how UNIVERS should be installed and how to access it once it is installed.

System Requirements

In order to run UNIVERS version 7.0, you must have an IBM or compatible PC with a hard drive and at least an 80286 processor running DOS version 3.0 or later. UNIVERS can run on a ``stand-alone'' machine or on a network.

Installing UNIVERS

UNIVERS must be installed on a hard drive with the executable programs and the data files in separate directories. There are also two special files which should be located in a directory other than the program or data directories.

UNIVERS.BAT File

To run UNIVERS, you must have a file called UNIVERS.BAT. This file must contain the following commands:

```
<program directory path>BTRIEVE /M:48 /P:2048 /C: /E:
<program directory path>UV00N70.EXE
```

UNIVERS.DAT File

You must also have a file called UNIVERS.DAT in the same directory as the UNIVERS.BAT file. This file must contain the following command:

For a stand-alone system:
70,.USR,<program directory path>,<data directory path>, ,<jurisdiction name>

For a network:
70,.USR,<program directory path>,<data directory path>,N,<jurisdiction name>

Where USR is the file extension assigned to your jurisdiction.

Starting UNIVERS

To start UNIVERS change the current directory to the directory which contains the UNIVERS.BAT and UNIVERS.DAT files. (This directory is called the start-up directory). Perform the following:

1. Type UNIVERS and press [ENTER].

2. The UNIVERS Sign-On Screen displays. If the UNIVERS Security System is not implemented, start-up continues with printer selection (go to step 7). If the UNIVERS Security System has been implemented, you must type your three character User ID and press [ENTER].

```
UNIVERS              ANYTOWN, USA            12/12/91
SIGN-ON                                  O9:33 AM




 UUUUUU   UUUUUU
  UU      UU
  UU      UU
  UU      UU   N  N  IIIII  V V  EEEEE  RRRR   SSSS
  UU      UU   NNN   I   V V  E    R R S
  UU      UU   N NN  I   V V  EEEE  RRRR   SSS
  UU      UU   N NN  I   VV  E    RR    S
 UUUUUUUUUUUUUU  N  N  IIIII   V   EEEEE  R R  SSSS


            MASS APPRAISAL SYSTEM


```

3.   You must then *type* your password. If you want to change your password *do not* press [ENTER] yet.

4.   UNIVERS displays ``*Press <C> to Change Password or <ENTER> to Continue*.'' If you wish to change your password, type **C** (continue with step 5). If you do not wish to change your password press [ENTER] (go to step 7).

5.   Type your new password. Passwords must be six characters long.

6.   Verify your new password by typing it again, then press [ENTER].

7.   The UNIVERS Main Menu (Figure 1-1) displays.

The UNIVERS Menus

UNIVERS is a menu-driven application. You can access all of the UNIVERS functions through the menus. To select an item from a menu, use [ ] and [ ] to highlight the item and press [ENTER] or type the number of the item. When exiting the menus to return to the previous menu, you can the type number of the return option or type **Q** or **q** to highlight the return option.

Many of the modules have menu bars displayed at the bottom of the screen. To select an option from any of these menu bars, use [ ] and [ ] to highlight the option or type the first letter of the option to highlight it. Then press [ENTER].
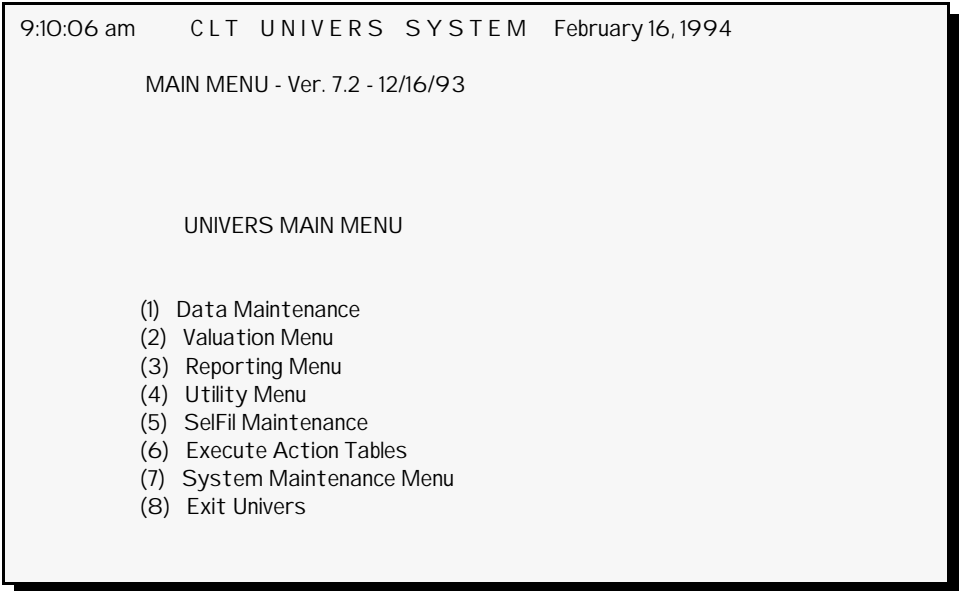
Note

If the UNIVERS Security System is implemented, some of the options listed below may not display. Your access to these modules depends on your security level.

UNIVERS Main Menu

When UNIVERS start-up is complete, the UNIVERS Main Menu (Figure 1-1) displays. Through this menu you can access all of the UNIVERS modules. The UNIVERS system is made up of specialized modules. There are thirty-three different modules, each performing a specific function within UNIVERS.

Most functions done in UNIVERS are done using tables. There are three main types of tables in UNIVERS: Factor Tables, Action Tables, and Selfil Tables. Each of these types of tables performs a different function within UNIVERS.

```
9:10:06 am      C L T  U N I V E R S  S Y S T E M   February 16,1994

         MAIN MENU - Ver. 7.2 - 12/16/93




              UNIVERS MAIN MENU


         (1)  Data Maintenance
         (2)  Valuation Menu
         (3)  Reporting Menu
         (4)  Utility Menu
         (5)  SelFil Maintenance
         (6)  Execute Action Tables
         (7)  System Maintenance Menu
         (8)  Exit Univers
```

Figure 1-1. UNIVERS Main Menu

Data Maintenance

This option executes the Action Tables which have been created for your jurisdiction for daily operations of UNIVERS, including inquiry and maintenance of parcel data. The difference between this option and the **Execute Action Tables** option is that this option executes a specific Action Table allowing you to bypass the Action Table Editor Screen and go directly to the main menu of the application developed for your jurisdiction. Descriptions of using the applications developed for your jurisdiction can be found in your UNIVERS Application Guide.

Valuation Menu

This option displays the UNIVERS Valuation Menu from which you can access the Valgen Modules, the Comparables Sales Module, or the UNIVERS Regression Menu. The Valgen Modules and the Comparable Sales Module are described in Section 5. The regression modules are described in Section 6.

Reporting Menu

This option displays the UNIVERS Reporting Menu from which you can access the UNIVERS reporting modules. The reporting modules are described in Section 8.

Utility Menu

This option displays the UNIVERS Utilities Menu from which you can access the UNIVERS utilities. These utilities are described in Section 7.

Selfil Maintenance

This module creates and maintains Selfil Tables which extract data from your data base. The tables created in this module are used by the valuation and reporting modules to limit the number of parcel records used when executing those modules. Selfil Tables enable you to extract or ``filter'' data from your data base, based on a set of criteria. You can use Selfil Tables to select only those parcels in your data base which meet the defined criteria. You can then run reports, display or maintain data, or perform calculations on only those selected records, instead of the entire data base. This module is described in Section 4.

Execute Action Tables

This module executes UNIVERS Action Tables. It is described in Section 3.

System Maintenance Menu

This option displays the UNIVERS System Maintenance Menu. There are two options on this menu: **Create and Maintain Factor Base** is described in Section 2 and **Create and Maintain Action Tables** is described in Section 3.

Exit UNIVERS

This option exits UNIVERS and returns you to the operating system.

UNIVERS Valuation Menu

When you select **Valuation Menu** from the UNIVERS Main Menu, the UNIVERS Valuation Menu (Figure 1-2) displays. This menu accesses the Valgen Modules, the Comparable Sales Module, and the UNIVERS Regression Menu. The Valgen Modules and Comparable Sales Module are described in Section 5. The modules on UNIVERS Regression Menu are described in Section 6.

```
9:10:11 am      C L T   U N I V E R S   S Y S T E M    February 16, 1994

              MAIN MENU - Ver. 7.2 - 12/16/93




           UNIVERS VALUATION MENU


      (1)  Execute Value Procedure
      (2)  Create and Maintain Value Table
      (3)  Create and Maintain Value Procedure
      (4)  Comparable Sales
      (5)  Regression Menu
      (6)  Return to Main Menu
```

Figure 1-2. UNIVERS Valuation Menu

Execute Value Procedure

This module executes the Value Procedures which were created using the **Create and Maintain Value Procedure** module.

Create and Maintain Value Table

This module creates and maintains the Value Tables which are used by the Value Procedures created with the **Create and Maintain Value Procedure** module and executed by the **Execute Value Procedure** module. These Value Tables can contain the cost and income parameters used when generating cost and income values for the parcel records in your data base.

Create and Maintain Value Procedure

This module creates the Value Procedures executed by the **Execute Value Procedure** module. These procedures can be used to generate cost and income values for the parcel records in your data base.

Comparable Sales

This module performs a comparable sales analysis and produces a report based on user-specified parameters.

Regression Menu

This option displays the UNIVERS Regression Menu from which you can access the regression modules which are used for market modeling and application. The regression modules are described in Section 6.

UNIVERS Regression Menu

When you select **Regression Menu** from the UNIVERS Valuation Menu, the UNIVERS Regression Menu (Figure 1-3) displays. This menu accesses the regression modules. The regression modules are described in Section 6.
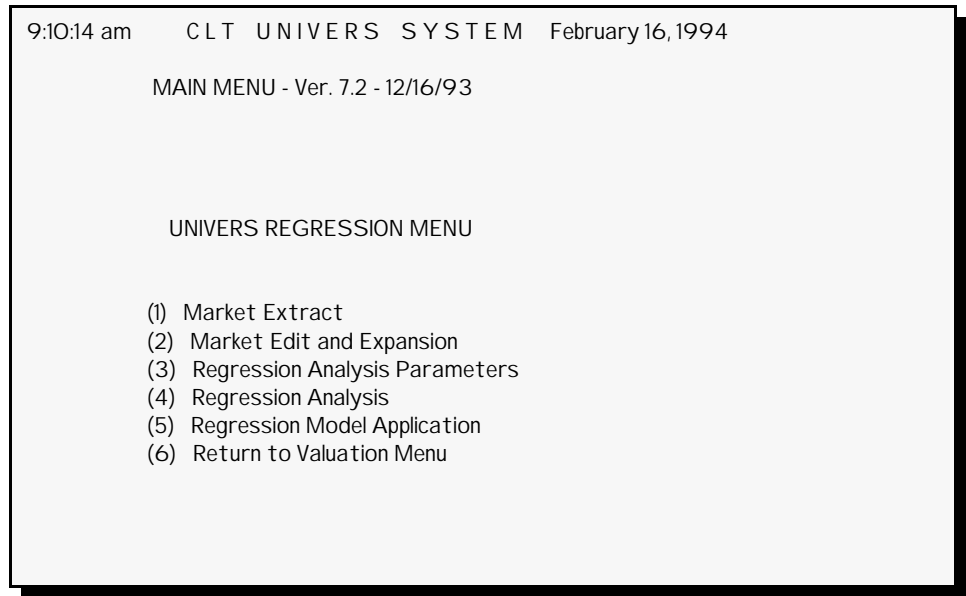
```
9:10:14 am      C L T   U N I V E R S   S Y S T E M    February 16, 1994

              MAIN MENU - Ver. 7.2 - 12/16/93




              UNIVERS REGRESSION MENU


         (1)  Market Extract
         (2)  Market Edit and Expansion
         (3)  Regression Analysis Parameters
         (4)  Regression Analysis
         (5)  Regression Model Application
         (6)  Return to Valuation Menu
```

Figure 1-3. UNIVERS Regression Menu

Market Extract
This module produces Market Extract Files based on user-specified parameters which are used in the Market Modeling process. This Market Extract File is used by the **Market Edit and Expansion** module. It also extracts subject records for the Market Application process.

Market Edit and Expansion
This module expands and edits the Market Extract File to define new variables or reject records based on edits. The new Expanded Extract File is used by the **Regression Analysis Parameters** module.

Regression Analysis Parameters
This module defines the parameters to use when building a Multiple Regression Analysis (MRA) Model from the Expanded Market Extract File.

Regression Analysis
This module uses the parameters defined by the **Regression Analysis Parameters** module to create a Multiple Regression Analysis (MRA) Model from the Expanded Market Extract File.

Regression Model Application
This module applies an MRA Model created by the **Regression Analysis** module to an Expanded Extract File with subject parcels in order to generate the Market Values for the parcel records in the subject file.

UNIVERS Reporting Menu

When you select **Reporting Menu** from the UNIVERS Main Menu, the UNIVERS Reporting Menu (Figure 1-4) displays. This menu accesses the reporting modules. There are eight reporting modules in UNIVERS. The reporting modules are described in Section 8.
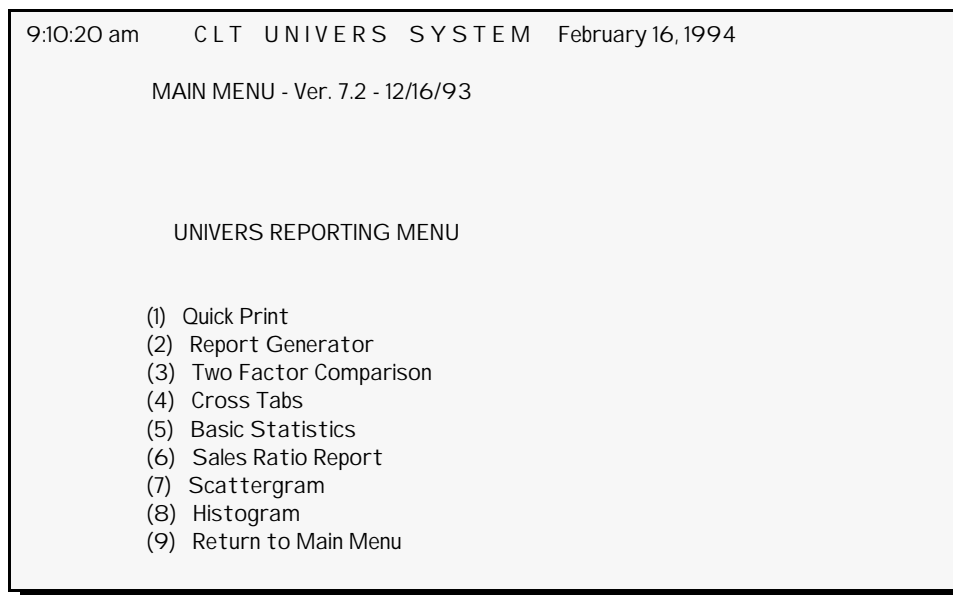
```
9:10:20 am      C L T  U N I V E R S   S Y S T E M   February 16, 1994


           MAIN MENU - Ver. 7.2 - 12/16/93




           UNIVERS REPORTING MENU


        (1)  Quick Print
        (2)  Report Generator
        (3)  Two Factor Comparison
        (4)  Cross Tabs
        (5)  Basic Statistics
        (6)  Sales Ratio Report
        (7)  Scattergram
        (8)  Histogram
        (9)  Return to Main Menu
```

Figure 1-4. UNIVERS Reporting Menu

Quick Print
This module creates simple columnar one-line-per-record reports containing values from user-specified factors in the data base.

Report Generator
This module creates more sophisticated reports than Quick Print. You can create multi-page-per-record reports, multi-record-per-page reports, or one-record-per-page reports. You can print values from factors in the data base, factor names, or literals.

Two Factor Comparison
This module produces reports comparing the values of two different factors for records in the data base. The difference between the two factors can be stored in a third factor.

Cross Tabs
This module produces Cross Tabs Reports which generate statistics based on the cross-tabulation of two factors from the data base. You can also generate statistics for a third factor.

Basic Statistics
This module produces four different kinds of statistical reports based on user-specified factors from the data base.

Sales Ratio Report
This module produces a Sales Ratio Report using user-specified parameters.

Scattergram

This module produces Scattergrams which represent data by plotting the values of two different factors on a single graph for a range of records.

Histogram

This module produces histograms which graph the frequency distribution of factors in your data base.

UNIVERS Utilities Menu

When you select **Utilities Menu** from the UNIVERS Main Menu, the UNIVERS Utilities Menu (Figure 1-5) displays. This menu accesses the UNIVERS utilities. There are five utility modules in UNIVERS. Each one performs a special maintenance function. The UNIVERS utilities are described in Section 7.

```
9:10:27 am      C L T   U N I V E R S   S Y S T E M   February 16, 1994

               MAIN MENU - Ver. 7.2 - 12/16/93




               UNIVERS UTILITIES MENU


          (1)  Printer Selection Support
          (2)  Quick Data Display & Maintenance
          (3)  Static Index Creation
          (4)  Import Data
          (5)  Export Data
          (6)  Return to Main Menu
```

Figure 1-5. UNIVERS Utilities Menu

Printer Selection Support

This module allows you to change the printer settings for UNIVERS after you have started-up UNIVERS. These printer settings are used by all modules which print data.

Quick Data Display & Maintenance

This module creates and maintains screen formats for repetitive or specialized display and maintenance tasks. You can create up to 999 different screen formats, each containing only the factors needed to perform the desired function.

Static Index Creation

This module creates and maintains up to 248 static indexes to be used in your data base.

Import Data

This module reads data from an ASCII or EBCDIC source file, enabling you to import data from another system into UNIVERS.

Export Data

This module creates an ASCII source file from your UNIVERS data, enabling you to export data from UNIVERS to another system.

UNIVERS System Maintenance Menu

When you select **System Maintenance Menu** from the UNIVERS Main Menu, the UNIVERS System Maintenance Menu (Figure 1-6) displays. There are two modules accessed from this menu.


```
9:10:36 am       C L T   U N I V E R S   S Y S T E M    February 16, 1994

              MAIN MENU - Ver. 7.2 - 12/16/93




         UNIVERS SYSTEM MAINTENANCE MENU


         (1)  Create and Maintain Factor Base
         (2)  Create and Maintain Action Tables
         (3)  Return to Main Menu
```

Figure 1-6. UNIVERS System Maintenance Menu

Create and Maintain Factor Base
This module creates and maintains the Factor Tables. Factor Tables are used to create and maintain the data base structure in UNIVERS described above. Factor Tables define factors and Card Types, assign factors to Card Types, and define factors as key fields for dynamic indexing. This module is described in Section 2.

Create and Maintain Action Tables
This module creates and maintains the Action Tables. This module only effects the Action Tables themselves. It does not effect the data in your data base. Action Tables are tables which contain IPTE Command statements which manipulate the data in your data base. For example, you can create tables which display parcel data on the computer screen, modify parcel data, or calculate the RCNLD of residential dwellings. This module is described in Section 3.

IPTE Commands. The IPTE Commands are part of a programming language specifically designed to construct Action Tables in UNIVERS. IPTE Commands manipulate the data base. Arranged logically together, these commands comprise the Action Tables. These commands are described in Appendix A.

UNIVERS Unlock

If your system ``locks-up'' abnormally, UNIVERS files and tables which were in use at the time the system ``locks-up'' will be locked and cannot be accessed when you load UNIVERS again, unless you ``unlock'' them. To unlock these files and tables, you must delete from your data directory the file UNVLOCK.USR (where USR is your jurisdictions default extension), then start-up UNIVERS. If you are on a network, *all users* must be out of UNIVERS when you start it up. All files and tables which were locked will be unlocked.

Cole-Layer Trumble Company

Section 2: Contents

Section 2: Contents

Create and Maintain Factor Base (cont.)

What are Factor Tables?

Factor Tables define the structure of your data base. They define the factors to be included on a Card Type. Each table defines a different Card Type. For each Card Type created, UNIVERS creates a separate data file. These data files comprise your data base.

Note

Because Factor Tables tell UNIVERS how the data in the data base is organized, some types of changes to them can destroy the data files. Functions which can destroy existing data files are noted in this section.

Record Storage

Within each data file are records which store the data for an individual parcel. These records are ``fixed length'' records, meaning each record uses the same number of bytes and the data is stored in the same order. The Factor Table tells UNIVERS how these factors are organized within each record in the data file. They act as ``templates'' which UNIVERS uses to determine the starting and ending positions for each factor and the type of data stored in those positions.

Example

Assume there is a card with the following definition:

Factor Name	Size	Type
P.P.N.	6	System
Owner Name	20	Text
Lot Number	2	Integer

There is also a reserved space of 25 characters. The data in the data file would be organized as follows:

Record #1				Record #2			
P.P.N.	Name	Lot #	Reserved	P.P.N.	Name	Lot #	Reserved

Important

If you change the structure of a Factor Table, you change the way UNIVERS looks at the data file. Your data file will no longer be recognizable to UNIVERS. Therefore, changes made to Factor Tables for an existing data base should be made *carefully*.

Primary and Secondary Card Types

The first Card Type created (referred to as the Base Card) is assigned Card Type 1. This Card Type defines the primary data file. You cannot have a data base without this Card Type. All of the data in other data files are accessed by their association with the Base Card data file through the Permanent Parcel Number (P.P.N.).

Important

If you destroy the Base Card data file, all of the records in the secondary data files are useless. UNIVERS will no longer be able to access them without a primary record with which to associate them.

The Permanent Parcel Number (P.P.N.)

Data for a parcel can reside in several different data files. UNIVERS needs a way to ``link'' the data in one file to the data in another. This purpose is served by the Permanent Parcel Number (P.P.N.). Therefore, the first factor for each Card Type is automatically assigned by the system as the P.P.N.

Secondary Cards

All of the additional Card Types (beside Card Type 1) are call secondary cards. When UNIVERS accesses data from the secondary card data files, it first looks at the primary data file to find the P.P.N. for the parcel record, then retrieves that record from the secondary file, accessing it by the P.P.N.

Series Cards

In the Base Card data file there can be only one record for each parcel. However, in the secondary file there can be more than one record (or card) for a parcel. Multiple cards of the same Card Type for the same parcel are called ``series cards.'' Series cards are possible because of the structure of the P.P.N.

Refer to the Factor Table Detailed Listing under the **Name** column. In the Base Card file the P.P.N. is stored by itself, so there can be only one record per parcel. In the secondary card data files, the P.P.N. has additional elements ``attached'' to it:

• **Set Number (Set)** is not currently used by the system.

• **Card Number (Nbr)** identifies the Card Number to UNIVERS.

• **Card Type (Typ)** identifies the Card Type (which data file) to UNIVERS. (This element is important to the internal processing of UNIVERS.

Because there is a Card Number ``attached'' to the P.P.N., there can be more than one record (or card) for the same P.P.N. within a secondary card file. UNIVERS uses the Card Number to distinguish between the records.

For example, there could be two separate records for the same parcel in a Dwelling Card data file. Each record could describe a different dwelling on the same parcel. Both of these records are associated to the Base Card record by the P.P.N. However, they are treated by the system as *two different records*.

Important

It is important to understand that series cards are treated as separate records by the system. This treatment is especially important in reference to how Selfil processes records in the data files.

UNIVERS Factor Definitions

Factors in UNIVERS are defined by nine characteristics. When you assign a factor to a Card Type, you must enter values for most of these characteristics. Some of the characteristics will not be applicable to some factors.

Name

Each factor is assigned a descriptive name of up to sixteen characters. You can change a factor name at any time without destroying your data base, since the name does not effect how the data is stored in the data file.

Type

Each factor is assigned a data type. There are eight different data types in UNIVERS:

- **Text or String** factors allow entry of any alpha or numeric characters.

- **Integer** factors are numeric factors which only allow whole numbers.

- **Single-Precision** factors are numeric factors which allow real numbers of up to 8 digits.

- **Double-Precision** factors are numeric factors which allow real numbers of up to 16 digits.

- **Categorical** Factors are numeric factors which store values between 0 and 255. Each Categorical Factor is assigned to a Categorical Segment Number. The Categorical Segment acts as a ``look up'' table to determine the corresponding Level Name and Level Value for the Level Number entered in the Categorical Factor (see **Categorical Factors** below).

- **User-Date** factors are date factors which can be entered by the user. They are stored in an MM/DD/YYYY format. They can be entered in any of the following formats and will be reformatted by UNIVERS: MM.DD.YY, MM.DD.YYYY, MM-DD-YY, MM-DD-YYYY, MM/DD/YY, MM/DD/YYYY, MMDDYY, or MMDDYYYY (the last two are invalid in **Quick Data Display & Maintenance**).

- **Byte** factors are numeric factors which use one byte to store numeric values between 0 and 255.

- **Auto-Date** factors are date factors which are assigned by the system when data is saved. They must be on the Base Card. The date saved is the system date. These dates are stored in MM/DD/YYYY format.

Size

Each factor is assigned a size. The size determines the number of bytes used to store the factor for each record in the data file. Factor type influences the size for some factors:

- **Text or String** factors can be 1-255 characters (bytes) long.

- **Integers** are always assigned two bytes by the system.

- **Single-Precision** factors are always assigned four bytes by the system.

- **Double-Precision** factors are always assigned eight bytes by the system.

- **Categoricals** are always assigned one byte by the system.

- **User-Dates** are always assigned two bytes by the system.

- **Byte** factors are always assigned one byte by the system.

- **Auto-Dates** are always assigned two bytes by the system.

Format

Format refers to how data is displayed by the computer. The format does not effect how the data is stored in the data file. **Text or String** data can be defined as **Right-Justified** or **Left-Justified**. Numeric data types are assigned a Format Style Number. (see **Modify/Add Format Style Numbers** below). Format is not applicable to **User-Date** and **Auto-Date** factors.

Factor Number (MS Location)

Each factor is assigned a Factor Number (sometimes referred to as MS Location). The Factor Number is used by the Action Tables to identify factors. Factor Numbers cannot be repeated on the same Card Type, but can be repeated across different Card Types.

Important

Because of the way Action Tables use Factor Numbers, certain restrictions apply to duplicating Factor Numbers across Card Types. All factors on Card Type 1 should be unique. Factor Numbers should not be duplicated across cards which may contain data for the same parcel (i.e. Land Card Factor Numbers should not be repeated on other Card Types, Residential Dwelling Card Factor Numbers should not be repeated on the Residential OBY card, Commercial Building Card Factor Numbers should not be repeated on the Commercial OBY card). You can duplicate Factor Numbers on Card Types which will not include data for the same parcel (i.e. You can repeat the same Factor Number on a Residential Dwelling Card and a Commercial Building Card).

Segment

Segment defines which Categorical Segment Number a Categorical Factor uses (see **Categorical Factors** below). Segment is not applicable to any other data type.

Key

Key defines the key number of the key factors in the data base. The first key is assigned by the system as the P.P.N. All other key factors must reside on Card Type 1 (see **UNIVERS Key Factors** below).

Duplicatable

This characteristic is only applicable to key factors. It determines whether two or more records can have the same value for a key factor. For instance, assume Parcel ID and Owner Name are defined as key factors. Parcel ID *should not* be duplicatable, since no two parcels should have the same Parcel ID. Owner Name *should* be duplicatable, since the same person can own more than one parcel.

Modifiable

This characteristic is only applicable to key factors. It determines whether or not a factor can be changed once data has been entered the first time.

UNIVERS Key Factors

Key factors are factors which UNIVERS uses to create ``dynamic'' indexes for the data files. Dynamic indexes are updated each time a change is made to the data base. Up to eight key factors can be defined in your data base.

Permanent Parcel Number

The first key factor is the Permanent Parcel Number (P.P.N.). It is assigned by the system. The P.P.N. is the primary key by which UNIVERS accesses records in the data files. The first record created is assigned a P.P.N. of **1**, the second is assigned a P.P.N. of **2**, etc. The P.P.N. never changes. In that sense the P.P.N. is not dynamic. Since the P.P.N. is the primary key to each record, every other key factor relies on it to access records from the data files.

Dynamic Indexes

When you assign a key factor, you are telling UNIVERS to create a dynamic index based on that factor. This index is stored within the Base Card data file and acts as a ``pointer'' to the records within the data files. The purpose of a dynamic index is to increase the speed in which UNIVERS accesses records.

Example of a Dynamic Index

Assume Parcel ID has been defined as a key factor. Within the data file is a dynamic index which stores nothing but Parcel IDs and P.P.Ns. When you use a function which accesses the parcel by the Parcel ID, UNIVERS ``looks up'' the Parcel ID in the index, finds the P.P.N. of the record containing that Parcel ID, then knows exactly which record to retrieve from the data file. This process is much faster than searching the entire data file for the correct Parcel ID.

Categorical Factors

Categorical Factors are factors which use ``look up'' tables called Categorical Segments. Categorical Segments are defined using the **Display** option of the Main menu bar. Each Categorical Factor is assigned a Segment Number to use as a ``look up'' table. More than one factor can use the same Categorical Segment. Categorical Segments have three types of values defined: Level Numbers, Level Names, and Level Values.

Level Numbers

Level Numbers are values from 1-255 which act as ``codes'' by which the other values are referenced. The Level Number is the value stored in the data file for each parcel record. UNIVERS uses this value to ``look up'' the Level Name and Level Value from the Segment Number assigned to the Categorical Factor.

Level Name

Level Names are descriptive names associated with each Level Number. These names can be used to display on the screen or to print on reports as descriptive titles for the Categorical Factor.

Level Value

Level Values are numeric values associated with the Level Number. These values can be used for calculation by the system.

Example of a Categorical Segment

Below is an example of a Categorical Segment. This segment lists adjustments which can be made to values based on the Categorical Level Number assigned to a parcel. The Level Numbers are listed sequentially in the table and act as ``codes'' by which the Level Names and Level Values are determined. The Level Names list a descriptive name associated with each Level Number. The Level Values list the actual values the system may use to perform the adjustment calculation.

Level No.	Level Name	Value
0	No Adjustment	100
1	+5% Adjustment	105
2	+10% Adjustment	110
3	+20% Adjustment	120
4	+30% Adjustment	130
5	+40% Adjustment	140
6	-30% Adjustment	70
7	-20% Adjustment	80
8	-10% Adjustment	90
9	-5% Adjustment	95

Create and Maintain Factor Base

This module creates and maintains the UNIVERS Factor Tables which define your data base. After you select **Create and Maintain Factor Base** from the UNIVERS System Maintenance Menu, the Factor Maintenance Screen (Figure 2-1) displays.

```
1:43:55 pm      FACTOR MAINTENANCE - Ver. 7.2 - 12/16/93   February 16, 1994

Card Type  Name    Factors  Length  Unused  Updated   Created

   1     BASE    172     829     22    10/01/91  4/12/91
   2     CMMN    141    1018     76     9/13/91  4/12/91
   3     RBLD     82     680     97    10/01/91  4/12/91
   4     ROBY     76     332     76     8/27/91  4/15/91
   5     CBLD    223    1021     98     8/27/91  4/15/91
   6     COBY    162     767     47     8/27/91  4/15/91
   7     I&E     140     765     32     9/11/91  4/15/91
```

Figure 2-1. Factor Maintenance Screen

At the bottom of the screen is the Main menu bar. Each menu bar option is explained in detail below. Above the menu bar are two boxes. The box on the left displays the Card Type and Name of the Factor Table currently in memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. (Normally, there will only be one page of Factor Tables). Use [ ] and [ ] to highlight a specific Factor Table on a page.

The top part of the Factor Maintenance Screen displays the Factor Table Listing. The Factor Table Listing lists all of the Factor Tables which have been created for your data base. Each Factor Table defines a different Card Type.

Card Type
This column identifies the Card Type number assigned to the Factor Table. Card Types are listed in numeric order. They are also created in numeric order. UNIVERS assigns the next available number to each newly created Factor Table. (i.e. the first Factor Table created is assigned Card Type **1**, the second is assigned Card Type **2**, etc.)

Name
This column lists the descriptive name assigned to the Card Type. The name can be up to four characters long.

Factors
This column lists the number of factors assigned to each card. The maximum number of factors which can be assigned to a Factor Table depends on the total length (number of characters) assigned to the Factor Table and the lengths of the factors assigned to the Factor Table.

Length
This column lists the total length (number of characters) of the Factor Table. Each Factor Table can have up to 2048 characters.

Unused
This column lists the number of unused (reserved) characters for the Factor Table. When you create a Factor Table, you can reserve space on the card for future use. As you add new factors to the Factor Table, the amount of unused space is reduced. You can continue to add factors to a Factor Table until all of the original reserved space is used.

Updated
This column lists the date that the last change was made and saved to the Factor Table.

Created
This column lists the date the Factor Table was originally created.

Load

Selecting the **Load** option from the Factor Maintenance menu bar loads a Factor Table into memory. A Factor Table must reside in memory to use the **Display** and **Save** options. You can ``push'' the resident Factor Table out of memory by loading a different Factor Table. If you made changes to the Factor Table in memory, UNIVERS will not let you load a different Factor Table until you save those changes. If you made changes to a Factor Table that you do not wish to save, you must use the **Quit** option to exit this module, without saving the changes.

Procedure
1. Highlight the Factor Table you wish to load to memory.

2. Select **Load** from the Factor Maintenance menu bar.

Create

Selecting the **Create** option from the Factor Maintenance menu bar creates a new Factor Table. The number assigned to the new Factor Table is the next available number (i.e. if the last Factor Table created was number **4**, the new Factor Table is assigned number **5**). After you use the **Create** option to create a new Factor Table, you must use the **Save** option to save the Factor Table. Once a Factor Table has been created and saved, it cannot be deleted from the listing.

Procedure
1. Select **Create** from the Factor Maintenance menu bar.

2. UNIVERS displays ``*Enter a four character card name.*'' Enter a four character descriptive name for the new Factor Table.

3. UNIVERS displays ``*Enter the factor name (XX characters max.).*'' Enter the name for the first factor to be assigned to the Factor Table.

4. Enter the additional information for the factor. As you complete the definition for each factor, UNIVERS displays the prompt described in step 2. You can continue to define factors for the Factor Table. (See **UNIVERS Factor Definitions** above).

5. After you have defined all of the factors to be included on the Factor Table, press [ESCAPE].

6. UNIVERS lists the total number of characters assigned to the Factor Table and asks you to enter the reserved space for the Factor Table. Enter the desired amount of reserved space for the Factor Table.

7. UNIVERS displays ``*Is the suggested reserve OK?*'' Type one of the following:

   Y - to accept the amount of reserved space

   N - to continue without accepting the amount of reserved space

8. The Factor Maintenance Screen displays with the new Factor Table listed. Use the **Save** option to save the new Factor Table.

Display

Selecting **Display** from the Factor Maintenance menu bar displays the Factor Listing (Figure 2-2) which lists the factors assigned to the Factor Table in memory. The Factor Listing consists of a ten column definition for each factor. (See **UNIVERS Factor Definitions** above for an explanation of factor definitions). Use [PAGE UP], [PAGE DOWN], [ ], and [ ] to scroll through the Factor Listing. At the bottom of the screen is a menu bar with five options which can be used to modify the Factor Table in memory. Any changes made to a card must be saved using the **Save** option.

```
1:44:27 pm      FACTOR MAINTENANCE - Ver. 7.2 - 12/16/93   February 16, 1994

Item       Name       Type   Size Format Factor Seg Key Dup Mod

 1 P.P.N.          System   3        1    1  N  N
 2 ENTITY ID NUMBER    Text     3   LJ   347
 3 BOROUGH          Text     1   LJ   348
 4 BLOCK            Text     5   LJ   349
 5 LOT          Text     4   LJ    5
 6 EASEMENT         Text     1   LJ    6
 7 SALE DATE        Text     8   LJ    7
 8 LOAD CONTROL INDICAT   Text     1   LJ    8
 9 MAINTENANCE CODE    Byte     1    2    9
10 E-B-B-L-E-SD (PID)   Text    29   LJ   10    2  N  Y
11 LAST MAINTENANCE DAT  AutDate   2    O    14
12 APPRAISAL YEAR     Integer   2    4    15
13 TAX CLASS        Text     2   LJ    16
```

Figure 2-2. Factor Listing

Edit a Factor

The **Edit** option of the Display menu bar, modifies an existing factor. To use this option perform the following:

1. Highlight the factor you wish to edit.

2. Select **Edit** from the menu bar.

3. UNIVERS displays a new menu bar with the following options:

   • **Name** changes the factor name.

   • **Type** changes the data type of the factor.

   • **Length** changes the length of the factor.

   • **Format** changes the format of the factor.

   • **MS Loc** changes the Factor Number (MS Location) of the factor.

   • **Categoricals** changes the Categorical Segment Number for the factor.

   • **Key** changes the key assignment for the factor. (Base Card only).

Warning
Changing the **Type**, **Length**, **Format**, or **Factor Number (MS Location)** will destroy the data file for the Card Type. If you destroy the data file for Card Type 1, *data for all of the other Card Types will be unusable*.

Warning
You can *add* key assignments to Card Type 1, but you should not *change* or *delete* them. *Changing or deleting existing key assignments will destroy your data base*.

4. Press [ESCAPE] to return to the Display menu bar.

5. Press [ESCAPE] again to return to the Factor Maintenance Screen.

Add a Factor

The **Add** option of the Display menu bar adds factors to a Factor Table, using the available reserved space. If there is no available reserved space, you cannot add any new factors. The length of the new factors added is limited to the amount of available reserved space for the card. To use this option perform the following:

1. Select **Add** from the menu bar.

2. Define the new factor(s).

3. After all new factors have been defined, press [ESCAPE] to return to the Display menu bar.

4. Press [ESCAPE] again to return to the Factor Maintenance Screen.

Delete a Factor

The **Delete** option of the Display menu bar deletes the highlighted factor from the Factor Table.

Warning
Deleting a factor from a Factor Table will cause UNIVERS to delete the file containing the data for that Card Type.

To use this option, perform the following:

1. Highlight the factor you wish to delete.

2. Select **Delete** from the menu bar.

3. *This step only applies if there is a data file for the Card Type.* UNIVERS displays ``*WARNING: Data file for this card type will be lost. Do you want to continue?*'' Type one of the following:

    Y - to continue deleting the factor from the card and the data file from the system

    N - to abort deleting the factor

4. Press [ESCAPE] again to return to the Factor Maintenance Screen.

Edit/Add Categoricals

The **Categoricals** option of the Display menu bar, does not effect the Factor Table in memory. This option adds or modifies Categorical Segments (see **Categorical Factors** above). Categorical Segments are added sequentially and assigned numbers by UNIVERS. To use this option, perform the following:

1. Select **Categoricals** from the Display menu bar.

2. UNIVERS lists the existing Categorical Segments and the next available Segment Number and displays ``*Enter the Categorical Segment Number*.'' Enter the Segment Number you wish to edit/add.

3. UNIVERS displays a window, showing the Level Numbers, Level Names, and Level Values assigned to the segment and the message, ``*Enter Level Number to Edit or next Level Number to Add*.'' Enter the Level Number you wish to edit/add.

4. Enter the Level Name and Level Value for the Level Number.

5. Repeat steps 3 and 4 until all desired levels have been edited/added, then press [ESCAPE].

6. UNIVERS displays ``*Enter the Categorical Segment Number*.'' Enter a new segment to edit/add or press [ESCAPE] to return to the Display menu bar.

7. Press [ESCAPE] again to return to the Factor Maintenance Screen.

Change Reserved Space

Selecting the **Reserved** option from the Display menu bar changes the amount of reserved space for the Factor Table.

Warning

Changing the amount of reserved space for a Factor Table will delete the data file for the Card Type.

To use this option perform the following:

1. Select **Reserved** from the menu bar.

2. *This step only applies if there is a data file for the Card Type*. UNIVERS displays ``*WARNING: Data file for this card type will be lost. Do you want to continue?*'' Type one of the following:

    Y - to continue changing the amount of reserved space

    N - to abort changing the amount of reserved space

3. Enter the new amount of reserved space.

4. Press [ESCAPE] to return to the Factor Maintenance Screen.

Print

Selecting the **Print** option from the Factor Maintenance menu bar prints four different types of reports. These reports list detailed information about the data base structure.

Detailed Listing

You can print a detailed listing of the factors assigned to the Factor Tables in your data base. You can print this listing for all Card Types or for selected Card Types. To print a Detailed Listing, perform the following steps:

1. Select **Print** from the Factor Maintenance menu bar.

2. Select **Detailed** from the Print menu bar.

3. Enter the range of Card Types to be included in the listing.

4. Press [ESCAPE] to return to the Factor Maintenance Screen.

Factor Table Summary

You can print a summary of the Factor Tables in your data base. This summary lists number of factors, the total length, the reserved length, the date of last update, and the creation date for each Factor Table in your data base. You can print this summary for all Factor Tables or for selected Factor Tables. To print a Factor Table Summary, perform the following steps:

1. Select **Print** from the Factor Maintenance menu bar.

2. Select **Summary** from the Print menu bar which displays.

3. Enter the range of Card Types to be included in the summary.

4. Press [ESCAPE] to return to the Factor Maintenance Screen.

Categorical Summary

You can print a summary of the Categorical Segments in your data base. This summary lists each segment along with the Level Numbers, Level Names, and Level Values for each segment. To print a Categorical Summary, perform the following:

1. Select **Print** from the Factor Maintenance menu bar.

2. Select **Categorical** from the Print menu bar which displays.

3. Press [ESCAPE] to return to the Factor Maintenance Screen.

Format Summary

You can print a summary of the numeric formats which have been created for the numeric data types in your data base. This summary lists the format number and style for each format. To print a Format Summary, perform the following steps:

1. Select **Print** from the Factor Maintenance menu bar.

2. Select **Formats** from the Print menu bar which displays.

3.   Press [ESCAPE] to return to the Factor Maintenance Screen.

Save

Selecting the **Save** option from the Factor Maintenance menu bar saves any changes made to the Factor Table in memory. If you have made changes to a Factor Table, you must save it before UNIVERS allows you to perform any other function within this module. If you do not wish to save the changes, use the **Quit** option to exit this module, without saving the changes.

Important

Exiting without saving changes will keep the Factor Table definitions intact. However, if you perform a function which causes UNIVERS to delete a data file, exiting without saving *will not* restore the data file.

Format

Selecting **Format** from the Factor Maintenance menu bar displays the Format Styles Screen (Figure 2-3). This screen is used to modify or add format styles to your system. Format styles define the different ways in which numeric data types can be displayed by the system. You can define up to 255 different numeric format styles. You can use [PAGE UP] and [PAGE DOWN] to scroll through the list of format styles. The format style *does not* effect how the data is *stored* by the computer, only how it is displayed.
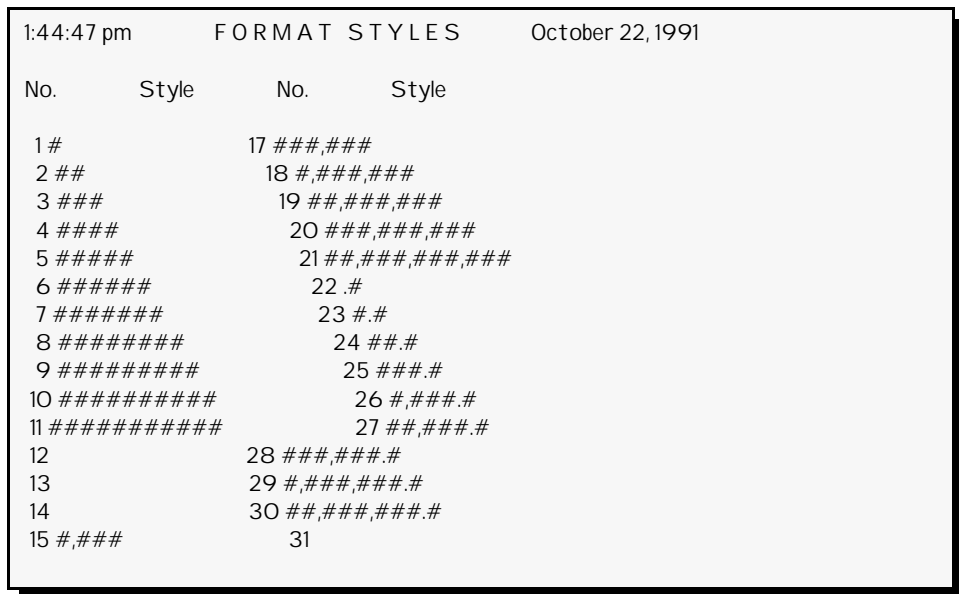
```
1:44:47 pm        F O R M A T   S T Y L E S        October 22, 1991

 No.        Style        No.          Style

  1 #                  17 ###,###
  2 ##                 18 #,###,###
  3 ###                19 ##,###,###
  4 ####               20 ###,###,###
  5 #####              21 ##,###,###,###
  6 ######             22 .#
  7 #######            23 #.#
  8 ########           24 ##.#
  9 #########          25 ###.#
 10 ##########         26 #,###.#
 11 ###########        27 ##,###.#
 12                    28 ###,###.#
 13                    29 #,###,###.#
 14                    30 ##,###,###.#
 15 #,###              31
```

Figure 2-3. Format Styles Screen

Format Styles

There are several different formats which can be used for numeric data. Numeric format styles are built from four characters:

- **#** (pound sign) - represents a numeric digit

- **.** (period) - represents a decimal point

- **$** (dollar sign) - places a dollar sign before a value to represent currency

- **,** (comma) - prints a comma as a thousands separator

Combine these characters to build your format. The table below shows examples of sample format styles and how each would display values.

Format Style	Sample Value
#	1
##	12
###	123
#####	12345
$###.##	$123.45
#,###,###.##	1,234,567.89
$###,###,###	$123,456,789

Procedure

1. Select **Format** from the Factor Maintenance menu bar.

2. UNIVERS displays the Format Styles Screen. Press the [SPACE BAR] to edit a style.

3. UNIVERS displays ``*Enter Format Number to Edit (1 to 255).*'' Enter the format number you wish to add/edit.

4. Enter/edit the format style.

5. UNIVERS displays ``*Enter Format Number to Edit (1 to 255).*'' Continue entering/editing format styles. When you have entered/edited all the desired format styles press [ESCAPE] to return to the format style listing.

6. Press [ESCAPE] again to return to the Factor Maintenance Screen.

Quit

Selecting the **Quit** option from the Factor Maintenance menu bar returns you to the UNIVERS System Maintenance Menu.

Procedure

1. Select **Quit** from the Factor Maintenance menu bar.

2. *This step only applies if there were changes made to a card which were not saved.* UNIVERS displays ``*WARNING: Files have not been saved. Do you want to exit anyway?*'' Type one of the following:

   Y - to exit without saving the changes

   N - to return to the Factor Maintenance Screen in order to save the changes

Section 3: Contents

Section 3: Contents

Action Table Design

Action Tables are tables that contain Information Processing Table Editor (IPTE) Commands which allow you to perform daily maintenance on the parcel records in your data base. This section of the manual offers you some information, advice and guidance on developing Action Tables. To create Action Tables you need a proper understanding of how to arrange the IPTE Commands which make up the Action Tables. The IPTE Commands are described in Appendix A.

Note

Changes to the Action Tables can interfere with the proper functioning of your system. Changes should only be made to Action Tables under the direction of Cole-Layer-Trumble.

Numbering IPTE Command Statements

An Action Table is comprised of logically sequenced IPTE Commands, each of which instructs UNIVERS to perform a specific task. Each IPTE Command in a table has its own Line and Statement Number. These numbers organize the design of the table and reference specific IPTE Command statements. An Action Table can be comprised of up to 3000 Line Numbers. Each Line Number can be comprised of up to 255 Statement Numbers, numbered consecutively from 1 to 255. This provides for the possibility of up to 765,000 different IPTE Commands within a given table.

Organizing Line Numbers by Function
Writing and modifying your Action Table will be much easier if you allocate certain Line Numbers, or groups of Line Numbers, in the table to specific functions. The more complicated an Action Table's purpose and logic is, the more important this type of organization and planning becomes.

Line Numbering and Interaction Between Tables
Before planning a new Action Table's Line and Statement numbering scheme, and actually entering the IPTE Commands, you will want to consider if it will interact with other Action Tables. UNIVERS has the built-in capacity for one Action Table to activate other tables via the **Add Block** (XXA) and **Remove Block** (XXR) Commands. This lets you connect two tables together or execute a single Action Table, versus many separate tables. This single table may consist of only a number of different menus, which allow the user to activate other Action Tables. This type of Action Table is referred to as a Menu Table.

If you will be creating a Menu Table, or if you will be linking two tables together, there are some limitations on the line numbering scheme you may use. When one Action Table is used to activate another Action Table (or tables), *the same Line Numbers cannot exist in both tables*.

Blank Space for Renumbering
It is important to maintain a range of blank Line Numbers within the Action Table which remain inactive, solely for the purpose of using when renumbering is required.

Staggered Line Numbers

Rather than using tightly-packed, consecutively numbered Line Numbers in your table (e.g., Line Number 1, 2, 3, 4, ...), consider a regular, staggered numbering scheme (e.g., 5, 10, 15, 20, ... or 10, 20, 30, ...). This reduces the need to renumber IPTE Commands statements in your table when you find that you must insert statements between existing Line Numbers. The interval of your staggered numbering scheme is entirely up to you. It depends on the complexity of your Action Table.

Remark Line

At the beginning of your Action Table (Line Number 1, Statement Number 1), include a remark line as a source of information for anyone else who may be modifying this table in the future. This remark line might provide a very brief description of the table, its creation date and the initials of the individual who developed it. To include a remark line in your Action Table, use the **Label** (L) Command at Line and Statement Number 1.

The Label (L) Command. The **Label** (L) Command must *always be the first statement in a Line Number*. UNIVERS will not recognize a **Label** (L) Command if it is not the first statement. If you must insert a **Label** (L) Command in the middle of an existing Line Number, then you must create a new Line Number and re-enter the statements which follow the **Label** (L) Command. There are three IPTE Commands which reference and/or interact with the **Label** (L) Command:

- **Transfer (T)** Command transfers control of the Action Table to a Label within the table which you have specified.

- **If Then (I)** Command transfers control of the Action Table to a Label within the table if a specified **If Then** condition is met.

- **Go to Subroutine** (XG) Command transfers control of the Action Table to a subroutine with a specified Label.

The Label may occur before or after the command which transfers control to it. For example, a Transfer (T) **Command** in Line Number 1000 of an Action Table may transfer control of the table back to a Label at Line Number 700. Each Label in an Action Table must be unique. If the same Label appears twice in a table, UNIVERS will transfer control to the first Label occurrence. If UNIVERS attempts to transfer control to a Label which does not exist, it will issue an error message and all processing will stop.

Conserving Memory

UNIVERS can accommodate between 1500 and 2000 IPTE Command statements in memory at any one time. The number of statements which can be accommodated in memory is affected by the number of data base factors associated in the table and the Cache Size (refer to **Set Cache Size (Xc)** in Appendix A). However, by creating and using a Menu Table to access and execute other Action Tables, functions requiring several thousand statements can be completed in less time and with less room than designing separate tables to perform each function.

MS Locations

When designing an Action Table, you may use up to 999 Memory Storage (MS) Locations as temporary holding grounds for data, storage for intermediate calculations, assignment as indices, assignment to control blocks and any other need you may have for process control or data manipulation within your table. These MS Locations are numbered 001 through 999. Certain MS Locations will be off limits in your table. These are the MS Location numbers associated with the data base factors that are accessed through the table. By associating these factors in the table, their MS Locations become off limits for other uses in the table.

Associating Data Items

The **Associate** (XA) Command is used within an Action Table to relate the Card Type and Item Number of each data base factor you plan to access with its MS Location number. That data base factor becomes the sole owner of the MS Location identified. A temporary storage location or File Control Block cannot be assigned this MS Location number.

The **Associate** (XA) Command statements should be placed in the first lines of your Action Table. By placing **Associate** (XA) Commands near the beginning of the table, data items can be associated once before other processing begins. A separate XA statement must exist for each Card Type that is being accessed through the table. During execution, this command requires a substantial amount of computer memory and takes more time to execute than other IPTE Commands. You will want to minimize the number of times you plan to execute an **Associate** (XA) Command within an Action Table.

When an Action Table will be accessed and executed by a Menu Table, associations can be made once within the Menu Table itself. These associations can be used by all Action Tables which the Menu Table invokes. In this case, the **Associate** (XA) Command will not be required in the new table being created.

File Control Blocks

UNIVERS relies on File Control Blocks to maintain control of table processing when an Action Table is reading data from and writing data to the data base. A File Control Block must be set up in your table *for each Card Type* that you will process through it. Each File Control Block uses eight contiguous MS Locations. The File Control Block for the Base Card (Card Type 1) differs from those required for secondary Card Types.

Setting the File Control Block for the Base Card

Determine the range of eight contiguous MS Locations that you will allocate to the File Control Block for Card Type 1, the Base Card. Any eight contiguous locations will do, so long as they are not associated with data base factors. The range of MS Locations for the entire File Control Block is specified by defining the *first* location number in the range, along with the **Make Base Card** (XXM) Command. For example:

XXM 710

When this command statement is entered to the Action Table, UNIVERS is informed that the File Control Block for the Base Card, Card Type 1, begins with MS Location 710 and continues through 717. This gives you eight contiguous MS Locations allocated to the Base Card's File Control Block.

The eight MS Locations in a File Control Block have specific purposes. These purposes differ slightly between the File Control Blocks for the Base Card and secondary cards. This paragraph focuses on the function of each MS Location in a Base Card's File Control Block.

- **MS Location (1)** refers to the Card Set Number. UNIVERS automatically establishes the Card Set Number for the Base Card as **1**.

- **MS Location (2)** refers to the Permanent Parcel Number (PPN) of a parcel being read from or written to the data base. UNIVERS determines this for you, based on values contained in MS Locations (5) and (6) of the File Control Block.

- **MS Location (3)** refers to the Card Type within a particular parcel being read from or written to the data base. UNIVERS automatically establishes the Card Type for this location as Card Type 1. This is because the **Make Base Card** (XXM) Command indicates that this is a File Control Block for the Base Card.

- **MS Location (4)** refers to the Card Number of a particular Card Type being read from or written to the data base. UNIVERS automatically establishes the Card Number for the Base Card as **1**, as there can only be one Base Card per parcel.

- **MS Location (5)** refers to the key value of a particular parcel, using the key field that you have specified in MS Location (6) of the File Control Block.

- **MS Location (6)** refers to the specific key field to be used to read parcel data from or write it to the data base. You must specify this key field.

- **MS Location (7)** sets the return status when you attempt to read data from or write data to the data base. UNIVERS places a value in this position to notify you if the read/write attempt is successful. A return status of **0** means that the attempt is successful. A return status greater than **0** means that the attempt has failed. A listing of return statuses and their meanings is found under the **Get Base Card** (G) Command in Appendix A.

- **MS Location (8)** refers to the status text to be displayed when you attempt to read data from or write data to the data base. UNIVERS places a brief message in this field to explain to you what has occurred. The message corresponds to the return status described in the discussion of MS Location (7), above.

Setting File Control Blocks for Secondary Card Types

Each secondary Card Type that will be processed through your Action Table must have its own File Control Block established. Eight contiguous MS Locations must be set aside for each of these File Control Blocks. The range of MS Locations for each of these File Control Blocks is specified by defining the *first* MS Location number in the range, along with the **Make Secondary Card** (XXm) Command. For example:

XXm 720

When this command statement is entered to the Action Table, UNIVERS is informed that a File Control Block for a secondary Card Type has been established, beginning with MS Location 720 and continuing through 727. This gives you eight contiguous MS Locations allocated to a secondary Card Type's File Control Block.

- **MS Location (1)** refers to the Card Set Number of the secondary Card Type being processed. UNIVERS supports up to 250 Card Sets. You must specify the Card Set Number as a value between 1 and 250, inclusive.

- **MS Location (2)** refers to the Permanent Parcel Number (PPN) of a parcel being read from or written to the data base. For secondary Card Types, you must define this parameter in MS Location (2) of your File Control Block. Usually, you will access a Base Card using specific key fields and values, and then access a secondary Card with the same PPN. In this case, you may want to copy the value in MS Location (2) of the Base Card File Control Block into MS Position (2) of this block.

- **MS Location (3)** refers to the Card Type within a specific parcel being read from or written to the data base.

- **MS Location (4)** refers to the Card Number of a specific Card Type being read from or written to the data base.

- **MS Location (5)** refers to the key value of a Secondary Card. Secondary cards are read from and written to the data base using PPN number rather than key value. You *do not* need to place a value in this field.

- **MS Location (6)** refers to the key field used to read and write a secondary card. The key is composed of the Card Set Number, the PPN, the Card Number and the Card Type.

- **MS Location (7)** refers to the return status indicated when you attempt to read data from or write data to the data base (same as for Base Card).

- **MS Location (8)** refers to the status text displayed when you attempt to read data from or write data to the data base (same as for Base Card).

Sketch Control Block

If you are going to access or create sketches within your Action Table, using the **Sketch** (XXs) Command, you will need to build a Sketch Control Block. A sketch control block requires ten consecutive MS Locations (see **Sketch Command (XXs)** in Appendix A).

Set Variables

You will need to allocate other MS Locations within your Action Table for setting print formats, setting edit ranges, solicitations, conditional testing, and intermediate calculations. Set variables should be grouped together in one place near the beginning of your Action Table. Whenever you attempt to display, maintain, or manipulate a variable which has not been associated, defined in a control block, or set; the system will generate an error message and processing will terminate. Grouping the Set Commands within your Action Table will provide for improved trouble-shooting if this situation occurs.

Accessing the Data

Nearly every Action Table you write, will retrieve data from and/or store data back to the data base. In UNIVERS, all data must at one time enter the work area, through a series of IPTE Commands before the data file is accessible.

The Make Commands

Data from data items in the data file are accessed according to their Card Type and Item Number. The Card Types to be processed in an Action Table are identified in the work area using the **Make Base Card** (XXM) and **Make Secondary Card** (XXm) Commands. These commands place a blank, skeletal Card Type in the work area, creating a Card Type buffer area with which to work.

Because the work area is of limited size, there is a limit on the number of Card Types that can be placed in the work area at one time. UNIVERS allows only five Card Types active in the work area at any given time. *One of these Card Types must be Card Type 1, the Base Card*. This presents a constraint on your Action Table design, should you have a table which requires access to data from more than five Card Types. If you will need to access data from more than five Card Types in your Action Table, you will need to:

1. Read up to five Card Types into the work area.

2. Process them as required.

3. Save them, if necessary.

4. Then release the space in the work area occupied by one Card Type using the **Release** (R) Command before executing a **Get Base Card** (G) or **Get Secondary Card** (g) Command on another Card Type.

The **Make Base Card** (XXM) Command creates a buffer in the work area to hold incoming data from a record's Base Card. The **Make Secondary Card** (XXm) Command creates a buffer in the work area to hold incoming data from a secondary card. When using either of these commands, an MS Location is specified within the Action Table which becomes the first position in the File Control Block for that Card Type.

You must execute a **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command or a Get Base Card (G) or **Get Secondary Card** (g) Command for a particular Card Type before attempting to manipulate its data by executing a **Move** (M), **Put Base Card** (P), **Put Secondary Card** (p), or **Save** (S) Command. Failure to do this results in a hard system error, which causes Action Table execution to terminate.

When including a **Make Secondary Card** (XXm) Command in your Action Table, you must specify the Card Type number (2 through 50) before executing the **Make Secondary Card** (XXm) Command. Failure to specify the Card Type number for the secondary card results in a hard system error, causing Action Table execution to terminate.

The Get Commands

The **Make Base Card** (XXM) and **Make Secondary Card** (XXm) Commands make room in the work area for incoming data from the data file. The **Get Base Card** (G) and **Get Secondary Card** (g) Commands are used to actually retrieve the data items for a particular Card Type from the data file, placing them in the work area. The **Get Base Card** (G) Command moves Base Card data into the work area, to the buffer identified through the **Make Base Card** (XXM) Command. The **Get Secondary Card** (g) Command moves secondary card data into the work area, to the buffer identified through the **Make Secondary Card** (XXm) Command. When using either of these commands, an MS Location is specified within the command statement, which references the File Control Block for that Card Type.

The Move Command

The **Move** (M) Command is used within an Action Table to move the data items for a particular Card Type from their MS Locations to the operating memory of the computer. A **Move** (M) Command must be preceded by a **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command or a **Get Base Card** (G) or **Get Secondary Card** (g) Command for the particular Card Type being moved. The **Move** (M) Command only moves data items which have been already associated in the Action Table for a particular Card Type. If you attempt to move a data item from a Card Type which has not been associated, an error results.

The Save Command

The **Save** (S) Command is used within an Action Table to move the data items for a particular Card Type from the operating memory of the computer to its MS Locations. This is the opposite function of a **Move** (M) Command. The **Save** (S) Command can only be used to save data items which have been previously associated for a particular Card Type. If no data has been associated for a Card Type being saved, an error results. All data items to be saved should either have been previously moved into operating memory or had data entered to them while the Card Type was in operating memory. Saving data items which have either not been moved into working memory or not had data entered to them can cause existing data to be overwritten.

The Put Commands

A **Put Base Card** (P) or **Put Secondary Card** (p) Command is used within an Action Table to move data for a particular Card Type from the work area to the data files. The **Put Base Card** (P) Command moves Base Card data. The **Put Secondary Card** (p) Command moves secondary card data. These commands must be preceded by either a corresponding **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command or a **Get Base Card** (G) or **Get Secondary Card** (g) Command, as well as a **Save** (S) Command, for the Card Type in question in order to function properly. If these commands have not been executed, a hard system error results and Action Table processing will be terminated.

Adding a Record to the Data File

The procedures followed for adding a record to the data file are different from those for modifying or updating an existing record. When you want to add a record to the data file, you must execute a **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command within your Action Table. This command creates an area in the work area to receive the new data which will be entered to the record. You should execute a **Move** (M) Command for each Card Type to be added to the record. This clears any data in the computer's operating memory which remains from processing of previous records.

You must then execute both a **Save** (S) and a **Put Base Card** (P) or **Put Secondary Card** (p) Command in order to write the new data from the computer's operating memory to the data files. *This must be done for each Card Type for which data is added*. You should test before executing the **Save** (S) and **Put Base Card** (P) or **Put Secondary Card** (p) Commands, to insure that data was in fact entered to each Card Type.

When you begin to enter data for a record, you may wish to execute a **Get Base Card** (G) Command and check the return status, to insure it does not already exist. UNIVERS will not execute a **Put Base Card** (P) or **Put Secondary Card** (p) Command for a particular Card Type which previously existed *unless* a corresponding **Get Base Card** (G) or **Get Secondary Card** (g) Command was performed for that Card Type.

Updating an Existing Record

Unlike the guidelines for adding a record to the data file, it is not necessary to execute a **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command when you update an existing record. Execution of the **Get Base Card** (G) or **Get Secondary Card** (g) Command creates the required work area for each Card Type. However, if a particular Card Type does not exist, you must execute a **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command for that type.

After performing the **Get Base Card** (G) or **Get Secondary Card** (g) Command and, if required, the **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command, you must execute a **Move** (M) Command for each Card Type. This moves data for the record to be updated from the work area into operating memory. If a particular Card Type does not exist for a record, the **Move** (M) Command clears any data in operating memory which remains from previous record updates.

For each Card Type being updated, you must execute both a **Save** (S) and a **Put Base Card** (P) or **Put Secondary Card** (p) Command in order to write the data from operating memory to the data files. You should test before executing the **Save** (S) and **Put Base Card** (P) or **Put Secondary Card** (p) Commands, to insure that data was in fact entered to each Card Type. Card Types which were moved into operating memory from the data files, but were subsequently not rewritten to the fixed disk, will continue to reside unchanged in the data files.

Subroutines

A subroutine is a group of IPTE Command statements which perform a repetitive task. A subroutine can be called upon at any point within an Action Table. When called, the subroutine is executed and then table control returns to the IPTE Command statement which immediately follows the statement that calls the subroutine. A subroutine can be called upon repeatedly from different points in the Action Table.

Planning for Subroutines

When planning a new Action Table, you should identify all of the functions that will be invoked on a repetitive basis. Place each of these functions in a separate subroutine. Using subroutines reduces the number of statements in a table, thus reducing the amount of time it takes to write the table. It also leaves more memory available so that you can include other functions in your table, if necessary.

Allocate specific Line Numbers in your table to each subroutine that you will be designing. These Line Numbers would preferably lie near the end of the table, where they are out of the way of main table commands. This will let you isolate your subroutine statements for greater ease when modifications are required.

Subroutines and Action Table Control

In UNIVERS, Action Table control returns from a subroutine via the **Return From Subroutine** (XR) Command to the IPTE Command statement which immediately follows the **Go To Subroutine** (XG) Command. UNIVERS counts the number of **Go To Subroutine** (XG) Commands and **Return From Subroutine** (XR) Commands which are executed. When the number of **Go To Subroutine** (XG) Commands executed exceeds the number of **Return From Subroutine** (XR) Commands executed by ten, UNIVERS generates an error message and table processing is terminated. When planning a subroutine, make sure that Action Table control is *not transferred* out of the subroutine to some other line within the table, other than that which follows the **Go To Subroutine** (XG) Command. Special care should be taken when using an If Then (I) or Transfer (T) Command within a subroutine.

Nested Subroutines

UNIVERS will let you execute subroutines within subroutines. These are referred to as nested subroutines. UNIVERS supports up to ten nested subroutine levels. When nesting subroutines, carefully plan their use before you begin to write them. Remember that when UNIVERS returns control from a subroutine, it will return it to the statement following the **Go To Subroutine** (XG) Command (even if that statement is in the middle of another subroutine), unless you specify another Label (i.e. XRNXT).

Direct Addressing

Direct addressing lets you to identify a specific MS Location for processing. This may be an MS Location which is either associated from the Factor Table or established by calculation through use of a Set Command.

Let us consider an example for illustration of this concept. Assume that in your Factor Table, you have a data item called **Owner Name**. This data item has Factor Number 040 assigned to it. Using the direct addressing capability, you elect to display an **Owner Name** for a specific parcel record. The IPTE Command you would use within your Action Table to accomplish this action might look like this:

f 040a004a005a001a030

This command statement would be translated as follows:

f   Factor Display (IPTE Commands)

_040   Display the data contained in Factor Number 040 of the parcel. This is the direct address. A space must always precede the Factor Number when using a direct address.

a004   Display this data at Row 4 (004) of the screen.

a005   Display this data in Column 5 (005) of the screen.

a001   Display this data using Style 001, String Type.

a030   Set the length of this displayed field to 30 (030) characters.

Absolute Addressing

Absolute addressing lets you specify an absolute value between 1 and 999, inclusive, to be used in processing data. Consider the following example, which demonstrates both absolute and direct addressing. Assume that, within your Action Table, you wish to multiply the value contained in MS Location 350 by 100. The IPTE Command statement you would use to accomplish this action within your table would look like this:

* 350 350a100

This command statement can be translated as follows:

*   Multiply

_350   (second occurrence) the data value in MS Location 350 for this parcel by

a100   the absolute value, 100

_350   (first occurrence) store the product in 350

Now, assume that the value in MS Location 350, before this Action Table is executed, is **50**. The calculation that is performed, based upon the example command statement shown above, would look like this:

50 X 100 = 5000

Indexed Addressing

Indexed addressing lets you perform repetitive procedures on a number of MS Locations with a single set of command statements. UNIVERS supports six different indices, which may all be active at any one time. The indices are denoted by the lower case letters **i**, **j**, **k**, **l**, **m** and **n**. You assign the MS Locations for these indices by using the **Set Index** (Xi) Command. Consider this simple command statement, which begins with the **Set Index** (Xi) Command:

Xi660

With this single **Set Index** (Xi) Command, the MS Locations for indices **i** through **n** are established:

660 = i
661 = j
662 = k
663 = l
664 = m
665 = n

Once you have defined the MS Locations of the indices using the **Set Index** (Xi)
Command, you can then place a value in each one of the indices using the **Set Value** (s)
Command. The **Set Value** (s) Command can be used to change the value in an index at
any point within the table.

Continuing with the example above, suppose that the next command statement after
Xi660 is:

s6601

After this command statement is executed, index **i** would have a set value of **1**. Indices
are used to offset the MS Location which the table is currently executing against. This
needs some detailed explanation. Let us continue with our example a bit further.
Suppose, within the same Action Table, this IPTE Command statement is present:

fi200a006a005a002a004

The value contained in index **i** is called the offset. The offset is added to the
MS Location specified in the command, to arrive at the MS Location which will be acted
upon by the command. In our example, index **i** contains the value **1**. We previously set
this with the **Set Value** (s) Command, **s6601**. The **Factor Display** (f) Command
statement shown above would be translated as follows:

f   Factor Display

i200   Display the value contained in MS Location 201. This position is determined
           through indexed addressing. It adds the offset value contained in index **i** (1) to
           the MS Location specified (200).

a006   Display this value at Row 6 (006) of the screen.

a005   Display this value in Column 5 (005) of the screen.

a002   Display this value using Style Type 002, Single-Precision.

a004   Set the length of this displayed field to 4 (004) positions.

Many appraisal systems allow for multiple entries of sales information, land information
and outbuilding (OBY) information. By assigning consecutive Factor Numbers to these
multiple occurrences, you can use indexed addressing to display many data items with
only a few statements in an Action Table.

Indirect Addressing

Indirect addressing allows you to reference the value in another MS Location when
executing an IPTE Commands. Indirect addressing is indicated in an Action Table by
use of the @ sign.

Let us consider an example. Assume we are working with two MS Locations, 652 and 522, within an Action Table. The contents of these two MS Locations are as follows:

MS Location	Contents
652	522
522	100

Using the **Add** (+) Command, we include this IPTE Command statement in your table:

+ @652@652a962

The calculation which would be performed by our statement, during table execution would be:

1062 = 100 + 962

And this new value, **1062**, would be stored in MS Location 522. This can be illustrated by breaking down the commands:

+   **Add** (+) Command

@652   (second occurrence) The @ sign signifies an indirect address. Therefore, add the contents of 522 to

a962   the absolute (a) value 962

@652   (first occurrence) store the sum in the MS Location equal to the contents of 652: 522.

Whenever indirect addressing is used, the command *does not* execute against the contents of the MS Location which is specified. In our example above, this would be MS Location 652. Note in our example, that this computation was not performed at table execution:

1484 = 522 + 962

Rather, the command is executed against the contents of the MS Location that is indirectly addressed through the specified position. In our example, the MS Location 522 is indirectly addressed through 652. Thus, the computation 1062 = 100 + 962 was performed.

When an MS Location is specified, through which an MS Location will be indirectly accessed (in our example, this would be position 652), the contents of this MS Location must lie between 001 and 999. Indirect addressing allows you to create an Action Table that is much more general. Indirect addressing allows the same statements to be used to execute calculations against different MS Locations that are not offset and cannot be processed using indexed addressing.

Data Tables

As part of any Action Table, you may include a data table (or, look-up table) by using the **Label** (L) and **Table Access** (XT) Commands. There are two important rules to remember when entering a data table to an Action Table. The first rule is that the first statement in a data table must be a **Label** (L) Command, to name the table. This label must be referenced when you execute the **Table Access** (XT) Command within the main body of your Action Table. This transfers processing to the look-up table. The second rule is that *each line of data within a data table must have a separate Line Number. The Create and Maintain Action Tables module uses the Line Numbers to keep track of its position within the data table*. UNIVERS will not recognize the second (or any subsequent) statement of a Line Number within a data table. Using a second statement within a Line Number of a data table can cause incorrect values to be identified during table look-up.

Create and Maintain Action Tables

This module creates and maintains the Action Tables which allow you to perform data management functions on the data in your data base. When you select **Create and Maintain Action Tables** from the UNIVERS System Maintenance Menu, the Action Table Editor Screen (Figure 3-1) displays.

```
1:45:14 pm      ACTION TABLE EDITOR - Ver. 7.2 - 12/16/93   February 16, 1994


   Table #         Table Name              Creation Date

   OO6     ACTION TABLE MAIN MENU                 1O/21/91
   OO8      * ACTION TABLE MAIN MENU              O9/2O/91
   OO9      * ACTION TABLE MAIN MENU              O6/O4/91
   O1O     DAILY OPERATION MENU              O4/16/91
   O11     BASE AND COMMON ASSOCIATIONS           O4/16/91
   O12     RESIDENTIAL HANDLER              O4/25/91
   O13     RESIDENTIAL ASSOCIATIONS             O4/16/91
   O14     COMMERCIAL ASSOCIATIONS            O9/2O/91
   O15     COMMERCIAL HANDLER              O4/23/91
   O16      COMMERCIAL HANDLER CONTINUED           O4/16/91
   O17     INCOME AND EXPENSE HANDLER           O4/16/91
   O18      INCOME AND EXPENSE ASSOCIATIONS           O5/29/91
```

Figure 3-1. Action Table Editor Screen

The top part of the screen lists Action Tables which have been created for your jurisdiction. Up to twelve tables are listed on the screen at once. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [] and [] to highlight a specific table on a page.

You can create up to 999 different Action Tables. There are two steps involved in creating Action Tables. First, you must use the **Create** option of the Action Table Editor Screen menu bar to add an Action Table to the listing. This step creates a blank Action Table. Second, you must use the **Display** option to enter the IPTE Command statements which make up to the Action Table.

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the Action Table currently loaded to memory. The box on the right displays the current page number and the number of pages in the listing.

Load

The **Load** option of the Action Table Editor Screen menu bar loads the highlighted table into memory. There must be a table in memory in order to use the **Display**, **Print**, and **Save** options.

Procedure
1. Highlight the table you wish to load.

2. Select **Load** from the Action Table Editor Screen menu bar.

3. *This step only applies if there is a table in memory which has been changed but not saved*. UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

    Y - to continue without saving the table in memory

    N - to abort the procedure in order to save the table in memory

Merge

The **Merge** option of the Action Table Editor Screen menu bar merges the contents of the table in memory to the highlighted table. The table in memory is called the merge table. The highlighted table is called the subject table. All line numbers from the merge table which are not in the subject table are added to the subject table. Line numbers which already exist in the subject table *will not be* overlaid by the merge table. (You will get an error message if this is going to happen).

Procedure

1. Load the merge table into memory.

2. Highlight the subject table.

3. Select **Merge** from the Action Table Editor Screen menu bar.

4. UNIVERS displays ``*New table may overlay/merge with current. Do you want to continue?* Type one of the following:

   Y - to merge the tables

   N - to abort the merge procedure

Display

The **Display** option of the Action Table Editor Screen menu bar displays and maintains the Action Table in memory.

Procedure

1. Load the desired table into memory.

2. Select **Display** from the Action Table Editor Screen menu bar. The IPTE Command List (Figure 3-2) displays. This screen displays the IPTE Command statements which make up the Action Table currently in memory. You can scroll the listing a screen at a time by pressing [PAGE UP], [PAGE DOWN], [ ], and [ ].

```
1:45:47 pm      ACTION TABLE EDITOR - Ver. 7.2 - 12/16/93   February 16, 1994

 Line No. Stat No.     Information Process        Table:006

   1    1   LREM LAST CHANGE 05/05/91 MAH
   1    2   Xca005a002
   1    3   XXAa011
   1    4   XGB&L
   1    5   XXR 079
   1    6   XXAa008
   1    7   XXAa009
   2    1   Xs 080NUL
   2    2   Xs 081INC
   2    3   Xs 082RSS
   2    4   Xs 083CMM
   2    5   Xi 460
   2    6   Xs 0201
```

Figure 3-2. IPTE Command List

First

This option of the IPTE Command List menu bar displays the first page of IPTE Command statements in the table. To use this option, select **First** from the IPTE Command List menu bar.

Last

This option of the IPTE Command List menu bar displays the last page of IPTE Command statements in the table. To use this option, select **Last** from the IPTE Command List menu bar.

Range

This option of the IPTE Command List menu bar displays the IPTE Command statements beginning with a specified line number and statement number. If the specified line number or statement number does not exist, the display begins with the next highest line number or statement number. To use this option, perform the following steps:

1. Select **Range** from the IPTE Command List menu bar.

2. UNIVERS displays ``*Enter line number to list.*'' Enter the first line number you wish to list.

3. UNIVERS displays ``*Enter the statement number to list*.'' Enter the first statement number to list.

Modify

This option of the IPTE Command List allows you to make changes to the IPTE Command statements in the Action Table. When you select this option, a new menu bar displays.

Edit. This option allows you to edit an IPTE Command statement. To use this option perform the following steps:

1. Select **Edit** from the menu bar.

2. UNIVERS displays ``*Enter the line number to edit*.'' Enter the line number you wish to edit.

3. UNIVERS displays ``*Enter the Statement number to edit*.'' Enter the statement number you wish to edit.

4. The IPTE Command statement displays on the edit line at the bottom of the screen. Type the new IPTE Command or press [ESCAPE] to return to the menu bar.

5. When you type the IPTE Command, the command syntax displays above the edit line. Type the rest of the command statement and perform one of the following:

   • Press [ENTER] to accept the new IPTE Command statement and return to the menu bar.

   • Press [ESCAPE] to re-enter the IPTE Command (Go back to step 4).

Insert. This option inserts a new IPTE Command statement in the Action Table. The new statement is inserted at the entered line number and statement number. If the entered line or statement number already exists, subsequent line numbers and/or statement numbers are renumbered as necessary. To use this option, perform the following:

1. Select **Insert** from the menu bar.

2. UNIVERS displays ``*Enter line number to insert*.'' Enter the new line number to insert.

3. UNIVERS displays ``*Enter statement number to insert*.'' Enter the new statement number to insert.

4. Type the new IPTE Command on the edit line at the bottom of the screen or press [ESCAPE] to return to the menu bar.

5. After you type the IPTE Command, the command syntax displays above the edit line. Type the rest of the command and perform one of the following:

   • Press [ENTER] to accept the new IPTE Command statement.

   • Press [ESCAPE] to re-enter the IPTE Command (Go back to step 4).

6. Repeat steps 4 and 5 until all desired IPTE Command statements have been entered. Each subsequent IPTE Command statement will use the same line number with a statement number incremented by one.

7. After all statements have been entered, press [ESCAPE] to return to the menu bar.

Delete. This option deletes an IPTE Command statement. To use this option, perform the following steps:

1. Select **Delete** from the menu bar.

2. UNIVERS displays ``*Enter line number for delete*.'' Enter the line number you wish to delete.

3. UNIVERS displays ``*Enter statement number to delete,[*] to delete line*.'' Enter the statement number you wish to delete or enter an asterisk (*) to delete all statements for the line.

Clear. This option deletes a range of IPTE Command statements. All statements for all line numbers in the entered range are deleted. To use this option, perform the following steps:

1. Select **Clear** from the menu bar.

2. UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line number you wish to clear.

3. UNIVERS displays ``*Enter ending line to clear*.'' Enter the last line you wish to clear.

Renumber. This option renumbers a range of IPTE Command statements. You cannot overlay existing line numbers when renumbering IPTE Command statements. To use this option, perform the following steps:

1. Select **Renumber** from the menu bar.

2. UNIVERS displays ``*Renumber starting at line (default=1).*'' Enter the first line number to renumber.

3. UNIVERS displays ``*and continuing thru line (default=3000).*'' Enter the last line number to renumber.

4. UNIVERS displays ``*New starting line will be (default=10).*'' Enter the new first line number of the range you are renumbering.

5. UNIVERS displays ``*with an increment of (default=10).*'' Enter the desired increment between line numbers.

Block-copy. This option copies a block of lines. You cannot overlay existing line numbers when attempting to copy lines. To use this option, perform the following steps:

1. Select **Block-copy** from the menu bar.

2. UNIVERS displays ``*Copy block starting at line (default=1).*'' Enter the first line number to copy.

3. UNIVERS displays ``*and continuing thru line (default=3000).*'' Enter the last line number to copy.

4. UNIVERS displays ``*New starting line will be (default=10).*'' Enter the first line number of the new range.

5. UNIVERS displays ``*with an increment of (default=10).*'' Enter the increment between the new line numbers.

Quit. This option returns you to the IPTE Command List menu bar.

Beau

This option of the IPTE Command List menu bar turns Beautification on and off. With Beautification on, descriptive explanations of each IPTE Command statement display.

Quit

This option of the IPTE Command list menu bar, returns you to the Action Table Editor Screen.

Print

The **Print** option of the Action Table Editor Screen menu bar prints the Action Table currently loaded to memory. To print a portion of a table, clear unwanted lines and then print the table. *Do not* save the table. Re-load it to retain all of the lines.

Procedure

1. Load the desired Action Table.

2. Select **Print** from the Action Table Editor Screen menu bar.

Create

The **Create** option of the Action Table Editor Screen menu bar creates a new Action Table. After you create the table, it is added to the listing. The table number and description are entered with this option. To enter the IPTE Command statements which make up the Action Table, you must use the **Display** option.

Procedure

1. Select **Create** from the Action Table Editor Screen menu bar.

2. UNIVERS displays ``*Enter table number (000-999)*.'' Enter the new table number.

3. UNIVERS displays ``*Enter table description (50 character max.)''* Enter the new table description.

Note

If you enter an asterisk (*****) as the first character of the name, the table will not display on the Action Table Execution Screen in the **Execute Action Table** module, but will still be accessible by the **Create and Maintain Action Tables** module.

Name

The **Name** option of the Action Table Editor Screen menu bar changes the name and description of highlighted Action Table.

Procedure

1. Highlight the table you wish to rename.

2. Select **Name** from the Action Table Editor Screen menu bar.

3. UNIVERS displays ``*Enter new table nmbr or   to use current nmbr*.'' Enter a new table number or press [ENTER] to accept the current number.

4. UNIVERS displays ``*Enter new table description (50 character max.)*'' Enter a new table description.

Note

If you enter an asterisk (*****) as the first character of the name, the table will not display on the Action Table Execution Screen in Module 40, but will still be accessible from Module 30.

Kill

The **Kill** option of the Action Table Editor Screen menu bar deletes the highlighted Action Table.

Procedure

1. Highlight the Action Table you wish to delete.

2. Select **Kill** from the Action Table Editor Screen menu bar.

3. UNIVERS displays ``*WARNING: Deleting Action Table ###. Do you wish to continue?*'' Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Save

The **Save** option of the Action Table Editor Screen menu bar saves the contents of the table in memory to the highlighted table.

Procedure

1. Select **Save** from the Action Table Editor Screen menu bar. If the highlighted table number is the table number in memory, the table is saved.

2. *This step only applies if the highlighted table number is different than the table number in memory*. UNIVERS displays ``*WARNING: Table XXX will be replaced by YYY. Do you want to continue?*'' Type one of the following:

    Y - to save the table in memory to the highlighted table number.

    N - to abort the save procedure

Quit

The **Quit** option of the Action Table Editor Screen menu bar returns you to the UNIVERS System Maintenance Menu.

Procedure

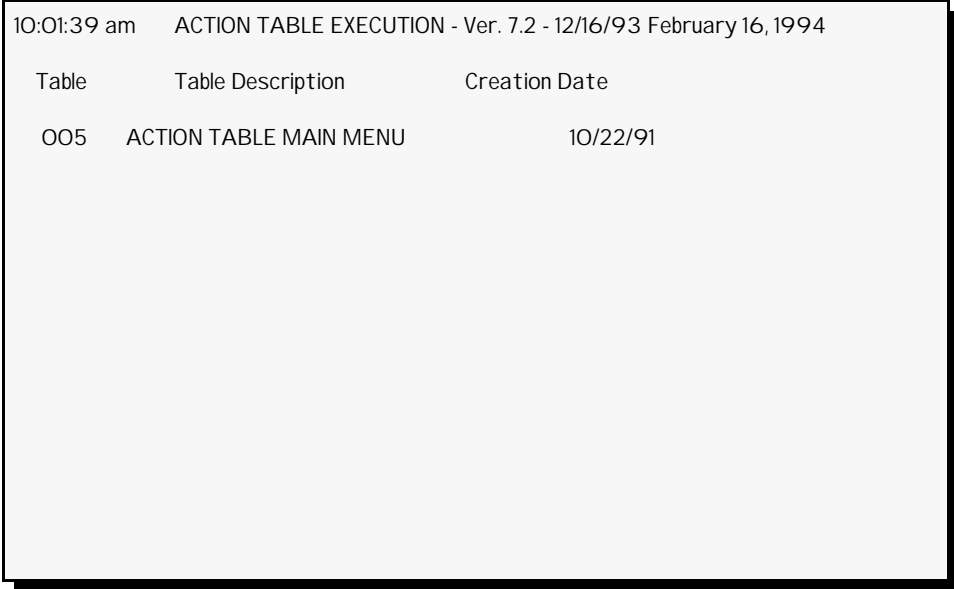1. Select **Quit** from the Action Table Editor Screen menu bar.

2. *This step only applies if the table in memory has been changed but not saved*. UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

    Y - to exit without saving the table in memory

    N - to return to the menu bar in order to save the table in memory

Execute Action Tables

Action Tables that have been created in the **Create Action Tables** module are executed through the **Execute Action Tables** module. By executing an Action Table through this module, the IPTE Commands statements in the table are read, interpreted and acted upon by UNIVERS. This module also allows you to debug your Action Tables. After you select **Execute Action Tables** from the UNIVERS Main Menu, the Action Table Execution Screen (Figure 3-3) displays.

```
1O:O1:39 am      ACTION TABLE EXECUTION - Ver. 7.2 - 12/16/93 February 16, 1994

   Table          Table Description          Creation Date

   OO5      ACTION TABLE MAIN MENU                1O/22/91
```

Figure 3-3. Action Table Execution Screen

The top part of the screen lists the Action Tables which have been created for your jurisdiction. Up to twelve tables are listed on the screen at once. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific Action Table on a page. At the bottom of the screen is a menu bar. Above the menu bar is a box which displays the current page number and the number of pages in the listing.

Run

The **Run** option of the Action Table Execution Screen menu bar executes the highlighted Action Table. While executing an Action Table, this module checks it for certain errors in logic and syntax as it reads each IPTE Command statement. If a logic or syntax error is encountered in the Action Table, the system emits a beep and an error message displays. Any error message identifies the type of error that has been encountered and the specific IPTE Command that has produced the error. Additionally, the message identifies both the line and statement numbers in the Action Table where the error was discovered. Two types of errors are possible when executing an Action Table:

- **Hard Errors** are those which cause table execution to cease. If you are executing an Action Table and a hard error occurs, you must use the Escape [ESCAPE] key to terminate the session and return to the Action Table Execution Screen.

- **Soft Errors** display an error message but do not cause table execution to terminate. (See **Error Messages** below for an explanation of each error).

Aborting Action Table Execution

In some cases, you may want to abort Action Table execution and return to the Action Table Execution Screen, even though the table is still executing. You can prematurely abort a table's execution by pressing [ESCAPE].

Note   Using [ESCAPE] to prematurely terminate Action Table execution may have an effect on the contents of your data base.

Quit

The **Quit** option of the Action Table Execution menu bar, returns you to the UNIVERS System Maintenance Menu.

Menu Key: F1

The Menu function can be activated by pressing [F1]. Menu may be activated at any time during Action Table execution, except when a **Factor Solicit** (F) Command is being executed. The Menu Key displays a menu of optional debug functions across the bottom of your screen. You may then select the desired function from the displayed menu listing. The Menu function also acts as a braking device. When [F1] is pressed, execution of an Action Table stops at the Line and Statement Number currently in process. You may then activate one or more of the other debug functions. You do not need to use the [F1] key first in order to use the others.

Help Key: F2

The Help function can be activated by pressing [F2]. Help may be activated at any time during Action Table execution, except when a **Factor Solicit** (F) Command is being executed. The Help function can also be selected directly from the debug menu or selected after you have activated the Trace function. Use the Help function to access a message file that contains more detailed error messages than those displayed on screen, as well as a brief description of each IPTE Command.

When the Help function is activated after a hard error condition has occurred, UNIVERS will display an enhanced description of the hard error. The system does not display enhanced error messages for soft errors. If the Help function is activated and the message file does not contain appropriate help messages, the following is displayed on screen:

Message Not Found

If the Help function is activated during Action Table execution, and no error condition exists, the screen will display a Help message that gives a brief explanation of the next IPTE Command statement to be executed. To clear the help message from the screen, press [F10] once.

Trace Key: F3

The Trace function is activated by pressing [F3]. This function may be activated at any time during table execution, except when a **Factor Solicit** (F) Command is being executed. For best results, the Trace function should be activated only after you have activated the Menu function which pauses table execution. You may also activate the Trace function by selecting it from the debug Menu. After selecting this function from the Menu, UNIVERS executes one statement in the current Action Table. The Trace function also lets you trace, or step through, an Action Table's execution one IPTE Command statement at a time.

