Ultimate

THE ULTIMATE CORP.

System Overview

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The Ultimate Corp.
East Hanover, NJ

Version 2.1

The Ultimate® Operating System
System Overview
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UltiWriter

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How to Use This Manual

This manual is an overview of the Ultimate Operating System. It covers features as of Revision 210 of the Ultimate Operating System.

For more information on the Ultimate Operating System, call your Ultimate representative, or call The Ultimate Corp. at (201) 887-9222.

How the Manual is Organized

Chapter 1 is an overview of the Ultimate Operating System.

Chapter 2 discusses the Ultimate file structure.

Chapter 3 describes the major features available in the Ultimate Operating System and includes examples of each.

Chapter 4 describes the system architecture.

Conventions

This guide uses the following conventions:

Convention	Description
UPPER CASE	Characters printed in upper case are required and must appear exactly as shown.
RETURN	The RETURN symbol indicates a physical carriage return pressed at the keyboard. A RETURN is required to complete a command line, and signals the system to begin processing the command.
`Enter option`	This typeface is used for messages and prompts displayed by the system, and in boldface type, to show data entered by the user.

Related Manuals

The following is a list of the manuals that provide more information on topics described in this document. The document number next to each manual is to be used when ordering manuals.

For a complete list of Ultimate system manuals, or to order manuals, refer to Ultimate's *Documentation Update* brochure, or call Ultimate's administration department at (201) 887-9222.

Manual	Document Number
Ultimate BASIC Language Reference Guide	6929-3
Beginner's Guide to Ultimate	6977
Guide to the Ultimate Editors	6939
PROC Manual	6936 (Bound) 6967 (Looseleaf)
Ultimate RECALL and Ultimate UPDATE User Guide	6963 (Bound) 6971 (Looseleaf)
Ultimate System Commands Guide	6985
Ultimate System Management and Support Guide	6960 (Bound) 6964 (Looseleaf)
UltiCalc III Reference Guide	6900 (Bound) 6950 (Looseleaf)
UltiCalc III Training Guide	6902 (Bound) 6951 (Looseleaf)
UltiKit User's Guide	6991
UltiLink User's Guide	6992
UltiMation User's Guide	6993
UltiNet User's Guide (MICOM® version)	6995
UltiPlot Reference Guide	6976 (Bound) 6980 (Looseleaf)
UltiPlot Training Guide	6975 (Bound) 6979 (Looseleaf)
UltiWord Reference Guide	6904 (Bound) 6905 (Looseleaf)

Manual	Document Number
UltiWord Training Guide	6908 ((Bound) 6948 (Looseleaf)
UltiWriter System Administrator's Guide	15121
UltiWriter Training Guide	15122
UltiWriter User's Guide	15120

Notes

1 Introduction

The Ultimate Operating System is a general-purpose, multi-user database management system. Ultimate systems provide both high performance and reliability by combining a flexible, Pick®-based operating system with superior hardware design from vendors such as IBM, Hewlett-Packard, and Bull HN.

An Ultimate system is specifically oriented to provide cost-effective database management. A database management system using the Ultimate Operating System provides the following major benefits:

- accurate and timely information, which forms the basis for significantly improving the decision-making process
- reduction in the clerical and administrative effort associated with the collection, storage, and dissemination of information pertaining to an organization
- easily modifiable and maintainable system, which allows your database to grow with minimal programming effort

Features of the Ultimate system include the following:

- flexible file system
- complete set of operating system processors
  - system-level commands
  - application development tools
  - database management facilities
  - office tools
  - communications tools
- transportable architecture that allows the Ultimate system and any applications you develop on it to run on a wide range of hardware platforms

Notes

2 File System

The Ultimate file system provides the following features:

- hierarchical file structure with variable length files, items (records), and attributes (fields)
- flexible database structure
- fast accessibility to data items
- indexing based on file attributes
- file and item sizes limited only by total disk capacity

Hierarchical File Structure

The Ultimate system has a hierarchical file structure composed of four levels of files, starting with level 0:

- system dictionary (SYSTEM) level 0
- account master dictionaries (MD) level 1
- file level dictionaries level 2
- data files level 3

The dictionary at each level points to files in the next lower level. That is, the system dictionary (SYSTEM) points to account master dictionaries (MDs). The account master dictionaries point to file dictionaries. The file dictionaries point to data files. The data files themselves contain no pointers, just data items. Figure 1 illustrates the file hierarchy.