When you first activate the Trace, some important information will be provided to you at the bottom of your screen. This information includes:

• The IPTE Command active in the current Action Table, its Line and Statement Number

• The number of bytes of free memory (Depending upon the size of your table, there will be between 32,000 and 40,000 bytes of memory available when execution of a table commences).

• The cache size (This refers to the number of Factors (F=200) and Linear Values (L=200) allowed in cache memory at any one time. The system defaults at 200 Factors and 200 Linear Values. You may set cache to some other size using the **Set Cache Size** (Xc) Command.

You may advance, one statement at a time, through table execution by pressing either [F10] or the [ENTER] key. Each time you press one of these keys, you will execute the active statement in the Action Table, and information for the next executable statement will be displayed.

To deactivate the Trace function, press [F3] again or press [F10]. By deactivating the Trace function, Action Table execution returns to its normal processing speed.

Debug Key: F5

To activate the Debug function, press [F5] during Action Table execution. This function cannot be activated if a **Factor Solicit** (F) Command is being executed. The Debug function lets you view the contents of a selected Memory Storage (MS) Location at a specific point in time.

When you first press the [F5] to invoke the Debug function, this message displays:

Enter MS, | OR |: _____

Enter the number (000 to 999) of the MS Location whose contents you wish to view and press [ENTER]. The MS Location number is sometimes referred to as a Factor Number.

UNIVERS displays the specified MS Location; the data type of the location; the Card Type in the Factor Table, if any, where that MS Location resides; and the Item Number of that factor in its Card Type. If the MS Location has been defined as a numeric data type (i.e., Byte, Integer, Single-Precision or Double-Precision), the contents of its field will appear directly to the right of the data type. If the MS Location has been defined as a Text type, the contents of the field will appear to the right of the words **STRING VALUE** on the second line of the display. If no data has been entered in a String type field, the field will have a data type of ``Undefined.''

Note

When displaying the data type for an MS Location with the Debug function, UNIVERS assumes that a four character string is a Single-Precision data item and an eight character string is a Double-Precision data item. When you have finished viewing one MS Location, you may enter another MS Location number and view its contents.

Pressing [ ] advances the MS Location numbers in ascending order. Pressing [ ] advances the MS Location numbers in descending order.

Action Table execution ceases while the Debug function is enabled. This lets you view the contents of several different MS Locations at any point in the table.

To end Debug, press [ESCAPE]. Action Table execution resumes from the point at which it was interrupted. If you have activated the Trace function prior to activating the Debug function, the table will execute only one statement after pressing [ESCAPE].

Dump Key: F7

The Dump function can be invoked by pressing [F7]. Dump cannot be activated if a **Factor Solicit** (F) Command is being executed. The Dump function may also be activated by selecting it from the debug Menu. By activating the Menu function first, you freeze Action Table execution while the Dump function is activated. If Dump is invoked from the debug Menu, only one statement in the Table will be executed after the Dump is complete. The Dump function lets you send the contents of a specified range of MS Locations from the Action Table currently in-process, to your printer, thus giving you a printed report from which to work.

After invoking the Dump function, you must specify the first MS Location to be included in the Dump: type in an MS Location, numbered 001 through 999, and press [ENTER]. Default value for this solicit is 001. Specify the last MS Location in the Dump by entering an MS Location number greater than the first number entered through 999. Then press [ENTER]. Default value for this solicit is 999. Entering the same number for the last MS Location as the first will dump the contents of a single MS Location. After you have entered the ending MS Location in your Dump range, UNIVERS generates a printed report. The printed Dump report lists the following information for each MS Location included in the dump range:

- The Card Type where it resides in the Factor Table

- Its Item Number on the card

- The data type of the item

- The numeric value, if the location stores a numeric data type, or the string value if it stores a String (or Text) data type

- The ASCII equivalent of the data

If you have activated the Dump function without activating the Menu function, the Action Table continues to execute as soon as the print has concluded. If you have accessed the Dump function through the debug Menu, only the next statement in the table is executed after the print is completed. To abort the Dump function press [F1].

Continue Key: F10

The Continue function is activated by pressing [F10]. The Continue function lets table execution resume after another function key has been activated for debugging purposes. The effect of activating the Continue function differs depending on which function key is currently active:

- Pressing [F10] after [F1] continues execution of the Action Table.

- Pressing [F10] after [F2] once clears the help message. Pressing it again continues execution of the Action Table.

- Pressing [F10] after [F3] executes the next IPTE Command statement.

- Pressing [F10] after [F5] or [F7] has no effect. You must use [ESCAPE] to deactivate these functions.

Error Messages

If an error is encountered while executing an Action Table, UNIVERS returns an error message to alert you of the interruption and to aid you in the debugging process. This error message is displayed across the bottom of your screen. Pressing [F2], the Help function, lets you view a more detailed explanation of the error.

There are two types of errors. A hard error terminates Action Table execution. When a hard error occurs, you must press [ESCAPE] to return to the Action Table Execution Screen. A soft error displays a warning message on screen, but does not terminate Action Table execution. Below are the soft error messages you may encounter.

Associated MS Not String

An attempt has been made to perform a string manipulation with an associated MS Location which is not associated as a String type.

Bad ASCII Format Value

An ASCII value has been supplied which is either less than 0 or greater than 255.

Base Card Release Attempt

An attempt has been made to release the Base Card from the work area. Only secondary cards may be released.

Byte Overflow MS

A value less than 0 or greater than 255 has been stored in an MS Location which is defined as a Byte.

Card Type Not Available

An attempt has been made to manipulate an inactive Card Type (one which is not in your work area). Look for a **Save** (S), **Move** (M) or **Release** (R) Command for which there is no corresponding **Make Base Card** (XXM), **Make Secondary Card** (XXm), **Get Base Card** (G), or **Get Secondary Card** (g) Command.

Categorical Out of Range

An attempt has been made to access a level for a Categorical Factor which is greater than the defined maximum level for that factor.

Discredel.dat is Not on Default Drive

The card element file (U020AC01.USR) is not on the default disk drive.

Disfacel.dat is Not on Default Drive

The factor element file (U020F02.USR) is not on the default disk drive.

Disfactx.dat is Not on Default Drive

The factor index file (U020AF01.USR) is not on the default disk drive.

Dislevel.dat is Not on Default Drive

The Categorical element file (U020AL02.USR) is not on the default disk drive.

Dislevix.dat is Not on Default Drive

The Categorical element file (U020AL01.USR) is not on the default disk drive

Divide By Zero, Default Used

Division by zero was encountered. The default value which is specified was placed in an MS Location.

Divide By Zero, No Default

An attempt has been made to divide by zero without specifying a corresponding default value to be placed in an MS Location.

End of Table Exceeded

> An attempt has been made to access a value from a position which lies beyond the end of the table specified. Check the value of the index which is being used.

FCB Exceeds Top of MS

> Part of the File Control Block extends beyond the end of the memory array. The maximum FCB base which you can define is 992.

FCB + 0 Set Undefined

> The set MS Location in the File Control Block (FCB + 0) has not yet been defined. The system defines the set as **1** for the Base Card, but you must define it for all secondary cards.

FCB + 1 PPN Undefined

> The PPN MS Location in the File Control Block (FCB + 1) has not yet been defined. Although the system defines the PPN for the Base Card, you must define it for all secondary cards. A Base Card must have the PPN defined before executing a **GE**, **GF**, **Ge**, **GG** or **G1** Command with the first key.

FCB + 2 Card Type Not Single

> The MS Location which you have defined as the File Control Block Card Type (FCB + 2) is not Single-Precision.

FCB + 2 Card Type Out of Range

> The value in the MS Location defined as FCB + 2 has a value which is either less than 1 or greater than the last Card Type which was defined for your data base.

FCB + 2 Card Type Undefined

> The Card Type MS Location in the File Control Block (FCB + 2) has not yet been defined. Although the system defines the Card Type as **1** for the Base Card, you must define it for all secondary cards.

FCB + 3 Card Nmbr Undefined

> The Card Number MS Location in the File Control Block (FCB + 3) has not yet been defined. Although the system defines the Card Number as **1** for the Base Card, you must define it for all secondary cards.

FCB + 5 Key Number Undefined

> The key number MS Location in the File Control Block (FCB + 5) has not yet been defined.

Format.dat is Not on Default Drive

The format data file is missing from the default disk drive.

Improper Format Style

UNIVERS is unable to use the format specified with the MS Location solicited. Make sure you are not mixing an MS Location defined as a String with a numeric format, or vice versa. Also, check with the manual to see that your format has been entered correctly. You may only enter one format at a time.

Incomplete Format

A special format has been used, using a style other than 13, without furnishing the output format for that style. The default format cannot be used when you have specified a special output; i.e., tab, skip, etc.

Index Not Single Prec

The index being used is not a Single-Precision data type. Make sure that you have defined your index base using the **Set Index** (Xi) Command, and then verify the MS Location of the index. Remember, i = index base + 0, j = index base + 1, etc.

Insufficient Security Clearance

Your security clearance is not high enough to access the attempted function.

Integer Overflow MS

A value which exceeds the integer limits of -32767 to +32767 has been stored in an MS Location which is defined as an Integer.

Invalid Card Type

An attempt has been made to access a Card Type with number less than 1 or greater than 50.

Invalid Command in Play Str

There is an invalid **Beep** (B) Command in the solicited play string.

Invalid Format Address

An attempt has been made to store or retrieve a format with a number that is either less than 1 or greater than 255.

Invalid Item

An attempt has been made to access an Item Number that exceeds the last Item Number in the Card Type solicited.

Justification Overflow

A number whose length exceeds the number of positions in the justification field has been encountered.

Key Number Out of Range

A key number has been specified which is either less than 1 or greater than the last key which was defined. Check MS Location FCB + 5. Remember that secondary cards only have Keys 1 and 2.

Line Execution Tbl Full

The line execution area for the Action Table is full. Break your table into several smaller tables and use the **Add Block** (XXA) and **Remove Block** (XXR) Commands.

Line Overlay

An attempt has been made to load a line over an existing Action Table line. Use the **Remove Block** (XXR) Command to clear the Action Table area where the new lines are to be added.

Max Level Exceeded, 0 Used

An MS Location containing a Categorical level which exceeds the maximum level defined for the factor in the data base has been encountered.

Missing Format Command

The format command is either missing or is an improper character. Formats supported in upper or lower case are:

A = ASCII Char
F = Factor Name
H = Heading
L = Level Name
P = Pagination
S = Skip Line
T = Tab
V = Level Value

More Than 10 Absolute Ref

A command which contains more than 10 absolute references has been encountered.

MS Location Not Associated

An association process has been attempted on an MS Location which has not yet been associated. If this position is a Factor Number, check to make sure that this item has been associated by Item Number and not Factor Number. If the position is not a Factor Number, then you may have specified an incorrect MS Location or command.

MS Location Out of Range

The MS Location being accessed is less than 1 or greater than 999.

MS Location Undefined

The MS Location which is being accessed has not yet been initialized. If it is a Factor Number, make sure that the required association has been performed.

MS Not Categorical Type

An instruction requiring a Categorical data type has encountered an MS Location which is other than a Categorical type.

MS Not Double Precision

An instruction requiring a Double-Precision data type has encountered an MS Location which is other than a Double-Precision type.

MS Not in Ascending Order

The first MS Location in your command must contain the low MS Location, while the second MS Location must contain the higher MS Location. The values in your MS Locations have no required order, only the position numbers themselves.

MS Not PPN Type

An instruction requiring an MS Location which contains a PPN has encountered an MS Location which does not contain a PPN.

MS Not Single Precision

An instruction requiring a Single-Precision data type has encountered an MS Location which is other than a Single-Precision data type.

Neg Format Cmnd Prmtr

A negative format command parameter has been specified. Formats must be positive and be between 1 and 255.

No Card Type Assc in Range

No association was found for the specified Card Type within the specified range.

Out of Memory

You have exhausted the memory which has been allocated to UNIVERS. Check with CLT to see if a longer memory version is available. Reducing the size of your cache will free memory. Use of overlays to reduce the size of your Action Tables will also free memory.

Overflow

A calculation has been performed that has produced a value exceeding the range of the command currently in use.

Position Beyond Table End

An attempt has been made to access a position beyond the end of a table, or to access, with a String data type, a table position which has already been converted to numeric form. The first time you access a numeric table line with a non-string data type, the table line is converted to numeric format

PPN Out of Issued Range

An attempt has been made to use a PPN which has not yet been issued by the system.

Printer Not On-Line

A print operation has been attempted when the printer is not ready to operate.

Printer Not Ready

Printer Off-Line

Printer Out of Paper

Put Without Get or Make

The **Put Base Card** (P) or **Put Secondary Card** (p) Command must be preceded by either a **Get Base Card** (G) or **Get Secondary Card** (g) Command (if you are updating a record) or a **Make Base Card** (XXM) or **Make Secondary Card** (XXm) Command (if you are creating a record).

Put Without Save

A **Put Base Card** (P) or **Put Secondary Card** (p) Command is being attempted when the data has not been saved to the work area.

Return Without (XG) Gosub

A **Return From Subroutine** (XR) Command has been encountered without a corresponding **Go To Subroutine** (XG) Command.

Root of Neg Number Attempted

An attempt has been made to find the square root of a negative number.

SCB Exceeds Top of MS

The last position in the Sketch Control Block extends beyond the last position in the MS Location array. The first position in the Sketch Control Block can be no higher than MS Location 990.

Security is Corrupt

An attempt has been made to remove security after it has been initialized. Further processing may result in serious damage to the data base. Call CLT.

Source MS Not Numeric

The source MS Location for this command must be either a Single-Precision or Double-Precision data type.

String Start Pos is < 1

The starting position of any string manipulation must be positive.

Syspar.dat is Not on Default Drive

The system parameter file (U011NS70.USR) is not on the default disk drive

Table is Improper Version

The Action Table executed has been created under a different version of UNIVERS and will not execute with this version until it has been converted.

The Requested Table is Missing From the Default Drive

You have specified an Action Table which is nonexistent on the default drive

Undefined Index

An attempt has been made to use an index which has not been defined. Make sure you have defined your index base MS Location using the **Set Index** (Xi) Command, and then verify that the MS Location where the index is located is a Single-Precision number. Remember: i = Index Base + 0, j = Index Base + 1, etc.

Undefined Label

A table control transfer to a Label which does not exist has been attempted.

UNIVERS Not Initialized

Execute Action Tables cannot be run directly.

Unknown Command

A command has been entered which this version of UNIVERS does not support. Make sure that you are using the correct version.

Unknown Display Style

There is no display style defined for the value being specified. Valid display styles are:

1 = String
2 = Single-Precision
3 = Double-Precision
4 - 12 = Associated Factor Styles

Unknown Get Command

An invalid **Get Base Card** (G) or **Get Secondary Card** (g) Subcommand was used. Remember, upper and lower case are unique. Valid subcommands are:

E = Equal
e = First Equal or Less
F = First Equal or Greater
G = First Greater
H = High
I = First Less
L = Low
N = Next
P = Prior

Unknown Index

An attempt has been made to use a character as an index, which is other than the defined indices (**i**, **j**, **k**, **l**, **m**, or **n**). Remember, lower case is required.

Unknown Output Type

An output type has been specified which is not supported. At present, only 1 (video) and **11** (printer) are supported.

Unknown Table Option

An incorrect table style has been invoked. Table styles supported are upper-case and lower-case A, B, C, D, F, or H.

Unsupported Input Type

The input type is other than **1** (String), **2** (Single-Precision), or **3** (Double-Precision). An undeclared type defaults to **2** (Single-Precision).

VCB + MS Undefined

An MS Location within the Video Control Block is undefined.

You Must First Choose an Action Table From the Menu

You have tried to run **Execute Action Tables** without running an Action Table.

Section 4: Contents

Selfil Maintenance

A Selfil (short for Selection Filter) Table is a table containing parameters which enable you to extract subsets of data from your data base. These subsets are parcel records which match the Selfil parameters. In effect, Selfil Tables act as ``filters'' through which you can run your data base. The Selfil Table filters out parcel records which do not match the parameters and only ``passes through'' parcel records which do. The records which pass through the Selfil Table are then used by other UNIVERS modules. The Selfil Table governs the following:

- The order in which parcel data is processed

- The range of parcel records to be processed

- The Card Type, Card Set, and series cards to be processed for each parcel

- The conditions parcel data must satisfy in order to be filtered through the table

Through this module you can create up to 999 different Selfil Tables. However, Selfil Tables are not executed through this module. Selfil Tables are executed when using other UNIVERS modules (see **Executing a Selfil Table** below). When you select **Selfil Maintenance** from the UNIVERS Main Menu, the Selection Filter Editor Screen (Figure 4-1) displays:

```
1:46:39 pm    SELECTION FILTER EDITOR - Ver. 7.2 - 12/16/93 February 16, 1994


 Table      Table Description              Creation Date

  OO1       RESIDENTIAL COST                10/22/1991
  OO2       COMMERCIAL COST                 10/22/1991
  OO3       COMMERCIAL INCOME               10/22/1991
  OO4       ALL RESIDENTIAL RECORDS          10/22/1991
  OO5       ALL COMMERCIAL RECORDS           10/22/1991
  OO6       COMPARABLE SALES TABLE            10/22/1991
  OO7       UNIT PRICE > O                 10/22/1991
  OO8       WORK IN PROGRESS                10/22/1991
```

Figure 4-1. Selection Filter Editor Screen

At the bottom of the Selection Filter Editor Screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to the computer's memory. The box on the right lists the current page number and number of pages for the table listing.

The number of pages in the listing depends on the number of Selfil Tables created. Up to 12 tables are listed on each page. Press [PAGE UP] and [PAGE DOWN] to scroll through the pages of the listing. Press [ ] and [ ] to move the highlighted bar from table to table on a page.

Fresh

This option refreshes the screen, updating any table descriptions which may have been change by another user since you first accessed the Selection Filter Editor Screen. This option is only relevant for network users.

Display

This option loads the highlighted Selfil Table into memory, displays the parameters, and allows you to modify them.

1. Highlight the desired Selfil Table.

2. Select **Display** from the Selection Filter Editor Screen menu bar. The Selfil Parameters Screen (Figure 4-2) displays. The parameters shown in the figure are the default parameters assigned to a Selfil Table when you create it.

```
1:47:OO pm    SELECTION FILTER EDITOR - Ver. 7.2 - 12/16/94 February 16, 1994


              Table : OO1   RESIDENTIAL COST


     Key number      :1   P.P.N.
     Start search with  : Low Value
     End  search with   : High Value
     End after find #    : All
     Process card types :1
         set  nmbrs : All
         card nmbrs  : All
     Search conditions  : Retrieve All
      "       "     :
      "       "     :
      "       "     :
      "       "     :
     Read/Write Mode    : Read Only
```

Figure 4-2. Selfil Parameters Screen with Default Parameters

Key Number
This parameter defaults to **1** (P.P.N.). The **Key number** determines the order in which UNIVERS retrieves records from the data base when the Selfil Table is executed. You may use a Dynamic key (1-8) or a Static key (9-255).

Start Search with
This parameter defaults to **Low Value**. **Start Search with** works in conjunction with **End Search with** to define the range of records to process. UNIVERS processes each record with a **Key number** value between the **Start Search with** and **End Search with** values, inclusive.

The **Start Search with** value cannot be greater than the **End Search with** value. Also, the data type entered for the **Start Search with** and **End Search with** parameters must match the data type of the **Key number** factor (Integer, Text or String, or Byte).

Note
When using a Static key as the **Key number**, the default for both the **Start Search with** and **End Search with** parameters cannot be changed. UNIVERS processes all records in the Static Index file.

End Search with

This parameter defaults to **High Value**. See **Start Search with** above.

End after find

This parameter defaults to **All**. **End after find#** defines how many records matching the **Search conditions** should be found before UNIVERS ends the Selfil procedure. If set to **All**, UNIVERS tests all records in the defined range against the **Search conditions**. If a different value is entered, UNIVERS tests records against the **Search conditions** until the number of matches equals the **End after find #** value, regardless of whether or not it has reached the end of the defined range.

Process card types

This parameter defaults to **1**. **Process card types** defines which Card Types (1-50) to process through the Selfil Table. Selfil will always process Card Type 1. You may add up to four additional Card Types to process. If you are going to enter **Search conditions** using a factor from a particular Card Type, you must include that Card Type in this parameter. This parameter also determines what data will be passed to the module using the Selfil Table. If the module to which the data is being passed will be using data from a particular Card Type, you must include that Card Type in this parameter, even if there are no **Search conditions** based on the Card Type.

set nmbrs

This parameter defaults to **All** when using a Dynamic key as the **Key number**. When using a Static key as the **Key number**, this parameter defaults to the Card Set Number used to create the Static Index. **Set nmbrs** defines which card sets to include in the Selfil process.

card nmbrs

This parameter defaults to **All**. **Card nmbrs** defines which Card Numbers to include in the Selfil process, if there are series cards. You can define up to five Card Types. When the Selfil Table is executed, UNIVERS retrieves each Card Number defined by this parameter for each Card Type defined in the **Process card types** parameter.

Note
When using a Static key as the **Key number**, UNIVERS only processes the Card Numbers which are stored in the Static Index file. Selecting **All** will ensure that every item in the Static Index file is processed. If an item in the Static Index file has a Card Number which is not defined in the **card nmbr** parameter, that item is not processed.

Search conditions

This parameter defaults to **Retrieve All**. **Search conditions** are conditional statements which must be satisfied in order for a record to pass through Selfil. If set to **Retrieve All**, all records in the range defined by the **Start Search with** and **End Search with** parameters are passed through the Selfil Table.

Setting **Search conditions** enables you to test each record against defined criteria in order to determine whether or not the record should pass through Selfil to the module using the data. **Search conditions** are created by comparing the values of factors in your data base against defined conditions. If the comparison is **true**, the record passes through Selfil. You may enter up to five **Search conditions**. Each **Search condition** occupies one line on the screen. For each line you must define the following:

- The Card Type of the factor being compared

- The Item Number of the factor being compared

- The comparison condition

- How to compare multiple search values

- The search value(s)

- The relationship between lines, which determines the *cumulative true/false value* of the **Search conditions**

Srch Typ. The **Srch Typ** field defines the Card Type of the factor being compared. All Card Types used in **Search conditions** must also be defined in the **Process card types** parameter.

Itm. The **Itm** field defines the Item Number of the factor being compared.

Condition. The **Condition** field is a blank line which defines the type of comparison being made.

= (equal to)
> (greater than)
< (less than)
>= (greater than or equal to)
<= (less than or equal to)
<> (not equal to)

Multiple Search Values. You can enter more than one search value for a **Search condition**. UNIVERS uses the comparison condition to compare the defined factor against each search value. This item defines whether the factor must meet all of the search values or only one of the search values in order for the **Search condition** to be **true**. There are two choices:

- **a**nd - The factor must meet all of the search values entered. This option is only relevant with the <> comparison condition.

- **o**r - The factor must meet only one of the search conditions entered.

The default is **o**r. This entry is made between the parentheses on the search condition line. Type **a** for **a**nd, or any other letter for **o**r.

Search Values. The **Search Values** are values with which UNIVERS compares the factor. The values entered can be actual values (text or numeric) or other factors in your data base. Search text must be entered in quotation marks (e.g. **"C"**). Null values for Text type factors can be entered with two quotes (e.g. **""**). A null value search on a Text type factor will select everything with no entry in the factor.

Line Comparison. The relationship between lines defines how UNIVERS determines the *cumulative true/false value* of the **Search condition**. This entry is made at the end of each search condition line. Enter the first letter of the desired value. The default is **E**ND. There are three values:

•   **A**ND - both lines must be **true** in order for the *cumulative true/false value* of the **Search conditions** to be **true**

•   **O**R - one line must be **true** in order for the *cumulative true/false value* of the **Search conditions** to be **true**

•   **E**ND - identifies the last line of **Search conditions**

Cumulative True/False Value. When a Selfil Table is executed, it uses a *cumulative approach* for the **Search conditions** to determine if the record should pass through Selfil. It establishes a **true** or **false** value for each **Search condition**. It then uses the line comparison type (**A**ND/**O**R/**E**ND) to determine the *cumulative true/false value*. The *cumulative true/false value* is then carried forward for the next line comparison. The *cumulative true/false value* for a line is determined by the *actual true/false value* for the current line, the line comparison factor of the previous line, and the *cumulative value* of the previous line. An example will clarify this process.

Example 1. Refer to the table below. The *cumulative value* for the first line is always equal to the *actual value* of the first line, so the *cumulative value* for line 1 is **true**. The *cumulative value* for line 2 is determined by using the line comparison factor for line 1 to compare the *actual value* of line 2 (**false**) and the *cumulative value* of line 1 (**true**). Since the line comparison factor is **A**ND, both values being compared must be **true** in order for the *cumulative value* to be **true**. Since one of the values is **false**, the *cumulative value* for line 2 is **false**.

The *cumulative value* for line 3 is determined by using the line comparison factor for line 2 to compare the *actual value* of line 3 (**false**) and the *cumulative value* of line 2 (**false**). Since the line comparison factor is **O**R, only one of the values need to be **true**. However, neither is **true**, so the *cumulative value* for line 3 is **false**.

Continuing with line 4, the *cumulative value* is **true**, since the line comparison factor for line 3 is **O**R and the *actual value* of line 4 is **true**.

Finally, the *cumulative value* for line 5 is **true**, since the line comparison factor for line 4 is **A**ND and both the *cumulative value* of line 4 and the *actual value* of line 5 are **true**.

When UNIVERS reaches the **E**ND factor, it uses the *final cumulative value* to determine the *overall true/false value* of the comparison. If the *overall cumulative value* is **true**, the record passes through Selfil. If it is **false**, the record is does not pass through Selfil.

Line #	Actual Value	Cumulative Value	Comparison Factor
1	True	True	**A**ND
2	False	False	**O**R
3	False	False	**O**R
4	True	True	**A**ND
5	True	True	**E**ND

Read/Write Mode

This parameter defaults to **Read Only**. **Read/Write Mode** defines whether or not the module which executes the Selfil Table will be allowed to write data to the data base. There are two options for this parameter: **Read Only**, and **Read/Write**. Some of the UNIVERS modules, such as the Valgen Modules, can write data to the data base. If this parameter is set to **Read Only**, the module using the Selfil Table will be prevented from making changes to the data base. If the Selfil Table being created is to be used with a module which will write data to the data base, such as Valgen, this parameter must be set to **Read/Write**. Selfil runs faster in **Read Only** mode. You should only use **Read/Write** mode if it is necessary to write data back to the data base.

Modify

The **Modify** option of the Selfil Parameters Screen menu bar allows you to change the parameters. If any changes are made to the parameters, they must be saved before you quit, or they will be lost. The following are special cursor movement keys for modifying parameters:

- [ ] - moves the cursor to the next parameter

- [ ] - moves the cursor to the previous parameter

- [ENTER] - accepts the new entry and moves the cursor to the next parameter or returns you to the Display menu bar from the **Read/Write Mode** parameter

- [ESCAPE] - returns you to the Display menu bar

- [ ] - moves the cursor one space to the right when modifying a parameter

- [ ] - moves the cursor one space to the left when modifying a parameter

- [BACKSPACE] - deletes one character at a time to the left of the cursor when modifying parameters

- [DELETE] - deletes one character at a time at the cursor when modifying parameters or deletes one line of a **Search condition** when you delete the **Srch Typ** for that line.

Modify Procedure
1. Select **Modify** from the Selfil Parameters Screen menu bar.

2. The cursor moves to the first parameter. Add, change, delete the desired parameter(s).

3. Press [ESCAPE] at any parameter or press [ENTER] at the **Read/Write Mode** parameter to return to the Selfil Parameters Screen menu bar.

Clear

The **Clear** option of the Selfil Parameters Screen menu bar clears the displayed Selfil parameters and replaces them with the default parameters. To use this option, select **Clear** from the Selfil Parameters Screen menu bar.

Save

The **Save** option of the Selfil Parameters Screen menu bar saves the Selfil parameters. If any changes were made to the parameters, they must be saved before using the **Quit** option. To use this option, select **Save** from the Selfil Parameters Screen menu bar.

Quit

The **Quit** option of the Selfil Parameters Screen menu bar exits the Selfil Parameters Screen and returns you to the Selection Filter Editor Screen. To use this option, perform the following steps:

1. Select **Quit** from the Selfil Parameters Screen menu bar.

2. If there are unsaved changes to the Selfil parameters, UNIVERS displays, ``*WARNING: Changes in table ### not saved. Continue anyway?*'' Type one of the following:

   Y - to exit the screen without saving the changes

   N - to return to the Selfil Parameters Screen menu bar

Create

This option assigns a table number and description to a new Selfil Table. The new table will use the default parameters shown in Figure 4-2. Use the **Display** option to change the parameters.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter new format table number.*'' Enter the new table number.

3. UNIVERS displays ``*Enter table ### description.*'' Enter the new table description.

Print

The **Print** option of the Selection Filter Editor Screen menu bar prints the parameters for the highlighted Selfil Table.

Procedure

1. Highlight the desired Selfil Table.

2. Select **Print** from the Selection Filter Editor Screen menu bar.

Kill

The **Kill** option of the Selection Filter Editor Screen menu bar deletes the highlighted Selfil Table.

Procedure

1. Highlight the Selfil Table you wish to delete.

2. Select **Kill** from the Selection Filter Editor Screen menu bar.

3. UNIVERS displays ``*WARNING: Table ### is about to be deleted. Continue anyway?*'' Type one of the following:

   Y - to delete the Selfil Table

   N - to end the **Kill** procedure without deleting the Selfil Table

Quit

The **Quit** option of the Selection Filter Editor Screen menu bar returns you to the UNIVERS Main Menu.

Executing a Selfil Table

You do not execute Selfil Tables with this module. They are executed when using other UNIVERS modules. A Selfil Table ``filters'' data from your data base and passes it to the module being executed. When you execute any of the modules which use Selfil Tables, the first step you must take is to select a Selfil Table to use with the module to extract data from the data base. When you select one of these modules from a UNIVERS menu, the UNIVERS Selfil Table Menu (Figure 4-3) displays. This menu lists all of the tables which have been created through this module. The number of pages in the listing depends on how many tables there are. Each page can have up to nine tables listed, along with the **Return to UNIVERS Main Menu** option.

```
1:47:25 pm      C L T   U N I V E R S   S Y S T E M    February 16, 1994

      SELECTION FILTER MENU - Ver. 7.1 - 12/16/93



            UNIVERS SELFIL TABLE MENU


      (1)  OO1  RESIDENTIAL COST              1O/22/1991
      (2)  OO2  COMMERCIAL COST               1O/22/1991
      (3)  OO3  COMMERCIAL INCOME             1O/22/1991
      (4)  OO4  ALL RESIDENTIAL RECORDS       1O/22/1991
      (5)  OO5  ALL COMMERCIAL RECORDS        1O/22/1991
      (6)  OO6  COMPARABLE SALES TABLE        1O/22/1991
      (7)  OO7  UNIT PRICE > O          1O/22/1991
      (8)  OO8  WORK IN PROGRESS             1O/22/1991
      (9)  Return to Univers Main Menu
```

Figure 4-3. UNIVERS Selfil Table Menu

Freshen

At the bottom of the UNIVERS Selfil Table Menu is a list of options. The **Freshen** option can be used to update the listing for any changes which may have been made through this module by another user since you first accessed the menu. This option is only relevant for network users.

Selecting a Selfil Table

1.   Press [PAGE UP] or [PAGE DOWN] until the desired Selfil Table is listed.

2.   Press [ ] or [ ] to highlight the desired table or type the number displayed to the left of the desired table.

3.   Press [ENTER]. UNIVERS displays the Selfil Parameters Screen (Figure 4-4).

The Parameters Screen

This screen displays the parameters which were defined for the table in this module. You can use the Selfil Table with the original parameters or you can change any of the first five parameters. Only the selected Selfil Table is effected by changes made on the Selfil Parameters Screen.

Sampling rate

This is an additional parameter which is not defined in this module. It determines which valid records are passed to the module using the Selfil Table. For example, if the Sampling rate is **10**, every tenth record *which passes the Selfil criteria* is passed to the module (i.e. records 1, 11, 21, 31, etc.).

Chain to tables

This is an additional parameter which is not defined in this module. This parameter allows you to ``chain'' Selfil Tables together for the module you are executing. UNIVERS will execute the module using the selected Selfil Table first. It will then execute the same procedure with the first Selfil Table listed in the **Chain to tables** parameter. Then it will use the second, etc.

```
1:47:44 pm      C L T   U N I V E R S   S Y S T E M   February 16, 1994

       SELECTION FILTER MENU - Ver. 7.2 - 12/16/93

   OO1  RESIDENTIAL COST              1O/22/1991
   Key number      : 1      P.P.N.
   Start search with  : Low Value
   End   search with  : High Value
   End after find #   : All
   Sampling rate     : All
   Chain to tables    : No Chain
   Process card types : 1
        set  nmbrs  : All
        card nmbrs  : All
   Search conditions  : Retrieve All
    "      "     :
    "      "     :
    "      "     :
    "      "     :
```

Figure 4-4. Selfil Parameters Screen

Run

The **Run** option of the menu bar executes the Selfil Table. To use this option, select **Run** from the menu bar. UNIVERS loads the Selfil Table into memory using the displayed parameters and accesses the module with which you are using the Selfil Table.

Selfil Processing

When a Selfil Table is executed, UNIVERS retrieves data one parcel at a time from the data base, using the **Key number** to access the data. The **Start Search with** and **End Search with** parameters determine the range of records to be retrieved. UNIVERS continues to retrieve data until the number of records defined in the **End after find #** parameter pass through Selfil. UNIVERS uses the **Process card types**, **set nmbrs**, and **card nmbrs** values to determine what data from each parcel to retrieve.

Accessing Records

UNIVERS accesses the record by the **Key number** and retrieves the Base Card data. It then searches each secondary card file defined in the **Process card types** parameter for the Card Numbers defined in the **card nmbrs** parameter.

For example, if the defined Card Types are 1, 3, and 4, and the defined Card Numbers are 1 and 2, UNIVERS first retrieves the Base Card, Card Type 3 Card Number 1, and Card Type 4 Card Number 1. This string of cards is treated as a single ``record'' by Selfil and is tested against the **Search conditions**.

Once the first ``record'' is processed, UNIVERS retrieves the next ``record,'' which is the Base Card, Card Type 3 Card Number 2, Card Type 4 Card Number 2 from the same parcel. After this ``record'' is processed, UNIVERS retrieves the next ``record,'' which would be the Base Card, Card Type 3 Card Number 1, and Card Type 4 Card Number 1 from the next parcel. This process continues until all parcels in the defined range have been processed or until the number of ``records'' defined in the **End after find #** parameter have passed through the Selfil Table.

Processing Search conditions

Before UNIVERS processes a ``record'' against the entered **Search conditions**, it verifies that a card for each Card Type defined in the **Search conditions** exists. If the ``record'' does not contain one of the Card Types, the record is rejected before being processed against the **Search conditions**.

For example, using the same parameters defined in the previous example, assume the **Search conditions** use items from both Card Type 3 and Card Type 4. The parcel being processed includes a Card Number 1 for both Card Types 3 and 4. It also has a Card Number 2 for Card Type 4, but not for Card Type 3.

When UNIVERS processes this parcel through Selfil, it first retrieves the Base Card, Card Type 3 Card Number 1, and Card Type 4 Card Number 1. It then verifies that all Card Types entered in the **Search conditions** exist. They do, so it processes the ``record'' against the **Search conditions** and rejects the ``record'' or passes it through based on the **Search conditions**.

Next, it retrieves the Base Card and Card Type 4 Card Number 2 (but not Card Type 3 Card Number 2, since it does not exist) for the same parcel. UNIVERS then verifies that each Card Type entered in the **Search conditions** exists. Since there is no Card

Type 3 Card Number 2 and one of the **Search conditions** is based on Card Type 3, the ``record'' is rejected.

Special Considerations

It is important to note that the values entered in the **Process card types** parameter will not cause a ``record'' to be rejected by Selfil if no card exists.  It is the **Srch Type** value entered in the **Search conditions** which causes the ``record'' to be rejected if no card exists. For example, using the same parcel described above, if the **Search conditions** did not include an item from Card Type 3, the second ``record'' would not be rejected before being tested against the **Search conditions**, even though there is not a Card Type 3 Card Number 2.

It is also important to note how this process can effect how you enter **Search conditions**. If you use two **Search conditions** with different Card Types and connect them with the **OR** line comparison, you may not get the desired results. This can happen if a ``record'' does not contain a card from one of the Card Types.  Even though the value from the other Card Type may pass the **Search condition**, the record will be rejected.  The comparison against the **Search conditions** will never be made, because UNIVERS rejects the ``record'' as soon as it discovers that one of the Card Types defined in the **Search conditions** does not exist.

Modify

The **Modify** option of the menu bar allows you to modify the first six parameters. The cursor movement keys for modifying parameters work the same for this screen as they do in the **Selfil Maintenance** module. If you add more than one table number to the **Chain to tables** parameter, they must be separated by commas.

Procedure
1. Select **Modify** from the menu bar.

2. The cursor move to the **Key number** parameter. Change any of the first six parameters.

3. Press [ESCAPE] at any parameter or [ENTER] at the **Chain to tables** parameter to return to the menu bar.

Quit

The **Quit** option of the menu bar exits the Selfil Parameters Screen and returns you to the UNIVERS Selfil Table Menu.

Section 5: Contents

Section 5: Contents

Introduction to Value Generation (Valgen)

The first three options of the UNIVERS Valuation Menu are the modules which comprise the Value Generation (Valgen) System in UNIVERS. Valgen is designed to implement a variety of valuation procedures which make use of user-defined tables and a pre-determined series of computations. Applications include Computer-Assisted Land Pricing (CALP), residential and commercial cost valuation, and income model valuation.

The Valgen Modules

The Valgen System consists of three UNIVERS modules:

- **Execute Valuation Procedure** executes the Value Procedures created with the **Create and Maintain Value Procedure** module. It also ``debugs'' the Value Procedures.

- **Create and Maintain Value Tables** creates and maintains the Value Tables which are use by the Value Procedures to ``look-up'' variables which are used in the procedures' calculations.

- **Create and Maintain Value Procedures** creates and maintains the step-by-step Value Procedures using a set of instructions known as Valgen Commands.

Developing a Valgen Application

Developing good Valgen application is a major task. Much of the work is systems analysis. You need to consider the structure of the data base, how the procedure must deal with multi-record parcels, and, depending upon the nature of the data and editing that will be done, the probability that inconsistent or erroneous data will get through to the procedure.

If the computations of the procedure are very detailed, involving many steps and many tables and adjustments, the procedure will also be involved and possibly complex. Up front analysis needs to determine the feasibility of simplifying the procedure: for instance, eliminating trivial or inconsequential adjustments; replacing large tables with simple formulas; replacing separate tables for different classes with a ``class'' factor if these tables exhibit consistent adjustments.

The first steps in developing a Valgen application is preparing an implementation plan. The following is an outline of an implementation plan for developing a cost application. An outline for an income model application would be similar:

1. Review the cost manual to be used as the basis for the application to determine the tables and pricing procedures required in your application.

2. Outline the Value Procedure, identifying tables (from the manual) that it will access.

3. Review these tables, identifying common elements across tables.

4. Identify tables that could have a simple underlying formula (these may be replaced by a computation in a Value Procedure or stored in a formula table).

5. Organize these tables into Value Tables, identifying the dimensions of the tables, the access indices, and the elements to be stored in the cells.

6. Review your procedure outline, penciling the tables accessed and noting specifics that will need to be addressed in writing the procedure.

7. Consider the system performance in a second review of your procedure. What are the frequently accessed tables? Are these being accessed for the same cells? Can these be accessed and stored early in the procedure? Is the table small enough to be included in memory? (Valgen run time will load tables, subject to available memory space.)

8. Is the procedure efficient or will it result in many lines of code?

9. Adjust the procedure as appropriate.

10. Load your tables. You may elect to load portions, rather than complete tables in order to get something up to test your procedure. If this is done, you will need to go back later and complete the tables.

11. Print out the tables, and verify the entries against your manual.

12. Write the procedure.

    *   Before starting, plan out your use of Memory Storage (MS) Locations (you have 999 available). Document as you go, the specific use of each location. Remember, MS Locations in Valgen are temporary memory locations and *do not* correspond to the MS Locations of the factors in the data base. Factors are referred to by Card Type and Item Number in Valgen.

    *   Write and test the procedure incrementally. Make extensive use of subroutines. The high level procedure can be written and tested with dummy subroutines and then as each actual subroutine is coded, it can be tested and fixed before proceeding to the next step.

13. Test your procedure and tables.

    *   Once the procedure is completed, it should be tested on two samples of test properties. The first sample can be a small set of ``made up'' parcels that are the extremes of the pricing algorithm and tables (e.g., sizes at the extremes or outside the range of the search items, and records with the maximum number of occurrence of entries, or no entries at all). The second sample should be a larger set (200 records or more), of live data representative of the extremes of the actual data that will be processed. These two samples should be processed to test the adequacy of the procedure's error handling as well as its speed. If the samples have been manually priced, you will need the pricing sheets against which to cross check computations.

    *   Identify problems, sources of error and correct these.

14. Document the procedure.

Valgen Search Utility

Provided with UNIVERS is a utility program which searches Value Procedures for Labels, Commands, MS Locations, and Card-Items. This utility enables you to search, sort, and print these items in order to aid you in your procedure development. There are two files which are required to run this utility: VGSRCH.EXE and BRUN30.EXE. They must be located in and executed from the data directory. The optional printout from this utility is directed to LPT1. To execute this utility, enter **VGSRCH** at the DOS prompt. The VGSRCH Menu (Figure 5-1) displays.

```
         COLE-LAYER-TRUMBLE COMPANY
          Utility Program VGSRCH
          Copyright (c) 1989
             05/19/1989



      1. Check ValGen labels

      2. Check ValGen commands

      3. Check ValGen MS locations

      4. Check ValGen Card-Item

      5. Exit
```
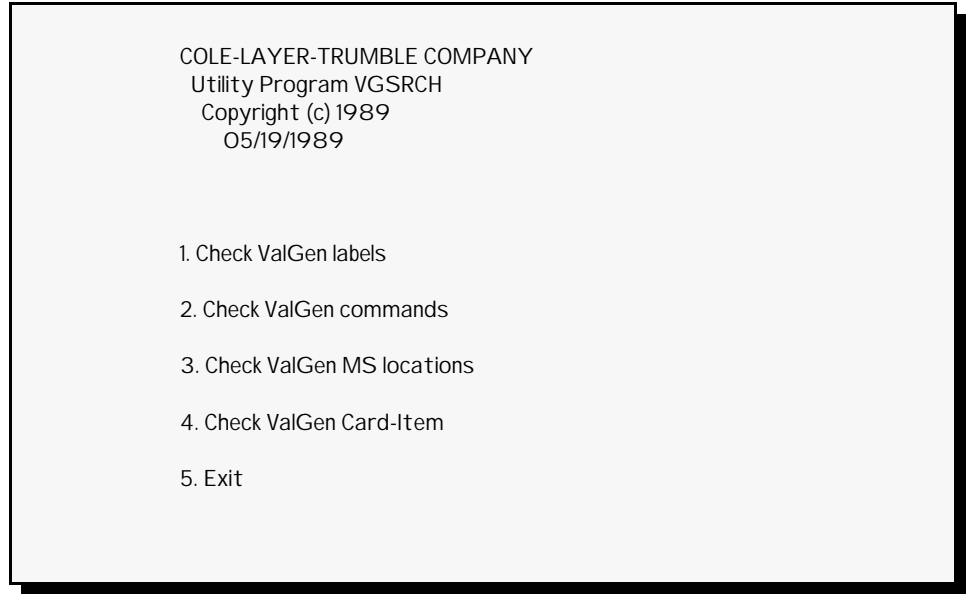
Figure 5-1. VGSRCH Menu

Searching for Labels

1. Select **Check Valgen labels** from the menu.

2. VGSRCH displays ``*Enter the Valgen command table name*.'' Enter the filename of the Value Procedure Table you wish to search (e.g. U203N###, where ### is the table number).

3. VGSRCH asks ``*Do you want to check all or partial Labels (A or P)?*'' Enter one of the following:

   A - to search for all Labels in the procedure (go to step 5)

   P - to search for a partial list of Labels in the procedure

4. VGSRCH displays ``*Enter up to 10 Labels*.'' Enter up to 10 Labels for which to search. Press [ESCAPE] to continue if entering less than 10 Labels.

5. VGSRCH asks ``*Do you want to have a hard copy (Y/N)?*'' Enter one of the following:

   Y - to print a hard copy of the results

   N - not to print a hard copy of the results

6. *This step only applies if you are printing a hard copy of the results.* VGSRCH asks ``*Do you want to have a sorted copy (Y/N)?*'' Enter one of the following:

   Y - to sort the results by Label

   N - not to sort the results

7. VGSRCH searches the procedure for Labels. The Label and procedure line number of each one found displays on the screen. The screen listing is in line number order. The procedure pauses at each full screen. Press any key to continue the search. The optional sort and print procedures are executed after the last screen is displayed.

Searching for Commands

1. Select **Check Valgen commands** from the menu.

2. VGSRCH displays ``*Enter the Valgen command table name*.'' Enter the filename of the Value Procedure Table you wish to search (e.g. U203N###, where ### is the table number).

3. VGSRCH asks ``*Do you want to check all or partial Commands (A or P)?*'' Enter one of the following:

   A - to search for all commands in the procedure (go to step 5)

   P - to search for a partial list of commands in the procedure

4. VGSRCH displays ``*Enter up to 10 Commands*.'' Enter up to 10 commands for which to search. Press [ESCAPE] to continue if entering less than 10 commands.

5. VGSRCH asks ``*Do you want to have a hard copy (Y/N)?*'' Enter one of the following:

   Y - to print a hard copy of the results

   N - not to print a hard copy of the results

6. *This step only applies if you are printing a hard copy of the results.* VGSRCH asks ``*Do you want to have a sorted copy (Y/N)?*'' Enter one of the following:

   Y - to sort the results by command

   N - not to sort the results

7. VGSRCH searches the procedure for commands. The command and procedure line number of each one found displays on the screen. The screen listing is in line number order. The procedure pauses at each full screen. Press any key to continue the search. The optional sort and print procedures are executed after the last screen is displayed.

Searching for MS Locations

1. Select **Check Valgen MS Locations** from the menu.

2. VGSRCH displays ``*Enter the Valgen command table name*.'' Enter the filename of the Value Procedure Table you wish to search (e.g. U203N###, where ### is the table number).

3. VGSRCH asks ``*Do you want to check all or partial MS Locations (A or P)?*'' Enter one of the following:

   A - to search for all MS Locations in the procedure (go to step 5)

   P - to search for a partial list of MS Locations in the procedure

4. VGSRCH displays ``*Enter up to 10 MS Locations*.'' Enter up to 10 MS Locations for which to search. Press [ESCAPE] to continue if entering less than 10 MS Locations.

5. VGSRCH asks ``*Do you want to have a hard copy (Y/N)?*'' Enter one of the following:

   Y - to print a hard copy of the results

   N - not to print a hard copy of the results

6. *This step only applies if you are printing a hard copy of the results*. VGSRCH asks ``*Do you want to have a sorted copy (Y/N)?*'' Enter one of the following:

   Y - to sort the results by MS Location

   N - not to sort the results

7. VGSRCH searches the procedure for MS Locations. The MS Location and procedure line number of each one found displays on the screen. The screen listing is in line number order. The procedure pauses at each full screen. Press any key to continue the search. The optional sort and print procedures are executed after the last screen is displayed.

Searching for Card-Items

1. Select **Check Valgen card-items** from the menu.

2. VGSRCH displays ``*Enter the Valgen command table name*.'' Enter the filename of the Value Procedure Table you wish to search (e.g. U203N###, where ### is the table number).

3. VGSRCH asks ``*Do you want to check all or partial Card-Items (A or P)?*'' Enter one of the following:

   A - to search for all Card-Items in the procedure (go to step 5)

   P - to search for a partial list of Card-Items in the procedure

4. VGSRCH displays ``*Enter up to 10 Card-items*.'' Enter up to 10 Card-Items for which to search. Press [ESCAPE] to continue if entering less than 10 Card-Items.

5. VGSRCH asks ``*Do you want to have a hard copy (Y/N)?*'' Enter one of the following:

   Y - to print a hard copy of the results

   N - not to print a hard copy of the results

6. *This step only applies if you are printing a hard copy of the results*. VGSRCH asks ``*Do you want to have a sorted copy (Y/N)?*'' Enter one of the following:

   Y - to sort the results by Card-Item

   N - not to sort the results

7. VGSRCH searches the procedure for Card-Items. The Card-Item and procedure line number of each one found displays on the screen. The screen listing is in line number order. The procedure pauses at each full screen. Press any key to continue the search. The optional sort and print procedures are executed after the last screen is displayed.
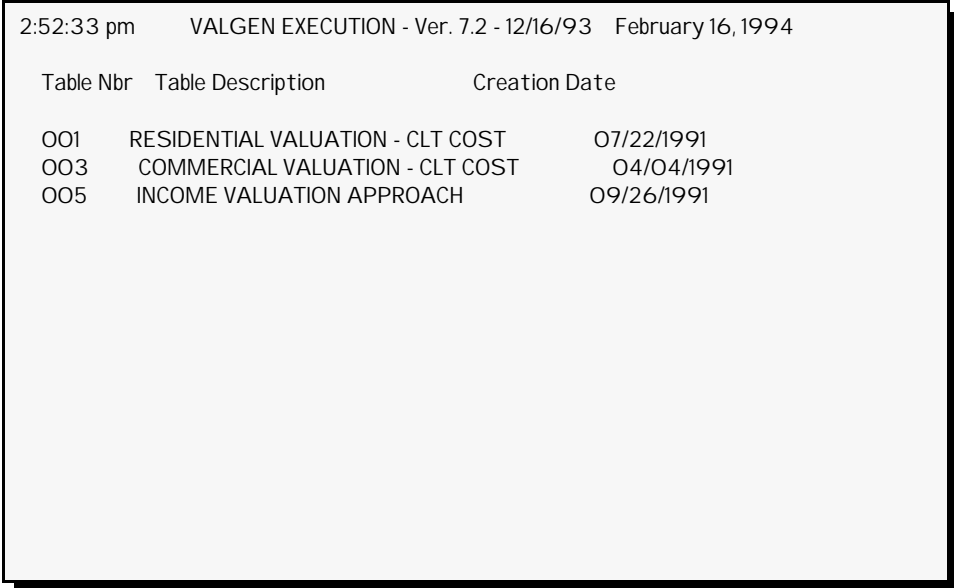
Execute Value Procedure

This module executes the Value Procedures created with the **Create and Maintain Value Procedure** module. It also allows you to ``debug'' Value Procedures. When you select **Execute Value Procedure** from the UNIVERS Valuation Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be included in the Value Procedure (see **Executing A Selfil Table** in Section 4). Only the records which pass through the selected Selfil Table are included in the processing.

Important

In order for the Value Procedure to write the calculated values back to the records in the data base, the Read/Write parameter of the selected Selfil Table must be set to **Read/Write**.

After you have executed a Selfil Table, the Valgen Execution Screen (Figure 5-2) displays. The Valgen Execution Screen displays a listing of all the Value Procedures which have been created by the **Create and Maintain Value Procedure** module.

```
2:52:33 pm       VALGEN EXECUTION - Ver. 7.2 - 12/16/93   February 16, 1994


  Table Nbr   Table Description              Creation Date

  OO1      RESIDENTIAL VALUATION - CLT COST       O7/22/1991
  OO3       COMMERCIAL VALUATION - CLT COST       O4/O4/1991
  OO5       INCOME VALUATION APPROACH            O9/26/1991
```

Figure 5-2. ValGen Execution Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left is not relevant since Value Procedures do not need to be loaded to memory to be executed. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific procedure on a page.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the listing by another user since you first accessed the Valgen Execution Screen. This option is only relevant for network users.

Run

The **Run** option executes the highlighted Value Procedure. The system initializes and then searches for duplicate Labels before executing the procedure. If the system finds any duplicate Labels, a message will be displayed and execution of the procedure will not occur. During the run procedure, UNIVERS checks the Card Types selected in the Selfil Table against the Card Types used in the Value Procedure. If a Card Type used in the procedure is not included in the selected Selfil Table, the system displays a message and the execution stops at the first reference of that Card Type.

Procedure

1. Highlight the Value Procedure you wish to execute.

2. Select **Run** from the menu bar.

Debugging a Procedure

The debug utility allows you to monitor the processing of the Value Procedure as it executes for every statement line being processed. The following keys can be used while the Value Procedure executes:

Help [F1] provides help for the debug function

Trace [F3] allows you to monitor the flow of your application procedure through line-by-line processing. This option lets you toggle between Trace **On** and **Off**. If you think that your procedure has caught in an infinite loop and you do not see any computer activity, you can use [F3] to find the processing status.

Debug [F5] allows you to see the contents of MS Locations, and types of MS Locations at the time of execution. You can use this option to monitor the contents of MS Location before and after the execution of the statement for which you are interested in finding the results.

Card-Item [F6] allows you to see the data base values for a specific Card Type and Item Number during the execution. The Card Types you can choose are the same as specified in the Selfil **Process card types** option.

Dump [F7] allows you to print the contents and types of MS Locations in a defined range. This option is very useful when you have used sequential MS Locations in your application procedure and you want to see the contents before and after a certain statement's execution.

Continue [F10] allows you to continue Trace **On** or **Off** processing based on your previous selection of Trace.

Quit [ESCAPE] allows you to stop the execution of your procedure at anytime.

Valgen Error Trapping

At the end of execution, the errors trapped by the **Execute Value Procedure** module are stored in an error file for your review. The error file is named U200N###.ERR, where ### is your UNIVERS station number; otherwise ### = 001 if you are working in a single-user environment. You can review this file by displaying its contents on the screen using the DOS Command **Type**, or you can send the file to the printer using the DOS Command **Print**.

Valgen Error Messages
The following is a list of the error messages which may be written to the error file:

Out of memory

>   This error occurs when Valgen tries to load your Value Tables into your computer's memory and the memory is full (which may be due to some memory-resident or other utility program you have loaded). You may want to remove some memory-resident program or utility programs. Or call the UNIVERS staff for further instructions.

Indirect card type cc not defined in Selfil

>   This error occurs when you have used a **CAAA** parameter form in one of your commands which possibly has one **AAA** set to the wrong Card Type. Find out the line number by pressing [F3] or save the error file and examine it for this error message and corresponding line number of your application procedure.

Invalid Valgen instruction

>   This error may occur if your Value Procedure is corrupted for any reason. Check the line at which this error occurred, correct the Valgen Command and run it again. If you think you have the correct command, contact the UNIVERS staff for further instructions.

Table already included

>   This error occurs when you use the **Include** (() Command a second time for the same table. Check your line number and see if the same table already was included before that line. Use the VGSRCH utility program to determine the occurrence of **Include** (() Command. A good practice will be to keep all your **Include** (() Commands in a group (maybe in a subroutine), and call the routine before entering any other Valgen Commands.

Label not found

>   This error occurs when you have referenced a Label from your **Gosub** (G), **Get Selfil** (g), **If** (I), **Conditional Gosub** (i), **Transfer** (T), or **Table** (t) Command and forgot to include the **Label** (L) Command for the Label being addressed from one of these commands. Check the line number which has a Label referenced, then enter the **Label** (L) Command with this Label. You may want to use VGSRCH to find the occurrence and this Label. If you detect only one occurrence then you know the **Label** (L) Command is missing for that Label.

Return without gosub

>   This error occurs when you have **Return** (R) Command but do not have a subroutine call made before this command. If you do not have any **GoSub** (G) or **Conditional G** (i) Command preceding **Return** (R) Command, then delete the **Return** (R) Command statement.

Missing command parameter

This error may occur if your Value Procedure Table is corrupted for some reason or you have modified a command which uses an absolute value (**aValue**) parameter in it which have caused the following parameters to vanish from your command line. The Value Procedure editor will catch this situation even before the execution of your Value Procedure. Check the line number that caused this error.

Invalid command parameter #, (parameter contents)

This error occurs due to the same reason explained for the ``*Missing command parameter*'' error. Check the line number that has caused this error.

Item retrieved before Selfil active

This error occurs if you reference any Card-Item in your Value Procedure before the **Get Selfil** (g) Command. You must have **Get Selfil** (g) Command before using Card-Item (**CIII** or **CAAA**) as a parameter for any command.

Card type not defined in Selfil

This error occurs when any command uses **CIII** as a parameter where **C** is not the same Card Type selected in your Selfil Table. Either change the Selfil Table to include Card Type **C** or do not reference **C** in your application if you do not want to use the same Selfil Table.

Address beyond last card type item ###

This error occurs when any command uses **CIII** or **CAAA** as a parameter where **III** is not a defined Item Number for that Card Type. Check your Factor Table for the maximum number for that Card Type or check if this is the Card Type you want to use if the **III** is correct. Use VGSRCH Utility to find the occurrences of **CIII** or check the line number that has caused this error.

Indirect MS is null

This error occurs when you have used **@AAA** as a parameter in your command as an object parameter (parameter 2-5) for that command and not set its value before execution of the command line that has caused this error. Use Debug [F4] to find if the MS Location is set to any type or not after the occurrence of this error. If the type is null, then you must set this MS Location before the command that has caused this error.

Indirect MS out of range

This error occurs when the indirect MS Location contains the address of an MS Location or Card-Item which is beyond 999 for the MS Location or beyond the Card-Item limit. This error may occur if you have used a looping process by incrementing the indirect MS Location, or moved a value without noticing that the MS Location was used as an indirect MS Location.

MS and item not the same type

> This error occurs when you used **CIII** or **CAAA** format in some commands where **CIII** or **CAAA** is a destination, and the commands does not allow the operation performed. For example, the **Table** (t) Command does not allow this parameter format as a destination. The **Level Name** (n) Command does not allow this parameter format as a destination. Change the destination and execute the Value Procedure.

MS mmm is undefined

> If you do not set the MS Location **mmm** using the **Set** (s) Command or any other commands like **Action** (A), **Mid String** (M), **Copy** (O), **Factor Name** (N), or **Level Name** (n) before using **mmm** as an object or destination, this error will occur. Use VGSRCH utility to find the occurrence of this MS Location.

Integer storage overflow, 0 used

> If you have used an Integer type MS Location as a destination and tried to move in a value which is beyond position Integer range (32-67), you will get this error. The value in the MS Location is set to **0**.

Integer storage underflow, 0 used

> This error is the same as ``*Integer storage overflow, O used*,'' except that the value is smaller than (-32767).

Byte storage overflow, 0 used

> This error is the same as ``*Integer storage overflow, O used*,'' except that the value is beyond the byte range 255.

Byte/categorical storage underflow, 0 used

> This error is the same as ``*Integer storage overflow, O used*,'' except that the value is smaller than 0.

Categorical storage overflow, 0 used

> This error is the same as ``*Byte/categorical storage underflow, 0 used*.''

Improper date format

> This error occurs when you try to set or move an improper date into an MS Location that is set as User-Date.

System PPN and auto date cannot be altered

> This error occurs when you try to move data into a System or Auto-Date Factor.

Table nnn not included

> This error occurs when you try to use the **Table** (t) Command before an **Include** (()
> Command for a table. You must include the table before accessing the table using
> the **Table** (t) Command.

Column ccc beyond table

> This error occurs when you try to reference a table column index which is not in
> your Value Table; if interpolation or direct search is used.

Row rrr beyond table

> This error is the same as ``*Column ccc beyond table*,'' except it is for a row search.

Exact column match not found

> This error occurs when you try to reference a table column index which is not in
> your Value Table, if exact match search is used.

Exact row match not found

> This error is the same as ``*Exact column match not found*,'' except it is for a row
> search.

ccc value exceeds last column value

rrr value exceeds last row value

ccc value is outside of table column range

rrr value is outside of table row range

Attempted interpolation of string

> This error occurs when you have used a String type index for row/column or both
> when interpolation is the search method. You cannot perform interpolation for
> String indices.

Undefined format command

> This error occurs when you have used > in your print statement but the characters
> following the > symbol are not appropriate for the format.

Format parameter out of range

> This error occurs when you use a UNIVERS defined format number in a **Print** (P)
> Command and the number is out of defined format range (1-max format #).

Invalid card type

Mid-string position less than 1

If you have used an MS Location which has a value less than **1** for position parameter (3) in a **Mid String** (M) Command or an absolute value less than **1**, then this error will occur. Check your Parameter 3 for the **Mid String** (M) Command for the line being executed.

Item not a categorical type

This error occurs if you use a non-categorical object in a **Level Name** (n) or **Level Value** (v) Command.

Valgen table is empty

This error occurs when you do not have any Valgen Commands in your Value Procedure and you try to execute the procedure.

Duplicate label LLL at lines, llll, nnnn, ..., zzzz

This error occurs when you use a **Label** (L) Command on 2 lines that have identical characters in parameter 1. You must delete one line or change the Label parameter 1.

Division by zero-0 used

This error occurs when you try to divide by zero with the **Action** (A) Command. The system uses a zero value for destination and the processing continues.

Table nnn does not exist

This error occurs if you try to include a table which does not have any one of the files existing on your hard drive. You may have created a table, but if you did not enter the table element values, this error will occur.

Improper format for print object

This error occurs if you do not use the appropriate formats. Follow the guidelines for the **Print** (P) Command described below.

Check printer

This error occurs if you have any **Print** (P) Command lines in your application procedure when you are executing a Value Procedure and the printer is not ready. Correct the problem and press any key to continue.

Action calculation overflow, 0 used

This error occurs if you try to store the calculated value into a lower precision number when the actual calculations are in a higher precision in the **Action** (A) Command.

Mid-string parameter overflow, null used

System error ## at line ####

> Report this error to the UNIVERS staff providing the error number, line number from your screen message, and the status of your work that caused this error.

Key

The **Key** option defines which UNIVERS dynamic key field to use to identify records in the error file. It cannot be the first key field (PPN). It should be a non-duplicatable key field. This setting remains effective for all Value Procedures which are executed until it is changed.

Procedure

1. Select **Key** from the menu bar.

2. UNIVERS displays ``*Enter Secondary Key (2-X)*.'' Enter the key number you wish to use to identify records in the error file.

Select

The **Select** option returns you to the Selfil Table Menu, so you can select a new Selfil Table for use with this module.

Quit

The **Quit** option returns you to the UNIVERS Valuation Menu.

Create and Maintain Value Table

Value Tables are columnar tables which store variables used by the Value Procedures created in the **Create and Maintain Value Procedure** module and executed by the **Execute Value Procedure** module. These tables give you flexibility within your Valgen application to change the rates and other variables used in the value calculations without having to change the Value Procedure. You can create up to 1000 Value Tables.

When you select **Create and Maintain Value Table** from the UNIVERS Valuation Menu, the Valuation Table Editor Screen (Figure 5-3) displays. The Valuation Table Editor Screen displays a list of all the Value Tables which have been created.

```
2:53:22 pm      VALUATION TABLE EDITOR - Ver. 7.2 - 12/16/93 February 16, 1994

 Table Nbr   Table Description                  Creation Date

   250      NEIGHBORHOOD-MODEL ASSIGNMENT          04/03/1991
   251      STANDARD LAND RATES BY TYPE            04/03/1991
   252      INC/DEC(+/-) RATE BT LAND TYP          04/03/1991
   253      DEPTH FACTOR TABLE BY DEPTH INDEX/ACT DP    12/03/1990
   300      RESIDENTIAL CONTROL TABLE              04/03/1991
   301      RESIDENTIAL CONSTRUCTION TYPE          07/25/1991
   302      RESIDENTIAL BASEMENTS & ATTICS         09/30/1991
   303      RESIDENTIAL GRADE FACTORS              02/25/1991
   304      RESIDENTIAL ADDITION VALUES            07/25/1991
   305      RESIDENTIAL PORCHES/PATIOS/UTILITY SHEDS    03/25/1991
   306      RESIDENTIAL ATTACHED GARAGES & CARPORTS     02/26/1991
   307      PERCENT GOOD TABLE - DWELLING          03/08/1991
   308      SET CONDITION TYPES                    03/08/1991
   309      RESIDENTIAL OTHER FEATURES             03/13/1991
```

Figure 5-3. Valuation Table Editor Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box on the right displays the current page number and the number of pages in the table listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are three steps involved in creating a Value Table. First, you must use the **Create** option of the Valuation Table Editor menu bar to define the table number, the description, and the elements which will be contained in each cell. Second, you must use the **Index** option to define the number of rows and columns in the table and the indexes for each. Finally, you must use the **Display** option to enter the contents of the cells.

Value Table Structure

Value Tables have three different dimensions. This structure enables them to store values which are dependent on three different variables. The first two dimensions are **row** and **column**. There can be up to 99 rows and 99 columns in a table. The intersections of a row and column is called a **cell**. (See the table below). If Value Tables were limited to only these two dimensions, you could only store one value in each cell.

However, UNIVERS provides a third dimension, the **element**. There can be up to ten elements in each cell. This allows you to store up to ten values in a cell. All cells contain the same number of elements.

Indexing

When a Value Procedure executes, it needs to know how to find the value it needs from the table. It needs to know the row, column, and element where the needed value is stored. Within the Value Procedure, a logical value is assigned to each of these items. UNIVERS uses these logical values to search the Value Table for the proper row, column, and element.

Columns

	1	2	3	4	5
R **O** **W** **S** **1**	Element 1 Element 2 Element 3 Element 4 Element 5 Element 6 Element 7 Element 8 Element 9 Element 10	Element 1 Element 2 Element 3 Element 4 Element 5 Element 6 Element 7 Element 8 Element 9 Element 10	Element 1 Element 2 Element 3 Element 4 Element 5 Element 6 Element 7 Element 8 Element 9 Element 10	Element 1 Element 2 Element 3 Element 4 Element 5 Element 6 Element 7 Element 8 Element 9 Element 10	Element 1 Element 2 Element 3 Element 4 Element 5 Element 6 Element 7 Element 8 Element 9 Element 10
2	Cell	Cell	Cell	Cell	Cell
3	Cell	Cell	Cell	Cell	Cell
4	Cell	Cell	Cell	Cell	Cell
5	Cell	Cell	Cell	Cell	Cell

Each row and column in a Value Table is assigned an index value. This value is used in one of several ways when UNIVERS searches the table. The way it is used depends on the **Search Type** assigned to the rows and columns. Elements are *not* indexed.

Search Types

There are 5 different Search Types which can be assigned to a row or column. The Search Type for the rows does *not* need to be the same as the Search Type for the columns in a table. The Search Type used for elements is *always* **Direct**, since they are not indexed.

- **Direct** ignores the index value and uses the logical value assigned in the Value Procedure as the physical row or column number.

- **Exact** searches for a row/column with an index value which exactly matches the logical value assigned within the Value Procedure.

- **Nearest** searches for a row/column with an index value nearest to the logical value assigned within the Value Procedure.

- **Equal or Next** searches for a row/column with an index value equal to the logical value assigned within the Value Procedure. If it does not find an exact match, it uses the row or column with the highest index value which is still lower than the logical value.

- **Interpolate** searches for a row/column with an index value equal to the logical value assigned within the Value Procedure. If it does not find an exact match, it uses the first row/column with an index value less than the logical value *and* the first row/column with an index value greater than the logical value. It then performs a mathematical calculation between them.

Examples

Refer to the table below. Use this table for the following examples. The columns in this table are indexed by Story Height. The rows are indexed by Total Living Area. The elements are set up for two different Exterior Composition Types.

Remember elements are not indexed, so the logical value assigned within the Value Procedure is used as the element number in the Value Table. In these examples, assume the element number is defined within the procedure as the Categorical Level Number for the Exterior Composition Type factor.

The Value Procedure is going to use this table to determine the Base Cost Rate for a residence based on its Story Height, Total Living Area, and Exterior Composition. It obtains the values for each of these factors from the data base and searches the table for the appropriate Base Cost Rate. The parcel it is costing has the following values:

- Story Height = 1

- Total Living Area = 825

- Exterior Composition = Siding (Level Number 1)

Example 1: Assume the column Search Type is **Exact** and the row Search Type is **Nearest**. To find the Base Cost Rate for the parcel, UNIVERS searches the column indexes to find the value *exactly* equal to 1. This is found in Column 1. It then searches the row indexes for the value *nearest* to 825. It then uses the Element 1 (for Siding). So the Base Cost Rate used is 40.00.

		Col 1 1	Col 2 2
Row 1 600	Siding Brick	1: 41.25 2: 50.50	1: 39.50 2: 48.00
Row 2 800	Siding Brick	1: 40.00 2: 47.50	1: 38.75 2: 47.00
Row 3 900	Siding Brick	1: 39.00 2: 46.50	1: 38.00 2: 46.00
Row 4 1000	Siding Brick	1: 38.25 2: 45.50	1: 37.50 2: 45.00
Row 5 1100	Siding Brick	1: 37.50 2: 44.50	1: 36.75 2: 44.00
Row 6 1200	Siding Brick	1: 37.00 2: 43.50	1: 36.00 2: 43.00

Example 2: Assume the column Search Type is **Direct** and the row Search Type is **Equal or Next**. To find the Base Cost Rate for the parcel, UNIVERS ignores the column indexes and uses the logical value assigned by the Value Procedure for the column number. In this case, the Value Procedure should be written so that it uses Column 1. UNIVERS then searches the row indexes to find a value equal to 825. It does not find one, so it uses the first row with a value higher than 825, which is Row 3 (900). It then uses Element 1 (for Siding). So, the Base Cost rate used is 39.00.

Example 3: Assume the column Search Type is **Exact** and the row Search Type is **Interpolate**. The column and element are determined the same as in Example 1. However, UNIVERS uses two rows to determine the Base Cost Rate. It uses the rows with the first index values lower and higher than 825. These are Row 2 (800) and Row 3 (900). It then interpolates the two Bases Cost Rates (39.00 and 40.00), finding a value between them which is proportional in relation to the logical value and the index values. In this case, the interpolated value would be 39.25.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Valuation Table Editor Screen. This option is only relevant for network users.

Load

The **Load** option loads a Value Table into memory. A Value Table must reside in memory to use the **Display**, **Index**, **Print**, and **Save** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1. Highlight the table you wish to load.

2. Select **Load** from the Valuation Table Editor menu bar.

3. If there is a table in memory which has had changes made to it which have not been saved, UNIVERS displays ``*WARNING: Current table changes not saved. Continue anyway?*'' Type one of the following:

   Y - to load the new table without saving the table currently in memory

   N - to continue without loading the new table

Display

The **Display** option lets you display and edit the cell contents of the Value Table in memory. When you select this option, the Cell Contents Screen (Figure 5-4) displays.

```
Table 25O    NEIGHBORHOOD-MODEL ASSIGNMENT          O3/13/1991

    Col 1 2  3  4  5            Description of Cols: LAND TYP
    Row                        Description of Rows: NEIGHBOR
    1
    2                      Col  1: 1
    3                      Row  1: 1O1
    4
    5                       Cell Contents
    6
    7                      1. 1
    8
    9                       Macro: Add +Row Elm=1
    1O
    11                     D = define macro  M = use macro
    12
    13
    14
```

Figure 5-4. Cell Contents Screen

Modifying Cell Contents

Displayed on the left side of the Cell Contents Screen is a grid which shows the current dimensions (rows and columns) of the table. Inside the grid are dots which represent the cells at the intersection of each row and column. Also inside the grid is a highlighted dot which identifies the current cell. Using [ ], [ ], [ ], and [ ] you can move the highlighted dot to change the current cell.

Displayed on the right side of the Cell Contents Screen is the cell contents window which displays the actual values of each element in the current cell. Above the cell contents window, the column and row descriptions defined by the **Index** option display. Below the column and row descriptions, the column and row number and the indexes for the current cell display.

Deleting Cell Contents. When you delete the contents of a cell, the value of any Integer or Single-Precision type element is set to **0**. String type elements are set to null. To delete the contents of cell, perform the following steps:

1. Highlight the cell you wish to delete.

2. Press [DEL].

3. UNIVERS displays ``*WARNING: Cell contents about to be deleted. Continue anyway?*'' Type one of the following:

    Y - to delete the contents of the highlighted cell

    N - to continue without deleting the cell contents

Entering/Modifying Cell Contents. To enter or modify the contents of a cell, perform the following steps:

1. Highlight the cell you wish to enter/modify.

2. Press [INS].

3. Enter/edit the cell contents using [ ] and [ ] to move from element to element in the cell and pressing [ENTER] after each entry to accept the new data.

4. Press [ESCAPE] at any element or [ENTER] after entering the last element to end the modify procedure.

Entering/Modifying/Deleting Cell Contents Using Macros. You can use the Macro feature of the Cell Contents Screen to add, modify, or delete cell contents in a sequential manner, performing a specified operation on only selected elements. This process involves two steps: defining the macro and using the macro.

Defining a Macro. There are three parts of a macro which need to be defined. The first part defines the operation to be performed. The second part defines the ``direction'' in which the macro will execute. The third part defines the elements within each processed cell that will be effected by the operation. To define a macro, perform the following steps:

1. Type **D**.

2. UNIVERS highlights the first parameter. Use [ ] and [ ] to scroll through the list of operations which can be performed:

    •   **Add** stops at each cell, deletes the data in the selected elements, and allows you to add new data to those elements.

    •   **Mod** stops at each cell and allows you to modify the contents of each selected element.

    •   **Del** stops at each cell and confirms deletion of the data in each selected element.

    •   **Kil** deletes data from each selected element for all cells processed without confirmation at each. There is only a confirmation at the beginning of the process.

3. When the desired operation is displayed, press [ ] to highlight the direction indicator.

4.   Press [ ] and [ ] to scroll through the direction options:

   • **Row** causes the macro to move down a column row by row during execution. When it reaches the last cell in a column, it moves to the first cell of the next column and continues down the column row by row, etc; until it reach the last cell or you press [ESCAPE].

   • **Col** causes the macro to move across a row column by column during execution. When it reaches the last cell in a row it moves to the first cell of the next row and continues across the row column by column, etc; until it reach the last cell or you press [ESCAPE].

5.   When the desired direction indicator is displayed, press [ ] to move to the element selection parameter.

6.   The first element number flashes to indicate that it is the element being toggled on or off.

7.   Use [ ] and [ ] to toggle the element number on or off. When an element is toggled on it is highlighted. Elements which are toggled on are effected by the selected macro operation when the macro is used. Elements which are toggled off on are *not* effected by the selected macro operation when the macro is used.

8.   Use [ ] and [ ] to move from element number to element number or between the parameters and complete the macro definition.

9.   When the macro definition is set as desired press [ESCAPE].

Using a Macro. To use a macro once it has been defined, press **M**.

Exiting the Cell Contents Screen
To exit the Cell Contents Screen and return to the Valuation Table Editor Screen, press [ESCAPE] when the ``*Use arrow keys to select cell, Ins to modify, Del to delete, and Esc to return*'' prompt is displayed.

Index

The **Index** option defines the dimensions (number of rows and columns) of a Value Table in memory. It also defines the row and column descriptions, the row and column indexes, the row and column search types, and the row and column index values. Changes to the table index must be saved before using the **Load** or **Quit** option or they will be lost. When you select this option, the Table Index Screen (Figure 5-5) displays.

```
Table 250   NEIGHBORHOOD-MODEL ASSIGNMENT        03/13/1991

 Table Size is 14 rows by 5 columns.

 Row Desc  : NEIGHBOR       Col Desc  : LAND TYP
 Index Type : Single        Index Type : Integer
 Search    : Exact          Search   : Direct

 1.  101            1.  1
 2.  102              2.  2
 3.  103               3.  3
 4.  104               4.  4
 5.  105              5.  5
 6.  106                  < End of Index >
 7.  106.1
 8.  107
 9.  108
 10.  301
 11.  302
```

Figure 5-5. Table Index Screen

Entering/Editing the Table Index Screen

To select an item on the Table Index Screen to enter/edit, move the highlighted bar to that item and press [ENTER]. Use [ ] and [ ] to move the highlighted bar up and down in the row or column index definition. Use [ ] and [ ] to move the highlighted bar between the row and column definitions. If a row or column definition has more lines than will fit on the screen at once, use [PAGE UP] and [PAGE DOWN] to display the next and previous screens of the index definition. When you select an item by pressing [ENTER], the field will ``open,'' so you can define it.

Row and Column Definitions. The row and column definitions are for descriptive purposes only. They should describe the values which are entered in the row or column index. To define them, select the **Row Desc** or **Col Desc** field, type the description, and press [ENTER].

Index Type. The **Index Type** field defines what type data is entered in the row or column index. To define the index type, select the **Index Type** field. Use [ ] and [ ] to scroll through the available index types. Press [ENTER] when the desired index type is displayed:

• **Integer** allows only whole numbers to be entered. The length defaults to five digits. If there are values entered in the index and you change the index type to **Integer**, Text entries are changed to **0** and decimal entries are rounded to the nearest whole number.

• **Single** allows entry of real numbers. Only seven significant digits are stored. If you enter whole numbers of more than seven characters, the value displays in scientific notation. This allows you to enter whole numbers of up to ten digits. The first seven are recognized and any additional digits will be used as zeros. For instance, if you enter **9876543210**, it is displayed as **9.876543E+09**. It will be used by Valgen as **9876543000**. If there are values entered in the index and you change the index type to **Single**, Integers remain the same and Text entries are changed to **0**.

- **Text** allows entry of any alphanumeric characters. They will be sorted in alphabetical order with numbers first. If you select this type, you must also define the length. The length can be up to twenty-three characters. If there are values entered in the index and you change the index type to **Text**, values will only be changed if they are longer than the defined length. They will be truncated beginning at the last digit.

Search Type. The **Search Type** field defines the search type for the row or column. To define the search type, select **Search Type**. Use [ ] and [ ] to scroll through the available search types. Press [ENTER] when the desired search type displays:

- **Direct** ignores the index value and uses the logical value assigned in the Value Procedure as the physical row or column number.

- **Exact** searches for a row/column with an index value which exactly matches the logical value assigned within the Value Procedure.

- **Nearest** searches for a row/column with an index value nearest to the logical value assigned within the Value Procedure.

- **Equal or Next** searches for a row/column with an index value equal to the value assigned within the Value Procedure. If it does not find an exact match, it uses the first row or column with an index value greater than the logical value.

- **Interpolate** searches for a row/column with an index value equal to the logical value assigned within the Value Procedure. If it does not find an exact match, it uses the first row/column with an index value less than the logical value *and* the first row/column with an index value greater than the logical value. It then performs a mathematical calculation to find an interpolated value.

Index Values. To enter/edit the values for the row and column indexes, select a line in the row or column index. Type the index value and press [ENTER]. Since index values must be entered in ascending order, the value entered will be moved to the appropriate line in the index based on its proper position in the ascending order of the index. All other lines will be adjusted accordingly.

Inserting Lines in the Index. To add new lines to an index, thus increasing the dimensions of the table, press [INSERT]. A new line will be added and ``opened'' for entry. Type the new index value and press [ENTER]. The new value will be entered in its appropriate position in the index.

Deleting Lines in the Index. To delete lines from an index, thus decreasing the dimensions of the table, move the highlighted bar to the line you wish to delete and press [DELETE]. UNIVERS displays ``*WARNING: Highlighted index is about to be deleted. Continue anyway?*'' Type one of the following:

Y - to delete the highlighted index

N - to continue without deleting the highlighted index

Exiting the Table Index Screen
To exit the Table Index Screen, press [ESCAPE] when the prompt displays at the bottom of the screen.

Print

The **Print** option prints the Value Table in memory. A complete listing of each cell and the value of each element in each cell is printed.

Procedure

1. Load the desired table into memory.

2. Select **Print** from the Valuation Table Editor menu bar.

Create

The **Create** option creates a new Value Table. Once you create the table, it is added to the listing. The table number and table description as well as the element definitions are defined with this option, but the table dimensions, the row and column indexes, and the values of the elements in each cell are not. To define the dimensions and the row and column indexes use the **Index** option. To define the values of the elements in each cell, use the **Display** option.

Procedure

1. Select **Create** from the Valuation Table Editor menu bar.

2. UNIVERS displays ``*Enter table number (000-999):*." Enter the new table number.

3. UNIVERS displays ``*Enter table XXX description*." Enter a description of up to 40 characters.

4. UNIVERS displays the Element Description Screen (Figure 5-6). Define the elements to be included in each cell.

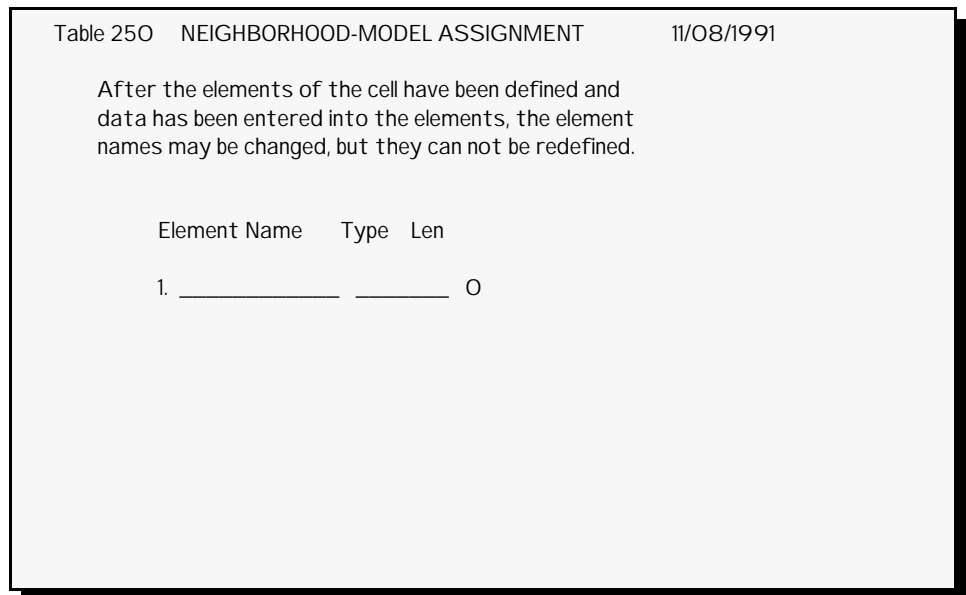5. Press [ESCAPE] to return to the Valuation Table Editor menu bar.

```
Table 25O    NEIGHBORHOOD-MODEL ASSIGNMENT           11/O8/1991

       After the elements of the cell have been defined and
       data has been entered into the elements, the element
       names may be changed, but they can not be redefined.


           Element Name     Type   Len

           1. _____  _____  O
```

Figure 5-6. Element Description Screen

Cole-Layer Trumble Company

Element Definitions

If you wish to change element definitions after the table has been initially created, you can use the **Rename** option. If no data has been entered into a table with the **Display** option, you can add, change, or delete any element definition using the **Rename** option. However, once data has been entered into the table using the **Display** option, only the Element Name can be changed. The **Type** and **Len** cannot be changed once data has been entered into the table. Furthermore, elements cannot be deleted once data has been entered into the table; but they can be added. There are three items which comprise an element definition:

- **Element Name** is the descriptive name given to the element.

- **Type** defines the type of data which can be entered into the element (Integer, Single-Precision, or String).

- **Len** defines the length of the data in the element. The length for an Integer is always 4. The length for a Single-Precision element is always 2. The length of a String element is user-defined.

Entering Element Definitions

The following rules apply when entering element definitions:

- [ ] and [ ] move the cursor between enterable items.

- When entering an element type use [ ] and [ ] to scroll through the different types.

- Press [ENTER] to accept a value for an item and go to the next item.

- You can only define length for String type elements.

- To delete an element, use [ ] and [ ] to move to the **Type** field for that element. Then use [ ] and [ ] to display the **Delete** option and press [ENTER].

- Press [ESCAPE] to return to the Valuation Table Editor menu bar.

Rename

The **Rename** option changes the table number and description of the highlighted table. If no data has been entered into the table, you can change the **Type** and **Len** of the element descriptions. However, if data has been entered into the table, only the **Element Name** can be changed for the element descriptions. Changes made with this option are saved automatically. They *do not* need to be saved using the **Save** option.

Procedure

1. Highlight the desired table.

2. Select **Rename** from the Valuation Table Editor menu bar.

3. UNIVERS displays ``*Enter new table number (000-999).*'' Enter the new table number.

4. UNIVERS displays ``*Enter new table XXX description.*'' Enter the new table description.

5.   The Element Description Screen (Figure 5-6). Modify the element descriptions as desired.

6.   Press [ESCAPE] to return to the Valuation Table Editor menu bar.

___

Kill

The **Kill** option deletes a Value Table. Once a Value Table has been deleted, it cannot be restored.

Procedure
1.   Highlight the table you wish to delete.

2.   Select **Kill** from the Valuation Table Editor menu bar.

3.   UNIVERS displays ``*WARNING: Valgen table ### is about to be killed. Continue anyway?*'' Type one of the following:

      Y - to delete the table

      N - to continue without deleting the table

___

Save

The **Save** option saves the Value Table in memory to the highlighted Value Table. This option can be used to save new Value Tables or update modified Value Tables. If you do not save the Value Table in memory before using the **Load** or **Quit** option, any changes made will be lost. You may save a modified Value Table in one of two ways:

•   You may overwrite the same Value Table, updating the changes made to it.

•   You may overwrite a different Value Table, replacing it with the Value Table in memory.

Overwriting the Same Value Table:
1.   Highlight the Value Table.

2.   Select **Save** from the menu bar. UNIVERS saves the Value Table.

Overwriting a Different Value Table:
1.   Highlight the Value Table to which you would like to save the table in memory.

2.   Select **Save** from the menu bar.

3.   UNIVERS displays ``*WARNING: Table ### will be overwritten by table ###. Continue anyway?*'' Type one of the following:

      Y - to continue the save procedure

      N - to abort the save procedure

Quit

The **Quit** option returns you to the UNIVERS Valuation Menu.

Procedure

1. Select **Quit** from the Valuation Table Editor menu bar.

2. If there is a table in memory which has been changed but not saved, UNIVERS displays ``*WARNING: Current table changes not saved. Continue anyway?*'' Type one of the following:

    Y - to quit without saving the table

    N - to return to the menu bar in order to save the table in memory

Create and Maintain Value Procedure

This module creates the Value Procedures which generate values using the factors stored in the data base and the rates and values stored in the Value Tables. The Value Procedures consist of Valgen Commands which process the factors from the data base and the rates and values in the Value Tables, print output reports, and update the data base with the calculated values.

When you select **Create and Maintain Value Procedure** from the UNIVERS Valuation Menu, the Valpro Editor Screen (Figure 5-7) displays. The Valpro Editor Screen displays a list of all the Value Procedure Tables which have been created.

```
2:56:36 pm        VALPRO EDITOR - Ver. 7.2 - 12/16/93    February 16, 1994


  Table Nbr   Table Description                  Creation Date

   OO1      RESIDENTIAL VALUATION - CLT COST       O7/22/1991
   OO3       COMMERCIAL VALUATION - CLT COST        O4/O4/1991
   OO5       INCOME VALUATION APPROACH            O9/26/1991
```

Figure 5-7. Valpro Editor Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the procedure currently loaded to memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific procedure on a page.

There are two steps involved in creating a Value Procedure. First, you must use the **Create** option of the Valpro Editor menu bar to add a Value Procedure Table to the table listing. This step creates a blank Value Procedure Table. Second, you must use the **Display** option to define the commands to be included in the procedure.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Valpro Editor Screen. This option is only relevant for network users.

Load

The **Load** option loads a Value Procedure Table into memory. A Value Procedure Table must reside in memory to use the **Display**, **Print**, and **Run** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1. Highlight the table you wish to load.

2. Select **Load** from the Valpro Editor menu bar.

3. If there is a table in memory which has been changed but not saved, UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to continue the load procedure without saving the table in memory

   N - to abort the load procedure in order to save the table in memory

Display

The **Display** option lets you display and edit the Value Procedure Table in memory. When you select this option, the Value Procedure Editing Screen (Figure 5-8) displays. To define a procedure, enter the commands on this screen.

Procedure
1. Load the desired table into memory.

2. Select **Display** from the Valpro Editor menu bar. The Value Procedure Editing Screen displays.

3. Use the following options from the Display menu bar to enter the commands into the procedure:

    •   **First** displays the first fifteen lines of the procedure

    •   **Last** displays the last page of the procedure

    •   **Range** displays the procedure beginning with a specific line.

    •   **Modify** adds or edits lines in the procedure.

    •   **Quit** returns you to the Valpro Editor menu bar.

```
2:57:24 pm      VALPRO EDITOR - Ver. 7.2 - 12/16/93   February 16, 1994

 Line Command                           Help

  31 I O2O =  O16 NPO                         IfGo
  32 I O2O =  O17 NPO                         IfGo
  33 T W/P                         GoTo
  34 L NPO                         Labl
  35 s1 O2O N                      Set
  36 s1 O22 NOPRINT OPTION SELECTED             Set
  37 s1 O23 LEAVE PRINTER ONLINE FOR ERROR MESSAGE LISTING-IF ANY..Set
  38 T BGN                         GoTo
  39 !S* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
         Cmnt
  4O ! SOLICIT FOR PRINTER TYPE(WIDE/8OCPI)            Cmnt
  41 ! S* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
         Cmnt
  42 L SWP                         Labl
  43 f O13 a5 a23                   Disp
```

Figure 5-8. Value Procedure Editing Screen

Modifying a Value Procedure

The **Modify** option of the Display menu bar lets you add or change lines in the Value Procedure. After you choose **Modify** from the menu bar, four new options display. Any changes made to a procedure must be saved using the **Save** option of the Valpro Editor menu bar or they will be lost.

Insert. This option inserts lines in the procedure at the highlighted bar. To use this option, perform the following steps:

1. Move the highlighted bar to the line you wish to insert.

2. Select **Insert** from the Modify menu bar.

3. UNIVERS displays ``*Enter or select command*'' along with a list of the Valgen Commands. Enter the desired command or use [ ] and [ ] to highlight the desired command, then press [ENTER].

4.   The command entry line displays. Above the command entry line is a listing of the format of the command and its parameters. Type the command line and press [ENTER].

5.   Repeat steps 3 and 4 until all desired lines have been inserted.

6.   Press [ESCAPE] to return to the Modify menu bar.

Edit. This option changes the highlighted line in the procedure. When editing a line, you can press [ESCAPE] to abort the edit function. To use this option, perform the following steps:

1.   Highlight the line you wish to edit.

2.   Select **Edit** from the Modify menu bar.

3.   The command entry line displays with the current command. Edit the command and press [ENTER] or press [ESCAPE] to display the command list from which you can select a new command.

Delete. This option deletes the highlighted line from the procedure. To use this option, perform the following steps:

1.   Highlight the line you wish to delete.

2.   Select **Delete** from the Modify menu bar.

3.   UNIVERS displays ``*WARNING: Highlighted command about to be deleted. Do you want to continue?*'' Type one of the following:

     Y - to delete the highlighted line.

     N - to continue without deleting the highlighted line

Quit. This option returns you to the Display menu bar.

Valgen Commands

A Valgen Command is a one line instruction for the computer to perform an operation. These commands can be used to perform arithmetic operations, ``look up'' the numbers stored in tables built from cost manuals, display data on the screen, or send the output to your printer. Valgen commands can be conditional in order to perform an operation based on different conditions. You can also perform repetitive operations using subroutines. By combining the different Valgen Commands into a procedure, you can create complex applications to value to parcels in your data base.

MS Locations. MS (Memory Storage) Locations are nothing but the names for your work areas and variables you want to use in your application procedure. MS Location definitions are only effective for the specific Value Procedure you are using. This adds more flexibility to your Value Procedure since you have 999 MS Locations to use in every Value Procedure you create.

When you define your MS Locations plan in advance on how to use the MS Locations more effectively. Set aside some ranges for constants, some for loop type processing, some for outputs, some as temporary calculations, and some to hold common information which is used throughout your Value Procedure. It is very important to use your MS Location wisely. These MS Locations are the keys to creating efficient Value Procedures. Use the following guidelines when defining MS Locations:

• Keep notes on MS Locations used.

• Set the constants into MS Location at the beginning of your procedure.

• Keep the usage of some MS Locations as ``Global'' then use and reuse them by redefining and setting them to different types.

• Group the MS Locations so that you can use the looping techniques or indirect MS Locations for repeating procedures.

Command Forms. Each command requires a certain number of parameters in certain forms for execution. There are five forms you can use for your object or destination locations. They are:

• **_AAA** - (Direct MS Location). This is the direct MS Location from which you want to use the contents for a command. The underscore means leave a ``blank'' before the number represented by **AAA**. For example, in using an **Action** (A) Command, the format is specified as:

A @AAA @BBB OP @CCC

If you want to use direct MS Location, then in the **Action** (A) Command, by leaving one space before entering the MS Location **AAA** as:

A _AAA _BBB OP _CCC

• **@AAA** - (Indirect MS Location). This is an indirect MS Location from which to use the contents for a command. The @ indicates to the system that the MS Location defined by **AAA** identifies another MS Location from which the data should be taken. For example, consider the following commands:

s 4 010 1000
s 2 001 010
A 005 @001 + a1

The **Action** command will take the contents of MS Location 010 (addressed by indirect MS Location 001) and will add a value 1 to 1000 and save the results in MS 005.

- **CIII** - (Direct Card-Item Address). This is the direct Card Type and Item Number from which you want to use the contents for a command. This format is very useful when you want to use the data from your data base. **C** - refers to a Card Type from your data base. **III** stands for an Item Number from your data base. Item Number **000** is reserved for testing for the existence of a Card Type. The test performed will be: if **C000** = 00 (card does not exist), then do not process Card Type **C**.

- **CAAA** - (Indirect Card-Item Address). This is an indirect Card Type and Item Number from which you want to use the contents for a command. This format is specially useful when you want to repeat the same procedure on a different Item Number of the same Card Type. The processing is the same as for **@AAA** processing where **C** is tells the system that the MS Location identified by **AAA**, contains the Card-Item to process. For example, consider the following commands:

    s 2 001 1010
    A 005 C001 + a1

    The **C001** tells the system that the value in MS **001** contains a Card Type and Item Number to use to add to the absolute value of **1**. The value in MS **001** is **1010**. This value tells the **Action** (A) command to use the value of Card Type 1, Item Number 010 in the equation. So the value in Card Type 1, Item Number 010 is added to **1**.

- **aVALUE** - (Absolute Value). This format tells the system to use the absolute value following letter **a**. This form is especially useful when you want to add constants to your calculations or use the absolute values for the table row/column indices when you are doing a table search. In the previous examples, **a1** was used in the equations. The **a1** tells the system to use the absolute value **1** in the equation.

List of Valgen Commands in Alphabetical Order

Command	Command Description
!	**Comment** - Up to 60 characters, ignored at run time
(	**Include** - Include a Value Table in the processing
A	**Action** - Perform arithmetic operations: +, -, *, /, and ^
c	**Clear** - Clear the screen
F	**Solicit** - Solicit one character
f	**Display** - Display data at specific row or column on the screen
G	**GoSub** - Transfer execution and process until a return is encountered
g	**Get Selfil** - Retrieve the next record from Selfil
I	**If** - If the condition is true then transfer, else process the next line
i	**Conditional GoSub** - If the condition is true then process as GoSub Command and return to next line, else process the next line
L	**Label** - Define a Label
M	**Mid String** - Store the mid string of an object of a specified length from the starting position
N	**Factor Name** - Retrieve the Factor Name from Factor Table
n	**Level Name** - Retrieve the Categorical Level Name from the Categorical Segment
O	**Copy** - Copy the data from one location to another
P	**Print** - Print the information to the printer
Q	**Quit** - Quit Value Procedure
R	**Return** - Return from a subroutine
r	**Round** - Round off a number to a certain decimal places
s	**Set** - Set the MS Location to a certain type (Integer, Single-Precision, Double-Precision, Byte, Categorical, String)
T	**Transfer** - Transfer program control to a Label
t	**Table** - Retrieve the element value from the specified table
v	**Level Value** - Retrieve the Categorical Level Value from the Categorical Segment
z	**Zero** - Set the MS Locations to zero for numeric type and to null String type

Command Name	Command	Parameters
Comment	!	Message of up to 60 characters

Purpose: This command allows a comment of up to 60 characters. It is ignored at the run time. You can have as many comment lines as you want.

Parameters: None

Notes: Having short length comments can increase the total number of lines in your procedure. The maximum allowable number of lines in your procedure depends on the length of each command line. If you need to enter long messages then break them into short statements and enter them as short comments. The system at execution time will ignore these comment lines and execute the next line in the procedure.

Command Name	Command	Parameters
Include	(	NNN

Purpose: This command loads information about Value Table **NNN** into memory for access.

Parameters: There is one parameter for this command. It is the table number of the Value Table in the range 001-999. At execution time the system checks if the included table exists.

Notes: If you get the following message at execution time:

<div align="center">

``**Table NNN does not exist''**

</div>

then go to the **Create Value Table** module and create Value Table **NNN**. If you do not want to create table NNN then delete the **Include** (() Command from your procedure.

Once you include a table then do not use the same table number in another **Include** statement. If you do, you will get the following message:

<div align="center">

``**Table NNN already included''**

</div>

Check your procedure for more than one **Include** (() Command including the same Value Table.

It is a good practice to keep all **Include** (() Command statements at one place or in a subroutine. This way you can keep track of how many and which Value Tables you are using in a procedure.

Command Name	Command	Parameters
Action	A	@AAA @BBB x @CCC

Purpose: This command allows you to perform simple arithmetic operations like Add (+), Subtract (-), Multiply (*), Divide (/) and Exponentiation (^) on two operands, storing the results in a destination location. Valgen will perform the operation (Parameter 3) by taking the values from Parameter 2 and Parameter 4 and stores the results in the destination location (Parameter 1).

Parameters: All four parameters are required.

Parameter 1 is the destination location to store the results of the calculations. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA** or **aVALUE**.

Parameter 2 is operand 1 location. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA** or **aVALUE**.

Parameter 3 is the operation parameter to perform. It can be: **+**, **-**, *****, **/**, or **^**.

Parameter 4 is operand 2 location. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA**, or **aVALUE**.

Notes: If you are using **@AAA** or **_AAA** for a location for Parameters 1, 2, or 4, you must set the type of MS Location before using the **Action** (A) Command. If the types of these MS Locations are not set, then at the execution time you will get the following message:

``**MS @AAA(or _AAA) is undefined in line # llll**''

If you use String type parameters for this command then the value of the MS Location will be used at the execution time. For Example, if MS 001 is set to:

s 1 001 100 Main st

Then in the **Action** (A) Command **A 002 001 + a1,** MS 002 will have value (100 + 1= 101) after execution of the **Action** (A) Command.

If the destination location of an **Action** (A) Command is not set to any type prior to the execution of the command, then after execution the destination location will be set to a Single-Precision type.

You can set the locations if a **@AAA** or **_AAA** form is used for Parameter 1, 2, or 4 using the **Set** (s) Command.

You may use the **Copy** (O) Command to set the MS Locations' type before the **Action** (A) Command, if **@AAA** or **_AAA** form is used for Parameter 1, 2, or 4.

Command Name	Command	Parameters
Clear	c	None

Purpose: This command allows clears the screen. You can clear the screen as many times as you wish.

Parameters: None

Notes: Use this command if you are going to display the results of your procedure on the screen during execution.

Command Name	Command	Parameters
Solicit	F	@AAA

Purpose: This command allows you to solicit one character from the keyboard. At execution time the system will wait for a single key stroke to be entered by the user.

Parameters: There is one parameter for this command. It is the destination location to store the users's response. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

If you use **CIII** then three cases are possible:

a.   If **CIII** is a UNIVERS key number then the value in destination **CIII** is not changed.

b.   If **CIII** is not a String type then you get the following error message:

<div align="center">

``**MS and Item not same type''**

</div>

The execution stops at this point. Change the destination parameter.

c.   If **CIII** is a String type, then the Card-Item in the data base will have the data value of the keyboard key you have press at execution.

Notes: The system at execution time will wait for the user to press a key before continuing the next line in the procedure.

For this command the destination location will be always set to String type.

You can display a message for the expected input for the **Solicit** command using the **Display** command.

Command Name	Command	Parameters
Display	f	@AAA @RRR @CCC

Purpose: This command allows you to display the contents of Parameter 1 on the screen at the row specified in Parameter 2 and the column specified in Parameter 3.

Parameters: All three parameters are required:

Parameter 1 is the location from which the contents are displayed. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 is the row number on the screen where the contents of Parameter 1 will display. It can be: **@AAA**, **_AAA**, or **aVALUE**.

Parameter 3 is the column number on the screen where the contents of Parameter 1 will display. It can be: **@AAA**, **_AAA**, or **aVALUE**.

Notes: If you are using **@AAA** or **_AAA** for the location (Parameters 2 and 3) and if the MS Locations are String types, the system will use the value of the MS Location to determine the numeric row and column value.

If you use String type parameters for this command, the value of the MS Location will be used. For Example, if MS 001 is set to:

s 1 001 5 Main st

Then in the **Display** (f) Command **f 002 001 a1,** the MS 001 will be set to **5**, which is the row number to use for **Display** (f) Command.

If the row/column MS Locations of **Display** (f) Command are not set to any type prior to the execution of the command, the system will display the contents of Parameter 1 at row 1 and column 1.

Set the locations if the **@AAA** or **_AAA** form is used for Parameter 1, 2, or 4 using the **Set** (s) Command.

You may use the **Copy** (O) Command to set the MS Locations' type before the **Display** (f) Command, if the **@AAA** or **_AAA** form is used for Parameter 1, 2, or 4.

Command Name	Command	Parameters
GoSub	G	GLLL

Purpose: This command allows you to call a subroutine from your current segment of the code. At the execution of this command control is transferred to Label **LLL** and the lines following the unique Label are executed until a **Return** (R) Command is encountered. You can use this command to execute the common processing of your Value Procedure.

Parameters: There is one parameter for this command. It is a three character Label which identifies where to transfer the execution flow. This can be any alphanumeric characters.

Notes: The system at execution time will check to see if the Label exists in your Value Procedure by searching for the **Label** (L) Command.

If the Label is found then the system will transfer the control by this Label and continue processing the lines after this Label.

If the Label is not found during execution the system will display a message:

<div align="center">

``Undefined Label''

</div>

Enter the **Label** (L) Command in your procedure. Make sure that you have a **Return** (R) Command at the end of the subroutine.

If the **Return** (R) Command is missing from your Value Procedure then the system will continue processing until it reaches the last line or a **Quit** (Q) Command.

Command Name	Command	Parameters
Get Selfil	g	LLL

Purpose: This command retrieves the first/or next parcel record from Selfil. When the end of file (EOF) is reached the system transfers the execution to the Label (**LLL**) specified by this command.

Parameters: There is one parameter for this command. It is the Label at which you want to branch when the End of File (EOF) is detected.

Notes: The system will get the next parcel record from the data base, based on your selected Selfil Table. If you have reached the end of the data base file, the system will transfer control to the Label **LLL**.

If you do not add the **Label** (L) Command line for this Label, the system will display the following message:

<div align="center">

``Undefined Label''

</div>

Insert the **Label** (L) Command line in your Value Procedure.

Network System Users Note:
The message ``*Data Manager is locked by another user*'' will display on the screen if more than one user is accessing the same parcel record at the same time. You can wait until the record is released or press [ESCAPE] to abort the execution.

Command Name	Command	Parameters
If	I	@AAA OP @BBB LLL

Purpose: This is a conditional statement. If the comparison of Parameter 1 with Parameter 3 based on the conditional operator in Parameter 2 is true, control is transferred to Label in Parameter 4.

Parameters: All four parameters are required:

Parameter 1 is the first argument location in your comparison. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 is the conditional operator: =, <>, >, <, >=, or <=.

Parameter 3 is the second argument location in your comparison. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA** or **aVALUE**.

Parameter 4 is the destination Label to process if the condition is true. The system checks the condition and transfers control to the Label; otherwise the next line following the **If** (I) Command in your procedure is executed.

Notes: If the arguments used in this command are of form **@AAA** or **_AAA** and if the type of these arguments are not defined or not the same, the command results in a false condition and processing continues with the next line following the **If** (I) Command.

You have to be careful when comparing different types of arguments in an **If** (I) Command, otherwise your procedure's flow will not be the same as you expected. If any one of the arguments is a String type, then the value of the String will be used when a numeric comparison is made; otherwise, a String comparison will be performed.

Command Name	Command	Parameters
Conditional GoSub	i	@AAA OP @BBB LLL

Purpose: This is a conditional subroutine call. If the comparison of Parameter 1 with Parameter 3 based on the conditional Parameter 2 is true, then control transfers to the Label in Parameter 4 and returns back to the line after this command to continue the processing. A **Return** (R) Command is a necessary after the processing at Label **LLL** to indicate the end of **Conditional GoSub**.

Parameters: All four parameters are required:

Parameter 1 is the first argument location in your comparison. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 is the conditional operator: =, <>, >, <, >=, or <=.

Parameter 3 is the second argument location in your comparison. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA** or **aVALUE**.

Parameter 4 is the destination Label to process if the condition is true. The checks the condition and transfers control to the Label to process the subroutine; otherwise, the next line following the **Conditional GoSub** (i) Command in your procedure will be executed.

Notes: If the arguments used in this command are of form **@AAA** or **_AAA** and if the type of these arguments are not defined or not the same then the command results in a false condition and processing continues with the next line following the **Conditional GoSub** (i) Command.

You have to be careful when comparing the different types of arguments in a **Conditional GoSub** (i) Command, otherwise your procedure's flow will not be the same as you expected. If the any one of the argument is String type then the value of the String will be used when a numeric comparison is made; otherwise, a String comparison will be performed.

Command Name	Command	Parameters
Label	L	LLL

Purpose: This command defines the logical starting point of a segment or subroutine within your main program. If there is a command that has a Label parameter which matches the **LLL** in the **Label** (L) Command, control is transferred to the Label until a **Transfer** (T) or **Return** (R) Command is detected.

Parameters: There is one parameter for this command. It is any three character combination from your keyboard. You can use letters, numbers, and any printable symbols from your keyboard.

Notes: You must specify all three characters in your Label.

The system at execution time will search for this Label when it detects a command that requires a transfer of the execution flow to this Label.

If the system finds duplicate Label(s) at execution time then the following message will be displayed:

      ``**Duplicate label LLL at line nnnn and llll''**

Check your Value Procedure and decide which Label you want to change.

If the system does not find the Label at which the branching occurs then the system displays the following message:

      ``**Undefined Label''**

Use the debug from the **Execute Action Table** module to trace the undefined Label and modify your Value Procedure by inserting the **Label** (L) Command with the LLL that was missing.

Command Name	Command	Parameters
Mid String	M	@AAA @BBB _POS _LEN

Purpose: This command returns the requested part of a given string (Parameter 2) in string or value form based on your destination parameter's (Parameter 1) type. You have to specify the starting position within the object string (Parameter 2) and the length of the string to be extracted.

Parameters: All four parameters are required:

Parameter 1 is the destination location to store the results of mid-string operation. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 is the object location on which the mid-string operation is performed. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 3 is the starting position from which you want to extract the part of the given string. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**, or **aVALUE**

Parameter 4 specifies the length of the string you want to extract from the starting position of the object. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA**, or **aVALUE**.

Notes: The system at execution time will return the string with the specifications from Parameter 2-4 if the destination MS Location is of String type and will return the value if the destination location, if it is a numeric type.

For Parameter 1: Before the **Mid String** (M) Command you can set the Parameter 1 MS Location to a numeric type, if you want to extract the value from the object string.

For example, if your object string is **100 Main St** and you want to extract the number **100** from this string, you can set Parameter 1 to a numeric type so that you can get the value **100** stored in Parameter 1 as a number and not a string. But if you have an object string **B2 Main St** and you are extracting a value from this string, you will get a **0** (zero) value.

For Parameter 4: If the parameter 4 MS Location is a String type then the total object string will be returned.

Examples: 1000 s 1 001 Hello, Good Morning Afternoon Evening
                     1001 M 002 001 a1 a12
                     1002 s 2 003 13
                     1003 s 2 004 7
                     1004 M 005 001 003 004
                     1005 P 002 00 256
                     1006 P 005 00 256

When you execute this procedure you will get the following message printed:

``Hello, Good Morning''

Use the **Set** (s) Command to set the parameters of the **Mid String** (M) Command to the type you want to use.

Use the **Copy** (C) Command to copy the object string to restore the original value if the destination location is same as object location, especially when you are using **CIII** as your destination parameter.

Command Name	Command	Parameters
Factor Name	N	@AAA CIII

Purpose: This command allows you to retrieve the Factor Name from the data base.

Parameters: There are two parameters for this command:

Parameter 1 is the destination location to store the Factor Name retrieved from the data base. It can be: **@AAA** or **_AAA**.

Parameter 2 is the Card-Item of the factor from which you want to retrieve the name. It can be: **CIII** or **CAAA**.

Notes: The system retrieves the Factor Name and stores the name at destination location.

The destination location's type will be changed to String type after execution of this command.

Parameter 2 must be a Card-Item or an indirect address of a Card-Item.

Command Name	Command	Parameters
Level Name	n	@AAA CIII

Purpose: This command allows you to retrieve the Categorical Level Name from the Categorical Segment.

Parameters: There are two parameters for this command:

Parameter 1 is the destination location to store the Categorical Level Name. It can be: **@AAA** or **_AAA**.

Parameter 2 is the Card Type and Item Number of the Categorical Factor for which the Level Name is being retrieved. It can be: **CIII** or **CAAA**.

Notes: Parameter 2 must be a Categorical type. If the parameter is not a Categorical type, then the system will display the following message at execution time:

<div align="center">

``**Card-Item is not Categorical Type''**

</div>

The execution will stop at that point. Correct the Card-Item.

After execution of **Level Name** (n) Command the destination location is set to a String type.

Command Name	Command	Parameters
Copy	O	@AAA @BBB

Purpose: This command allows you to copy the contents of the object location to the destination location. The destination location's type will be set to the object's location type when the destination parameter is of a **@AAA** or **_AAA** form.

Parameters: There are two parameters for this command:

Parameter 1 is the destination location to store the contents of the object location. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 is the object location from which the contents are copied. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Notes: The system at execution time will copy the contents of Parameter 2 into Parameter 1.

If the destination parameter is a non-duplicatable key field, the object contents are not copies to destination location.

If you are going to use this command make sure the destination location is not used later in the procedure. If it is used for some different purposes make sure you set the location to the required type for that command, if your destination is of form **@AAA** or **_AAA**.

You may want to use the **Set** (s) command to set Parameter 2 before the execution of this command and to set Parameter 1 after the execution of this command, if the form of the parameters is **@AAA** or **_AAA**.

Command Name	Command	Parameter
Print	P	@AAA SZ FORM Format

Purpose: This command allows you to print the contents of Parameter 1 for the specified size (Parameter 2) and in specified format (Parameter 3). The output will be send to the printer.

Parameters: Three parameters are required. The fourth parameter is optional.

Parameter 1 is the object location from which the contents are printed. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 defines the print size of the data, if you want it to be greater than length of the data stored in the location defined by Parameter 2. If the length of the data is less than the number entered in Parameter 2, the length defined by Parameter 2 is used. If the length of the data is greater than the length defined by Parameters, Parameter 2 is ignored.

Parameter 3 defines the format in which the data should be printed:

- Entering a value between **001-255** prints numeric data in the format defined in the **Create and Maintain Factor Base** module.

- Entering **256** prints Text and dates left-justified.

- Entering **257** prints Text and dates right-justified.

- Entering **258** prints the data as defined by Parameter 4.

Parameter 4 defines the print format if **258** is entered in Parameter 3. It can be one of the following:

>H prints the data which follows the **>H** as the report title in the second line of the report. When using this parameter, the MS Location specified in Parameter 1 should be null; otherwise, the data in that MS Location will print along with the data which follows the **>H** parameter. These parameters can be combined.

>P sends a form feed code to the printer.

>Snn advances the print head the number of lines specified by **nn** (01-99).

>Tnnn prints the data at the column position identified by **nnn** (001-132).

& prints all of the data in the MS Location specified by Parameter 1. This parameter can be combined with other parameters and characters. For example, the command **001 10 258 >T80PARCEL VALUE: &** would print **PARCEL VALUE** followed by the value stored in MS Location 001 at column 80.

prints one numeric character. For example, if MS Location 001 contained a numeric value with six digits, you could enter the following

command to print it as a dollar value with two decimal places: **001 06 258 >$###,###.##**.

!...! prints Text data one character at a time. Each period represents one character. The exclamation points also represent a character.

Notes: The system will check first if your printer is on line or not, out of paper or not, connected or not. If any one of the conditions is met, the system will display the following message:

<div align="center">

``**Check Printer''**

</div>

Correct the problem and proceed.

The system will check the format with the object type. If the match is not found, then the system will display the following message:

<div align="center">

``**Improper Format for Print Object''**

</div>

Correct the format in your procedure.

After all printer and format checks are made the system will print the contents of the object parameter on the printer in a specified format.

Prepare your print report layout before you start implementing your procedure. Get familiar with the effect of Size (Parameter 2), Form (Parameter 3) and Format (Parameter 4) on your **Print** (P) Command statements and the actual output. You need to do some planning up front before getting the print reports from your Value Procedure.

Command Name	Command	Parameters
Quit	Q	None

Purpose: This command indicates the end of a Value Procedure. The system transfers control to the main menu of the **Execute Value Procedure** module.

Parameters: None

Notes: You should always include this command in your procedure to indicate the end of your procedure. Only one **Quit** (Q) Command should be used in your Value Procedure. If you have more than one **Quit** (Q) Command the system will halt your procedure at the first occurrence of **Quit** (Q) Command.

Command Name	Command	Parameters
Return	R	None

Purpose: This command indicates the end of a subroutine. Control is transferred to the line following the **GoSub** (G) Command or **Conditional GoSub** (i) Command which originally transferred control to the subroutine.

Parameters: None

Notes: You should include this command in every subroutine used in your Value Procedure.

If this command is used without the **GoSub** (G) or **Conditional GoSub** (i) Command, the system will display the following message at execution time:

<div align="center">

``**Return without Gosub found''**

</div>

Find the **Return** (R) Command and delete it, if you do not have a subroutine.

Command Name	Command	Parameters
Round	r	@AAA POS

Purpose: This command rounds the destination location to the number of decimal positions specified in POS parameter.

Parameters: There are two parameters for this command:

Parameter 1 is the destination location to round and store the results. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 2 lets you specify the number of positions to round. It can have values in the range -10 to 10. Zero (0) is considered as rounding to a whole number.

Command Name	Command	Parameters
Set	s	T @AAA v..v

Purpose: This command sets the destination location to the UNIVERS defined data type. The system will assign the destination Parameter 2 the value specified in Parameter 3 and will set the data type to the type specified in Parameter 1 at execution time.

Parameters: All three parameters are required:

Parameter 1 is a data type code: **0** (System), **1** (String), **2** (Integer), **3** (Single-Precision), **4** (Double-Precision), **5** (Categorical), **6** (User-Date), **7** (Byte), or **8** (Auto-Date).

Parameter 2 is the destination location to be set for the specified type. It can be: **@AAA** or **_AAA**.

Parameter 3 is the value to set for the destination location in parameter 2. This parameter can be any value you want to assign to the destination parameter. If you assign incorrect type values, then the default values will be used for the type. Up to sixty characters can be entered for a String type.

Command Name	Command	Parameters
Transfer	T	LLL

Purpose: This command transfers the flow of your procedure to the Label **LLL**.

Parameters: There is one parameter for this command. It is any three character combination from your keyboard. You can use letters, numbers, and any printable symbols from your keyboard.

Notes: You must specify all three characters in your Label. The system at execution time will search for this Label to transfer the execution flow. If the system finds duplicate Labels, the following message displays:

``**Duplicate label LLL at line nnnn and llll''**

If the system does not find the Label to which the branching occurs then the system displays the following message:

``**Undefined Label''**

Use the debug from the **Execute Value Procedure** module to trace the undefined Label and modify your Value Procedure by inserting the **Label** (L) Command with the LLL that was missing.

Use the **Label** (L) Command to indicate the starting point for the transfer when the **Transfer** (T) Command is executed.

Command Name	Command	Parameters
Table	t	TAB @AAA @ROW @COL @ELE LLL

Purpose: This command searches the table specified in Parameter 1 and retrieves the value from the table for the specified row, column, and element. The system searches the Value Table and retrieves the element value, and stores it in the destination location. In case of error the execution will continue based on the value in Parameter 6.

Parameters: Five parameters are required. Parameter six is optional.

Parameter 1 is the Valgen Table you want to search to retrieve the value. This parameter is an integer in the range of 001-999.

Parameter 2 is a destination location in which to store the value from the table. It can be: **@AAA**, **_AAA**, **CIII**, or **CAAA**.

Parameter 3 is the row index to search in the table. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA**, or **aVALUE**.

Parameter 4 is the column index to search in the table. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA**, or **aVALUE**.

Parameter 5 is element number from the table to retrieve. It can be: **@AAA**, **_AAA**, **CIII**, **CAAA**, or **aVALUE**.

Parameter 6 can be any three character Label to which to transfer if the table search process could not find the row, column or element. If you omit this Label and the row, column, or element is not found, an error message will be stored in the error file. The execution will be continued from the next line of your procedure.

Notes: You must use the **Include** (() Command to include the Parameter 1 table before executing the **Table** (t) Command.

If you use **LLL** then you must have a **Label** (L) Command for the Label specified in the **Table** (t) Command.

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Command Name	Command	Parameters
Level Value	v	@AAA CIII

Purpose: This command retrieves the Level Value of a Categorical Factor from the Categorical Segment.

Parameters: Two parameters are required:

Parameter 1 is the destination location in which to store the Level Value. It can be: **@AAA** or **_AAA**.

Parameter 2 identifies the Card Type and Item Number of the Categorical Factor for which the Level Value is being retrieved.

Notes: After execution of this command the destination location is set to an Integer type.

Command Name	Command	Parameters
Zero	z	AAA BBB

Purpose: This command clears a range of MS Locations. All the numeric MS Locations will be set to **0** (zero) and all String type variables will be set to null string.

Parameters: There are two parameters for this command:

Parameter 1 is the starting MS Location in the range to clear. It's form is **AAA**, where **AAA** is in the range 001-999.

Parameter 2 is the ending MS Location in the range to clear. The parameter form is **BBB**, where **BBB** is in the range AAA-999

Print

The **Print** option prints the Value Procedure Table in memory.

Procedure
1. Load the desired table into memory.

2. Select **Print** from the Valpro Editor menu bar.

Create

The **Create** option creates a Value Procedure Table. Once you create the table, it is added to the listing. The table number and description are defined with this option, but the commands to be included in the procedure are not. To define the commands to be included in the procedure, use the editing functions of the **Display** option.

Procedure
1. Select **Create** from the Valpro Editor menu bar.

2. UNIVERS displays ``*Enter table number (000-999):*.'' Enter a new table number.

3. UNIVERS prompts ``*Enter table XXX description.*'' Enter a table description of up to 40 characters.

Rename

The **Rename** option changes the table number and description of the highlighted table.

Procedure
1. Highlight the table to be change.

2. Select **Rename** from the Valpro Editor menu bar.

3. UNIVERS displays ``*Enter new table number (000-999):*.'' Enter the new table number.

4. UNIVERS prompts ``*Enter new table XXX description.*'' Enter a new description for the table of up to 40 characters.

Kill

The **Kill** option deletes a Value Procedure Table. Once a Value Procedure Table has been deleted, it cannot be restored.

Procedure
1. Highlight the table you wish to delete.

2. Select **Kill** from the Valpro Editor menu bar.

3. UNIVERS displays ``*WARNING: Procedure table ### is about to be deleted. Do you want to continue?*'' Type one of the following:

   Y - to delete the table

   N - to continue without deleting the table

Save

The **Save** option saves the Value Procedure Table in memory to the highlighted table. This option can be used to save new tables or update modified tables. If you do not save the table in memory before using the **Load** or **Quit** options, any changes made to the table will be lost. You may save a modified table in one of two ways.

• You may overwrite the same table, replacing the old contents with the new contents.

• You may overwrite a different table, replacing its contents with the table in memory.

Overwriting the Same Table
1. Highlight the table.

2. Select **Save** from the menu bar. The table is saved.

Overwriting a Different Table
1. Highlight the table to which you would like to save the table in memory.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Table XXX will be overwritten by table YYY. Do you want to continue?*''

   Y - to overwrite the highlighted table with the table in memory

   N - to abort the save procedure

Quit

The **Quit** option returns you to the UNIVERS Valuation Menu.

Procedure
1. Select **Quit** from the Valpro Editor Screen menu bar.

2. If there is a table in memory which has been changed but not saved, UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to quit without saving the table in memory

   N - to return to the menu bar in order to save the table in memory

Comparable Sales

This module performs comparable sales analysis on parcel records from your data base, comparing subject properties selected by a Selfil Table to comparable properties in a Sales Set File. The Sales Set File is also created by this module using a Selfil Table to extract the records to be included in the file.

When you select **Comparable Sales** from the UNIVERS Valuation Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used by Comparable Sales (see **Executing A Selfil Table** in Section 4). Only the records which pass through the selected Selfil Table are used by this module.

If you are going to **Generate** a Sales Set File, execute the Selfil Table which will extract valid sales from the data base. If you are going to **Run** a comparable sales analysis, select the Selfil Table which will select the subject parcels to be compared to the parcels in Sales Set File.

After you have executed a Selfil Table, the Comparable Sales Screen (Figure 5-9) displays. The Comparable Sales Screen displays a listing of all the Comparable Sales Tables which have been created. Each table defines a different format which can be used to generate a comparable sales analysis.
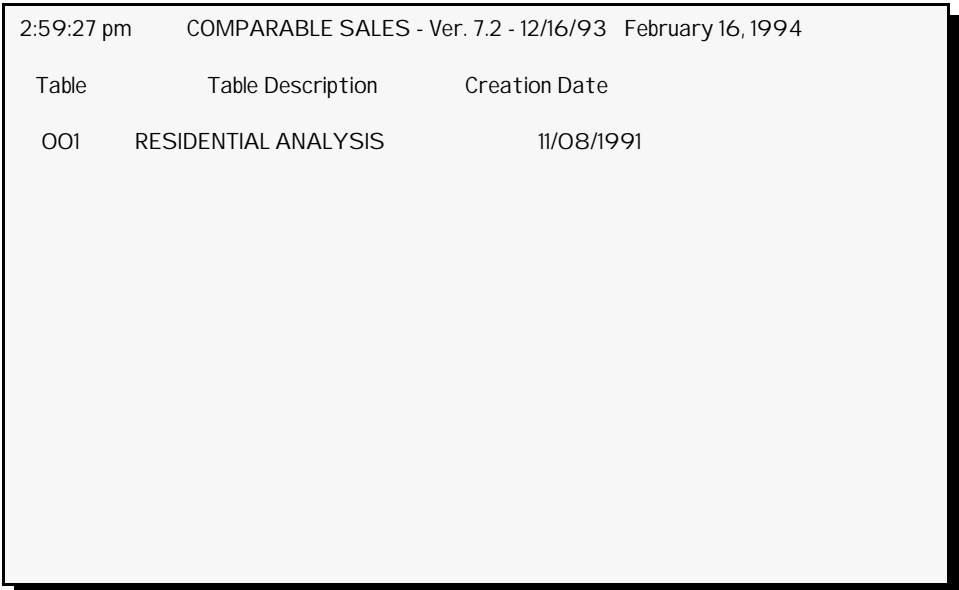
```
2:59:27 pm        COMPARABLE SALES - Ver. 7.2 - 12/16/93   February 16, 1994

  Table              Table Description        Creation Date

  OO1      RESIDENTIAL ANALYSIS                11/O8/1991
```

Figure 5-9. Comparable Sales Screen

At the bottom of the screen is a menu bar. Above the menu bar is a box which displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are 3 steps involved in creating a comparable sales analysis format. First, you must use the **Create** option of the Comparable Sales menu bar to add a Comparable Sales Table to the table listing. This step creates a blank Comparable Sales Table. Second, you must use the **Edit** option to define the format for the comparable sales analysis. Third, you must use the **Parms** option to set the parameters for the table.

After a table is completed, there are two steps involved in doing a comparable sales analysis. First you must create a Sales Set File using the **Generate** option. The **Generate** option uses a Selfil Table to extract records from the data base which are included in the Sales Set File. The Selfil Table used should extract only records with valid sales. After the Sales Set File is generated, you must use the **Run** option to perform the actual comparable sales analysis. The **Run** option uses a Selfil Table to extract subject properties from the data base which are compared to the properties in the Sales Set File. The Selfil Table used with the **Run** option should be a *different* table than the one used with the **Generate** option, unless you want to run a comparable sales analysis on the sales in your generated sales file.

Create

The **Create** option creates a Comparable Sales Table. Once you have created a table, it is added to the table listing. Use the **Create** option to define the table number and the description, but not to define the factors to be included in the format. The format is defined using the **Edit** and **Parms** options.

Procedure
1.   Select **Create** from the menu bar.

2.   UNIVERS displays ``*Enter Format Number (001-999):*.'' Enter a three-digit number.

3.   UNIVERS displays ``*Enter Format Description:*.'' Enter a table description of up to 40 characters.

Edit

The **Edit** option defines the factors which will be stored for each record in the Sales Set File when the **Generate** option is used. It also defines the factors which will be used to calculate distance between the subject properties and the properties in the Sales Set File when the comparable sales analysis is **Run**. You can also define adjustments to be made to the comparable properties' Sale Prices. These adjustments can be in addition to the MRA Value adjustment or instead of it, if MRA is not being used. To use this option, highlight the Comparable Sales Table you wish to edit and select **Edit** from the menu bar. The Comparable Sales Format Screen (Figure 5-10) displays.

```
10:34:07 am     ANYTOWN, U.S.A._____     January 25, 1992

Card-Item Scrn Factor      Format       SelWgt / Type  Adj / Type

 1 01-005    ROUTING                    _____.___  _____.___
 2 01-004    PROP ADDRESS         30 _____.___  _____.___
 3 01-008    NEIGHBORHOOD          100.000 2 _____.___
 4 01-112   NBHD GRP    # ##      250.000 2 _____.___
 5 01-048    TOTAL ACRES  #,###.###      _____.___  _____.___
 6 01-013    CURNT STATE CL             _____.___  _____.___
 7 01-014   LIVING UNITS ###      250.000 1 _____.___
 8 03-021    ATTIC       #         _____.___  _____.___
 9 03-003    STORY HEIGHT  #.#     150.000 1 _____.___
10 03-004    EXTERIOR WALL  #           _____.___  _____.___
11 03-005    STYLE      ##        150.000 6 _____.___
12 03-006    YEAR BUILT  ####       2.000 1 _____.___
13 03-017    BASEMENT    #         _____.___  _____.___
14 03-009    BEDROOMS    ##        _____.___  _____.___
```

Figure 5-10. Comparable Sales Format Screen

Comparable Sales Format Screen
When you select **Edit** from the Comparable Sales Screen menu bar, the Comparable Sales Format Screen displays. This screen displays the factors to be used in the comparable sales analysis process, both for the creation of the Sales Set File and the selection of comparable sales. All of these factors are included on the printed Comparable Sales Analysis Reports. Some of them can be included on the screen reports. If you are editing a new Comparable Sales Table, the screen will be blank. At the top of the screen is a line to enter a descriptive title which will print on the Comparable Sales Analysis Report. At the bottom of the screen there are three boxes. The large box at the bottom displays entry instructions or a menu bar, depending on the process you are performing. The small box to left above it displays the Comparable Sales Table being edited. The small box to the right displays the number of factors which have been defined and the number of factors which have been selected as screen report items.

Factor Definitions. The middle part of the screen displays the factor definitions. You can enter up to 48 lines. These lines can either be factor definitions or remarks. Entering remarks reduces the number of factors which can be included in the process. Factor definitions consist of the following:

• **Card-Item** defines the Card Type and Item Number of the factor being included in the analysis process. When entering them, you must enter both the Card Type and the Item Number separated by a dash (**-**).

• **Screen** defines whether or not the factor should be displayed on screen reports when the **Run** option is used. (Blank = No, **S** = Yes).

• **Factor** displays the Factor Name as defined in the Factor Tables. This is not a maintainable item.

• **Format** displays the format of the factor as defined in the Factor Tables.   This is not a maintainable item.

- **SelWgt/ Type** defines the weight to be given to the factor when calculating distance between subject properties and properties in the Sales Set File. Only enter values in this field for factors you wish to use in the distance calculation. If you enter a Selection Weight, you must enter a calculation type (see **Selection Calculations** below).

- **Adj/ Type** defines the value adjustment to be made to a comparable property's Sale Price based on the factor. This adjustment can be in addition to the MRA Value adjustment to take into consideration data not accounted for in the model. You can also make adjustments to the Sale Price using these fields, if MRA is not being used. Enter the appropriate adjustment value and type for each factor which should be used to adjust the comparable property's Sale Price (see **Sale Price Adjustment Calculations** below).

Selection Calculations. When the comparable sales analysis is executed using the **Run** option, properties in the Sales Set File are compared to the subject properties and a distance is calculated based on the values entered for each factor in the **SelWgt/ Type** fields. There are four calculation types which may be used to apply a selection weight to the distance calculation for a comparable parcel. The calculation types and their applicability to various data types are as follows:

1 **Continuous** - The amount specified as the selection weight is multiplied by the absolute value of the difference between the subject and comparable properties values for the factor. This type is only applicable to numeric data types. For Categorical Factors the Level Value is used.

2 **Yes/No** - If the values for this factor for the subject and comparable properties do not match exactly, the distance equals the amount specified raised to the lambda power. For Categoricals the Level Value is used. For String data, leading and trailing spaces are ignored and comparisons are not case sensitive.

3 **Level Value** - This type is valid only for Categorical Factors. The amount specified is multiplied by the absolute value of the difference between the subject and comparable properties Categorical Level Values.

6 **Yes/No (Level Value)** - This type is valid only for Categorical Factors. It is similar to type 2 except that the subject and comparable properties' Level Values are used.

Sale Price Adjustment Calculations. When the comparable sales analysis is executed using the **Run** option, you can optionally make adjustments to the comparable properties' Sale Prices based on the difference between certain factors for the subject and comparable properties. There are four calculation types which may be used to apply adjustments to a comparable parcel's Sales Price. The calculation types and their applicability to various data types are as follows (String data *cannot* be used to make Sale Price adjustments):

1 **Continuous** - The adjustment equals the amount specified multiplied by the difference between the subject and comparable values (subject value - comparable value) for the factor. For Categoricals the Level Value is used.

3   **Level Value** - This type is valid only for Categorical Factors. The adjustment equals the amount specified multiplied by the difference between the subject and comparable Categorical Level Values (Subject Level Value - Comparable Level Value).

4   **% Sale Price (Level Value)** - This type is similar to type 3 except that the amount specified is interpreted as a percentage which is multiplied by the comparable's Sale Price. This value is then multiplied by the difference between the subject and comparable Categorical Level Values to determine the adjustment.

5   **% Sale Price (Continuous)** - This type is similar to type 1 except that the amount specified is interpreted as a percentage which is multiplied by the comparable's Sale Price. This value is then multiplied by the difference between the subject and comparable values to determine the adjustment. For Categoricals, the Level Value is used.

Editing the Comparable Sales Factors

When you first display the Comparable Sales Format Screen, you are in edit mode. Use [ ] and [ ] to scroll from line to line in the listing. Use [ENTER] to enter values in fields and move the cursor to the next enterable field. Use [ ] and [ ] to move the cursor from character to character within a field. Use [PAGE UP] and [PAGE DOWN] to scroll one page at a time through the listing. Use [ESCAPE] to display the Comparable Sales Format Screen menu bar. There are seven options on this menu bar.

Edit. This option returns you to edit mode.

Insert. This option inserts a line at the cursor position. To use this option, perform the following:

1.   While in edit mode, move the cursor to the line you wish to insert.

2.   Press [ESCAPE] to display the menu bar.

3.   Select **Insert** from the menu bar.

4.   A blank line is inserted and you are in edit mode.

Delete. This option deletes a line from the listing. To use this option, perform the following:

1.   While in edit mode, move the cursor to the line you wish to delete.

2.   Press [ESCAPE] to display the menu bar.

3.   Select **Delete** from the menu bar.

4.   The line is deleted and you are in edit mode.

Remark. This option inserts a remark at the cursor position. To use this option, perform the following:

1. While in edit mode, move the cursor to the line where you wish to enter the remark.

2. Press [ESCAPE] to display the menu bar.

3. Select **Remark** from the menu bar.

4. Enter the remark. You are placed in edit mode.

Clear. This option clears the entire format.

Save. This option saves the changes made to the format. To use this option perform the following:

1. While in edit mode, press [ESCAPE] to display the menu bar.

2. Select **Save** from the menu bar.

3. If changes were made to the format, UNIVERS displays ``*Saving will Overwrite the Previous Version...Continue? (Y/N).*'' Type one of the following:

    Y - to save the changes

    N - to abort the save procedure

Quit. This option exits the Comparable Sales Format Screen and returns you to the Comparable Sales Screen. To use this option, perform the following:

1. While in edit mode, press [ESCAPE] to display the menu bar.

2. Select **Quit** from the menu bar.

3. If changes were made but were not saved, UNIVERS displays ``*Quitting without saving will lose current edits...Continue? (Y/N).*'' Type one of the following:

    Y - to continue without saving the changes

    N - to return to the Comparable Sales Format Screen in order to save the changes

Parms

The **Parms** option sets parameters which are used when the Sales Set File is created with the **Generate** option and the comparable sales analysis is executed with the **Run** option. To use this option, highlight the Comparable Sales Table for which you wish to define the parameters and select **Parms** from the menu bar. The Comparable Sales Analysis Parameters Screen (Figure 5-11) displays.

```
10:35:08 am        COMPARABLE SALES - Ver. 7.2 - 12/16/93   February 16, 1994

                   Comparable Sales Analysis Parameters

 1 Parcel ID(12).......Card 1 Item   2   5 Market Estimate.....Card 1 Item 109
 2 Sale Price..........Card 1 Item 27   6 Weighted Estimate...Card 1 Item 111
 3 MRA Value...........Card 1 Item 110  7 LVD Frame Number....Card-- Item ---
 4 Neighborhood Group..Card 1 Item 112

 8 Maximum Number of Comparables to Display.. 5
 9 Reject Subject as a Comparable............No
10 Maximum Distance Points to Display........500
11 Output Device...........................Printer (report format 1)
12 Print Weights and Adjustments.............No
13 Print Parcel Adjustment...................Yes
14 List Undisplayed Comparables..............No
15 Minkowski Exponent, Lambda................ 2 (Euclidean)
16 Comparison Ratio Factor...................MKT Estimate
```

Figure 5-11. Comparable Sales Analysis Parameters Screen

Comparable Sales Analysis Parameters Screen

This screen displays the parameters which effect the execution of the **Generate** and **Run** parameters. There are sixteen parameters which can be defined on this screen. The first four are required for both generating the Sales Set File and executing the comparable sales analysis. These factors are stored for each record in the generated Sales Set File. Parameters 5 and 6 are optional and are only used by the comparable sales analysis process. They are not stored for each record in the generated Sales Set File. Parameter 7 is optional. If it is entered, it is stored for each record in the generated Sales Set File. Parameters 8-16 only effect the comparable sales analysis.

Parcel ID. This parameter defines the Card Type and Item Number of the factor to be used as the Parcel ID. The Parcel ID is always included on the printed and screen reports, so it does not need to be included on the Comparable Sales Format Screen. This parameter also defines the break point of the Parcel ID for screen reports. Because of screen size limitations, up to only twelve (12) characters of a Parcel ID can be displayed on one line. If your Parcel ID format is longer than twelve characters, it can be split at a ``logical'' point within the first twelve characters in order to display on two separate lines on screen reports. The break point identifies how many characters should be displayed on the first line.

Sale Price. This parameter defines the Card Type and Item Number of the factor which stores the Sale Price. The Sale Price is always included on the printed and screen reports, so it does not need to be included on the Comparable Sales Format Screen.

MRA Value. This parameter defines the Card Type and Item Number of the factor which stores the MRA Estimate. The MRA Estimate is always included on the printed

and screen reports, so it does not need to be included on the Comparable Sales Format Screen. It must be on the Base Card.

Neighborhood Group. This parameter defines the Card Type and Item Number of the factor which stores the Neighborhood Group. The Neighborhood Group *is not* automatically included on the printed and screen reports, so it must be entered on the Comparable Sales Format Screen if it should be included on the reports.

Market Estimate. This parameter defines the Card Type and Item Number which stores the Market Estimate. It must be entered if you want the calculated Market Estimate to be written back to the data base for the subject properties. It must be on the Base Card.

Weighted Estimate. This parameter defines the Card Type and Item Number which stores the Weighted Estimate. It must be entered if you want the calculated Weighted Estimate to be written back to the data base for the subject properties. It must be on the Base Card.

LVD Frame Number. This parameter defines the Card Type and Item Number which stores the LVD Frame Number. If entered, this factor will be included on the screen reports. This parameter is included so that you can use your Laser Video Disk Interface to automatically display the comparable properties on your Laser Video Disk display screen when the screen report is displayed.

Maximum Number of Comparables to Display. This parameter defines how many comparable properties should be printed/displayed on the printed and screen reports produced by the comparable sales analysis process. The maximum for printed reports is **5**. The maximum for screen reports is **4**. For screen reports, if you enter a value less than **4**, the Parcel ID and (optional) LVD Frame Number for the all four comparable properties will still display.

Output Device. This parameter defines whether the report produced by the comparable sales analysis process should be printed or displayed on the screen (**P** = Printer, **S** = Screen). It also defines which report format to use. There are two formats for printed reports and three formats for screen reports (see **Comparable Sales Analysis Reports** below).

Print Weights and Adjustments. This parameter defines whether the Selection Weight and Adjustment Rate columns should be printed on Printed Report Type 1. These values cannot be printed on Printed Report Type 2 or displayed on any of the screen reports.

Print Parcel Adjustments. This parameter defines whether the Sale Price adjustments calculated for each factor should be printed for each comparable property on Printed Report Type 1. These values cannot be printed on Printed Report Type 2 or displayed on any of the screen reports.

List Undisplayed Comparables. This parameter defines whether or not to print/display the Parcel ID and distance of the comparable properties not included on the report. You can choose whether or not to list them on the printed reports. However, on the screen reports this parameter is set based on the report type. It is set to **No** for types 1 and 3. It is set to **Yes** for type 2.

Minkowski Exponent, Lambda. This parameter defines the lambda component to use when calculating distances. This parameter can be any value between **0.2** and **5.0**. However, the list of options only displays **1 - City Block** and **2 - Euclidean**, since they are the most widely recognized. City Block raises values to the first power. Euclidean raises values to the second power (see **Calculation of Distance** below).

Comparison Ratio Factor. This parameter defines the value from the subject property to use when calculating the Adjusted Sale Price ratios for the comparable properties. Ratios can either be calculated as subject MRA Estimate to comparable Adjusted Sale Price; or subject Market Estimate to comparable Adjusted Sale Price (see **Other Calculations Below**).

Editing the Comparable Sales Analysis Parameters

At the bottom of the Comparable Sales Analysis Parameters Screen is a menu bar. This menu bar has four options.

Change. This option allows you to change a parameter. To use this option perform the following:

1. Select **Change** from the menu bar.

2. UNIVERS displays ``*Enter the Parameter Number to Change (1-16)*.'' Enter the number of the parameter you wish to change.

3. Enter the new value for the parameter.

Save. This option saves the changes made to the parameters. To use this option, perform the following:

1. Select **Save** from the menu bar.

2. If changes were made, UNIVERS displays ``*Saving will Replace Default Values with Current Values...Continue? (Y/N)*.'' Type one of the following:

    Y - to continue the save procedure

    N - to abort the save procedure

Restore. This option clears all of the parameters and resets them to the initial values. Using this option will delete Parameters 1-7. To use this option, perform the following:

1. Select **Restore** from the menu bar.

2. UNIVERS displays ``*Restoring Previous Values with These Initial Values...Continue? (Y/N).*'' Type one of the following:

   Y - to clear the parameters

   N - to abort the clear procedure and leave the parameters intact

Quit. This option exits the Comparable Sales Analysis Parameters Screen and returns you to the Comparable Sales Screen. To use this option, perform the following steps:

1. Select **Quit** from the menu bar.

2. If changes were made but were not saved, UNIVERS displays ``*Quitting without saving will lose current edits...Continue? (Y/N).*'' Type one of the following:

   Y - to continue without saving the changes

   N - to return to the Comparable Sales Analysis Parameters Screen in order to save the changes

---

Run

The **Run** option executes the comparable sales analysis procedure and generates a printed report or screen report based on the parameters set on the Comparable Sales Analysis Parameters Screen. The comparable sales analysis procedure compares the subject properties extracted by the selected Selfil Table against the properties in the Sales Set File created when the **Generate** option was used with the same Comparable Sales Table. There must be a previously created Sales Set File for the selected table in order to use this option. If changes were made on the Comparable Sales Format Screen since the Sales Set File was generated, you may need to regenerate it.

Running Comparable Sales for Printed Reports

1. Highlight the desired table.

2. Select **Run** from the menu bar.

3. *This step only applies if changes were made to the format since the Sales Set File was created.* UNIVERS displays ``*Comparable Sales Format has Changed, Sales Set File must be Generated Again. To override press [^], Press any other key to abort.*'' Perform one of the following:

   • Press the caret key (**^**) to execute the procedure. If you choose to execute the procedure, you will not get the above message on subsequent runs of the same analysis. Continue with step 4.

   • Press any other key to abort the procedure.

4. UNIVERS displays ``*Press   to continue or [ESC] to return to menu.*'' Perform one of the following:

   • Press [ENTER] to continue the procedure.

   • Press [ESCAPE] to abort the procedure.

Running Comparable Sales for Screen Reports

1. Highlight the desired table.

2. Select **Run** from the menu bar.

3. *This step only applies if changes were made to the format since the Sales Set File was created.* UNIVERS displays ``*Comparable Sales Format has Changed, Sales Set File must be Generated Again. To override press [^], Press any other key to abort*.'' Perform one of the following:

    *   Press the caret key (**^**) to execute the procedure. If you choose to execute the procedure, you will not get the above message on subsequent runs of the same analysis. Continue with step 4.

    *   Press any other key to abort the procedure.

4. UNIVERS displays ``*Press [C] for Continuous mode, [P] for Pause mode, or [ESC] to return to menu*.'' Perform one of the following:

    *   Press **C** to run the procedure in Continuous mode. Continuous mode does not pause between each subject parcel as it executes the comparable sales analysis. A new screen report displays as each analysis is completed.

    *   Press **P** to run the procedure in Pause mode. Pause mode pauses execution after each completed subject parcel analysis. You can continue in Pause mode, continue in Continuous mode, or abort the procedure. The Pause mode enables you to check the first several parcels for accuracy before continuing. It also enables you to use the Laser Video Disk Interface.

    *   Press [ESCAPE] to abort the procedure.

Comparable Sales Analysis Processing

To select comparable properties, UNIVERS compares the subject properties selected by the Selfil Table against the properties in the Sales Set File and calculates the distance between them. It first searches those parcels in the Sales Set File which are in the same Neighborhood Group as the subject property. It finds the ten parcels with the least distance from the subject parcel.

If the distance for all ten parcels is less than the Maximum Distance entered on the Comparable Sales Analysis Parameters Screen, it ends the search. If not all ten fall within the Maximum Distance, UNIVERS searches the remainder of the Sales Set File. When it reaches the end of the file, the ten closest properties are selected.

Even though ten parcels are selected, UNIVERS will only use up to five parcels for the calculations in the comparable sales analysis. It will only use parcels which fall within the Maximum Distance for the calculations, so fewer than five may be used for the calculations if there are fewer than five which fall within the Maximum Distance.

Calculation of Distance. The distance is calculated based on the weights of each term as defined in the parameter set. The following formula is used:

$$\sqrt[\lambda]{\sum_i [W_i(X_i - X_{si})]^\lambda + \sum_j [W_j \bar{\delta}(X_j, X_{sj})]^\lambda}$$

Where:

λ	=	Minkowski Exponent Lambda
W_i	=	Weight associated with ith continuous characteristic
X_i	=	Value of ith characteristic in sale property
X_{si}	=	Value of ith characteristic in subject property
$\sum_i$	=	Summation of terms of i characteristics
W_j	=	Weight associated with jth continuous characteristic
X_j	=	Value of jth characteristic in sale property
X_{sj}	=	Value of jth characteristic in subject property
$\sum_j$	=	Summation of terms of j characteristics
$\delta(a,b)$	=	Inverse delta function (**0**, if a = b; **1**, if a ≠ b)

Sale Price Adjustment. For each comparable property UNIVERS calculates the Adjusted Sale Price. To adjust the Sale Price, UNIVERS uses the following formula:

Adjusted Sale Price = SalePrice + (Comp MRA − Subject MRA) + Other Adjustments

The Other Adjustments are calculated using the adjustments entered on the Comparable Sales Format Screen. If the Adjusted Sale Price is less than **0**, it is set to **0**. If a parcel's Adjusted Sale Price is **0**, it is not used in any of the other calculations.

Weighted Estimate Calculation. For the subject property UNIVERS calculates a Weighted Estimate. This value can be stored in the factor defined as the Weighted Estimate on the Comparable Sales Analysis Screen. If this parameter is omitted, the value will not be written to the data base. Also, the **Read/Write** parameter of the selected Selfil Table must be set to Write. UNIVERS uses the following formula to calculate the Weighted Estimate:

$$\textit{Weighted Estimate} = \frac{W_1}{T}A_1 + \frac{W_2}{T}A_2 + \ldots + \frac{W_n}{T}A_n$$

Where: W = Weight of Comp
              A = Adjusted Sale Price of Comp
              T = Total Weight ($W_1 + W_2 + \ldots W_n$)

Weight of Comp $\dfrac{1}{\left(\dfrac{M}{2}\right)^2 \quad D^2 \quad \left(2M \; x \; \dfrac{|A \; S|}{S}\right)^2}$

Where: M = Maximum Distance
         D = Distance of Comp
         A = Adjusted Sale Price of Comp
         S = Sale Price of Comp

Market Estimate Calculation. The Market Estimate of the subject property is determined by finding a ``midpoint'' of the following values: the subject MRA Estimate (if not **0**), the subject Weighted Estimate, and the Adjusted Sale Price from each valid comparable parcel. There can be from 1 to 7 values used in this calculation.

•   If there is only one value, it is used as the Market Estimate.

•   If there are two values, they are averaged to determine the Market Estimate.

•   If there are three values, the middle value is the Market Estimate.

•   If there are four values, the highest and lowest are ``discarded'' and the middle two are averaged to determine the Market Estimate.

•   If there are five values, the middle value is the Market Estimate.

•   If there are six values, the two highest and lowest are ``discarded'' and the middle two are averaged to determine the Market Estimate.

•   If there are seven, the two highest and lowest are ``discarded'' and the middle three are averaged to determine the Market Estimate.

Other Calculations. UNIVERS also performs the following statistical calculations:

•   For each comparable, a subject MRA Estimate to comparable Adjusted Sale Price or a subject Market Estimate to comparable Adjusted Sale Price (depending on the parameters on the Comparable Sales Analysis Parameters Screen).

•   Average of the above ratio

•   Standard deviation from the mean of the above ratio

•   Standard deviation about 1 of the above ratio

•   Average Adjusted Sale Price

•   Standard deviation about the mean for the Adjusted Sale Price

•   Coefficient of Variation for the Adjusted Sale Price

- Field Control Code indicating the ``accuracy'' of the analysis, based on the Coefficient of Variance:

  - Field Control Code is **1** if the Coefficient of Variation is less than 5.
  - Field Control Code is **2** if the Coefficient of Variation is equal to or greater than 5 but less than 10.
  - Field Control Code is **3** if the Coefficient of Variation is equal to or greater than 10 but less than 20.
  - Field Control Code is **4** if the Coefficient of Variation is equal to or greater than 20.

Comparable Sales Analysis Reports

For each subject property, UNIVERS produces a Comparable Sales Analysis Report. The type of report produced depends on the parameters set on the Comparable Sales Analysis Parameters Screen. There are two kinds of printed reports and three kinds of screen reports. On the reports, the Sale Prices, MRA Estimates, Weighted Estimates, and Market Estimates are rounded to the nearest 100 dollars and the Adjusted Sale Prices are rounded to the nearest 10 dollars, so they will not reflect the exact dollar amounts used for the calculations or the exact dollar amounts which were retrieved from and saved to the data base.

Printed Report Type 1. This report prints in landscape orientation. (See the sample report on page 5 - 68.) All of the factors defined on the Comparable Sales Format Screen will print for up to five comparable properties. All of the calculations performed by the analysis are printed on this report. You can optionally print the Selection Weight and Adjustment Rate for each factor. You can optionally print the actual value adjustment made to the Sale Price of each comparable property for each factor. You can also optionally print a listing of the comparable properties selected which were not used in the calculations. These optional parameters are defined on the Comparable Sales Analysis Parameters Screen.

Printed Report Type 2. This report prints in portrait orientation. (See the sample report on page 5 - 69.) For laser printers it prints on narrow paper. For character printers it prints on wide paper. Your printer setup must be set to narrow for laser printers and to wide for character printers. All of the factors defined on the Comparable Sales Format Screen will print for up to five comparable properties. All of the calculations performed by the analysis are printed on this report. However, unlike Printed Report Type 1, you cannot print the Selection Weight and Adjustment Rate for each factor, nor can you print the actual value adjustment made to the Sale Price of each comparable property for each factor. You can optionally print a listing of the comparable properties selected which were not used in the calculations. These optional parameters are defined on the Comparable Sales Analysis Parameters Screen.

Screen Report Type 1. This report displays up to four comparable properties for a subject property. The six fields defined by the first six parameters on the Comparable Sales Analysis Parameters Screen display for each parcel. If the LVD Frame Number was defined, it also will display. It also displays the first 9 or 10 factors (depending on whether the LVD Frame Number is included) from the Comparable Sales Format Screen which are defined as screen report factors. At the bottom of the screen, an abbreviated listing for the fifth comparable property displays. None of the **Other Calculations** defined above display.

C L T U N I V E R S S Y S T E M (c) 1986-1993 Ver 7.1
ANYTOWN USA COMPARABLE SALES ANALYSIS REPORT

91 sales in the neighborhood group were searched

Factor	Subject Parcel Value	Comp. 1 Value	Comp. 2 Value	Comp. 3 Value	Comp. 4 Value	Comp. 5 Value
Parcel ID	0204 19 8	0204 12 4	0204 8 7	0204 15 3	0204 13 10	0204 8 2
PROP ADDRESS	544 S. OCEAN AVE.	23 W. LAKE DR.	40 FIRST ST.	33 PROSPECT AVE.	19 AMITY ST.	29 THIRD ST.
CURRENT CLASS	210	210	210	210	210	210
NEIGHBORHOOD	8.1			8.1		
NBHD GRP #	2	2	2	2	2	
TOTAL ACRES	0.187	0.138	0.236	0.201	0.356	0.196
LIVING UNITS	1	1	1	1	1	
STORY HEIGHT	1.0	1.0	1.0	1.0	1.5	
BASEMENT	2-CRAWL	4-FULL	4-FULL	4-FULL	3-PART	4-FULL
EXTERIOR WALL	8-ASBESTOS	8-ASBESTOS	1-FRAME	1-FRAME	1-FRAME	1-FRAME
STYLE	4-CAPE	4-CAPE	4-CAPE	4-CAPE	5-OLD STYLE	4-CAPE
YEAR BUILT	942	961	940	950	966	926
TOTAL ROOMS	6	5	6	6	6	
HEATING	2-BASIC	2-BASIC	2-BASIC	2-BASIC	2-BASIC	2-BASIC
HEAT FUEL TYPE	4-OIL	4-OIL	4-OIL	4-OIL	2-GAS	4-OIL
GROUND FLR AREA	1340	1100	884	992	576	926
TOT LIVING AREA	1876	1540	1509	1459	1912	1621
FBLA SIZE 2	0	0	0	0	0	
REC ROOM SIZE 2	0	0	0	0	350	
OPEN FR PRCH L	0	0	0	192	186	
OPEN FR PRCH U	0	0	0	0	0	
ENCL FR PRCH L	54	0	0	0	0	
ENCL FR PRCH U	0	0	0	0	0	
WOOD DECK L	396	0	52	0	0	
WOOD DECK U	0	0	0	0	0	
FULL BATHS	1	1	1	1	2	
HALF BATHS	0	0	0	0	0	
TOTAL FIXTURE	5	5	5	7	8	
NO. KITCHENS	1	1	1	1	1	
WB FP OPENING	1	0	0	0	1	
ATTIC	4-FULL FINISH	4-FULL FINISH	4-FULL FINISH	4-FULL FINISH	4-FULL FINISH	1-NONE
BASEMENT GARAGE	0	0	0	0	0	
ATTCH FR GAR	0	242			0	
RES GRADE	C	C	C	C	C+	C
GRADE FACTOR	1.00	1.00	1.00	1.00	1.08	1.00
CDU FACTOR	4	4	5	5	4	
CDU	AV	AV	FR	FR	AV	AV
RCN RESIDENCE	124,220	111,950	107,510	109,510	138,690	124,050
PERCENT GOOD %	60	70	55	64	55	72
RCNLD RESIDENCE	74,500	78,400	59,100	70,100	76,300	89,300
TOTAL OBY VALUES	10500	0	0	5400	2400	5200
LAND VALUE COST	$36,100	$35,200	$40,100	$38,500	$38,000	$38,300
TOT. VALUE COST	$121,100	$113,600	$99,200	$114,000	$116,700	$132,800
VALUE FLAG	3-MARKET	0-COST APPROCH	0-COST APPROCH	0-COST APPROCH	0-COST APPROCH	0-COST APPROCH
NOTE		CDU LOWERED NEXTO KNIGHTS	CDU LOWERED NEXTO KNIGHTS	CDU LOWERED NEXTO KNIGHTS	CDU LOWERED COMMERCIAL ARE	
SALE DATE	0	9107	9111	9003	9201	9204
SALE PRICE	$0	$117,000	$105,000	$126,000	$120,000	$121,000

	Subject	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
Total Adjustments:		0	0	0	0	0
Distance:		220	224	226	230	230
Sale Price:		117,000	105,000	126,000	120,000	121,000
Adjusted Sale Price:		117,000	105,000	126,000	7,520	121,000
Ratio with MKT Estimate:		0.00000	0.00000	0.00000	0.09995	0.00000
MRA Estimate:	0	121,800	106,500	127,100	112,500	133,700
Weighted Estimate:	1,500					
Market Estimate:	800					
F.C.C.:	1					

Average Adjusted Sale Price: 7,520   Std. Deviation: 0.00000   C.O.V.: 0.00
Average MKT ratio to A.S.P.: 0.09995   Std. Deviation: 0.00000   Std. Deviation about 1: 0.90005

002 - COMPARABLE SALES

October 7, 1993   11:10:30 am

C L T   U N I V E R S   S Y S T E M (c) 1986-1993   Ver 7.1
ANYTOWN USA COMPARABLE SALES ANALYSIS REPORT

91 sales in the neighborhood group were searched

Factor	Subject Parcel	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
Parcel ID:	0204 19 8 0204	12 4 0204	8 5 0204	15 10204	13 10 0204	8 2
PROP ADDRESS	544 S. OCEAN AV 23	W. LAKE DR. 40	FIRST ST. 33	PROSPECT AV19	AMITY ST. 29	THIRD ST.
CURRENT CLASS	210	210	210	210	210	210
NEIGHBORHOOD	8.1	.	8.1	8.1		
NBHD GRP #	2	2	2	2	2	2
TOTAL ACRES	0.187	0.138	0.236	0.201	0.356	0.196
LIVING UNITS	1	1	1	1		
STORY HEIGHT	1.0	1.0	1.0	2.0	1.5	
BASEMENT	2-CRAWL	4-FULL	4-FULL	4-FULL	3-PART	
EXTERIOR WALL	8-ASBESTOS	8-ASBESTOS	8-ASBESTOS	1-FRAME	1-FRAME	1-FRAME
STYLE	4-CAPE	4-CAPE	4-CAPE	4-CAPE	5-OLD STYLE	4-CAPE
YEAR BUILT	942	961	940	950	925	966
TOTAL ROOMS	6	5	6	6	6	
HEATING	2-BASIC	2-BASIC	2-BASIC	2-BASIC	2-BASIC	2-BASIC
HEAT FUEL TYPE	4-OIL	4-OIL	4-OIL	4-OIL	2-GAS	4-OIL
GROUND FLR AREA	1340	1100	884	992	576	926
TOT LIVING AREA	1876	1540	1509	1459	1912	1621
FBLA SIZE 2	0	0	0	0	0	
REC ROOM SIZE 2	0	0	0	0	350	
OPEN FR PRCH L	0	0	192	186	0	
OPEN FR PRCH U	0	0	0	0	0	
ENCL FR PRCH L	54	0	0	0	0	
ENCL FR PRCH U	0	0	0	0	0	
WOOD DECK L	396	0	52	0	0	
WOOD DECK U	0	0	0	0	0	
FULL BATHS	1	1	2	2		
HALF BATHS	0	0	0	0	0	
TOTAL FIXTURE	5	5	8	7	8	
NO. KITCHENS	1	1	1	1	1	
WB FP OPENING	1	0	0	0	1	
ATTIC	4-FULL FINISH	4-FULL FINISH	4-FULL FINISH	4-FULL FINISH	4-FULL FINISH	1-NONE
BASEMENT GARAGE	0	0	0	0	0	
ATTCH FR GAR	0	242	0	0	0	
RES GRADE	C	C	C	C	C+	
GRADE FACTOR	1.00	1.00	1.00	1.00	1.00	
CDU FACTOR	1.00	1.00	1.00	1.00	1.08	
CDU	4 AV	5 FR	4 AV	5 FR	4 AV	
RCN RESIDENCE	124,220	111,950	107,510	109,510	138,690	124,050
PERCENT GOOD %	60	70	55	55	72	
RCNLD RESIDENCE	74,500	78,400	59,100	70,100	76,300	89,300
TOTAL OBY VALUES	10500	0	0	5400	2400	5200

Screen Report Type 2. This report displays up to four comparable properties for a subject property. The six fields defined by the first six parameters on the Comparable Sales Analysis Parameters Screen display for each parcel. If the LVD Frame Number was defined, it also will display. It also displays the first 4 or 5 factors (depending on whether the LVD Frame Number is included) from the Comparable Sales Format Screen which are defined as screen report factors. At the bottom of the screen, an abbreviated listing for the fifth through tenth comparable properties displays. None of the **Other Calculations** defined above display.

Screen Report Type 3. This report displays up to four comparable properties for a subject property. The six fields defined by the first six parameters on the Comparable Sales Analysis Parameters Screen display for each parcel. If the LVD Frame Number was defined, it also will display. It also displays the first 6 or 7 factors (depending on whether the LVD Frame Number is included) from the Comparable Sales Format Screen which are defined as screen report factors. At the bottom of the screen, an abbreviated listing for the fifth comparable property displays. In addition it does display the **Other Calculations** defined above.

Generate

The **Generate** option generates a Sales Set File using the records extracted by the selected Selfil Table. Only records with valid sales should be included. All of the factors defined by the first seven parameters on the Comparable Sales Analysis Parameters Screen are extracted for each record. All of the factors defined on the Comparable Sales Format Screen are also extracted for each record. The extract file is given the name U241N###.DAT, where ### is the number of the Comparable Sales Table used to create the file.

Procedure
1. Highlight the desired table.

2. Select **Generate** from the menu bar.

3. If there is already an extract file for the selected table, UNIVERS displays ``*There is existing sales set data...Overwrite it? (Y/N)*.'' Type one of the following:

   Y - to continue the procedure and overwrite the existing file

   N - to abort the procedure

4. A screen which shows the status of the procedure displays. You can abort the procedure by pressing [ESCAPE].

Print

The **Print** option prints a listing of the format for the highlighted Comparable Sales Table.

Procedure
1. Highlight the desired table.

2. Select **Print** from the menu bar.

Copy

The **Copy** option copies the highlighted table to a new table number.

Procedure
1. Highlight the table to be copied.

2. Select **Copy** from the Comparable Sales menu bar.

3. UNIVERS displays ``*Enter Format Number (001-999)*.'' Enter the new table number.

4. UNIVERS prompts ``*Enter Format Description*. Enter a description of up to 40 characters.

Kill

The **Kill** option deletes the highlighted Comparable Sales Table. Once a table has been deleted, it cannot be restored.

Procedure
1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*Delete Format ###? (Y/N)*.'' Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Select

The **Select** option returns you to the Selfil Table Menu, so you can select a new Selfil Table for use with this module.

Quit

The **Quit** option and returns you to the UNIVERS Valuation Menu.

Section 6: Contents

Section 6: Contents

Introduction to Market Valuation

The modules accessed through the UNIVERS Regression Menu give you the capability to value property using a market approach by performing Multiple Regression Analysis on a set of parcels with sales data in order to create a model which can then be applied to subject parcels. All of these modules are interdependent, meaning there is a specified order in which they must be used in order to generate MRA Estimates for the parcels in your database. The following list of steps describes each step briefly, and includes the number of the module that is used to accomplish the step:

1. Generate a Sales Extract File. This is accomplished by setting up a Selfil Table which selects parcels with sales data from the database. You must then set up a Market Extract Table in the **Market Extract** module which identifies the factors which should be included in the Sales Extract File. Finally, you must run the Market Extract Table using the Selfil Table to generate a Sales Extract File.

Note

When creating the Market Extract Table you must include any factors which you may wish to use as part of the model and any factors which you wish to have transgenerated. You can also include any other factors you wish to have for descriptive purposes. Finally, you may want to include some ``dummy'' factors at the end of the table, so if you want to add other factors to your extract later in your transgenerations or modeling, you can do so without changing the original line numbering. Changing the original line number after transgenerations and edits have been created requires you to adjust the line number references in the Edit Parameters Tables and the Expansion Parameters Tables.

2. Use the **Market Edit and Expansion** module to create Edit Parameters Tables, Expansion Parameters Tables, and Skip Tables. Using the original Sales Extract File as input, these tables generate an Expanded Extract File which will include transgenerated factors. Transgenerated factors are additional factors which are created by performing transgenerations on factors already in the Sales Extract File.

The Edit Parameter table allows you to ``edit'' out of the Market Extract File certain sales, based upon data range checks. For example, a transgeneration may be used to compute the ratio between current appraised value and sale price. This ratio could be edited for being in a range of say 0.50 to 1.50, with sales outside this range being excluded from the file to be passed to modeling.

The Skip table lets you identify specific sales which will be excluded from the Expanded Sales File, passed to modeling. These might include sales of unique properties which don't lend themselves to market modeling, invalid sales or sales with data problems requiring correction.

Some examples of transgenerated factors are as follows:

• Assigning a Neighborhood Group to a parcel based on its Neighborhood.

• Assigning a Class to a parcel, so that different classes of parcels within the same Neighborhood Group can be assigned to different models. Parcels can be divided into three classes for use in the Multiple Regression Analysis and application of models. One way of classifying parcels is into the three classes of Single-Family Dwelling, Condo, and Multi-Family Dwelling. To do this you must transgenerate the factors which identify a parcel as being in one of these classes.

• You can also transgenerate factors in order to write the resulting value back to another factor on the database during model application in the **Regression Model Application** module.

3. Use the **Regression Analysis Parameters** module to create Multiple Regression Analysis Tables which define the parameters for the Multiple Regression Analysis. Each table created in this module can create up to twenty models.

4. Use the **Regression Analysis** module to develop the models using the parameters defined in the Multiple Regression Analysis Tables created in the **Regression Analysis Parameters** module.

5. Go back to any of the previous steps to adjust the model.

6. Once an adequate model (or set of models) is developed, create a Selfil Table which will select the subject parcels to be included in the Subject Extract File. Use the **Market Extract** module to generate the Subject Extract File. The Market Extract Table used in the **Market Extract** module must generate the same factors in the same line numbers as the Sales Extract File. You can do this is two ways. You can use the same table, which would cause the Sales Extract File to be overwritten by the Subject Extract File; or you can copy the table to another number then run it.

7. Use the **Market Edit and Expansion** module to create an Expanded Extract File using the Subject Extract File as input. If you used the copy option in step 6, you must create new Edit Parameters Tables and Expansion Parameters Tables which create the same transgenerated factors in the same line numbers as the Expanded Extract File created from the Sales Extract File.

Note

You must ensure that the factors in the Expanded Subject File to which the generated models are to be applied contain the same data as the factors in the Expanded Sales File from which the model was generated. In the descriptions below, the term **line number** is used. Each line number designates a field in an extract file record.

8. Use the **Regression Model Application** module to apply the model(s) to the Expanded Extract File which includes the subject parcel data. You can also use this module to write the value in any field in the Expanded Extract File back to the database. This is normally used to write transgenerated values back to factors in the database.

UNIVERS allows you to develop and apply models using different sets of sales data and modeling criteria by specifying different tables which uniquely define these parameters for each set of models.

The Market Valuation Subsystem generates MRA estimates which can be used by Comparable Sales Analysis to produce additional market value estimates and comparable sales reports for each property valued. This report can be used by the appraiser or assessor to review the computer-assisted estimate of value and to explain and support market appraisals.

Before the actual development and calculation of a model, you should review the mass of data collected to date. The steps to be performed are:

- Verify the validity of existing neighborhoods.

- For each model to be developed (there may be several, such as Single-Family Residential, Condominiums, etc.), determine the terms or factors likely to affect value for the subject model.

- Estimate the range of coefficient value each term may take.

- Also determine the terms of factors which will be used to select comparables from the sales base and the relative importance or ``weight'' of each term.

Market Extract

This module extracts records containing user-specified factors from the database to create a Market Extract File. There are two types of Market Extract Files: Sales Extract Files and Subject Extract Files. A Sales Extract File is used to develop Multiple Regression Analysis models. The Subject Extract File is to select the parcels to which the model will be applied.

When you select **Market Extract** from the UNIVERS Regression Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used by Market Extract (see **Executing A Selfil Table** in Section 4). Only the records which pass through the selected Selfil Table are used by this module.

If you are going to create a Sales Extract File, execute the Selfil Table which will extract the valid sales from the database upon which a Multiple Regression Analysis (MRA) will be performed by the **Regression Analysis** module. If you are going to create a Subject Extract File, select the Selfil Table which will select the records to which a Regression Analysis Model will be applied by the **Regression Model Application** module.

After you have executed a Selfil Table, the Market Extract Screen (Figure 6-1) displays. The Market Extract Screen displays a listing of all the Market Extract Tables which have been created. Each table defines a different format which can be used to create extract files.

```
2:35:2O pm        MARKET EXTRACT - Ver. 7.2 - 12/16/94    February 16, 1994

  Table    Table Description              Created

  OO1      RESIDENTIAL EXTRACT           11/12/1991
```

Figure 6-1. Market Extract Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are 3 steps involved in creating a Market Extract File. First, you must use the **Create** option of the Market Extract menu bar to add a Market Extract Table to the table listing. This step creates a blank Market Extract Table. Second, you must use the edit functions of the **Display** option to define the format for the Market Extract File to be created. Third, you must use the **Run** option to generate the Extract File using the loaded table and the data set filtered by the selected Selfil Table.

Fresh

The **Fresh** option refreshes the screen, updating changes made to the listing by another user since you first accessed the Market Extract Screen. The **Fresh** option is only relevant for network users.

Load

The **Load** option loads a Market Extract Table into memory. A Market Extract Table must reside in memory to use the **Display**, **Print**, **Run**, and **Copy** options. Only one Market Extract Table may be resident in memory at a time. You can ``push'' the resident Market Extract Table out of memory by loading a new table.

Procedure
1.   Highlight the table you wish to load.

2.   Select **Load** from the menu bar.

Display

The **Display** option lets you display and edit the contents of an existing Market Extract Table. For instructions on modifying a Market Extract Table see **Modifying a Market Extract Table** below.

1. Load the desired table.

2. Select **Display** from the menu bar. The Market Extract Format Screen (Figure 6-2) displays. If you are displaying a new Market Extract Table, the format area will be blank.

3. Modify the Market Extract Table, if desired (see **Modifying a Market Extract Table** below).

4. Select **Quit** from the Display menu bar to return to the Market Extract menu bar.

```
2:46:5O pm       MARKET EXTRACT - Ver. 7.2 - 12/15/93    February 16, 1994


Line C-Type Item  Item Name        Data Type Format       Size Pos.

  1  1  1O  E-B-B-L-E-SD (PID)   T   Left Justified   29   1
  2  1  76  NEIGHBORHOOD TYPE    T   Categorical CN   1O   3O
  3  1  13  TAX CLASS            T   Left Justified    2   4O
  4  1  46  NEIGHBORHOOD CODE    N   Numeric           4   42
  5  1  34  ASSESSMENT DISTRICT  N   Numeric           4   46
  6  1  24  BUILDING CLASS       T   Left Justified    3   5O
  7  1  25  PRIMARY USE CODE     T   Left Justified    3   53
  8  1  45  HISTORICAL DESIGNAT  N   Categorical CL    4   56
  9  1  64  SALE DATE            N   Numeric           4   6O
 1O  1  67  SALE AMOUNT          N   Numeric           4   64
 11  1  73  SALE VALIDITY        T   Left Justified    1   68
 12  1  77  AREA RATING          N   Categorical CL    4   69
 13  1  8O  STREET TYPE          N   Categorical CL    4   73
 14  1  97  LOT TYPE             N   Categorical CL    4   77
```

Figure 6-2. Market Extract Format Screen

The Market Extract Format Screen

When you select **Display** from the Market Extract menu bar, the Market Extract Format Screen (Figure 6-2) displays. This screen displays the format of the Market Extract Table in memory. Each line in the format defines a factor to be extracted to the extract file. The Market Extract Format consists of an eight column definition:

*   **Line** is the line number of the item in the table.

*   **C-Type** is the Card Type of the factor to be extracted.

*   **Item No** is the Item Number of the factor to be extracted.

*   **Item Name** is the name of the factor. The name will default to the factor name on the Factor Table. It can be changed, but it is only used for display purposes.

- **Data Type** defines the format of the data as it will be stored in the extract file. Data can either be stored as text data or numeric data. All numeric data items are stored as Single-Precision data. You can define String factors as numeric data, *if all records being extracted contain only numeric data in the that field*. For Categorical Factors, you can use the Categorical Level Number, Categorical Level Name, or Categorical Level Value. When entering a Categorical Factor, the **Data Type** displays as **C**. It is changed in the listing to **T** or **N**, depending on what part of the Categorical is being used. It is changed to **T**, if the Categorical Level Name is being used. It is changed to **N**, if the Categorical Level Number or Categorical Level Value is being used:

  T = Text data

  N = Numeric data

- **Format** defines the format of the extracted data. The format defaults to the format defined on the Factor Table (except commas will be stripped from numeric data fields).

- **Size** defines the number of bytes to be extracted for the factor. The size defaults to the number of bytes required to express the data in the default format.

- **Pos** defines the beginning position of the factor in the extract record layout.

Modifying a Market Extract Table

When you select **Display** from the Market Extract menu bar, the Market Extract Format Screen displays. At the bottom of the screen is a menu bar with five options:

- **First** displays the first fourteen lines of the market extract format.

- **Last** displays the last page of the market extract format.

- **Range** displays the market extract format beginning with a specific line.

- **Modify** adds or edits lines in the market extract format.

- **Quit** returns you to the Market Extract menu bar.

The **Modify** option lets you add lines or change any line in the market extract format. After you choose **Modify** from the Display menu bar, five new options display.

Edit. 2 The **Edit** option edits an existing line. To use the **Edit** option, perform the following steps:

1. Highlight the line you wish to edit.

2. Select **Edit** from the menu bar.

3. A new menu bar displays. Choose one of the following options and edit the line:

    •   **C-Type** allows you to edit the line beginning with the Card Type.

    •   **Item No** allows you to edit the line beginning with the Item Number.

    •   **Name** allows you to edit the Item Name.

    •   **D-Type** allows you to edit the line beginning with the Data Type.

    •   **Format** allows you to edit the line beginning with the Format.

    •   **Size** allows you to edit the Size.

4. After you edit the line, UNIVERS displays ``*Is this information correct (Y/N)*.''
    Enter one of the following:

    Y - to accept the changes

    N - to reject the changes

5. Press [ESCAPE] to return to the Modify menu bar.

Insert. The **Insert** option inserts a new line in the market extract format. To use the
Insert option, perform the following:

1. Select **Insert** from the menu bar.

2. UNIVERS prompts ``*Enter line to insert*.'' Enter the new line number to insert.

3. Enter the line.

4. UNIVERS displays ``*Is this information correct (Y/N)*.'' Enter one of the following:

    Y - to accept the entry

    N - to reject the entry

5. Repeat steps 1 through 4 until all desired lines have been inserted.

6. Press [ESCAPE] to return to the Modify menu bar.

Delete. The **Delete** option deletes a line from the market extract format. To use the
Delete option, perform the following steps:

1. Highlight the line you wish to delete.

2. Select **Delete** from the menu bar.

3. UNIVERS displays ``*WARNING: Delete highlighted line. Do you want to Continue?*'' Type one of the following:

   Y - to delete the highlighted line

   N - to continue without deleting the highlighted line

Clear. The **Clear** option clears a range of lines from the market extract format. All lines, inclusive, between the first and last line entered are deleted. To use the **Clear** option, perform the following steps:

1. Select **Clear** from the menu bar.

2. UNIVERS displays ``*Enter starting line to clear.*'' Enter the first line you wish to delete.

3. UNIVERS displays ``*Enter ending line to clear.*'' Enter the last line you wish to delete.

Save. The **Save** option saves the market extract format. To use the **Save** option, perform the following:

1. Select **Save** from the menu bar.

2. UNIVERS displays ``*WARNING: Current Format ### will be Overwritten. Do you want to Continue?*'' Type one of the following:

   Y - to save the table

   N - to abort the save procedure

Quit. The **Quit** option returns you to the Display menu bar. To use the **Quit** option, perform the following:

1. Select **Quit** from the menu bar.

2. If changes were made but were not saved, UNIVERS displays ``*WARNING: Current format changes not saved. Do you want to Continue?*'' Type one of the following:

   Y - to return to the Display menu bar without saving the changes

   N - to return to the Modify menu bar in order to save the changes

---

Print

The **Print** option prints a listing of the Market Extract Table in memory. Once you complete the format of a Market Extract Table, you should print it. It will be necessary for reference when using the subsequent Market Analysis Modules.

Procedure

1. Load the desired Market Extract Table.

2. Select **Print** from the menu bar.

Create

The **Create** option creates a new Market Extract Table. Once you have created a table, it is added to the Market Extract Table Listing. Use the **Create** option to define the table number and the description, but not to define the market extract format. The market extract format is defined using the **Display** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter format number (001-999):*.'' Enter the number for the new table.

3. UNIVERS prompts ``*Enter format description (40 character max.)*.'' Enter a description of up to 40 characters.

Kill

The **Kill** option deletes an existing Market Extract Table. Once a Market Extract Table has been deleted from the listing, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Deleting Format ###. Do you want to continue?*'' Type one of the following:

   Y - to delete the Market Extract Table

   N - to continue without deleting the Market Extract Table

Run

The **Run** option generates an extract file using the specified Market Extract Table and the data set filtered by Selfil. UNIVERS also prints each extracted record on a report. The file name of the extract file created will be U232N###.USR, where ### is the table number used to create the extract and USR is the default extension for your jurisdiction.

Procedure

1. Load the desired Market Extract Table.

2. Select **Run** from the menu bar.

3. If a file already exists, UNIVERS displays ``*WARNING: File U232N###.USR will be Overwritten. Do you want to Continue?*'' Type one of the following:

   Y - to overwrite the existing Extract File

   N - to abort the Run procedure

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a new Selfil Table to use with this module.

Copy

The **Copy** option copies the highlighted table to a new table number.

Procedure

1. Highlight the table to be copied.

2. Select **Copy** from the Market Extract menu bar.

3. UNIVERS displays ``*Enter format number (001-999):*.'' Enter the new table number.

4. UNIVERS prompts ``*Enter format description (40 character max.)*.'' Enter a Market Extract Table description of up to 40 characters.

Quit

The **Quit** option exits returns you to the UNIVERS Regression Menu.

Market Edit and Expansion

This module enables you transgenerate an Extract File created in the **Market Extract** module. An Expanded Extract File is created using a Market Extract File and from one to three types of Transgeneration Tables as input:

• You can create Edit Parameters Tables which edit factors in the Market Extract File in order to flag and/or bypass records which do not ``pass'' the edits. Edits can be defined for transgenerated factors.

• You can create Expansion Tables which transgenerate factors in the Market Extract File. Transgenerations produce new fields (referred to as line numbers). The same line number (field) can be used over and over in the transgeneration procedure. The data which is contained in a line number (field) at the end of the transgeneration procedure is the data used in the modeling process.

• You can create Skip Tables to identify up to 300 individual records to automatically exclude from the Expanded Extract File.