Each Ultimate system has one system dictionary. Each account has one master dictionary. There may be multiple file dictionaries in an account and multiple data files per file dictionary. Files can contain any number of items (records) and can expand to any size.

Data in all files is kept in *items*. Data in an item is kept in *attributes*. Data in an attribute can be further subdivided into *values* and *sub-values*. An item is referenced by its *item-id*.

The correspondence between names used in Ultimate systems and in non-Ultimate, non-Pick systems is summarized below:

Ultimate Name	Similar to
item	record
item-id	record key
attribute	field
value	sub-field

Level 0 - The SYSTEM Dictionary

The SYSTEM dictionary is the highest level file. It contains the file pointers to every account in the database, as well as pointers to system-level files. It also contains all valid user logon names and other information relevant to each user account. The file pointer for each account points to that account's Master Dictionary.

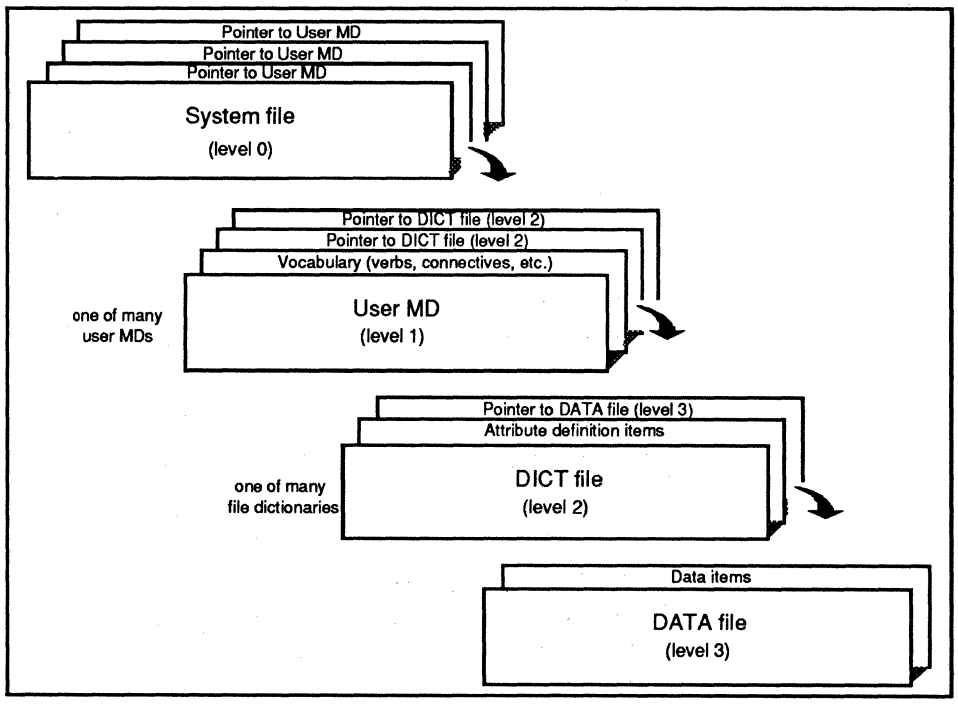


Figure 1. File Hierarchy

Level 1 - User Master Dictionaries

The master dictionary for each account contains the definitions of the account's vocabulary, such as verbs, PROCs, and cataloged BASIC programs. The master dictionary also contains file definition items that point to files belonging to the current account and synonym definition items that point to files in other accounts on your own system and, in some cases, other systems.

One of the powerful features of the Ultimate system is the ability to customize each user's account. Because each user's master dictionary contains the vocabulary for that user, one user's vocabulary can be changed without affecting the vocabulary of other users. This feature enables each account on the system to be tailored to suit the needs of the users of that account.