When you select **Market Edit and Expansion** from the UNIVERS Regression Menu, the Market Edit and Expansion Menu (Figure 6-3) displays:

```
2:48:05 pm        C L T   U N I V E R S   S Y S T E M    February 16, 1994

          MARKET EDIT AND EXPANSION - Version 7.2 - 12/16/93




          (1)  Add / Modify Edit Parameters - Extract
          (2)  Add / Modify Expansion Parameters - Extract
          (3)  Add / Modify Skip Records list

          (4)  Execute Edits and Expansion

          (Q)  Return to Regression Menu
```
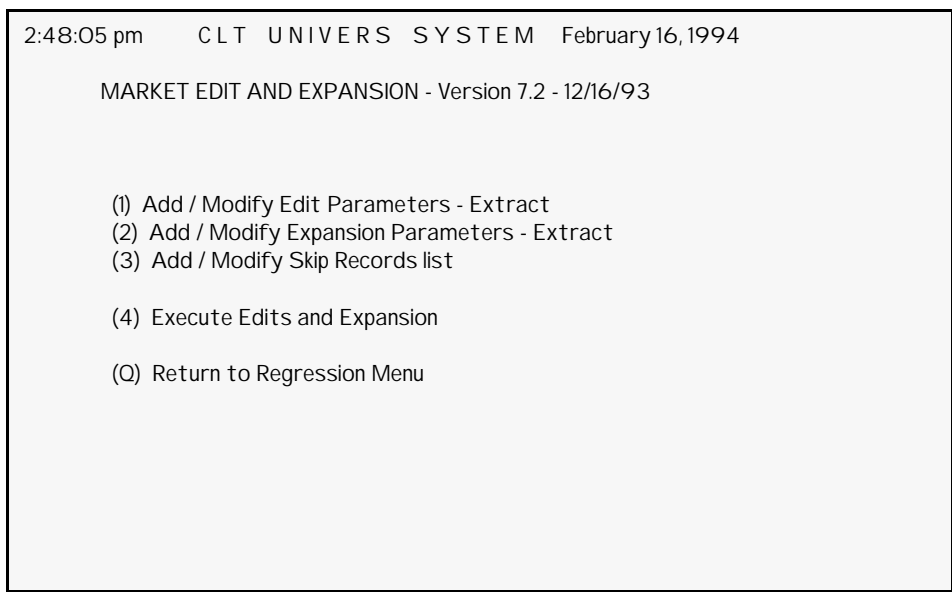
Figure 6-3. Market Edit and Expansion Menu

The first three options on the menu define the three types of Transgeneration Tables.
The fourth option generates an Expanded Extract File. The file name given to the file is
U233N2##.USR, where ## is the Transgeneration Series used to generate the file and USR is
the default extension for your jurisdiction. All operations performed by this module are
performed on the data in a Market Extract File created by the **Market Extract** module.
The UNIVERS database is not used in any of these processes.

Transgeneration Tables are created in a ``series.'' A series refers to the tables which have
the same last two digits. For example, Edit Parameters Table 101, Expansion Table 201,
and Skip Table 301 belong to the same series. A Transgeneration Table series is
associated with *one* Market Extract File. The Market Extract File association is made
when you create the first Transgeneration Table for the series. More than one series can
be assigned to the same Market Extract File.

Add/Modify Edit Parameters - Extract

This option of the Market Edit and Expansion Menu creates and maintains the Edit Parameters Tables. An Edit Parameters Table defines the edits to be performed against records in a Market Extract File. Edits can be performed based on the factors defined in the Market Extract Table which created the Market Extract File, or based on any transgenerated factors defined by the Expansion Table in the same series. The Edit Parameters Tables are numbered between 100-199. Each edit parameter also includes a disposition which identifies whether or not to ``flag'' the record and/or omit it from the Expanded Extract File based on whether or not it ``passed'' the edit.

When you select the **Add/Modify Edit Parameters - Extract** option from the Market Edit and Expansion Menu, the Add/Modify Edit Parameters Screen (Figure 6-4) displays:

```
2:49:18 pm      ADD/MODIFY EDIT PARAMETERS         November 13, 1991

Table No. Extract Table    Table Description        Creation Date

  101    001       Residential Extract          11/13/1991
```
1 of 1

Figure 6-4. Add/Modify Edit Parameters Screen

This screen displays a list of the Edit Parameters Tables which have been created and the Market Extract Table to which they are associated. Each table defines a different set of edits to be performed on the records in the associated Market Extract File. These edits can be performed based on factors from the Market Extract Table or transformed factors defined by the Expansion Table from the same series.

Editing Edit Parameters

The **Edit** option of the Add/Modify Edit Parameters Screen menu bar enters/edits edit parameters in an Edit Parameters Table. To use this option, perform the following:

1.   Highlight the table you wish to edit.

2.   Select **Edit** from the menu bar. The Edit Parameters Screen (Figure 6-5) displays.

```
3:41:57 pm      SALES EDITS_____ December 11, 1991

 # Type   Low Value  Data Item     High Value  Disposition

 1 1    30000.000    7__      500000.000    1_
```

Figure 6-5. Edit Parameters Screen

This screen displays the edit parameters defined by the table. When you first access this screen, you are in ``edit'' mode, positioned at the Descriptor field at the top of the screen. To end the ``edit'' mode and display the menu bar, press [ESCAPE]. The menu bar which displays has eight options.

Edit. This option places you in ``edit'' mode. When in edit mode, you can edit/enter the Edit Parameters Table title at the top of the screen and the edit parameters in the table. Each edit parameter defines a range against which the value of a factor should be tested for each record in the Market Extract File. It also defines the disposition of the record if it does not ``pass'' the edit. There are four types of range edits which can be performed and four dispositions. The **Data Item** column always defines the line number of the factor or transgenerated factor to be tested.

Types of Edits. The **Type** column defines the type of data to be entered in the **Low Value** and **High Value** columns:

Type	Low High
1	C1 <= X <= C2
2	C1 <= X <= X2
3	X1 <= X <= C2
4	X1 <= X <= X2

where Ci represents a constant numeric value and Xi represents a variable factor (line item) which contains the numeric value to be applied as the low or high limit.

• **Type 1** uses a constant numeric value in both the **Low Value** and **High Value**.

• **Type 2** uses a constant numeric value for the **Low Value** and the line number of another factor or transgenerated factor for the **High Value**.

• **Type 3** uses the line number of another factor or transgenerated factor for the **Low Value** and a constant numeric value for the **High Value**.

• **Type 4** uses the line number of another factor or transgenerated factor for the **Low Value** and the line number of another factor or transgenerated factor for the **High Value**.

Disposition. The **Disposition** column identifies whether or not the record should be within or outside the defined range in order to ``pass'' the edit and what to do with the record if it does not ``pass'' the edit:

• **Disposition 1** causes the record to fail the edit if it is outside the range. The record is listed on the Market Edit - Exceptions Report, *but is still included in the Expanded Extract File*.

• **Disposition 2** causes the record to fail the edit if it is within the range. The record is listed on the Market Edit - Exceptions Report, *but is still included in the Expanded Extract File*.

• **Disposition 3** causes the record to fail the edit if it is outside the range. The record is listed on the Market Edit - Exceptions Report *and is excluded from the Expanded Extract File*.

• **Disposition 4** causes the record to fail the edit if it is within the range. The record is listed on the Market Edit - Exceptions Report *and is excluded from the Expanded Extract File*.

Insert. This option inserts a line in the Edit Parameters Table. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Insert** from the menu bar.

3.   UNIVERS displays ``*Enter line number to insert*.'' Enter the line number you wish to insert.

4.   Enter the parameters for the new line.

5.   You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Delete. This option deletes a line from the Edit Parameters Table. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Delete** from the menu bar.

3.   UNIVERS displays ``*Enter Line to delete*.'' Enter the line number you wish to delete.

4.   You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Clear. This option deletes a range of lines from the Edit Parameters Table. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Clear** from the menu bar.

3.   UNIVERS displays ``*Enter First Line to Clear*.'' Enter the first line number you wish to delete.

4.   UNIVERS displays ``*Enter Last Line to Clear*.'' Enter the last line number you wish to delete. All lines, inclusive, between the first and last line numbers entered are deleted.

5.   You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Pack. This option ``packs'' the Edit Parameters Table, deleting any blank lines. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Pack** from the menu bar. All blank lines are deleted.

List. This option displays a window which lists all of the factors and transgenerated factors for the Market Extract File. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **List** from the menu bar.

3. UNIVERS displays a window listing the factors and transgenerated factors. Press [ENTER] to scroll through the list. Press [ESCAPE] to ``close'' the window.

4. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Save. This option saves any changes made to the Edit Parameters Table. If changes are not saved before using the **Quit** option, they will be lost. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*Saving will Overwrite Any Previous Version...Continue? (Y/N)*.'' Type one of the following:

   Y - to save the table

   N - to abort the save procedure

4. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Quit. This option exits the Edit Parameters Screen and returns you to the Add/Modify Edit Parameters Screen. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Quit** from the menu bar.

3. If changes were made to the table but were not saved, UNIVERS displays ``*Quitting without saving will lose current edits...Continue? (Y/N)*.'' Type one of the following:

   Y - to quit without saving the table

   N - to return to the Edit Parameters Screen in order to save the table

Printing an Edit Parameters Table

The **Print** option of the Add/Modify Edit Parameters Screen menu bar prints the Edit Parameters Table. To use this option, perform the following:

1. Highlight the table you wish to print.

2. Select **Print** from the menu bar.

Creating an Edit Parameters Table

The **Create** option of the Add/Modify Edit Parameters Screen menu bar creates a new Edit Parameters Table. The table number and description are defined with this option. The parameters which make up the table are not. Use the **Edit** option to define the edit parameters. This option will define the Market Extract Table (and file) to which the Transgeneration Table series is associated, *if this is the first table in the series to be created*. If an Expansion Parameters Table or Skip Table has already been created for the series, the Market Extract Table association is automatically made for the new Edit Parameters Table. To use this option, perform the following:

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter New Table Number (00-99).*'' Enter the series number for the new table (the last two digits of the table number).

3. If an Expansion Parameters Table or a Skip Table has not been created for the series, UNIVERS displays ``*Enter Extract File Number.*'' Enter the Market Extract Table to which the series should be associated.

4. UNIVERS displays ``*Enter Table Description.*'' Enter a table description of up to 40 characters.

Killing an Edit Parameters Table

The **Kill** option of the Add/Modify Edit Parameters Screen menu bar deletes the highlighted Edit Parameters Table. Once an Edit Parameters Table is deleted, it cannot be restored. To use this option, perform the following:

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*Delete table ###? (Y/N).*'' Type one of the following:

    Y - to delete the table
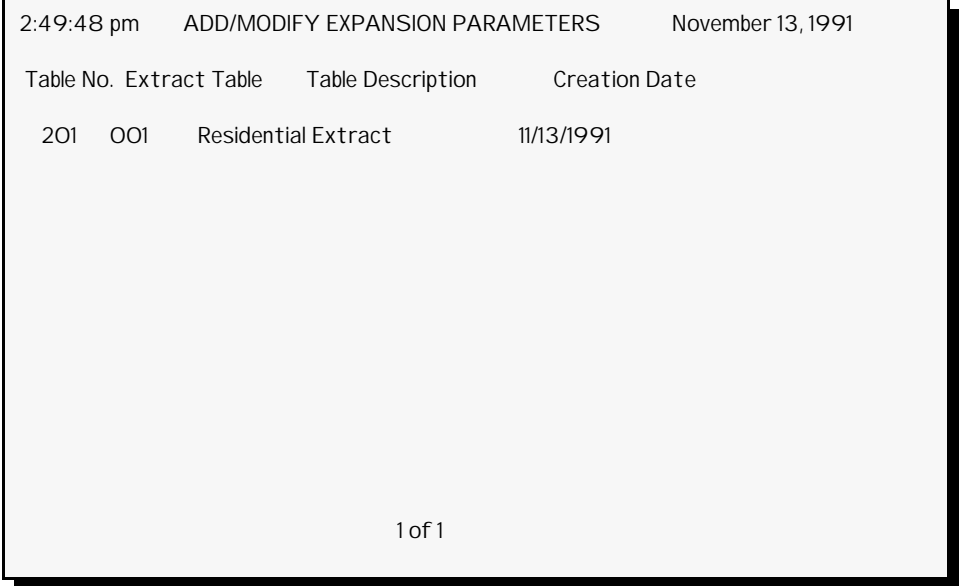
    N - to continue without deleting the table

Exiting the Add/Modify Edit Parameters Screen

The **Quit** option of the Add/Modify Edit Parameters Screen menu bar exits the Add/Modify Edit Parameters Screen and returns you to the Market Edit and Expansion Menu.

Add/Modify Expansion Parameters - Extract

This option of the Market Edit and Expansion Menu creates and maintains the Expansion Parameters Tables. An Expansion Parameters Table defines the expansion parameters which create transgenerated factors. Transgenerated factors are created by performing transgenerations on the factors included in the associated Market Extract Table. The transgenerated factors become part of each record in the Expanded Extract File. The Expansion Parameters Tables are numbered between 200-299. When you select the **Add/Modify Expansion Parameters - Extract** option from the Market Edit and Expansion Menu, the Add/Modify Expansion Parameters Screen (Figure 6-6) displays:

```
2:49:48 pm        ADD/MODIFY EXPANSION PARAMETERS        November 13, 1991

Table No.  Extract Table      Table Description        Creation Date

 201      001       Residential Extract          11/13/1991




















                                   1 of 1
```

Figure 6-6. Add/Modify Expansion Parameters Screen

This screen displays a list of the Expansion Parameters Tables which have been created and the Market Extract Table to which they are associated. Each table defines a different set of transgenerations. At the bottom of the screen is a menu bar with five options.

Editing Expansion Parameters

The **Edit** option of the Add/Modify Expansion Parameters Screen menu bar enters/edits expansion parameters in an Expansion Parameters Table. To use this option, perform the following:

1. Highlight the table you wish to edit.

2. Select **Edit** from the menu bar. The Expansion Parameters Screen (Figure 6-7) displays.

```
3:48:27 pm      RESIDENTIAL SALE TRANSGENS_____  December 11, 1991

 # Type   Transformation

 1  3  59_ = 8__  ^  0.5000
 2  3  60_ = 32_  ^  0.5000
 3  1  61_ = 60_  *  36_
 4  1  62_ = 60_  *  25_
 5 10  63_ = YYMM____ , 091991 , 6__
 6  1  64_ = 63_  *  60_
 7  1  65_ = 63_  *  59_
 8  6  IF 17_ =_     1.000 THEN 66_ = 32_
 9  6  IF 17_ =_     1.000 THEN 67_ = 60_
10  1  68_ = 23_ + 24_
11  1  69_ = 34_ + 35_
12  3  70_ = 69_  ^  0.5000
13  3  71_ = 33_  ^  0.5000
14 12  72_ = SUM ( 26_ … 31_ )
15  1  73_ = 19_  *  20_
```

Figure 6-7. Expansion Parameters Screen

This screen displays the expansion parameters defined by the table. When you first access this screen, you are in ``edit'' mode. To end the ``edit'' mode and display the menu bar, press [ESCAPE]. The menu bar which displays has eight options.

Edit. This option places you in ``edit'' mode. When in edit mode, you can edit/enter the Expansion Parameters Table title at the top of the screen and the expansion parameters in the table. Each expansion parameter defines a transgenerated factor. Each transgenerated factor is assigned a line number beginning with the next line number after the last line number used by the associated Market Extract Table.

Entering Line Numbers. The first time you use a new line number, you are prompted to enter a name and a data type (**T** = Text, **N** = Numeric). These become ``permanent'' for that line number. If you refer to that line number again in an Expansion Parameters Table or an Edit Parameters Table associated with the same Market Extract Table, the name and type will already be assigned. However, when used in a different Expansion Parameters Table associated with the same Market Extract Table, you can define a different transgeneration to that line number, *as long as it is used as the same data type as defined when it was first created*.

Note

If you change the number of factors in the Market Extract Table, the line numbers will change so that the first line number used by the first transgenerated parameter is the next line number after the last line number in the Market Extract Table. However, the line number references in any edit parameters or expansion parameters *will not change*. Therefore, you must modify them to change the line number references.

UNIVERS stores the extracted and expanded numeric market data in a single precision floating point format. Generally this isn't too important to most users, but occasionally you may run into instances where you don't understand why it produces the values that it does. Single precision floating is a format which is usually accurate to about seven (7) decimal places. Whole numbers that are larger than 10,000,000 may not be accurately represented by a floating point number. Occasionally transgenerations that may involve computing differences between large numbers that are very close in value, will produce differences that are considerably less precise than expected; this can be attributed to the limitations of single precision floating point arithmetic.

Temporary Values. You can create temporary values with transgenerations. If you use a negative line number to define a transgeneration, it becomes temporary. Temporary values are not stored as part of the Expanded Extract File record. You can define up to ten temporary values per table.

Transgeneration Types. There are 21 types of transgenerations which can be performed on factors. You can also create transgenerations of a transgenerated factor, as long as it was previously defined in the same table. Refer to the table below for a description of the format of each type. When entering constants, you can enter any real number of up to twelve characters, including the decimal. The screen will only display up to three decimal places, but the value is stored and used as entered:

Arithmetical

- **Type 1** performs an arithmetical operation (+, -, *, or /) with two line numbers to determine the value of the transgenerated factor.

- **Type 2** performs an arithmetical operation (+, -, *, or /) with a line number and a constant to determine the value of the transgenerated factor.

Exponential

- **Type 3** raises the value of a line number to a specified power to determine the value of the transgenerated factor. The power to which the value will be raised is the *exact* value entered with up to two digits to the right of the decimal and four to the left. There is one exception: to get the cube root, enter **.3333**.

Conversion of String Data

- **Type 4** assigns the entered constant value to the transgenerated factor if the entered line number is equal to the entered string. This transgeneration can be used to convert string data to numeric data.

Assignment

- **Type 5** assigns the value of the entered line number to the transgenerated factor.\

Conditional Assignment

The transgeneration factor is unchanged from its prior value (0, if previously undefined), if the specified relationship is not met.

- **Type 6** assigns the value of the second line number to the transgenerated factor if the first line number meets the specified relationship with the entered constant.

- **Type 7** assigns the value of the second constant to the transgenerated factor if the entered line number meets the specified relationship with the first constant.

- **Type 8** assigns the value of the third line number to the transgenerated factor if the first line number meets the specified relationship with the second line number.

- **Type 9** assigns the value of the entered constant to the transgenerated factor if the first line number meets the specified relationship with the second line number.

Date Transgeneration

- **Type 10** calculates the number of months between the date in the line number specified and the date value specified. The date format entered defines the format of the date in the specified line number. This transgeneration can be used to calculate the number of months from the Date of Sale to the Assessment Date.

Substring

- **Type 11** assigns a string value to the transgenerated factor by taking a substring of the entered line number. The substring is defined by the beginning and ending positions entered.

Summation

- **Type 12** sums the values of a range of line numbers to determine the value of the transgenerated factor.

Intrinsic Functions - (Exponential, Integer, Absolute Value, Logarithms, Trigonometric Functions**)

- **Type 13** determines the value of the transgenerated factor through the following computation. The entered line number is used as the variable for the defined function. The result is raised to the power defined by the second constant and then multiplied by the first constant. That result is added to the third constant.

There are some restrictions on these functions. In the event that an invalid value is presented to the function, the value zero will be returned for the function. Let x be the input value to the function:

- Exponential - x should be less than 88.02969

- Logarithm - x should be positive (greater than 0).

- Sine, cosine, tangent - x is assumed to be entered in degrees (it is converted to radians for input to the intrinsic Basic function SIN (x). x should not be too large as the single precision calculations which convert degrees to radians will only be accurate to six or seven decimals.

- Tangent - as x approaches 90 degrees, the tangent function approaches infinity. Because PI is an irrational number it cannot be accurately represented beyond 13-14 decimal places (double precisions). It is quite possible the large values returned by the tangent function will be less accurate, the closer x becomes to 90 degrees. It is also possible for error conditions to occur, due to sufficiently large values of TAN (x), should the single precision floating point range be exceeded.

Exponentiation of a Constant

- **Type 14** determines the value of the transgenerated factor through the following computation. The entered line number is multiplied by the third constant to determine the power to which to raise the second constant. The result is multiplied by the first constant. That result is added to the fourth constant.

Exponentiation of a Variable

- **Type 15** determines the value of the transgenerated factor through the following computation. The first line number is raised to the power determined by the second constant times the second line number. The result is multiplied by the first constant. That result is added to the third constant.

Location Analysis Transgens: Setting reference (x, y) coordinates

- **Type 16** creates two transgenerated factors to identify the X and Y coordinates of a point on a graph. You only enter the line number of the first transgenerated factor. The second one uses the next line number. For instance, if you enter **4** as the first line number, the second line number is automatically assigned as **5**. You must also enter two numeric values which are the X and Y coordinates of the point.

Distance from a point

- **Type 17** determines the value of the transgenerated factor as the distance between two points. The values stored in the first two line numbers entered become the X and Y coordinates of the first point. The third line number entered must be the first line number of a Type 16 transgeneration. The X and Y coordinates defined by the Type 16 transgeneration determine the second point.

Distance from a line segment

• **Type 18** determines the value of the transgenerated factor as the shortest distance between a point to a line. The values stored in the first two line numbers entered become the X and Y coordinates of the point. The third and fourth line numbers entered must be the first line number of a Type 16 transgeneration. The X and coordinates of these two points determine the line.

Half-Gaussian from a point

• **Type 19** determines the value of the transgenerated factor as the Half-Gaussian from a point.

Half-Gaussian from a line segment

• **Type 20** determines the value of the transgenerated factor as the Half-Gaussian from a line.

Elliptical half-Gaussian

• **Type 21** determines the value of the transgenerated factor as the Half-Gaussian from an ellipse.

Note
:   The **Format** column in the table below shows what displays on the screen, when the transgeneration type is selected. The codes in the **Entry** column show what should be entered in each position of the format. Refer the **Legend** to identify the meaning of the codes.

Insert. This option inserts a line in the Expansion Parameters Table. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Insert** from the menu bar.

3. UNIVERS displays ``*Enter line number to insert*.'' Enter the line number you wish to insert.

4. Enter the parameters for the new line.

5. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Transgeneration Types Table		
Type	**Format**	**Entry**
1	___ = ___ _ ___	T L O L
2	___ = ___ _ _____.___	T L O C
3	___ = ___ ^ __.____	T L E
4	___ = ___ Conv _____ To _____.___	T L S C
5	___ = ___	T L
6	IF ___ __ _____.___ THEN ___ = ___	L R C T L
7	IF ___ __ _____.___ THEN ___ = _____.___	L R C T C
8	IF ___ __ ___ THEN ___ = ___	L R L T L
9	IF ___ __ ___ THEN ___ = _____.___	L R L T C
10	___ = _____, _____, ___	T M D L
11	___ = ___ TO ___ OF ___	T P P L
12	___ = SUM (___ ... ___)	T L L
13	___ = _____.___ * (Function __ (___) ^ _____.___ + _____.___	T C F L C C
14	___ = _____.___ * _____.___ ^ (_____.___ * ___) + _____.___	T C C C L C
15	___ = _____.___ * ___ ^ (_____.___ * ___) + _____.___	T C L C L C
16	___ (and the following ExpFld item) = _____.___ X and _____.___ Y	T (T) C C
17	___ = Distance of X,Y coords (___, ___) from point stored at ___	T L L L
18	___ = Distance of X,Y coords (___, ___) from line ___ to ___	T L L L L
19	___ = Half-G of coords (___, ___) from ___ range _____.___	T L L L C
20	___ = Half-G of coords (___, ___) line ___ to ___ range _____.___	T L L L L C
21	___ = Half-G of coords (___, ___) at ___ a,b ___ angle _____.___	T L L L L C

Legend:

C = Constant
D = Date Value (in MMYYYY format)
E = Exponent
F = Function (see Function List)
L = Line Number
M = Date Format (YYMM, MMYY, YYMMDD, MMDDYY, MMDDYYYY)
O = Mathematical Operator (+, -, *, /)
P = Position
R = Relational Operator (<, >, <=, >=)
S = String (converted to upper case)
T = Transgenerated Factor Line Number

Function List: 3 = EXP
8 = INT
9 = ABS Value
13 = LOG base e
14 = Log base 10
15 = SIN
16 = COS
17 = TAN
18 = ArcSIN
19 = ArcCOS
20 = ArcTAN

Arc Functions - These are inverse trigonometric functions whose input is the value of sine, cosine or tangent. As such, the sine and cosine values must be between -1 and 1 inclusive. For tangent, any value may be specified, although extremely large values cannot be processed with great accuracy. The intrinsic Basic function ATN output radians, which UNIVERS converts to degrees. Arcsin returns values between -90 and 90, while Arccos and Arctan return values between 0 and 180.

Delete. This option deletes a line from the Expansion Parameters Table. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Delete** from the menu bar.

3. UNIVERS displays ``*Enter Line to delete*.'' Enter the line number you wish to delete.

4. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Note

Delete removes the specified lines and shifts the subsequent lines up.

Clear. This option deletes a range of lines from the Expansion Parameters Table. All lines, inclusive, between the first line and last line number entered are deleted. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Clear** from the menu bar.

3. UNIVERS displays ``*Enter First Line to Clear*.'' Enter the first line number you wish to delete.

4. UNIVERS displays ``*Enter Last Line to Clear*.'' Enter the last line number you wish to delete.

5. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Note

Clear blanks the lines in the specified range, without physically deleting them, i.e. removing them and shifting any subsequent lines up. (You must use the pack option to shift the subsequent line with transgen data up.)

Pack. This option ``packs'' the Expansion Parameters Table, deleting any blank lines. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Pack** from the menu bar. All blank lines are deleted.

List. This option displays a window which lists all of the factors and transgenerated factors for the Market Extract File. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **List** from the menu bar.

3. UNIVERS displays a window listing the factors and transgenerated factors. Press [ENTER] to scroll through the list. Press [ESCAPE] to ``close'' the window.

4. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Modify Names. This option displays a window which lists the transgenerated factors defined in the current table and allows you to change the names. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Modify Names** from the menu bar.

3.   UNIVERS displays a window listing the transgenerated factors. Enter **E** to select a factor. Press [ESCAPE] to ``close'' the window.

4.   Enter the line number of the factor you wish to change.

5.   Enter the new name for the factor.

Save. This option saves any changes made to the Expansion Parameters Table. If changes are not saved before using the **Quit** option, they will be lost. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Save** from the menu bar.

3.   UNIVERS displays ``*Saving will Overwrite Any Previous Version...Continue? (Y/N)*.'' Type one of the following:

      Y - to save the table

      N - to abort the save procedure

4.   You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Quit. This option exits the Expansion Parameters Screen and returns you to the Add/Modify Expansion Parameters Screen. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Quit** from the menu bar.

3.   If changes were made to the table but were not saved, UNIVERS displays ``*Quitting without saving will lose current edits...Continue? (Y/N)*.'' Type one of the following:

      Y - to quit without saving the table

      N - to return to the Expansion Parameters Screen in order to save the table

Printing an Expansion Parameters Table

The **Print** option of the Add/Modify Expansion Parameters Screen menu bar prints the Expansion Parameters Table. To use this option, perform the following:

1.   Highlight the table you wish to print.

2.   Select **Print** from the menu bar.

Creating an Expansion Parameters Table

The **Create** option of the Add/Modify Expansion Parameters Screen menu bar creates a new Expansion Parameters Table. The table number and description are defined with this option. The parameters which make up the table are not. Use the **Edit** option to define the expansion parameters. This option will define the Market Extract Table (and file) to which the Transgeneration Table series is associated, *if this is the first table in the series to be created*. If an Edit Parameters Table or Skip Table has already been created for the series, the Market Extract Table association is automatically made to new Expansion Parameters Table. To use this option, perform the following:

1.   Select **Create** from the menu bar.

2.   UNIVERS displays ``*Enter New Table Number (00-99)*.'' Enter the series number for the new table (the last two digits of the table number).

3.   If Edit Parameters Table or a Skip Table has not been created for the series, UNIVERS displays ``*Enter Extract File Number*.'' Enter the Market Extract Table to which the series should be associated.

4.   UNIVERS displays ``*Enter Table Description*.'' Enter a table description of up to 40 characters.

Killing an Expansion Parameters Table

The **Kill** option of the Add/Modify Expansion Parameters Screen menu bar deletes the highlighted Expansion Parameters Table. Once an Expansion Parameters Table is deleted, it cannot be restored. To use this option, perform the following:

1.   Highlight the table you wish to delete.

2.   Select **Kill** from the menu bar.

3.   UNIVERS displays ``*Delete table ###? (Y/N)*.'' Type one of the following:

   Y - to delete the table

   N - to continue without deleting the table

Exiting the Add/Modify Expansion Parameters Screen

The **Quit** option of the Add/Modify Expansion Parameters Screen menu bar exits the Add/Modify Expansion Parameters Screen and returns you to the Market Edit and Expansion Menu.

Add/Modify Skip Records List

This option of the Market Edit and Expansion Menu creates and maintains the Skip Tables. A Skip Table identifies up to 300 values for a particular line number (field). The values entered in the Skip Table are compared to the value of the line number (normally Parcel ID) specified on the Execute Edits and Expansion Screen for each record in the Market Extract File. Any records with matching values are bypassed and not included in the Expanded Extract File. The Skip Tables are numbered between 300-399. When you select the **Add/Modify Skips - Extract** option from the Market Edit and Expansion Menu, the Add/Modify Records To Skip Screen (Figure 6-8) displays:

```
2:51:05 pm        ADD/MODIFY EDIT PARAMETERS            November 13, 1991

Table No.  Extract Table     Table Description        Creation Date

  301      001       Residential Extract          11/13/1991














                                  1 of 1
```

Figure 6-8. Add/Modify Records To Skip Screen

This screen displays a list of the Skip Tables which have been created and the Market Extract Tables to which they are associated. Each table defines a different set of records to be bypassed in the associated Market Extract File. At the bottom of the screen is a menu bar with five options.

Editing Skips

The **Edit** option of the Add/Modify Records To Skip Screen menu bar enters/edits records to skip in a Skip Table. To use this option, perform the following:

1. Highlight the table you wish to edit.

2. Select **Edit** from the menu bar. The Records To Skip Screen (Figure 6-9) displays.

```
10:36:53 am        RESIDENTIAL EXTRACT_____    January 25, 1992

 # Type    Record ID

 1 1   057010   050_____
 2 1   057010   083_____
 3 1   057010   087_____
 4 1   057013   014_____
 5 1   057019   062_____
 6 1   057021   013_____
 7 1   057021   028_____
 8 1   057021   137_____
 9 1   057021   145_____
10 1   057030   015_____
11 1   057030   044_____
12 1   057030   064_____
13 1   057031   001_____
14 1   057038   081_____
15 1   057039   095_____
```

Figure 6-9. Records To Skip Screen

This screen displays the records to skip defined by the table. When you first access this screen, you are in ``edit'' mode.  To end the ``edit'' mode and display the menu bar, press [ESCAPE]. The menu bar which displays has eight options.

Edit. This option places you in ``edit'' mode. When in edit mode, you can edit/enter the Skip Table title at the top of the screen and the records to skip in the table. The **Type** must always be **1**.

Insert. This option inserts a line in the Skip Table. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Insert** from the menu bar.

3.   UNIVERS displays ``*Enter line number to insert*.'' Enter the line number you wish to insert.

4.   Enter the parameters for the new line.

5.   You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Delete. This option deletes a line from the Skip Table. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Delete** from the menu bar.

3. UNIVERS displays ``*Enter Line to delete*.'' Enter the line number you wish to delete.

4. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Clear. This option deletes a range of lines from the Skip Table. All lines, inclusive, between the first and last line number entered are deleted. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Clear** from the menu bar.

3. UNIVERS displays ``*Enter First Line to Clear*.'' Enter the first line number you wish to delete.

4. UNIVERS displays ``*Enter Last Line to Clear*.'' Enter the last line number you wish to delete.

5. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Pack. This option ``packs'' the Skip Table, deleting any blank lines. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **Pack** from the menu bar. All blank lines are deleted.

List. This option displays a window which lists all of the factors and transgenerated factors for the Market Extract File. To use this option, perform the following:

1. Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2. Select **List** from the menu bar.

3. UNIVERS displays a window listing the factors and transgenerated factors. Press [ENTER] to scroll through the list. Press [ESCAPE] to ``close'' the window.

4. You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Save. This option saves any changes made to the Skip Table. If changes are not saved before using the **Quit** option, they will be lost. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Save** from the menu bar.

3.   UNIVERS displays ``*Saving will Overwrite Any Previous Version...Continue? (Y/N)*.'' Type one of the following:

   Y - to save the table

   N - to abort the save procedure

4.   You are placed in ``edit'' mode. Press [ESCAPE] to display the menu bar.

Quit. This option exits the Records To Skip Screen and returns you to the Add/Modify Records To Skip Screen. To use this option, perform the following:

1.   Press [ESCAPE] while in ``edit'' mode to display the menu bar.

2.   Select **Quit** from the menu bar.

3.   If changes were made to the table but were not saved, UNIVERS displays ``*Quitting without saving will lose current edits...Continue? (Y/N)*.'' Type one of the following:

   Y - to quit without saving the table

   N - to return to the Records To Skip Screen in order to save the table

Printing a Skip Table

The **Print** option of the Add/Modify Records To Skip Screen menu bar prints the Skip Table. To use this option, perform the following:

1.   Highlight the table you wish to print.

2.   Select **Print** from the menu bar.

Creating a Skip Table

The **Create** option of the Add/Modify Records To Skip Screen menu bar creates a new Skip Table. The table number and description are defined with this option. The parameters which make up the table are not. Use the **Edit** option to define the skips. This option will define the Market Extract Table (and file) to which the Transgeneration Table series is associated, *if this is the first table in the series to be created*. If an Expansion Parameters Table or Skip Table has already been created for the series, the Market Extract Table association is automatically made to the new Skip Table. To use this option, perform the following:

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter New Table Number (00-99)*.'' Enter the series number for the new table (the last two digits of the table number).

3. If an Expansion Parameters Table or an Edit Parameters Table has not been created for the series, UNIVERS displays ``*Enter Extract File Number*.'' Enter the Market Extract Table to which the series should be associated.

4. UNIVERS displays ``*Enter Table Description*.'' Enter a table description of up to 40 characters.

Killing a Skip Table

The **Kill** option of the Add/Modify Records To Skip Screen menu bar deletes the highlighted Skip Table. Once a Skip Table is deleted, it cannot be restored. To use this option, perform the following:

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*Delete table ###? (Y/N)*.'' Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Exiting the Add/Modify Records To Skip Screen

The **Quit** option of the Add/Modify Records To Skip Screen menu bar exits the Add/Modify Records To Skip Screen and returns you to the Market Edit and Expansion Menu.

Execute Edits and Expansion

This option of the Market Edit and Expansion Menu displays the Execute Edit and Expansion Menu (Figure 6-10) which sets the run parameters for and executes the Edits and Expansion program. To select an item from the menu, type the number or letter next to the option or use [ ] and [ ] to highlight it. Then press [ENTER].

```
1O:37:39 am     MARKET EDIT AND EXPANSION - Version 7.2     February 16, 1994

                    EXECUTE EDITS AND EXPANSION



            (1)  Transgen Table Series              O1
            (2)  Item Number of Record ID           OO1
            (3)  Number of Records to Process        All
            (4)  Frequency of Expansion Reports      2OO
            (5)  Exceptions Report to Screen/Printer     Screen
            (6)  Print Expansion Reports            No
            (7)  Print Statistics Report            No
            (8)  Print Temp Values (On Expansion Reports)  No

            (R)  Run Edits and Expansion
            (Q)  Return to Previous Menu
```

Figure 6-10. Execute Edits and Expansion Menu

Transgen Table Series

This option defines the Transgeneration Table series number to be used when the Edits and Expansion program is executed. This number pulls the associated edits 1xx, transgens 2xx and skip parameters 3xx, if any, to be used in the edit and expansion process. The parameters in the tables are applied to the associated Market Extract File when the Expanded Market Extract File is generated.

Line Number of Record ID

This option identifies the line number to use when matching records in the Market Extract File with the values in the Skip Table. Leading and trailing zeros are ignored during the comparison. It also determines what line number to use as the Parcel ID on the Exceptions Report.

Number of Records to Process

This option identifies the number of records to process from the Market Extract File. This option can be set to **All** or a specific number between **1** and **99999**. **All** is the default. To re-select **All** if a number has been entered, select this option, press the space bar to clear out the present value, and press [ENTER].

Frequency of Expansion Reports

This option defines the ``skip factor'' to use when printing the Expansion Reports. If you enter **1** in this field, an Expansion Report will print for each record included in the Expanded Extract File. If you enter **2**, an Expansion Report will print for every other record included in the Expanded Extract File, etc. If you have a large number of records in the process, you can use this option to print a sampling of the records included in the Expanded Extract File. This option is only relevant if the **Print Expansion Reports** option is set to **Yes**.

Exceptions Report to Screen/Printer

This option determines whether the Exceptions Report should be displayed on the screen or output to the printer. The Exceptions Report lists each record which did not pass one of the Edits in the Edit Parameters Table. The edit parameter which was failed is printed along with the Parcel ID. When defining this option, enter **S** for Screen or **P** for Printer.

Print Expansion Reports

This option determines whether or not to print the Expansion Reports. An Expansion Report lists the values for all factors and transgenerated factors for a record which was written to the Expanded Extract File. *All* transgenerated factors which have been defined for the particular Market Extract File are included on the report. However, values are only printed for those transgenerated factors which are included in the Expansion Table in the series used. When defining this option, enter **Y** for Yes and **N** for No.

Print Statistics Reports

This option determines whether or not to print the Statistics Reports. A Statistics Report lists various statistics for each factor and transgenerated factor, based on the values of the records included in the Expanded Extract File. When defining this option, enter **Y** for Yes and **N** for No.

Print Temp Values (On Expansion Reports)

This option determines whether or not to include the temporary values defined in the Expansion Parameters Table on the Expansion Reports. When defining this option, enter **Y** for Yes and **N** for No.

Run Edits and Expansion

This option executes the Edits and Expansion program using the displayed settings. In order to run this program, there must be an Expansion Parameters Table or an Edit Parameters Table in the series selected. To use this option, perform the following steps:

1. Set the options on the menu, as desired.

2. Select **Run Edits and Expansion** from the menu.

3. If an Expanded Extract File already exists for the Market Extract File being used, UNIVERS displays ``*Overwriting existing file [d:]\[path]\U233N###...Continue? (Y/N)*.'' Type one of the following:

   Y - to continue and overwrite the existing file

   N - to abort the run

Return to Previous Menu

This option returns you to the Market Edit and Expansion Menu.
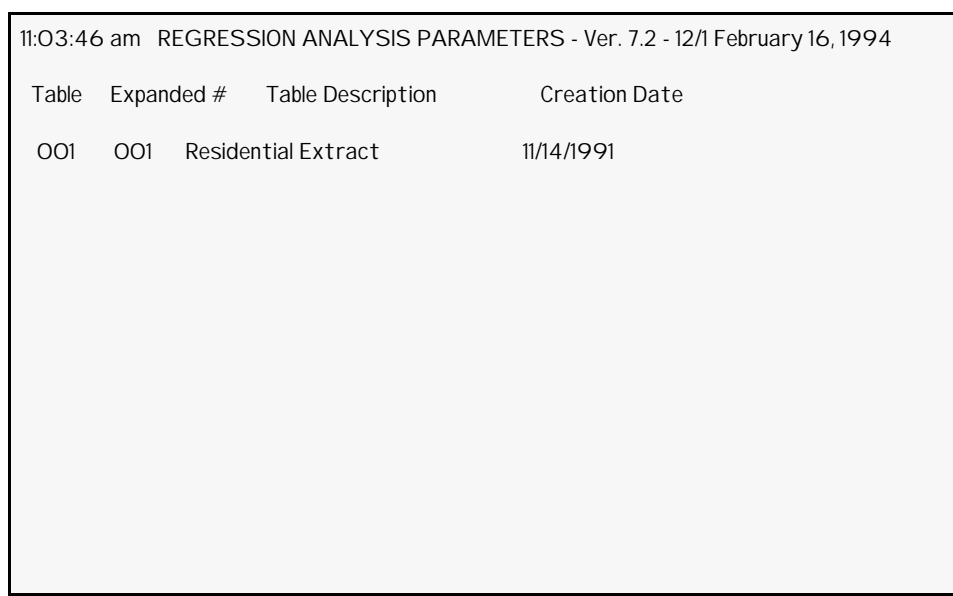
Return to Regression Menu

This option of the Market Edit and Expansion Menu returns you to the UNIVERS Regression Menu.

Regression Analysis Parameters

This module creates Regression Analysis Parameter Tables which define the parameters which are used by the **Regression Analysis** module to perform Multiple Regression Analysis on an Expanded Extract File containing sales data. A Regression Analysis Parameters Table is associated with an Expanded Extract File by the table number of the Market Extract Table which created the original Market Extract File in the **Market Extract** module.

When you select **Regression Analysis Parameters** from the UNIVERS Regression Menu, the Regression Analysis Parameters Screen (Figure 6-11) displays. The Regression Analysis Parameters Screen displays a list of all the Regression Analysis Parameters Tables which have been created. Each table defines a different set of parameters which can be used to perform Multiple Regression Analysis on an Expanded Extract File. Up to 20 models can be created by each table.

```
11:03:46 am   REGRESSION ANALYSIS PARAMETERS - Ver. 7.2 - 12/1 February 16, 1994

  Table    Expanded #     Table Description          Creation Date

  001      001     Residential Extract               11/14/1991
```

Figure 6-11. Regression Analysis Parameters Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently in memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are 2 steps involved in creating a Regression Analysis Parameters Table. First, you must use the **Create** option of the Regression Analysis Parameters menu bar to add a Regression Analysis Parameters Table to the table listing. This step creates a blank Regression Analysis Parameters Table. Second, you must use **Modify** option to define the parameters for the table.

Fresh

The **Fresh** option refreshes the screen, updating changes made to the listing by another user since you first accessed the Regression Analysis Parameters Screen. The **Fresh** option is only relevant for network users.

Load

The **Load** option loads a Regression Analysis Parameters Table into memory. A Regression Analysis Parameters Table must reside in memory to use the **Display**, **Modify**, **Print**, and **Save** options. Only one Regression Analysis Parameters Table may be resident in memory at a time. You can ``push'' the resident Regression Analysis Parameters Table out of memory by loading a new table.

Procedure

1. Highlight the table you wish to load.

2. Select **Load** from the menu bar.

3. If there is a table in memory which has been changed but not saved, UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

    Y - to load the highlighted table without saving the table in memory

    N - to abort the load procedure in order to save the table in memory

Display

The **Display** option lets you display the parameters for an existing Regression Analysis Parameters Table. For descriptions of the parameters see **Modifying a Regression Analysis Parameters Table** below. The menu and screens for the **Display** option have the same items as the **Modify** option.

1. Load the desired Regression Analysis Parameters Table.

2. Select **Display** from the menu bar. The Display Menu displays. See the Modify Menu below for an example of the options on the Display Menu.

3. Display any of the parameters screens.

4. Press [ESCAPE] from any of the parameters screens to return to the Display Menu.

5. Press [ESCAPE] from the Display Menu to return to the Regression Analysis Parameters Screen.

Modify

When you select **Modify** from the Regression Analysis Parameters menu bar, the Modify Menu (Figure 6-12) displays. From this menu you can access the seven parameters screens. Each screen contains different types of parameters which effect the Multiple Regression Analysis when it is executed in the **Regression Analysis** module. To select an item from the Modify Menu, type the number beside the option you wish to select or use [ ] and [ ] to move the highlighted bar to that option. Then press [ENTER].

To exit this screen and return to the Regression Analysis Parameters Screen press [ESCAPE]. If there is erroneous data on any of the screens, UNIVERS will warn you by identifying the screen number and the line number containing the error. If a warning displays press [ENTER]. UNIVERS will then display ``*WARNING: Do You Want to Correct Error (Y OR N).*'' Type **Y** to return to the Modify Menu in order to correct the error or **N** to return to the Regression Analysis Parameters Screen without correcting the error. If you save the table with errors in it, it will not run in the **Regression Analysis** module.

```
11:04:34 am    MARKET MODEL PARAMETERS - Ver. 7.2 - 12/16/93 February 16, 1994


                 MODIFY MENU                 Table 001



       MODIFY PARAMETERS FOR:

            1  Regression Definition
            2  Residual Error Display
            3  Database Description
            4  Cluster Assignment
            5  Model Execution
            6  Model Constraint
            7  Residual Error Plot
```
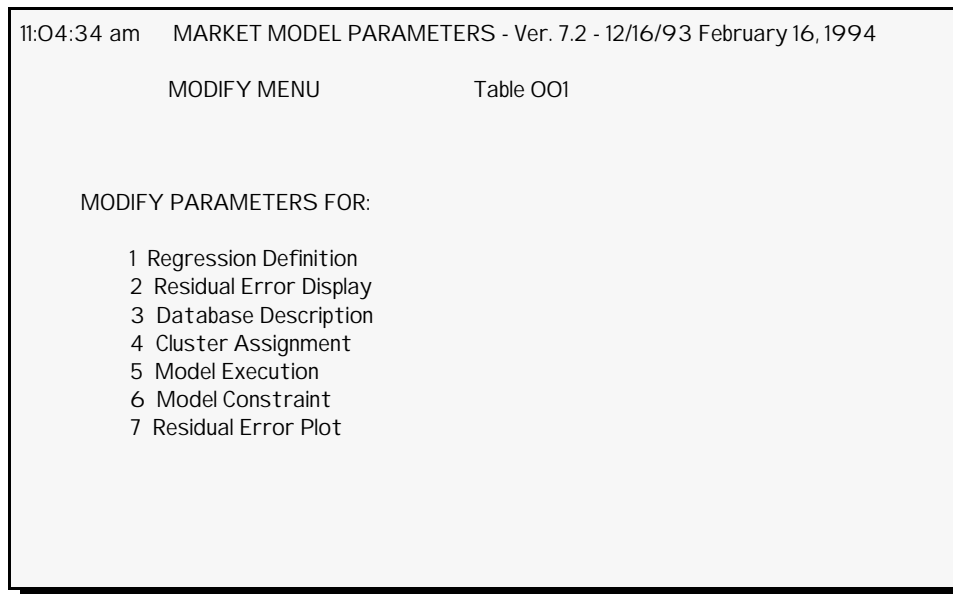
Figure 6-12. Modify Menu

Regression Definition

This option of the Modify Menu displays the Regression Definition Parameters Screen (Figure 6-13). This screen defines default parameters for all of the models defined by the Regression Analysis Parameters Table. Use [ ] and [ ] to move the cursor between fields. To enter a parameter move the cursor to the desired parameter, type the desired value, and press [ENTER].

To exit this screen press [ESCAPE] while the cursor is at any parameter or press [ENTER] while the cursor is on the last parameter. If you press [ESCAPE] and receive an error message, the cursor will be placed at the erroneous parameter. To exit the screen without correcting the error, move the cursor using [ ] to the last parameter and press [ENTER].

```
10:38:28 am    MARKET MODEL PARAMETERS Ver 7.2 12/16/93      February 16, 1994

                 REGRESSION DEFINITION PARAMETERS        Table OO1


  1. Title Line One                ANYTOWN, USE
  2. Title Line Two
  3. Line # of Dependent Variable          11

  4. Print Correlation Matrix            Y
  5. Number of Models                1
  6. Number of Clusters              1
  7. Number of Neighborhood Groups        2
  8. Line # of Neighborhood Groups        85
  9. Line # of Class              9
 1O. Type of Error Plot            RED
 11. Title for P.B. Report
 12. Type of Regression to Process        CRM
```

Figure 6-13. Regression Definition Parameters Screen

Title Line One. This parameter defines the first title line which prints on the first page of the Multiple Regression Analysis Report.

Title Line Two. This parameter defines the second title line which prints on the first page of the Multiple Regression Analysis Report.

Line # of Dependent Variable. This parameter defines the line number in the Expanded Extract File of the default dependent variable upon which the Multiple Regression Analysis is being run. This factor is normally the Sale Price. While additional models may be calibrated based upon alternate dependent variables, e.g. adjusted sale price, unit sale price (per square foot or rental unit), logarithm of sale price (log-linear modeling), there is no provision in UNIVERS for applying these alternate models. They are supported solely for sales analysis.

Print Correlation Matrix. This parameter determines whether a correlation matrix should be printed for each of the models defined by the table. This parameter can be overridden on the Model Execution Parameters Screen for each model.

UNIVERS supports segmenting sales into distinct groups (clusters) on which separate market models will be calibrated. Several models may be developed for a single cluster, but in order to insure applicability, there should be a one to one equality between model number and cluster number for the primary model for each cluster.

Number of Models. This parameter defines how many models (1-20) should be created by this table.

The following four parameters are needed to segment the sales into homogeneous groups (clusters) for market modeling:

Number of Clusters. This parameter defines how many clusters (1-20) are to be assigned for this table.

Number of Neighborhood Groups. This parameter defines how many Neighborhood Groups there are in the Expanded Extract File.

Line # of Neighborhood Group. This parameter defines the line number of the Expanded Extract File which stores the Neighborhood Group.

Line # of Class. This parameter defines the line number of the Expanded Extract File which stores the Class. The Class is used to segregate sales, based upon general property type (single family, multi-family, condominium) or other non-locational delineation. With the Class, different types of parcels from the same Neighborhood Group are assigned to different clusters. The class variable should only take on the value, 1, 2 or 3.

Type of Error Plot. This parameter defines the type of Error Plot to produce:

• **RED** = Residual Error Display. This option allows you to add additional fields to print on the Model Plotback Report. Printing of the Model Plotback Report is dependent on the setting of the **Model Plotback Report Flag** on the Model Execution Parameters Screen for each model in the table. You can also print Residual Error Plots with this option. The number of Residual Error Plots printed depends on the setting of the **Number of Residual Error Plots** on the Model Execution Parameters Screen for each model in the table.

• **REP** = Residual Error Plot. This option allows you to print Residual Error Plots for each model in the table. The number of Residual Error Plots printed depends on the setting of the **Number of Residual Error Plots** on the Model Execution Parameters Screen for each model in the table. You cannot add fields to the Model Plotback Report with this option.

• **Blank** = No Report. This option prevents the Residual Error Plots from printing for each model in the table. It also prevents you from adding descriptive fields to the Model Plotback Report. You can still print the Model Plotback Report without additional fields, if you set the **Model Plotback Report Flag** on the Model Execution Screen to **Y**.

Title for P.B. Report. This option defines the title which will print on the Model Plotback Report.

Type of Regression Process. This option defines what type of regression process will be performed when the analysis is run in the **Regression Analysis** module:

• **CRM** = Constrained Regression Analysis

• **REG** = Standard Regression Analysis

• **FSW** = Forward Selection

Residual Error Display

When you select **Residual Error Display** from the Modify Menu, the Residual Error
Display Parameters Screen (Figure 6-14) displays. This screen defines the additional
descriptive factors which should be included on the Model Plotback Report. There are
50 character positions (columns 83-132) on the report which are reserved for additional
factors. If you enter **RED** as the **Type or Error Plot** on the Regression Definition
Parameters Screen, you must enter at least one factor to include as an additional factor on
the report. Enter the line number and the format for each factor to be included. When
entering the format for text fields, enter the number of characters. For numeric fields,
enter pound signs (**#**) and decimals (**.**) to define the format. For example, to define a
numeric field with four characters to the right of the decimal and two to the left, enter
####.##. There is a maximum of seven characters to the right and three to the left. To
return to the Modify Menu, press [ESCAPE].

Note

In calculating starting positions UNIVERS automatically inserts a space after the
previous fields.

```
10:38:52 am   MARKET MODEL PARAMETERS Ver 7.2 12/16/93      February 16, 1994

                RESIDUAL ERROR DISPLAY PARAMETERS        Table OO1


     Line Number       Format          Start Positions


   1   9__           ##                 83
   2   10            ####               86
   3   13            ######             91
   4   17            ####               98
   5   43            ####              103
   6   46            ##                108
   7   51         ##                111
   8   48            ####              114
   9   66            ####              119
```

Figure 6-14. Residual Error Display Parameters Screen

Database Description

When you select **Database Description** from the Modify Menu, the Database Description Parameters Screen (Figure 6-15) displays. This screen identifies which factors should be used in the modeling process and defines a reference name for each. You must enter an abbreviated name for each. The displayed name defaults for modification to the first six characters of the reference name. All numeric factors are listed on this screen in groups of ten. The **Record # of #** identifies how many screens there are and which screen is displayed. To move from screen to screen, press [PAGE UP] and [PAGE DOWN]. To move the cursor from line to line press [ ] and [ ]. To make an entry, move the cursor to the field, type the entry and press [ENTER]. When you move to the **Item Name** column, an abbreviated name will display. If you wish to leave it as is, simple press [ENTER]. Or you can change it, if desired. The **Use Flag** column defines whether or not to use the factor in modeling (**0** = do not use; **1** = use). To exit the screen and return to the Modify Menu, press [ESCAPE]. These factors become the basis for the candidate variable list for all models in the run.

```
10:39:12 am   MARKET MODEL PARAMETERS Ver 7.2 12/16/93      February 16, 1994

                 DATABASE DESCRIPTION PARAMETERS        Table 001

   Record: 1_ of 9

       Line #      Use Flag    Item Name    Reference Name


   1     5          0          LVUNIT   PRIOR TOTAL
   2     9          0           SALEDT   LIVING UNITS
   3     10         0           SALE P   SALE DATE
   4     11         0          SALE $   SALE PRICE
   5     12         0           LNDVAL   TOTAL ACRES
   6     13         1          LAND   LAND VALUE COST
   7     14         0           STYLE   NBHD GRP #
   8     15         0           YRBLT   STYLE
   9     16         0           FULL B   STORY HEIGHT
   10    17         0           HALF B   YEAR BUILT
```

Figure 6-15. Database Description Parameters Screen

Cluster Assignment

When you select **Cluster Assignment** from the Modify Menu, the Cluster Assignment Parameters Screen (Figure 6-16) displays. Items 6-9 on the Regression Definition Parameters screen provides the information needed for this table to operate. This screen assigns the different classes of parcels within a given Neighborhood Group to a cluster. You must define a record for each Neighborhood Group as defined by the **Number of Neighborhood Groups** on the Regression Analysis Parameters Screen. To scroll through the records press [PAGE UP] and [PAGE DOWN] or enter a record number in the field at the top of the screen. To move from field to field press [ ] and [ ]. To make an entry, move the cursor to the field, type the entry and press [ENTER]. To exit the screen and return to the Modify Menu, press [ESCAPE].

```
10:39:37 am   MARKET MODEL PARAMETERS Ver 7.2 12/16/93       February 16, 1994

              CLUSTER ASSIGNMENT PARAMETERS          Table 001



    Record:1___ of 2


        1. Neighborhood Group #      1
        2. Valuation Area            O
        3. Class 1 Cluster           1
        4. Class 2 Cluster           1
        5. Class 3 Cluster           1
```

Figure 6-16. Cluster Assignment Parameters Screen

Neighborhood Group #. This parameter defines the Neighborhood Group for which clusters are being assigned. It is the same as the record number.

Valuation Area. This parameter is a 2-digit descriptive number which can be given to the Neighborhood Group.

Class 1 Cluster. This parameter determines the Cluster Number to which Class 1 parcels are assigned.

Class 2 Cluster. This parameter determines the Cluster Number to which Class 2 parcels are assigned.

Class 3 Cluster. This parameter determines the Cluster Number to which Class 3 parcels are assigned.

Model Execution

When you select **Model Execution** from the Modify Menu, the Model Execution Parameters Screen (Figure 6-17) displays. This screen defines parameters for the individual models in the table. **Record # of #** displays at the top of the screen. This parameter identifies how many models there are, as defined by the **Number of Models** on the Regression Definition Parameters Screen, and the Model Number being defined. To scroll through the models press [PAGE UP] and [PAGE DOWN] or enter the number of the desired model in the **Record # of #** field. To move from field to field press [ ] and [ ]. To make an entry, move the cursor to the desired field, type the entry, and press [ENTER]. To exit the screen and return to the Modify Menu, press [ESCAPE].

```
10:40:00 am    MARKET MODEL PARAMETERS Ver 7.0 12/19/91        January 25, 1992

                    MODEL EXECUTION PARAMETERS            Table 001

                    Record:1_ of 1
     1. Model Number              1
     2. Action                    U
     3. Model Cluster Number          1
     4. Distribution Analysis Flag     Y
     5. Correlation Matrix Flag        Y
     6. Regression Action Report Flag      Y
     7. Model Plotback Report Flag       Y
     8. Percent Error Parameter         10
     9. Number of Residual Error Plots      1
    10. Number of Constrained Factors         15
    11. Alternate Dependent Variable       0
    12. Use Zero Intercept Model          N
    13. F - Value to Enter            1.00
    14. F - Value to Delete           1.00
```

Figure 6-17. Model Execution Parameters Screen

Model Number. This parameter identifies the Model Number being defined. It is the same as the record number.

Action. This parameter defines whether or not new coefficients will be calculated for the model. If you are generating the model for the first time, this parameter must be set to **U** for each model in the table. In subsequent executions, you can change this parameter to **C**. An entry of **C** causes UNIVERS to copy the old model coefficients to the new file when modeling is performed by the **Regression Analysis** module. An entry of **U** causes UNIVERS to generate a new model and update the new file with the new coefficients.

Model Cluster Number. This parameter defines the Cluster Number assigned to the model. The Cluster Number of a parcel depends on its Neighborhood Group and Class as assigned by the Cluster Assignment Parameters Screen.

Distribution Analysis Flag. This parameter determines whether or not to produce a Distributional Analysis Report for the model. A Distributional Analysis Report provides statistics for each factor which was included in the model. The statistics included are: Number of Non-Zero Occurrences, Sum, Sum of Squares, Mean, Standard Deviation, Minimum Value, and Maximum Value. Enter **Y** to produce the report, or **N** not to produce the report.

Correlation Matrix Flag. This parameter determines whether or not to produce a Correlation Matrix for the model. A correlation matrix defines the correlation of each variable included in the model to every other variable included in the model. The value entered here overrides the value entered in the **Print Correlation Matrix** field on the Regression Definition Parameters Screen.

Regression Action Report Flag. This parameter determines whether or not to produce a Regression Action Report for the model. The Regression Action Report identifies each factor flagged on the Database Description Parameters Screens and whether or not it was added to or deleted from the model. It also prints the Partial F-Test result, the Determinant, the R-Square, the Coefficient, and the B Hold (unconstrained) value for each factor prior to its deletion.

Model Plotback Report Flag. This parameter defines whether or not to produce a Model Plotback Report for the model. The Model Plotback Report compares the Estimate determined by the model with the dependent variable (normally Sale Price) to determine the percentage difference. Only those parcels with a percentage difference outside the positive and negative value entered in the **Percent Error Parameter** are listed. If you entered **RED** in the **Type of Error Plot** on the Regression Definition Parameters Screen, the additional fields defined on the Residual Error Display Parameters Screen are included on the Model Plotback Report.

Percent Error Parameter. This parameter determines the percentage difference to print on the Model Plotback Report.

Number of Residual Error Plots. This parameter determines the number of Residual Error Plots to print for the model. Residual Error Plots provide a graphical view of the relationship between a factor and the difference between the Estimated Value and the dependent value (normally Sale Price). The number of records entered for the model on the Residual Error Plot Parameters Screen must match the number entered for this parameter.

Number of Constrained Factors. This parameter identifies how many constrained factors there are for the model. Constrained factors are those upon which a limit has been placed on what the coefficient value can be. Constrained factors are automatically included in the model, regardless of whether the Partial F Value is within the limits set by the **F - Value to Enter** and **F - Value to Delete** parameters. The number of records entered for the model on the Model Constraint Parameters Screen must match the number entered for this parameter.

Alternate Dependent Variable. This parameters allows you to use a dependent variable for the model other than the one identified on the Regression Definition Parameters Screen. Enter the line number of the alternate factor.

Use Zero Intercept Model. This parameter allows you to use a Zero Intercept Model, meaning that the constant for the model will be **0**.

F - Value to Enter. This parameter determines the lowest the Partial F Value for a factor can be to be included in the model.

F - Value to Delete. This parameter determines the ``cut-off'' point for the Partial F Value. Any factor with a Partial F Value lower than this value is deleted from the model.

Line Number for Estimate (0 to Skip). This parameter defines a line number in the Expanded Extract File to which to write the MRA Estimate for each record. Enter **0**, if you do not wish to write the MRA Estimate.

Model Constraint

When you select **Model Constraint** from the Modify Menu, the Model Constraint Parameters Screen (Figure 6-18) displays. This screen defines the constrained factors for a model. To select the model, enter the Model Number in the **Model number** field. After you enter it, the **Record __ of #** field displays. The number of records entered for the model must match the **Number of Constrained Factors** on the Model Execution Parameters Screen. Enter the record number to enter/edit. A list of the line numbers flagged displays. Press [PAGE UP] and [PAGE DOWN] to scroll from record to record. Press [ ] and [ ] to move the cursor between fields. To make an entry, move the cursor the desired field, type the value, and press [ENTER]. To exit the screen and return to the Modify Menu, press [ESCAPE].

```
11:42:49 am   MARKET MODEL PARAMETERS Ver 7.2 12/16/93      February 16, 1994

                MODEL CONSTRAINT PARAMETERS          Table OO1


     Model Number: 1              Record: 1 of 15


  1. Line Number of Item to be Constrained      7_
  2. Constrain Type                 1
  3. Low Value Allowed                   2.OO
  4. High Value Allowed                  2.OO
  Line # of flagged database are:
   13  19  21  48  53  65  66  67  69  70  71  72  76  77  87
   89  91  94  97
```

Figure 6-18. Model Constraint Parameters Screen

Line Number of Item to be Constrained. This parameter identifies the line number of the item to be constrained.

Constraint Type. This parameter defines the constraint type. All constrained factors are included in the model, regardless of their calculated Partial F Value. The value given to the coefficient is determined by the Constraint Type and whether or not the factor is ``significant.'' A factor is significant if the Partial F Value is greater than the **F - Value to Delete** entered for the model on the Model Execution Parameters Screen. For types **1**, **2**, and **3**, the calculated coefficient is not changed if it falls within the specified low and high value and is significant. For types **1** and **2**, if the calculated coefficient falls outside the range and the factor is significant, it is assigned the nearest limit. If the calculated coefficient falls outside the range and the factor is not significant, the coefficient is set as follows:

• For type **0**, there is no constraint if the factor is significant. If the factor is not significant, the coefficient is set to **0**, so that the factor does not effect the model. For type **0**, there is no range set.

- For type **1** the calculated coefficient is not changed if it falls within the specified low and high value, regardless of whether it is significant or not. If the calculated coefficient falls outside the range and the factor is significant, it is assigned the nearest limit. If the calculated coefficient falls outside the range and the factor is not significant, the coefficient is set to the nearest limit.

- For type **2** the calculated coefficient is not changed if it falls within the specified low and high value, regardless of whether it is significant or not. If the calculated coefficient falls outside the range and the factor is significant, it is assigned the nearest limit. If the calculated coefficient falls outside the range and the factor is not significant, the coefficient is set to the midpoint of the range.

- For type **3**, the calculated coefficient is not changed if it falls within the specified low and high value and is significant. If the calculated coefficient falls outside the range and if the factor is significant, it is assigned the nearest limit. If the factor is not significant, the coefficient is set to the midpoint of the range, whether the calculated coefficient is inside or outside the range.

Constraint Type	Variable is Insignificant		Variable is Significant	
	In Range	**Out of Range**	**In Range**	**Out of Range**
0	0	0	Unconstrained	Unconstrained
1	Unconstrained	Nearest Limit	Unconstrained	Nearest Limit
2	Unconstrained	Midpoint	Unconstrained	Nearest Limit
3	Midpoint	Midpoint	Unconstrained	Nearest Limit

Low Value Allowed. This parameter defines the low value of the range for the factor's coefficient.

High Value Allowed. This parameter defines the high value of the range for the factor's coefficient.

Note

Some constraints may be negative. If they are, the negative number with the largest magnitude should be listed as the Low Value Allowed.

Residual Error Plot
When you select **Residual Error Plot** from the Modify Menu, the Residual Error Plot Parameters Screen (Figure 6-19) displays. This screen defines the factors for which Residual Error Plots should be generated. To select the model, enter the Model Number in the **Model number** field. After you enter it, the **Record __ of #** field displays. The number of records defined for the model must match the **Number of Residual Error Plots** on the Model Execution Parameters Screen. Enter the record number to enter/edit. A list of the line numbers flagged displays. Press [PAGE UP] and [PAGE DOWN] to scroll from record to record. Press [ ] and [ ] to move the cursor between fields. To make an entry, move the cursor the desired field, type the value, and press [ENTER]. To exit the screen and return to the Modify Menu, press [ESCAPE].

```
11:43:46 am   MARKET MODEL PARAMETERS Ver 7.2 12/16/93      February 16, 1994

                    RESIDUAL ERROR PLOT PARAMETERS          Table OO1


     Model Number: 1              Record: 1 of 1


    1. Line Number of Item to Plot Against        1
    2. Beginning Value for X - Axis            5OOOO.OO
    3. Ending Value for X - Axis              3OOOOO.OO
    4. Y - Axis Range                         1OOOOO.OO
    Line # of flagged database are:
     13  19  21  48  53  65  66  67  69  7O  71  72  76  77  87
      89  91  94  97


    Line # of dependent variable is:  11
```

Figure 6-19. Residual Error Plot Parameters Screen

Line Number of Item to Plot Against. This parameter determines the line number of the factor to be plotted against the difference between the Estimate and the dependent variable.

Beginning Value for X - Axis. This parameter determines the low value on the graph for the factor being plotted.

Ending Value for the X - Axis. This parameter determines the high value on the graph for the factor being plotted.

Y - Axis Range. This parameter determines the range to use on the Y axis for the difference between the Estimate and the dependent variable. The range on the Y axis will be the positive and negative value of the number entered.

Plot Title. This parameter defines the title to print on the graph.

Print

The **Print** option prints a listing of the parameters for the Regression Analysis Parameters Table in memory.

Procedure
1.   Load the desired table.

2.   Select **Print** from the menu bar.

Create

The **Create** option creates a new Regression Analysis Parameters Table. Once you have created a table, it is added to the Regression Analysis Parameters Table Listing. Use the **Create** option to define the table number, the description, and the Expanded Extract File to which it is associated; but not to define the parameters in the Regression Analysis Parameters Table. The parameters are defined using the **Modify** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter format number (001-999):*.'' Enter the number for the new table.

3. UNIVERS prompts ``*Enter file description (40 character max.)*.'' Enter a description of up to 40 characters.

4. UNIVERS displays ``*Enter expanded format number.*'' Enter the Expanded Extract File number to which the Regression Analysis Parameters Table should be associated.

Kill

The **Kill** option deletes an existing Regression Analysis Parameters Table. Once a Regression Analysis Parameters Table has been deleted from the listing, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Deleting highlighted format ###. Do you want to continue?*'' Type one of the following:

   Y - to delete the table

   N - to continue without deleting the table

Save

The **Save** option saves the Regression Analysis Parameters Table in memory to the highlighted Regression Analysis Parameters Table. This option can be used to save new Regression Analysis Parameters Tables or update modified Regression Analysis Parameters Tables. If you do not save the Regression Analysis Parameters Table in memory before using the **Load** or **Quit** option, any changes made will be lost. You may save a modified Regression Analysis Parameters Table in one of two ways:

• You may overwrite the same Regression Analysis Parameters Table, updating the changes made to it.

• You may overwrite a different Regression Analysis Parameters Table, replacing it with the Regression Analysis Parameters Table in memory.

Overwriting the Same Regression Analysis Parameters Table:

1. Highlight the Regression Analysis Parameters Table.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Current format will be overwritten. Do you want to continue?*'' Type one of the following:

   Y - to save the table

   N - to abort the save procedure

Overwriting a Different Regression Analysis Parameters Table:

1. Highlight the Regression Analysis Parameters Table to which you would like to save the table in memory.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Save format XXX into format YYY. Do you want to continue?*'' Type one of the following:

   Y - to overwrite the highlighted table with the table in memory

   N - to abort the save procedure

Quit

The **Quit** option returns you to the UNIVERS Regression Menu.

Procedure

1. Select **Quit** from the menu bar

2. If there is a table in memory which has been changed but not saved, UNIVERS display ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to continue without saving the table in memory

   N - to return to the menu bar in order to save the table in memory

Regression Analysis

This module executes the tables defined in the **Regression Analysis Parameters** module in order to generate MRA models. The Expanded Extract File assigned to the table in the **Regression Analysis Parameters** module is used as the input data. The result of this module is a file containing the model(s) defined by the table in the **Regression Analysis Parameters** module. Once these models are created, they can be applied against a set of subject parcels with the **Regression Model Application** module. When you select **Regression Analysis** from the UNIVERS Regression Menu, the Regression Analysis Screen (Figure 6-20) displays. This screen displays all of the tables created in Module 234 and allows you to perform an analysis using one of them.

```
4:08:25 pm      REGRESSION ANALYSIS - Ver. 7.2 - 12/16/93   February 16, 1994

  Table Nbr   Table Description              Creation Date

  001      MODEL PARMS                  05/21/1991
  002       CONDO MODEL PARMS                06/12/1991
```

Figure 6-20. Regression Analysis Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently highlighted. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

Fresh

The **Fresh** option refreshes the screen, updating changes made to the listing by another user since you first accessed the Regression Analysis Screen. The **Fresh** option is only relevant for network users.

Run

The **Run** option generates the models defined by the highlighted table.

Quit

The **Quit** option returns you to the UNIVERS Regression Menu.

Regression Model Application

This module applies the models generated by the **Regression Analysis** module to an Expanded Extract File containing subject parcel records. The subject file must have the same structure as the sales file which was used to generate the model. An MRA Estimate is calculated for each record in the Expanded Extract File and is written to the specified MRA Estimate field on the database. You can also write the data from any line number in the Expanded Extract File to a factor on the database.

When you select **Regression Model Application** from the UNIVERS Regression Menu, the Model Application Screen (Figure 6-21) displays. This screen displays a list of all of the Model Application Tables which have been created.

```
10:41:26 am       MODEL APPLICATION - Ver. 7.2 - 12/16/93   February 16, 1994


 Table Number    MRA      Id Field
 Num Model Data Crd-Itm ExpFld Crd-Itm  Description         Date

 OO1 OO1  OO1  O1-11O   OO1   O1-OO2 MODEL APPLICATION        O1/O2/1992
```

Figure 6-21. Model Application Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

Fresh

The **Fresh** option refreshes the screen, updating changes made to the listing by another user since you first accessed the Model Application Screen. The **Fresh** option is only relevant for network users.

Load

The **Load** option loads a Model Application Table into memory. A Model Application Table must reside in memory to use the **Display**, **Print**, and **Run**, options. Only one Model Application Table may be resident in memory at a time. You can ``push'' the resident Model Application Table out of memory by loading a new table.

Procedure
1.   Highlight the table you wish to load.

2.   Select **Load** from the menu bar. The Model Application Table is loaded to memory

Display

The **Display** option lets you display and edit the contents of an existing Model Application Table.

1.   Load the desired Model Application Table.

2.   Select **Display** from the menu bar. The Model Application Format Screen (Figure 6-22) displays. If you are displaying a new Model Application Table, the format area will be blank.

3. Modify the Model Application Table, if desired (see **Modifying a Model Application Table** below).

4. Select **Quit** from the Display menu bar to return to the Model Application menu bar.

```
10:41:46 am      MODEL APPLICATION - Ver. 7.2 - 12/16/93   February 16, 1994

 Line ExpFld D-Type  Extrct Fctr Nm    Crd-Itm D-Type   DBase Fctr Nm

  1   66  Numeric  REC ROOM SF      O3-O97  Integer    CALCULATE REC R
  2   67  Numeric  FBLA SF          O3-O98  Integer    CALC FIN BSMNT
  3   78  Numeric  RDOS             O1-117  Byte       RDOS
  4   82  Numeric  TLA-FBLA         O3-1O7  Integer    TLA-FBLA
  5   85  Numeric  NBHD GROUP       O1-112  Byte       NBHD GRP #
  6   86  Numeric  FP OPENINGS      O3-1O8  Byte       FIRE STACK
```

Figure 6-22. Model Application Format Screen

Modifying a Model Application Table

When you select **Display** from the Model Application menu bar, the Model Application Format Screen (Figure 6-22) displays. This screen displays the format of the Model Application Table in memory. Each line in the format defines a line number in the Expanded Extract File which will be written to a factor on the database for each record in the Expanded Extract File. At the bottom of the screen is a menu bar with five options:

• **First** displays the first thirteen lines of the model application format.

• **Last** displays the last page of the model application format.

• **Range** displays the model application format beginning with a specific line.

• **Modify** adds or edits lines in the model application format.

• **Quit** returns you to the Model Application menu bar.

The **Modify** option lets you add lines or change any line in the model application format. After you choose **Modify** from the Display menu bar, five new options display.

Edit. The **Edit** option changes the parameters of the highlighted line in the market extract format. The **Edit** option edits an existing line. To use the **Edit** option, perform the following steps:

1. Highlight the line you wish to edit.

2. Select **Edit** from the menu bar.

3. A new menu bar displays. Choose one of the following options and edit the line:

   • **ExpFld** allows you to edit the line number from the Expanded Extract File which will be written to the database, as well as the Card Type and Item Number to which the data will be written.

   • **Card & Item** allows you to edit the Card Type and Item Number to which the data will be written.

4. After you edit the line, UNIVERS displays ``*Is this information correct (Y/N).*'' Enter one of the following:

   Y - to accept the changes

   N - to reject the changes

Insert. The **Insert** option inserts lines in the market extract format at the highlighted bar. To use the **Insert** option, perform the following:

1. Select **Insert** from the menu bar.

2. UNIVERS prompts ``*Enter Line to Insert.*'' Enter the new line number to insert.

3. Enter the line.

4. UNIVERS displays ``*Is this information correct (Y/N).*'' Enter one of the following:

   Y - to accept the entry

   N - to reject the entry

5. Repeat steps 1 through 4 until all desired lines have been inserted.

6. Press [ESCAPE] to return to the Modify menu bar.

Delete. The **Delete** option deletes the highlighted line from the market extract format. To use the **Delete** option, perform the following steps:

1. Highlight the line you wish to delete.

2. Select **Delete** from the menu bar.

3. UNIVERS displays ``*WARNING: Delete highlighted line. Do you want to continue?*'' Type one of the following:

   Y - to delete the highlighted line.

   N - to continue without deleting the highlighted line

Clear. The **Clear** option deletes a range of lines from the market extract format. All lines, inclusive, between the first and last line entered are deleted. To use the **Clear** option, perform the following steps:

1. Select **Clear** from the menu bar.

2. UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line you wish to delete.

3. UNIVERS displays ``*Enter Ending Line to Clear*.'' Enter the last line you wish to delete.

Save. The **Save** option saves the Model Application Table. To use the **Save** option, perform the following:

1. Select **Save** from the menu bar.

2. UNIVERS displays ``*Current Format ### will be Overwritten. Do you want to Continue?*'' Type one of the following:

    Y - to save the table

    N - to abort the save procedure

Quit. The **Quit** option returns you to the Display menu bar To use the **Quit** option, perform the following:

1. Select **Quit** from the menu bar.

2. If changes were made but were not saved, UNIVERS displays ``*Current Format Changes Not Saved. Do you want to Continue?*'' Type one of the following:

    Y - to quit the modify function without saving the changes

    N - to return to the menu bar in order to save the changes

---

Print

The **Print** option prints a listing of the Model Application Table in memory. Once you complete the format of a Model Application Table, you should print it. It will be necessary for reference when using the subsequent Market Analysis Modules.

Procedure

1. Load the desired table.

2. Select **Print** from the menu bar.

Create

The **Create** option creates a new Model Application Table. Once you have created a table, it is added to the listing. Use the **Create** option to define the table number, the description, the Expanded Extract File to use as input, the Model File to use to calculate MRA Estimates, the Card Type and Item Number to which to write the calculated MRA Estimates, and the Card Type and Item Number of the database factor to match with the line number being used in the Expanded Extract File as the key. The factors which can be updated by other line numbers in the Expanded Extract File are defined using the edit functions of the **Display** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter Format Number (001-999):*.'' Enter the number for the new table.

3. UNIVERS displays ``*Enter Number of Expansion Data File, U233N___*.'' Enter the rest of the file name of the Expanded Extract File (not including the extension). The first digit is always **2**.

4. UNIVERS displays ``*Enter Number of Model File, U235N___*.'' Enter the rest of the file name of the Model File. The last three digits are the table number used to generate the model in the **Regression Analysis** module.

5. UNIVERS displays ``*Enter Crd & Item for MRA field*.'' Type the Card Type, a dash (**-**), and the Item Number of the MRA Estimate on the database and press [ENTER]. The MRA Estimate must be on the Base Card.

Note

Since there is only one MRA Estimate per parcel record, you cannot generate multiple MRA Estimates for multi-card records.

6. If the name of the factor entered in step 5 is not **MRA Estimate**, UNIVERS displays ``*ERROR: Factor is not MRA Estimate, Continue (Y/N)*.'' Type one of the following:

   Y - to continue so that the calculated MRA Estimate will be written to the entered factor

   N - to enter a different factor

7. UNIVERS displays ``*Enter Item Number for Database ID Field 1-___*.'' Enter the Item Number on Card Type **1** which identifies the non-duplicatable key field which will be used to match the records in the Expanded Extract File to the records in the database.

8. UNIVERS displays ``*Enter Number of Expanded ID Field*.'' Enter the line number in the Expanded Extract File which will be used with the UNIVERS non-duplicatable key field to match records in the Expanded Extract File to records in the database. The only edit performed for these two fields is that they must be the same length.

9. UNIVERS displays ``*Enter Format Description (25 character max.)*'' Enter a table description of up to 25 characters.

Kill

The **Kill** option deletes an existing Model Application Table. Once a Model Application Table has been deleted from the listing, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Deleting Format ###. Do you want to Continue?*'' Type one of the following:

    Y - to delete the Model Application Table

    N - to continue without deleting the Model Application Table

Run

The **Run** option runs the Model Application Table, generating an MRA Estimate for each record in the designated Expanded Extract File using the specified model. It also will update the database as defined by the model application format defined with the **Display** option.

Procedure

1. Highlight the desired table.

2. Select **Run** from the menu bar.

Quit

The **Quit** option returns you to the UNIVERS Regression Menu.

Section 7: Contents

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Printer Selection Support

This module allows you to change the printer selection for UNIVERS. When you select **Printer Selection Support** from the UNIVERS Utilities Menu, the UNIVERS Printer Selection Screen (Figure 7-1) displays showing the current settings in a window.

```
                UNIVERS Printer Selection


    Your current printer settings are:

         Port or Filename - LPT1:
         Paper Width     - Wide
         Printer        - Epson 9 Pin Dot-Matrix




            < Ok >          < Change >


    Use the TAB key to move.  Use the SPACE BAR to make your selection.
    Select Ok when your settings are correct.
```
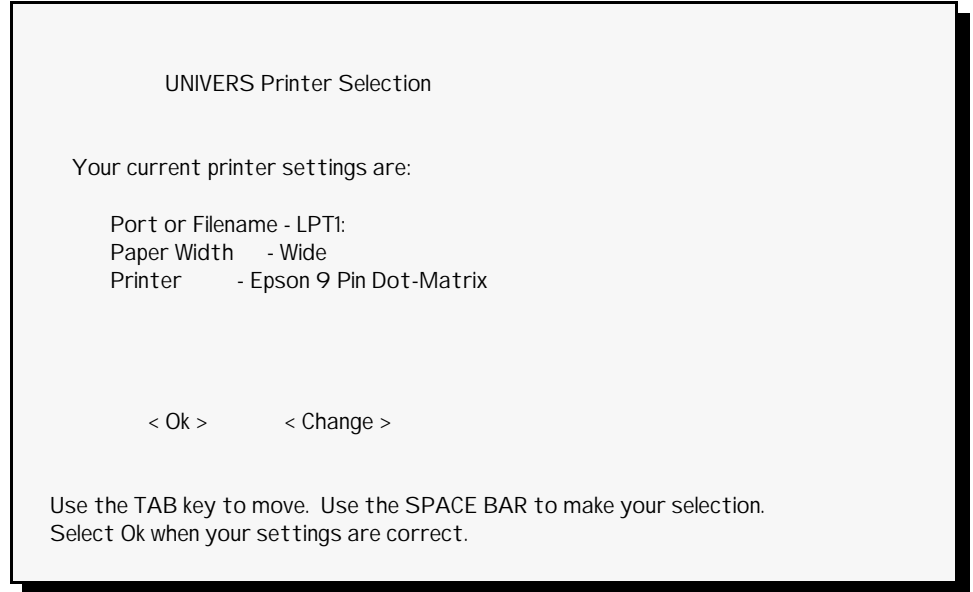
Figure 7-1. UNIVERS Printer Selection Screen with Settings Window

To change the settings, use the [TAB] key to highlight **<Change>** and press [ENTER]. The settings window disappears and the full UNIVERS Printer Selection Screen is visible (see Figure 7-2). Make the appropriate selections. Highlight **<Done>** and press [ENTER]. The settings window will re-display with the new settings. Highlight **<Ok>** and press [ENTER]. These settings will be used for all modules in UNIVERS which print data.

```
                    UNIVERS Printer Selection


     Port or Filename        Printer

      LPT1:             Epson 9 Pin Dot-Matrix
                        HP LaserJet II, IIP or III
                        IBM 9 Pin Dot-Matrix
     Paper Width            IBM LaserPrinter Model 4019
                        Panasonic 24 Pin Dot-Matrix
      ( ) Wide            ASCII - No Control Codes
      ( ) Narrow



     Use the TAB key and the UP and DOWN Arrow keys to move.  Use the
     SPACE BAR to make your selections.  Select Ok when your selections
```
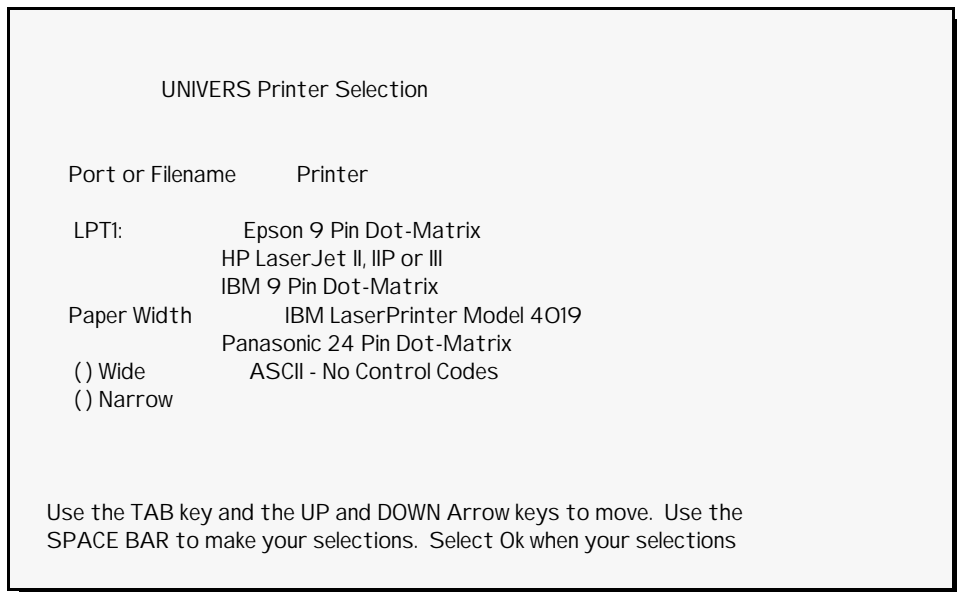
Figure 7-2. UNIVERS Printer Selection Screen

Port or Filename	This option allows you to select the port to which you wish to print. You can also direct the output to an ASCII file on disk by entering a file name. To select the output device, type the port name or file name.

Paper Width	This option allows you to select whether to print on wide paper (14 x 11") or narrow paper (8½ x 11"). To select the paper size, place the cursor in the Paper Width Box and press the space bar to select the paper width.

Printer	This option allows you to select the brand of printer to which you are printing. To select a printer, highlight the printer name and press [ENTER] or the space bar.

Quick Data Display & Maintenance

This module creates screen formats containing factors from the data base which can be displayed or maintained. You can create up to 1000 different screen formats, each one defining a different set of factors for display or maintenance purposes. Each screen format can contain up to 36 factors.

When you select **Quick Data Display & Maintenance** from the UNIVERS Utilities Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used by Quick Data Display and Maintenance (see **Executing A Selfil Table** in Section 4). Only the records which pass through the selected Selfil Table are used by this module.

After you have executed a Selfil Table, the Quick Data Display Screen (Figure 7-3) displays. The Quick Data Display Screen displays a listing of all the Quick Data Tables which have been created. Each table defines a different screen format which can be used to display or maintain data.

```
3:21:42 pm      QUICK DATA DISPLAY - Ver. 7.2 - 12/16/93   February 16, 1994


Table No.            Table Description            Creation Date

   OO1      RESIDENTIAL DWELLING AND SALES           1O/O7/1991
   OO2      COMMERCIAL OBY AND VALUES                1O/O7/1991
   OO3      ADDING COMMERCIAL BUILDING DATA          1O/O9/1991
   OO4      PUTTING IN BLDING DATA             1O/15/1991
   OO5      ODD DATA ENTERED              1O/19/1991
   OO6      RESIDENTIAL VALUES            1O/19/1991
   OO7      ADDITIONAL RES VALUES              1O/19/1991
```

Figure 7-3. Quick Data Display Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently highlighted. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are two steps involved in creating a screen format. First, you must use the **Create** option of the Quick Data Display menu bar to add a Quick Data Table to the table listing. This step creates a blank Quick Data screen format. Second, you must use the **Edit** option to define the factors which can be displayed or maintained when using the screen format.

After the screen format is defined, you can use it in two ways. You can display data using the **Display** option or you can maintain data using the **Maintain** option. You can also use the **Range** option to limit the acceptable values which can be entered for a factor when maintaining data.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Quick Data Display Screen. This option is only relevant for network users.

Maintain

The **Maintain** option allows you to maintain each record filtered by the Selfil Table. Records are displayed one at a time, in ascending order of the Selfil Table **Key number**. The **Read/Write** parameter of the Selfil Table must be set to **Read/Write** in order to maintain data.

Procedure
1. Highlight the desired table.

2. Select **Maintain** from the menu bar. If there are any records filtered by the selected Selfil Table, the first record displays.

3. Maintain the record, advance to the next record, or return to the Quick Data Display menu bar.

Cursor Movement Keys
The following cursor movement keys can be used when maintaining a record:

• [ENTER] accepts changes made to a field and advances the cursor to the next field.

• [ ] and [ ] move the cursor between fields.

• [ ] and [ ] move the cursor within a field.

• [DELETE] deletes one character at a time.

• [INSERT] allows you to insert characters within a field instead of typing over existing characters.

Calculated Factors
Fields which are calculated by the Action Tables should be maintained carefully with this module, since the calculations defined in the Action Tables will not be performed by this module.

Factors with N/A
Factors which display N/A cannot be maintained. The N/A indicates one of two conditions:

• The Card Type does not exist for the displayed record.

• The Card Type is not specified in the **Process card types** parameter of the selected Selfil Table.

Non-Maintainable Factors

UNIVERS does not allow you to modify a factor which meets either of the following criteria:

• It is defined as a Non-Duplicatable key in the Factor Tables.

• It is defined as a Non-Modifiable key in the Factor Tables.

• It is used as the **Key number** in the Selfil Table.

Range Edits

If you try to modify a factor, but UNIVERS beeps and will not allow the change, then you have encountered a range edit for that factor. Range edits limit the acceptable values which can be entered for a factor when using the **Maintain** option. Range edits are defined using the **Range** option.

Edit Line

Factors which are longer than twenty-seven characters display on an edit line at the bottom of the screen. When you arrive at such a data item, the edit line automatically displays and the cursor is positioned on it. Make the change as you would for any other data item.

Advancing to the Next Record

You can advance to the next record by pressing [PAGE DOWN]. If you have not made any changes to the current record, UNIVERS advances to the next record. You can continue to advance until you reach the end of the file. You *cannot* go back to a previous record. If you make changes to a record and press [PAGE DOWN], a menu bar displays. Select one of the following options:

• **Edit** - to return to the current record to continue editing

• **Save** - to save the changes made to the current record and advance to the next record

• **Ignore** - to advance to the next record *without saving* the changes made to the current record

• **Quit** - to return to the Quick Data Display menu bar *without saving* the changes made to the current record.

Entering Date Factors

When entering dates in date factors, you cannot use the MMDDYY or MMDDYYYY formats.