Level 2 - File Dictionaries

The file dictionary contains two types of items: *file definition items*, which are pointers to the data files; and *attribute definition items*, which can define attributes in the data files, relationship between attributes, and translations to attributes in other files. You can add attribute definitions at any time to access items by new criteria. You are not constrained to the original definitions.

In some cases, multiple data files may share the same dictionary. These are known as *shared dictionary* or *multi-level* files, and have the file name format dictname,dataname. On the other hand, some dictionaries do not have any associated data files. These are known as *dictionary only* or *single-level* files; any data is stored in the dictionary itself.

Level 3 - Data Files

Data files contain the actual data, which is stored in variable length attributes and items. Each item has a name, which is known as the item-id and serves as a key to retrieving the item's data.

Flexible Database Structure

Ultimate is an easily modifiable and maintainable system, which allows your database to grow with minimal programming effort. The database structure provides the following flexibility:

- new attribute definitions can be defined as required
- new attributes can be added to existing items as necessary, without requiring any reprogramming
- new relationships can be defined as desired
- the number of characters in items and attributes can be changed without requiring any conversions or reformatting
- data can be stored in an unformatted form and then displayed in as many formats as needed

Accessing Items

Items in a file can be accessed directly by item-id, sequentially in the order in which they are located in the file, or in sorted order. The entire file or just those items meeting specified criteria can be selected. Items can be sorted either by item-id or by attributes within the item. The items can be sorted as needed, or you can index the file, which presorts the items.

File indexes, which are permanent, up-to-date sorted listings of items based on specified attributes, can be created and used at any time. A file index reduces the time needed to produce sorted output because the index allows items to be accessed immediately in sorted order. For more information on indexes, see the sub-section, File Indexes.

Special delimiters are used to separate values in an attribute, attributes in an item, and items in a file. By using delimiters rather than byte counts to determine the limits of values, attributes, and items, the Ultimate system provides flexible and efficient storage, updating, and retrieval of items of variable length.

Figure 2 shows examples of various methods of accessing items.

`:LIST CARS.FILE 'CORVETTE'`	accessed by specific item-id
`:EDIT CARS.FILE *`	accessed sequentially in order they are located in file
`:SORT CARS.FILE`	accessed in sorted order
`:SELECT CARS.FILE WITH TRANS = "Auto"`	only those items meeting specified criteria are accessed

Figure 2. Accessing Items

File Indexes

In the Ultimate system, a file index is a set of item-ids sorted by attributes in the file, and is an alternative means of accessing the data in the file. File indexes provide a permanent, presorted, up-to-date means of accessing the items in that file and are an efficient way to retrieve data from large files when frequent sorting or selection criteria are used.

Indexes are maintained by the system itself. Once an index is created, the system automatically updates all indexes associated with a file whenever the file itself is updated.

An index can be used on any attribute or combination of attributes, such as vendor in the parts file, or employee name and department in an employee file. The index is created from a single Ultimate UPDATE definition item (attribute definition item created by the Ultimate UPDATE processor); however, the Ultimate UPDATE definition item can combine several attributes.

The number of indexes that a file can have is unlimited and indexes can be created or deleted at any time.

The use of indexes in day-to-day operations is transparent to the user. A user never needs to request that an index be used. The system automatically uses them to access a file when you enter an Ultimate RECALL command that specifies selection criteria or sorting using an indexed attribute.

3 Operating System Features

The Ultimate system includes facilities for system-level command processing, application development, database management, and a full set of office tools, as well as communications between computer systems.

System-level command processing:

TCL (Terminal Control Language)	executes commands entered at the TCL prompt; TCL is the primary way to communicate with the operating system

Application development tools:

BASIC	programming language enhanced to support the unique features of the Ultimate database structure and operating system
PROC	procedural language used to prestore a sequence of operations, which can then be invoked by a single word command
UltiKit	application development environment

Database management facilities:

Ultimate RECALL	query language used to retrieve information and generate reports
Ultimate UPDATE	screen-oriented, online database maintenance functions
UltiCalc	spreadsheet processing for your database (optional package)
UltiPlot	produces graphs from information in your database

Office tools:

Editors	both line editor and screen editor, either of which can be used to create and edit items
UltiMation	office automation package
UltiWord	word processor that uses commands for editing
UltiWriter	word processor that uses function keys for editing

Communication tools:

Bisynchronous support	set of system commands used to receive and transmit data, emulating IBM® 2780 or 3780 communication devices
UltiLink	basic asynchronous communication support
UltiNet	networking support (optional package)

TCL - System Level Command Processing

The Terminal Control Language (TCL) is the starting point for performing most tasks in the Ultimate system. TCL is the primary interface between the user and the Ultimate system. You can access most of the system software by entering a single statement at TCL. TCL processes the statement and returns to the TCL level when processing is complete.

The default TCL prompt is a colon (:). Whenever you are at the TCL prompt, you can enter any valid TCL statement. A TCL stacker saves the statements that you enter at the TCL prompt; these statements can be easily retrieved, edited, and re-executed.

You can suspend activity in the current TCL session (level) and start an additional, completely separate TCL session without logging off. This ability, which is called level pushing, can be used whenever the system is waiting for input. The information for the session at each level is saved and is restored when you return to that level. When you return to the previous TCL level (also known as popping), the screen looks just as it did before the push.

Each TCL statement must begin with a system command. The command may be followed by one or more parameters, although many commands do not require any parameters. The parameters affect the processing that is carried out. For example, if you invoke the WHO command with no parameters, the system displays your user id and port number. If you invoke WHO with a port number as a parameter, the system displays the user id currently logged on to the specified port.

System Commands

The Ultimate Operating System includes over 300 system commands. These commands provide capabilities such as:

- listing, sorting, updating items and files
- user account creation and maintenance
- magnetic tape unit functions
- printer spooling control
- file and account backup and restore functions
- terminal characteristics specifications

- multiple languages on one system
- systems accounting
- TCL stacker characteristics
- terminal viewing, which displays the output of a process on two terminals simultaneously
- block printing

Figure 3 displays sample TCL statements.

For further information, please refer to the *Ultimate System Commands Guide*.

```
:WHO
9 TMP

:WHO 0
0 SYSPROG

:DATE
11:04:45  11 NOV 1990

:CT  MD  V/CORR
    V/CORR
001 A
002 08
003 CORRELATIVES
004
005
006
007
008
009 L
010 25
:
```

Figure 3. Sample TCL Statements

Application Development Tools

The following application development tools are available:

- BASIC programming language
- PROC procedural language
- UltiKit application development environment

BASIC

BASIC is a simple yet versatile programming language that was first developed at Dartmouth College in 1963 and is suitable for developing a wide range of applications. The Ultimate version has been extensively modified to support the unique features of the Ultimate database structure and operating system.

Ultimate BASIC includes the following features:

- compiled object code
- Ultimate file access and update capabilities
- optional alphanumeric or numeric statement labels of any length
- multiple statements on one line
- single statements on multiple lines
- fixed point, floating point, and string arithmetic
- data conversion capabilities
- string handling with variable length strings
- string and numeric format masking
- pattern matching
- shared source code between programs
- linked programs
- external subroutine calls
- complex and multi-line IF statements
- CASE statement selection
- magnetic tape input and output
- item locking capabilities
- dynamic arrays
- variably dimensioned arrays
- job control capabilities
- debugging language