Returning to the Menu Bar

If you have not made changes to the current record, you can return to the Quick Data Display menu bar by pressing [ESCAPE]. If you have made changes to the record and you press [ESCAPE], the menu described under **Advancing to the Next Record** displays.

Display

The **Display** option allows you to display each record filtered by the Selfil Table. Records are displayed one at a time, in ascending order of the Selfil Table **Key number**.

Procedure

1. Highlight the desired table.

2. Select **Display** from the menu bar. If there are any records filtered by the selected Selfil Table, the first record displays.

3. Press [PAGE DOWN] to advance to the next record until all desired records have been displayed or until you reach the end of the file. (You *cannot* go back to a previous record).

4. Press [ESCAPE] to return to the Quick Data Display menu bar.

Edit

The **Edit** option defines the factors which will display when using the **Display** and **Maintain** options. Figure 7-4 is an example of a Quick Data Format Screen. The Quick Data format consists of two lines at the top of the screen where you can enter a screen description and two columns of 18 lines each which define the factors to be included in the screen format.

```
11:25:23 am      ANYTOWN, USA_____      January 25, 1992
                      MISCELLANEOUS MAINTENANCE
PARCEL ID                      __-___
OWNER NAME 1            3O    __-___
ROUTING                        __-___
NEIGHBORHOOD               __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
__-___                   __-___
```

Figure 7-4. Quick Data Screen Format

Procedure

1. Highlight the desired table.

2. Select **Edit** from the menu bar.

3. The contents of the selected screen format display. If it is a new screen format, there will be no contents. Enter/edit each line of the description. (Cursor movement keys work the same for **Edit** as they do for **Maintain**).

4. Enter/edit the factors to be included in the screen format.

5. When you are finished, press [ESCAPE].

6. The Edit menu bar displays. Select **Save** from the menu bar.

7. Press [ESCAPE].

8. The Edit menu bar displays. Select **Quit** from the Edit menu bar to return to the Quick Data Display menu bar.

Specifying Factors for the Screen Format

To specify a factor when entering it on the Quick Data Format Screen, type the Card Type, followed by a dash (-), followed by the Item Number and press [ENTER]. After you press [ENTER], UNIVERS displays the factor name and format, showing the length for the data item. The maximum number of characters which will display for a factor name is 10. The maximum number of characters which will display for the actual data is 27. If either of these maximums is exceeded, the *display* will be truncated.

The Edit Menu Bar

At any time while editing the screen format, you may press [ESCAPE] to access the Edit menu bar. The Edit menu bar has six options:

- **Edit** returns you to ``edit'' mode.

- **Insert** inserts a blank line at the cursor position, so you can insert a new factor between two existing factors in your screen format.

- **Delete** deletes a factor from the screen format.

- **Clear** erases the entire contents of the screen format.

- **Save** saves the screen format. If you make changes to a screen format, you must save them. If you do not save them, the changes will be lost.

- **Quit** returns you to the Quick Data Display menu bar.

Range

The **Range** option sets range edits which limit the values which can be entered for the factors when using **Maintain**. When you select **Range** from the Quick Data Display menu bar, the Maintenance Edit Ranges Screen (Figure 7-5) displays.

```
11:26:07 am          MAINTENANCE EDIT RANGES          January 25, 1992

   Factor    Low       High    Factor    Low       High

PARCEL ID  _____  _____
OWNER NAME _____  _____
ROUTING    _____  _____
NEIGHBORHO _____  _____
```

Figure 7-5. Maintenance Edit Ranges Screen

Each factor in the selected screen format displays in one of two columns, under the heading **Factor**. You can enter both a low and high range value. These values sets the range of acceptable values for the factor. Range edit values *do not* have to be entered for every factor in the format. If no range is entered for a factor, there is no limit on the values that may be entered during maintenance. You cannot set range edits for System (P.P.N.), User-Date, Auto-Date, and Categorical Factor types.

Procedure

1. Highlight the desired table.

2. Select **Range** from the menu bar.

3. The Maintenance Edit Ranges Screen (Figure 7-5) displays. Enter/edit the range edits. (Cursor movement keys work the same for **Range** as for they do for **Maintain**).

4. Press [ESCAPE] to access the Range Edit menu bar.

5. Select one of the following from the menu bar:

   • **Edit** - to continue editing the ranges

   • **Clear** - to clear all range edits

   • **Save** - to save the range edits

   • **Quit** - to return to the Quick Data menu bar

Create

The **Create** option creates a Quick Data Table. Once you have created a table, it is added to the table listing. Use the **Create** option to define the table number and the description, but not to define the factors to be included in the screen format. The screen format is defined using the **Edit** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter Table Number (0-999)*.'' Enter a new table number.

3. UNIVERS displays ``*Enter table ### description*.'' Enter a table description of up to 40 characters.

Print

The **Print** option prints a listing of the screen format for the highlighted Quick Data Table.

Procedure

1. Highlight the desired table.

2. Select **Print** from the menu bar.

Kill

The **Kill** option deletes the highlighted Quick Data Table. Once a table has been deleted, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Table ### is about to be killed. Do you want to continue?*'' Type one of the following:

   Y - to delete the table

   N - to continue without deleting the table

Select

The **Select** option returns you to the Selfil Table Menu, so you can select a new Selfil Table for use with this module.
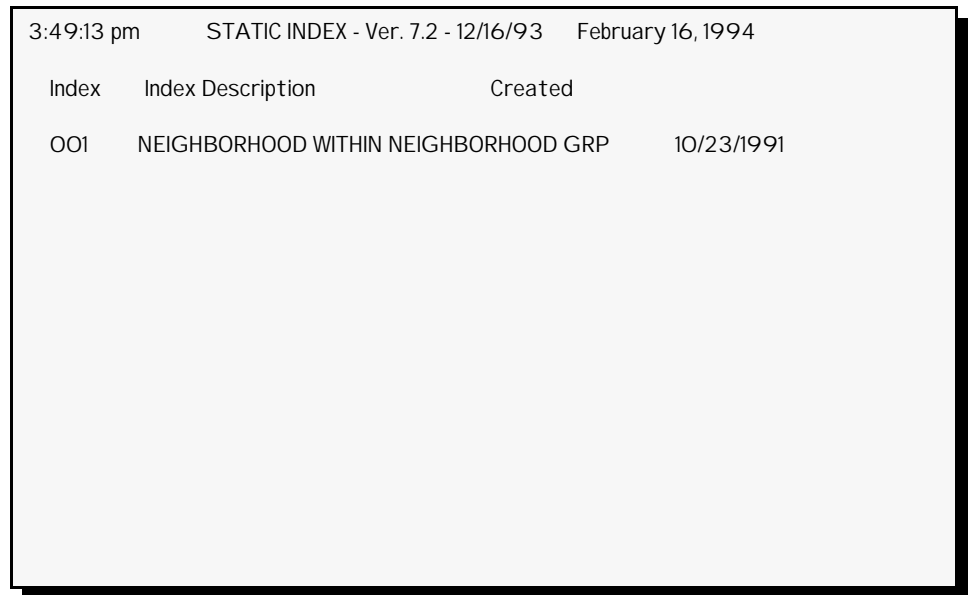
Quit

The **Quit** option returns you to the UNIVERS Utilities Menu.

Static Index Creation

This module generates static indexes which can be used as the key to access records through a Selfil Table. UNIVERS allows you to create up to 247 different static indexes, numbered 9 to 255. Indexes 1 through 8 are reserved for dynamic indexes defined in the Factor Tables. An index is a listing of records arranged in a specific order. It can be used to access the records in a logical processing sequence for another function. An index is ``static'' when the listing of records is not automatically rearranged when changes are made to the data base. Therefore, a static index must be re-generated every time a change is made to the data base that effects the field(s) being sorted.

When you select **Static Index Creation** from the UNIVERS Utilities Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used by Static Index Creation (see **Executing A Selfil Table** in Section 4). Only records which pass through the selected Selfil Table are used by this module. In essence, you must use one Selfil Table to filter records that will produce an index to be used by another Selfil Table. This process produces a specific set of records to use with any module which uses Selfil Tables.

After you have executed a Selfil Table, the Static Index Screen (Figure 7-6) displays. The Static Index Screen displays a listing of the Static Index Tables which have been created. Each table defines a static index format. A static index format is a set of factors upon which a static index can be generated.

```
3:49:13 pm          STATIC INDEX - Ver. 7.2 - 12/16/93     February 16, 1994


  Index     Index Description                    Created

  OO1       NEIGHBORHOOD WITHIN NEIGHBORHOOD GRP         1O/23/1991
```

Figure 7-6. Static Index Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table loaded to memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are two steps involved in producing a static index. First, you must use the **Create** option of the Static Index menu bar to create a Static Index Table. Second, you must use the **Generate** option to produce the static index file. Once the static index is generated, it can be used as the **Key number** in a Selfil Table.

It is important to understand how UNIVERS treats the data in the data base to produce a ``record'' in Selfil. Each ``record'' is a string of cards of different Card Types and the same Card Number for the same P.P.N. When UNIVERS creates the static index file, it stores the P.P.N. and Card Number for each record. The order in which these records are stored depends on the factors defined in the Static Index Table.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the listing by another user since you first accessed the Static Index Screen. This option is only relevant for network users.

Load

The **Load** option loads a Static Index Table into memory. A Static Index Table must reside in memory in order to use the **Display**, **Print**, and **Generate** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1.   Highlight the table you wish to load.

2.   Select **Load** from the menu bar.

Display

The **Display** option lets you display the index format of the Static Index Table in memory. You can also display the settings for the Selfil Table used to create the index, if the index has been generated.

Procedure
1.   Load the desired table.

2.   Select **Display** from the menu bar.

3.   UNIVERS displays the index format of the Static Index Table in memory. Select one of the following from the menu bar at the bottom of the screen:

   •   **Display** - to toggle between displaying the index format and displaying the settings of the Selfil Table used to create the index. If the index has not been generated, the **Display** option will not work.

   •   **Quit** - to return to the Static Index menu bar.

Print

The **Print** option prints a listing of the index format for the Static Index Table in memory. It can also print the settings of the Selfil Table used to generate the index and an Index Listing, if the index has been generated.

Procedure

1. Load the desired table.

2. Select **Print** from the menu bar. If the index has not been generated, UNIVERS prints the index format and stops. If the index has been generated, UNIVERS prints the index format and the Selfil Table settings used to create the index and displays, ``*Do you want an index key listing (Y/N)?*'' Go to step 3.

3. Type one of the following:

   Y - to print the Index Key Listing

   N - to end the print function without printing the Index Listing

4. If you typed **Y** in step 3, UNIVERS displays ``*Enter base card item # to be used as record identifier.*'' Enter an Item Number for a factor from the Base Card which you wish to print on the Index Key Listing to identify each record. UNIVERS prints the Index Key Listing.

The Index Key Listing

The Index Key Listing is a list of each record in the index file. Included in the listing is a count of the number of records in the index, the P.P.N. of each record, the Card Types included in each record, the Card Number used to ``string'' the Card Types together as a record, and the Base Card identifier for each record (defined when you print the listing).

Create

The **Create** option creates the index format for a Static Index Table. It does not create the actual index file. To create the index file, use the **Generate** option. You can enter up to 5 factors in an index format.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter new index table number.*'' Enter a new table number between 009 and 255.

3. UNIVERS prompts ``*Enter table XXX description.*'' Enter a description of up to 40 characters.

4. The Static Index Format Screen (Figure 7-7) displays. In the first column, enter the Card Type for the factor to be included in the index format.

```
11:47:16 am        STATIC INDEX - Ver. 7.2 - 12/16/93    February 16, 1994

 OO9        DFF                        O1-25-1992


KEY FORMAT
CrdTyp Item Factor Name      Type           Format  Len

 1  78  NBHD GROUP      Str    Left Justified     2
 1   8  NEIGHBORHOOD    Str    Left Justified     4
 ___
```

Figure 7-7. Static Index Format Screen

5.   In the second column, enter the Item Number for the factor to be included in the
      index format

      •   If the factor is a System (P.P.N.), User-Date, or Auto-Date type, go to step 8.

      •   If the factor is a an Integer, Double-Precision, or Single-Precision type, go to
           step 7.

      •   If the factor is a String type, UNIVERS displays ``*Enter <R>ight or <L>eft
           justification.*'' Go to the next step.

6.   Enter one of the following:

      L - for Left-Justified

      R - for Right-Justified

7.   Enter the length of the factor or press [ENTER] to accept the default.

8.   UNIVERS displays ``*Is this line ok (Yes/No)?*'' Enter one of the following:

      Y - to add the line to the index format

      N - to make changes to the line

9.   Repeat steps 4 through 8, until all desired factors have been entered.

10.   After the last factor is entered, press [ENTER].

11. UNIVERS displays, ``*Enter static set number*.'' Enter the Card Set Number to use to generate the index. (Since UNIVERS does not currently provide the capability to create multiple card sets, **1** is the only acceptable value). The index format is saved, the Static Index Table is added to the listing, and UNIVERS returns to the Static Index menu bar.

The Static Index Format

The factors which define the index format are entered on the Static Index Format Screen (Figure 7-7). You can define up to 5 different factors in a Static Index Table. The first factor entered is the primary key by which records will be sequenced. Each subsequent factor represents a nested sequencing to break ``ties'' for the previous factor.

The index format consists of a 5 column definition for each factor. The first 2 columns are the Card Type and Item Number of the factor. These are entered when defining the index format. After these items are entered, the third column automatically displays the Factor Name. The fourth column displays the format for the factor. The format defaults to the format defined in the Factor Tables. It can only be changed for String type factors. A String factor is either Right-Justified or Left-Justified. How String type factors are justified effects how they are sequenced and how they are truncated when generating a static index.

The last column displays the length of the factor. The length defaults to the length defined in the Factor Tables. It *cannot* be increased, but it can be truncated for String, Integer, Double-Precision, and Single-Precision factor types. It *cannot* be truncated for System (P.P.N.), User-Date, and Auto-Date types. You normally will not want to truncate data, since truncation can effect the proper sequencing of records in the static index.

Data Truncation

Truncation of Integer, Double-Precision, and Single-Precision data begins with the right-most character. Truncation of String data depends on the justification. The shaded areas in the table below show how data is truncated for String data. Right-Justified data are truncated beginning with the left-most character. Left-Justified data are truncated beginning with the right-most character.

Right-Justified	Left-Justified
456 Main St	456 Main St
12 334 Alberta St	12334 Alberta St
One N orthwest Plaza	One Northwest Plaza
high St	high St

Record Sequencing

The order in which records are sequenced in a static index depends on the type of factor(s) being used in the index format:

- **System (P.P.N.)** - sequenced in ascending order of the P.P.N.

- **User-Date and Auto-Date** - sequenced in date order beginning with the most recent date

- **Integer** - sequenced in ascending order of the value

- **Double-Precision and Single-Precision** - sequenced in ascending order of value

- **Byte** - sequenced in ascending order of value (0-255)

- **Categorical** - sequenced in ascending order of Categorical Level Number

- **String** - sequenced according to the ASCII (American Standard Code for Information Interchange) value, sorted one character at a time.

ASCII Value. The ASCII value is value (0-255) given to each character recognized by the Personal Computer. The basic order of the ASCII character set is as follows:

- **0-31** - control characters (will probably not be used in your data base)

- **32** - space character

- **33-47** - special characters (**! " # $ % & ' ( ) * + , - .**)

- **48-57** - numbers (**1-9**)

- **58-64** - special characters (**: ; < = > ? @**)

- **65-90** - uppercase letters (**A-Z**)

- **91-96** - special characters (**[\ ] ^ _ `**)

- **97-122** - lowercase letters (**a-z**)

- **123-126** - special characters (**{ | } ~**)

- **127-255** - special characters which will probably not be found in your data base

For practical purposes, you most often will not need to worry about the special characters in the ASCII characters set. However, there are a few important things you should consider in regard to the sequencing of String data:

- The space *is* a character and is placed *first* when data is sequenced.

- Numbers come *before* letters.

- All uppercase letters come *before* lower case letters.

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Justification and Sequencing. Refer to the previous table. Since the space is considered a character and comes first, the data shown in the table would be sequenced differently based on whether Right Justification or Left Justification was used. If the data were Right-Justified, the data would be sequenced as follows:

1. high St
2. 456 Main St
3. 12334 Alberta St
4. One Northwest Plaza
5. 9383 Western Hills Blvd

This is the order because spaces are the first several characters for many of the items. The result is that the shortest items are ordered first, regardless of what the first character is.

If the data were Left-Justified, the order would be as follows:

1. 12334 Alberta St
2. 456 Main St
3. 9383 Western Hills Blvd
4. One Northwest Plaza
5. high St

This is the order, because the spaces are not considered first. There are a few things to notice in the sequencing:

• The numbers in the street address *are not* treated as values.

• String factors are treated one character at a time when they are sequenced; so since 1 comes before 4, **12334 Alberta St** comes before **456 Main St**.

• The fields beginning with numbers come *before* the fields beginning with letters.

• **One Northwest Blvd** comes *before* **high St**, since uppercase letters come before lowercase letters.

Truncation and Sequencing. Refer to the previous table and consider how truncation effects sequencing. For Left-Justified data, there is little effect in this example since the end of each item is truncated. However, for Right-Justified data, truncation has a significant effect. The sequencing would change from the previous example to the following:

1. high St
2. 456 Main St
3. 334 Albert St
4. ern Hills Blvd
5. orthwest Plaza

The first two item remain the same, because the preceding spaces are still considered. The last three items are different, because the preceding spaces and the first few characters have been truncated. The third item remains in the same sequence, but not because of spaces. It comes before the last two items, because the first character is a number and numbers precede letters. The last two items are reversed from the previous example, because of the alphabetic order of the first character.

Special Considerations. The effects of justification and truncation can cause indexes based on String factors to be unpredictable when sequenced. This unpredictability is especially true for String factors which vary in length from record to record and have a mixture of alpha and numeric characters. Therefore, it is best to avoid using these types of factors to index records, if possible. However, if String factors are consistent from record to record, meaning they are the same length (they can have a mix of alpha and numeric characters and still be consistent), they can be good factors upon which to index records.

Generate

The **Generate** option creates a static index file for the records passed through Selfil based on the index format of the Static Index Table in memory.

Procedure

1. Load the desired table.

2. Select **Generate** from the menu bar. If there is no static index file already created using the selected Static Index Table, UNIVERS generates the static index file and returns you to the Static Index menu bar.

3. If there is already a static index file based on the selected Static Index Table, UNIVERS displays `` *WARNING: Index already exists. Continue anyway?*'' Type one of the following:

   Y - to generate the new static index file and overwrite the old one

   N - to return to the Static Index menu bar without generating the static index file

Static Index File

The static index is stored in a file. In this file are the P.P.N. and the Card Number for each record passed through Selfil. They are sequenced according to the index format of the Static Index Table used to generate the file. When this index is used as the **Key number** for another Selfil Table, the Selfil Table will access records using the P.P.N. and the Card Number.

There can be more than one record in a static index file with the same P.P.N, if there are series cards and more than one of the ``records'' (string of Card Types with the same Card Number and P.P.N.) passes through the Selfil Table. Each ``record'' will be a separate entry in the static index file. Each entry when used in another Selfil Table will only return a string of Card Types using the Card Number stored in the static index file. In other words, if the entry in the static index file stores the P.P.N. and Card Number 2, then when it is used in another Selfil Table, only cards with Card Number 2 will be returned for processing. This particular entry *will not* retrieve any other Card Numbers, even though the **card nmbrs** parameter in the Selfil Table may include other Card Numbers. Also, if the **card nmbrs** parameter does not include Card Number 2, this entry *will not* pass through that Selfil Table.

Kill

The **Kill** option deletes the highlighted Static Index Table. Once a table has been deleted, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Static index ### is about to be killed. Continue anyway?*'' Type one of the following:

    Y - to delete the index

    N - to continue without deleting the index

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a new Selfil Table for use with this module.

Quit

The **Quit** option returns you to the UNIVERS Utilities Menu.

Import Data

Import Data imports data into the data base from a fixed length ASCII or EBCDIC source file or from a delimited ASCII file. You can use this utility to create new records or update existing records. EBCDIC importing can accommodate packed fields, but ASCII import cannot.

When you select **Import Data to UNIVERS** from the UNIVERS Utilities Menu, the Data Import Screen (Figure 7-8) displays. The Data Import Screen displays a list of all the Data Import Tables which have been created. Each table defines a data import format for importing data into UNIVERS. Each data import format defines the structure of a source file and to what factors the data in the source file will be imported.

```
3:5O:17 pm          DATA IMPORT - Ver. 7.2 - 12/16/93      February 16, 1994

   Table       Table Description                 Created

   OO1         TEST                          1O/16/1991
   111         Base card data                    1O/23/1991
```

Figure 7-8. Data Import Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently in memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are two steps involved in creating a Data Import Table. First, you must use the **Create** option of the Import Data menu bar to add a Data Import Table to the table listing. This step creates a blank Data Import Table. Second, you must use the **Edit** option to define the factors which are to be imported from a source file.

Fresh

The **Fresh** option refreshes the screen, updating changes made to the listing by another user since you first accessed the Data Import Screen. The **Fresh** option is only relevant for network users.

Load

The **Load** option loads a Data Import Table into memory. A Data Import Table must reside in memory to use the **Display**, **Print**, **Save**, and **Run** options. Only one Data Import Table may be resident in memory at a time. You can ``push'' the resident Data Import Table out of memory by loading a table.

Procedure

1. Highlight the table you wish to load.

2. Select **Load** from the menu bar.

3. If there is a Data Import Table in memory which has been changed but not save, UNIVERS displays ``*WARNING: Changes in table ### not saved. Continue anyway?*'' Type one of the following:

    Y - to load the highlighted table without saving the table in memory

    N - to keep the current table in memory

Display

The **Display** option lets you display and edit the contents of an existing Data Import Table.

Procedure

1. Load the desired Data Import Table.

2. Select **Display** from the menu bar.

3. The Data Import Format Screen (Figure 7-9) displays. If you are displaying a new Data Import Table, the format area will be blank. Modify the data import format, if desired (see **Modifying a Data Import Table** below).

4. Select **Quit** from the Display menu bar to return to the Data Import menu bar.

The Data Import Format

When you select **Display** from the Data Import menu bar, the Data Import Format Screen (Figure 7-9) displays. This screen displays the format of the Data Import Table in memory. Each line in the format defines a data item in the source file and to what factor in the UNIVERS data base that data item should be imported. The Data Import Format consists of a 9 column definition:

*   **Fld** is the field number. The field number is assigned sequentially by UNIVERS when you add lines to the format.

*   **Posn** defines the starting position for the field within each record in the source file for fixed record imports and the field number for delimited imports.

*   **Len** defines the length of the field in the source file.

*   **Form** defines the format of the data in the source file.

- **CTyp** defines the Card Type in the UNIVERS data base to which the data in the source file will be imported.

- **Item** defines the Item Number in the UNIVERS data base to which the data in the source file will be imported. If it is a numeric item, UNIVERS asks you whether or not the data in the source file is packed.

- **Low Range** defines the lowest value allowed in the field when importing data.

- **High Range** defines the highest value allowed in the field when importing data.

- **Default** defines what value will be entered for the factor if the source file has no value in the field or if the data fails the range test.

Note
: There should be at least one non-duplicatable key field in your import format. If there is not, you cannot **Run** an import in Update mode and the Create mode may produce unpredictable results. The non-duplicatable key field should preferably be the first field in the record layout, since it is the field used to identify records on the error report that is produced at **Run** time.

```
9:18:41 am          DATA IMPORT - Ver. 7.2 - 12/16/93      February 16, 1994

Fld  Posn  Len  Form  CTyp  Item  Low Range  High Range  Default

  1    1   18         1    10
  2    1    3         1     2
  3    5    1         1     3
  4    7    5         1     4
  5   13    4         1     5
  6   18    1         1     6
  7   81    4  Unp .O  1    12    O         9999        O
  8   85    4  Unp .O  1    17    O          9999         O
  9   89    2  Unp .O  1     9    O          99         O
 1O   91    8  MDYr    1    11   OO/OO/19OO  12/31/2O27  OO/OO/19OO
 11   99    2         1    13
 12  1O1    3         1    24
 13  1O4    3         1    25
```

Figure 7-9. Data Import Format Screen

Modifying a Data Import Table

When you select **Display** from the Data Import menu bar, the Data Import Format Screen displays. At the bottom of the screen is a menu bar with five options:

- **First** displays the first thirteen lines of the data import format.

- **Last** displays the last page of the data import format.

- **Range** displays the data import format beginning with a specific line.

- **Modify** adds or edits lines in the data import format.

•   **Quit** returns you to the Data Import Screen menu bar.

The **Modify** option lets you add lines or change any line in the data import format. After you choose **Modify** from the Display menu bar, five new options display:

Edit. The **Edit** option edits an existing line in the table. To use the **Edit** option, perform the following steps:

1.   Highlight the line you wish to edit.

2.   Select **Edit** from the menu bar.

3.   UNIVERS displays ``*Enter new source starting position*.'' Enter the starting position of the item in the source file record layout if the table is to be used for a fixed record import or the field number if the table is to be used for a delimited import.

4.   UNIVERS displays ``*Enter new source field length*.'' Enter the length of the item in the source file record layout.

5.   UNIVERS displays ``*Enter new destination card type*.'' Enter the Card Type to which the data should be written.

6.   UNIVERS displays ``*Enter new destination item*.'' Enter the Item Number to which the data should be written.

7.   *This step only applies if the Card-Item entered is a numeric type (Single-Precision, Double-Precision, Integer, Byte, or Categorical).* UNIVERS displays ``*Is the source file packed (Y/N)*.'' Enter one of the following:

      Y - if the data in the source file is stored as a packed numeric field

      N - if the data in the source file is not stored as a packed numeric field

8.   *This step only applies if the Card-Item entered is a numeric type (Single-Precision, Double-Precision, Integer, Byte, or Categorical).* UNIVERS displays ``*Enter the number of implied decimal places from source*.'' Enter the number of implied decimal places in the source file record layout. Go to step 10.

9.   *This step only applies if the Card-Item entered is a date type (User-Date or Auto-Date).* UNIVERS displays ``*Enter the date format*.'' What choices displayed depends on the length entered in step 4. Select the format of the date in the source file record layout.

10.   UNIVERS displays ``*Enter low range limit*.'' Enter the low range limit.

11.   UNIVERS displays ``*Enter high range limit*.'' Enter the high range limit.

12.   UNIVERS displays ``*Enter default value*.'' Enter the default value.

13.   UNIVERS displays ``*Is this field ok (Yes/No)?*'' Type one of the following:

      Y - to accept the changes

N - to reject the changes (Go back to step 3)

Insert. The **Insert** option inserts lines in the data import format at the highlighted bar. To use the **Insert** option, perform the following:

1. Move the highlighted bar to where you want to insert a line.

2. Select **Insert** from the menu bar.

3. UNIVERS displays ``*Enter new source starting position*.'' Enter the starting position of the item in the source file record layout.

4. UNIVERS displays ``*Enter new source field length*.'' Enter the length of the item in the source file record layout.

5. UNIVERS displays ``*Enter new destination card type*.'' Enter the Card Type to which the data should be written.

6. UNIVERS displays ``*Enter new destination item*.'' Enter the Item Number to which the data should be written.

7. *This step only applies if the Card-Item entered is a numeric type (Single-Precision, Double-Precision, Integer, Byte, or Categorical).* UNIVERS displays ``*Is the source file packed (Y/N)*.'' Enter one of the following:

    Y - if the data in the source file is stored as a packed numeric field

    N - if the data in the source file is not stored as a packed numeric field

8. *This step only applies if the Card-Item entered is a numeric type (Single-Precision, Double-Precision, Integer, Byte, or Categorical).* UNIVERS displays ``*Enter the number of implied decimal places from source*.'' Enter the number of implied decimal places in the source file record layout. Go to step 10.

9. *This step only applies if the Card-Item entered is a date type (User-Date or Auto-Date).* UNIVERS displays ``*Enter the date format*.'' What choices displayed depends on the length entered in step 4. Select the format of the date in the source file record layout.

10. UNIVERS displays ``*Enter low range limit*.'' Enter the low range limit.

11. UNIVERS displays ``*Enter high range limit*.'' Enter the high range limit.

12. UNIVERS displays ``*Enter default value*.'' Enter the default value.

13. UNIVERS displays ``*Is this field ok (Yes/No)?*'' Type one of the following:

    Y - to accept the changes

    N - to reject the changes (Go back to step 3)

14. Repeat steps 3 through 13 until all desired lines have been inserted.

15. Press [ESCAPE] to return to the Modify menu bar. The new line(s) is inserted at the highlighted bar.

Delete. The **Delete** option deletes the highlighted line from the data import format. To use the **Delete** option, perform the following steps:

1. Highlight the line you wish to delete.

2. Select **Delete** from the menu bar.

3. UNIVERS displays `` *WARNING: Highlighted field will be deleted. Continue anyway?*'' Type one of the following:

   Y - to delete the highlighted line.

   N - to continue without deleting the highlighted line

Clear. The **Clear** deletes a range of lines from the data import format beginning at the highlighted bar. All line, inclusive, between the starting and ending lines are deleted. To use the **Clear** option, perform the following steps:

1. Move the highlighted bar to the first line you wish to delete.

2. Select **Clear** from the menu bar.

3. UNIVERS displays ``*Delete fields # thru __.*'' Enter the last line you wish to delete.

4. UNIVERS displays ``*WARNING: Deleting fields # thru #. Continue anyway?*'' Type one of the following:

   Y - to delete the range of lines

   N - to continue without deleting the range of lines

Quit. The **Quit** returns you to the Display menu bar.

Print

The **Print** option prints a listing of the Data Import Table in memory.

Procedure
1. Load the desired Data Import Table.

2. Select **Print** from the menu bar.

Create

The **Create** option creates a new Data Import Table. Once you have created a format, it is added to the Data Import Table Listing. Use the **Create** option to define the table number and the description, but not to define the data import format. The format is defined using the **Display** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter new format table number*.'' Enter a new table number.

3. UNIVERS prompts ``*Enter table XXX description*.'' Enter a Data Import Table description of up to 40 characters.

Name

The **Name** option changes the table number and/or description of the highlighted table.

Procedure

1. Highlight the desired table.

2. Select **Name** from the menu bar.

3. UNIVERS displays ``*Enter new format table number*.'' Enter a new table number or press [ENTER] to accept the old number.

4. UNIVERS display ``*Enter table XXX description*.'' Enter a new table description or press [ENTER] to accept the old description.

Kill

The **Kill** option deletes an existing Data Import Table. Once a Data Import Table has been deleted from the listing, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Table ### is about to be killed. Continue anyway?*'' Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Save

The **Save** option saves the Data Import Table in memory to the highlighted Data Import Table. This option can be used to save new Data Import Tables or update modified Data Import Tables. If you do not save the Data Import Table in memory before using the **Load** or **Quit** option, any changes made will be lost. You may save a modified Data Import Table in one of two ways:

•   You may overwrite the same Data Import Table, updating the changes made to it.

•   You may overwrite a different Data Import Table, replacing it with the Data Import Table in memory.

Overwriting the Same Data Import Table:

1. Highlight the Data Import Table.

2. Select **Save** from the menu bar.

Overwriting a Different Data Import Table:

1. Highlight the table to which you would like to save the table in memory.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: You are saving to a different table. Continue anyway?*'' Type one of the following:

    Y - to continue the save procedure

    N - to abort the save procedure

Run

The **Run** option imports data from a source file you specify into the UNIVERS data base, using the Data Import Table in memory.

Procedure

1. Load the desired table.

2. Select **Run** from the menu bar.

3. UNIVERS displays ``*Enter source file.*'' Enter the path and filename of the source file, if it is not in the UNIVERS start-up directory. If you enter a file name only, UNIVERS will search the start-up directory for the file.

4. UNIVERS displays ``*Fixed length or Delimited.*'' Enter one of the following:

    • Enter **F** to import a fixed length file (continue with step 5)

    • Enter **D** to import a delimited file (go to step 8)

5. UNIVERS displays ``*Source record length.*'' Enter the length of each record in the source file.

6. UNIVERS divides the total length of the import file by the entered record length. If it is evenly divisible, the procedure continues with step 6. If it is not evenly divisible, UNIVERS displays ``*ERROR: File <filename> May have incorrect record length, Continue (Y/N.*'' Type one of the following:

    Y - to continue the import using the entered record length

    N - to return to the record length prompt

7. UNIVERS displays ``*Is this source code in ASCII or EBCDIC*.'' Enter one of the following:

   A - ASCII

   E - EBCDIC

8. *This step only applies if **D** was selected in step 4.* Enter the character which is the field delimiter.

9. UNIVERS displays ``*Are we Creating or Updating*.'' Enter one of the following:

   C - to import using the Create mode

   U - to import using the Update mode

Creating New Records

When in Create mode, Data Import creates a new UNIVERS record for each record in the source file that *does not* already exist in the UNIVERS data base. It uses the non-duplicatable key field defined in the Data Import Table to determine if a record already exists. Series cards are created if two *consecutive* records in the source file have the same key. If a record in the source file already exist in the UNIVERS data base, it is written to a temporary file and the procedure continues. After all records in the source file are processed, the following message displays:

1. UNIVERS displays ``*# records already existed during the create. Do you wish to update them now (Y/N)?*'' Type one of the following:

   Y - This option will update the existing UNIVERS records with the data in the data in the temporary file. (Only the first card of any Card Type can be updated. Data Import *cannot* update series cards). The temporary file is then deleted and the procedure is completed.

   N - This option will bypass the Update process. Continue with step 2.

2. If you choose not to update the existing records, UNIVERS displays ``*Do you wish to save the records that already existed to a new file (Y/N)?*'' Type one of the following:

   Y - This option will allow you to save the contents of the temporary file to another file. Continue with step 3.

   N - This option will delete the temporary file and end the procedure.

3. If you choose to save the data in the temporary file to another file, UNIVERS displays ``*Enter the new file name to use*.'' Enter a file name to which to save the data. If you do not enter a path, the file is saved to the UNIVERS start-up directory.

4. If the file already exists, UNIVERS displays ``*File <filename> Exists, do you want to replace it(Y/N)?*'' Type one of the following:

   Y - to overwrite the file with the data in the temporary file

   N - to return to the file name prompt

Updating Existing Records

When in Update mode, Data Import updates existing UNIVERS records with the data in the source file. It uses the non-duplicatable key field defined in the Data Import Table to determine if a record exists. If any records in the source file do not exist in the UNIVERS data base, they are written to a temporary file and the procedure continues as follows:

1. UNIVERS displays ``*# records not found during the update. Do you wish to create them now (Y/N)?*'' Type one of the following:

    Y - This option will create UNIVERS records with the data in the temporary file. Series cards are created if two *consecutive* records in the source file have the same key. The Base Card data from the second record overwrites what was written by the first record. The temporary file is then deleted and the procedure is completed.

    N - This option will bypass the Create process. Continue with step 2.

2. If you choose not to create new records, UNIVERS displays ``*Do you wish to save the records that were not found to a new file (Y/N)?*'' Type one of the following:

    Y - This option will allow you to save the contents of the temporary file to another file. Continue with step 3.

    N - This option will delete the temporary file and end the procedure.

3. If you choose to save the data in the temporary file to another file, UNIVERS displays ``*Enter the new file name to use.*'' Enter a file name to which to save the data. If you do not enter a path, the file is saved to the UNIVERS start-up directory.

4. If the file already exists, UNIVERS displays ``*File <filename> Exists, do you want to replace it(Y/N)?*'' Type one of the following:

    Y - to overwrite the file with the data in the temporary file

    N - to return to the file name prompt

Data Import Error/Exception Report

If any errors are detected in the source file by the import procedure, a report is produced listing those errors. There are two types of errors which can be listed. The first type are data errors in the source file, such as alphanumeric data in a numeric field. The second type of errors listed are data which did not pass the range edits. The first field value for the record (which should be the key to the record) prints along with the field number containing the error and the actual data which produces the error.

Note

For range edits on date fields, **0** is *not* considered invalid. A value of **0** in a date field will be imported as **0**.

Quit

The **Quit** option returns you to the UNIVERS Utilities Menu. Any changes you have made to the Data Import Table currently loaded to memory will be lost if you quit without first saving the changes.

Procedure

1. Select **Quit** from the menu bar.

2. If there is a Data Import Table in memory which has had changes made but has not been saved, UNIVERS displays ``*WARNING: Changes in table ### not saved. Continue anyway?*'' Type one of the following:

    Y - to quit without saving the changes

    N - to return to the menu bar in order to save the table

Export Data

This utility allows you to create an ASCII source file directly from your UNIVERS data base for import into another system. When you select **Export Data** from the UNIVERS Utilities Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used by Export Data From UNIVERS (see **Executing A Selfil Table** in Section 4). Only records which pass through the selected Selfil Table are used by this module.

After you have executed a Selfil Table, the Data Export Screen (Figure 7-10) displays. The Data Export Screen displays a listing of the Data Export Tables which have been created. Each table defines a data export format. A data export format is a set of factors which will be exported to an export file when the Export Table is **Run**.

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box on the right displays the current page number and the number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

```
3:51:35 pm        DATA EXPORT - Ver. 7.2 - 12/16/93     February 16, 1994


  Table    Table Description              Created

  OO1      EXPORT RESIDENTIAL DATA 4OOO BYTES       O8/14/1991
  OO2      EXPORT COMMERCIAL DATA 4OOO BYTES\        O8/14/1991
  OO3      EXPORT INCOME/EXPENSE DATA 4OOO BYTES       O8/14/1991
  OO5      EXPORT RESIDENTIAL DATA 4OOO BYTES       O8/21/1991
  OO7      EXPORT COMMERCIAL DATA 4OOO BYTES        O8/21/1991
  OO9      EXPORT INCOME/EXPENSE DATA 4OOO BYTES        O8/21/1991
```

Figure 7-10. Data Export Screen

There are two steps involved in creating a Data Export Table. First, you must use the **Create** option of the Data Export menu bar to add a Data Export Table to the table listing. This creates a blank Data Export Table. Second, you must use the **Display** option to define the factors to be included in the Data Export Table.

Fresh

The **Fresh** option refreshes the screen, updating changes made to the listing by another user since you first accessed the Data Export Screen. The **Fresh** option is only relevant for network users.

Load

The **Load** option loads a Data Export Table into memory. A Data Export Table must reside in memory to use the **Display**, **Print**, **Run**, and **Copy** options. Only one Data Export Table may be resident in memory at a time. You can ``push'' the resident Data Export Table out of memory by loading a new format.

Procedure
1.   Highlight the table you wish to load.

2.   Select **Load** from the menu bar.

Display

The **Display** option lets you display and edit an existing Data Export Table.

1.   Load the desired Data Export Table.

2.   Select **Display** from the menu bar. UNIVERS displays the Data Export Format Screen (Figure 7-11). If you are displaying a new Data Export Table, the format area will be blank. Modify the Data Export Table, if desired (see **Modifying a Data Export Format** below).

3.   Select **Quit** from the Display menu bar to return to the Data Export menu bar.

```
3:52:01 pm        DATA EXPORT - Ver. 7.2 - 12/16/93    February 16, 1994

Line C-Type Item No Item Name      Format         Size  Pos.

  1  1     2  ENTITY ID NUMBER   LEFT JUSTIFIED      3    1
  2  1     3  BOROUGH        LEFT JUSTIFIED      1    4
  3  1     4  BLOCK          LEFT JUSTIFIED      5    5
  4  1     5  LOT            LEFT JUSTIFIED      4   10
  5  1     6  EASEMENT         LEFT JUSTIFIED    1   14
  6  1     7  SALE DATE        LEFT JUSTIFIED    8   15
  7  1     8  LOAD CONTROL INDICAT LEFT JUSTIFIED      1   23
  8  1     9  MAINTENANCE CODE   ##             2   24
  9  1    10  E-B-B-L-E-SD (PID)  LEFT JUSTIFIED     29   26
 10  1    11  LAST MAINTENANCE DAT ########        8   55
 11  1    12  APPRAISAL YEAR    ####          4   63
 12  1    13  TAX CLASS        LEFT JUSTIFIED    2   67
 13  1    14  HIGHEST LND CARD NO. ####          4   69
 14  1    15  HIGH RES BLD/OBY CN ####           4   73
```

Figure 7-11. Data Export Format Screen

The Data Export Format Screen

When you select **Display** from the Data Export menu bar, the Data Export Format Screen (Figure 7-11) displays. This screen display the format of the Data Export Table in memory. Each line in the format defines a factor to be extracted to the export file. The Data Export Format consists of a six column definition:

- **Line** is the line number of the item in the table.

- **C-Type** is the Card Type of the factor to be exported.

- **Item No** is the Item Number of the factor to be exported.

- **Item Name** is the name of the factor. The name will default to the factor name on the Factor Table. It can be changed, but it is only used for display purposes.

- **Format** defines the format of the exported data. This format will default to the format defined on the Factor Table (except commas will be stripped from numeric data fields).

- **Size** defines the number of bytes to be exported for the factor. The size defaults to the number of bytes required to express the data in the default format.

Modifying a Data Export Format

When you select **Display** from the Data Export menu bar, the Data Export Format Screen displays. At the bottom of the screen is a menu bar with five options:

- **First** displays the first fourteen lines of the data export format.

- **Last** displays the last page of the data export format.

- **Range** displays the data export format beginning with a specific line.

- **Modify** adds or edits lines in the data export format.

- **Quit** returns you to the Data Export menu bar.

The **Modify** option lets you add lines or change any line in the data export format. After you choose **Modify** from the Display menu bar, seven new options display:

Edit. The **Edit** option edits an existing line. To use the **Edit** option, perform the following steps:

1. Highlight the line you wish to edit.

2. Select **Edit** from the menu bar.

3. A new menu bar displays. Choose one of the following options and edit the line:

    - **C-Type** allows you to edit the line beginning with the Card Type.

    - **Item No** allows you to edit the line beginning with the Item Number.

    - **Name** allows you to edit the line beginning with the Name.

    - **Format** allows you to edit the line beginning with the Format.

    - **Size** allows you to edit the line beginning with the Size.

4. After you edit the Size, UNIVERS displays ``*Is this information correct (Y/N).*" Enter one of the following:

    Y - to accept the changes

    N - to reject the changes

5. Repeat steps 1 through 4 until all desired editing is complete.

6. Press [ESCAPE] to return to the Modify menu bar.

7. Press [ESCAPE] again to return to the Display menu bar.

Auto. The **Auto** option adds a line for each factor on a specified Card Type to the data export format. The lines are added beginning at the position of the highlighted bar.To use the **Auto** option, perform the following:

1.   Move the highlighted bar to where you wish to automatically add factors.

2.   Select **Auto** from the menu bar.

3.   UNIVERS displays ``*Enter card number for automatically add*.'' Enter the Card Number which you wish to add to the table. All factors from the entered Card Type are added to the table at the highlighted bar.

Insert. The **Insert** option inserts lines in the data export format. To use the **Insert** option, perform the following:

1.   Select **Insert** from the menu bar.

2.   UNIVERS prompts ``*Enter line to insert*.'' Enter the new line number to insert.

3.   Enter the line.

4.   UNIVERS displays ``*Is this information correct (Y/N)*.'' Enter one of the following:

      Y - to accept the entry

      N - to reject the entry

5.   Repeat steps 1 through 4 until all desired lines have been inserted.

6.   Press [ESCAPE] to return to the Display menu bar.

Delete. The **Delete** option deletes the highlighted line from the data export format. To use the **Delete** option, perform the following steps:

1.   Highlight the line you wish to delete.

2.   Select **Delete** from the menu bar.

3.   UNIVERS displays ``*WARNING: Delete highlighted line. Do you want to Continue?*'' Type one of the following:

      Y - to delete the highlighted line.

      N - to continue without deleting the highlighted line

Clear. The **Clear** option deletes a range of lines from the data export format beginning at the highlighted bar. All lines, inclusive, between the first and last line entered are deleted. To use the **Clear** option, perform the following steps:

1. Select **Clear** from the menu bar.

2. UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line you wish to delete.

3. UNIVERS displays ``*Enter ending line to clear*.'' Enter the last line you wish to delete.

Save. The **Save** option saves the Data Export Table. To use the **Save** option, perform the following:

1. Select **Save** from the menu bar.

2. UNIVERS displays ``*Current format will be Overwritten. Do you want to Continue?*'' Type one of the following:

    Y - to save the table

    N - to abort the save procedure

Quit. The **Quit** option returns you to the Display menu bar. To use the **Quit** option, perform the following:

1. Select **Quit** from the menu bar.

2. If changes were made but were not saved, UNIVERS displays ``*Current Format Changes Not Saved. Do you want to Continue?*'' Type one of the following:

    Y - to quit the modify function without saving the changes

    N - to return to the Modify menu bar so that the changes can be saved

Print

The **Print** option prints a listing of the Data Export Table in memory.

Procedure
1. Load the desired Data Export Table.

2. Select **Print** from the menu bar.

Create

The **Create** option creates a new Data Export Table. Once you have created a table, it is added to the Data Export Table Listing. Use the **Create** option to define the table number and the description, but not to define the data export format. The data export format is defined using the **Display** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter format number (000-999):*.'' Enter the new table number.

3. UNIVERS prompts ``*Enter Format Description (40 character max.)*.'' Enter a Data Export Table description of up to 40 characters.

Kill

The **Kill** option deletes an existing Data Export Table. Once a Data Export Table has been deleted, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Table ### is about to be killed. Do you want to continue?*'' Type one of the following:

   Y - to delete the Data Export Table

   N - to continue without deleting the Data Export Table

Run

The **Run** option generates an export file using the specified Data Export Table and the data set filtered by Selfil. UNIVERS also prints each extracted record on a report.

Procedure

1. Load the desired Data Export Table.

2. Select **Run** from the menu bar.

3. UNIVERS displays the default name it will give the export file and gives you the opportunity to change it. Change it or leave it as is and press [ENTER]. If you do not enter a path, the export file will be written to the UNIVERS start-up directory.

4. UNIVERS displays ``*Do you want a delimited file (Y or N)?*'' Enter one of the following:

   • **Y** - to create a delimited file (continue with step 5)

   • **N** - to create a non-delimited file (go to step 6)

5. UNIVERS displays ``*What character to delimit fields?*'' The default is a comma (,). You can enter another character if you wish. UNIVERS creates the export file.

6. If you are not creating a delimited file, UNIVERS asks ``*Do you want to append end of record mark for each record (Y/N)?*'' Enter one of the following:

   Y - to write records with CRLF codes at the end of each record

N - to write records without an end of record delimiter

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a new Selfil Table.

Copy

The **Copy** option copies the table in memory to a new table number.

Procedure

1. Load the table to be copied.

2. Select **Copy** from the Data Export menu bar.

3. UNIVERS displays ``*Enter format number (000-999):*.'' Enter the new table number.

4. UNIVERS prompts ``*Enter Format Description (40 character max.)*.'' Enter a Data Export Table description of up to 40 characters. The highlighted Data Export Table is copied to the new table number.

Quit

The **Quit** option returns you to the UNIVERS Utilities Menu.

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Quick Print

This module creates columnar, one-line-per-record report formats which can be used to print data from your data base. You can create up to 999 different formats, each one defining a different set of factors to print.

When you select **Quick Print** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used with Quick Print. Only the records which pass through the selected Selfil Table will be included on any report which is **Run**. (See **Executing a Selfil Table** in Section 4).

After you have executed a Selfil Table, the Quick Print Screen (Figure 8-1) displays. The Quick Print Screen displays a list of all the Quick Print Tables which have been created. Each table defines a different report format.

```
11:31:01 am        QUICK PRINT - Ver. 7.2 - 12/16/93      February 16, 1994


   Format      Format Description              Created

   OO1      CHECK COND                  10/27/1991
   OO2       TAX DISTRICTS AND CARDS          10/28/1991
   OO4       CHECK FUNC/ECON             O9/11/1991
   OO5       GRANTEE NAME                10/12/1991
   O1O      NBHD CHARACTERISTICS            10/2O/1991
   O15       IDENTIFY BLOCKED SALES.          10/3O/1991
   1OO       TRANSGEN CHECK              10/25/1991
   111     VACANT PARCEL LISTING           1O/3O/1991
   112      SKELETAL RECORDS             10/3O/1991
   115      CLASS LISTING              10/3O/1991
   117      LAST UPDATES               10/3O/1991
   125       COSTED PARCELS             10/3O/1991
   143       COMMERCIAL LISTING           10/3O/1991
   155       DEACTIVATED PARCELS            10/3O/1991
```

Figure 8-1. Quick Print Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the format number of the report format currently loaded to memory. The box on the right displays the current page number and the number of pages in the report format listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific report format on a page.

There are two steps involved in creating a Quick Print report format. First, you must use the **Create** option of the Quick Print menu bar to add a Quick Print Table to the table listing. This step creates a blank Quick Print Table. Second, you must use the **Display** option to define the factors to be included on the report.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Quick Print Screen. This option is only relevant for network users.

Load

The **Load** option loads a Quick Print Table into memory. A Quick Print Table must reside in memory to use the **Display**, **Print**, and **Run** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1. Highlight the table you wish to load.

2. Select **Load** from the Quick Print menu bar. The selected table is loaded into memory.

Display

The **Display** option lets you display and edit the format of the Quick Print Table in memory. When you select this option, the Quick Print Report Format Screen (Figure 8-2) displays. To define a report format, you enter the factors you wish to appear on the report, the position where they should print, and the format in which they should print.

```
11:31:42 am       QUICK PRINT - Ver. 7.2 - 12/16/93     February 16, 1994

 Line  C-Type  Item No  Item Name        Format          Size  Pos.

  1    1     1O  E-B-B-L-E-SD (PID)  LEFT JUSTIFIED      29    1
  2    1    1O2  SECO          ####          4   31
  3    1    1O7  PAR           LEFT JUSTIFIED     3   36
  4    2     24  STREET NUMBE    RIGHT JUSTIFIED     12   4O
  5    2     45  SQF         CL          3   53
  6    2     56  S           LEFT JUSTIFIED    1   57
  7    2     78  USER DEFINE     LEFT JUSTIFIED    11   59
  8    3     81  SKETCH VECTOR DATA  LEFT JUSTIFIED    21   71
  9    3     67  ADDITION CODES    LEFT JUSTIFIED    17   93
 1O    4     66  OBY           ###          3  111
 11    4     76  OBY: RCNL     #########        9  115
                 LAST LINE IN FORMAT
```

Figure 8-2. Quick Print Report Format Screen.

Quick Print Report Format Screen

The Quick Print report format is defined by entering lines on the Quick Print Report Format Screen. Each line defines a column of data which will print on the report. Each column on the report prints the value of a factor from the data base. One line will print on the report for every parcel passed to Quick Print by Selfil.

- **Line** is the sequential line number of the lines in the report format. The first line defines the first column of the report. The second line defines the second column, etc.

- **C-Type** defines the Card Type of the factor to print on the report.

- **Item No** defines the Item Number of the factor to print on the report.

- **Item Name** is the column heading on the report. UNIVERS defaults to the factor name defined in the Factor Table. However, you may change the name on the report to provide better descriptive headings. The length of the name cannot exceed the size of the column.

- **Format** defines how the data will print on the report. (See **Formatting the Printed Data** below).

- **Size** defines the numbers of characters used to print a data item. Size defaults to the size of the factor as defined in the Factor Table. You may change the size if you wish. Shortening the size may cause truncation on the printed report. You should not shorten the size of Date fields or Categoricals.

- **Pos** defines the column position where the factor will print on the report. This is a display-only field calculated by UNIVERS. A report format can have a total cumulative length of no greater than 131 characters.

Procedure

1. Load the desired table.

2. Select **Display** from the Quick Print menu bar. The Quick Print Report Format Screen displays.

3. Use the following options from the Display menu bar to define the report format:

   - **First** displays the first fifteen lines of your report format.

   - **Last** displays the last page of your report format.

   - **Range** displays the report format beginning with a specific line.

   - **Modify** adds or edits lines in the report format.

4. Modify the report format, if desired (see **Modifying a Quick Print Report Format** below).

5. After all changes have been made select **Quit** from the Display menu bar to return to the Quick Print Screen.

Modifying a Quick Print Report Format

The **Modify** option of the Display menu bar lets you add or change lines in the report format. After you choose **Modify** from the menu bar, six new options display.

Edit. This option changes the parameters of a line in the report format. When editing a line, you can press [ESCAPE] to abort the edit function. You can also use [ ] to back up to the previous item. To use this option, perform the following steps:

1.   Highlight the line you wish to edit.

2.   Select **Edit** from the Modify menu bar.

3.   Select one of the following from the new menu bar which displays:

    •   **C-Type** - to edit the Card Type, Item Number, Format, Size, and Item Name

    •   **Item No** - to edit the Item Number, Format, Size, and Item Name

    •   **Name** - to edit the Item Name

    •   **Format** - to edit the Format, Size, and Item Name

    •   **Size** - to edit the Format, Size, and Item Name

4.   After you edit the item, UNIVERS displays ``*Is this information correct (Yes/No)?*'' Type one of the following:

    Y - to accept the changes

    N - to reject the changes

5.   Press [ESCAPE] to return to the Modify menu bar.

Insert. This option inserts lines in the report format. To use this option, perform the following steps:

1.   Select **Insert** from the Modify menu bar.

2.   Enter the line number you wish to insert.

3.   Enter the information for the new line.

4.   UNIVERS displays ``*Is this information correct (Yes/No)?*'' Type one of the following:

    Y - to accept the entry

    N - to reject the entry

5.   Repeat steps 3 and 4 until all desired lines have been inserted.

6.   Press [ESCAPE] to return to the Modify menu bar.

Delete. This option deletes the highlighted line from the report format. To use this option, perform the following steps:

1. Highlight the line you wish to delete.

2. Select **Delete** from the Modify menu bar.

3. UNIVERS displays ``*Delete highlighted line. Do you want to continue?*'' Type one of the following:

   Y - to delete the highlighted line.

   N - to continue without deleting the highlighted line

Clear. This option deletes a range of lines from the report. All line, inclusive, between the starting line and ending line entered are deleted. To use this option, perform the following steps:

1. Select **Clear** from the Modify menu bar.

2. UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line number you wish to clear.

3. UNIVERS displays ``*Enter ending line to clear*.'' Enter the last line you wish to clear.

Save. This option saves the changes made to the report format. If you do not save the changes before you quit, the changes will be lost. To use this option, perform the following steps:

1. Select **Save** from the Modify menu bar.

2. UNIVERS displays ``*WARNING: Current format will be overwritten. Do you want to continue?*'' Type one of the following:

   Y - to save the changes

   N - to continue without saving the changes

Quit. This option returns you to the Display menu bar. To use this option, perform the following steps:

1. Select **Quit** from the Modify menu bar.

2. If there are changes to the format which have not been saved, UNIVERS displays ``*Current format changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to continue without saving the changes

   N - to return to the Modify menu bar to save the changes

Formatting the Printed Data

Format refers to the appearance of the data on the report when it is printed. The format for all types of data defaults to the definition in the Factor Tables.

Formatting Text or String Data. Text or String data is formatted as either right-justified or left-justified. You can enter the words **Right Justified** or **Left Justified** for descriptive purposes, but UNIVERS only uses the first letter (R or L) to determine how to justify the data.

Formatting Dates. Dates are formatted as Text or String data. UNIVERS defaults to eight characters for an MMDDYYYY format. You may change it to **MM/DD/YYYY**.

Formatting Numeric Data. There are several different formats which can be used for numeric data. Numeric format styles are built from four characters:

• **#** (pound sign) - represents a numeric digit

• **.** (period) - represents a decimal point

• **$** (dollar sign) - places a dollar sign before a value to represent currency

• **,** (comma) - prints a comma as a thousands separator

Combine these characters to build your format. The table below shows examples of sample format styles and how each would display values.

Format Style	Sample Value
#	1
##	12
###	123
#####	12345
$###.##	$123.45
#,###,###.##	1,234,567.89
$###,###,###	$123,456,789

Formatting Categoricals. There are three different entities which may be printed for Categorical Factors: Level Number, Level Name, and Level Value. You must specify which one of the three to print using the one of the following formats:

• **CL** tells UNIVERS to print the Categorical Level Number.

• **CN** tells UNIVERS to print the Categorical Level Name.

• **CV** tells UNIVERS to print the Categorical Level Value.

Print

The **Print** option prints the report format of the Quick Print Table in memory. It does not produce the Quick Print report.

Procedure

1. Load the desired table into memory.

2. Select **Print** from the Quick Print menu bar.

Create

The **Create** option creates a Quick Print Table. Once you create the table, it is added to the listing. The table number and description are defined with this option, but the factors to be included in the report format are not. To define the factors to be included in the format, use the editing functions of the **Display** option.

Procedure

1. Select **Create** from the Quick Print menu bar.

2. UNIVERS displays ``*Enter format number (001-999):.*'' Enter new table number.

3. UNIVERS prompts ``*Enter format description (40 characters max.)*'' Enter a description of up to 40 characters.

Copy

The **Copy** option copies the highlighted table to a new table number.

Procedure

1. Highlight the table to be copied.

2. Select **Copy** from the Quick Print menu bar.

3. UNIVERS displays ``*Enter new format number (001-999):.*'' Enter the table number to give to the new table.

4. UNIVERS prompts ``*Enter Format Description (40 character max.)*.'' Enter a Quick Print Table description of up to 40 characters.

Kill

The **Kill** option deletes a Quick Print Table. Once a Quick Print Table has been deleted, it cannot be restored.

Procedure
1. Highlight the table you wish to delete.

2. Select **Kill** from the Quick Print menu bar.

3. UNIVERS displays ``*WARNING: Deleting format ###.   Do you want to continue?*'' Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Run

The **Run** option generates a report using the specified loaded table and the data set filtered by Selfil. UNIVERS uses the selected Selfil Table to extract data from the data base and prints each extracted record on the report according to the report format. Totals and averages for all numeric factors are calculated. You can also calculate median values for all numeric factors. You can also have the report output to the screen instead of the printer.

Procedure
1. Load the desired table.

2. Select **Run** from the Quick Print menu bar.

3. UNIVERS asks ``*Do you want to calculate medians (Y OR N).*'' Type one of the following:

    Y - to calculate medians for numeric factors

    N - to not calculate medians for numeric factors

4. UNIVERS asks ``*Do you want to view or print the results (V OR P).*'' Type one of the following:

    V - to view the results on the screen

    P - to print the results on the printer

Select

The **Select** option returns you to the UNIVERS Selfil Table Menu, so you can select another Selfil Table for use with this module.

Quit

The **Quit** option returns you to the UNIVERS Reporting Menu

Report Generator

This module creates more sophisticated report formats than can be created with Quick Print. You can create multi-line-per-record reports, form letters, mailing labels and other complex report formats. You can also perform calculations using parcel data and/or constant values and print the results on a report. You can create up to 999 different report formats.

In order to most effectively use the Report Generator, you should be familiar with the capabilities and limitations of your printer. You should also be familiar with how lines per inch, characters per inch, and inches per page interrelate to determine how many rows (lines) long and how many columns (characters) wide a report format can be. Report Generator allows you to set all of these items for your report. It also allows you to determine the exact position on the page (row and column) where items will print. You can print factor names and actual values from factors in your data base. You can also print constants on your report, such as headings and titles.

When you select **Report Generator** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used with Report Generator. Only the records which pass through the selected Selfil Table will be included on any report which is **Run**. (See **Executing a Selfil Table** in Section 4).

After you have executed a Selfil Table, the Report Generator Screen (Figure 8-3) displays. The Report Generator Screen displays a listing of all Report Generator Tables which have been created. Each table defines a different report format which can be used to print data.

```
1:37:58 pm        REPORT GENERATOR - Ver. 7.2 - 12/16/93    February 16, 1994


    Table      Table Description            Created

    OO1        CHECK COND                   1O/27/1991
    OO2         TAX DISTRICTS AND CARDS             1O/28/1991
    OO4         CHECK FUNC/ECON             O9/11/1991
    OO5         GRANTEE NAME                1O/12/1991
    OO9         ICS SHEET                  1O/2O/1991
    O15         IDENTIFY BLOCKED SALES.            1O/3O/1991
    1OO         TRANSGEN CHECK              1O/25/1991
    111       VACANT PARCEL LISTING            1O/3O/1991
    112        SKELETAL RECORDS             1O/3O/1991
    115        CLASS LISTING               1O/3O/1991
    117        LAST UPDATES                1O/3O/1991
    125         COSTED PARCELS                 1O/3O/1991
    143         COMMERCIAL LISTING              1O/3O/1991
```

Figure 8-3. Report Generator Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box on the right displays the current page number and number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are two steps involved in creating a report format. First, you must use the **Create** option of the Report Generator menu bar to add a Report Generator Table to the table listing. This step creates a blank Report Generator Table. As part of this step, you can optionally create calculations for the report. Second, you must use the **Display** option to define the factors to be included on the report. Additional characteristics of a report format can be defined using the **Disp** and **Calc** options.

Load

The **Load** option loads a Report Generator Table into memory. A Report Generator Table must reside in memory in order to use the **Disp**, **Calc**, **Print**, **Options**, **Run**, **Save**, or **Copy** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1. Highlight the table you wish to load.

2. Select the **Load** from the Report Generator menu bar. If there is already a report format in memory, which has been changed but not saved, UNIVERS displays ``*WARNING: Current format ### changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to load the new table without saving the table in memory

   N - to end the load function and keep the current table in memory

Display

The **Disp** option lets you display and edit the contents of a Report Generator Table. When you select this option from the Report Generator menu bar, the Report Generator Format Screen (Figure 8-4) displays. To define a report format, you enter the items you wish to appear on the report, the position where they should print, and the format in which they should print. Other format settings can be set through the **Options** option.

Procedure
1. Load the desired table.

2. Select **Disp** from the Report Generator menu bar. The Report Generator Report Format Screen (Figure 8-4) displays.

3. Use the following options from the Display menu bar to define the report format:

- **First** displays the first page of your report format.

- **Last** displays the last page of your report format.

- **Range** displays the report format beginning with a specific line.

- **Modify** adds or edits lines in the report format.

- **Quit** returns you to the Report Generator Screen.

4. Modify the report format, if desired (see **Modifying a Report Generator Report Format** below).

5. After all changes have been made select **Quit** from the Display menu bar to return to the Report Generator Screen.

```
3:57:33 pm        REPORT GENERATOR - Ver. 7.2 - 12/16/93   February 16, 1994

 Line  Row  Column  Type  Sktch Line, Factor Name, Constant, or Card-Item

   1   2    59    C    CLT UNIVERS
   2   3    54    C    ANYTOWN, USA
   3   4    47    C    RESIDENTIAL INVENTORY CONTENT SHEET
   4   5    1    C    O1O MAP & LOT #
   5   5    19    D    C-Type O1 Item OO2 LEFT JUSTIFIED
   6   5    4O    C    CARD
   7   5    48    C    OF
   8   5    51    D    C-Type O1 Item 113 ##
   9   5    61    C    1OO/1O1 CLASS CODE
  10   6    1    A    ADD-O12
  11   7    1    T    T-Calc OO1
  12   1    1    E    EJECT
  13   1    2    S    Line-# O1
  14   2    2    S    Line-# O2
```

Figure 8-4. Report Generator Report Format Screen

Report Generator Report Format Screen

The Report Generator report format is defined by entering lines on the Report Generator Report Format Screen. Each line defines an item to be printed on the report. Unlike Quick Print, you are not limited to a columnar format. You can place items anywhere on the page. The report format must be defined from the top left of the page, across the page and down. You cannot enter a line definition which places an item above or to the left of the item defined by the previous line. Other special page and print settings must be set using the **Options** option.

- **Line** is the format line number, not the line number on the printed page.

- **Row** is the row (line) number where the item will appear on the printed report.

- **Column** is the column (character position) where the item will appear on the printed page.

- **Type** identifies the type of item to appear on the report at the defined row and column position. There are three types of items which can be defined:

  - **A** prints an addition code line on the report. There are some special processes involved with printing additional lines. See **Printing Addition Code Lines** below for more information on using this feature.

  - **C** prints a constant on the report. You can define a constant of up to 40 characters. If you want to create a constant of more than 40 characters, you must use multiple format lines.

  - **D** prints the value of a factor from the data base.

  - **E** causes a page ejection to occur. This feature is used to create multi-page forms or to create a duplex form for those printers which support duplex printing.

  - **F** prints the Factor Name on the report. The Factor Name defaults to the Factor Name defined in the Factor Tables. You can modify it to create a more descriptive name for the report.

  - **S** prints a Sketch Vector Line on the report. You must specify a sketch vector line number. The number of lines in the sketch is determined by the calculations made on the Report Generator Options Menu (see **Options** below). Referring to Figure 8-4, line numbers 13 and 14 are examples which would print the first and second lines of a sketch in a report format.

  - **T** prints the value of a calculated temporary factor defined using the **Calc** option. Referring to Figure 8-4, line number 11 is an example which would print the Temporary Factor 001 defined using the **Calc** option. These temporary factors must be defined before than can be included in a report format.

- **Sktch Line, Factor Name, Constant or Card-Item** displays what prints on the report based on the **Type**.

  - **Addition Code Line** - If **A** is the **Type**, the addition code line number and the number identifying part of the addition to be printed displays. (See **Printing Addition Code Lines** below).

  - **Constant** - If **C** is the **Type**, the constant displays exactly as it will print.

  - **Card-Item** - If **D** is the **Type**, the Card Type, Item Number, and format display.

  - **Eject** - If **E** is the **Type**, the descriptive text entered when the eject was defined displays.

  - **Factor Name** - If **F** is the **Type**, the Card Type and Item Number of the factor displays.

- **Sketch Vector Line** - If **S** is the **Type**, the sketch vector line number to be printed displays.

- **Calculated Factor** - If **T** is the **Type**, the factor number of the calculated factor defined using the **Calc** option displays.

Modifying a Report Generator Report Format

The **Modify** option lets you add or change lines in the report format. After you choose **Modify** from the Report Format menu bar, six new options display.

Edit. The **Edit** option changes the settings of an existing line in the report format. To this option, perform the following steps:

1. Select **Edit** from the Modify menu bar.

2. Highlight the line you wish to edit and select one of the following from the Edit menu bar:

    • **Line** allows you to change the line number of the specified line.

    • **Row** allows you to change the row position of the specified line.

    • **Column** allows you to change the column position of the specified line.

    • **Type** allows you to change the factor type and the factor name or constant or card-item for the specified line.

    • **S-Line Fctr Name, Cnstnt, Crd-Itm, Tmp or Adtn** allows you to change the specific items unique to each **Type** for the specified line.

3. Repeat step 2 until all editing is completed.

4. Press [ESCAPE] to return to the Modify menu bar.

Insert. The **Insert** option inserts a new line in the report format. To use this option, perform the following steps:

1. Select **Insert** from the Modify menu bar.

2. Enter the new line in the format.

3. Repeat step 2 until all desired lines have been inserted.

4. Press [ESCAPE] to return to the Modify menu bar.

Delete. The **Delete** option deletes a line from the format. To use this option, perform the following steps:

1. Highlight the line you wish to delete.

2. Select **Delete** from the Modify menu bar.

3. UNIVERS displays ``*Delete highlighted line. Do you want to Continue?*'' Type one of the following:

   Y - to delete the highlighted line

   N - to end the continue without deleting the highlighted line

Clear. The **Clear** option deletes a range of lines in the report format. All lines between the starting and ending line numbers, inclusive, are deleted. To use this option, perform the following steps:

1. Select **Clear** from the Modify menu bar.

2. UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line number.

3. UNIVERS displays ``*Enter ending line to clear*.'' Enter the last line number.

Renumber. The **Renumber** option renumbers line numbers or row numbers in your report format. When changing line and row numbers, UNIVERS will not let you overlap existing line and row numbers.

To Renumber Line Numbers

1. Select **Renumber** from the Modify menu bar.

2. Enter **1** to change line numbers.

3. Enter the starting and ending line numbers to be renumbered.

4. Enter the new starting line number.

5. Enter the increment between lines. UNIVERS renumbers the line numbers.

To Renumber Row Numbers.

1. Select **Renumber** from the Modify menu bar.

2. Enter **2** to change the row numbers.

3. Enter the starting and ending line numbers to be renumbered.

4. Enter the new row position for the starting line number.

5. Enter one of the following:

    1 - If multiple lines in the format have the same row number, they will continue to have the same row numbers. For example, if lines 2 and 3 both are defining an item in row 1 and the rows are renumbered, both will change to the same new row number.

    2 - If multiple lines in the format have the same row numbers, they will no longer have the same row numbers. They will be incremented by the increment between lines. For example, if lines 2 and 3 both are defining an item in row 1 and the rows are renumbered with 1 as the increment between lines, the row number in line 3 will be 1 greater than the row number in line 2.

6. Enter the increment between lines. UNIVERS renumbers the row numbers.

Quit. The **Quit** option returns you to the Display menu bar.

Printing Addition Code Lines

There are two ways to print addition code lines on a report format. First you can simply print the data as it is stored in the data base. Or you can use the special processing features of the Report Generator to print the addition code line data in a more descriptive format. When choosing this second option to print addition code data, there are some special processing features which must be taken into account. First, you must understand how addition code lines are stored in UNIVERS. Also, you must understand the function of a special file which is used by the Report Generator in order to print addition code data on a report.

Addition Line Format. Addition code data are stored in a specific format in UNIVERS. There are three different types of data which comprise this format: Addition Codes, user-defined areas, and calculated areas. Below is an example addition line as it is stored UNIVERS.

Example: `Lw1s2s3sAAAACCCCC`
              `1010      1832`

Addition Codes. In the example above the top row shows an example of the addition line layout. The second row shows an example of actual data which could be stored in the addition line. In this example, there are four locations (Lw, 1s, 2s, and 3s) which define Addition Codes. Each of these can contain a two character Addition Code. Your addition code lines may have a different format. For instance, there may only be three levels which can contain three character codes. The Report Generator uses the ADDITION.DAT file to determine the exact format of the addition lines in your data base.

Addition Areas. There are two types of areas which can be stored for an addition line. The first one is a user-defined area (designated by the As in the example above). The second type is the system calculated area (designated by the Cs in the example above). In the example the user-defined area is four characters long and the calculated area is five characters long. The lengths used in your data base may be different. The Report Generator uses the ADDITION.DAT file to determine these lengths.

ADDITION.DAT File. There is a special file used by the Report Generator to print addition line data on a report. It must be located in your data directory. It cannot be edited from within UNIVERS, but can be edited by any DOS text editor. This file

defines the format of the addition code lines in your data base and stores the descriptive names which can be printed for each Addition Code.

Defining the Addition Code Line Format. The first line in this file defines the format of the addition code lines in your data base. The example below would define the format of the addition line example above.

Example: 04020904130516

This line contains sixteen characters, counting the carriage return [CR] and line feed [LF] characters. Every two characters defines something to the Report Generator:

• The first two characters define the number of levels which can store Addition Codes. In the example, there are four levels: Lower (Lw), First Story (1s), Second Story (2s), and Third Story (3s).

• The third and fourth characters define the length of each Addition Code. In this example all Addition Codes are two characters in length.

• The fifth and sixth characters define the starting location in the addition line string of the user-defined area. In this example the starting location is character position 9.

• The seventh and eighth characters define the length of the user-defined area. In this example the length is four characters.

• The ninth and tenth characters define the starting location in the addition line string of the calculated area. In this example the starting location is character position 13.

• The eleventh and twelfth characters define the length of the calculated area. In this example the length is five characters.

• The last two characters define the record length of the Addition Code descriptions in the ADDITION.DAT file.

Defining the Descriptive Names. The ADDITION.DAT file also stores the descriptive names which can be printed for each Addition Code. Every line after the first line is an Addition Code Description record. Each record can be up to sixteen characters long, counting the carriage return [CR] and line feed [LF] codes which must end each record. Below is an example of a record from an ADDITION.DAT file.

Example: 18Attic Unfshd[CR][LF]

In this example, the first two characters identify the Addition Code for which a description is being define. If Addition Codes in your data base are three characters in length, the first three characters in each record must define the Addition Code. The next twelve characters define the descriptive name. If Addition Codes were three characters long in this example, there would only be eleven characters available to define the descriptive name for the code.

Defining Addition Lines for Printing. When you select **A** as the **Type** for a line in a report format, you must define two items which instruct the Report Generator as to what to print. First, you must enter the addition line number. Entering **01** will cause data to

print for the first factor defined as an addition code line on the Report Generator Options Menu (see **Options** below); entering **02** will cause data to print for the second factor defined as an addition code line on the Report Generator Options Menu; etc.

Example: `Lw1s2s3sAAAACCCCC`
`        1010       1832`

After you define the addition line number, you must define the position number of the data to print. In the addition line format example above, there are six different parts to each addition line. There are four levels to define Addition Codes and there are two types of areas (user-defined and calculated). Using the example above, the following entries in the position number would work as described:

- Entering **1** for position number would cause Report Generator to print the *descriptive name* for the Lower Level (Lw) Addition Code. The Addition Code for the Lower Level is blank, so nothing would print.

- Entering **2** for position number would cause Report Generator to print the *descriptive name* for the First Story (1s) Addition Code. The Addition Code for the First Story is **10**, so the *descriptive name* defined in the ADDITION.DAT file for Addition Code **10** would print.

- Entering **3** for position number would cause Report Generator to print the *descriptive name* for the Second Story (2s) Addition Code. The Addition Code for the Second Story is **10**, so the *descriptive name* defined in the ADDITION.DAT file for Addition Code **10** would print.

- Entering **4** for position number would cause Report Generator to print the *descriptive name* for the Third Story (3s) Addition Code. The Addition Code for the Third Story is blank, so nothing would print.

- Entering **5** for position number would cause Report Generator to print the user-defined area for the addition line. There is no user defined area in this example, so nothing would print.

- Entering **6** for position number would cause Report Generator to print the calculated area for the addition line. The calculated area in this example is **1832**.

Notes

Referring to Figure 8-4, line number 10 shows an example which would print the *descriptive name* of the Addition Code for the First Story for the first factor defined as an addition code line on the Report Generator Report Options Menu (Figure 8-6).

If your data base uses a different number of levels, the number used for each position number must be adjusted accordingly.

Entering an Eject Code

Entering an **E**(ject) code in a report causes the printer to eject a page before continuing with the rest of the format. This can be used to create multi-page forms or to print duplex on printers which support duplex printing. When entering an **E**(ject) code in the report format, enter a row number one greater than the one defined in the previous format line and enter column **1**. The row number will be changed to **1** after editing is completed. Referring to Figure 8-4, line number 12 shows an example of an **E**(ject) code in a report format. The subsequent format lines would print on a second page.

Once an **E**(ject) code has been entered, you can begin printing with row **1** once again starting with the next format line. However, if you start with row **1**, you cannot print in column **1**. You must start with column **2**, since the **E**(ject) code has been defined with row **1** and column **1**.

Note

If you have an **E**(ject) code in your report format, you must be very careful about deleting it. You should delete all of the format lines following it first. When you delete the **E**(ject) code the following lines *are not renumbered*. Therefore, deleting an **E**(ject) code without deleting the format lines which follow will create error conditions when you **Run** the report.

Calc

The **Calc** option lets you display and edit the calculated factors defined for a report format. When you select this option from the Report Generator menu bar, the Report Generator Calculations Screen (Figure 8-5) displays.

Procedure

1. Load the desired table.

2. Select **Calc** from the Report Generator menu bar. The Report Generator Calculations Screen (Figure 8-5) displays.

3. Use the following options from the Calculation menu bar to define the report format:

    •   **First** displays the first page of calculated factors.

    •   **Last** displays the last page of calculated factors.

    •   **Range** displays the calculated factors beginning with a specific line.

    •   **Modify** adds or edits calculated factors.

    •   **Quit** returns you to the Report Generator Screen.

4. Modify the calculated factors, if desired (see **Modifying Calculated Factors** below).

5. After all changes have been made select **Quit** from the Calculation menu bar to return to the Report Generator Screen.

```
10:30:43 am       REPORT GENERATOR - Ver. 7.2 - 12/16/93   February 16, 1994

 Ln T-Itm  Desc    Format    Cd-Itm  Name  Op Cd-Itm  Name  RD

 1 T- 1 SALE SUM  ##,###,###    O1-O31 SALE PRICE SUM O1-O33 SALE PRICE  O
 2 T- 2 SALE AVE  ##,###,###    T-OO1 SALE SUM  /  C-      3  O
 3 T- 3 SUB PRICE ##,###,###    O3-134 BASE PRICE SUM O3-142 UNFIN. ARE  O
 4 T- 4 TOT PRICE ##,###,###    T-OO3  SUB PRICE  +  O3-145 FIREPLACE  -2
 5 T- 5 TOT AREA  ##,###,###    O3-124 TOT LIVING +  O3-129 TOT UNFIN  O
 6 T- 6 ASSESSED  ##,###,###    O1-O87 TOT APPRAI *   C-     .3  -2
                    LAST LINE IN FORMAT
```

Figure 8-5. Report Generator Calculations Screen

Report Generator Calculations Screen

Calculated factors are define by entering data on the Report Generator Calculations Screen (Figure 8-5). Calculated factors are ``temporary'' factors which are used to perform calculations with constants and/or numeric factors from the data base. These temporary factors are not stored in the UNIVERS data base. They are only created temporarily in memory when you use the **Run** option to produce the Report Generator report. Calculated factors must be defined on this screen before they can be defined as part of the report format using the **Display** option. Each calculated factor consists of the following items:

- **Ln** defines the line number (001-200) of the calculated factor.

- **T-Itm** defines the factor number of the calculated factor. You can use the same number several times in a format. The last calculation performed for a temporary factor number is the one which will be printed on the report.

- **Desc** defines the description of the calculated factor.

- **Format** defines the print format of the calculated factor.

- **Cd-Itm** defines the data to be used in the calculation. There are two of these which must be defined. The first defines the First Operand. The second defines the Second Operand. These operandi can be numeric factors from the data base, other calculated factor, or constants.

- **Name** displays a description for the operand. There are two of these, one for each operand. If the operand is a factor from the data base, the factor name displays. If the operand is a calculated factor, the description displays. If the operand is a constant, the constant displays.

- **Op** defines the operator to use with the two operandi. The following operators can be used:

    - **Addition** - Enter **1** as the operator type to add the two operandi.

    - **Subtraction** - Enter **2** as the operator type to subtract the second operand from the first.

    - **Multiplication** - Enter **3** as the operator type to multiply the two operandi.

    - **Division** - Enter **4** as the operator type to divide the first operand by the second.

    - **Summation** - Enter **5** as the operator type to sum a range of values. The two operandi must be of the same type and the range defined must contain all numeric factors.

- **RD** defines the rounding factor to use for the calculated factor. This value can be from **-3** to **9** (nearest one thousandth to nearest one billion).

    Example: To round 14.682 to the nearest one (which would be 15), set **RD** = **0**. To round it to the nearest ten (which would be 10), set **RD** = **1**. To round it to the nearest tenth (which would be 14.7), set **RD** = **-1**.

Modifying Calculated Factors

The **Modify** option lets you add or change calculated factors in a report format. After you choose **Modify** from the Report Format menu bar, five new options display.

Edit. The **Edit** option changes the settings of an existing calculated factor. To this option, perform the following steps:

1. Select **Edit** from the Modify menu bar.

2. Highlight the calculated factor you wish to edit and select one of the following from the Edit menu bar:

    - **TempCalc** allows you to edit the Item Number, Name, and Format of the calculated factor.

    - **FirstOperand** allows you to edit the first operand.

    - **Operator** allows you to edit the operator.

    - **SecondOperand** allows you to edit the second operand.

    - **Round** allows you to edit the rounding factor.

3. Repeat step 2 until all editing is completed.

4. Press [ESCAPE] to return to the Modify menu bar.

Insert. The **Insert** option inserts a new calculated factor. To use this option, perform the following steps:

1. Select **Insert** from the Modify menu bar.

2. Enter the new calculated factor information.

3. Repeat step 2 until all desired lines have been inserted.

4. Press [ESCAPE] to return to the Modify menu bar.

Delete. The **Delete** option deletes a calculated factor. To use this option, perform the following steps:

1. Highlight the line you wish to delete.

2. Select **Delete** from the Modify menu bar.

3. UNIVERS displays ``*Delete highlighted line. Do you want to Continue?*'' Type one of the following:

   Y - to delete the highlighted line

   N - to end the continue without deleting the highlighted line

Clear. The **Clear** option deletes a range of calculated factors. All lines between the starting and ending line numbers, inclusive, are deleted. To use this option, perform the following steps:

1. Select **Clear** from the Modify menu bar.

2. UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line number to clear.

3. UNIVERS displays ``*Enter ending line to clear*.'' Enter the last line number to clear.

Quit. The **Quit** option returns you to the Calculation menu bar.

Print

The **Print** option prints a listing of the table in memory. The purpose of the **Print** option should not be confused with the **Run** option. The **Print** option produces a printout of the report format. It does not generate the report.

Procedure

1. Load the desired table.

2. Select **Print** from the menu bar. UNIVERS prints the report format.

Create

The **Create** option creates a new table. Use the **Create** option to define the table number and description, but not to define the report format. The report format is defined using the **Disp** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter format number (001-999).*'' Enter a new table number.

3. UNIVERS prompts ``*Enter Format Description (39 characters max.)*'' Enter a description of up to 39 characters.

4. UNIVERS asks ``*Do you wish to input User Calculations Y or N?*'' Enter one of the following:

    N - to continue without entering user calculations

    Y - to enter user calculations

Note

The Report Generator Calculations Screen (Figure 8-5) displays. Continue with step 3 of the **Calc** option procedure.

Kill

The **Kill** option deletes an existing table. Once a table has been deleted, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Deleting Format ###. Do you want to Continue?*'' Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Options

The **Options** option displays the Report Generator Options Menu (Figure 8-6). The Report Generator Options Menu allows you to set print characteristics for your report. If you change any of these options for a report format, they are saved automatically. You do not need to use the **Save** option.

Changing Options

1. Load the desired table.

2. Select **Options** from the menu bar. The Report Generator Options Menu (Figure 8-6) displays.

3. Enter the Item Number (1-7) you wish to change.

4. Press the space bar to scroll through the valid values for the option and press [ENTER] to select the one you want (for items 1, 2, 5, 6, 9, 11, 12, and 13) or enter the desired value (for items 3, 4, 7, 8, and 10).

5. Use [ ], [ ] and [ENTER] to move from line to line.

6. From any item, press [ESCAPE] or from item 13 press [ENTER] to return to the menu bar.

7. Press [ESCAPE] or enter **R** to return to the Report Generator Screen.

```
3:57:53 pm        REPORT GENERATOR - Ver. 7.2 - 02/16/94   February 16, 1994


                  Options Menu

 1. Characters Per Inch                  17
 2. Lines Per Inch                 6
 3. Inches Per Page                11
 4. Records Per Page               1
 5. Print Landscape N=No, 1=legal, 2=letter      N
 6. Print Date/Time in Upper Hand Left Corner    Y
 7. Print Duplex N=No, L=Long edge, S=Short edge     N
 8. Card, Item, # of Lines for Sketch Vector   Card 3 Item 81 Lines 9
 9. Additions    Card 3 Items 72 73 74 75 76 77 78 79 80
10. Width of Sketch in inches            4
11. Height of Sketch in inches         6
12. Display Sketch Error Message         N
13. Print Page Number in Upper Right Hand Corner   Y
   Total Chars  68    Total lines  36
```

Figure 8-6. Report Generator Options Menu

Characters Per Inch (CPI)

There are three choices for characters per inch: 10, 12, and 17. You need to make sure the number of columns (characters) in any row of your report format does not exceed the number of characters you can print per line with your printer based on the size of the paper you are using and the characters per inch you define. The actual number of characters per inch and maximum number of characters per line will vary slightly from printer to printer, especially when using compressed print (17 CPI).

In order to allow maximum flexibility in report design, UNIVERS assumes you have calculated the maximum characters per line correctly. It does not warn you if you exceed the maximum, since it does not know the exact limitations of your printer. Miscalculation of the maximum may cause unpredictable results when generating your report.

Lines Per Inch

There are two choices for lines per inch: 6 and 8.

Inches Per Page

You can set inches per page to any value between 1 and 22 in tenth of an inch increments. This option is useful for creating reports for non-standard forms, such as mailing labels.

Records Per Page

Use this option to set how many records you want to print on each page of your report. UNIVERS will verify that the number of records selected will fit on a single page using the following formula:

Records Per Page <= Lines Per Inch X Inches Per Page / Last Row

This calculation is done when you set Records Per Page. If you change the number of rows in your report format after setting this option, you may get unpredictable results when generating the report. You should reset this option if you change the number of rows in the report format.

Print Landscape

This option allows you to print landscape on laser printers. The following values are valid. For printers which do not support landscape printing, this option should be set to **N**:

N - prints in portrait mode on a laser printer.

1 - prints landscape on legal size (8½ x 14) paper.

2 - prints landscape on legal size (8½ x 11) paper.

Print Date/Time in Upper Left Corner

This option can be set to one of the following:

Y - prints the date and time beginning at row 1 column 1 of each page of the report.

N - suppresses printing the date and time.

Print Duplex

If the **Print Landscape** option is set to **N**, this option will default to **N** and cannot be changed. If the **Print Landscape** option is set to **Y**, this option determines whether or not duplexed pages should be oriented for **L**(ong) or **S**(hort) edge binding. (Refer to your printer manual for an explanation of Long and Short edge binding).

Card, Item, # of Lines for Sketch Vector

This option defines card type and item number of the first sketch vector and the number of sketch vector lines (up to nine) defined in the factor tables. Report Generator assumes that all sketch lines are stored in consecutive item numbers on the same card type beginning with the card type and item number defined by this option. If sketch vector lines are not going to be included in the report format, this item can be left blank.

Additions

This option defines the card type and item numbers for the addition code lines. Report Generator assumes all addition code lines are located on the same card type. However, the item numbers *do not* need to be consecutive. Up to nine addition lines can be defined. If addition code lines are not going to be included in the report format, these items can be left blank.

Width of Sketch

This option defines the print width in inches of the sketch on the printed report. This option combined with the characters per inch are used to calculate the **Total Chars** required to display a sketch line on the printed report. If sketch vector lines are not going to be included in the report format, this item can be left blank.

Height of Sketch

This option defines the print height in inches of the sketch on the printed report. This option combined with the lines per inch are used to calculate the **Total lines** required to display a sketch on the printed report. If sketch vector lines are not going to be included in the report format, this item can be left blank.

Display Sketch Error Message

This option defines whether or not to print error messages for those records which encounter errors in the sketch routine due to incorrect data on the parcel record. If **N** is selected and an error is encountered, the sketch area will be left blank on the report. If **Y** is selected and an error is encountered, an error message will print in the sketch area on the report.

Print Page Number in Upper Right Corner

This option can be set to one of the following:

Y - prints the page number right-justified in row 1 of each page of the report

N - suppresses printing the page number

Run

The **Run** option generates a report, using the table in memory and the data set filtered by Selfil. If the desired table is already loaded and has been modified but not saved, you must save it before you can run it.

Procedure
1.   Load the desired table.

2.   Select **Run** from the menu bar.

Save

The **Save** option saves the table in memory. This option can be used to save new tables or update modified tables. If you do not save the table in memory before using the **Load**, **Select**, or **Quit** options, changes will be lost.

1.   Select **Save** from the menu bar.

2.   UNIVERS displays ``*WARNING: Current Format will be Overwritten. Do you want to Continue?*'' Type one of the following:

   Y - to continue the save procedure

   N - to abort the save procedure

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a new Selfil Table.

Procedure
1.   Select **Select** from the menu bar.

2.   If there is a table in memory which has had changes made but has not been saved, UNIVERS displays ``*WARNING: Current format ### changes not saved. Do you want to Continue?*'' Type one of the following:

   Y - to return to the UNIVERS Selfil Table Menu without saving the table

   N - to end the select function

Copy

The **Copy** option copies the table in memory to a new table number. All elements of a table are copied, including the table options and calculations.

Procedure

1. Load the table to be copied.

2. Select **Copy** from the menu bar.

3. UNIVERS displays ``*Enter format number (001-999).*'' Enter the new table number.

4. UNIVERS displays ``*Enter Format Description (39 character max.).*'' Enter a description of up to 39 characters.

Quit

The **Quit** option returns you to the UNIVERS Reporting Menu. Any changes you have made to the table currently loaded to memory will be lost if you quit without first saving the changes.

1. Select **Quit** from the menu bar.

2. If there is a table in memory which has had changes made but has not been saved, UNIVERS displays ``*WARNING: Current format ### changes not saved. Do you want to Continue?*'' Type one of the following:

   Y - to quit without saving the table

   N - to return to the menu bar in order to save the table

Two Factor Comparison

This module generates reports which compare two different numeric factors from the data base. The difference between the two factors can be stored to another factor. You can create up to 999 different comparison formats.

When you select **Two Factor Comparison** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used by Two Factor Comparison. Only the records which pass through the selected Selfil Table will be included in the comparison (see **Executing a Selfil Table** in Section 4).

After you execute a Selfil Table, the Two Factor Comparison Screen (Figure 8-7) displays. The Two Factor Comparison Screen displays a list of all the Two Factor Comparison Tables which have been created. Each table defines a different comparison format.

```
1:39:38 pm      TWO FACTOR COMPARISON - Ver. 7.2 - 12/16/93  February 16, 1994

   Table      Table Description               Created

   OO1       MRA VS SALE PRICE               11/19/91
```

Figure 8-7. Two Factor Comparison Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box on the right displays the current page number and the number of pages in the report format listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are two steps involved in creating these report formats. First, you must use the **Create** option of the Two Factor Comparison menu bar to add a Two Factor Comparison Table to the table listing. This step creates a blank Two Factor Comparison Table. Second, you must use the **Display** option to define the factors to be compared.

A Two Factor Comparison Report is a three part report. Part I of the report is a listing of the parameters used to generate the comparison. (See example on page 8 - 29.) Part II of the report is a detailed listing of the comparison results. (See example on page 8 - 30.) In the **Breaks Valid** columns, pound signs (#) display to indicate if the comparison fell within the break points entered in the format. One pound sign prints if it fell within the first range, two for the second range, and three for the third. Part III of the report is a statistical summary of the comparison results. (See the example on page 8 - 31.) All of the statistics provided on the report, except for Total Number of Cases, are based on valid record observances. The statistical summary provides the following statistics: Total Number of Cases, Number of Valid Cases for Calculating Absolute Difference, Number of Valid Cases for Calculating Percentage Difference, Mean of Comparison for Factor 1, Standard Deviation of Comparison Factor 1, Mean of Comparison for Factor 2, Standard Deviation of Comparison Factor 2, Mean of Absolute Difference, Standard Deviation of Absolute Difference, Mean of Absolute Percentage Difference, Standard Deviation of Absolute Percentage Difference, Number of Absolute Highlights (1-3), Number of Absolute Percentage Highlights (1-3), Absolute t-Value for Absolute Difference, and Degrees of Freedom (used in calculating t-Value.

```
          C L T   U N I V E R S   S Y S T E M (c) 1986-1990
4:22:31 pm              T W O   F A C T O R   C O M P A R I S O N   L I S T I N G            October 7, 1993
================================================================================================================
====================
Parm No.      Parameter
----------------------------------------------------------------------------------------------------------------

 1.    Parcel Identifier              PARCEL ID        Card NO. 1  Item No. 2


 2.    Comparison Factor #1 (Denominator)   MRA ESTIMATE       Card No. 1  Item No. 117
       0 is Valid Value for Factor #1          NO


 3.    Comparison Factor #2 (Numerator)     SALE PRICE       Card No. 1  Item No. 27
       0 is Valid Value for Factor #2          NO


 4.    Difference stored at                   Card No. 0  Item No. 0


 5.    Absolute Difference Break #1              1000


 6.    Absolute Difference Break #2              5000


 7.    Absolute Difference Break #3              15000


 8.    Absolute Percentage Break #1              5


 9.    Absolute Percentage Break #2              10


 10.   Absolute Percentage Break #3              15
```

Example of Part I of the Two Factor Comparison Report

```
            C L T   U N I V E R S   S Y S T E M  (c) 1986-1990
  4:22:32 pm              T W O   F A C T O R   C O M P A R I S O N   L I S T I N G          October 7, 1993
==================================================================================================================
=====================
     PARCEL ID         #1 MRA ESTIMATE       #2 SALE PRICE     Difference   Breaks Valid % Diff. Breaks Valid
-------------------------- ---------------------- ---------------------- ---------------- ------ ----- ------- ------ -----
0204   2   1    3      143,119.000        135,000.000       8,119.000   ##   YES   5.67   #    YES
0204   2   1    4      135,728.727        162,500.000     -26,771.273   ###  YES  19.72   ###  YES
0204   2   2   20      133,337.215        105,000.000      28,337.215   ###  YES  21.25   ###  YES
0204   2   2   27      186,236.837        201,000.000     -14,763.163   ##   YES   7.93   #    YES
0204   3   2   18      171,619.307        165,000.000       6,619.307   ##   YES   3.86        YES

0204   3   2   21      120,926.396        135,000.000     -14,073.604   ##   YES  11.64   ##   YES
0204   3   3   11      158,086.193        161,000.000      -2,913.807   #    YES   1.84        YES
0204   4   1   28       78,430.354         30,000.000      48,430.354   ###  YES  61.75   ###  YES
0204   4   1   32       92,265.777         93,000.000        -734.223        YES   0.80        YES
0204   4   1  41.3     109,371.500         52,500.000      56,871.500   ###  YES  52.00   ###  YES

0204   4   1   7.1     127,110.553        139,000.000     -11,889.447   ##   YES   9.35   #    YES
0204   4   3   14      106,609.962        115,000.000      -8,390.038   ##   YES   7.87   #    YES
0204   4   4   19      103,739.915        115,000.000     -11,260.085   ##   YES  10.85   ##   YES
0204   4   8   19      149,130.516        135,000.000      14,130.516   ##   YES   9.48   #    YES
0204   4   8   25       98,954.548        100,000.000      -1,045.452   #    YES   1.06        YES

0204   4   8   33      121,832.273        121,500.000         332.273        YES   0.27        YES
0204   4   9   11      211,094.999        195,000.000      16,094.999   ###  YES   7.62   #    YES
0204   5   1    4      149,355.848        175,000.000     -25,644.152   ###  YES  17.17   ###  YES
0204   5   1   35      126,662.000        149,000.000     -22,338.000   ###  YES  17.64   ###  YES
0204   5   1   38      135,157.187        136,000.000        -842.813        YES   0.62        YES

0204   5   2   10      167,381.683        184,000.000     -16,618.317   ###  YES   9.93   #    YES
0204   5   3   21      130,640.754        117,500.000      13,140.754   ##   YES  10.06   ##   YES
0204   5   3   38      138,403.266        130,000.000       8,403.266   ##   YES   6.07   #    YES
0204   5   4    3      132,099.129        117,000.000      15,099.129   ###  YES  11.43   ##   YES
0204   5   4    8      117,301.609        115,000.000       2,301.609   #    YES   1.96        YES

0204   5   4   10      108,957.636        126,000.000     -17,042.364   ###  YES  15.64   ###  YES
0204   5   4   18      120,225.000        117,000.000       3,225.000   #    YES   2.68        YES
0204   5   4   20      135,765.951        118,000.000      17,765.951   ###  YES  13.09   ##   YES
0204   5   4   30      149,162.765        160,000.000     -10,837.235   ##   YES   7.27   #    YES
0204   5   5   14      131,813.061        138,000.000      -6,186.939   ##   YES   4.69        YES

0204   5   5   22      119,900.120         60,000.000      59,900.120   ###  YES  49.96   ###  YES
0204   5   6    5      113,776.000        120,000.000      -6,224.000   ##   YES   5.47   #    YES
```

Example of Part II of the Two Factor Comparison Report

```
        C L T   U N I V E R S   S Y S T E M  (c) 1986-1990
  4:23:23 pm           T W O   F A C T O R   C O M P A R I S O N   L I S T I N G        October 7, 1993
=================================================================================================================
====================
                              STATISTICAL SUMMARY
  -------------------------------------------------------------------  -------------------

  Total Number of Cases                                  231

  Number of Valid Cases for Calculating Absolute   Difference           231

  Number of Valid Cases for Calculating Percentage Difference            231

  Mean of Comparison Factor #1                      118456.05

  Standard Deviation of Comparison Factor #1          21518.46

  Mean of Comparison Factor #2                      114845.91

  Standard deviation of Comparison Factor #2          58983.89

  Mean of Absolute Difference                       20506.07

  Standard Deviation of Absolute Difference           49030.34

  Mean of Absolute Percentage Difference               17.38

  Standard Deviation of Percentage Difference          34.73

  Number of Absolute Highlights  -  1                    48

  Number of Absolute Highlights  -  2                    76

  Number of Absolute Highlights  -  3                    94

  Number of Absolute Percentage Highlights  -  1         49

  Number of Absolute Percentage Highlights  -  2         33

  Number of Absolute Percentage Highlights  -  3         76

  Absolute t - Value for Absolute Difference            6.34

  Degrees of Freedom                               230
```

Example of Part III of the Two Factor Comparison Report

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Two Factor Comparison Screen. This option is only relevant for network users.

Load

The **Load** option loads a Two Factor Comparison Table into memory. A Two Factor Comparison Table must reside in memory to use the **Display**, **Run**, and **Save** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1. Highlight the table you wish to load.

2. Select **Load** from the menu bar.

3. If there is a table in memory which has been changed but not saved, UNIVERS displays ``*WARNING: Current report format changes not saved. Do you want to continue?*'' Type one of the following:

    Y - to load the new table format without saving the table in memory

    N - to end the load function and keep the current table in memory

Display

The **Display** option lets you display and edit the comparison format of the Two Factor Comparison Table in memory. When you select this option, the Two Factor Comparison Parameter Screen (Figure 8-8) displays.

Procedure
1. Load the desired table.

2. Select **Display** from the menu bar. UNIVERS displays the Two Factor Comparison Format Screen (Figure 8-8).

3. Modify the Two Factor Comparison format, if desired (see **Modifying Comparison Parameters** below).

4. Press [ESCAPE] to return to the Two Factor Comparison Screen.

```
11:5O:51 am      TWO FACTOR COMPARISON - Ver. 7.2 - 12/16/93  February 16, 1994


                 Parameter                <Table OO1 >

  1 Parcel Identifier         PARCEL ID        Card 1_ Item 2

  2 Comparison Factor 1 (Denominator) MRA ESTIMATE      Card 1 Item 117
    O is a Valid Value for Factor #1 NO
  3 Comparison Factor 2 (Numerator)  SALE PRICE       Card 1 Item 27
    O is a Valid Value for Factor #2 NO
  4 Location to store the difference  Card O Item O



  5 Absolute Difference Break #1       1OOO
  6 Absolute Difference Break #2       5OOO
  7 Absolute Difference Break #3      15OOO

  8 Absolute Percentage Break #1       5 %
  9 Absolute Percentage Break #2      1O %
```

Figure 8-8. Two Factor Comparison Parameter Screen

Two Factor Comparison Parameters Screen

The Two Factor Comparison Parameters Screen defines a pair of factors for which a Two Factor Comparison study will be performed.

Parameter 1: Parcel Identifier. The Two Factor Comparison module produces a report which lists factor comparison results for each record processed through Selfil. The Parcel Identifier is a UNIVERS factor of your choice used to identify each record on the report (normally a key field). This is *not* one of the factors for comparison. The Factor Name which displays can be changed, if desired. This name will appear as the column heading for the Parcel Identifier on the Two Factor Comparison Report.

Parameters 2-3: Comparison Factors. These parameters define the factors for value comparison. They must be numeric factors (Integer, Single-Precision, Double Precision, Categorical or Byte). Comparisons of String, Date, or System (PPN) type factors cannot be made. The Factor Names which display can be changed, if desired. These names will appear as the column headings on the Two Factor Comparison Report. If the factor entered is a Categorical, UNIVERS allows you to compare either the Level Number or Level Value. To complete the comparison factors, you must indicate whether a value of **0** is considered valid.

Parameter 4: Location to Store the Difference. This parameter defines the factor to which the difference between the comparison factors will be stored.

Parameters 5-7: Absolute Difference Breaks. If you would like to identify those records where the difference in value between Comparison Factor 1 and 2 fall within a certain range, use Parameters 5, 6, and 7 to specify these three different ranges. Value ranges are created by specifying three breakpoints. Breakpoints represent the absolute value of the difference between Comparison Factors 1 and 2. On the Two Factor Comparison report, those records that have an absolute factor difference which falls within one of these three ranges will be noted. You must enter all three breakpoints in ascending order or enter none at all.

Parameters 8-10: Absolute Percentage Breaks. If you would like to identify those records where the percentage difference in value between Comparison Factor 1 and 2 fall within a certain percentage range, use Parameters 8, 9, and 10 to specify these three different ranges. Percentage difference ranges are created by specifying three breakpoints. Breakpoints represent the absolute percentage difference between Comparison Factors 1 and 2. On the Two Factor Comparison report, those records that have an absolute percentage difference which falls within one of these three ranges will be noted.

Modifying Comparison Parameters

When modifying the comparison parameters, use the following cursor movement keys:

- [ENTER] accepts the entry and advances the cursor to the next field.

- [] moves the cursor to the previous field.

- [] moves the cursor to the next field.

- [ESCAPE] saves the changes and returns you to the Two Factor Comparison Screen.

Create

The **Create** option creates a Two Factor Comparison Table. Once you have created a table, it is added to the table listing. The table number and description are defined with this option, but the comparison parameters are not. To define the comparison parameters, use the editing functions of the **Display** option.

Procedure

1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter table number (1-999):*.'' Enter a new table number.

3. UNIVERS prompts ``*Enter table description (40 character max.)*.'' Enter a description of up to 40 characters.

Kill

The **Kill** option deletes an existing Two Factor Comparison Table. Once a table has been deleted, it cannot be restored.

Procedure

1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Deleting table XXX. Do you want to continue?*'' Type one of the following:

   Y - to delete the table

   N - to continue without deleting the table

Run

The **Run** option generates the comparison and produces a report, using the Two Factor Comparison Table in memory and the data set filtered by Selfil.

Procedure

1. Load the desired table.

2. Select **Run** from the menu bar.

Save

The **Save** option saves the Two Factor Comparison Table in memory to the highlighted table. This option can be used to save new tables or update modified tables. If you do not save the table in memory before using the **Load**, **Select**, or **Quit** option, any changes made to the table will be lost. You may save a modified table in one of two ways.

• You may overwrite the same table, replacing the old contents with the new contents.

• You may overwrite a different table, replacing its contents with the table in memory.

Overwriting the Same Table

1. Highlight the table.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Current table will be overwritten. Do you want to continue?*'' Type one of the following:

   Y - to save the table

   N - to continue without saving the table

Overwriting a Different Table

1. Highlight the table to which you would like to save the table in memory.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Save table XXX into table YYY. Do you want to continue?*''

4. Type one of the following:

   Y - to continue the save procedure

   N - to abort the save procedure

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a new Selfil Table for use with this module.

Procedure

1. Select **Select** from the menu bar.

2. If there is a table in memory which has had changes made but has not been saved, UNIVERS displays ``*Current table is not saved. Do you want to continue?*'' Type one of the following:

    Y - to continue the Select procedure without saving the table in memory

    N - to abort the Select procedure

Quit

The **Quit** option returns you to the UNIVERS Reporting Menu. Any changes you have made to the table currently loaded to memory will be lost if you quit without first saving the changes.

Procedure

1. Select **Quit** from the menu bar.

2. If there is a table in memory which has had changes made but has not been saved, UNIVERS displays ``*Current table is changes not saved. Do you want to continue?*'' Type one of the following:

    Y - to quit without saving the changes

    N - to abort the quit procedure

Cross Tabs

This module allows you to create a two-way frequency distribution for up to 15 different factor pairs. When you select **Cross Tabs** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used with Cross Tabs. Only the records which pass through the selected Selfil Table will be included on any report which is **Run**. (See **Executing a Selfil Table** in Section 4).

After you have executed a Selfil Table, the Cross Tab Parameters Screen (Figure 8-9) displays. The Cross Tab Parameters Screen consists of a listing of up to 15 lines of cross tab parameters. You can have a maximum of 15 parameters defined at once. Each set of parameters consists of a line number and the Card Types, Item Numbers, and Factor Names of a vertical factor, horizontal factor, and a third factor upon which calculations can be performed. Each line generates an individual Cross Tabs Report. For each factor you can define break points to determine how to group values within factors on your Cross Tabs Report. There is a second screen of parameters which define the report name and types of calculations to be performed for each Cross Tabs Report.

The UNIVERS Cross Tabs matrix consists of a vertical and a horizontal factor with break points for each. The two factors must be factors from your data base. The break points define the ranges for each factor. You can define up to 7 break points for the vertical factor (giving you 6 ranges) and up to 6 break points for the horizontal factor (giving you 5 ranges). The matrix created will contains cells created by the intersection of the ranges for each factor.

Vertical Factor:	Horizontal Factor				
	Range 1	**Range 2**	**Range 3**	**Range 4**	**Range 5**
Range 1	Cell	Cell	Cell	Cell	Cell
Range 2	Cell	Cell	Cell	Cell	Cell
Range 3	Cell	Cell	Cell	Cell	Cell
Range 4	Cell	Cell	Cell	Cell	Cell
Range 5	Cell	Cell	Cell	Cell	Cell
Range 6	Cell	Cell	Cell	Cell	Cell

The Cross Tab Report lists up to seven different types of data for each cell:

- Type 1: **Count** is the number of records whose values for the two factors fall within the ranges defining the cell.

- Type 2: **Percentage** is the count of the cell divided by the total number of records in the matrix.

- Type 3: **Percentage by Row** is the count of the cell divided by the total number of records in the same row.

- Type 4: **Percentage by Column** is the count of the cell divided by the total number of records in the same column.

- Type 5: **Total of Third Factor** is the sum of the third factor for all records included in the cell.

- Type 6: **Mean of Third Factor** is the average of the third factor for the records included in the cell.

- Type 7: **Percentage Aggregate of Third Factor** is the Total of Third Factor for the cell divided by the Total of the Third Factor for all cells.

The Report will list the total number of records in the matrix and the number of records which passed through the selected Selfil Table, but were outside of one or both of the factor ranges defining the matrix. The latter are not used in any of the calculations. At the bottom of the report, the following information will print:

•   The Factor Names used

•   The Low Break for each factor

•   The High Break for each factor

•   The Mean for each factor

•   The Standard Deviation for each factor

```
11:53:04 am       CROSS TAB PARAMETERS - Ver. 7.2 - 12/16/93  February 16, 1994


      Vertical Factor        Horizontal Factor      Third Factor

Line Cd Itm Factor name     Cd Itm Factor name    Cd Itm Factor name
 1  1  8 NEIGHBORHOOD     3   6 YEAR BUILT      1 117 MRA ESTIMATE
```

Figure 8-9. Cross Tab Parameters Screen

Refresh

The **Refresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Cross Tab Parameters Screen. This option is only relevant for network users.

Modify

A single Cross Tabs Report is created for each factor pair specified on the parameter screen. You may specify up to 15 different factor pairs in one run, resulting in up to 15 different Cross Tabulation reports. The **Modify** option lets you edit the parameters. Value breakpoints for each factor pair are stored in a hidden window which is accessible only while using the **Modify** option. To define the types of calculations to perform use the **Next** option of the Cross Tabs menu bar.

Adding/Modifying a Line

1. Select the **Modify** from the Cross Tabs menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter the line number you wish to add or modify. If you are adding a new line, enter the line number that is next in sequence.

3. Enter the Card Type and Item Number of the factor to use as the vertical factor.

4. UNIVERS displays the breakpoints window for the vertical factor. Enter the breakpoints for the vertical factor (see **Entering Breakpoints** below).

5   Enter the Card Type and Item Number of the factor to use as the horizontal factor.

6. UNIVERS displays the breakpoints window for the horizontal factor. Enter the breakpoints for the horizontal factor (see **Entering Breakpoints** below).

7. Enter the third factor.

8. Repeat steps 2-7 until all desired lines have been added/modified.

10. Press [ESCAPE] to return to the Cross Tabs menu bar.

Entering Breakpoints

After entering the Item Number of the vertical or horizontal factor, the breakpoints window displays. Vertical breakpoints determine the number of rows in your Cross Tabs matrix, as well as the range of factor values that comprise each row. You may specify a maximum of six rows for any Cross Tabs matrix. You must add at least two breakpoints to a blank window or you may modify any existing breakpoints that are displayed. Without at least two breakpoints defined, a row cannot be determined for your Cross Tabs matrix.

The breakpoints window for the factors have six or seven possible breakpoint entries: **Lo**, **1-5** (for the vertical factor) or **1-4** (for the horizontal factor), and **Hi**. They combine to give you up to six rows and five columns in your matrix. You must enter valid factor values, in ascending order, for each breakpoint entry that you make.

Use the following cursor controls when entering breaks:

•   To make an entry, type the value for the breakpoint and press [ENTER]. The cursor moves to the next breakpoint in sequence.

•   Use the [ ] and [ ] to move the cursor through the breakpoint entries in the direction of the arrow without changing them.

•   Type an asterisk (*****) at an existing entry and press [ENTER] to delete an entry.

•   Advance to the **Return to Modify Line** prompt at the bottom of the window and press [ENTER] to return to the Cross Tab Parameters Screen.

Deleting a Line

1. Select **Modify** from the Cross Tabs menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter **D** or **d**.

3. UNIVERS displays ``*Enter Line Number to Delete, use (1-X)*.'' Enter the line number you wish to delete. The specified line number and its breakpoints are deleted.

4. Repeat steps 2 and 3 until all desired lines are deleted.

5. Press [ESCAPE] to return to the Cross Tabs menu bar.

Next

The **Next** option displays the Cross Tab Run Parameters Screen (Figure 8-10). This screen allows you to enter Report Titles and Calculation Types for the Cross Tab lines on the Cross Tab Parameters Screen.

Procedure

1. Select **Next** from the Cross Tabs menu bar to display the Cross Tab Run Parameters Screen:

```
11:53:59 am CROSS TAB RUN PARAMETERS - Version 7.2 12/16/93   February 16, 1994

 Line    Report Name (30 characters)       Type(s)
 ----    ------------------------------    -------------
  1     NEIGHBORHOOD VS YEAR BUILT         1 2 3 4 5 6 7
```

Figure 8-10. Cross Tab Run Parameters Screen

2. At the prompt, enter the line number to modify. Each line number on this screen corresponds to a line number on the Cross Tab Parameters Screen.

3. Enter the Report Name for the line.

4. Enter the types of calculations to produce for the line

5. Repeat steps 2-4 until all desired lines have been defined.

6. Press [ESCAPE] to return to the Cross Tab Parameters Screen.

Entering Calculation Types. When you are entering Calculation Types, UNIVERS allows you to add, delete or skip types. The cursor will highlight numbers 1 through 7, consecutively. To add a type, press [ENTER] when the type number displays. To skip or delete a type, enter an asterisk (*) when the type number displays. Press [ESCAPE] to stop modifying types.

Run

The **Run** option produces the Cross Tabs reports. For each factor pair defined on the parameter screen, UNIVERS will print a one page Cross Tabulation report which includes (see example below):

- The Cross Tab matrix for the two factors, with breaks along the vertical and horizontal axes

- Within each cell, the results of the selected calculations

- The low break, high break, calculated mean, and standard deviation of all three factors in the Cross Tabulation

- The calculated Correlation Coefficient of the vertical and horizontal factors, provided as a measure of the strength of their relationship.

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a different Selfil Table to use with the Cross Tabs module. When you return to the Selfil Table Menu, UNIVERS automatically saves the factor pairs and their breaks.

Quit

The **Quit** option returns you to the UNIVERS Reporting Menu. When you exit, UNIVERS automatically saves the factor pairs and their breaks.

```
        C L T   U N I V E R S   S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994              ANYTOWN USA  CROSS TABULATION REPORT                    8:58:31 am
===============================================================================================================
===================
                    Report Name:
                      Report Run with SELFIL TABLE: 999
                      Report Contains  133 Records
                      98 Record(s) out of Range

        AGGREGATE STATISTICS INCLUDED for Third Factor:    Card:  1    Item:  117    Name:  MRA ESTIMATE

    Vertical Factor            Horizontal Factor:   Card:  3    Item:  6    Name:  YEAR BUILT
---------------------------------------------------------------------------------------------------------
Card:  1   Item:  8    Type |    900   |    940   |   960    |    970   |    980   |   Row    |
Name:  NEIGHBORHOOD         |    940   |    960   |   970    |    980   |    993   |   Total  |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
1-2               1 |    8    |    8    |    7    |    8    |   10    |    41    |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
2-3               1 |    6    |    8    |    2    |    2    |    8    |    26    |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
3-4               1 |   10    |    6    |    2    |         |         |    18    |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
4-6               1 |   27    |    4    |         |         |    2    |    33    |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
6-7               1 |    7    |         |         |         |         |    7     |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
7-8               1 |    2    |    2    |    2    |    1    |    1    |    8     |
-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
     Column Total      1 |   60    |   28    |   13    |   11    |   21    |   133    |
---------------------------------------------------------------------------------------------------------

                      S T A T I S T I C S

    Factor                  Range                          Standard
    Name            Low Break           High Break       Mean      Deviation
--------------------  ----------------------------  ------------------------------  --------------  --------------
NEIGHBORHOOD                     1                  8
YEAR BUILT                    900               993        946.98        25.66
MRA ESTIMATE                 0.00          211095.00     119991.56      22587.37

===============================================================================================================
====================
   Type Definitions:    1 = count,    2 = percentage,    3 = percentage by row,      4 = percentage by column,
                5 = total of third factor,      6 = mean of third factor,    7 = percentage aggregate of third factor
```

Example of a Cross Tabulation Report

Basic Statistics

This module produces four types of statistical reports. When you select **Basic Statistics** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used with Basic Statistics. Only records which pass through the executed Selfil Table are included on any report produced by this module (see **Executing a Selfil Table** in Section 4).

After you have executed a Selfil Table, the UNIVERS Basic Statistics Menu (Figure 8-11) displays. This menu allows you to access one of the four types of reports produced by this module. You may generate one or more of the reports against the records passed to Basic Statistics by Selfil.

```
11:32:18 am      C L T  U N I V E R S   S Y S T E M      February 16, 1994

              BASIC STATISTICS - Version 7.2  12/16/93



              UNIVERS BASIC STATISTICS MENU



              (1) Descriptive Statistics
              (2) Percentile Calculations
              (3) 2-Factor Correlation
              (4) Two Population T-Test
              (5) Return To Univers Reporting Menu
```

Figure 8-11. UNIVERS Basic Statistics Menu

Descriptive Statistics

When you select this option from the UNIVERS Basic Statistics Menu, the Descriptive Statistics Screen (Figure 8-12) displays. The top part of the screen displays up to 15 factors upon which you can generate a Descriptive Statistics Report. The Descriptive Statistics Report performs nine pre-defined standard statistical measures against the records passed from Selfil for each of the factors selected. These calculations can only be performed against numeric (Integer, Byte, Single-Precision, Double-Precision, and Categorical) factors. These measures are applied separately for each of the factors. It also performs an extra calculation for byte and Categorical Factors:

- **Number of Cases** - For each factor specified, the number of records in the data set passed from Selfil with a valid value is determined. This number is used to generate the remaining statistics.

- **Mean** - For each factor specified, the mean is calculated.

- **Standard Deviation** - For each factor specified, the standard deviation is calculated.

- **Minimum** - For each factor specified, the lowest value is determined.

- **Maximum** - For each factor specified, the highest value is determined.

- **Median** - For each factor specified, the median value is determined.

- **Mode** - For each factor specified, the mode is determined.

- **Coefficient of Kurtosis** - For each factor specified, a coefficient of kurtosis is calculated.

- **Coefficient of Skewness** - For each factor specified, a coefficient of skewness is calculated.

- **Frequency** - For byte and Categorical Factors, an extra page is generated which lists the number of cases for each Categorical Level Number and the percentages.

```
3:49:02 pm         (1) Descriptive Statistics      December 11, 1991

Line     Card      Item        Factor name

1        1        117          MRA ESTIMATE
2        1         27          SALE PRICE
```

Figure 8-12. Descriptive Statistics Screen

Modify

The **Modify** option of the Descriptive Statistics Screen menu bar modifies, adds, and deletes factors from the list of factors to be calculated.

Modifying/Adding Factors

1. Select **Modify** from the Descriptive Statistics Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' To modify a factor enter an existing line number. To add a factor enter the next sequential line number.

3. Enter the Card Type for the factor.

4. Enter the Item Number for the factor.

5. Repeat steps 2 through 4 until all desired factors are modified/added.

6. Press [ESCAPE] to return to the Descriptive Statistics Screen menu bar.

Deleting Factors

1. Select **Modify** from the Descriptive Statistics Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter **D** or **d**.

3. UNIVERS display ``*Enter Line Number to Delete,use (1-X)*.'' Enter the line number to delete.

4. Repeat step 3 until all desired factors have been delete.

5. Press [ESCAPE] to return to the Descriptive Statistics Screen menu bar.

Run

The **Run** option of the Descriptive Statistics Screen menu bar generates the Descriptive Statistics Reports (see example below). To use this option, perform the following steps:

1. Select **Run** from the Descriptive Statistics Screen menu bar.

2. UNIVERS searches the data base using the selected Selfil Table and displays a running count of the parcels processed. When the process is complete, UNIVERS displays ``*Hit any key to print the report. Use <ESC> to Terminate Printing*.'' Perform one of the following:

    •   Press any key to print the report.

    •   Press [ESCAPE] to abort printing the report.

Select

The **Select** option of the Descriptive Statistics Screen menu bar allows you to select another Selfil Table to use with the Descriptive Statistics module. After you execute the new Selfil Table, the UNIVERS Basic Statistics Menu displays, so you can choose any of the four reporting options.

Quit

The **Quit** option returns you to the UNIVERS Basic Statistics Menu.

```
      C L T   U N I V E R S   S Y S T E M  (c) 1986-1991

  October 8, 1993              B A S I C  S T A T I S T I C S  R E P O R T          9:02:16 am
                       (1) Descriptive Statistics
===========================================================================================================
======================

         Number         Standard                              Coefficient  Coefficient
Factor Name    of cases    Mean  Deviation    Minimum     Maximum     Median        Mode  of Kurtosis  of Skewness
_____
_____

MRA ESTIMATE       231   118456.05   21518.47    78430.35   211095.00   114544.00  not unique      4.3084       0.8475

SALE PRICE     231  114845.90   58983.90       4.00   850000.00   115000.00   135000.00    105.7815       8.3694

===========================================================================================================
====================


  Blanks in Columns Represent Calculations Not Possible
```

Example of a Descriptive Statistics Report

Percentile Calculations

When you select this option from the UNIVERS Basic Statistics Menu, the Percentile Calculations Screen (Figure 8-13) displays. This screen displays up to 15 factors upon which you can generate a Percentile Calculations Report. The Percentile Calculations Report lists the number of records for each factor whose value is below the value calculated for a series of user-defined percentage breakpoints. The values for the percentage breakpoints are calculated using the **Weighted Average at X(N*P)** method, where X is the sequentially ordered observations, N is the number of observations, and P is the percentile. Percentile Calculations can only be performed for numeric (Integer, Byte, Single-Precision, Double-Precision, and Categorical) factors.

```
3:49:2O pm          (2) Percentile Calculations      December 11, 1991

Line     Card      Item        Factor name

1        1         117          MRA ESTIMATE
2        1         124          SALE PRICE
```

Figure 8-13. Percentile Calculation Screen

Modify

The **Modify** option of the Percentile Calculations Screen menu bar modifies, adds, and deletes factors from the list of factors to be calculated. If the percentage breakpoint list was displayed, selecting this option displays the factor list.

Modifying/Adding Factors
1.   Select **Modify** from the Percentile Calculations Screen menu bar.

2.   UNIVERS displays ``*Enter Line Number to Modify/Add*.'' To modify a factor enter an existing line number. To add a factor enter the next sequential line number.

3.   Enter the Card Type for the factor.

4.   Enter the Item Number for the factor.

5.   Repeat steps 2 through 4 until all desired factors are modified/added.

6.   Press [ESCAPE] to return to the Percentile Calculations Screen menu bar.

Deleting Factors
1.   Select **Modify** from the Percentile Calculations Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter **D** or **d**.

3. UNIVERS display ``*Enter Line Number to Delete,use (1-X)*.'' Enter the line number to delete.

4. Repeat step 3 until all desired factors have been delete.

5. Press [ESCAPE] to return to the Percentile Calculations Screen menu bar.

Break%

The **Break%** option of the Percentile Calculations Screen menu bar modifies, adds, and deletes the percentage breakpoints which are used for each Percentile Calculation Report. When you select this option the Percentage Breakpoint List (Figure 8-14) displays. You can define up to ten percentage breakpoints.

```
2:14:46 pm          (2) Percentile Calculations      January 17, 1992

    Line        Percentage%

    1           1
    2           10
    3           20
    4           30
    5           40
    6           50
    7           60
    8           75
    9           90
    10          99
```

Figure 8-14. Percentage Breakpoints List

Modifying/Adding Breakpoints.
1. Select **Break%** from the Percentile Calculations Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' To modify a breakpoint enter an existing line number. To add a breakpoint enter the next sequential line number.

3. Enter the percentage breakpoint.

4. Repeat steps 2 and 3 until all desired breakpoints are modified/added.

5. Press [ESCAPE] to return to the Percentile Calculations Screen menu bar.

Deleting Breakpoints

1. Select **Break%** from the Percentile Calculations Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter **D** or **d**.

3. UNIVERS display ``*Enter Line Number to Delete,use (1-X)*.'' Enter the line number to delete.

4. Repeat step 3 until all desired factors have been delete.

5. Press [ESCAPE] to return to the Percentile Calculations Screen menu bar.

Run

The **Run** option of the Percentile Calculations Screen menu bar generates the Percentile Calculations Reports (see example below). To use this option, perform the following steps:

1. Select **Run** from the Percentile Calculations Screen menu bar.

2. UNIVERS searches the data base using the selected Selfil Table and displays a running count of the parcels processed. When the process is complete, UNIVERS displays ``*Hit any key to print the report. Use <ESC> to Terminate Printing*.'' Perform one of the following:

   • Press any key to print the report.

   • Press [ESCAPE] to abort printing the report.

Select

The **Select** option of the Percentile Calculations Screen menu bar allows you to select another Selfil Table to use with the Percentile Calculations module. After you execute the new Selfil Table, the UNIVERS Basic Statistics Menu displays, so you can choose any of the four reporting options.

Quit

The **Quit** option returns you to the UNIVERS Basic Statistics Menu.

```
      C L T  U N I V E R S  S Y S T E M  (c) 1986-1991

 October 8, 1993              B A S I C  S T A T I S T I C S  R E P O R T              9:05:12 am
                     (2) Percentile Calculations
============================================================================================================
=====================
   Factor        1 %      10 %     20 %     30 %     40 %     50 %     60 %     75 %     90 %     99 %
_____
_____

MRA ESTIMATE        79194.52 92526.36 101491.60 107260.40 111097.80 114515.00 120395.80 129867.75 147068.70 177951.15
                 2      23      46      69      92     115     138     173     207     228

SALE PRICE          25860.00 65000.00 85000.00 98650.00 107000.00 115000.00 120600.01 130000.00 149950.00 203760.01
                 2      18      44      69      91     109     138     170     207     228

============================================================================================================
=====================

 Blanks in Columns Represent Calculations Not Possible
```

Example of a Percentile Calculations Report

2-Factor Correlation

When you select this option from the UNIVERS Basic Statistics Menu, the 2-Factor Correlation Screen (Figure 8-15) displays. This screen displays up to 15 factors upon which you can generate a 2-Factor Correlation Report. The 2-Factor Correlation Report calculates the correlation coefficient for up to 15 factor pairs. 2-Factor Correlation can only be performed for numeric (Integer, Byte, Single-Precision, Double-Precision, and Categorical) factors. For each of the factor pairs specified, the report lists the following:

•   The correlation coefficient for the factor pair

•   The number of cases observed (only records with valid values in both factors are counted)

•   The mean for each factor in the factor pair

•   The standard deviation for each factor in the factor pair

```
3:49:38 pm          (3) 2-Factor Correlation        December 11, 1991

Line  Card  Item  Factor Name        Card  Item  Factor Name

  1    1    117  MRA ESTIMATE         1    27   SALE PRICE
```

Figure 8-15. 2-Factor Correlation Screen

Modify

The **Modify** option of the 2-Factor Correlation Screen menu bar modifies, adds, and
deletes factor pairs from the list of factors to be calculated.

Modifying/Adding Factor Pairs

1.   Select **Modify** from the 2-Factor Correlation Screen menu bar.

2.   UNIVERS displays ``*Enter Line Number to Modify/Add*.'' To modify a factor pair
      enter an existing line number. To add a factor pair enter the next sequential line
      number.

3.   Enter the Card Type for the first factor.

4.   Enter the Item Number for the first factor.

5.   Enter the Card Type for the second factor.

6.   Enter the Item Number for the second factor.

7.   Repeat steps 2 through 6 until all desired factor pairs are modified/added.

6.   Press [ESCAPE] to return to the 2-Factor Correlation Screen menu bar.

Deleting Factor Pairs

1.   Select **Modify** from the 2-Factor Correlation Screen menu bar.

2.   UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter **D** or **d**.

3.   UNIVERS display ``*Enter Line Number to Delete,use (1-X)*.'' Enter the line number
      to delete.

4.   Repeat step 3 until all desired factor pairs have been delete.

5.   Press [ESCAPE] to return to the 2-Factor Correlation Screen menu bar.

Run

The **Run** option of the 2-Factor Correlation Screen menu bar generates the 2-Factor Correlation Reports (see example below). To use this option, perform the following steps:

1.   Select **Run** from the 2-Factor Correlation Screen menu bar.

2.   UNIVERS searches the data base using the selected Selfil Table and displays a running count of the parcels processed. When the process is complete, UNIVERS displays ``*Hit any key to print the report. Use <ESC> to Terminate Printing*.'' Perform one of the following:

•   Press any key to print the report.

•   Press [ESCAPE] to abort printing the report.

Select

The **Select** option of the 2-Factor Correlation Screen menu bar allows you to select another Selfil Table to use with the 2-Factor Correlation module. After you execute the new Selfil Table, the UNIVERS Basic Statistics Menu displays, so you can choose any of the four reporting options.

Quit

The **Quit** option returns you to the UNIVERS Basic Statistics Menu.

```
       C L T   U N I V E R S   S Y S T E M  (c) 1986-1991

 October 8, 1993              B A S I C   S T A T I S T I C S   R E P O R T              9:07:30 am
                      (3) 2-Factor Correlation
==================================================================================================
====================
```

Factor1	Factor2	Correlation Coefficient	Number of cases	Mean 1	Mean 2	Standard deviation 1	Standard deviation 2
MRA ESTIMATE	SALE PRICE	0.4447	231	118456.05	114845.90	21518.470	58983.90

```
==================================================================================================
====================

 Blanks in Columns Represent Calculations Not Possible
```

Example of a 2-Factor Correlation Report

Two Population t-Test

When you select this option from the UNIVERS Basic Statistics Menu, the Two Population t-Tests Screen (Figure 8-16) displays. The top part of the screen displays up to 15 factors upon which you can generate a Two Population t-Tests Report. The Two Population t-Tests Report calculates a t-value and an F-value for two populations for each factor listed. This procedure can only be run for numeric (Integer, Byte, Single-Precision, Double-Precision, and Categorical) factors. For each of the factors specified, the report lists the following:

• Mean, standard deviation, and number of cases observed for each population

• t-value

• F-value

• Degrees of freedom

```
3:49:57 pm          (4) Two Population T-Test       December 11, 1991

Line  Card  Item   Factor Name

 1    1    117   MRA ESTIMATE
```

Figure 8-16. Two Population t-Test Screen

Modify

The **Modify** option of the Two Population t-Test Screen menu bar modifies, adds, and deletes factors from the list of factors to be calculated.

Modifying/Adding Factors
1. Select **Modify** from the Two Population t-Test Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' To modify a factor enter an existing line number. To add a factor enter the next sequential line number.

3. Enter the Card Type for the factor.

4. Enter the Item Number for the factor.

5. Repeat steps 2 through 4 until all desired factors are modified/added.

6. Press [ESCAPE] to return to the Two Population t-Test Screen menu bar.

Deleting Factors

1. Select **Modify** from the Two Population t-Test Screen menu bar.

2. UNIVERS displays ``*Enter Line Number to Modify/Add*.'' Enter **D** or **d**.

3. UNIVERS display ``*Enter Line Number to Delete,use (1-X)*.'' Enter the line number to delete.

4. Repeat step 3 until all desired factors have been delete.

5. Press [ESCAPE] to return to the Two Population t-Test Screen menu bar.

Population

The **Population** option of the Two Population t-Test Screen menu bar allows you to define the two populations for a factor. The two populations are defined using a factor from the data base and defining low and high ranges for the two populations. All parcels with values for the defined factor within the first range are included in the first population. All parcels with values for the defined factor within the second range are included in the second population. All factors listed will be broken down by the same population definition. To use this option, perform the following steps:

1. Select **Population** from the Two Population t-Test Screen menu bar. UNIVERS displays the Population Definition Window:

```
 3:49:57 pm         (4) Two Population T-Test       December 11, 1991


 Line Card Item   Factor Name


  1   1   117  MRA ESTIMATE
                  POPULATION
                                DEFINITION
 ----------------------------
                             Card  3  Item  6                        YEAR
 BUILT
                                                        Pop.1   900  to
 950
                          Pop.2   951 to   993




```

Figure 8-17. Population Definition Window

2. Enter the Card Type of the factor to be used to define the populations.

3. Enter the Item Number of the factor to be used to define the populations.

4. Enter the low and high values to define the range of values to be included in each population. These values cannot overlap.

Run

The **Run** option of the Two Population t-Test Screen menu bar generates the Two Population t-Test Reports (see example below). To use this option, perform the following steps:

1.   Select **Run** from the Two Population t-Test Screen menu bar.

2.   UNIVERS searches the data base using the selected Selfil Table and displays a running count of the parcels processed. When the process is complete, UNIVERS displays ``*Hit any key to print the report. Use <ESC> to Terminate Printing*.'' Perform one of the following:

   •   Press any key to print the report.

   •   Press [ESCAPE] to abort printing the report.

Select

The **Select** option of the Two Population t-Test Screen menu bar allows you to select another Selfil Table to use with the Two Population t-Test module. After you execute the new Selfil Table, the UNIVERS Basic Statistics Menu displays, so you can choose any of the four reporting options.

Quit

The **Quit** option returns you to the UNIVERS Basic Statistics Menu.

```
     C L T   U N I V E R S   S Y S T E M  (c) 1986-1991

  October 8, 1993              B A S I C   S T A T I S T I C S   R E P O R T           9:12:32 am
                           (4) Two Population T-Test
==============================================================================================
====================
Population ONE defined by factor YEAR BUILT  has values between    900  and    950
Population TWO defined by factor YEAR BUILT  has values between    951  and    993


              POPULATION ONE                       POPULATION TWO
_____
_____

               Standard   Number         Standard   Number
    Factor      mean    Deviation  of cases   Mean    Deviation  of cases   F value    t value    d.f
_____
_____

MRA ESTIMATE        111507.44    17990.71   136     131568.02    22281.20   78        0.652     -7.185   212


==============================================================================================
====================

  Blanks in Columns Represent Calculations Not Possible
```

Example of a Two Population T-Test Report

Return to Univers Reporting Menu

This option of the UNIVERS Basis Statistics Menu returns you to the UNIVERS Reporting Menu.

Sales Ratio Report

This module generates Sales Ratio Reports which allow you to compare parcel values against Sale Prices for parcel records selected by Selfil. You can create up to 999 report formats. The reports produced have either two or three parts:

- Part 1 is a listing if each parcel record included in the study. The Selfil Table used to select parcels should only select parcels which have sales data. Parcels for which the Sale Price (as designated in the **Run** procedure) is **0** are bypassed and are not included in the calculations.

- Part 2 is statistical summary of all parcel records included.

- Part 3 is only included if break definitions are entered with the **Totals** option. You can enter up to ten break definitions which generate the same statistics as part 2, but subtotalled by defined ranges for a specified factor. In addition, a Mann-Whitney Test and a Kruskal-Wallis Test are performed for each range.

When you select **Sales Ratio Report** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used this module. Only the records which pass through the selected Selfil Table will be included on the Sales Ratio Report when it is **Run**. (See **Executing a Selfil Table** in Section 4).

After you have executed a Selfil Table, the Sales Ratio Report Screen (Figure 8-18) displays. The Sales Ratio Report Screen displays a listing of all Sales Ratio Report Tables which have been created. Each table defines a different report format which can be used to print a Sales Ratio Report.

```
11:03:42 am      SALES RATIO REPORT - Ver. 7.2 - 12/16/93   February 16, 1994

  Table        Table Description            Creation Date

  OO2           SALES RATIO REPORT              O1/21/1991
  OO3           SALES RATIO REPORT  #2           O7/24/1991
```

Figure 8-18. Sales Ratio Report Screen

At the bottom of the screen is a menu bar. Above the menu bar are two boxes. The box on the left displays the table number of the table currently loaded to memory. The box

on the right displays the current page number and number of pages in the listing. Press [PAGE UP] and [PAGE DOWN] to move from page to page in the listing. Use [ ] and [ ] to highlight a specific table on a page.

There are two steps involved in creating a Sales Ratio Report format. First, you must use the **Create** option of the Sales Ratio Report menu bar to add a Sales Ratio Report Table to the table listing. This step creates a blank Sales Ratio Report Table. Second, you must use the **Display** option to define the factors to be included on the report. You can optionally use the **Totals** option to define breaks for subtotals.

Fresh

The **Fresh** option refreshes the screen, updating any changes made to the table listing by another user since you first accessed the Sales Ratio Report Screen. This option is only relevant for network users.

Load

The **Load** option loads a Sales Ratio Report Table into memory. A Sales Ratio Report Table must reside in memory if you want to use the **Display**, **Print**, **Totals**, **Run** or **Save** options. Only one table may be resident in memory at a time. You can ``push'' the resident table out of memory by loading a new table.

Procedure
1. Highlight the table you wish to load.

2. Select **Load** from the Sales Ratio Report menu bar. If there is already a table in memory, which has been changed but not saved, UNIVERS displays ``*WARNING: Current format ### changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to load the new table without saving the table in memory

   N - to end the load function and keep the current table in memory

Display

The **Display** option lets you display and edit the contents of an Sales Ratio Report Table. When you select this option from the Sales Ratio Report menu bar, the Sales Ratio Report Format Screen (Figure 8-19) displays. To define a report format, you enter the items you wish to appear on the report. A new menu bar displays at the bottom of the screen with the following options:

• **First** displays the first page of your report format.

• **Last** displays the last page of your report format.

• **Range** displays the report format beginning with a specific line.

• **Modify** adds or edits lines in the report format (see **Modifying a Sales Ratio Report Format** below).

• **Quit** returns you to the Sales Ratio Report Screen.

```
11:O8:44 am        SALES RATIO REPORT - Ver. 7.2 - 12/16/93   February 16, 1994

 Line  C-Type  Item No  Item Name        Format          Size  Pos.

   1    1      2  PARCEL ID        LEFT JUSTIFIED      28    1
   2    1      3  OWNER NAME 1     LEFT JUSTIFIED        30   30
   3    1     13  CURRENT CLASS    LEFT JUSTIFIED        13   61
   4    1      8  NEIG             LEFT JUSTIFIED       4    75
   5    1     21  SALE DATE        ####              9    80
   6    1     24  SALE TYPE        CL               9    90
   7    1     27  SALE PRICE       $$#,###,###        11   1OO
   8    1     33  VALID            LEFT JUSTIFIED     5   112
   9    1    113  TOT. VALUE       $$#,###,###        11   118
  1O   51      1  S RATIO          ####.##            7   13O
                        LAST LINE IN TABLE
```

Figure 8-19. Sales Ratio Report Format Screen

Sales Ratio Report Format Screen

The Sales Ratio Report format is defined by entering lines on the Sales Ratio Report Format Screen. Each line defines a column on the report. The maximum width of the report is 132 characters. The factor defined by the first line in the format begins at position **1** on the report. The actual Sales Ratio value has a ``dummy'' Card Type of **51** (there is no Item Number). *This factor must be included in order for the program to execute*. The Sales Ratio Report format consists of a seven column definition:

- **Line** defines the format line number.

- **C-Type** defines Card Type of the factor to be included on the report.

- **Item No** defines the Item Number of the factor to be included on the report.

- **Item Name** defines the name of the item to be included on the report. The name will print as the column heading for the item. It cannot be longer than the **Size** of the item. If you wish to make the name longer, you must increase the **Size**.

- **Format** is the format in which the data will be printed. It defaults to the format defined for the factor in the Factor Tables. You can change it, if desired.

- **Size** is the number of characters the data for the factor will use in the report format. The size defaults to the number of characters needed to print the data in the defined format. You can change it, if desired.

- **Pos** is the beginning position of the item on the printed report. This value is calculated by UNIVERS.

Modifying a Report Format

The **Modify** option of the Display menu bar lets you add or change lines in the report format. After you choose **Modify** from the Report Format menu bar, five new options display.

Edit. The **Edit** option changes the settings of an existing line in the report format. To this option, perform the following steps:

1. Select **Edit** from the Modify menu bar.

2. Highlight the line you wish to edit and select one of the following from the Edit menu bar:

    • **C-Type** allows you to change the Card Type, Item Number, Format, Size, and Name of the item.

    • **Item No** allows you to change the Item Number, Format, Size, and Name of the item.

    • **Format** allows you to change the Format, Size, and Name of the item.

    • **Size** allows you to change the Size and Name of the item.

    • **Name** allows you to change the Name of the item.

3. Edit the line.

4. UNIVERS displays ``*Is this information correct (Y/N)*.'' Type one of the following:

    Y - to accept the changes and continue

    N - to abort the edit procedure without the changes being made

5. Press [ESCAPE] to return to the Modify menu bar.

Insert. The **Insert** option inserts a new line in the report format. To use this option, perform the following steps:

1. Select **Insert** from the Modify menu bar.

2. UNIVERS displays ``*Enter line to insert*.'' Enter the line number you wish to insert. All subsequent lines will be ``pushed'' down.

3. Enter the new line in the format.

4. UNIVERS displays ``*Is this information correct (Y/N)*.'' Type one of the following:

    Y - to accept the new line and continue

    N - to continue without inserting the new line

5. Repeat steps 3 through 4 until all desired lines have been inserted.

6.   Press [ESCAPE] to return to the Modify menu bar.

Delete. The **Delete** option deletes a line from the format. To use this option, perform the following steps:

1.   Highlight the line you wish to delete.

2.   Select **Delete** from the Modify menu bar.

3.   UNIVERS displays `` *WARNING: Delete highlighted line. Do you want to continue?*'' Type one of the following:

       Y - to delete the highlighted line

       N - to continue without deleting the highlighted line

Clear. The **Clear** option deletes a range of lines in the report format. All lines, inclusive, between the starting and ending line numbers are deleted. To use this option, perform the following steps:

1.   Select **Clear** from the Modify menu bar.

2.   UNIVERS displays ``*Enter starting line to clear*.'' Enter the first line number to clear.

3.   UNIVERS displays ``*Enter ending line to clear*.'' Enter the last line number to clear.

Quit. The **Quit** option returns you to the Display menu bar.

Print

The **Print** option prints a listing of the table in memory. The purpose of the **Print** option should not be confused with the **Run** option. The **Print** option produces a printout of the report format. It does not generate the report.

Procedure
1.   Load the desired table.

2.   Select **Print** from the menu bar.

Create

The **Create** option creates a new table. Once you have created a table, it is added to the listing. Use the **Create** option to define the table number and the description, but not to define the report format. The report format is defined using the **Display** option.

Procedure
1. Select **Create** from the menu bar.

2. UNIVERS displays ``*Enter table number (001-999):*." Enter a new table number.

3. UNIVERS prompts ``*Enter file description (40 characters max.)*" Enter a description of up to 40 characters.

Kill

The **Kill** option deletes an existing table. Once a table has been deleted from the listing, it cannot be restored.

Procedure
1. Highlight the table you wish to delete.

2. Select **Kill** from the menu bar.

3. UNIVERS displays ``*WARNING: Deleting highlighted table. Do you want to continue?*" Type one of the following:

    Y - to delete the table

    N - to continue without deleting the table

Totals

The **Totals** option displays the Break Definition Screen (Figure 8-20) which allows you to enter up to ten break definitions. For each definition entered, a page will print with statistics for the ranges defined for the factor.

```
10:49:21 am                           January 25, 1992

              Data Item for Totals

   C-Type  Item     Item Name
   -------- ------ ---------------------

 1
 2
 3
 4
 5
 6
 7
 8
 9
10
```

Figure 8-20. Break Definition Screen

Break Definitions

Break definitions consist of two parts. The first part is the factor definition which defines the Card Type, Item Number, and Item Name for the factor upon which records will be assigned to groups. The second part is the range definitions which are entered in the Break Window which displays while editing the Break Definitions. For numeric factors, you can have UNIVERS automatically calculate up to 20 break values or you can enter up to 10 breaks manually. For all other types, you must enter the breaks manually.

When the Sales Ratio Report is **Run**, parcels are assigned to groups based on the value in the defined factor. Values which are greater than or equal to an entered break value, but less than the next break value, are included in that group, with one exception. For the value entered on the **Hi** line, only records equal to that value are included in that group. When you enter values in the Break Window, UNIVERS will sort them from low to high value, placing the lowest value in the **Lo** line, the highest value in the **Hi** line, and all others in between.

When doing the comparison between a records value and the break values, the processing depends on the data type. For numeric factors, a straight low to high numeric comparison is done. For Date factors, an earliest to latest date comparison is done. Date factors must be entered in **YYYYMMDD** or **YYYY/MM/DD** format. For Text factors, trailing spaces are stripped and a character by character comparison is done using the ASCII values.

Note   When doing a Text comparison, alphabetic characters (a-z) are converted to upper-case.

Defining Break Definitions

1. At the ``*Enter Number (1-10 only) to Edit/Modify*'' prompt, enter the line number of the break definition you wish to add/edit.

2. The cursor moves to the **C-Type** column. Enter the Card Type of the factor to be used.

Note

To delete an existing definition, type an asterisk (*****) in the **C-Type**, **Item**, or **Item Name** field and press [ENTER].

3. The cursor moves to the **Item** column. Enter the Item Number of the factor to be used.

4. The cursor moves to the **Item Name** column. The name displayed defaults to the name on the Factor Table. Change it if desired and press [ENTER].

5. *This step only applies if the factor is a Categorical Factor.* UNIVERS will ask you to specify whether to compare using the Categorical Level Number, the Categorical Level Name, or the Categorical Level Value. Enter one of the following:

    CL - for the Categorical Level Number

    CN - for the Categorical Level Name

    CV - for the Categorical Level Value

6. The Break Window (Figure 8-21) displays.

```
11:11:07 am                           November 21, 1991

          Data Item for Totals

   C-Type  Item     Item Name
   -------- ------ ---------------------       BREAKS
                        Lo
 1   1    46  NEIGHBORHOOD CODE     1
 2                       2
 3                       3
 4                       4
 5                       5
 6                       6
 7                       7
 8                       8
 9                       9
10                       Hi
                  All No - Enter Up to 10 Breaks
                     Return to Total Screen
```

Figure 8-21. Break Definition Screen with Break Window

Define the breaks as follows:

- To enter a break value, type the value on a line and press [ENTER]. Enter/edit up to 10 break values.

- To move the cursor from line to line without entering or changing the values use [ ] and [ ].

- To delete an existing entry, type an asterisk (*****) in the first character position of a line and press [ENTER].

- Enter **Y** in the **All** line to have UNIVERS determine the breaks for you at the time the report is **Run**. (Valid for numeric factors only, not Text or Date factors). No values display if you enter this option, since the breaks are determined at **Run** time based on the lowest and highest occurrence encountered in the parcel records included in the report.

- If the **All** option is already set to **Y**, you must change it to **N** in order to enter breaks manually.

7. When the breaks are entered, press [ESCAPE] or move the cursor to the **Return to Totals Screen** line and press [ENTER].

8. The cursor returns to the next line in the **C-Type** column. Repeat steps 2 through 6 until all desired definitions have been entered.

9. Press [ESCAPE] to return to the ``*Enter Number (1-10 only) to Edit/Modify*'' prompt.

10 Press [ESCAPE] again to return to the Sales Ratio Report Screen.

Run

The **Run** option generates a report, using the table in memory and the data set filtered by Selfil. If the desired table is already loaded and has been modified but not saved, you must save it before you can run it. Refer to the sample detail, statistical summary, and break points reports on the following pages.

Procedure

1. Load the desired table.

2. Select **Run** from the menu bar.

3. UNIVERS displays ``*Enter Card and Item of Assessed Value Crd__ Itm__*.'' Enter the Card Type and Item Number which stores the value to be compared to the Sale Price to determine the Sales Ratio.

4. UNIVERS displays ``*Enter Card and Item of Sale Price Crd__ Itm__*.'' Enter the Card Type and Item Number which stores the Sale Price. UNIVERS runs the report.

5. When it is complete, UNIVERS displays ``*Press any key to go back to Main Menu*.'' Press any key to return to the Sales Ratio Report Screen.

```
        C L T   U N I V E R S   S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994              ANYTOWN USA SALES RATIO REPORT                   9:16:38 am
=================================================================================================

   PARCEL ID     DATE SALE PRICE TOT. VALUE     PROP ADDRESS      GRADE CDU TOT LIV CLASS S RATIO
-------------------- ---- ---------- ---------- ------------------------------ ----- --- ------- ----- -------

057030   086   8912   140,000   109,900 00113 GROVE STREET        1  5   2066 R     78.50
057030   155   8908   182,000   187,700 00057 COTTAGE ST          1  3   3328 R    103.13
057030   167   8909   108,000   101,200 00011 COTTAGE ST          1  4   1580 R     93.70
057031   002   8904   172,000   161,200 00100 COTTAGE ST          1  3   3024 R     93.72
057031   003   8907   160,000   133,100 00104 COTTAGE ST          1  4   3018 R     83.19

057031   004   9011   176,000   158,900 00106 COTTAGE ST (LOT       1  3   2783 R     90.28
057031   016   9007   150,000   137,100 00123 BELLINGHAM ST  (      1  4   2720 R     91.40
057031   023   9008   185,000   155,600 00122 BELLINGHAM ST         1  4   3840 R     84.11
057031   060   8906   170,000   151,300 00130 GROVE ST          1  4   2820 R     89.00
057031   078   9003   120,000   113,300 00131 MARLBORO ST         1  4   1760 R     94.42

057031   086   9003   192,500   164,100 00113 MARLBORO ST         1  3   2880 R     85.25
057031   120   8909   165,000   145,300 00123 WILLOW STREET        1  4   2626 R     88.06
057038   085   8909   137,000   102,200 00016 SIXTH ST         1  5   1736 R     74.60
057039   055   8907   140,000   126,100 00055 LIBRARY ST        1  5   2778 R     90.07
057039   059   8904   165,000   149,300 00033 LIBRARY ST        1  4   3108 R     90.48

057047   007   8910   108,000   101,900 00231 SPRUCE ST     (     1  5   2544 R     94.35
057048   074   9106   138,000   136,100 00029 CARY AVENUE        1  4   2832 R     98.62
057049   025   8901   130,000   120,500 00723 BROADWAY ST        1  4   2248 R     92.69
057049   030   9010   185,000   184,500 00707 BROADWAY ST        1  3   4800 R     99.73
057056   027   8901   145,000   105,600 00258 SPRUCE STREET       1  4   1710 R     72.83

057056   091   8905   145,000   118,800 00084 ORANGE ST         1  5   1544 R     81.93
057056   094   8901   144,000   130,900 00071 ORANGE ST         1  4   2194 R     90.90
057056   156   8912   150,000   124,400 00257 SPRUCE STREET       1  3   1414 R     82.93
057056   159   8904   105,000    86,700 00249 SPRUCE STREET       1  5   2328 R     82.57
057056   164   9012   120,000   111,300 00057 HEARD STREET       1  5   3006 R     92.75

057057   012   8901   110,000    90,100 00028 ORANGE ST         1  4   1156 R     81.91
057057   059   8912   125,500   113,800 00192 WASHINGTON AVE       1  4   1829 R     90.68
057057   085   8906   210,200   176,800 00028 GARDNER ST         1  3   2880 R     84.11
057057   110   8901   157,000   142,300 00079 TUDOR STREET        1  4   2943 R     90.64
057057   121   9011   126,000   117,100 00012 GEORGE ST         1  4   2058 R     92.94

057057   154   9006   117,420   117,300 00128 WASHINGTON AVE       1  4   1680 R     99.90
057057   159   9003   125,000   128,500 00008 BLOOMINGDALE ST       1  4   2818 R    102.80
057057   162   9003   112,000   100,800 00047 EDEN STREET        1  4   1624 R     90.00
057057   164   8901   105,000   101,100 00019 ORANGE ST         1  4   1860 R     96.29
057057   167   9010    90,000    97,900 00013 ORANGE ST         1  4   1812 R    108.78

057057   170   8909   173,000   147,000 00010 ORANGE ST         1  3   1964 R     84.97
057057   171   9004    95,000    91,000 00016 ORANGE ST         1  4    520 R     95.79
057057   174   9105   162,000   156,600 00019 ADDISON ST        1  4   4168 R     96.67
057058   032   8912   133,350   135,500 00101 TUDOR STREET        1  4   3732 R    101.61
057058   045   9011   175,000   155,900 00017 JOHN ST     (     1  4   3456 R     89.09

057058   059   9001   250,000   189,100 00058 ELEANOR ST        1  4   3240 R     75.64
057058   069   8902   183,000   183,800 00092 CLARK AVE         1  3   2548 R    100.44
057058   160   8902   166,000   149,300 00783 BROADWAY ST        1  4   4056 R     89.94
057059   018   8909   165,000   137,900 00873 BROADWAY ST        1  4   2541 R     83.58
057059   048   8906   120,000    92,600 00031 DUDLEY ST         1  5   1914 R     77.17


=================================================================================================
 002  -  SALES RATIO REPORT                                    Page 2
```

Example of a Sales Ratio Detail Report

```
           C L T   U N I V E R S   S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994                ANYTOWN USA SALES RATIO REPORT                      9:18:49 am
=====================================================================================================
                         STATISTICAL SUMMARY
-----------------------------------------------------------------------------------------------------


Sales in Study                          143


Total Assessed Value                    $19,544,300


Total Sale Price                        $21,346,620


Total Assessment Value/Total Sale Price  %              91.56


Mean Ratio  %                           95.51


t-Test for Level of Assessment (Mean Ratio)            Passed


Median  %                               91.00


Binomial Test for Level of Assessment (Median Ratio)        Failed


Standard Deviation                      0.50


Coefficient of Dispersion - Median  %              13.04


Coefficient of Variance - Mean  %              52.46


Chi-Square Test for Normality              Failed


Confidence Interval                     95%
```

```
=====================================================================================================
 002  -  SALES RATIO REPORT                              Page 5
```

Example of a Sales Ratio Stastical Summary Report

```
        C L T   U N I V E R S   S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994              ANYTOWN USA SALES RATIO REPORT              9:18:49 am
```

SALE PRICE BREAK	# OF SALES	ASSESSED VALUE	SALE PRICE	A/S RATIO%	MEAN%	t-TEST	BINOMIAL MEDIAN%	STD TEST	COD% DEV	COV% MEDIAN	MEAN	NORMALITY
35,000.000	1	$234,600	$35,000	670.29	670.29	M	670.29		0.00			
45,750.000	0											
56,500.000	0											
67,250.000	0											
78,000.000	2	$189,300	$167,500	113.01	114.02		114.02		0.32	19.71	27.88	
88,750.000	6	$566,700	$565,500	100.21	100.44		106.45		0.14	7.80	13.72	
99,500.000	12	$1,253,600	$1,281,500	97.82	97.67		94.03		0.17	10.53	17.90	
110,250.000	10	$1,075,000	$1,175,420	91.46	91.50	M	93.85	N	0.07	4.95	7.78	
121,000.000	11	$1,317,100	$1,395,400	94.39	94.43	M	92.69		0.07	5.54	7.52	
131,750.000	19	$2,389,500	$2,634,850	90.69	90.70	M	95.07	N	0.09	8.21	10.24	
142,500.000	26	$3,566,500	$3,832,000	93.07	93.07	M	90.85	N	0.09	6.77	9.38	
153,250.000	10	$1,271,700	$1,585,750	80.20	80.24		88.29	N	0.29	14.60	35.71	
164,000.000	13	$1,907,800	$2,176,000	87.67	87.68	M	89.00	N	0.05	4.47	6.04	
174,750.000	14	$2,364,400	$2,536,500	93.22	93.20	M	93.56		0.09	7.80	9.91	
185,500.000	6	$1,018,400	$1,156,500	88.06	88.06	M	87.81	N	0.06	5.07	6.31	
196,250.000	6	$1,110,700	$1,217,500	91.23	91.27	M	91.42		0.06	4.95	6.90	
207,000.000	3	$539,200	$640,200	84.22	84.22	M	84.11		0.05	3.69	5.52	
217,750.000	1	$191,000	$225,000	84.89	84.89	M	84.89		0.00			
228,500.000	1	$149,100	$229,500	64.97	64.97	M	64.97		0.00			
239,250.000	1	$210,600	$242,500	86.85	86.85	M	86.85		0.00			
= 250,000.000	1	$189,100	$250,000	75.64	75.64	M	75.64		0.00			

OF SALES PAGE TOTAL 143

B - FAILED BINOMIAL TEST FOR NORMALITY
M - MEAN FAILED TEST FOR ASSESSMENT/APPRAISED VALUE LEVEL OF 95%
N - MEDIAN FAILED BINOMIAL TEST FOR ASSESSMENT/APPRAISED VALUE LEVEL OF 95%
X - FAILED CHI-SQUARED TEST FOR NORMALITY

KRUSKAL-WALLIS TEST: Test not performed due to small sample size in one or more groups

```
 002  -  SALES RATIO REPORT                                    Page 6
```

Example of a Sales Ratio Break Points Report

Save

The **Save** option saves the table in memory. This option can be used to save new tables or update modified tables. If you do not save the table in memory before using the **Load**, **Select**, or **Quit** option, any changes made to the table will be lost. You may save a modified table in one of two ways.

- You may overwrite the same table, replacing the old contents with the new contents.

- You may overwrite a different table, replacing its contents with the table in memory.

Overwriting the Same Table

1. Highlight the table.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Current table will be overwritten. Do you want to continue?*'' Type one of the following:

   Y - to save the table

   N - to continue without saving the table

Overwriting a Different Table

1. Highlight the table to which you would like to save the table in memory.

2. Select **Save** from the menu bar.

3. UNIVERS displays ``*WARNING: Save table XXX into table YYY. Do you want to continue?*''

4. Type one of the following:

   Y - to continue the save procedure

   N - to abort the save procedure

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a new Selfil Table to use with this module.

Procedure

1. Select **Select** from the menu bar.

2. If there is a table in memory which has had changes made but has not been saved, UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to continue the Select function

   N - to end the Select function

Quit

The **Quit** option returns you to the UNIVERS Reporting Menu. Any changes you have made to the table currently loaded to memory will be lost if you quit without first saving the changes.

1. Select **Quit** from the menu bar.

2. If there is a table in memory which has had changes made but has not been saved, UNIVERS displays ``*WARNING: Current table changes not saved. Do you want to continue?*'' Type one of the following:

   Y - to quit without saving the table

   N - to return to the menu bar in order to save the table

Scattergram

When you select **Scattergram** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table before to select the parcels to use with Scattergram. Only the records which pass through Selfil will be included on the Scattergram. (see **Executing a Selfil Table** in Section 4). After you have executed a Selfil Table, the Scattergram Screen (Figure 8-22) displays:

```
3:5O:47 pm        C L T   U N I V E R S   S Y S T E M    February 16, 1994

              SCATTERGRAM - Version 7.2  12/16/93


1. Enter Report Name     : COST VALUE VS SALE PRICE

2. Enter X variable    : Card  1   Item  113      TOT. VALUE COST
3. Enter Low, High Limit :     1OOOO       3OOOOO
4. Modify X Break Points : (Y/N)N

5. Enter Y variable    : Card  1   Item  27      SALE PRICE
6. Enter Low, High Limit :     1OOOO       3OOOOO
7. Modify Y Break Points : (Y/N)

8. Screen or Printer (S/P): S
9. # of Occurrence Symbols: 1O
1O. Regression Line (Y/N)  : Y
```

Figure 8-22. Scattergram Screen

Scattergram Graph

This module produces a Scattergram Graph which represents data by plotting the values of two different factors on a single graph for a range of records. (See sample report below.) The range of records is determined by the Selfil Table executed. Each record processed through Selfil is plotted on the Scattergram according to its (X,Y) coordinates. UNIVERS calculates 30 value breaks along the horizontal axis and 20 value breaks along the vertical axis. It relies on user-specified low and high limits to calculate these breaks. The low limits determine the point of origin for each axis. You can also optionally include a regression line on the graph, if the system-generated breakpoints for the X and Y axes are not modified. The regression line is represented on the graph by the caret (^) symbol. The line drawn with linear regression follows the algebraic formula for a straight line $(Y = a + bX)$, where:

- **X** is the value of the X variable, in the (X,Y) coordinate.

- **Y** is the value of the Y variable, in the (X,Y) coordinate.

- **a** is the calculated Y-intercept, the point at which the drawn line will cross the Y-axis (X is equal to 0 at the Y-intercept).

- **b** is the slope of the line, also called the regression coefficient. It measures the change in the Y variable for every one (1) unit change in the X variable.

Scattergram Statistical Report

A Statistics Report is printed or displayed as Part II of the Scattergram output. For each Scattergram that is generated, this report includes (see example below):

- A calculation of mean, standard deviation and number of cases observed for both the X-axis and Y-axis variables.

- A calculation of the correlation coefficient (r) for the two factors, which measures the strength of the relationship between the factors.

- The statistical results of linear regression, applied to the Scattergram plot to measure the strength of the linear relationship.

- A calculation of the Y-intercept and regression coefficient (slope), as well as the computed standard deviations for each of these values.

- A calculation of the F-value for the factors under study.

```
        C L T   U N I V E R S   S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994          ANYTOWN USA  SCATTERGRAM REPORT --- COST VALUE VS SALES PRICE              9:22:33 am
================================================================================================================
            Scattergram of SALE PRICE  vs.  TOT. VALUE COST
  ----------------------------------------------------------------------------------------------------

    300000 -|
        -|
    285500 -|
        -|
    271000 -|
        -|                                        ^^
    256500 -|                                     ^^^
        -|                                 ^^^
    242000 -|                                 ^^^
        -|                              ^^
    227500 -|                    *          ^^^
        -|                         ^^^
    213000 -|                *    *    ^^^
        -|                       ^^^
    198500 -|                *       *  ^^^
        -|                      ^^
    184000 -|             * #  * #    ^^^
        -|                    ^^^
    169500 -|             #    #  * ^^*^
        -|                 ^^^
    155000 -|          *  *  # #   ^*^   #
        -|                  ^^^
    140500 -|        *  *  *  :  =  - ^#^^ x  *
        -|           ^^^
    126000 -|      *  #  X  x : ^:^^ -       *       *
        -|          ^^^
    111500 -|        # #  x :^^. # *   *
        -|          ^^^
     97000 -|      #  +^^^+ .  # #
        -|        ^^^
     82500 -|      *^^^* * # # #
        -|      ^^
     68000 -|     ^^*^ # # # * * * *        * *
        -|    ^^^
     53500 -|   ^^^  *   # * * #
        -| ^^^
     39000 -|^^^     *     * *
        -|
     24500 -|                 *
        -|
     10000 -+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
        | 29333 | 68000 | 106667 | 145333 | 184000 | 222667 | 261333 | 300000
        10000    48667    87333   126000   164667   203333   242000   280667
```

Example of a Scattergram Graph

```
        C L T   U N I V E R S   S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994        ANYTOWN USA  SCATTERGRAM REPORT --- COST VALUE VS SALES PRICE                9:22:33 am
==========================================================================================================================
                           STATISTICS REPORT
--------------------------------------------------------------------------------------------------------------------------


  SelFil Table          999  PARCEL'S WITH SALES
  Records Processed     231
  Valid Cases           229

  X Axis is TOT. VALUE COST
  X Mean         113813.54     Std. Dev.   27912.709

  Y Axis is SALE PRICE
  Y Mean         112137.12     Std. Dev.   32771.976

LINEAR REGRESSION (based on Valid Cases)
  Y Intercept    21341.980     Std. Dev.   9130.844
  X Coefficient      0.798     Std. Dev.      0.078
  Correlation        0.679466
  F Statistics     194.68


==========================================================================================================================
```

Example of a Scattergram Statistical Report

Setting Up the Scattergram Parameters

You establish the criteria for a Scattergram by defining Parameters 1-10. You must define each parameter. A single Scattergram is generated for the factor pair specified on the parameter screen, accompanied by a statistics report. If you see parameter values already listed on the screen, they are the result of a previous Scattergram work session. To modify any of the Scattergram parameters, type the number of the parameter you want to modify at the ``*Enter the Selection (1-10, Q, R, or S)*'' prompt and press [ENTER].

Cursor Controls for Modifying Parameters

When modifying Scattergram parameters, you may use the following keys:

• Use [ ] and [ ] to move the cursor through the parameters without changing them.

• Press [ESCAPE] at any parameter to return to the ``*Enter the Selection (1-10, Q, R, or S)*'' prompt. Pressing [ESCAPE] while modifying one of the value break windows or the Occurrence Symbol Window, returns you to the cursor to the parameter from which the window was accessed.

• [ENTER] moves the cursor to the next parameter and accepts any change made to the current parameter.

Parameter 1: Enter Report Name

This parameter allows you to name the Scattergram Report. This name appears at the top of both report pages. The name can be up to 30 characters in length.

Parameter 2: Enter X Variable

This parameter defines the factor that will act as the X-axis (or horizontal axis) variable in your Scattergram. Enter the Card Type and Item Number of any numeric (Integer, Single-Precision, Double-Precision, Categorical or Byte) factor from the data base . A Scattergram cannot be generated for a String or Date type factor. The factor must be located within a Card Type that is filtered by your Selfil Table.

Parameter 3: Enter Low, High Limit (X-Axis)

The Low limit is the lowest value on the X-axis (or horizontal axis) of your Scattergram; High limit is the highest value. Together, they define a range of values for the X-axis factor. UNIVERS uses this range of values to calculate 30 breaks for the X-axis of your Scattergram. There must be a minimum of 30 X-axis breaks possible from this value range. If the difference of your high and low limits is less than 30, UNIVERS will change your high limit to (low + 30). For Single-Precision or Double-Precision factors, the number of decimal places that you enter for the low and high limits determines the number of decimal places that will be calculated for all X-axis breaks. For example, if you enter **2500.26** as a low limit and **6500.892** as a high limit, your X-axis breaks will be calculated to three (3) decimal places.

Parameter 4: Modify X Variable Breaks

This parameter lets you modify any or all of the 30 X-axis (or horizontal axis) breaks determined by UNIVERS for your Scattergram. UNIVERS determines these 30 equal breaks using the low and high limits entered for Parameter 3. When you move the cursor to Parameter 4, a window is displayed to the right of your screen listing the first ten breaks (1-10) for your X-axis variable, as well as the low limit (0). The low limit is not considered a break, but rather the point of origin for the X-axis. To modify the values listed in this window, enter **Y** in Parameter 4. Once inside the X-axis break window, you may make changes to any of the values listed, including the low (0) and high (30) limits. If you change either of these limits, the change will be reflected for Parameter 3. Breaks must be specified in ascending order. While you are in the X-axis break window, these cursor controls are important:

*   [ ] and [ ] move you through the breaks.

*   [PAGE UP] and [PAGE DOWN] scroll through the window to the next page of breaks.

*   [ESCAPE] exits the window. Control returns to Parameter 4.

If you ``open'' the window by entering **Y** for Parameter 4, UNIVERS assumes you have modified the breaks. This prevents you from entering **Y** in Parameter 10 to print a Regression Line. If you do this, you must re-enter the high limit in Parameter 3 to recalculate the value breaks in order to enter **Y** in Parameter 10

Parameter 5: Enter Y Variable

This parameter defines the factor that acts as the Y-axis (or vertical axis) variable in your Scattergram. Enter the Card Type and Item Number from the data base of any numeric (Integer, Single-Precision, Double-Precision, Categorical or Byte) factor. A Scattergram cannot be generated using a String or Date type factor. The factor must be located within a Card Type that is filtered by your Selfil Table.

Parameter 6: Enter Low, High Limit (Y-Axis)

The Low limit is the lowest value on the Y-axis (or vertical axis) of your Scattergram; High limit is the highest value. Together, they define a range of values for the Y-axis factor. UNIVERS uses this range of values to calculate 20 breaks for the Y-axis of your Scattergram. There must be a minimum of 20 Y-axis breaks possible from this value range. If the difference of your high and low is less than 20, UNIVERS will change your high limit to (low + 20). For Single-Precision or Double-Precision factors, the number of decimal places that you enter for the low and high limits determines the number of decimal places that will be calculated for all Y-axis breaks. For example, if you enter **2500.26** as a low limit and **6500.892** as a high limit, your Y-axis breaks will be calculated to three (3) decimal places.

Parameter 7: Modify Y Variable Breaks

This parameter lets you modify any or all of the 20 Y-axis (or vertical axis) breaks determined by UNIVERS for your Scattergram. UNIVERS determines these 20 equal breaks using the low and high limits entered for Parameter 6. These breaks are used as the Y coordinates when plotting the Scattergram. When you move the cursor to Parameter 7, a window is displayed to the right of your screen listing the first ten breaks (1-10) for your Y-axis variable, as well as the low limit (0). The low limit is not considered a break, but rather the point of origin for the Y-axis. Enter **Y** at Parameter 7 to modify of the 20 breaks on the Y-axis. Once inside the Y-axis break window, you may make changes to any of the values listed, including the low (0) and high (20) limits. If you change either of these limits, the change will be reflected for Parameter 6. While you are in the Y-axis break window, these cursor controls are important:

- [ ] and [ ] move you through the breaks.

- [PAGE UP] and [PAGE DOWN] scroll through the window to the next page of breaks.

- [ESCAPE] exits the window. Control returns to Parameter 7.

If you ``open'' the window by entering **Y** for Parameter 7, UNIVERS assumes you have modified the breaks. This prevents you from entering **Y** in Parameter 10 to print a Regression Line. If you do this, you must re-enter the high limit in Parameter 6 to recalculate the value breaks in order to enter **Y** in Parameter 10.

Parameter 8: Screen or Printer (S/P)

This parameter indicates whether you to display the results of your Scattergram on screen (S) or send the results to your printer for a hard-copy report (P). Even though you select the Screen option, you still have the opportunity of printing the report after you view it.

Parameter 9: Number of Occurrence Symbols

When creating a Scattergram, UNIVERS plots a symbol at an (X,Y) coordinate for each record processed through the Selfil Table. If UNIVERS finds more than one occurrence of a particular (X,Y) coordinate (i.e., more than one record in your Selfil data set has the same values for X and Y), you may want to reflect this condition on the Scattergram. Parameter 9 lets you identify the number of different symbols that will be used by UNIVERS to plot the (X,Y) coordinates on the Scattergram. You may choose from one to ten different symbols and, for each symbol, the minimum number of (X,Y) occurrences each represents. To modify Parameter 9, perform the following steps:

1. Type the number of different symbols you would like UNIVERS to use when plotting your Scattergram. You are allowed from one (1) to ten (10) different symbols. Press [ENTER].

2. A window will be displayed on the right of your screen. It will list from 1-10 plotting symbols, depending upon your entry to Parameter 10. This window is used to record the minimum number of (X,Y) occurrences that each plotting symbol represents. For each symbol listed in the window, you must specify the minimum number of (X,Y) occurrences that each will represent when plotted. The only exception to this rule is Symbol 1. This symbol will always have a minimum value equal to **1**. It will always represent at least one occurrence. You cannot modify the value for Symbol 1. Values entered must be positive integers, 2 through 32767 and greater than the minimum value of the preceding symbol. Values must be specified in ascending order. You cannot use two different symbols to represent the same number of (X,Y) occurrences.

Parameter 10: Regression Line

This parameter determines whether or not to print a regression line on the Scattergram Graph. If you modify any of the break points, you will not be able to print a regression line. Enter **Y** in Parameter 10 to print a regression line on the graph. The regression line is represented on the graph by the caret (**^**) symbol.

Generating the Scattergram

Once you have set the parameters, you are ready to produce the Scattergram and its accompanying statistics report. Enter **R** or **r** after the **Enter the Selection** prompt. Depending upon your entry to Parameter 8 you may either display the Scattergram report on screen or send it to a printer. Processing begins as the data base is filtered through the selected Selfil Table. A message is displayed, indicating that the filter is in process. The Selfil Table Number is indicated for your reference. A count of each record which is passed by Selfil is maintained as each record is processed through the table. A count of valid cases observed for each variable, x and y, is displayed as the records are processed. The Scattergram module only considers those records that have values entered to both the x and y factor. When all records have been processed through Selfil, UNIVERS displays the ``*End of File*'' message. The Scattergram and basic statistics for each factor (x and y) in your run are prepared and organized into a temporary output file for display or printing. The report is ready to display and/or print when you are prompted with this message, ``*Press any key to continue*.''

*   If your entry to Parameter 8 was set to **S** (Screen), press any key of your keyboard to display your Scattergram report on screen. You will have an option to print the report after viewing it, as well as an option to terminate the display. Your Scattergram displays two screens. The first screen displays the Scattergram Graph. Because of screen size, all x-axis breaks cannot be indicated on the graph. Only 15 x-axis breaks can be displayed. The low and high limits are drawn, as are every other break from 2 through 28. The second screen displays the Scattergram Statistics Report. You can toggle between screens by pressing [ENTER]. You can print the Scattergram Graph and Report by pressing **P**. For color monitors, the plotted points display in bright white. The symbol printed matches the symbol assigned for the number of occurrences in Parameter 9. The Scattergram determines an occurrence to be less than or equal to a break point on the axis and greater than the previous breakpoint. You can return to the menu bar by pressing [ESCAPE].

*   If your entry to Parameter 8 was set to **P** (Printer), press any key of your keyboard to send your two page Scattergram report to the printer. On screen display will be by-passed.

Selecting a New Selfil Table

Enter **S** or **s** after the ``*Enter the Selection (1-10, Q, R, or S)*'' prompt to return to the Selfil Table Menu, where you can select a different Selfil Table to execute with the Scattergram module. Before you return to the Selfil Table Menu, UNIVERS saves the current parameters as they are displayed on screen.

Quitting Scattergram

Enter **Q** or **q** after the ``*Enter the Selection (1-10, Q, R, or S)*'' prompt to return to the UNIVERS Reporting Menu. Before you exit the module, UNIVERS saves the current parameters as they are displayed on screen.

Histogram

This module creates histograms which graph the frequency distribution of factors in your data base. It produces a bar graph for a specific factor with ranges of value for the factor (X-axis) graphed against the frequency of occurrence of each range (Y-axis). You may specify these ranges, or breakpoints, for your factor, or you may let UNIVERS determine them for you. For String type factors, you must specify them. Descriptive statistics (mean, median, mode, and standard deviation) are calculated for the factor under study. These statistics are calculated using only valid occurrences for the factor. They cannot be calculated for String type factors.

When you select **Histogram** from the UNIVERS Reporting Menu, the UNIVERS Selfil Table Menu displays. You must execute a Selfil Table to select the records to be used with Histogram. Only the records which pass through the selected Selfil Table will be included in the Histogram calculations. (See **Executing a Selfil Table** in Section 4).

After you have executed a Selfil Table, the Histogram Screen (Figure 8-23) displays. The Histogram Screen displays a list of all the factors which will produce a histogram when the **Run** option is selected.

```
1:59:48 pm        HISTOGRAM   Version 7.2  12/16/93     February 16, 1994

Line  Card  Item     Factor name          Breaks

 1    1    27  SALE PRICE
```

Figure 8-23. Histogram Screen.

Modify

A single histogram is created for each factor specified on the parameter screen. You may specify up to 15 different factors in one run, resulting in up to 15 different histograms. The **Modify** option lets you edit the parameter screen, defining the candidate factors and their X-axis breakpoints.

The Histogram Parameter Screen holds up to 15 factors, with a line number (1-15) assigned to each. The line number is used to reference the factor on screen. For each line number on the parameter screen, the Card Type, Item Number, and Factor Name are identified for the factor. Breakpoints for each factor are stored in a hidden window under the column heading **Breaks**. To view breakpoints, you must use the **Modify** option command to access the factor, keying through to the breakpoint column.

Adding/Modifying a Line

1. Select **Modify** from the Histogram menu bar.

2. UNIVERS prompts ``*Enter line number to Modify/Add*.'' Enter the line number you wish to add or modify.

3. Enter the Card Type and Item Number of the factor.

4. UNIVERS displays the Break Window (Figure 8-24). Enter the break values to define the ranges on the histogram.

```
1:59:16 pm       HISTOGRAM   Version 7.2  12/16/93    February 16, 1994

 Line Card Item     Factor name            Breaks

 1   1   27 SALE PRICE            LINE 1 BREAKS
                        Lo O
                        1 _____
                        2
                        3
                        4
                        5
                        6
                        7
                        8                                       9
                        Hi
                        ALL No            O
                            Return to Modify line
```

Figure 8-24. Histogram Screen with Break Window

5. Repeat steps 2-4 until all desired lines have been entered.

6. Press [ESCAPE] to return to the Histogram menu bar.

Entering the Breakpoints

You have three options when defining breakpoints for a factor:

- You may specify each breakpoint that you want. Up to 11 breakpoints can be specified, resulting in a Histogram with a maximum of ten bars. You *must* enter them when your factor is a String type factor.

- You may specify a **Lo** and **Hi** value only, letting the system determine ten equally wide bars for your histogram.

- You may bypass all breakpoint entries and set the **All** parameter to **Yes**. This lets the system determine all breaks, including the **Lo** and **Hi** values, creating a histogram with ten equally wide bars.

If a record in your Selfil data set has a value that is less than the **Lo** value or equal to or greater than the **Hi** value for a factor, it is omitted from the histogram.

Deleting a Line

1. Select **Modify** from the Histogram menu bar.

2. UNIVERS prompts ``*Enter line number to Modify/Add*.'' Enter **D** or **d**.

3. UNIVERS prompts ``*Enter Line Number to Delete, use (1-X)*.'' Enter the line number to delete.

4. Repeat 3 until all desired lines have been deleted.

5. Press [ESCAPE] to return to the Histogram menu bar.

Run

The **Run** option generates Histograms for each factor listed on the Histogram Screen. Once the Histograms have been generated, you have the option of displaying the report on screen, sending it to a printer, or both.

How UNIVERS Constructs the Histogram

UNIVERS can create a Histogram with no more than 10 bars on its X-axis. If you choose to let UNIVERS calculate and establish the X-axis breakpoints for each bar of the graph, UNIVERS uses this algorithm:

1. Divide the total range of values for the factor (Highest Value - Lowest Value) by the number of breakpoints (or bars) specified for the Histogram. UNIVERS uses 10, unless the total range is less than 10. The resulting quotient represents a common increment for each bar range.

2. Determine the value ranges for each bar; this formula is observed:

   Highest Value, Bar n = Lowest Observed Value + n(quotient)

   Range for Bar n = Highest Value, Bar (n-1) through Highest Value, Bar n

   Exception: Range, Bar 1 = Lowest Observed Value through Highest Value, Bar 1

   Example. UNIVERS is creating a 10 bar Histogram. The highest value observed for the factor is 1000; the lowest value is 250. Increments for each bar (Step 1) is determined as:

$(1000 - 250)/10 = 75$

Value ranges for 10 bars must be determined (Step 2). Ranges for the first three bars are determined as follows:

Highest Value, Bar 1 = 250 + 1(75) or 325
Highest Value, Bar 2 = 250 + 2(75) or 400
Highest Value, Bar 3 = 250 + 3(75) or 475
Range, Bar 1 = 250 through 325
Range, Bar 2 = 325 through 400
Range, Bar 3 = 400 through 475

3. Assign factor occurrences to X-axis bar values. Calculate percentage frequency.

4. Draw the graph. This final step of the algorithm applies to all Histograms, even if you choose to specify the X-axis breakpoints.

Processing the Histogram Report

The report is ready to display and/or print when this message displays ``*Do You Want to Display Histograms On Screen or Send to Printer (S/P)?*'' Enter **S** to display your Histogram Report on screen. Enter **P** to bypass the on screen display and send the report directly to your printer. Below is a sample of a printed Histogram Report.

Select

The **Select** option returns you to the Selfil Table Menu, where you can select a different Selfil Table to execute with the Histogram module.