A sample BASIC program is shown in Figure 4. The program prints a report showing total cost of quantity on hand by product group, as further described by the program's comment statements. Figure 5 shows sample output from the program.

```
** Print Cost * Quantity on Hand by Product Group
*
   DIM STOCKITEM(20)            ;* ID = Part No
   EQU COST TO STOCKITEM(4)     ;* Cost
   EQU QOH TO STOCKITEM(3)      ;* Quantity on Hand
   EQU PRODGRP TO STOCKITEM(1) ;* Product Group
   EQU AM TO CHAR(254)
*
   PRDGRPS=''  ;*List of Product Groups
   VALUES=''   ;* Total Values of Product Groups
   TOTQTYS=''  ;* Total Quantities of Product Groups
*
   OPEN 'STOCK' TO STOCK ELSE STOP 201,'STOCK'
   SELECT STOCK
1  *
   READNEXT ID ELSE
       HD="Product  Total Value       Average'L' Group"
       HD=HD:SPACE(22):"Value'L'"
       HEADING HD
       AMC=DCOUNT(PRDGRPS,AM)
       FOR I = 1 TO AMC
           PRINT PRDGRPS<I> 'L#7':
           PRINT VALUES<I> 'R26,$#13':
           IF TOTQTYS<I>=0 THEN
               AVG=0
           END ELSE
               AVG=VALUES<I>/TOTQTYS<I>
           END
           PRINT AVG 'R26,$#14'
       NEXT I
       STOP
   END
   MATREAD STOCKITEM FROM STOCK,ID ELSE GOTO 1
   LOCATE PRODGRP IN PRDGRPS BY 'AL' SETTING POS THEN
       VALUES<POS>=VALUES<POS> + COST*QOH
       TOTQTYS<POS>=TOTQTYS<POS> + QOH
   END ELSE
       INS PRODGRP BEFORE PRDGRPS<POS>
       INS COST*QOH BEFORE VALUES<POS>
       INS QOH BEFORE TOTQTYS<POS>
   END
   GOTO 1
END
```

Figure 4. BASIC Example

Product Group	Total Value	Average Value
BRAMLEY	$9,350.00	$425.00
CRONK	$6,475.00	$1,295.00
HAN	$6,500.00	$1,300.00
OLYMPIC	$15,050.00	$430.00
SHARE	$19,538.75	$342.79
TOMPKIN	$459.00	$22.95

Figure 5. Sample Output

For further information, please refer to the *Ultimate BASIC Reference Manual.*

PROC

PROC is a procedural language that allows you to prestore a complex sequence of operations which you can then invoke by a single word command. Any sequence of operations that can be executed at TCL can be prestored via the PROC processor. This prestored sequence of operations (called a PROC) is executed interpretively by the PROC processor and requires no compilation phase.

The PROC processor includes the following features:

- argument passing
- interactive terminal prompting
- extended I/O and buffer control commands
- conditional and unconditional branching
- relational character testing
- pattern matching
- free-field and fixed-field character moving
- optional command labels
- user-defined subroutine linkage
- four variable-length I/O buffers

Figure 6 shows the PROC called LISTACC, which lists the accounting usage for the system.

For further information, please refer to the *Ultimate PROC Reference Manual.*

```
    CT
001 PQ
002 C  COPIES AN ITEM OR ITEMS FROM THE FILE SPECIFIED
003 C  TO THE TERMINAL.
004 F
005 HCOPY
006 11 A
007 IF A GO 11
008 H
009 STON
010 H<
011 P
```

Results when the PROC is executed:

```
:CT  CARS.FILE  CRESSIDA
    CRESSIDA
001 Toyota
002 4-door front-wheel
003 Beige]White]Burg
004 156
005 Auto
006 19/44
007 0]2]1
008 1986
009 13847
010 16840
011 ]6945]6945
012 0
```

Figure 6. PROC Example

UltiKit

UltiKit is an application development environment that contains all the tools needed to build, test, run, and modify new and existing UltiKit applications.

UltiKit merges the Ultimate Operating System languages and other system tools with a number of utilities that increase user productivity. In addition, UltiKit has self-documenting features that allow you to display, print, or save menus and screens as your applications are developed.

The UltiKit menus and screens that you use to create your applications were themselves created using UltiKit tools. Figure 7 shows a sample of the UltiKit main menu, which was created by UltiKit.

For further information, please refer to the *UltiKit User's Guide*.