Quit

The **Quit** option exits the Histogram module and returns you to the UNIVERS Reporting Menu. The Histogram Screen is saved when you quit.

```
        C L T  U N I V E R S  S Y S T E M  (c) 1986-1993   Ver 7.2
February 16, 1994              ANYTOWN USA  HISTOGRAM REPORT                    9:26:53 am
=============================================================================================================

        Report Name :  SALE PRICE HISTOGRAM                        HISTOGRAM  1 of  1

            Histogram for Card:  1    Item:   27    Item name:  SALE PRICE
                    Report Run with Selfil Table:   999

            S T A T I S T I C S

    Cases   Cases Outside Limit     Mean        Median        Mode      Standard Deviation
    -----   ------------------   --------------  --------------  --------------  ------------------
     231          1              115282.61      114102.56      112500.00       36458.6342



        _|
  P  100_|
  E    _|
  R   90_|
  C    _|
  E   80_|
  N    _|
  T   70_|
  A    _|
  G   60_|
  E    _|
      50_|
  F    _|
  R   40_|
  E    _|              33.91%
  Q   30_|               HHHHHH    31.74%
  U    _|                HHHHHH    HHHHHH
  E   20_|                HHHHHH    HHHHHH
  N    _|        17.39%   HHHHHH    HHHHHH
  C   10_|        9.57%   HHHHHH    HHHHHH    HHHHHH
  Y    _|         HHHHHH   HHHHHH    HHHHHH    HHHHHH
       0_|         HHHHHH   HHHHHH    HHHHHH    HHHHHH
       |.....|....|.....|....|.....|....|.....|....|.....|....|.....|....|.....|....|.....|....|
  Lower Limit :   0.0    25M    40M    50M    75M    100M    125M    175M    200M    250M
  Upper Limit :   25M    40M    50M    75M    100M    125M    175M    200M    250M    300M
  Occurrences :    2      3      4     22     40      78     73      5       3

=============================================================================================================
  The M in the scale is read as (number x 1000),for example 3M represents 3 x 1000 = 3000
```

Example of a Histogram Report

List of ValGen Tables

Table 250: Neighborhood - Model Assignment
Table 251: Standard Land Rates by Type
Table 253: Depth Factor Table By Depth Index / Actual Depth
Table 300: Residential Control Table
Table 301: Residential Dwelling Pricing Schedules
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Table 250: Neighborhood - Model Assignment

Column Description

There are 5 columns in this table. The values entered in these columns have no effect, since the Column Search Type is **Direct**. The columns are defined as follows:

- **Column 1** is for Lot Types.
- **Column 2** is for Square Foot Types.
- **Column 3** is for Acre Types.
- **Column 4** is for Depth Factor
- **Column 5** is for Site Model

Row Description

There rows in this table are indexed by Neighborhood Code. You can add rows to this table if more Neighborhood Codes are required.

Element Description

Each cell contains 1 element. For **columns 1-3**, this element is the Model Number based on the Neighborhood and Land Type. For **column 4** this element is the Depth Factor for the Neighborhood. For **column 5** this element is the Site Model for the Neighborhood.

Table 251: Standard Land Rates by Type

Column Description

There are 11 columns in this table indexed by Land Type. The columns have the following assignments:

- **Column 1** is used to enter the standard sizes for the Land Types and the Site Value.
- **Column 2** is categorical level number 1 (Lot=Regular Lot, Sq Ft=Primary, Acre=Primary).
- **Column 3** is categorical level number 2 (Lot=Minus Lot, Sq Ft=Secondary, Acre=Secondary).
- **Column 4** is categorical level number 3 (Lot=Apt Site, Sq Ft=Undeveloped, Acre=Undeveloped).
- **Column 5** is categorical level number 4 (Lot=Other, Sq Ft=Residual, Acre=Marsh Land).
- **Column 6** is categorical level number 5 (Lot=N/A, Sq Ft=Other, Acre=Adj Primary).
- **Column 7** is categorical level number 6 (Lot=N/A, Sq Ft=N/A, Acre=Forest).
- **Column 8** is categorical level number 7 (Lot=N/A, Sq Ft=N/A, Acre=Open Space).
- **Column 9** is categorical level number 8 (Lot=N/A, Sq Ft=N/A, Acre=Water Supply).
- **Column 10** is categorical level number 9 (Lot=N/A, Sq Ft=N/A, Acre=Mill Forest).
- **Column 11** is categorical level number 10 (Lot=N/A, Sq Ft=N/A, Acre=Farm).

Row Description

The rows in this table are indexed by Model Number. There are the same number of rows as there are models.

Element Description

Each cell contains 4 elements. In **column 1**, these elements are standard values for each Model Number: Number. They are as follows:

- **Element 1** is the Standard Land Size for Lots.
- **Element 2** is the Standard Land Size for Square Feet.
- **Element 3** is the Standard Land Size for Acres.
- **Element 4** is the Site Value.

In **columns 2-11**, these elements are standard rates for the Land Types based on the Model Number and the categorical level number of the Land Type. The element used (1-3) is determined by the Value Procedure based on the Land Type being used. **Element 4** does not apply in these columns:

- **Element 1** is the standard rate for Lots.
- **Element 2** is the standard rate for Square Foot.
- **Element 3** is the standard rate for Acres.

Table 252: Incremental/Decremental Rate By Land Type

Column Description

There are 10 columns in this table indexed by the categorical level number of the Land Type. They are as follows:

- **Column 1** is categorical level number 1 (Lot=Regular Lot, Sq Ft=Primary, Acre=Primary).
- **Column 2** is categorical level number 2 (Lot=Minus Lot, Sq Ft=Secondary, Acre=Secondary).
- **Column 3** is categorical level number 3 (Lot=Apt Site, Sq Ft=Undeveloped, Acre=Undeveloped).
- **Column 4** is categorical level number 4 (Lot=Other, Sq Ft=Residual, Acre=Marsh Land).
- **Column 5** is categorical level number 5 (Lot=N/A, Sq Ft=Other, Acre=Adj Primary).
- **Column 6** is categorical level number 6 (Lot=N/A, Sq Ft=N/A, Acre=Forest).
- **Column 7** is categorical level number 7 (Lot=N/A, Sq Ft=N/A, Acre=Open Space).
- **Column 8** is categorical level number 8 (Lot=N/A, Sq Ft=N/A, Acre=Water Supply).
- **Column 9** is categorical level number 9 (Lot=N/A, Sq Ft=N/A, Acre=Mill Forest).
- **Column 10** is categorical level number 10 (Lot=N/A, Sq Ft=N/A, Acre=Farm).

Row Description

The rows in this table are indexed by Model Number. There are the same number of rows as there are models.

Element Description

Each cell contains 6 elements. These elements are incremental and decremental rates based on the Land Type and Model Number. They are as follows:

- **Element 1** is the Incremental Lot Rate.
- **Element 2** is the Decremental Lot Rate.
- **Element 3** is the Incremental Square Foot Rate.
- **Element 4** is the Decremental Square Foot Rate.
- **Element 5** is the Incremental Acre Rate.
- **Element 6** is the Decremental Acre Rate.

Table 253: Depth Factor Table By Depth Index / Actual Depth

Column Description

The columns in this table are indexed by Depth Index which is assigned by Column 4 in Table 250. There is one column for each possible depth index.

Row Description

The rows in this table are indexed by Actual Depth.

Element Description

Each cell contains 1 element. This element is the Depth Factor based on the Actual Depth and the Depth Index.

Table 300: Residential Control Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There is 1 row in this table. The value entered in this row has no effect, since the Row Search Type is **Direct**.

Element Description

Each cell contains 5 elements. These elements contain administrative information relevant to the valuation process. They are as follows:

- **Element 1** is the Assessment Year.
- **Element 2** is the Assessment Level.
- **Element 3** is the Jurisdiction Name.
- **Element 4** is the Table Level.
- **Element 5** is the Local Modifier.

Note

Though the name of this table suggests it is a **control table**, *it is not*. It is *not* a **control table**, because you can change the values in the cells. This table effects value generation for *residential parcels only*.

Table 301: Residential Dwelling Pricing Schedules

Column Description

There are 5 columns in this table indexed by Story Height.

Row Description

There are 30 rows in this table indexed by Area.

Element Description

Each cell contains 4 elements. These elements are prices based on the Story Height and Area. They are as follows:

- **Element 1** is the Base Price for a Wood Frame Type.
- **Element 2** is the Base Price for a Masonry Type.
- **Element 3** is the Base Price Reduction for No Heat.
- **Element 4** is the Base Price Addition for Air Conditioning.

Table 302: Residential Basements and Attics

Column Description

There are 6 columns in this table indexed by the categorical level number of the Basement/Attic Type:

- **Column 1** is categorical level number 1 (None).
- **Column 2** is categorical level number 2 (Basement = Crawl Space, Attic = Unfinished).
- **Column 3** is categorical level number 3 (Basement = ¼, Attic = Partially Finished).
- **Column 4** is categorical level number 4 (Basement = ½, Attic = Fully Finished).
- **Column 5** is categorical level number 5 (Basement = ¾, Attic = Partially Finished).
- **Column 6** is categorical level number 6 (Basement = Full, Attic = N/A).

Row Description

There are 30 rows in this table indexed by Area.

Element Description

Each cell contains 2 elements. These elements are the Adjustments for Basements and Attics based on the Basement/Attic Type and the Area:

- **Element 1** is the Basement Adjustment.
- **Element 2** is the Attic Adjustment.

Table 303: Residential Grade Factor

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 18 rows in this table indexed by Grade.

Element Description

Each cell contains 1 element. This element is the Grade Factor based on the Grade.

Table 304: Residential Living Area Additions

Column Description

There are 11 columns in this table. The value entered in these columns have no effect, since the Column Search Type is **Direct**. Each column corresponds to a type of Addition. Descriptive names have been entered for ease of reading:

- **Column 1** is a First Floor Addition for Wood Frame Type.
- **Column 2** is an Upper Floor Addition for a Full Story Wood Frame Type.
- **Column 3** is an Upper Floor Addition for a Half Story Wood Frame Type.
- **Column 4** is a First Floor Addition for Masonry Type.
- **Column 5** is an Upper Floor Addition for a Full Story Masonry Type.
- **Column 6** is an Upper Floor Addition for a Half Story Masonry Type.
- **Column 7** is a Basement Addition.
- **Column 8** is an Unfinished Attic Addition.
- **Column 9** is a Partially Finished Attic Addition.
- **Column 10** is a Fully Finished Attic Addition.
- **Column 11** is an Air Conditioned Addition.

Row Description

There are 35 rows in this table indexed by Area.

Element Description

Each cell contains 1 element. This element is the Point Value for the Addition based on the Type of Addition and the Area:

- **Element 1** is the Basement Adjustment.
- **Element 2** is the Attic Adjustment.

Table 305: Residential Porches/Patios/Utility Sheds

Column Description

There are 15 columns in this table. The values entered in these columns have no effect, since the Column Search Type is **Direct**. Each column corresponds to a type of Addition. Descriptive names have been entered for ease of reading:

- **Column 1** is a First Floor Open Porch for a Wood Frame or Cinder Block Type.
- **Column 2** is an Upper Floor Open Porch for a Wood Frame or Cinder Block Type.
- **Column 3** is a First Floor Closed Porch for a Wood Frame or Cinder Block Type.
- **Column 4** is an Upper Floor Enclosed Porch for a Wood Frame or Cinder Block Type.
- **Column 5** is a First Floor Open Porch for a Brick or Stone Type.
- **Column 6** is an Upper Floor Open Porch for a Brick or Stone Type.
- **Column 7** is a First Floor Closed Porch for a Brick or Stone Type.
- **Column 8** is an Upper Floor Enclosed Porch for a Brick or Stone Type.
- **Column 9** is a Masonry Stoop or Terrace.
- **Column 10** is a Concrete or Brick Patio.
- **Column 11** is a Flagstone or Tile Patio.
- **Column 12** is a Wood or Aluminum Canopy.
- **Column 13** is a Wood Sundeck.
- **Column 14** is a Wood Utility Building.
- **Column 15** is a Metal Utility Building.

Row Description

There are 20 rows in this table indexed by Area.

Element Description

Each cell contains 1 element. This element is the Point Value for the Structure based on the Type of Structure and the Area.

Table 306: Residential Attached Garages and Carports

Column Description

There are 3 columns in this table. The values entered in these columns have no effect, since the Column Search Type is **Direct**. Each column corresponds to a type of structure. Descriptive names have been entered for ease of reading:

- **Column 1** is a Wood Frame Garage.
- **Column 2** is a Brick Garage.
- **Column 3** is a Carport.

Row Description

There are 24 rows in this table indexed by Area.

Element Description

Each cell contains 1 element. This element is the Point Value for the Structure based on the Structure Type and the Area.

Table 307: Percent Good Table - Dwelling

Column Description

There are 8 columns in this table. The values entered in these columns have no effect, since the Column Search Type is **Direct**. The column number used is determined by Table 308. This table structure is used so the columns could be ordered from highest to lowest CDU value. If the columns were indexed by CDU value, they would be in alphabetical order, not in highest to lowest CDU value order.

- **Column 1** is for CDU = EX (Excellent).
- **Column 2** is for CDU = VG (Very Good).
- **Column 3** is for CDU = GD (Good).
- **Column 4** is for CDU = AV (Average).
- **Column 5** is for CDU = FR (Fair).
- **Column 6** is for CDU = PR (Poor).
- **Column 7** is for CDU = VP (Very Poor).
- **Column 8** is for CDU = UN (Unsound).

Row Description

There are 51 rows in this table indexed by Age.

Element Description

Each cell contains 1 element. This element is the Percent Good for the Dwelling based on the CDU and Age.

Table 308: Set Condition Types

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 8 rows in this table indexed by CDU Factor.

Element Description

Each cell contains 1 element. This element is a value which identifies the column number to use in Table 307. This table was created, so the columns in Table 308 could be ordered from highest to lowest CDU.

Table 309: Residential Other Features

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 10 rows in this table. The values entered in these rows have no effect, since the Row Search Type is **Direct**. Each row corresponds to an Other Feature Type. Descriptive names have been entered for ease of reading:

- **Row 1** is for a One Car Basement Garage.
- **Row 2** is for a Two Car Basement Garage.
- **Row 3** is for a Finished Basement.
- **Row 4** is for a Masonry Trim.
- **Row 5** is for a Prefabricated Fireplace.
- **Row 6** is for a Recreation Room.
- **Row 7** is for an Unfinished Area.
- **Row 8** is for Wood Burning Fireplace Openings.
- **Row 9** is for Wood Burning Fireplace Stacks.
- **Row 10** is for Wood Central Fireplaces.
- **Row 11** is for Fixtures (over or under five).

Element Description

Each cell contains 2 elements. **Element 1** is the Flat Value or Rate for the Other Feature. **Element 2** is a description of the Other Feature.

Table 401: OBY - Pricing Setup

Column Description

There are 2 columns in this table. The values entered in these columns have no effect, since the Column Search Type is **Direct**. **Column 1** is used to calculate costs for OBYs. **Column 2** is used to calculate costs for Special Modifications to the OBY.

Row Description

The rows in this table are indexed by OBY. There is one row for each OBY Type.

Element Description

Each cell contains 7 element. The elements have different purposes based on which column is being used.

The elements for the cells in **Column 1** are as follows:

- **Element 1** identifies the Cost Method used to cost the OBY.

Method Number	Description	Formula
1	Area	$C_1 + C_2(A) + C_3(A)$
2	Lineal Feet	$C_1(L)$
3	Cylinder Area	$C_1 + C_2(D*H) + C_3(D^2)$
4	Quantity	C_1
5	Cylinder Lineal Feet	$C_1(L) + C_2(D*L)$
6	Cylinder Volume	$C_1 + C_2(H*D^2) + C_3(D^2)$
Where: C_1=First Coefficient, C_2=Second Coefficient, C_3=Third Coefficient A=Area, D=Diameter, H=Height, L=Length		

- **Element 2** is the First Coefficient (C_1).
- **Element 3** is the Second Coefficient (C_2).
- **Element 4** is the Third Coefficient (C_3).
- **Element 5** determines whether to do a Grade Factor Adjustment (1=No, 2=Yes). See Table 403.
- **Element 6** identifies the column number to use in Table 405 for the Condition Adjustment.
- **Element 7** is a **control element** and should not be changed.

The elements for the cells in **Column 2** are as follows:

- **Elements 1-6** are either Flat Values or Rates to use when calculating the value of a Modification to the OBY. The element number used is equal to the Modification Code.

- **Element 7** determines whether the values in **Elements 1-6** are used as Flat Values or Rates (1=Flat Values, 2=Rates).

Table 402: OBY Special Modification Codes

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Special Modification Code. There is one row for each Special Modification Code.

Element Description

Each cell contains 2 elements. **Element 1** determines how **Element 2** is used (1=Flat Value, 2=Area Rate, 3=Linear Rate). **Element 2** is a Flat Value, Area Rate, or Linear Rate for the Special Modification.

Table 403: OBY Grade Types

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 5 rows in this table indexed by Grade.

Element Description

Each cell contains 1 element. This element is the rate used for the Grade Factor Adjustment for an OBY. See Table 401.

Table 404: OBY Condition Types

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 6 rows in this table indexed by Condition.

Element Description

Each cell contains 1 element. The value of this element determines the element number used in Table 405 when doing a Condition Adjustment for an OBY. See Table 401.

Table 405: OBY Percent Good Tables

Column Description

There are 8 columns in this table. The values entered in these columns have no effect, since the Column Search Type is **Direct**. Each column is actually a separate Percent Good Table for different categories of OBYs. The column number used is determined by Table 401.

Row Description

There are 51 rows in this table indexed by Age.

Element Description

Each cell contains 6 elements. Each element is a Condition Adjustment Percentage used when doing a Condition Adjustment (See Table 401). The element number used is determined by Table 404.

Table 500: Commercial Control Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There is 1 row in this table. The value entered in this row has no effect, since the Row Search Type is **Direct**.

Element Description

Each cell contains 5 elements. These elements contain administrative information relevant to the valuation process. They are as follows:

- **Element 1** is the Assessment Year.
- **Element 2** is the Assessment Level.
- **Element 3** is the Jurisdiction Name.
- **Element 4** is the Table Level.
- **Element 5** is the Local Modifier.

Note

Though the name of this table suggests it is a **control table**, *it is not*. It is *not* a **control table**, because you can change the values in the cells. This table effects value generation for *commercial parcels only*.

Table 501: Commercial Structure Type to Basic Code

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Structure Code. There is one row for each Structure Code.

Element Description

Each cell contains 7 elements. The first 4 elements contain the Expected Life for different Construction Types based on the Structure Code. The element number used is the categorical level number of the Construction Type:

- **Element 1** is the Expected Life for Wood Joist.
- **Element 2** is the Expected Life for Fire Resistant.
- **Element 3** is the Expected Life for Fireproof.
- **Element 4** is the Expected Life for Light Steel.

Element 5 is not currently used.

Element 6 is the Basic Code assigned to the Structure Code. This code determines the row used in the Commercial Base Square Foot Rate by Structure Table (511). It is also determines the column used in the Commercial Exterior Wall Adjustment by Basic Code Table (513). The Basic Codes are as follows:

1 = Hotel/Apt, Hi-Rise
2 = Hotel/Apt, Lo-Rise
3 = Retail
4 = Warehouse
5 = Office, Lo-Rise
6 = Institution
7 = Light Metal
8 = Office, Hi-Rise
9 = Fast Food
10 = Residential

Element 7 is a Description of the Structure Code.

Table 502: Commercial Grade Factor Adjustment

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Grade. There is one row for each Grade.

Element Description

Each cell contains 1 element. This element is the Quality Grade Factor for the Grade.

Table 503: Commercial Functional Utility/Physical Condition Index

Column Description

There are 5 columns in this table indexed by the categorical level number of the Functional Utility.

- **Column 1** is categorical level number 0 (None).
- **Column 2** is categorical level number 1 (Poor).
- **Column 3** is categorical level number 2 (Fair).
- **Column 4** is categorical level number 3 (Normal).
- **Column 5** is categorical level number 4 (Good).

Row Description

There are 5 rows in this table indexed by the categorical level number of the Physical Condition.

- **Row 1** is categorical level number 1 (Poor).
- **Row 2** is categorical level number 2 (Fair).
- **Row 3** is categorical level number 3 (Average).
- **Row 4** is categorical level number 4 (Good).
- **Row 5** is categorical level number 5 (Renovated).

Element Description

Each cell contains 1 element. This element is an index value based on the Functional Utility and Physical Condition. This index value determines the element number used in the Commercial Depreciation Table (505) to figure the Percent Good of a building based on Expected Life and Age.

Table 504: Commercial Use Type Descriptions

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Use Type. There is one row for each Use Type.

Element Description

Each cell contains 1 element. This element is a Description for the Use Type.

Table 505: Commercial Depreciation Table

Column Description

There are 11 columns in this table indexed by Expected Life.

Row Description

There are 70 rows in this table indexed by Age.

Element Description

Each cell contains 10 elements. Each element is the Percent Good based on the Expected Life and Age. The Percent Good is also dependent on the Functional Utility and Physical Condition. The element number used is the index value obtained from the Commercial Functional Utility/Physical Condition Index Table (503).

Table 506: Commercial Use Type Descriptions (Continued)

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Use Type. There is one row for each Use Type.

Element Description

Each cell contains 1 element. This element is a Description for the Use Type.

Table 511: Commercial Base Square Foot Rate by Structure Code

Column Description

There are 4 columns in this table indexed by the categorical level number of the Construction Type.

- **Column 1** is categorical level number 1 (Wood Joist).
- **Column 2** is categorical level number 2 (Fire Resistant).
- **Column 3** is categorical level number 3 (Fireproof).
- **Column 4** is categorical level number 4 (Light Steel).

Row Description

There are 10 rows in this table indexed by Basic Code. The Basic Code is obtained from **Element 6** of the Commercial Structure Type to Basic Code Table (501).

- **Row 1** is Basic Code 1 (Hotel/Apt, Hi-Rise).
- **Row 2** is Basic Code 2 (Hotel/Apt, Lo-Rise).
- **Row 3** is Basic Code 3 (Retail).
- **Row 4** is Basic Code 4 (Warehouse).
- **Row 5** is Basic Code 5 (Office, Lo-Rise).
- **Row 6** is Basic Code 6 (Institution).
- **Row 7** is Basic Code 7 (Light Metal).
- **Row 8** is Basic Code 8 (Office, Hi-Rise).
- **Row 9** is Basic Code 9 (Fast Food).
- **Row 10** is Basic Code 10 (Residential).

Element Description

Each cell contains 3 elements. These elements are Square Foot Rates based on the Construction Type and the Basic Code. They are as follows:

- **Element 1** is the Basement Square Foot Rate.
- **Element 2** is the First Floor Square Foot Rate.
- **Element 3** is the Upper Floor Square Foot Rate.

Table 512: Commercial Other Rates by Use Type

Column Description

There are 7 columns in this table indexed by the categorical level number of the element being used.

Row Description

The rows in this table are indexed by Use Type. There is one row for each Use Type.

Element Description

Each cell contains 10 elements. The first two elements only use **Column 1**. **Element 1** is the rate used to determine the Interior Finish Adjustment for the Base Cost based on the Use Type. **Element 2** is the rate used to determine the Unfinished Adjustment for the Base Cost based on the Use Type. **Columns 2-6** are not used for these elements, since they are not categoricals.

Elements 3-8 are rates used to determine adjustments to the Base Cost based on the Use Type. The column used is determined by the categorical level number of the element being used:

- **Element 3** is the rate for the Partition Adjustment.
- **Element 4** is the rate for the Heating Adjustment.
- **Element 5** is the rate for the Air Conditioning Adjustment.
- **Element 6** is the rate for the Plumbing Adjustment.
- **Element 7** is the rate for the Sprinkler Adjustment.
- **Element 8** is the rate for the Lighting Adjustment.

Elements 9 and 10 are not currently used, but are reserved to be assigned to other adjustment rates.

Table 513: Commercial Exterior Wall Adjustment by Basic Code

Column Description

There are 10 columns in this table indexed by Basic Code. The Basic Code is obtained from **Element 6** of the Commercial Structure Type to Basic Code Table (501).

- **Column 1** is Basic Code 1 (Hotel/Apt, Hi-Rise).
- **Column 2** is Basic Code 2 (Hotel/Apt, Lo-Rise).
- **Column 3** is Basic Code 3 (Retail).
- **Column 4** is Basic Code 4 (Warehouse).
- **Column 5** is Basic Code 5 (Office, Lo-Rise).
- **Column 6** is Basic Code 6 (Institution).
- **Column 7** is Basic Code 7 (Light Metal).
- **Column 8** is Basic Code 8 (Office, Hi-Rise).
- **Column 9** is Basic Code 9 (Fast Food).
- **Column 10** is Basic Code 10 (Residential).

Row Description

There are 17 rows in this table indexed by the categorical level number of the Exterior Wall Code.

- **Row 1** is categorical level 0 (Blank).
- **Row 2** is categorical level 1 (Brick/Stone).
- **Row 3** is categorical level 2 (Frame).
- **Row 4** is categorical level 3 (Concrete Block).
- **Row 5** is categorical level 4 (Brick/Concrete Block).
- **Row 6** is categorical level 5 (Tile).
- **Row 7** is categorical level 6 (Masonry/Frame).
- **Row 8** is categorical level 7 (Light Metal).
- **Row 9** is categorical level 8 (Metal, Sandwich).
- **Row 10** is categorical level 9 (Concrete, Load Bearing).
- **Row 11** is categorical level 10 (Concrete, Non-Load Bearing).
- **Row 12** is categorical level 11 (Glass & Steel).
- **Row 13** is categorical level 12 (Class & Masonry).
- **Row 14** is categorical level 13 (Enclosure).
- **Row 15** is categorical level 14 (Concrete, Tilt-Up).
- **Row 16** is categorical level 15 (Solar Glass/Steel).
- **Row 17** is categorical level 16 (Corrugated Asbestos).

Element Description

Each cell contains 1 element. This element is an Exterior Wall Adjustment Rate based on the Basic Code and Exterior Wall Code.

Table 550: Commercial Table Base Other Feature

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 4 rows in this table indexed by the Structure Code of the Other Feature.

Element Description

Each cell contains 3 elements. **Element 1** is a Description for the Other Feature. **Element 2** is a **table control** element in every cell and should not be changed. **Element 3** is a Cost per Stop Rate based on the Elevator Type (EL1-EL4).

Table 551: Commercial Other Feature - Square Foot Type

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by the Structure Code of the Other Feature. There is one row for each Structure Code requiring a Square Foot Type calculation.

Element Description

Each cell contains 2 elements. **Element 1** is a Description for the Other Feature. **Element 2** is a Square Foot Rate based on the Structure Code of the Other Feature.

Table 552: Commercial Other Feature - Linear Foot Type

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by the Structure Code of the Other Feature. There is one row for each Structure Code requiring a Linear Foot Type calculation.

Element Description

Each cell contains 2 elements. **Element 1** is a Description for the Other Feature. **Element 2** is a Linear Foot Rate based on the Structure Code of the Other Feature.

Table 553: Commercial Other Feature - Flat Cost Type

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by the Structure Code of the Other Feature. There is one row for each Structure Code requiring a Flat Cost Type calculation.

Element Description

Each cell contains 2 elements. **Element 1** is a Description for the Other Feature. **Element 2** is a Flat Cost for the Other Feature.

Table 554: Commercial Elevator EL1-EL4 Cost Table

Column Description

There are 16 columns in this table indexed by Capacity in pounds

Row Description

There are 20 rows in this table indexed by Speed in feet/minute.

Element Description

Each cell contains 4 elements. These elements are the Base Cost for the different Elevator Types based on Speed and Capacity. They are as follows:

- **Element 1** is the Base Cost for Type EL1.
- **Element 2** is the Base Cost for Type EL2.
- **Element 3** is the Base Cost for Type EL3.
- **Element 4** is the Base Cost for Type EL4.

Table 601: Commercial OBY - Square Foot Type

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by the Structure Code of the OBY. There is one row for each Structure Code requiring a Square Foot Type calculation. There can be up to 99 rows in a table. If more than 99 rows are required the additional codes will be defined in Table 603.

Element Description

Each cell contains 3 elements. **Element 1** is a Description for the OBY. **Element 2** is a Square Foot Rate for the OBY. **Element 3** is the Expected Life of the OBY.

Table 602: Commercial OBY - Flat Cost Type

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by the Structure Code of the OBY. There is one row for each Structure Code requiring a Flat Cost Type calculation.

Element Description

Each cell contains 3 elements. **Element 1** is a Description for the OBY. **Element 2** is the Flat Cost of the OBY. **Element 3** is the Expected Life of the OBY.

Table 603: Commercial OBY - Square Foot Type (Second Half)

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by the Structure Code of the OBY. There is one row for each Structure Code requiring a Square Foot Type calculation. There can be up to 99 rows in a table. This table is a continuation of Table 601.

Element Description

Each cell contains 3 elements. **Element 1** is a Description for the OBY. **Element 2** is a Square Foot Rate for the OBY. **Element 3** is the Expected Life of the OBY.

Table 700: Income Approach Control Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There is 1 row in this table. The value entered in this row has no effect, since the Row Search Type is **Direct**.

Element Description

Each cell contains 5 elements. These elements contain administrative information relevant to the valuation process. They are as follows:

- **Element 1** is the Assessment Year.
- **Element 2** is the Assessment Level.
- **Element 3** is the Jurisdiction Name.
- **Element 4** is the Table Level.
- **Element 5** is the Local Modifier.

Note

Though the name of this table suggests it is a **control table**, *it is not*. It is *not* a **control table**, because you can change the values in the cells. This table effects value generation for *residential parcels only*.

Table 701: Structure Type Assignment Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Structure Type. There is one row for each Structure Type.

Element Description

Each cell contains 3 elements. They are as follows:

- **Element 1** is the Structure Type.
- **Element 2** is a Description of the Structure Type.
- **Element 3** is the Model Type to use for income valuation

Table 703: Use Type Assignment Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Use Type. There is one row for each Use Type.

Element Description

Each cell contains 5 elements. They are as follows:

- **Element 1** is the Use Type.
- **Element 2** is a Description of the Use Type.
- **Element 3** is the Model Type to use for income valuation
- **Element 4** defines the Model Method to use. The Model Method determines how the data in the Model Tables (711-735) are used:

    - Method **1** is an Apartment Model.
    - Method **2** is a Hotel Model.
    - Method **3** is an Enclosure/Other Model.

- **Element 5** is a Parking Flag. If the Parking Flag is blank, parking is calculated as part of the model. If the Parking Flag is **P**, parking is calculated by a separate model.

Table 704: Use Type Assignment Table (Continued)

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Use Type. There is one row for each Use Type.

Element Description

Each cell contains 5 elements. They are as follows:

- **Element 1** is the Use Type.
- **Element 2** is a Description of the Use Type.
- **Element 3** is the Model Type to use for income valuation
- **Element 4** defines the Model Method to use. The Model Method determines how the data in the Model Tables (711-735) are used:

  - Method **1** is an Apartment Model.
  - Method **2** is a Hotel Model.
  - Method **3** is an Enclosure/Other Model.

- **Element 5** is a Parking Flag. If the Parking Flag is blank, parking is calculated as part of the model. If the Parking Flag is **P**, parking is calculated by a separate model.

Table 705: Neighborhood Model Assignment Table

Column Description

The columns in this table are indexed by Model Type. There is one column for each Model Type.

Row Description

The rows in this table are indexed by Neighborhood. There is one row in this table for each Neighborhood.

Element Description

Each cell contains 1 element. It defines the Model Number (column number) from the Model Table to use for income valuation.

Table 706: Tax Rates By Tax Class

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Tax Class. However, the Row Search Type is **Direct**, so the values entered have no effect. There is one row for each Tax Class. If Tax Class is not used by your jurisdiction, there will only be one row. In that case, the value entered in the one cell will be used to determine the Tax Rate for all parcels.

Element Description

Each cell contains 1 element. It is the Tax Rate.

Table 707: Physical/Functional Adjustment Table

Column Description

The columns in this table are indexed by Functional Utility. There is one column for each Functional Utility Code.

Row Description

The rows in this table are indexed by Physical Condition. There is one row for each Physical Condition Code.

Element Description

Each cell contains 1 element. It is the Physical/Functional Adjustment Rate.

Table 708: Room Unit Adjustment Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows are indexed by Number of Units. You can add as many rows as necessary to accomodate however many Room Unit Adjustments which are required.

Element Description

Each cell contains 1 element. It is the Room Unit Adjustment.

Table 709: Residual Land

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

There are 2 rows in this table. The Search Type is **Direct**. The first row contains entries for Square Foot Land. The second row contains entries for Acreage Land.

Element Description

Each cell contains 10 elements. Each element defines a Land Type which is to be considered as Residual Land for Income Value calculation. The program searches the elements until it reaches the first occurences of **0**, so the values must be entered sequentially beginning with the first element. Each non-zero entry encountered represents a Land Type which is to be considered Residual Land.

Table 710: List of Model Types Table

Column Description

There is 1 column in this table. The value entered in this column has no effect, since the Column Search Type is **Direct**.

Row Description

The rows in this table are indexed by Model Type. However, the Row Search Type is **Direct**, so the values entered have no effect. There is one row for each Model Type.

Element Description

Each cell contains 2 elements. They are as follows:

- **Element 1** is the Model Type.
- **Element 2** is a Description of the Model Type.

Table 711-735: Model Tables

Model Table Description

There are 25 Model Tables. Each of these tables contains the factors used to calculate an income model for a specific type of property. The tables used for a model depend on the Model Type assignments made by Tables 701 and 703. Each table can contain up to 99 different models for the Model Type. The title of each table identifies the type of properties which should use the models defined by it.

Column Description

The columns in these tables are indexed by Model Number. There is one column for each Model Number. You can create up to 99 models for each Model Type.

Row Description

There are 3 rows in each of these tables. They contain the factors which are used in the income valuation.

Element Description

Each cell contains 10 elements. How each element is used depends on the Model Method for the Model Type being used. The table on the following page identifies what each element represents based on the Model Method being used.

Element Descriptions by Model Method

	Apartment Models	**Hotel Models**	**Enclosure/Other Models**
Row 1, Element 1	Model Number	Model Number	Model Number
Row 1, Element 2	Model Type	Model Type	Model Type
Row 1, Element 3	Studio Apartment Rate	Base Room Rate	Leasable PSF
Row 1, Element 4	1 Bdrm Apartment Rate	Typical Quality	Covered Parking Rate
Row 1, Element 5	2 Bdrm Apartment Rate	Quality Rate 1	Uncovered Parking Rate
Row 1, Element 6	3 Bdrm Apartment Rate	Quality Rate 2	Undefined
Row 1, Element 7	Undefined	Quality Rate 3	Undefined
Row 1, Element 8	Covered Parking Rate	Quality Rate 4	Undefined
Row 1, Element 9	Uncovered Parking Rate	Quality Rate 5	Undefined
Row 1, Element 10	Undefined	Room Size Rating	Undefined
Row 2, Element 1	Maximum Age 1	Pool	Maximum Age 1
Row 2, Element 2	Expense Factor 1	No Pool	Expense Factor 1
Row 2, Element 3	Maximum Age 2	Maximum Age 1	Maximum Age 2
Row 2, Element 4	Expense Factor 2	Expense Factor 1	Expense Factor 2
Row 2, Element 5	Maximum Age 3	Maximum Age 2	Maximum Age 3
Row 2, Element 6	Expense Factor 3	Expense Factor 2	Expense Factor 3
Row 2, Element 7	Maximum Age 4	Maximum Age 3	Maximum Age 4
Row 2, Element 8	Expense Factor 4	Expense Factor 3	Expense Factor 4
Row 2, Element 9	Undefined	Maximum Age 4	Undefined
Row 2, Element 10	Undefined	Expense Factor 4	Undefined
Row 3, Element 1	Occupancy Rate	Occupancy Rate	Occupancy Rate
Row 3, Element 2	Management Expense %	Management Expense %	Management Expense %
Row 3, Element 3	PSF Expense Rate	Per Room Expense Rate	PSF Expense Rate
Row 3, Element 4	PSF Utility Rate	NU Per Room Exp Rate	PSF Utility Rate
Row 3, Element 5	% Mortgaged	% Mortgaged	% Mortgaged
Row 3, Element 6	Mortgage Rate	Mortgage Rate	Mortgage Rate
Row 3, Element 7	Mortgage Term	Mortgage Term	Mortgage Term
Row 3, Element 8	Cash Flow	Cash Flow	Cash Flow
Row 3, Element 9	Yield Rate	Yield Rate	Yield Rate
Row 3, Element 10	Undefined	Room Size Factor Flag	Undefined

Appendix A: Contents

Appendix A: Contents

Computational Commands

Computational commands are those used to compute values which are subsequently stored in a user-specified Memory Storage (MS) Location.

Add (+)

This command adds the Single-Precision contents of up to two MS Locations and stores the sum in the specified Single-Precision MS Location.

Format
+@SSS@AAA@bbb

@ can be [space], a, i, j, k, l, m, n, or @

Description
Adds MS Location AAA (direct, absolute, indexed or indirect) to MS Location bbb (direct, absolute, indexed or indirect) and stores the result in SSS (direct, indexed or indirect).

If bbb is not specified, the contents of AAA (direct, absolute, indexed or indirect) are placed in SSS (direct, indexed or indirect).

Error Conditions
An error message is generated and table execution stops if any of the MS Locations are not Single-Precision.

Examples
+@SSS@AAA@bbb
+ 962 960 961

Add the number stored in MS Location 960 to the number stored in MS Location 961 and store the sum in MS Location 962.

+@SSS@AAA@bbb
+ 640 640a001

Add the absolute value 1 to the number stored in MS Location 640 and store the sum in MS Location 640.

+@SSS@AAA@bbb
+ 960 960i401

(Assume i = 001) Add the number stored in MS Location 402 (401+001) to the number stored in MS Location 960 and store the sum in MS Location 960.

+@SSS@AAA@bbb
+ 960 960@475

Add the number stored in the MS Location referenced by MS Location 475 to the number stored in MS Location 960 and store the sum in MS Location 960.

Subtract (-)

This command subtracts the Single-Precision contents of two MS Locations and stores the difference in the specified Single-Precision MS Location.

Format
-@DDD@MMM@SSS

@ can be [space], a, i, j, k, l, m, n, or @

Description
Subtract MS Location SSS (direct, absolute, indexed or indirect) from MS Location MMM (direct, absolute, indexed or indirect) and store the difference in DDD (direct, indexed or indirect).

Error Conditions
An error message is generated and table execution stops if any of the MS Locations are not Single-Precision.

Examples
-@DDD@MMM@SSS
- 961 962 960

Subtract the number stored in MS Location 960 from the number stored in MS Location 962 and store the difference in MS Location 961.

-@DDD@MMM@SSS
- 512 512a005

Subtract the absolute value 5 from the number stored in MS Location 512 and store the difference in MS Location 512.

-@DDD@MMM@SSS
- 961 961i877

(Assume i = 003) Subtract the number stored in MS Location 880 (877+003) from the number stored in MS Location 961 and store the difference in MS Location 961.

-@DDD@MMM@SSS
- 960 960@475

Subtract the number stored in the MS Location referenced by MS Location 475 from the number in MS Location 960 and store the difference in MS Location 960.

Multiply (*)

This command multiplies the Single-Precision contents of two MS Locations and stores the product in the specified Single-Precision MS Location.

Format
*@PPP@AAA@BBB

@ can be [space], a, i, j, k, l, m, n, or @

Description
Multiplies MS Location AAA (direct, absolute, indexed or indirect) by MS Location BBB (direct, absolute, indexed or indirect) and stores the product in PPP (direct, indexed or indirect).

Error Conditions
An error message is generated and table execution stops if any of the MS Locations are not Single-Precision.

If the multiplication results in an overflow (i.e., the absolute value of the product is greater than 10^{38} or less than 10^{-38}), an overflow error message will be displayed on the screen, the value in MS Location PPP will be set to 0, and table execution will continue.

Examples
*@PPP@AAA@BBB
* 421 305 309

Multiply the number stored in MS Location 305 by the number stored in MS Location 309 and store the product in MS Location 421.

*@PPP@AAA@BBB
* 961 961a100

Multiply the absolute value 100 by the number stored in MS Location 961 and store the product in MS Location 961.

*@PPP@AAA@BBB
* 421i304i308

(Assume i = 001) Multiply the number stored in MS Location 305 (304+001) by the number stored in MS Location 309 (308+001) and store the product in MS Location 421.

*@PPP@AAA@BBB
* 961 961@475

Multiply the number stored in the MS Location referenced by MS Location 475 by the number in MS Location 961 and store the product in MS Location 961.

Divide (/)

This command divides the Single-Precision contents of one MS Location by another and stores the quotient in the specified Single-Precision MS Location.

Format
/@QQQ@NNN@DDDvvv...vvv

@ can be [space], a, i, j, k, l, m, n, or @

Description
Divides MS Location NNN (direct, absolute, indexed or indirect) by MS Location DDD (direct, absolute, indexed or indirect) and stores the quotient in QQQ (direct, indexed or indirect).

If ``vvv...vvv'' is specified and the value in MS Location DDD is 0, then the value in ``vvv...vvv'' is stored in MS Location QQQ. If ``vvv...vvv'' is not specified, and the value in MS Location DDD is 0, then MS Location QQQ is set to 0.

Error Conditions
An error message is generated and table execution stops if any of the MS Locations are not Single-Precision.

Whenever the value in MS Location DDD is 0, whether or not ``vvv...vvv'' is specified, an error message:

<div align="center">

``*Division by zero in line _____*''

</div>

is displayed on the screen, the system emits a beep, and table execution continues.

If the division results in an overflow (i.e, the absolute value of the quotient is greater than 10^{38} or less than 10^{-38}), an overflow error message will be displayed on the screen, the value in MS Location QQQ will be set to 0, and table execution will continue.

Examples
/@QQQ@NNN@DDDvvv...vvv
/ 373 403 367

Divide the number stored in MS Location 403 by the number stored in MS Location 367 and store the quotient in MS Location 373. If the value in MS Location 367 is 0, a 0 will be stored in MS Location 373.

/@QQQ@NNN@DDDvvv...vvv
/ 373 403 3671000

Divide the number stored in MS Location 403 by the number stored in MS Location 367 and store the quotient in MS Location 373. If the value in MS Location 367 is 0, the value 1000 (the value in vvv...vvv) will be stored in MS Location 373.

Square Root (r)

This command calculates the square root of a MS Location and places the result in a Single-Precision memory location.

Format
r@DDD@sss

@ can be [space], a, i, j, k, l, m, n, or @

Description
Calculate the square root of MS Location sss and place the result in MS Location DDD. If MS Location sss is not specified, then DDD will serve as both the source and the destination.

Error Conditions
If the value in the source MS Location is negative, the square root of the absolute number will be calculated, a positive value will be placed in the destination MS Location, and the system will emit a beep.

Examples
r@DDD@sss
r 770 775

Take the square root of the value in MS Location 775 and place it in MS Location 770.

r@DDD@sss
r 770

Take the square root of the value in MS Location 770 and place it in MS Location 770.

r@DDD@sss
r 770@775

Take the square root of the value stored in the MS Location referenced by MS Location 775 and place it in MS Location 770.

Add Double

This command adds the Double-Precision contents of up to two MS Locations and stores the sum in the specified double MS Location.

Format
X+@SSS@AAA@bbb

@ can be [space], a, i, j, k, l, m, n, or @

Description
Add Double-Precision MS Location AAA (direct, indexed or indirect) to Double-Precision MS Location bbb (direct, indexed or indirect) and store the result in Double-Precision MS Location SSS (direct, indexed or indirect).

If bbb is not specified, the contents of AAA (direct, indexed or indirect) is stored in SSS (direct, indexed or indirect).

Error Conditions
An error message will be generated and table execution stops if any of the MS Locations are not Double-Precision.

An error message will be generated and table execution will halt if the level in the source MS Location (sss if it is specified, DDD if it is not) is outside the allowable range for the Categorical data item.

Examples
X+@SSS@AAA@bbb
X+ 962 960 961

Add the Double-Precision number stored in MS Location 960 to the Double-Precision number stored in MS Location 961 and store the sum in Double-Precision MS Location 962.

X+@SSS@AAA@bbb
X+ 960 960i401

(Assume i = 001) Add the Double-Precision number stored in MS Location 402 (401+001) to the Double-Precision number stored in MS Location 960 and store the sum in Double-Precision MS Location 960.

X+@SSS@AAA@bbb
X+ 960 960@475

Add the Double-Precision number in the MS Location referenced by MS Location 475 to the Double-Precision number stored in MS Location 960 and store the sum in Double-Precision MS Location 960.

X+@SSS@AAA@bbb
X+ 960 409

Store the Double-Precision number found in MS Location 409 in Double-Precision MS Location 960.

Subtract
Double (X-)

This command subtracts the Double-Precision contents of up to two MS Locations and stores the difference in the specified Double-Precision MS Location.

Format
X-@DDD@MMM@SSS

@ can be [space], a, i, j, k, l, m, n, or @

Description
Subtract Double-Precision MS Location SSS (direct, indexed or indirect) from Double-Precision MS Location MMM (direct, indexed or indirect) and store the difference in Double-Precision MS Location DDD (direct, indexed or indirect).

Error Conditions
An error message will be generated and table execution stops if any of the MS Locations are not Double-Precision.

Examples
X-@DDD@MMM@SSS
X- 961 962 960

Subtract the Double-Precision number stored in MS Location 960 from the Double-Precision number stored in MS Location 962 and store the difference in Double-Precision MS Location 961.

X-@DDD@MMM@SSS
X- 961 961i877

(Assume i = 003) Subtract the Double-Precision number stored in MS Location 880 (877+003) from the Double-Precision number stored in MS Location 961 and store the difference in Double-Precision MS Location 961.

X-@DDD@MMM@SSS
X- 960 960@475

Subtract the Double-Precision number stored in the MS Location referenced by MS Location 475 from the Double-Precision number stored in MS Location 960 and store the difference in Double-Precision MS Location 960.

Multiply Double (X*)

This command multiplies the Double-Precision contents of two MS Locations and stores the product in the specified Double-Precision MS Location.

Format
X*@PPP@AAA@BBB

@ can be [space], a, i, j, k, l, m, n, or @

Description
Multiply Double-Precision MS Location AAA (direct, indexed or indirect) by Double-Precision MS Location BBB (direct, indexed or indirect) and store the product in Double-Precision MS Location PPP (direct, indexed or indirect).

Error Conditions
An error message is generated and table execution stops if any of the MS Locations are not Double-Precision.

If the multiplication results in an overflow (i.e., the absolute value of the product is greater than 10^{38} or less than 10^{-38}) an overflow error message will be displayed on the screen, the value in MS Location PPP will be set to Double-Precision 0, and table execution will continue.

Examples
X*@PPP@AAA@BBB
X* 421 305 309

Multiply the Double-Precision number stored in MS Location 305 times the Double-Precision number stored in MS Location 309 and store the product in Double-Precision MS Location 421.

X*@PPP@AAA@BBB
X* 421i304i308

(Assume i = 001) Multiply the Double-Precision number stored in MS Location 305 (304+001) times the Double-Precision number stored in MS Location 309 (308+001) and store the product in Double-Precision MS Location 421.

X*@PPP@AAA@BBB
X* 961 961@475

Multiply the Double-Precision number stored in the MS Location referenced by MS Location 475 times the Double-Precision number stored in MS Location 961 and store the product in Double-Precision MS Location 961.

Divide Double (X/)

This command divides the Double-Precision contents of one MS Location by another and stores the quotient in the specified Double-Precision MS Location.

Format
X*@QQQ@NNN@DDDvvv...vvv

@ can be [space], a, i, j, k, l, m, n, or @

Description
Divide Double-Precision MS Location NNN (direct, indexed or indirect) by Double-Precision MS Location DDD (direct, indexed or indirect) and stores the in Double-Precision quotient in QQQ (direct, indexed or indirect).

If ``vvv...vvv'' is specified and the value in MS Location DDD is 0, then the value in ``vvv...vvv'' is stored in MS Location QQQ as a Double-Precision number. If ``vvv...vvv'' is not specified, and the value in MS Location DDD is 0, then 0 is stored in MS Location QQQ as a Double-Precision number.

Error Conditions
An error message is generated and table execution stops if any of the MS Locations are not Double-Precision.

Whenever the value in MS Location DDD is zero, whether or not ``vvv...vvv'' is specified, an error message ``Division by zero at line ____'' is displayed on the screen, the system emits a beep and table execution continues.

If the division results in an overflow (i.e., the absolute value of the quotient is less than 10^{-38}), an overflow message will be displayed on the screen, the value in MS Location QQQ will be set to Double-Precision 0, and table execution will continue.

Examples
X/@QQQ@NNN@DDDvvv...vvv
X/ 373 403 367

Divide the Double-Precision number stored in MS Location 403 by the Double-Precision number stored in MS Location 367 and store the quotient in Double-Precision MS Location 373. If the value in MS Location 367 is 0, then value 1000 (the value in vvv...vvv) will be stored in MS Location 373 as a Double-Precision number.

X/@QQQ@NNN@DDDvvv...vvv
X/i372i402i366

(Assume i = 004) Divide the Double-Precision number stored in MS Location 406 (402+004) by the Double-Precision number stored in MS Location 370 (366+004) and store the quotient in Double-Precision MS Location 376 (372+004). If the value in MS Location 370 is 0, a Double-Precision 0 will be stored in MS Location 376.

Add Series (XX+)

This command adds the values of a series of consecutive MS Locations and stores the sum in a specified MS Location. ⚓

Format
XX+@SSS@BBB@eee

@ can be [space], i, j, k, l, m, n or @

Description
Add the values in a series of consecutive MS Locations beginning with MS Location BBB (direct, indexed or indirect) and ending with MS Location eee (direct, indexed or indirect). The sum is stored in MS Location SSS. All MS Locations must be Single-Precision.

If eee is not specified, the value in BBB will be placed in SSS.

You should exercise caution if MS Location SSS is within the range of BBB and eee. This creates a circular reference.

Error Conditions
An error message will be generated and table execution will stop if any of the MS Locations referenced in the series BBB to eee are not Single-Precision.

An error message will be generated and table execution stops if the MS Location referenced in BBB is greater than the MS Location referenced in eee.

Examples
XX+@SSS@BBB@eee
XX+ 111 100

Take the value in MS Location 100 and place it in MS Location 111.

XX+@SSS@BBB@eee
XX+ 111 100j105

(Assume j=003) Add the value in the range of MS Locations from 100 to 108 (105 + 003) and place the sum in MS Location 111.

XX+@SSS@BBB@eee
XX+ 111 100@300

Add the value in the range of MS Locations from 100 to the MS Location referenced in MS Location 300 (which must be equal to or greater than 100) and place the sum in MS Location 111.

File Management Commands

The IPTE Commands addressed under this functional group are used to manage the movement of data between the data file and the Action Table work area. There are two groups of file management commands: those used to retrieve data from the data file, placing it in the work area, and those used to reverse the process, storing data back to the data file. In all, there are a total of 14 IPTE Commands addressed under this section.

Get Base Card (G)

This command gets a Base Card (Card Type 01) and places it in the work area.

Format
GS@MMM

S can be E, e, F, l, G, L, H, P or N

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command gets a Base Card (Card Type 01) from the disk and places it in the work area where it is available for further processing. The card which is returned is determined by the contents of the File Control Block (described below) and the Style Parameter (S) that you select, which is described beginning on the next page.

The File Control Block is a series of eight consecutive MS Locations which you specify. The MS Locations allocated to the File Control Block for a Base Card are specified using the Make Base Card command (XXM).

Each position in the File Control Block is significant. The contents of each position are described below:

Position in Block	Definition	Value
0	Set Number	1
1	Permanent Parcel Number (PPN)	Returned by System
2	Card Type	1
3	Card Number	1
4	Key Value	Set by User
5	Key Number	Set by User
6	Return Status	Returned by System
7	Status Text	Returned by System

The Style parameter determines the relationship between the Key Value in the File Control Block and the Key Value of the Base Card which you will be executing the Get on.

E   (Equal) gets a Base Card with a Key Value equal to the value in the Key Value field of the File Control Block.

e   (Equal to or Less Than) gets a Base Card with a Key Value equal to the value in the Key Value field of the File Control Block, or, if there is no Base Card with a Key Value which is equal, the one with a Key Value which is closest to but less than the value in the Key Value field of the File Control Block.

F   (Equal to or Greater Than) gets a Base Card with a Key Value equal to the value in the Key Value field of the File Control Block, or, if there is no Base Card with a Key Value which is equal, the one with a Key Value which is closest to but greater than the value in the Key Value field of the File Control Block.

l   (Less Than) gets a Base Card with a Key Value which is closest to but less than the value in the Key Value field of the File Control Block.

G   (Greater Than) gets a Base Card with a Key Value which is closest to but greater than the value in the Key Value field of the File Control Block.

L   (Lowest) gets a Base Card with the lowest value in the Key Value field of any Folder on the file.

H   (Highest) gets a Base Card with the highest value in the Key Value field of any Folder on the file.

P   (Previous) gets a Base Card with the Key Value which is closest to but less than the Key Value of the Base Card which is currently in the work area.

N   (Next) gets a Base Card with the Key Value which is closest to but greater than the Key Value of the Base Card which is currently in the work area.

There are certain rules to remember when executing Gets:

1.   You must do some other type of Get using the same Key Number before attempting to use the P or N styles.

2.   The P and N styles are the only way to access all Folders by a key when duplicate values occur in the key in different Folders (i.e., the Owner Name is the Key Value field and there are five owners named Smith.)

       A Get Equal (E) will always return the first Folder with the occurrence of the Key. Successive Get Next (N) and Get Previous (P) commands will allow to move forward and backward through the occurrences.

3.   Permanent Parcel Numbers (PPNs) are assigned serially as new Folders are added to the database. Thus, the PPN Sequence, (Key Number One) will be of limited usefulness in searching records.

Error Conditions

An error message will be generated and table execution will halt if you attempt to execute a Get Base Card command without first having executed a Make Base Card command (XXM).

When the system executes the Get command, it will return a Status and a Status Text in positions six and seven of the File Control Block indicating whether the Base Card specified was retrieved from the file and placed in the work area. Table execution will continue regardless of the contents of these MS Locations, but, by checking them, you may prevent errors from occurring at another point in the table. The most common Statuses and Text are listed below.

0   =   **Successful**

2   =   **I/O Error** - Indicates damaged data file or hardware problem.

4   =   **Key Not Found** - Indicates that there is no folder on the file with a key value equal to the value specified for the Key Number specified.

6   =   **Invalid Key Number** - Key Number specified does not exist on the Factor Table.

7   =   **Different Key Number** - Key Number was changed while using the P or N styles.

9   =   **End of File** - Folder with the lowest or highest value in the key value field was returned on previous request.

Examples

The following examples assume a File Control Block beginning at MS Location 710. They assume that you want to access folders by Account Number which is Key Number 2. They assume that there are five folders in the file:

PPN	Account #
1	130
2	110
3	150
4	140
5	120

Before executing the Get Base Card command, you must execute a Make Base Card command, specify the Key Number, and, in some cases, specify the key value. Assume that you want to retrieve from the database the Base Card from the folder with the Account Number 130. The commands might be as follows:

XXM 710   Make Base Card
s 7142   Set Key Number
s 715130   Set Key Value
GE 710   Get Base Card with value of 130 in Key Number 2.

If the Base Card is found on the file, the system will place the value 0 in MS Location 716 and the string value ``Successful'' in MS Location 717. If the Base Card is not found on the file, the system will return the appropriate ``Status'' and ``Status Text'' indicating the nature of the problem.

Assume that you want to retrieve from the database the Base Card from the folder with the Account Number equal to or less than 125. The commands might be as follows:

XXM 710	Make Base Card	
s 7142	Set Key Number	
s 715125	Set Key Value	
Ge 710	Get Base Card with value equal to or less than 125 in Key Number 2.	

With the database defined above, the system would execute a Get on the Base Card with PPN 5 and a value in Key Number 2 of 120.

Another set of commands using the same style parameter can produce very different results.

XXM 710	Make Base Card
s 7142	Set Key Number
s 715130	Set Key Value
Ge 710	Get Base Card with value equal to or less than 130 in Key Number 2.

With the database defined above, the system would execute a Get on the Base Card with the PPN number of 1 and a value in Key Number 2 of 130.

Assume that you want to retrieve from the database the Base Card with the Account Number equal to or greater than 125. The commands might be as follows:

XXM 710	Make Base Card
s 7142	Set Key Number
s 715125	Set Key Value
GF 710	Get Base Card with value equal to or greater than 125 in Key Number 2.

With the database defined above, the system would execute a Get on the Base Card with PPN 1 and a value in Key Number 2 of 130.

As with the ``e'' style, another set of commands using the ``F'' style parameter can produce very different results:

XXM 710	Make Base Card
s 7142	Set Key Number
s 715120	Set Key Value
GF 710	Get Base Card with value equal to or greater than 120 in Key Number 2.

With the database above, the system would execute a Get on the Base Card with PPN 5 and a value in Key Number 2 of 120.

Assume that you want to retrieve from the database the Base Card with the Account Number less than 125. The commands might be as follows:

```
XXM 710          Make Base Card
s 7142           Set Key Number
s 715125     Set Key Value
Gl 710           Get Base Card with value less than 125 in Key Number 2.
```

With the database defined above, the system would execute a Get on the Base Card with a PPN of 5 and a value in Key Number 2 of 120.

Assume that you want to retrieve from the database the Base Card with the Account Number greater than 125. The commands might be as follows:

```
XXM 710          Make Base Card
s 7142           Set Key Number
s 715125     Set Key Value
GG 710           Get Base Card with value greater than 125 in Key Number 2.
```

With the database defined above, the system would execute a Get on the Base Card with a PPN of 1 and a value in Key Number 2 of 130.

Assume that you want to retrieve from the database the Base Card with the lowest Account Number on the file. The commands might be as follows:

```
XXM 710          Make Base Card
s 7142           Set Key Number
GL 710           Get Base Card with the lowest value in Key Number 2.
```

With the database defined above, the system would execute a Get on the Base Card with a PPN of 2 and a value in Key Number 2 of 110. There is no need to specify a key value, as the system will retrieve the Base Card with the lowest Key value.

Assume that you want to retrieve from the database the Base Card with the highest Account Number on the file. The commands might be as follows:

```
XXM 710          Make Base Card
s 7142           Set Key Number
GH 710           Get Base Card with the highest value in Key Number 2.
```

With the database defined above, the system would execute a Get on the Base Card with a PPN of 3 and a value in Key Number 2 of 150. As with the ``L'' style parameter, there is no need to specify a Key value, as the system will retrieve the Base Card with the highest Key value.

Assume that you want to retrieve from the database a number of Base Cards in sequence. The commands might be as follows:

XXM 710	Make Base Card
s 7142	Set Key Number
GL 710	Get Base Card with the lowest value in Key Number 2.
....	
GN 710	Get the Base Card with the value in Key Number 2 which is next highest than the value currently in memory.

With the database defined above, the system would first execute a Get on the Base Card with a PPN of 2 and a value in Key Number 2 of 110. The system would then execute a Get on the Base Card with a PPN of 5 and a value in Key Number 2 of 120.

By placing the Get Next command in a processing loop, you may Get all the Base Cards on the file in any key sequence from lowest to highest.

When using the ``Next'' style parameter in this way, you must include a status check in the Action Table to determine when the end of the file has been reached. An example of this follows:

XXM 710	Make Base Card
s 7142	Set Key Number
GL 710	Get Base Card with the lowest value in Key Number 2.
....	
GN 710	Get the Base Card with the value in Key Number 2 which is next higher than the value currently in memory.
I 716=a009END	If the value in MS Location 716 equals 9, go to the label END. Otherwise go to the next statement.

Get Secondary Card (g)

This command gets a secondary card (Card Types 02-50) and places it in the work area.

Format
gS@MMM

S can be E, L, H, P, or N
@ can be [space], a, i, j, k, l, m, n, or @

Description
This command gets a secondary card (Card Type 02-50) from the disk and places it in the work area where it is available for further processing. The card which is returned is determined by the contents of the File Control Block (described below) and the Style Parameter (S) which you select, which is described beginning on the next page.

The **File Control Block** is a series of eight consecutive MS Locations which you specify. The MS Locations for the File Control Block for a Secondary Card are specified using the Make Secondary Card command (XXm).

Each position in the File Control Block is significant. The contents of each position are described below:

Position in Block	Definition	Value
0	Set Number	Set by User
1	Permanent Parcel Number (PPN)	Set by User
2	Card Type	Set by User
3	Card Number	Set by User
4	Key Value	Does not Apply
5	Key Number	Set by User
6	Return Status	Returned by System
7	Status Text	Returned by System

There are two allowable Keys for secondary cards. The first Key (#1) consists of the Set Number, the Permanent Parcel Number, and the Card Number. This is the default key for all secondary cards. This Key will allow you to traverse the file in PPN Sequence within a Set. The second Key (#2) consists of the Permanent Parcel Number, the Set Number, and the Card Number. This Key will allow you to look at all occurrences of a card with a given Permanent Parcel Number, regardless of the Set it is in. All keys for secondary cards are defined by the system as non-duplicatable and non-modifiable. In other words, each one is unique and they can not be changed.

The Style parameter determines the relationship between the Key value in the File Control Block and the Key value of the Secondary Card which you will be executing the Get on:

E (Equal) gets a Secondary Card with a Key Value equal to the value in the Key Value field of the File Control Block. The PPN portion of the Key value field is usually determined by executing a Get on the Base Record, and then copying the PPN from Position 1 in the File Control Block of the Base Card to Position 1 in the File Control Block of the Secondary Card.

L   (Lowest) gets a Secondary Card with the lowest Key value using the Key Number specified in the File Control Block.

H   (Highest) gets a Secondary Card with the highest Key value using the Key Number specified in the File Control Block.

P   (Previous) gets a Secondary Card with the Key Value which is closest to but less than the Key Value of the Secondary Card which is currently in the work area.

N   (Next) gets a Secondary Card with the Key Value which is closest to but greater than the Key Value of the Secondary Card which is currently in the work area.

There are certain rules to remember when executing Gets:

1.   You must do some other type of Get using the same Key Number before attempting to use the P or N styles.

2.   When using the E style on secondary Card Types, it makes no difference which Key Number is specified unless it is to be followed by use of the P or N styles. In that case, the Key Number used must stay the same. It will govern the sequence in which secondary cards are processed.

3.   Permanent Parcel Numbers are assigned serially as new folders are added to the database. Thus, secondary keys, which rely heavily on PPN Numbers will be of limited usefulness in searching records.

4.   Execution of the Get command will claim a space in the work area.

Error Conditions

An error message will be generated and table execution will halt if you attempt to execute a Get Secondary Card command without first having executed a Make Secondary Card command (XXm), which initializes the File Control Block for that secondary card. When the system executes a Get command, it will return a Status and Status Text in positions six and seven of the File Control Block indicating whether the folder specified was retrieved from the file and placed in the work area. Table execution will continue regardless of the contents of these MS Locations, but, by checking them, you may prevent errors from occurring at another point in the table. The most common Statuses and Text are listed below:

0 = **Successful**
2 = **I/O Error** - Indicates damaged data file or hardware problem.
4 = **Key Not Found** - Indicates that there is no secondary card on the file with a key value equal to the value specified for the Key Number specified.
6 = **Invalid Key Number** - Key Number specified is not equal to 1 or 2.
7 = **Different Key Number** - Key Number was changed while using the P or N styles.
9 = **End of File** - Folder with the lowest or highest value in the key value field was returned on previous request.

Examples

The following examples assume a File Control Block for the Base Card beginning at MS Location 710 and a file control block for Card Type 2 beginning at MS Location 720. They assume that there are five folders in the file with the following PPN and Account Numbers.

PPN	Account #
1	130
2	110
3	150
4	140
5	120

PPN is key number 1 on the Base Card. Account Number is key number 2 on the Base Card. Card Type 2 has two keys. The make-up of these keys are described in the explanation of the file control block above.

Before executing a Get Base Card and Get Secondary Card command, you must execute appropriate Make command and specify the active key number for each card.

Depending on the Style of the Get Base Card command to be executed, the key value for the Base Card may have to be specified.

1. Assume that you want to retrieve from the dataBase Card Types 1 and 2 from the folder with the Account Number 140. The commands might be as follows:

XXM 710	Make Base Card
XXm 720	Make Secondary Card
s 7142	Set key number for Base Card
s 715140	Set key value for Base Card
GE 710	Get Base Card with value of 140 in Key Number 2
XXO 720 71004	Copy the contents of MS Locations 710-713 (4 positions) into MS Locations 720-723

    This command sets the values in the file control block for the secondary card. Value of 1 is copied from MS Location 710 to 720. Value of 4 (the PPN for the folder with a key value of 140 in Key Number 2) is copied from MS Location 711 to 721. Value of 1 is copied from MS Location 712 to 722. Value of 1 is copied from MS Location 713 to 723.

s 7222	Sets the number of Card Type for secondary card.
s 7241	Sets Key Number for secondary card to 1 (Set, PPN, Card Number).
gE 720	Get Secondary Card Type 2 with the value specified in Key Number 1. This would be Card Type 2 from the folder with a value of 140 in Base Card Key Number 2, i.e., Card Type 2 for the parcel with an Account Number of 140.

    If the Base Card is found on the file, the system will place the value 0 in MS Location 716 and the string value ``Successful'' in MS Location 717. If the Base Card is not found on the file, the system will return the appropriate ``Status'' and ``Status Text'' indicating the nature of the problem.

When a Get is executed on the secondary card, a status will be placed in MS Location 726 and a status text will be placed in MS Location 727.

A folder may consist of a Base Card only. In this case, the status text would be ``Successful'' in MS Location 717 and ``Key Not Found'' in MS Location 727.

2. Assume that you want to retrieve from the database a Secondary Card with the lowest key value on the file. The commands might be as follows:

XXm 720	Make Secondary Card
s 7222	Set Card Type to 2
s 7251	Sets Key Number to 1 (Set, PPN, Card Number).
gL 720	Get Secondary Card Type 2 with the lowest key value in Key Number 1. Using the sample data file described above, this command would return Card Type 2 with a set of 1, a PPN of 1 and a Card Number of 1. This would be a Card Type 2 from the parcel with an Account Number of 130.

3. Assume that you want to retrieve from the database a Secondary Card with the highest Key value on the file. The commands might be as follows:

XXm 720	Make Secondary Card
s 7223	Set Card Type to 3
s 7252	Set Key Number to 2 (PPN, Set, Card Number).
gH 720	Get Secondary Card Type 3 with the highest key value in Key Number 2. Using the sample data file described above, this command would return Card Type 3 with a PPN of 5, the highest set number (up to 250) and the highest Card Number (up to 250). This would be a Card Type 3 from the parcel with an Account Number of 120.

4. Assume that you want to retrieve from the database a number of Secondary Cards in ascending sequence. The commands might be as follows:

XXm 720	Make Secondary Card
s 7223	Set Card Type to 3
s 7251	Set Key Number to 1 (Set, PPN, Card Number).
gL 720	Get Secondary Card Type 3 with the lowest key value in Key Number 1.
....	
gN 720	Get Secondary Type Card 3 with the value in Key Number 1 which is next higher than the value currently in memory.

With the database defined above, the system would first execute a Get on Card Type 3 with a set of 1, a PPN of 1, and a Card Number of 1. The system would then execute a Get on the next occurrence of Card Type 3 in a Set, PPN, Card Number sequence. This might be set of 1, PPN of 1 and Card Number of 2. It might also be set 1, PPN of 2, and Card Number of 1.

Since Permanent Parcel Numbers are assigned serially as new folders are added to the database, the use of keys in secondary cards without reference to the Base Card will be of limited usefulness.

5. The following set of commands would allow you to search the file for secondary cards in ascending Account Number sequence.

XXM 710	Make Base Card
XXm 720	Make Secondary Card
s 7142	Set Key Number for Base Card
GL 710	Get Base Card with the lowest value in Key Number 2.
XXO 72071004	Copy the contents of MS Locations 710-713 (4 positions) into MS Locations 720-723.

    The Get Lowest using Key Number 2 (Account Number) retrieved a folder with a PPN of 2. This is copied from Position 711 to Position 721.

s 7222	Sets Card Type to 2.
s 7241	Sets Key Number for secondary card to 1 (Set, PPN, Card Number).
gE 720	Get Secondary Card Type 2 with value specified in Key Number 1.
....	
GN 710	Get the Base Card with the value in Key Number 2 which is next highest than the value currently in memory.
XX0 721 711	Copy the contents of MS Location 711 (the Permanent Parcel Number) to MS Location 721.
gE 720	Get Secondary Card Type 2 with value specified in Key Number 1. The Get Next on the Base Card will have changed the PPN Value in the Key. The Set and Card Number will stay the same.

6. Assume that you want to retrieve from the database a number of Secondary Cards in descending sequence. The commands might be as follows:

XXm 720	Make Secondary Card
s 7223	Set Card Type to 3
s 7251	Set Key Number to 1 (Set, PPN, Card Number.)
gH 720	Get Secondary Card Type 3 with the highest Key value specified in Key Number 1.
....	
gP 720	Get Secondary Card Type 3 with the value in Key Number 1 which is next lower than the value currently in memory.

    With the database defined above, the system would first execute a Get on Card Type 3, with the highest set number (up to 250) a PPN of 5 and the highest Card Number (up to 250). The system would then execute a Get on the next lowest occurrence of Card Type 3 in a Set, PPN, Card Number sequence.

    If there was more than one occurrence of Card Type 3 in the folder with a PPN of 5, this would be Card Type 3, with the highest set number, a PPN of 5 and the next to highest Card Number. If there was only occurrence of Card Type 3 in the folder with a PPN of 5, this would be Card Type 3 with the highest set number, a PPN of 4 and the highest Card Number. Since Permanent Parcel Numbers are assigned serially as new folders are added to the database, the use of Keys in secondary cards without reference to the Base Card will be of limited usefulness.

7. The following set of commands would allow you to search the file for secondary cards in descending Account Number sequence.

XXM 710	Make Base Card
XXm 720	Make Secondary Card
s 7142	Set Key Number for Base Card
GH 710	Get Base Card with the highest value in Key Number 2.
XXO 72071004	Copy the contents of MS Locations 710-713 (4 positions) into MS Locations 720-723.

The Get Highest using Key Number 2 retrieved a folder with a PPN of 3. This is copied from Position 711 to Position 721.

s 7222	Sets Card Type to 2.
s 7241	Sets Key Number for secondary card to 1 (Set, PPN, Card Number).
gE 720	Get Secondary Card Type 2 with value specified in Key Number 1.
....	
GP 710	Get the Base Card with the value in Key Number 2 which is next lowest than the value currently in memory.
XX0 721711	Copy the contents of MS Location 711 (the Permanent Parcel Number) to MS Location 721.
gE 720	Get Secondary Card Type 2 with value specified in Key Number 1. The Get Previous on the Base Card will have changed the PPN Value in the Key. The Set and Card Number will stay the same.

Move (M)

This command moves data from the work area into operating memory for specified data items associated with a specified Card Type.

Format
MTT@BBB@eee

@ can be [space] a, i, j, k, l, m, n, or @

Description
This command moves data for a Card Type specified by TT from the work area to operating memory for further processing.

Data items to be moved must have been previously associated using the Associate command (XA).

The range of data items to be moved is determined by the values in MS Locations BBB and eee. All associated data items in the Card Type specified in TT with Factor Numbers in the range defined by the values in MS Locations BBB and eee will be included. If eee is not specified or is not associated for the Card Type, only the data item referenced in BBB will be moved.

Any data already in operating memory for the MS Locations to be moved will be overwritten when the Move is executed.

Error Conditions

The system will generate an error message and table execution will stop if a Move is attempted on a Card Type which is not in the work area. Execute a Get Base Card (G) or Get Secondary Card (g) to place a card in the work area.

An error beep will be generated if the data item referenced in BBB or eee is not associated for the Card Type specified.

Examples

MTT@BBB@eee
M01 010 962

Move data for all data items associated with Card Type one with Factor Numbers between 010 and 962 from the work area to the operating memory.

MTT@BBB@eee
M02 301

Move data associated with Card Type two with a Factor Number of 301 from the work area to the operating memory.

Put a Base Card (P)

This command puts a Base Card (Card Type 01) which is in the work area on the fixed disk.

Format

P@MMM

@ can be [space] a, i, j, k, l, m, n, or @

Description

This command places a Base Card on the disk file using the File Control Block which begins at the MS Location referenced in MMM. It must be preceded by a Make Base Card (command XXM) or a Get Base Card command (G) and then a Save command (S) which specifies Type 01.

The values in the File Control Block will usually be those set when the Make or Get is executed.

The system will return a status value and a status text in the last two positions in the File Control Block. (See description of File Control Block in Get Base Card command (G)).

If the Put is preceded by a Make command, the Put will cause the system to attempt to add a new Base Card to the file. If the attempt is successful, the Base Card created will have a PPN equal to the highest previously existing PPN plus one (1).

If the Put is preceded by a Get command, the Put will cause the system to attempt to update the Base Card which was retrieved by the Get. In either case, if the Put is not also preceded by a Save command (S), no data will be written to disk; although a card will be created or updated.

Execution of a Put command removes the Base Card from the work area. Although the values of the data items remain in the MS Locations, you must execute a Get Base Command (G) and a Move command (M) before doing any further processing on the card.

Error Conditions

An error message will be generated and table execution will halt if a Make Base Card (XXM), a Get Base Card (G) or a Save (S) command does not precede the Put command.

When the system executes the Put command, it will return a Status Value and Status Text in positions six and seven of the File Control Block indicating whether the Base Card specified was written to the fixed disk. Table execution will continue regardless of the contents of these MS Locations but, by checking them, you may prevent errors from occurring at another point in the table.

A return status of 0 with a Status Text of ``Successful'' indicates that the Base Card was successfully written to disk.

When you have defined a Key which is Not Duplicatable, and attempt to create a Base Card (Put preceded by Make) with a Key value which is already on file, UNIVERS will return a Status of 5 and a Status Text of ``Duplicates Error.'' This would occur when you have designated Account Number as the non-duplicatable active key, and attempted to add a Base Card with an Account Number which duplicates one already on file.

When you attempt to update a Base Card (Put preceded by Get) which contains a Key value which is not on file, UNIVERS will return a Status of 4 and a Status Text of ``Key Not Found.'' This would occur when you have designated Account Number, as the active Key changes the Account Number of an existing Base Card to one which does not exist and attempts a Put.

Example

P@MMM
P 710

Put the Base Card currently in the work area on the fixed disk using the File Control Block which begins at MS Location 710.

The MS Location used in this command is usually the same one used in the Get Base Card or Make Base Card command which precedes it. Otherwise, it will be necessary to redefine the File Control Block.

Put a Secondary Card (p)

This command puts a secondary card (Card Type 02-50) which is in the work area on the fixed disk.

Format
p@MMM

@ can be [space] a, i, j, k, l, m, n, or @

Description
This command places a secondary card on the disk file using the File Control Block which begins at the MS Location referenced by MMM. It must be preceded by a Make Secondary Card (command XXm) or a Get Secondary Card command (g) and then a Save command (S) which specifies the Card Type which is equal to the value in MS Location two of the File Control Block.

The values in the File Control Block will usually be those set when the Make or Get is executed. Changes in values in the File Control Block while the card is in memory can result in corruption of the database if not done with great care.

The system will return a Status Value and a Status Text in the last two positions in the File Control Block. (See description of File Control Block in Get Secondary Card command (g).

If the Put is preceded by a Make command for a specified Card Type, the Put will cause the system to attempt to add a new Secondary Card of that type to the file.

If the Put is preceded by a Get command for a specified Card Type, the Put will cause the system to attempt to update the Secondary Card which was retrieved by the Get.

In either case, if the Put is not also preceded by a Save command (S) for the specified Card Type, no data will be written to disk; although a card will be created or updated.

Execution of a Put command removes the specified Card Type from the work area. Although the values of the data items remain in the MS Locations, you must execute a Get Secondary Command (g) and a Move command (M) for the specified Card Type before doing any further processing on the card.

Error Conditions
An error message will be generated and table execution will halt if a Make Secondary Card (XXm), a Get Secondary Card (g) or a Save (S) command for the specified Card Type does not precede the Put command.

When the system executes the Put command, it will return a Status Value and Status Text in positions six and seven of the File Control Block indicating whether the Card Type specified in position two of the File Control Block was written to the fixed disk. Table execution will continue regardless of the contents of these MS Locations but, by checking them, you may prevent errors from occurring at another point in the table.

A return Status of 0 with a Status Text of ``Successful'' indicates that the specified card was successfully written to disk.

When you attempt to create a Secondary Card (Put preceded by Make) with a Key value which is already on file (i.e., a specified Secondary Card Type with the same set number and Card Number as one on file), the system will return a Status of 5 and a Status Text of ``Duplicates Error.''

When you attempt to update a Secondary Card (Put preceded by Get) and changes a value in the File Control Block (i.e., changes value in Position 3, Card Number from 1 to 2), the Put command may result in an attempt to update a card which does not exist. The system will return a Status of 4 and a Status Text of ``Key Not Found.''

Example
p@MMM
p 720

Put the Secondary Card of the type specified in MS Location 722 which is currently in the work area on the fixed disk using the File Control Block which begins at MS Location 720. The MS Location used in this command is usually the same one used in the Get Secondary Card (g) or Make Secondary Card (XXm) command which preceded it. Otherwise, it will be necessary to redefine the File Control Block.

Release (R)

This command releases the space in the work area occupied by a specified Card Type.

Format
RTT

Description
The UNIVERS work area has space for five Card Types at any one time. One of the five spaces in the work area is always reserved for the Base Card. Four secondary cards (Card Types 02-50) may be in the work area at any one time. Space in the work area is allocated for a Card Type when you execute a Make Secondary Card (XXm) or Get Secondary Card (g) command. Space remains allocated even if you execute a Put Secondary Card (p) command.

The Release command makes the space available for use by another Card Type. The Card Type to be released is the value in TT. No data is written to the disk by this command. You should execute a Save command (S) and a Put Secondary Card command (p) before releasing the Card Type.

Error Conditions
An error message is generated and table execution stops if the value in TT is 01. One of the five spaces in the work area is always allocated for the Base Card.

An error message is generated and table execution stops if the card specified in TT is not in the work area (no Make Secondary Card (XXm) or Get Secondary Card (g) executed).

Example
RTT
R02

Make the space in the work area occupied by Card Type 02 available for reassignment.

Save (S)

This command places data in operating memory in the work area for specified data items associated with a specified Card Type.

Format
STT@BBB@eee

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command places data for a Card Type specified by TT into the work area preliminary to being transferred to the fixed disk. Data items to be saved must have been previously associated using the Associate command (XA).

Execution of this command will cause a subsequent Put Base Card (P) or Put Secondary Card (p) to transfer data from the work area to the fixed disk.

The range of data items to be saved is determined by the values in MS Location BBB and eee. All associated data items in the Card Type TT with Factor Numbers in the range defined by the values in MS Locations BBB and eee will be included. If eee is not specified or is not associated for the Card Type, only the data item referenced in BBB will be moved.

Error Conditions
An error beep will be generated if the data item referenced in BBB or eee is not associated for the Card Type specified.

Examples
STT@BBB@eee
S01 010 962

Save data for all data items associated with Card Type one with Factor Numbers between 010 and 962 from the operating memory to the work area.

STT@BBB@eee
M02 301

Save data associated with Card Type two with a Factor Number of 301 from the operating memory to the work area.

Associate (XA)

This command associates data items in the Factor Table for a specified Card Type with the appropriate MS Locations.

Format
XATTIIIjjjkkk...

Description
This command associates the Factor Numbers of data items from the Factor Table with MS Locations used in Action Tables.

The data items in Card Type number TT with Item Numbers III, jjj, kkk, etc., are associated by this command. The Item Number for each data item in a Card Type appears in the first column on a Factor Table listing.

When the Associate command has been executed, all reference to data items in the Action Table are made using the MS Location which corresponds to the Factor Number.

Remember that the same Factor Number may be used for data items in two different Card Types within a Factor Table. If this occurs, you must avoid associating both data items in the same Factor Table. If both data items are associated, the last one associated will occupy the MS Location during table execution.

An Associate command must be executed before attempting to execute a Move (M) or Save (S) command.

Up to 25 items within a Card Type may be associated in one statement. However, a maximum of 19 will allow you to see all items associated on the screen.

Error Conditions
An error message is generated and table execution will halt if any attempt is made to associate a Card Type or an Item Number within a Card Type which does not exist on the Factor Table.

Example
XATTIIIjjjKKK
XA02001002003006004014

Associate data items 1, 2, 3, 6, 4 and 14 within Card Type Number 2.

Set Cache Size (Xc)

This command sets the cache size for factors and factor levels.

Format
Xc@fff@lll

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command sets the size of the cache for the number of factors and the number of levels. The number of factors is specified by the value in MS Location fff (absolute, direct, indexed or indirect). The number of levels is specified by the value in MS Location lll (absolute, direct, indexed or indirect).

The system sets the cache size at 200 factors and 200 levels. The cache size will remain unchanged until this command is executed. If only one MS Location is specified in the command, only one cache size will be changed.

Data items in cache memory are immediately available for processing during table execution. A larger cache will result in faster processing of an Action Table.

Cache consumes a portion of the 64 kilobytes of memory which is available for Action Table execution. By reducing cache size, you may be able to accommodate a larger Action Table. This will result in slower processing of the table.

Each Categorical Segment represents one level in cache. If a Factor Table has forty Categorical Segments, the value in MS Location lll may be set at 40 without affecting processing speed.

Error Conditions
An error condition will be generated and table execution will stop if the values in the MS Locations are not Single-Precision.

Examples
Xc@fff@lll
Xc@150@042

The number of factors in the cache is reduced from 200 to 150 and the number of levels in the cache is reduced from 200 to 42.

Xc@fff@lll
Xc 000@042

The number of factors in the cache remains at 200 and the number of levels in the cache is reduced from 200 to 42.

Xc@fff@lll
Xc@250 000

The number of factors in the cache is increased from 200 to 250 and the number of levels in the cache remains at 200.

Delete Base Card (XXD)

This command deletes a Base Card from the Disk.

Format
XXD@MMM

@ can be [space], i, j, k, l, m, n or @

Description
This command deletes a Base Card from the disk using the File Control Block which begins at MS Location MMM (direct, indexed or indirect). The structure of the File Control Block for a Base Card is discussed in the Get Base Card Command (G).

The Base Card to be deleted will be determined by the values in the File Control Block when this command is executed.

All secondary cards in the folder with this Base Card must have been deleted (see XXd Command) prior to execution of this command.

Error Conditions
An error message will be generated and table execution will halt if there are secondary cards (Card Types 02-50) on the fixed disk which have the same Permanent Parcel Number as the Base Card being deleted with this command.

When the system executes the Delete Base Card Command, it will return a Status and a Status Text in positions six and seven of the File Control Block indicating whether the Base Card specified was deleted from the disk. The execution will continue regardless of the contents of these MS Locations, but, by checking them, you may prevent errors from occurring at another point in the table.

The most common Statuses and Text for the Delete Base command are listed below:

0 = **Successful**

2 = **I/O Error** - Indicates damaged data file or hardware problem.

4 = **Key Not Found** - Indicates that there is no folder on the file with a key value equal to the value specified for the key number specified.

Example
XXD@MMM
XXD 710

Delete from the disk the Base Card specified by the values in the File Control Block beginning at MS Location 710. If secondary cards with the same Permanent Parcel Number (PPN) as the Base Card are on the file, issue an error message. If the Base Card is not found on the file, return a non-zero status in MS Location 716.

Delete Secondary Card (XXd)

This command deletes a Secondary Card (Card Types 02-50) from the disk.

Format
XXd@MMM

@ can be [space], i, j, k, l, m, n or @

Description
This command deletes a secondary card (Card Type 02-50) from the disk using the File Control Block which begins at MS Location MMM (direct, indexed or indirect). The structure of the File Control Block for a Secondary Card is discussed in the Get Secondary Card command (g).

The Secondary Card to be deleted will be determined by the values in the File Control Block when the command is executed.

Error Conditions
This command does not generate system errors. When it is executed, the system will return a Status and Status Text in positions six and seven of the File Control Block indicating whether the Secondary Card specified was deleted from the disk. Table execution will continue regardless of the contents of these MS Locations, but, by checking them, you may prevent errors from occurring at another point in the table.

The most common Statuses and Text for the Delete Base command are listed below:

0 = **Successful**

2 = **I/O Error** - Indicates damaged data file or hardware problem.

4 = **Key Not Found** - Indicates that there is no secondary card on the file with a key value equal to the value specified for the key number specified.

6 = **Invalid Key Number** - Key Number is not equal to 1 or 2.

Example
XXd@MMM
XXd 720

Delete from the disk the secondary card specified by the values in the File Control Block beginning at MS Location 720. If the specified secondary card is not found on the file, return a non-zero status in MS Location 726.

Make a Base Card (XXM)

This command makes an area in the work area for a Base Card.

Format
XM@NNN

@ can be [space], i, j, k, l, m, n or @

Description
This command allocates the area in the work area which is reserved for the Base Card, sets the MS Locations associated with all Factor Numbers of String type data to Null and the MS Locations associated with all Factor Numbers of numeric type to zero.

The value in MS Location NNN (direct, indexed or indirect) becomes the first MS Location of the File Control Block.

The command sets the Permanent Parcel Number (PPN) for any Base Card which is later added to the fixed disk (see Put command, P) at one higher than the highest PPN currently on file.

Error Conditions
An error message is generated and table execution will halt if the value in NNN is greater than 992. Use of a value higher than 992 would result in a status text in a MS Location higher than 999.

Examples
XXM@NNN
XXM 710

Make a Base Card in the work area with a File Control Block beginning at MS Location 710.

XXM@NNN
XXM@900

Make a Base Card in the work area with a File Control Block beginning at the MS Location referenced by MS Location 900.

Make a Secondary Card (XXm)

This command makes an area in the work area for a secondary card (Card Type 02-50).

Format
XXm@NNN

@ can be [space], i, j, k, l, m, n or @

Description
This command allocates an area in the work area for a secondary card, sets the MS Locations associated with all Factor Numbers of String type data to Null and the MS Locations associated with all Factor Numbers of numeric type to zero.

The value in MS Location NNN (direct, indexed or indirect) becomes the first MS Location of the File Control Block. However, prior to execution of this command, the number of the Card Type must be set in position two in the File Control Block.

This command is required before attempting to add a secondary Card Type to the file using a put command (p).

Error Conditions
An error message is generated and table execution stops if a value has not been assigned for Card Type, Position 2 in the File Control Block, before the Make Secondary Card command is executed.

An error message will be generated and table execution will stop if you attempt to make a secondary card with a Card Type number which does not exist in the Factor Table.

An error message will be generated and table execution will stop if five cards are already active in the work area when a Make Secondary Card command is executed. You may execute a Release (R) command to make space available in the work area.

An error message will be generated and table execution will stop if the value in NNN is greater than 992. Use of a value higher than 992 would result in a status text in a MS Location higher than 999.

Example
XXm@NNN
XXm 720

Make a secondary card in the work area with a Card Type number equal to the value which had previously been placed in MS Location 722. Create a File Control Block beginning at MS Location 720. The two commands should be in the following sequence:

s 7222
XXm 720

Next Card (XXn)

This command returns the next card of a given PPN starting with a given Card Type.

Format
XXn@MMM

Where @ could be [space], @, i, j, k, l, m or n.

Description
This IPTE Command returns the next card for a PPN stored in MMM+1, starting with the Card Type stored in MMM+2, where MMM is the base of a File Control Block (FCB). Only the first occurrence of a Card Type is returned. If you want to check for a second occurrence on that same Card Type, you must use a Get Next (gN) after this command has found the first occurrence.

If an occurrence is not found on the Card Type specified in MMM+2, and the Card Type in MMM+2 is not the last Card Type defined, then the Card Type in MMM+2 is incremented and the search continues until either an occurrence is found or no Card Types remain. At this time, the appropriate status code and message is returned in MMM+6 and MMM+7, respectively.

File Control Block Position Definitions			
MS Position	**Field Definition**	**Required for XXn**	**Returned by System**
MS Position + 0	Set Number		X
MS Position + 1	PPN Number	X	X
MS Position + 2	Card Type	X	X
MS Position + 3	Card Number		X
MS Position + 4	Key Value		X
MS Position + 5	Key Number		X
MS Position + 6	Return Status		X
MS Position + 7	Status Text		X

The File Control Block is a series of MS positions defined by you in your Action Table to determine index numbers, key values, etc. to be used by the call to the file handler. Moreover, the file handler also uses the File Control Block to communicate the results (success status) of the file call. If your work area is full and your database contains more than five Card Types, you must release one of the Card Types before performing this IPTE Command.

Error Conditions
If an occurrence is not found, the appropriate status code is returned to MMM+6 and the status message is returned to MMM+7; Action Table execution continues.

Example
XXn@MMM
XXn 200

Assume MS position 201 has the PPN form of the value 235 and MS 202 has the value 3. Assume Card Type 3 has no occurrences of PPN 235, but that Card Type 4 has an occurrence of PPN 235. A search for a card with a PPN of 235 begins with Card Type 3 and continue until the occurrence of PPN 235 is found on Card Type 4. MS 200 through MS 207 are loaded with the appropriate values as determined from the outcome of the search. MS 205 is always loaded with the first key.

Processing Control Commands

The IPTE Commands addressed under this functional group are used to control the processing logic of an Action Table. There are a total of eight (8) commands that fall within this functional category.

If Then (I)

This command transfers control within table depending on truth of statement.

Format
IT@AAACC@BBBggg

T can be A or S
@ can be [space], a, i, j, k, l, m, n, or @
CC can be =, < >, <, >, < =, = >

Description
This command compares the value of MS Location AAA (direct, absolute, indexed or indirect) with the value of MS Location BBB (direct, absolute, indexed or indirect) using the relationship specified in CC.

The T or Type parameter defines the type of data items being compared. Type A refers to Alpha or String data. When this type is used, both AAA and BBB must be String or Text data items. Type S refers to Single-Precision data. When this type is used, both AAA and BBB must be Byte, Categorical, Integer or Single-Precision data items. The Default type is S if no types are specified.

If the statement is true, execution of the table continues at label ggg if it is specified or at the next statement if a label is not specified. If the statement is false, execution of the table continues at the next statement if a label (ggg) is specified or at the first statement of the next line if a label is not specified.

The command supports six relationships which can be tested for:

=	AAA equals BBB
< >	AAA is not equal to BBB
<	AAA is less than BBB
>	AAA is greater than BBB
<=	AAA is less than or equal to BBB
=>	AAA is greater than or equal to BBB

Error Conditions
An error message is generated and table execution stops if either MS Locations AAA or BBB are not Single-Precision data items if the type parameter (T) is not specified or is specified as S.

An error message is generated and table execution stops if a label (ggg) is specified which is not found as the first statement of a line in the table.

Examples
IT@AAACC@BBBggg
IS 500 =a003OBY

If the value in MS Location 500 (which is Single-Precision) is equal to the absolute number 3, transfer to the Label OBY. Otherwise, continue execution of the table with the next statement.

IT@AAACC@BBBggg
I i 300>=a001

(Assume i = 002) If the value in MS Location 302 (300+002) is greater than or equal to the absolute number 1, continue execution of the table at the next statement. Otherwise, continue execution of the table with the first statement of the next line.

Since the Type parameter is not specified, the value in AAA is assumed to be Single-Precision.

IT@AAACC@BBBggg
IA 040<> 650LND

If the value in MS Location 040 (which is a String or Text type) is not equal to the value in MS Location 650, transfer to the label LND. Otherwise, continue execution of the table with the first statement of the next line.

IT@AAACC@BBBggg
IA 040<=@650

If the value in MS Location 040 (which is a String or Text type) is less than or equal to the value stored in the MS Location referenced by MS Location 650, continue execution of the table at the next statement. Otherwise, continue execution of the table with the first statement of the next line.

Label (L)

This command labels a line in an Action Table.

Format
LAAA

Description
This command labels a line in an Action Table. A Label is required when a command is used to transfer control of the Table (see If Then, Transfer, Go Sub, and Return commands). Labels are also used to identify look-up tables which are searched but which control is not transferred to. Labels *must always be* the first statement in a line. The system discriminates between Upper and Lower case letters when searching for a label. Labels of LAB, lab, LaB, and lAB are all unique.

Error Conditions
If a Label is not the first statement of a line, the system will not recognize it and an error may result when control of the table is transferred to it.

Example
LAAA
LLND

Assign the Label LND to this line of a Table.

LLND Land Valuation Begins Here.

Assign the Label LND to this line of a table. The words ``Land Valuation Begins Here'' will be ignored when the table is executing but will aid you in reviewing the table's logic. Labels are more helpful if they relate to the contents of the line, i.e., a label of LND at the line where processing of land information begins.

Quit (Q)

This command quits processing of the Action Table and return to the Action Table Execution Screen.

Format
Q

Description
This command ends processing of the current Action Table and causes the Action Table Execution Screen to return to the screen. MS Locations associated using the Associate command (XA) will remain associated. All values in MS Locations will remain the same. Index values are reset to 0. All subroutine return points are cleared.

Error Conditions
None.

Example
Q

Quit processing and return to the Action Table Execution Screen.

Transfer (T)

This command transfers control of the table to the line specified.

Format
TLLL or T@MMM

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command transfers control of the table to the line with the Label specified in LLL or to the line with a Label which is the value specified in MS Location MMM (direct, indexed or indirect).

This command is functionally the same as GOTO in many programming languages.

Error Conditions
An error message will be generated and table execution will halt if the label specified does not exist or is not the first statement of the line it is in.

Examples
TLLL
TCST

Transfer control of the table to the line beginning with the Label ``LCST.''

T@MMM
T 392

Assume that MS Location 392 is a String type data item and contains the value ``SUM.'' This command will transfer control of the table to the line beginning with the Label ``LSUM.''

Go to Subroutine (XG)

This command executes a subroutine beginning at the line specified.

Format
XGLLL or XG@MMM

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command transfers control of the table to the subroutine beginning at the line with the Label LLL or at the line with a Label which is the value specified in MS Location MMM (direct, indexed or indirect).

Execution of the subroutine will continue until the Return Command (XR) occurs. Control of the table will then transfer to the statement following the most recent Go to Command (XG) unless a label is specified in the Return Command; then it will transfer to the label specified.

Subroutines may be nested up to a limit of 10. When subroutines are nested, one subroutine calls another which may call another. When nesting is used, each Return Command (XR) encountered will transfer control of the table to the GoSub Command (XG) most recently encountered. When using nesting, care must be taken to ensure that the subroutines will execute in the correct sequence regardless of the data encountered.

The system maintains a count to ensure that it encounters a Return Command (XR) for every GoSub (XG). Users should make sure that they do not transfer control out of a subroutine by use of a Transfer Command (T) or an IfThen Command (I) and subsequently fail to execute a Return Command (XR).

Error Condition
An error message will be generated and table execution will halt if the label specified does not exist or is not the first statement of the line it is in.

Examples
XGLLL
XGSVM

Transfer control of the table to the line beginning with the Label ``LSUM.'' Continue processing until a Return Command (XR) is encountered.

XG@MMM
XG 392

Assume that MS Location 392 is a String type and contains the value ``SUM.''  This command will transfer control of table to the line beginning with the Label ``LSUM.'' Processing will continue until a Return Command (XR) is encountered.

Return From Subroutine (XR)

This command transfers control of the table to a specified point following execution of a subroutine.

Format
XRLLL or XR@MMM

@ can be [space] i, j, k, l, m, n, or a

Description
This command transfers control of the table to the statement following the most recent Go to Subroutine (XG) Command if no label or MS Location is specified to the line starting with the label LLL if LLL is specified, or to the line with a label equal to the value in MS Location MMM (direct, indexed or indirect).

Care should be taken when executing returns to a label or a MS Location to ensure that the table will execute in proper sequence regardless of the data encountered.

Error Conditions
An error message will be executed and table execution will halt if the system encounters a Return Command which is not preceded by a Go to Subroutine (XG) Command or two Return Commands which are not separated by a Go to Subroutine Command.

An error message will be generated and table execution will halt if a label is specified and it does not exist or it is not the first statement of the line it is in.

Examples
XRLLL
XR

Transfer control of the table to the statement immediately following the most recent Go to Subroutine (XG) Command executed.

XRLLL
XREND

Transfer control of the table to the line beginning with the label ``LEND.''

XR@MMM
XR 392

Assume that MS Location 392 is a String type and contains the value ``END.'' This command will transfer control of the table to the line beginning with the label ``LEND.''

Add Block (XXA)

This command adds an Action Table to the Active Action Table.

Format
XXA@NNN

@ can be [space], a, i, j, k, l, m, n or @

Description
This command adds the Action Table with a number equal to the value in MS Location NNN to the Action Table currently in operating memory.

The line numbers used in the Table to be added must not be in use in the Table currently in memory.

When executing this command, you should make sure that there are not duplicate labels in the two tables and there are not conflicting use of the same MS Locations.

Error Conditions
An error message will be generated and table execution will stop if the table number specified has not been created.

An error message will be generated and table execution will stop if the Action Table being added uses Line numbers already used by the Action Table currently in memory.

An error message will be generated and table execution will stop if the first line of the first table is removed.

Examples
XXA@NNN
XXA&110

Add Action 110 to the Action Table currently in memory.

XXA@NNN
XXA 670

Add the Action Table with a number equal to the value in MS Location 670 to the Action Table currently in memory.

Remove Block (XXR)

This command removes a block of lines from the Active Action Table.

Format
XXR@SSS@fff

@ can be [space], i, j, k, l, m, n or @

Description
This command removes or deletes a block of lines from the active Action Table beginning with the label referenced in MS Location SSS (direct, indexed or indirect) and up to and including the label referenced in MS Location fff (direct, indexed or indirect). If fff is not specified, all lines in the table beginning with the label referenced in SSS will be removed.

If the XXR command being executed is within the block of lines being removed, table execution will continue at the label referenced in fff. If fff is not specified, the system will execute a Quit (Q) command.

Error Conditions
An error message will be generated and table execution will stop if the label(s) referenced in MS Locations SSS and/or fff are not present in the active Action Table.

An error message will be generated and table execution will stop if the first line of the first table is removed.

Examples
XXR@SSS@fff
XXR 130 131

Assume that MS Location 130 contains the string value ``LND'' and that MS Location 131 contains the string value ``RES.'' All lines in the table beginning with the line which has the label ``LND'' up to but not including the line which has the label ``RES'' will be removed from the table.

XXR@SSS@fff
XXR 130

Assume that MS Location 130 contains the string value ``LND.'' All lines in the table beginning with the line which has the label ``LND'' will be removed from the table.

Screen Commands

The IPTE Commands addressed under this functional group are used to control on screen displays through an Action Table. There are a total of eight (8) commands that fall within this functional category.

Color (C)

This command sets the primary and secondary colors for foreground and background using MS Location references.

Format
C@FFF@bbb@ggg@ccc@eee@sss

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command sets the screen colors. MS Location FFF (direct, absolute, indexed or indirect) sets the primary foreground color. MS Location bbb sets the primary background color. MS Location ggg sets the secondary foreground color. MS Location ccc sets the secondary background color. MS Location eee sets the border color. MS Location sss sets the ASCII fill character for the Factor Solicit (F) command.

This command does not cause colors to change on the screen. It sets the colors for use by other commands. The Factor Display (f) command uses the primary foreground and background screen colors, unless otherwise specified. The Factor Solicit (F) command uses the secondary foreground and background colors, unless otherwise specified.

The Color (C) command is the only way to change one of the screen colors. If you specify a color parameter within another command, the color specified will be used only during the execution of that command. The screen colors will remain the same.

Changing the value in the MS Locations used in the Color (C) command will not cause the screen colors to change until the command is subsequently executed. UNIVERS uses the following color value table:

1.	Black	9.	Gray
2.	Blue	10.	Light Gray
3.	Green	11.	Light Green
4.	Cyan	12.	Light Cyan
5.	Red	13.	Light Red
6.	Magenta	14.	Light Magenta
7.	Brown	15.	Yellow
8.	White	16.	Hi-intensity White

Using the same color for foreground and background will make the information being displayed invisible. Using two dark colors or two light colors for foreground and background may make the information being displayed invisible if the Action Table is executed on a computer with a monochrome monitor.

When a value of 17 to 32 is used in FFF, the corresponding color with a value of 1 to 16 will be used but it will be flashing.

Color codes for foreground are translated as a MOD 32 function, i.e., color 33 is the equivalent of color 1. Color codes for background are translated as a MOD 16 function, i.e., color 23 is the equivalent of color 7.

If the screen colors are not set, the system will use the default colors. The default colors are as follows:

Primary foreground	=	3	Green
Primary background	=	1	Black
Secondary foreground	=	8	White
Secondary background	=	1	Black
Border	=	1	Black
Solicit Fill Character	=	95	Underline

Error Conditions
An error message is generated and table execution will halt if any of the MS Locations specified in the command are not Single-Precision.

Examples
C@FFF@bbb@ggg@ccc@eee@sss
C 160

Set the primary foreground color to the number in MS Location 160. Leave the primary background, secondary background, border and underline character at the default setting.

C@FFF@bbb@ggg@ccc@eee@sss
C@209

Set the primary foreground color to a flashing light red. Leave the primary background, secondary foreground, secondary background, border and underline character at the default setting.

C@FFF@bbb@ggg@ccc@eee@sss
C 160 170 000@175 000a042

Set the primary foreground color to the number in MS Location 160, and the primary background color to the number in MS Location 170. Leave the primary background color at default (black) since its value is 0. Set the secondary foreground to the number stored in the MS Location referenced by MS Location 175. Leave the secondary background color at default (black). Set the solicit fill character to ASCII 42 which is an ``*.''

Clear (c)

This command clears a specified portion of the screen, optionally filling the cleared portion with a character on a specified foreground and background color.

Format
crrccllxxxffbb

Description
This command clears the screen beginning at row rr and column cc for a length (number of columns to be cleared) of ll, filling the area with the character produced by the ASCII character xxx using ff as the color code for the foreground and bb as a color code for the background. (See the color command (C) for an explanation of the Color values.)

If rr, cc, and ll are not all specified, the ones which are specified will be ignored and the entire screen will be cleared. All rows beginning with the row specified and continuing through row 24 will be cleared, beginning at the column specified and for the number of columns specified. If xxx is not specified, a space (ASCII character 32) will be used as the fill character. If ff is not specified, the current primary foreground will be used. If bb is not specified, the current primary background will be used.

Error Conditions
None.

Examples
crrccllxxxffbb
c

Clear the screen using space for fill character and current primary colors.

crrccllxxxffbb
c223527

Clear the screen starting with row 22, column 35 for a length of 27 characters (through column 61). Fill with a space character and use the current primary colors.

crrccllxxxffbb
c010110065

Clear the screen starting with row 1, column 1, for a length of 10 characters (through column 10). Fill with the letter ``A,'' (ASCII character 065) and use the current primary colors.

crrccllxxxffbb
c1201400381501

Clear the screen starting with row 12, column 1, for a length of 40 characters (through column 40). Fill with the symbol ``&'' (ASCII character 038) using a foreground color of Hi- Intensity White (Color 15) on a background color of Black (Color 1).

Factor Solicit (F)

This command solicits the value for a factor (MS Location).

Format
F@MMM@ttt@lll@bbb@hhhjjj

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command solicits the value for MS Location MMM from the keyboard and displays the response on the screen at the current screen location.

The ``ttt'' parameter is the type of data to be solicited for the MS Location. A value of 001 indicates a String or Text data item. This includes User-Date and Auto-Date items. A value of 002 indicates a Single-Precision item. This includes Byte, Categorical, and Integer items. A value of 003 indicates a Double-Precision data item. A value of 004 indicates that the type of data item for this MS Location will be the type specified in the Factor Table.

If the ``ttt'' parameter is not specified, (set to 000), the MS Location is assumed to be Single-Precision.

The ``lll'' parameter is the length or number of characters to be solicited for the MS Location. If ``lll'' is not specified and the type parameter ttt is set to 001, 002, or 003, the length is assumed to be 1. If ``lll'' is not specified and the type parameter ``ttt'' is set to 004, the length will default to the number of characters in a String or Text data item or to the number of characters in the format of a numeric data item.

The ``bbb'' parameter is the low edit range limit for the MS Location being solicited. The ``hhh'' parameter is the high edit range limit for the MS Location being solicited.

The range limits can be set independently of one another, i.e., you may set only one limit. If neither parameter is set, than no range check will be performed.

Range checks can only be performed on numeric MS Locations (byte, Categorical, Integer, Single-Precision and Double-Precision). If the MS Location is String or Text (including User-Date and Auto-Date) no range check will be performed.

If a MS Location fails a range check, an appropriate message appears on the screen and the solicit is repeated.

The ``jjj'' parameter directs control of the table to a label with the value in jjj when you enter the ``^'' as the line first character in a solicit. If ``^'' is entered and the jjj parameter is not specified, then the solicit is repeated.

Error Conditions
An error will result and table execution will halt if an invalid type has been specified for a MS Location or if the values in the range parameters are not of the same type as the MS Location.

For instance, if you are attempting to solicit for a Double-Precision MS Location, the type parameter must be 003, and the values in the low range parameters ``bbb,'' and high range parameters ``hhh'' must be Double-Precision.

An error will result and table execution will halt if there is no label in the table with a value equal to the value in jjj.

Examples
F@MMM@ttt@lll@bbb@hhhjjj
F 120

Solicit the value for MS Location using the default type of Single-Precision and default length of 1. No range checks will be performed and the data item will be solicited again if you enter a ``^.''  The screen position will have been set by the previous command (probably a Literal Display ``1'' or Factor Display ``f'') which positions the cursor at the beginning of the data field.

F@MMM@ttt@lll@bbb@hhhjjj
F 010a001a015

Solicit the value for MS Location 010. MS Location 010 is a String or Text type with a length of 15 characters. Since the MS Location is a Text type, there are no edit ranges. There is no jump label specified.

F@MMM@ttt@lll@bbb@hhhjjj
F 010a001a015 000 000BAS

Solicit the value for MS Location 010. MS Location is a String or Text type with a length of 15 characters. Since the MS Location is a Text type, there are no edit ranges. The BAS in parameter jjj indicates that control of the table will transfer to label BAS if you enter a ``^.''

F@MMM@ttt@lll@bbb@hhhjjj
Fi800a002a003a001a084OBY

(Assume i = 3) Solicit the value for MS Location 803 (800+003). MS Location 803 is a Single-Precision type, with a length of 3 positions, a low edit range of 1 and a high edit range of 84. The OBY in parameter jjj indicates that control of the table will transfer to label OBY if you enter a ``^.''

F@MMM@ttt@lll@bbb@hhhjjj
F 961a003a009 170 171BAS

Solicit the value for MS Location 961. MS Location 961 is a Double-Precision type, with a length of 9 characters. The low edit range is the value in MS Location 170, which is Double-Precision. The high edit range is the value in MS Location 171, which is also Double-Precision. The BAS in parameter jjj indicates that control of the table will transfer to label BAS if you enter a ``^.''

Factor Display (f)

This command displays the value of a factor (MS Location).

Format
f@MMM@rrr@ccc@sss@lll@kkk@fff@bbb

Description
This command displays the value of MS Location MMM to either the screen or printer. If you wish to display the MS Location on a printer, you must have previously invoked the Set Out command (XXo).

The effect of some of the parameters differs depending on the output device chosen.

The rrr parameter sets the row where display of the data begins on the screen. The ccc parameter sets the column where display of the data begins on the screen. These parameters are ignored when data is to be displayed on the printer.

Row parameters are translated as a MOD 24 function, i.e., a row reference of 029 will have the same effect as a row reference of 005. Column parameters are translated as a MOD 80 function, i.e., a column reference of 110 will have the same effect as a column reference of 030.

The sss parameter sets the style for display of data in the MS Location. The allowable styles are 001 for String or Text data (including User-Date and Auto-Date) 002 for Single-Precision data (including byte, Categorical, and Integer) and 003 for Double-Precision data.

There are nine other styles numbered 4 through 12 for MS Locations which correspond with Factor Numbers of Items in the Factor Table. These Items must have been associated using the Associate (XA) command. The meaning of these styles is different for Categorical type data items and *all* other types of data items.

Finally, style 013 is used when the printer has been selected as the output device to transmit control codes to the printer. Control codes are created using the Set String (Xs) and Set Format (Xf) command.

The following charts set forth the information displayed when the various styles are specified for Categorical and Non-Categorical data items, respectively.

For Non-Categorical Data Items:

Style	Data Displayed	Justification
4	Fnumber, Fname, Fvalue	R, L, D
5	Fname, Fvalue	L, D
6	Fvalue	D
7	Fvalue, Fname, Fnumber	D, L, R
8	Fvalue, Fname	D, L
9	Fvalue	D
10	Fvalue	D
11	Fname, Fvalue	L, D
12	Fvalue	L

For Categorical Data Items:

Style	Data Displayed	Justification
4	Fnumber, Fname, Lnumber, Lname	R, L, R, L
5	Fname, Lname	L, L
6	Lvalue	R
7	Lname, Lvalue, Fname	L, R, L
8	Lname, Fname	L, L
9	Lname	L
10	Lnumber, Lname	L, L
11	Lnumber	L
12	Fname	L

Key: Fnumber = Factor Number; Fname = Factor Name; Fvalue = Factor Value; Lnumber = Level Number; Lname = Level Name; R = Right; L = Left; D = Default (Refers to format for Factor specified in Factor Table).

Field size for Fnumber and Lnumber is 3. Field size for Fname, Fvalue, and Lname is defined in Module 20. One space is inserted between fields and at the end of the format when display styles 4 through 12 are used.

When no style is specified, a string style (001) is assumed.

The **lll** parameter sets the length of the field to be displayed. If the display length (lll) is shorter than the specified format style (sss), the length will be ignored and the complete format will be printed. If the display length (lll) is longer than the specified format style (sss), the format will be padded on the right with spaces to the length lll. When the length exceeds the number of characters in a format for styles 2 (Single-Precision) and 3 (Double-Precision) the format will be padded on the left with spaces to the length lll. This feature is useful for aligning columns or for erasing text which is currently on the screen. If length is unspecified, no padding will be done.

The **kkk** format sets the format for display of data in the MS Location. When this parameter is invoked, the format specified will override the default formats of styles 4 through 12. Allowable formats are 001 through 255 as established in Module 20, as well as formats established using the Set Format (Xf) command.

The **fff** parameter sets the foreground color for display of the data. This parameter uses the color value table listed in the Color (C) Command. Color codes for foreground are translated as a MOD 32 function, i.e., color 33 is the equivalent of color 1.

The **bbb** parameter sets the background color for display of data. This parameter also uses the color value table listed in the Color (C) Command. Colors 1 through 8 are available for use in the background. Color codes for background are translated as a MOD 8 function, i.e., color 15 is the equivalent of color 7.

If either the foreground color or background color parameters are not specified, the primary screen colors will be used for display of the data.

Error Conditions

An error message will be generated and table execution will halt if a style is encountered which is invalid for the MS Location being displayed (i.e., if the MS Location being displayed is Double-Precision, the style can not be 001 (String) or 002 (Single-Precision)).

An error message will also be generated and table execution will halt if a style of 004 through 012 is used for a MS Location which has not been associated (XA Command).

An error message will also be generated and table execution will halt if a MS Location is used in one of the parameters which is not of the same type as the MS Location being displayed. For example, if the MS Location being displayed is Double-Precision, any MS Location used in the parameters must be Double-Precision.

An error message will also be generated and table execution will stop if the value in the format parameter is less than one or greater than 255, if there is an error in the format (see Set format command, Xf) or if the format is incompatible with the data type (for example, a format for display of a Text type MS Location can not reference to Level Name).

Examples

f@MMM@rrr@ccc@sss@lll@kkk@fff@bbb
f 010a004a010

Display MS Location 010 beginning at row 004, column 010, using the default style of 001, the number of characters for the data item specified in the Factor Table and the primary screen colors for foreground and background.

f@MMM@rrr@ccc@sss@lll@kkk@fff@bbb
f 504a032a018a002a004a004

Display MS Location 504 beginning at row 008 (32-24), column 18, using a Single-Precision style, a length of four characters, a format of 004 (usually ####) and the primary screen colors for foreground and background.

f@MMM@rrr@ccc@sss@lll@kkk@fff@bbb
fi366k641a012a008 000 000a013a002

(Assume i = 003 and k = 008) Display MS Location 369 (366+003) beginning at a row equal to the value in MS Location 641 plus 8, and at column 12, using a style which will display the Factor Value and Factor Name. Since the style will calculate a length and specify a format, the length (lll) and format (kkk) parameters are set to 000. The primary foreground color is Light Red, 013, and the primary background color is Blue, 002.

f@MMM@rrr@ccc@sss@lll@kkk@fff@bbb
f 940 000 000a013 000a091

Display the contents of MS Location 940 on the printer using format 091 (which had been previously been set using the Set Format, Xf command, and style 013, which allows use of printer control codes in the format.

The row parameter (rrr), column parameter (ccc), and color parameters (fff and bbb) are ignored when a MS Location is being displayed on the printer. The length parameter (lll) is ignored when the format uses control codes.

This example is the same as the one above. A statement has been added after the Get Next command to check the value in the Return Status position of the File Control Block. A value of 9 means that the system has reached the end of the file. The statement is transferring control to a Label END. Without this kind of statement, the table would continue to execute indefinitely, even though all records had been processed.

Assume that you want to retrieve from the database a number of Base Cards with descending Account Numbers. The commands might be as follows:

XXM 710	Make Base Card
s 7142	Set Key Number
s 715130	Set Key Value
GL 710	Get Base Card with value of 130 in Key Number 2.
....	
GP 710	Get the Base Card with the value in Key Number 2 which is next lowest than the value currently in memory.

With the database defined above, the system would first execute a Get on the Base Card with a PPN of 1 and a value in Key Number 2 of 130. The system would then execute a Get on the Base Card with a PPN of 5 and a value in Key Number 2 of 120. By placing the Get Previous command in a loop, you may get some or all of the Base Cards on the file in any key sequence from highest to lowest.

Just as with the ``Next'' parameter described above, you must include a status check to determine when the end of file has been reached.

Literal Display (l)

This command displays a literal value at a specified row and column on the screen.

Format
l@RRR@CCCllffzz...zzzz

@ can be [space] a, i, j, k, l, m, n, or @

Description
Display the literal value zz...zzzz at the row on the screen referenced by MS Location RRR (direct, absolute, indexed or indirect) and at the column referenced by MS Location CCC (direct, absolute, indexed or indirect) for a length of 11 characters using a foreground color specified in ff.

The row reference will be computed as a MOD 24 function, i.e., a row reference of 029 will have the same effect as a row reference of 005. The column reference will be computed as a MOD 80 function, i.e., a column reference of 110 will have the same effect as a column reference of 030.

If the length of zz...zzzz is greater than the value in 11, the number of characters in 11 will be displayed. zz...zzzz will be truncated from the right.

If the length of zz...zzzz is less than the value in 11, zz...zzzz will be displayed in full and spaces will be padded to the right.

The foreground color reference will be computed as a MOD 32 function, i.e., a color reference of 33 will have the same effect as a color reference of 01. If the foreground color is not specified, the system will default to the previous primary foreground color.

This command is used to display screen headings or to ``paint'' the screen with names for data items if you do not choose to use the Factor Names from the Factor Table.

This command is used for screen displays only. It will not execute properly if you have chosen the printer as the set-out device.

Error Conditions
None.

Examples
l@RRR@CCCllffzz...zzzz
1a003a0351105CLT UNIVERS

Display the words ``CLT UNIVERS'' on the screen beginning at row 3 column 35 for a length of 11 positions using a color of red (reference 05). Since the text is the same length as the number of characters specified, no padding or truncation takes place.

l@RRR@CCCllffzz...zzzz
1 120 12120 LAND INFORMATION

Display the words ``LAND INFORMATION'' on the screen beginning at the row with the value in MS Location 120 and at the column with the value in MS Location 121 for a length of 20 characters.

Since no color is specified, the previous primary foreground color will be used.

Since the length in 11 is greater than the length required for the words ``LAND INFORMATION,'' the field will be padded to the right with blank spaces on the screen.

l@RRR@CCCllffzz...zzzz
la006a010

The cursor is positioned at row 6 and column 10. Since no text is specified in zz...zzzz, nothing is displayed. The use of the command allows you to position the cursor in preparation for a solicit.

Set Format (Xf)

This command sets a new format into the format array.

Format
Xf@MMM@FFF

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command moves the string value in MS Location MMM (direct, indexed or indirect) into the format array at the position referenced in MS Location FFF (direct, absolute, indexed or indirect).

The value in MS Location FFF may be any whole number between 1 and 255. The format array is defined in Module 20. Any format placed in the array using the Xf command will supersede formats defined in Module 20 while the Action Table in which it is defined is executing.

The string value to be moved into the format array will have been placed in MS Location MMM using the Set String (Xs) command. There are two kinds of formats which may be placed in the format array using this command. Alpha Formats and Control Code Formats. Alpha Formats can be used with either the screen or the printer as the output device (see XXo Command). Control Code Formats are used only when the printer is the output device. Alpha Formats control the number of characters in a String field to be displayed or printed. These formats can be used to truncate a string. The number of characters in the string to be displayed or printed is equal to the number of spaces in the format plus two.

Assume the string ``CLT UNIVERS"

The Alpha Format _ _ _ _ _ _ _ _ _\ will display or print ``CLT UNIVERS__."

The Alpha Format __\ will display or print ``CLT."

The Alpha Format \\ will display or print ``CL."

The Alpha Format ! will display or print ``C" (one letter).

The Alpha Format & will display or print ``CLT UNIVERS" (the string without padding or truncation).

Control Code Formats are used to control positioning of the print head on the page and length of certain fields. The system supports nine control codes:

>> Output is ``>." This format is used if you wish a field to begin with a greater than symbol.

>ANNN Output ASCII character NNN. This format is used to send control codes to the printers. With most PC compatible printers, these codes can be used to set page lengths, print compression, etc. Consult the User's Manual which came with your printer to determine its use of the various codes.

>d Display/print data in the format MM/DD/YY.

>FNN Output NN characters of the name of the Factor. The format created using this command would be used with a MS Location which has been associated with a Factor Number from the Factor Table.

>H Output the Standard Heading shown below:

UNIVERS(c)DATETIME

The standard heading is followed by a blank line before the next statement is executed.

>LNN Output NN characters of the Level Name. The format created using this command would be used with a MS Location which has been associated with a Factor Number from the Factor Table for a Categorical type data item.

>m Display/print time in the format HH:MM:SS.

>P Output a Page feed or form feed command to the printer. This will cause the printer to go to the top of the next page.

>SNN Output NN line feed commands to the printer. This will cause the paper in the printer to move the number of lines specified.

>TNNN - This format causes the printer to tab to position NNN on a line where it will be ready to execute the next command. Position numbers are counted from left to right.

Most printers are set at 10 positions per inch.

>VNN Output NN characters of the linear value. The format created using this command would be used with a MS Location which has been associated with a Factor Number from the Factor Table for a Categorical Type Data Item.

>zNNN Send control code to the selected printer. Valid codes are as follows:

002 = Set 132 column mode
003 = Set 233 column mode (requires wide carriage printer with wide paper)
004 = Set 80 column mode
005 = Set compressed mode
006 = Set double-wide mode
007 = Set draft mode
009 = Set 6 lines per inch
010 = Set 8 lines per inch
011 = Set near-letter quality mode
013 = Reset the printer
014 = Send form feed
102 = Cancel 132 column mode
103 = Cancel 233 column mode
105 = Cancel compressed mode
106 = Cancel compressed mode
110 = Cancel 8 lines per inch
111 = Cancel near-letter quality mode

Error Conditions

An error message will be generated and table execution will halt if the value in the MS Location FFF is less than one or greater than 255.

Examples

There are three statements required to execute a format. Some examples follow:

Assume that the value in MS Location 575 is Massachusetts.

Xs570_ _\
Xf 570a110
f 575a000a000a013a000a110The word ``Mass'' would be printed.

Xs 570>P>503>T10
Xf 570a111
f 580a000a000a013a000alll

The printer head would move to the top of the next page, move three lines, and move to position ten, where it would await the next command.

Xs570>502 Call us at 276-5261
Xf 570a112
f 575a000a000a013a000a112

The printer head would move two lines and print the message ``Call us at 276-5261.''

Xs 570>P>S03>H>S02>F14>T18>L08>T29>U05
Xf 570a113
f 520a000a000a013a000a113

Assume that MS Location 520 is associated with a Factor Number from the Factor Table for a Categorical data type. The printer head would move to the top of the next page, move three lines, print the standard header, move two lines, print the first fourteen characters of the Factor Name, move to column eighteen, print the first eight characters of Level Name, move to column twenty-nine and print the first characters of the linear value.

Line (XXL)

This command draws a line or a rectangle on the screen at the location specified by the MS Locations used in the command.

Format

XXL@RRR@CCC@LLL@aaa@nnnsffbb

@ can be [space], i, j, k, l, m, n or @

Description

This command draws a line or rectangle on the screen beginning at the row specified in MS Location RRR (direct, absolute, indexed or indirect) and the column specified in MS Location CCC (direct, absolute, indexed or indirect) for the length specified in MS Location LLL (direct, absolute, indexed or indirect).

MS Location aaa (direct, absolute, indexed or indirect) contains the ASCII value of the character to be used in drawing the line or rectangle. If the value in aaa is in the range of 009 to 013, a single line rectangle will be drawn. If the value in aaa is in the range of 028 through 031, a double line rectangle will be drawn. For all other values of aaa, the ASCII character will be used. If aaa is not specified, the value in aaa is assumed to be 032 (spaces). Use of this style when attempting to draw a line will cause a blank screen.

To draw a line without corners, use a value of 196 in aaa.

MS Location nnn (direct, absolute, indexed or indirect) contains the number of rows which the line should occupy on the screen. If nnn is not specified, or if the value in nnn is one, a line (or double line, if specified) will appear on the screen. If nnn is greater than one, a rectangle will be drawn which occupies the number of rows specified in nnn.

The s parameter may be [space], C, B, or F. If s equals [space] or ``C,'' then any area in a rectangle will be cleared. If s equals ``B,'' the area inside the rectangle will be unaffected and a border will be drawn. If s equals ``F,'' the rectangle will be filled with the character specified in aaa.

The ff and bb parameters are for foreground and background colors respectively. Allowable range of values for ff is 01-32. The allowable range of values for bb is 01-16. The ff and bb parameters use the color value table listed in the Color command (C). If ff has a value between 17 and 32, the foreground color will be flashing. If ff and bb are specified, they will apply to this command. The primary screen colors will remain unchanged. If ff and/or bb are not specified, the primary screen colors will be used.

If the sum of the values in rrr and nnn is greater than 24, or if the sum of the values in CCC and LLL is greater than 80, the system will clip the rectangle so that no attempt is made to write outside the area of the screen.

If a line or rectangle in its area row 24, line 80, the screen will scroll one line. All data on the screen will move up one line. This is something you usually want to avoid.

Error Conditions
None.

Examples
XXL@RRR@CCC@LLL@aaa@nnnsffbb
XXLa001a002a077a013a02300205

Draw a rectangle beginning at row 001 (RRR) and column 002 (CCC) with a length of 77 columns (LLL) and a depth of 23 rows (nnn). Use a single line border (aaa=01). Clear the interior area of the rectangle (s=0). Use a foreground color of Blue (ff=02) and a background color of Red (bb=05).

XXL@RRR@CCC@LLL@aaa@nnnsffbb
XXLa001a002a077a030a023C1805

Draw a rectangle beginning at row 001 (RRR) and column 002 (CCC) with a length of 77 columns (LLL) and a depth of 23 rows (nnn). Use a double line border (aaa=030). Clear the interior area of the rectangle (s=C). Use a foreground color of flashing Blue (ff=18) and a background color of Red (bb=05).

XXL@RRR@CCC@LLL@aaa@nnnsffbb
XXL 120 121a030a015a010B

Draw a rectangle beginning at the row with the value in MS Location 120 and at the
column with the value in MS Location 121 with a length of 30 columns (LLL) and a
depth of 10 rows (nnn). Use a * as the border (aaa=015) and leave the area in the
rectangle unaffected (s=B). Use the current primary screen colors.

XXL@RRR@CCC@LLL@aaa@nnnsffbb
XXLa005a001a080a196

Draw a line beginning at row 005 (RRR) and column 001 (CCC) and a length of 80
columns. Use a -- to draw the line (aaa=196). Assume that the number of rows (nnn),
which is not specified, is equal to 001. Since s is not specified, assume that any
characters in row 5 are cleared. Use the current primary screen colors.

Set Out (XXo)

This command selects an output device to be used during table execution.

Format
XXo@MMM

@ can be [space], a, i, j, k, l, m, n or @

Description
The output device code stored at MMM is used to configure the output of the factor
display command. The output codes are 001 for the Screen and 011 for the printer. The
output will continue to go to this device until another XXo command is executed.

The Screen is the default output device. This command does not have to be executed if
all output is to go to the screen.

Error Conditions
An error message will be generated and table execution will halt if the value in MMM is
not equal to 001 or 011.

Examples
XXo@MMM
XXoa011

Send output to the printer.

XXo@MMM
XXo 192

(Assume MS Location 192=1). Send output to the screen.

Sketch Command (XXs)

This functional category addresses one (1) IPTE Command only, the XXS (Sketch) command. This command is used in an Action Table when you wish to be able to enter the vector sketch of a building and calculate the building's area based upon the sketch.

Format
XXs@MMM

where ``@'' could be [space], @, i, j, k, l, m or n.

Description
Areas for the sketch and the sketch itself are generated using the parameters identified in the Sketch Control Block (SCB) at MMM. The SCB consists of ten (10) contiguous MS positions, each of which holds an SCB parameter:

SCB Parameter Requirements		
MS Position	**Parameter**	**Format**
MMM + 0	Vector Information	MMMNN
MMM + 1	Processing Option	N
MMM + 2	Sketch Display Parameter	MMMXXYYxxyy
MMM + 3	Addition Code Input	MMMNNLCA
MMM + 4	Area Computation Table	MMMNNA
MMM + 5	Area Outputs	MMMNN
MMM + 6	Display Offset Parameters	LLLRRRBBBAAA
MMM + 7	Scale Parameter	
MMM + 8	Error Status	
MMM + 9	Status Message	

MMM + 0 Vector Information, Format: MMMNN. Vector information are the strings of vector codes that describe your sketch. The vector strings start in MS position MMM and continue for NN MS positions. Acceptable vector codes for these strings are as follows:

A - followed by a single digit 0 through 9 reflects the ADDITION number. A0 represents the main building/dwelling. Additions must be in increasing order, beginning with 0 and continuing through 9.

C - represents the command, COMMENCE. This command is used to begin drawing the sketch by initializing pen down at origin (0,0).

U - represents the command, UP. Followed by a number, U commands the pen to continue the sketch by moving up for the specified dimension.

R - represents the command, RIGHT. Followed by a number, R commands the pen to continue the sketch by moving right for the specified dimension.

D - represents the command, DOWN. Followed by a number, D commands the pen to continue the sketch by moving down for the specified dimension.

L   -   represents the command, LEFT. Followed by a number, L commands the pen to continue the sketch by moving left for the specified dimension.

  Note: All sketch dimensions are in feet.

X   -   followed by a number will complete the sketch of a rectangle if only the first side is defined. The number following the X command represents the length of the second side. The X command completes the sketch by moving the pen in a clockwise direction until it returns to the origin of the rectangle.

V   -   This command sketches an angle. The V command requires that it be followed immediately with two direction codes (UP or DOWN, and RIGHT or LEFT) and the dimension of those codes. The point that will be plotted after these two are entered will be the point in your sketch where you continue from. Your area will be computed by traveling the hypotenuse of this triangle.

F   -   The F command is similar to the X command in that it completes an addition traveling in a clockwise fashion. Unlike the X command, the F command requires no dimension. It merely completes the sketch by finishing either the last two sides or one side of the shape. When using the F command, the preceding side of the sketch must be in a perpendicular or horizontal direction.

N   -   This command is used to indicate NO VECTOR. When the N command is used, you must manually furnish the addition area with the codes (A) for the N vectored addition.

H   -   represents the HALT command. This command is used only after you have vectored the last addition in your sketch. The H command is used to terminate vector information.

MMM + 1 Processing Option, Format: N. The processing option holds a single string value, 1 through 4. You must set select a processing option 1, 2, 3 or 4 and set MS position MMM+1 of your SCB equal to this option number. Each of the four options is described below.

1   -   Edit and Calculate Areas Only. Option 1 calculates area only; sketch vectors are not generated with this option.

2   -   Generate Using Previous Offset. Option 2 calculates the area of your sketch, and generates the sketch itself, using either a previously set offset or an offset you've defined in MS position MMM+6 of the SCB (which follows).

3   -   Generate Using Standard Offset. Option 3 calculates the area of you sketch, and generates the sketch itself, using a standard offset. This standard offset is: 30 left of origin, 70 right of origin, 30 below origin, and 70 above origin.

4   -   Generate Using Calculated Offsets. Option 4 calculates the area of your sketch, and generates the sketch itself, by using an offset which UNIVERS calculates.

MMM + 2 Sketch Display Parameter, Format: MMMXXYYxxyy. This SCB parameter controls the output appearance of your sketch. The format of this parameter is explained as follows:

MMM is the starting MS position for your display strings.

yy is a number greater than 4 but less than 25 ($4 < yy < 25$). This component of the format indicates the number of print lines, the consecutive number of MS positions for your display strings (which begin in MMM).

xx is a number greater than 9 but less than 80 ($9 < xx < 80$). This format component indicates the length (or character positions) in each of the display lines. All display lines must be the same length.

XX represents the horizontal dimension of your display window, in tenths of an inch. The range for this format component is: $2 <= XX < 10$.

YY represents the vertical dimension of your display window, in tenths of an inch. The range for YY is: $2 <= YY <= 8$.

After you have defined the number of print lines (yy) and the length of each print line (xx), you can measure the length and width of the ``window'' they create and appropriately determine components XX and YY. This will put your scale very close to correct. If your sketch appears out of scale (i.e., one side longer than the other), the XX and YY components of this SCB parameter are incorrect.

MMM + 3 Addition Code Inputs, Format: MMMNNLCA.

MMM = starting MS position for additions
NN = number of addition entries
L = number of levels (e.g., first, second or third story, basement)
C = number of characters in addition code
A = number of positions in addition area field

Sample Layout: NN = 3, L = 3, C = 2, A = 4

	1 Code	2 Code	3 Code	Addition Area
Level				
Entry #1	[][]	[][]	[][]	[][][][]
Entry #2	[][]	[][]	[][]	[][][][]
Entry #3	[][]	[][]	[][]	[][][][]

The addition code input defines the addition code input area by MS position number. MS position MMM is the first position where you have input your addition code information. NN is the total number of additions you may work with and should therefore be consecutive MS positions. L is the number of levels for additions that you have defined. L may be a value from 1 through 9. C is the number of characters in your addition code; this may be a number from 1 to 9. A is the number of positions in your area field. In most cases, four positions will be sufficient to record the area of each addition; however, UNIVERS permits a value of 1 to 7.

MMM + 4 Area Computation Table, Format: MMMNNA.
This SCB parameter defines the layout of your Area Computation Table. Specifically, it identifies the storage buckets (see MMM+5, which follows) where area values are to be directed and aggregated for each addition code and level in the sketch. Briefly, the functions of each component in the format MMMNNA are as follows:

MMM = Label of your computation table
NN = Number of lines in the table
A = Number of bucket pointers

MMM is the Label assigned to the area computation table in your Action Table. The actual computation table must be set up using the Table Definition command, (.

NN is the number of contiguous Action Table lines that comprise the area computation table referenced by MMM.

A is the number of pointers to area output buckets (see MMM+5), where the calculated area of each addition code and level are stored and aggregated for the sketch. You may identify from 1 to 9 pointers. Basically, you will need to define a pointer for each type of area total you desire. For each addition code and level, the calculated area is directed by the pointers to the output buckets identified in the table.

A sample table layout is shown below.

Area Computation Table Layout

```
[][]          [][]     []      [][]      [][]     [][] []       [][]      [][] [][]
# Entries #      level    code     ptr        ptr  level    code     ptr  ptr
in this          Chars/            First    Entry                Second   Entry
Table Line     Entry
```

N = 1, A = 3, C = 2
Level is always 1 character (1-9, see MMM+3 above).
Pointer is always 2 characters (00-99).

Information on the byte length of each line in your area computation table should be noted here. Each entry to your table will consist of:

a. Level, one (1) byte in length;

b. Addition Code, with byte length equal to the length defined for this component as ``C'' in MMM+3; and,

c. Pointer, two (2) bytes for each pointer defined as ``A'' in MMM+4.

As an example, if you have defined your addition code (C) as two bytes in MMM+3, and you have elected 3 pointers in ``A'' of MMM+4, your total entry length in bytes is nine (9) bytes [i.e., (Level=1) + (Addition Code=2) + 3(Pointer=2) = 9].

MMM + 5 Area Outputs, Format = MMMNN. This defines the range of MS positions that you will assign in your Action Table to the area storage buckets. As area is calculated for each level and addition code of your sketch, UNIVERS must direct the results to specific buckets where the area can be stored and aggregated for a total area. The pointers of your Area Computation Table direct the area results to these buckets (see MMM+4, above).

MMM defines the starting MS position for your range of area storage buckets in your Action Table.

NN defines the number of contiguous MS positions in the range of area storage buckets. Together with MMM, NN defines the range of MS positions by number for your area buckets. NN may be any number from 1 to 99, but must not be less than the number of pointers identified as ``A'' in MMM+4.

MMM + 6 Display Offset Parameter, Format: LLLRRRBBBAAA. This SCB parameter must only be defined if you have selected option 2 as your processing option in MMM+1. (However, see the NOTE below for Option 3).

Since option 2 relies on offset parameters which you supply in order to display the generated sketch, parameter MMM+6 allows you to define these display offset parameters. You will do this by entering the offset according to the format, LLLRRRBBBAAA, where:

LLL is the distance in feet left of the origin;
RRR is the distance in feet right of the origin;
BBB is the distance in feet below the origin;
AAA is the distance in feet above the origin.

When selecting your display offset dimensions, you should choose dimensions which lie outside of your building. If you choose dimensions which lie inside the building itself, you may find that your sketch will not appear within your display window. If you choose parameters which are larger than the building itself, you may find that your building when sketched is extremely small in relation to your window.

Note: If you have selected Option 3 as your processing option in MMM+1, UNIVERS will use the MS position referred to as MMM+6. Therefore, make sure you enter parameter value for MMM+6 only when Option 2 is in use.

MMM + 7 Scale Parameter. This parameter is returned to you by UNIVERS. It identifies the scale of your sketch in feet per inch. Return of this parameter assumes that you have established the display parameters (MMM+2) correctly.

MMM + 8 Error Status. This is an error status code number returned by UNIVERS when an error has been encountered while processing a sketch. If a sketch is processed successfully with no errors encountered, UNIVERS will return a '0' in this MS position.

MMM + 9 Error Message. An error message, in conjunction with the error status code number in MMM+8, is returned by UNIVERS to this MS position.

Error Conditions
If an error condition is encountered within sketches, MMM+8 will be loaded with the status number and MMM+9 will be loaded with the status message. Action Table execution continues with the next IPTE Command.

Example
XXs@BBB@ZZZ
XXs 750

Assume that the SCB for this example contains the following parameters:

- MS position 750 contains the string, 70108.
- MS position 751 contains the string, 4.
- MS position 752 contains the string, 77035253510.
- MS position 753 contains the string, 60110424.
- MS position 754 contains the string, TAB112.
- MS position 755 contains the string, 95117.

Presuming that these MS positions have been properly set up and that the area computation table has also been properly developed and entered, this sketch vector will:

(1) Generate a sketch using vector information which starts in MS position 701 and continues through MS 708 (see MS 750, above).

(2) Calculate the sketch area and generate the sketch by calculating the offsets (see MS 751, above).

(3) The sketch will be moved into MS positions 770 through 779 (see MS 752, above).

(4) Addition code input will occur in MS positions 601 through 610. Each addition code will allow up to four levels, with two characters used to express each code. The area code will consist of 4 positions, but must be filled in only if a an addition is a NO VECTOR addition (see MS 753, above).

(5) The area computation table is found at the Label, TAB. It consists of eleven (11) table lines, with each entry having two pointers to an area bucket (see MS 754, above). Area buckets begin with MS position 951 and occupy 17 consecutive MS positions (see MS 755, above).

Video Disc Command (XXV) ⸸

This functional category addresses one (1) IPTE Command only, the XXV (Video Disc) command. This command is incorporated into an Action Table when you wish to use UNIVERS' capabilities in conjunction with a laser video disc, for visual property display.

UNIVERS software is compatible with the following brands and models of video disc hardware:

(1) Sony LDP 1000
(2) Sony LDP 1200
(3) Panasonic TQ-2026F/TQ-2027F

Switches for your video disc player should be set as follows:

Baud Rate = 1200
Parity = None
Word Length = 8
Stop Bits = 1

If you need further information about video disc hardware, and/or its interface and compatibility with UNIVERS, contact the CLT Implementation Manager of Microcomputer Systems.

The Video Disc command (XXV) operates the video disc using the parameters from the Video Control Block (VCB).

Format
XXV@MMM

where ``@'' could be [space], @, i, j, k, l, m or n.

Description
The video disc is operated using the parameters from the VCB, found at MS position MMM. The VCB consists of five (5) MS positions, each holding a separate parameter:

VCB Parameter Requirements		
MS Position	**Parameter**	**Required/Optional**
MMM + 0	Command F, Q, I	Required
MMM + 1	Subject Frame Number	Required
MMM + 2	Retries	Required
MMM + 3	Secondary Frame Number	Optional
MMM + 4	Video Disc Player Type	Optional

MMM + 0 Set this position to F, Q or I. Each option is explained below.

F - Command F allows you to randomly access any frame specified and then continues Action Table execution.

Q - Command Q allows random access of any frame specified, but stays ``local'' to the PC cursor control keys. Under the Q command the following functions are active:

UP ARROW Key, or ``8,'' regresses the frame number.

DOWN ARROW Key, or 2, advances the frame number.

HOME Key, or 7, returns immediately to the subject frame (see VCB parameter MMM + 1).

LEFT ARROW, or 4, retrieves the secondary frame. The other keys remain active. For example, if you have loaded the secondary position with the frame number of a house across the street, then pressing the LEFT ARROW key would let you ``look'' across the street. You could then look up and down the houses on the other side of the street and return instantly to the subject property using the HOME key.

ENTER, or CR, continues Action Table execution.

I - Command I initializes the video disc. The initialize function is automatic. However, using the I command, it's possible to retrieve more status data than is returned by an abnormal return.

MMM + 1 The subject frame is the frame which will be initially displayed. Set this parameter to a Single-Precision number from 1 to 54000.

MMM + 2 Number of retries is the number of attempts the system will make when attempting to establish communications with the video disc player. Set this parameter to a Single-Precision number.

MMM + 3 Secondary frame number is the frame that will be displayed if the Q command is specified in MMM+0 and the LEFT ARROW key is pressed. If the secondary frame is not entered for this parameter, UNIVERS defaults to Frame 1.

MMM + 4 This refers to the brand and model of the video disc player you are utilizing. For this parameter, enter:

10 for a Sony LDP 1000
11 for a Sony LDP 1200
20 for a Panasonic TQ-2026F/TQ-2027F

Default for this optional parameter is 10, Sony LDP 1000.

The contents of the VCB upon exiting the video disc function will look as follows:

VCB Upon Exit	
MS Position	**Contents**
MMM + 0	Original Command (F, Q, I)
MMM + 1	Frame Number displayed or attempted
MMM + 2	Remaining retries
MMM + 3	Secondary Frame Number
MMM + 4	Type of Video Disc Player in use
MMM + 5	Error Status 0 = Successful, -1 = Error
MMM + 6	Error Message

Note: Switches on your video disc player should be set to the following, for proper functioning:

Baud Rate = 1200
Parity = None
Word Length = 8
Stop Bits = 1

Error Conditions

If a communication link is unable to be established, then the return status and an error message will be set into MS positions MMM+5 and MMM+6, respectively, of the VCB. Table execution will continue with the next IPTE Command.

Example

XXV@MMM
XXV 500

Assume MS position 500 is set to ``F,'' MS 501 contains the number 10000, and MS 502 contains the number 5. Five (5) tries will be made to establish video disc communication, as VCB parameter 502 dictates. If a link is established, Frame 10000 will be displayed and Action Table execution will continue. If a link is not established, the return status and error message will be set in MS positions 505 and 506, and Action Table execution will resume.

Memory Manipulation Commands

The commands organized into this section are those which perform manipulation of Memory Storage (MS) Locations within your table. A total of 20 commands are organized into this functional category. They include two specific groups of commands:

• Those that take data from one MS position and place it into another position in a different form. These are referred to as MS Conversion commands, and include the following: XJ, XS, XV, XXC, XXc, XXP, XXp,

• Those used to initialize an MS position or manipulate the position in some way. These are referred to as MS Manipulation commands, and include the following: B, s, v, Xc, XI, Xi, XL, XM, Xs, XXN, XXO, XXS, XXz,

Beep (B)

This command makes a beep or plays a tune.

Format
(B@mmm

@ can be [space], i, j, k, l, m, n, or @

Description
This command plays a string which is loaded in MS Location mmm or, if mmm is not specified, emits a single beep. The string would be loaded using the Set String (Xs) command. The string, if supplied, can consist of the following characters ONLY:

A through G   With optional + (sharp) or - flat. Only legal notes should be used. (For example, there is no B+.)

On   Octave where n can be a number for 0 to 6. Octave 3 starts with middle c.

>   Go up an octave.

<   Go down an octave.

Nn   Plays a note by a number n where n can range from 0 (rest) through 84.

Lnn   Length of notes to follow. L1 = whole note, L2 = half note, L64 = sixty-fourth note.

Pnn   Length of pause. P1 = whole note, P2 = half note, P64 = sixty-fourth note.

.   When placed after a note, a period increases the length of the preceding note by 1/2.

MN   Music normal; plays each note for 7/8th of the time specified by Lnn.

ML   Music legato; plays each note the full period of Lnn.

MS   Music staccato; plays each note 3/4 of the time specified by Lnn.

Error Conditions
If an invalid character is found in the play string, an error message will be displayed and table execution will halt.

Examples
B@mmm
B

Emits a beep.

B@mmm
B 190

Assume that MS Location 190 contains the following string:
``L604CCGGAAPGFFEEDDC.''  The command will play ``Twinkle Twinkle Little Star, How I Wonder What You Are.''

B@mmm
B 190

Assume that MS Location 190 contains the following string:
``LGN49n49N56n56N58N58N56P6n54n53n53N51N51N49.''

The command will play ``Twinkle Twinkle Little Star, How I Wonder What You Are.'' Note that the command supports either upper or lower case letters.

Set Value (s)

This command places the value supplied in the MS Location specified.

Format
s@MMMvvv...vvv

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command places the numeric value in vvv...vvv in MS Location MMM. If vvv...vvv is not supplied, place a zero in MS Location MMM.

If there is a non-numeric character in vvv...vvv, only numbers to the left of the non-numeric character are placed in MS Location MMM.

The value placed in MS Location MMM is a Single-Precision number. Use of the set command will change the data type of a MS Location to Single-Precision, even if it is some other type in the Factor Table.

Error Conditions
None.

Examples
s@MMMvvv...vvv
s 7701.5

Set the value of MS Location 770 to 1.5.

s@MMMvvv...vvv
s 770

Set the value of MS Location 770 to zero.

s@MMMvvv...vvv
si770100

(Assume i = 003) Set the value of MS Location 773 (770+003) to 100.

s@MMMvvv...vvv
s 770230 E. 30TH STREET

The value in MS Location 770 is set to 230. The space and the E are non-numeric characters. Only numeric characters to the left of the non-numeric characters are set into the MS Location specified.

s@MMMvvv...vvv
s@770100

Set the value of the MS Location referenced by MS Location 770 to 100.

Look up Linear Value (v)

This command looks up the linearized value of a specified MS Location in the Factor Table and store it in a specified MS Location.

Format
v@DDD@sss

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command places the linearized value for MS Location sss (direct, indexed or indirect) in Single-Precision MS Location DDD (direct, indexed or indirect). If MS Location sss is not specified, the value in MS Location DDD is replaced by its linearized value.

This command refers back to the Factor Table to find the linearized value. Consequently, the source MS Location must have been associated with the Factor Table using the Associate (XA) command.

Error Conditions
An error message will be generated and table execution will halt if the source MS Location (sss if it is specified, DDD if it is not) is not Single-Precision.

An error message will be generated and table execution will halt if the source MS Location (sss if it is specified, DDD if it is not) has not been associated with the Factor Table (see XA command) or has been associated and is not a Categorical type data item.

An error message will be generated and table execution will halt if the level in the source MS Location (sss if it is specified, DDD if it is not) is outside the allowable range for the Categorical data item.

Examples
The following examples assume the Categorical Data Item described below:

Categorical

Factor Number	Factor Name	Level Number	Level Name	Linear Value
538	Grade	1	A	155
		2	B	126
		3	C	100
		4	D	78
		5	E	55

v@DDD@sss
v 120 538

Store the linearized value of the Level Number found in MS Location 538 in MS Location 120. Assume the Level Number or value in MS Location 538 is 3. The value stored in MS Location 120 is 100.

v@DDD@sss
v 120i535

(Assume i = 3) Store the linearized value of the Level Number found in MS Location 538 (535+003) in MS Location 120. Assume the Level Number or value in MS Location 538 is 4. The value stored in MS Location 120 is 78.

v@DDD@sss
v@120 538

Store the linearized value of the Level Number found in MS Location 538 in the MS Location referenced by MS Location 120. Assume the Level Number or value in MS Location 538 is 2. The value stored in the MS Location referenced by MS Location 120 is 126.

v@DDD@sss
v 538

Store the linearized value of the Level Number found in MS Location 538 in MS Location 538. Assume the Level Number or value in MS Location 538 is 5. The value stored in MS Location 538 is 55.

Caution should be exercised in using this form of the command. If this data item is later written to the fixed disk using the Save (S) and Put (P or p) commands, the Level Number of the data item will be overwritten with the linear value.

Concatenate (XC)

This command concatenates two strings.

Format
XC@SSS@AAA@ddd

@ can be [space], a, i, j, k, l, m, n, or @

Description
The string value in MS Location AAA is added to the end of the string value in MS Location SSS and the resulting string is placed in MS Location ddd.

If MS Location ddd is not specified, the string value in MS Location AAA is added to the end of the string value in MS Location SSS and the resulting string is placed in MS Location SSS.

Error Conditions
None. However, you should make sure that all MS Locations referenced in this command are a String data type.

Examples
XC@SSS@AAA@ddd
XC 110 120 130

Assume that MS Location 110 contains the string ``CLT UNIVERS'' and that MS Location 120 contains the string ``SYSTEM.'' The string ``CLT UNIVERS SYSTEM'' will be placed in MS Location 130.

XC@SSS@AAA@ddd
XC 110 120

Assume that MS Location 110 contains the string ``CLT'' and that MS Location 120 contains the string ``UNIVERS.'' The string ``CLT UNIVERS'' will be placed in MS Location 110.

In String (XI)

This command searches for a string value within a string and return the starting position of the string value.

Format
XI@SSS@AAA@RRR@ppp

@ can be [space], a, i, j, k, l, m, n, or @

Description
This command will search the String type MS Location SSS (direct, indexed or indirect), starting at MS Location ppp (direct, absolute, indexed or indirect) for a string value equal to the value in MS Location AAA (direct, indexed or indirect). If the value in AAA is found within SSS, the position at which the value begins will be stored in MS Location RRR (direct, indexed or indirect). If the value in AAA is not found within SSS, a 0 will be stored in RRR. MS Location RRR will be Single-Precision type following execution of this command. If no position is specified in ppp, a starting position of 1 is assumed.

Error Conditions
An error message will be generated and table execution will stop if the value in MS Location ppp is less than one.

Examples
Assume that the value in MS Location 520 is ``Cole Layer Trumble'' and that the value in MS Location 521 is ``Trumble.''

XI@SSS@AAA@RRR@ppp
XI 520 521 522a005

The search for the string value ``Trumble'' will begin in position 5. A Single-Precision value of 12 will be placed in MS Location 522.

Assume that the value in MS Location is ``Cole Layer Trumble'' and that the value in MS Location 521 is ``Dog.''

Set Index (Xi)

This command sets indices i, j, k, l, m, and n.

Format
Xi@MMM

@ can be [space] or a

Description
This command sets the MS Location for index i to MS Location MMM (direct, or indirect). The indices j, k, l, m, and n are assigned to the five succeeding MS Locations.

The Set command (s) can be used to assign a value to an index.

These MS Locations will remain as the index positions until another Set Index command is executed.

Error Conditions
An error message is generated and table execution stops if the MS Location for index i has not been defined by a previous statement in the table. A Set command (S) is one good way to define a MS Location. When using an index, an error message is generated and table execution stops if an index is used and a value has not been placed in the corresponding MS Location.

Examples
Xi@MMM

Xi 660The command assigns MS Location 660 as the MS Location for index i. The other indices will be in other MS Locations as follows:

MS Location	Index
661	j
662	k
663	l
664	m
665	n

Xi@MMM

Xi@475

This command assigns index i to the MS Location referenced by MS Location 475. Assume that the value in MS Location 475 is 190. The indices will be set in MS Locations as follows:

MS Location	Index
190	i
191	j
192	k
193	l
194	m
195	n

Justify Number (XJ)

This command justifies a number into a String field with a specified number of decimal places.

Format
XJ@MMM@SSS@ddd

where ``@'' could be [space], @, i, j, k, l, m, n or possibly a.

Description
This IPTE Command takes the single or Double-Precision number stored in MS position SSS and converts it to a string which contains the number of decimal places specified in ddd. The resulting string is placed in MS position MMM. If ddd is omitted, a whole number with no decimal places is assumed. MMM must be associated.

This command must be used if you plan to make a single or Double-Precision field a key field. In this case, you create the key field as a String type and use the XJ command to correctly place all numbers within this string.

Error Conditions
If MMM is not associated; if MMM is not a String type field; and/or if SSS is not a single or Double-Precision type field, then an appropriate error message is issued and table execution terminates.

Examples
XJ@MMM@SSS@ddd
XJ 110 111a002

Assume that MS position 110 is associated in the Action Table and is a String type field with length equal to 8. Assume also that MS position 111 contains the Single-Precision number, 72.453. The resulting string, ``72.45'' is place in MS position 110.  Notice that this command truncates an overflow on both the right and left sides.  If MS position 111 contained the Single-Precision number, 123456, then the resulting string placed in MS position 110 would have been ``23456.00.'' This example would result in a soft error message.

String Length (XL)

This command gets length of string.

Format
XL@SSS@lll

@ can be [space] i, j, k, l, m, n, or a

Description
Store in MS Location lll (direct, indexed or indirect) the length of the string in MS Location SSS (direct, indexed or indirect). If lll is not specified, the length of SSS will be placed in SSS.

Error Conditions
None. However, you should make sure that the MS Location SSS is a String data type.

Examples
XL@SSS@lll
XL 010 907

Assume that MS Location 010 contains the string ``00001_0001_00001.0000.'' The Single-Precision value placed in MS Location 907 is 21.

XL@SSS@lll
XL 013 907

Assume that MS Location 013 contains the string ``_ _ _13045.'' The Single-Precision value placed in MS Location 907 is 8. When a MS Location is associated with a Factor Number of a String type data item, the length of the string will be the length set in the Factor Table.

When the key value in the File Control Block is a String data type, the length of the string will be the length set in the Factor Table.

When a String data item is entered through the keyboard (See F command) or created in a MS Location which is not associated with a Factor Number, the length will be the number of characters in the string.

XL@SSS@lll
XL 040

Assume that MS Location 040 contains the string value ``Cole Layer Trumble.'' The Single-Precision value 18 will be placed in MS Location 040. Care should be taken in using this form of the command with MS Locations associated with Factor Numbers, as it may result in overwriting of data if a Put Command (P, p) is later executed.

Midstring (XM)

This command takes a portion of a string and places it in the same or another MS Location.

Format
XM@SSS@PPP@lll@ddd

@ can be [space] i, j, k, l, m, n, or a

Description
This command takes a substring with a length equal to the value in MS Location lll (direct, absolute, indexed or indirect) from the String type data item in MS Location SSS (direct, indexed or indirect) starting at a position equal to the value in MS Location PPP (direct, indexed or indirect) and places it in MS Location ddd (direct, indexed or indirect).

If MS Location lll is not specified, the command will take a substring beginning at the value in PPP and continuing through the end of SSS.

If MS Location ddd is not specified, the substring will be placed in SSS.

Error Conditions
An error condition will be generated and table execution will stop if the value in MS Location PPP is less than 1.

An error condition will be generated and table execution will stop if the value in MS Location lll is zero.

You should make sure that MS Location SSS is a String data type.

Examples
XM@SSS@PPP@lll@ddd
XM 900a006a005 901

The midstring ``Layer'' will be placed in MS Location 901.

XM@SSS@PPP@lll@ddd
XM 900a006 000 901

Since no length is specified, the string ``Layer _ Trumble'' will be placed in MS Location 901.

XM@SSS@PPP@lll@ddd
XM 900a012

Since no length is specified, the string ``Trumble'' will be placed in MS Location 900. Care should be taken in using this form of the command with MS Locations associated with Factor Numbers, as it may result in overwriting of data if a Put Command (P, p) is later executed.

String of Number (XS)

This command stores the string equivalent of a MS Location in the specified MS Location.

Format
XS@RRR@nnn

@ can be [space] i, j, k, l, m, n, or a

Description
This command converts the Single-Precision value in MS Location nnn (direct, indexed or indirect) to a String value and places it in MS Location RRR (direct, indexed or indirect).

If nnn is not specified, RRR will serve as both the source and destination MS Location.

Error Conditions
An error message is generated and table execution will halt if the source MS Location is not a Single-Precision type data item.

Examples
XS@RRR@nnn
XS 900 901

Assume that MS Location 901 contains the Single-Precision value 65545. The string value ``_65545'' will be placed in MS Location 900. The space is left to identify positive and negative values. If the value was negative, ``-'' would be entered in the position of the space.

XS@RRR
XS 900

Assume that MS Location 900 contains the Single-Precision value 65545. MS Location 900 will be converted to String type and the string value ``_65545'' will be placed in it. Care should be taken in using this form of the command with MS Locations associated with Factor Numbers, as it may result in overwriting of data if a Put Command (P, p) is later executed.

XS@RRR@nnn
XS 900a901

Assume that the MS Location referenced by MS Location 901 contains the Single-Precision value 65545. The string value ``_65545'' will be placed in MS Location 900.

Set String (Xs)

This command sets a string value in the specified MS Location.

Format
Xs@MMMlll...lll

@ can be [space] i, j, k, l, m, n, or a

Description
Place the string value ``lll...lll'' in MS Location MMM (direct, indexed or indirect). If necessary, convert MS Location MMM to a String type data item.

Error Conditions
None.

Examples
Xs@MMMlll...lll
Xs 905 CLT UNIVERS

If necessary, convert MS Location 905 to a String type and place the value ``CLT UNIVERS'' in it.

Xs@MMM@lll...lll
Xs 905

If necessary, convert MS Location 905 to a String type with a value of Null.

Xs@MMM@lll...lll
Xsn905 ANYTOWN, USA

(Assume n = 004) If necessary, convert MS Location 909 (905 + 004) to a String type and place the value ``ANYTOWN, USA'' in it.

Xs@MMMlll...lll
Xs@905 ANYTOWN, USA

If necessary, convert the MS Location referenced by MS Location 905 to a String type and place the value ``ANYTOWN, USA'' in it.

Value of String (XV)

This command places the numeric value of a string in a specified MS Location.

Format
XV@DDD@sss

@ can be [space], i, j, k, l, m, n or @

Description
Convert the String value in MS Location sss (direct, indexed or indirect) to Single-Precision value and place it in MS Location DDD (direct, indexed or indirect). If sss is not supplied, DDD serves as both the source and destination.

Conversion of the string stops at the first non-numeric character. For purposes of this command, minus sign and one decimal point are considered numeric characters.

Error Conditions
An error message will be generated and table execution will stop if the source MS Location has a Null value.

Examples
XV@DDD@sss
XV 130 131

Assume that MS Location 131 contains the String value ``150.'' The Single-Precision value 150 would be placed in MS Location 130.

XV@DDD@sss
XV 130

Assume that MS Location 130 contains the String value ``-15.5.'' The Single-Precision value -15.5 would be placed in MS Location 130.

XV@DDD@sss
XV 130 131

Assume that MS Location 131 contains the string ``100 Tompkins Street.'' The Single-Precision value 100 would be placed in MS Location 130.

Double Single (XXC)

This command converts the Single-Precision value in a specified MS Location to a Double-Precision value and places it in a specified MS Location.

Format
XXC@DDD@aaa

@ can be [space], a, i, j, k, l, m, n or @

Description
This command converts the Single-Precision number in MS Location aaa (absolute, direct, indexed or indirect) to a Double-Precision number and places the value in MS Location DDD (direct, indexed or indirect). If aaa is not supplied, DDD is used as both the source and destination MS Location.

No accuracy is gained in this transformation. It is used to allow arithmetic calculations with other Double-Precision MS Locations (See commands X+, X-, X*, X/) because arithmetic calculations including Single-Precision and Double-Precision MS Locations are not supported.

Error Conditions
An error message is generated and table execution stops if the source MS Location (aaa or DDD if aaa is not supported) is not Single-Precision.

Examples
XXC@DDD@aaa
XXC 960 402

Convert the Single-Precision number in MS Location 402 to Double-Precision format and place it in MS Location 402. Care should be taken in using the command in this way with a MS Location which has been associated (See XA command) with a Factor Number from the Factor Table. Corruption of data can result from an attempt to do a Save (S) and Put (P, p) of a Double-Precision MS Location into a Factor defined as Single-Precision in the Factor Table.

XXC@DDD@aaa
XXC 960n402

(Assume n=003) Convert the Single-Precision number in MS Location 405 (402 & 003) to Double-Precision format and place it in MS Location 960.

XXC@DDD@aaa
XXC 940@370

Convert the Single-Precision number in the MS Location referenced by MS Location 370 to Double-Precision format and place it in MS Location 960.

Single Double (XXc)

This command converts the single Double-Precision value in a specified MS Location to a Single-Precision value and places it in a specified MS Location.

Format
XXc@SSS@aaa
@ can be [space], i, j, k, l, m, n or @

Description
The command converts the Double-Precision number in MS Location aaa (direct, indexed or indirect) to a Single-Precision number and places the value in MS Location SSS (direct, indexed or indirect). If aaa is not supplied, SSS is used as both the source and destination MS Location.

Significant digits beyond six positions are lost in this transformation. If the source MS Location contains more than six significant digits, you may wish to consider use of the Double Single command (XXC).

This command allows arithmetic calculations with other Single-Precision MS Locations (See commands +, -, *, /, XX+) because arithmetic calculations involving Single-Precision and Double-Precision MS Locations are not supported.

Error Conditions
An error message is generated and table execution stops if the source MS Location (aaa or SSS if aaa is not supplied) is not Double-Precision.

Examples
XXc@SSS@aaa
XXc 402 960

Convert the Double-Precision number in MS Location 960 to Single-Precision format and place it in MS Location 402.

XXc@SSS@aaa
XXcn402 960

(Assume n=003) Convert the Double-Precision number in MS Location 960 to Single-Precision format and place it in MS Location 405 (402 & 003).

XVc@SSS@aaa
XXc@370 960

Convert the Double-Precision number in MS Location 960 to Single-Precision format and place it in the MS Location referenced by MS Location 370.

Random Number (XXN)

This command places a Random Number in the range specified in the MS Location specified.

Format
XXN@MMMLLLLLLHHHHHH

@ can be [space], i, j, k, l, m, n or @

Description
This command generates a Single-Precision random number in the range of low value LLLLLL and high value HHHHHH and places it in MS Location MMM (direct, indexed or indirect). If LLLLLL is greater than HHHHHH, a value of zero will be placed in MMM.

This command is useful to place values in MS Locations for testing of Action Tables. To obtain a negative number, multiply the random number (* command) by -1. To obtain a number with decimals, divide the random number (/ command) by 10, 100, 1000, etc.

Error Conditions
No system errors are generated. However, as indicated, a value of zero is placed in MMM if the value in LLLLLL is greater than the value in HHHHHH.

An error message will be generated and table execution will stop if the value in NNN is greater than 992. Use of a value higher than 992 would result in a status text in a MS Location higher than 999.

Examples
XXN@NNNLLLLLLHHHHHH
XXN 650001000005000

Generate a random number between 1000 and 5000 and place it in MS Location 650.

XXN@NNNLLLLLLHHHHHH
XXNm650000001999999

(Assume m=005) Generate a random number between 1 and 999999 and place it in MS Location 655 (650 + 005).

XXN@NNNLLLLLLHHHHHH
XXN@650111111666666

Generate a random number between 111111 and 666666 and place it in the MS Location referenced by MS Location 650.

Copy (XXO)

This command copies one or more MS Location(s) to (an)other position(s).

Format
XXO@DDD@SSSnn

@ can be [space], i, j, k, l, m, n or @

Description
This command copies the values in nn MS Locations beginning at MS Location SSS (direct, indexed or indirect) to MS Locations beginning at DDD (direct, indexed or indirect). If nn is not specified, it is assumed to be 01. In this case, the contents of SSS will be copied into DDD.

The MS Locations beginning at DDD will be set to the type of the MS Locations in SSS.

The contents of the MS Locations beginning at SSS are not affected unless MS Location DDD is within the MS Location beginning at SSS.

Error Conditions
An error message is generated and table execution will halt if the sum of nn and the MS Location referenced by DDD or the sum of nn and the MS Location referenced by SSS is greater than 999.

Examples
XXO@DDD@SSSnn
XXO 961 960

Copy the contents of MS Location 960 into MS Location 961.

XXO@DDD@SSSnn
XXO 180 17010

Copy the contents of MS Locations 170 through 179 (10 MS Locations) into MS Locations 180 through 189 respectively. If nn has been greater than 10, some or all of the MS Locations from 180 through 189 would have been used as both a source and destination.

XXO@DDD@SSSnn
XXOn180 17010

(Assume n=005) Copy the contents of MS Locations 170 through 179 (10 MS Locations) into MS Locations 185 (185 + 005) through 194 respectively.

XXO@DDD@SSSnn
XXO@180 17010

Copy the contents of MS Locations 170 through 179 (10 MS Locations) into the MS Location referenced by MS Location 180 and the nine succeeding MS Locations.

Double to PPN (XXP)

This command converts a MS Location from Double-Precision format into permanent parcel number format.

Format
XXP@BBB@ddd

@ can be [space], i, j, k, l, m, n or @

Description
Convert MS Location ddd (direct, indexed or indirect) which contains a Double-Precision whole number to a three position packed String which is the file image of the PPN and stores it in MS Location BBB (direct, indexed or indirect).

If ddd is not supplied, then BBB is converted from Double-Precision to PPN format.

This command is the inverse of command XXp (PPN to Double).

If you set MS Location BBB to the second position of the file control block and executes a Get Base command using Key Number 1, the system will return a folder with a Permanent Number equal to the number stored in Double-Precision format in ddd.

Error Conditions
An error message is generated and table execution will halt if MS Location ddd (or BBB if ddd is not supplied) is not an eight byte Double-Precision number.

Examples
XXP@BBB@ddd
XXP 711 015

Convert the Double-Precision whole number in MS Location 015 to a packed three position String and store the result in MS Location 711.

XXP@BBB@ddd
XXP 711

Convert the Double-Precision whole number in MS Location 711 to a packed three position String.

XXP@BBB@ddd
XXP 711@015

Convert the Double-Precision whole number in the MS Location referenced by MS Location 015 to a packed three position String and store the result in MS Location 711.

XXP@BBB@ddd
XXP 711i015

(Assume i=004) Convert the Double-Precision whole number in MS Location 019 (015 + 004) to a packed three position String and store the result in MS Location 711.

PPN to Double (XXp)

This command converts a MS Location from permanent parcel number format into a Double-Precision format.

Format
XXp@DDD@bbb

@ can be [space], i, j, k, l, m, n or @

Description
Convert MS Location bbb (direct, indexed or indirect) which contains a three position packed String which is the file image of the PPN to a Double-Precision whole number and stores it in MS Location DDD (direct, indexed or indirect).

If bbb is not supplied, then DDD is converted from PPN format to Double-Precision.

This command is the inverse of command XXP (Double to PPN).

If you set MS Location bbb to the second position of the file control block of the Base Card and executes this command, the Double-Precision number in DDD will be the Permanent Parcel Number of the folder retrieved from the database.

Error Conditions
An error message is generated and table execution will halt if MS Location bbb (or DDD if bbb is not supplied) is not a three byte String.

Examples
XXp@DDD@bbb
XXp 015 711

Convert the packed three position String in MS Location 711 to a Double-Precision whole number and store the result in MS Location 015.

XXp@DDD@bbb
XXp 711

Convert the packed three position String in MS Location 711 to a Double-Precision whole number. Note that if MS Location 711 is the second position in the file control block, an error message will issue if a Put (P) command is executed and this position is Double-Precision.

XXp@DDD@bbb
XXp@015 711

Convert the packed three position String in MS Location 711 to a Double-Precision whole number and store the result in the MS Location referenced by MS Location 015.

Random String (XXS)

This command generates a random character string of the length specified.

Format
XVS@MMMNNLLLHHH

@ can be [space], i, j, k, l, m, n or @

Description
This command creates a string with a length of NN characters which have ASCII values in the range from LLL to HHH and stores it in MS Location MMM (direct, indexed or indirect).

The values for LLL and HHH must be in a range from 000 to 255. The value in HHH must be greater than the value in LLL.

Error Conditions
None. However, if the value in NN is 99, this command will be ignored during table execution.

Use of a value less than 32 in LLL or greater than 126 in HHH may produce undesirable results.

Example
XXS@MMMNNLLLHHH
XXS 130 1,0065090

Create a 10 character string comprised of characters with ASCII values of 65 through 90 inclusive (``A'' through ``Z'') and store it in MS Location 130.

Zero MS (XXz)

This command stores Single-Precision zeroes in MS Positions.

Format
XXz@BBB@eee

where ``@'' can be [space], @, i, j, k, l, m or n.

Description
Fill with zero (0) (Single-Precision) from MS position referenced by BBB (direct, indirect or indexed) to MS position referenced by eee (direct, indirect or indexed), inclusive. Existing contents of the specified range are overwritten with zeroes.

If eee is omitted, then only the MS position referenced by BBB will be zeroed.

Error Conditions
If BBB is larger than eee, a screen message will be generated, and the positions will not be zeroed.

Examples
XXz@BBB@eee
XXz 120 130

This IPTE Command will store Single-Precision zeroes in MS positions 120 through and including 130. Existing associations will be ignored. Note that eleven (11) positions are included within this range.

XXz@BBB@eee
XXz@120@130

This IPTE Command will store Single-Precision zeroes in the range of MS positions which begin with the MS number stored in position 120 and ends with the MS number stored in position 130.

XXz@BBB@eee
XXzi143i176

(Assume i=300). Store zeroes in the range of MS positions starting with MS 433 (i.e., 143 + i, or 143 + 300) and ending with MS 476 (176 + i, or 176+300).

XXz@BBB@eee
XXz@150k340

(Assume k= -50 and MS 150=250). Store zeroes in the range of MS positions beginning with the MS number stored in position 150 (i.e., 250) and continuing through MS position 290 (340 + k, or 340 - 50).

Look Up Table Commands

This section addresses the two (2) IPTE Commands used for creating/defining look-up tables and for accessing these tables. These two commands are:

(Table Reference
XT   Table Access

The first of these two commands, the (command, is used to define a look-up table's contents within your Action Table. The second command, XT, is used to access the look-up table as part of the Action Table logic.

Table Reference (()

This command defines a line in a look-up table.

Format
(CCLLA...Ab...bc...cd...de...e...

Description
This command defines a line within a look-up table. The line will consist of CC occurrences. Each occurrence will have a length of LL. CC and LL are whole numbers.

This command will generally be preceded by a Label command (L) or another table reference command. The label will state the look-up table name. The look-up table may consist of as many lines as needed, provided that memory is available.

Each look-up table line MUST be the first statement of a Line Number within the Action Table. If a look-up table line is not the first statement of a line within the Action Table, the system will ignore it.

The Table Access command (XT) determines how a look-up table is to be searched. If the table is NOT being searched for an exact match, the entries in a look-up table line MUST be in ascending sequence.

Error Conditions
Since the Table Reference command does not manipulate the database, no errors result.

Examples
(CCLA......Ab......bc......cd......de......e

Line	Stmt	
10	1	LT01
15	1	(0508New YorkNew JersConnectiMassachuMaine
20	1	(0508IllinoisIndiana KentuckyMissouriMichigan
25	1	(0408MississiAlabama Georgia Florida

This look-up table is named ``T01.'' It contains three (3) table lines of string data. Each entry is eight characters long. If an entry does not require eight characters (i.e., Indiana, Alabama) space is left before the start of the next entry.

Lines one and two of the look-up table each have five entries (05). The third line in the table has four entries (04).

(CCLLAAAAbbbbccccddddeeeeffffggggghhhhiiiijjjj

Line Stmt
10   1   LT02
15   1   (10040.700.800.900.951_ _ _1.081.151.251.351.50

This look-up table is named ``T02." It contains one line of numeric data. There are 10 elements of four positions each (1004).

Hint: The product of the number of table entries in a line of a look-up table (CC) times the length of a table entry (LL) should not exceed 50.

Table Access (XT)

Using the style specified and the look-up table specified, this command returns a value corresponding to the argument supplied.

Format
XTSI@LLL@AAA@rrr

@ can be [space], i, j, k, l, m, n or @
S must be A, B, C, D, F, or H
I must be t, j, k, l, m, or n

Description
Use the line of the table which is equal to the value of the MS Location specified for the index format in I.

Use the Style specified in S.

Access the look-up table with a label which equals the value found in MS Location LLL (direct, indexed or indirect).

Use the Argument referenced in MS Location AAA (direct, indexed or indirect) to return a value to the MS Location referenced in rrr (direct, indexed or indirect).

If rrr is not specified, the value from the table will be re- turned to the MS Location AAA.

There are six styles of tables: A, B, C, D, F, and H. The following paragraphs describe the rules for use of each style:

A - The value in AAA must be a String type. The value returned in rrr is a Single-Precision number which is the location of the String value in the specified line of the table.

Each entry within the specified table line is compared with the value in AAA until an exact match is found. Blank positions are considered significant when doing the match (i.e., the entry in the table must be the same length as the value in AAA). If no matching entry is found, then a value of zero is returned in rrr.

B - The value in AAA must be a Single-Precision number. It may contain a fraction but the fraction will be ignored and the whole number will be used in table processing.

The value in rrr is a string which contains the value from the specified line of the table which is found in the position specified in AAA. The length of the string placed in rrr and its justification is the same as the value in the table.

If the value in AAA is not a String type, an error will be generated and table execution will halt.

If the value in AAA is negative, an error message will be generated and table execution will halt.

If the value in AAA is zero or greater than the number of entries on the line, a Null String will be placed in rrr.

C - The value in AAA must be a Single-Precision number. It may contain a fraction but the fraction will be ignored and the whole number will be used in table processing.

The value returned in rrr is a Single-Precision number converted from the table entry string which is in the position in the specified line equal to the value in AAA. If the value in AAA is 4, the fourth entry in the line will be returned to rrr in Single-Precision format.

Conversion of the String to Single-Precision will stop at the first non-numeric character (see value of string command).

If the value in AAA is not Single-Precision, an error message will be generated and table execution will halt.

If the value in AAA is negative, an error message will be generated and table execution will halt.

If the value in AAA is zero or greater than the number of entries on the line, the string value ``ERR'' will be placed in rrr.

D - This style is similar to Style C. The difference is that fractions in AAA are considered and a linear interpolation is performed before the Single-Precision number is placed in rrr. If the value in AAA is 4.5, a linear interpolation will be performed on the fourth and fifth entries in the line, and the resulting value will be returned to rrr in Single-Precision format.

Conversion of String entries to Single-Precision numbers occurs before the linear interpolation is performed.

The error messages and the return of a string value ``ERR'' are the same as in Style C.

F - The value in AAA must be a Single-Precision number. The value returned in rrr is the whole number position in the specified line of the matching value. If there is no match and the argument falls between two elements, the position of the first number is returned.

If the value in AAA is not Single-Precision, a 0 will be returned in rrr.

If the value in AAA is less than the value of the first entry in the line, a 0 will be returned in rrr.

If the value in AAA is greater than any of the entries on the line, the whole number position of the last entry on the line will be returned in rrr.

H - This style is similar to Style F. The differences is that if there are no matching values in the specified line, a linear interpolation is performed and a fractional position number is returned in rrr.

If the value in AAA is not Single-Precision, a 0 will be returned in rrr.

If the value in AAA is less than the value of the first entry on the specified line or greater than the value of the last entry on the line, a 0 will be returned in rrr.

Note: Because of internal conversion processes during execution of the XT Command, the same tables should not be accessed using the A or B Styles, and the C, D, F or H Styles during execution of the Action Table.

When a table is used with Styles F or H, all values in the table must be in ascending sequence. Otherwise, a zero will be returned in rrr whenever these styles are used.

Error Conditions

If there is no look up table within the Action Table with a label which equals the value in LLL, and error message will be generated and table execution will halt.

If the line number equal to the value of the MS Location specified for the index found in I is greater than the number of lines in the table, an error message will be generated and table execution will halt. When counting the number of lines in a look up table, do not count the label. Remember that each line in a look up table must be the first statement of a line in the Action Table.

Error messages which cause table execution to halt can be generated using Styles B, C and D. These messages are described in the Description of the respective styles.

In addition to these errors, the system will, under certain circumstances, place a 0, a Null String or the string value ``ERR'' in position rrr. These circumstances are described in the Style descriptions above.

You may wish to check position rrr for these values after table access. Failure to do this can result in a system error later in table execution, particularly if the value ``ERR'' has been placed in what is otherwise a numeric field.

Examples

The following examples use the two tables listed below.

Table T01 is used with Styles A and B. Table T02 is used with Styles C, D, F and H.

For more information on Table construction, refer to the Table Reference Command (L).

LT01

<0508New YorkNew JersConnectiMassachuMaine_ _ _ _ _

<0508IllinoisIndianaKentuckyMissouriMichigan

<0408MississiAlabama_Georgia_Florida

LT02

<1004_.70_.80_.90_.951.001.081.151.251.351.65

XTSI@LLL@AAA@rrr

XTAi 120 121 122

(Assume i = 003) The string value ``T01'' is in MS Location 120 and the string value ``Florida_'' is in MS Location 121. (Note that the trailing blank (denoted here as a ``_'' is significant.)

The Single-Precision value 4 would be returned in MS Location 122. This is because ``Florida_'' is the fourth group of eight characters in the third line of the label ``T01.''

XTSi@LLL@AAA@rrr

XTBi 120 121 122

(Assume i = 002) The string value ``T01'' is in MS Location 120, and the Single-Precision value 5 is in MS Location 121.

The string ``Michigan'' would be returned in MS Location 122. This is because ``Michigan'' is the fifth group of eight characters in the second line of the table with the label ``T01''.

XTSI@LLL@AAA@rrr

XTCk 130 131 132

(Assume k = 001) The string value ``T02'' is in MS Location 130 and the Single-Precision value 8 is in MS Location 131.

The Single-Precision value 1.25 would be returned in MS Location 132 because the value 1.25 is the eighth entry in the first line of the table with the label ``T02.''

XTSI@LLL@AAA@rrr

XTDk 130 131 132

(Assume k = 001) The string value ``T02'' is in MS Location 130 and the Single-Precision value 7.5 is in MS Location 131.

The Single-Precision value 1.20 would be returned in MS Location 132. The seventh entry in the first line of the table with the label ``T02'' is 1.15. The eighth value in the same line is 1.25. The system performs a linear interpolation on the two values and returns a value of 1.20 in MS Location 132.

XTSI@LLL@AAA@rrr
XTFk 130 131 132

(Assume k = 001) The string value ``T02'' is in MS Location 130 and the Single-Precision value 1.35 is in MS Location 131.

The system would return a Single-Precision value of 9 in MS Location 132. This is because 1.35 is the ninth entry in the first line of the table with the label ``T02.''

XTSI@LLL@AAA@rrr
XTFk 130 131 132

(Assume k = 001) The string value ``T02'' is in MS Location 130 and the Single-Precision value 1.50 is in MS Location 131.

The Single-Precision value 9 would be returned in MS Location 132. The value 1.50 falls between the ninth entry in the line, 1.35, and the tenth entry in the line 1.65. When the value in AAA falls between two entries in the table, the position of the first entry is returned in rrr.

XTSI@LLL@AAA@rrr
XTHk 130 131 132

(Assume k = 001) The string value ``T02'' is in MS Location 130 and the Single-Precision value 1.50 is in MS Location 131.

The Single-Precision value 9.5 would be returned in MS Location 132. The value 1.50 falls between the ninth entry in the line 1.35, and the tenth entry in the line 1.65. The system performs an interpolation based on the value in AAA and the value in the two entries from the line. Since 1.50 is halfway between 1.35 and 1.65, a value of 9.5 is returned in MS Location 132.