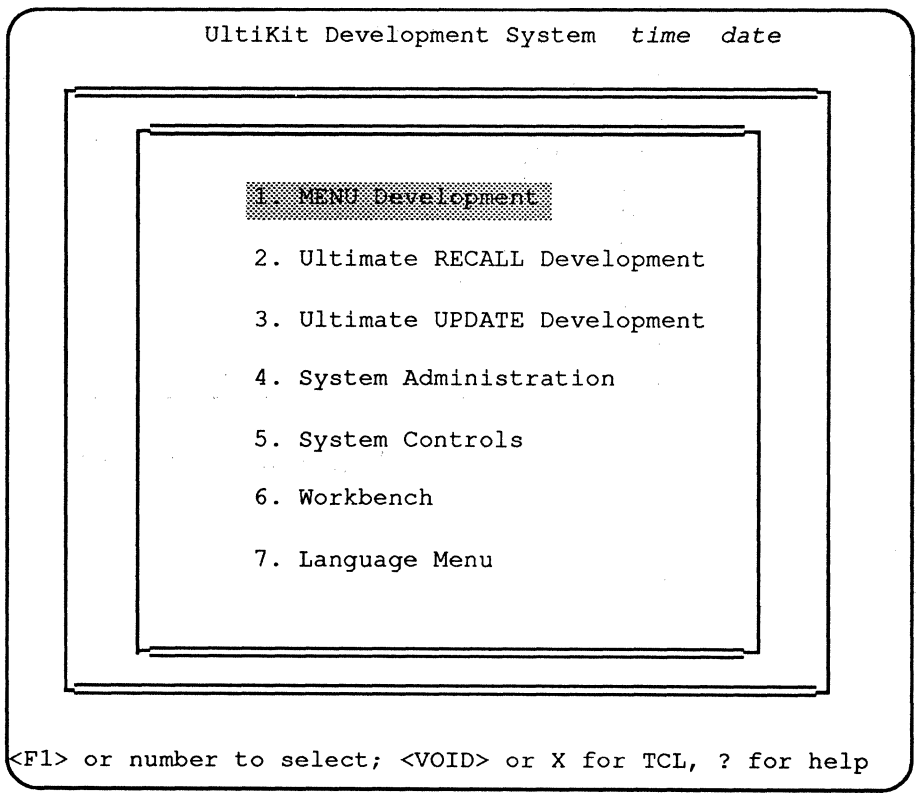


Figure 7. UltiKit Main Menu

Database Management Facilities

The following database management facilities are available to help you create reports and update your information without the need to write special programs:

- Ultimate RECALL
- Ultimate UPDATE
- UltiCalc III
- UltiPlot

Ultimate RECALL

Ultimate RECALL is a general-purpose data retrieval language that enables you to selectively retrieve information from your database and create customized reports. Ultimate RECALL uses simple, English-like sentences to query the database, so you do not need any programming experience to develop a variety of reports. Ultimate RECALL statements can contain any number of variable-length words and allow flexibility in word order and syntax, making it an easy-to-use language even for novice Ultimate users.

You can perform all of the following functions with Ultimate RECALL:

- create reports at any time using TCL commands
- select items to be processed by other system commands
- sort by any number of attributes
- use multi-valued data
- specify complex selection criteria
- specify multiple levels of breaks and totals
- use preprinted forms
- print labels
- call BASIC programs for special processing
- reformat items in files
- write selected information to tape
- provide statistical information about files, items, and attributes
- produce checksums for any attributes in your database

Table 1 lists the Ultimate RECALL commands and their major functions.

For further information, please refer to the *Ultimate Recall and Update User Guide.*

Table 1. Ultimate RECALL Commands

Command	Description
CHECK-SUM	generates a check-sum
COUNT	counts number of items
HASH-TEST	provides statistical information about organization of a file based on a test modulo
ISTAT	provides statistical information about organization of a file
LIST	lists items in a file as a formatted report
LIST-ITEM	lists contents of items in a file
LIST-LABEL	lists items in a file in label format
REFORMAT	reformats items into a new file
S-DUMP	writes items to tape in sorted order
SELECT	selects items, puts item-ids into select list
SORT	lists items in a file as a formatted report in sorted order
SORT-ITEM	lists contents of items in a file in sorted order
SORT-LABEL	lists items in a file in label format in sorted order
SREFORMAT	reformats items into a new file in sorted order
SSELECT	selects items, puts item-ids into select list in sorted order
STAT	provides statistical information on attributes, items
SUM	provides totals for values or count of characters
T-DUMP	writes items to tape
T-LOAD	reads items from tape

A simple Ultimate RECALL statement consists of a command and a filename. For example, if there is a file in your account called CARS.FILE, the following command would count all items in the CARS.FILE file:

```
:COUNT CARS.FILE
 22 items counted.
```

Note: *The TRAINING account, which is included as part of every Ultimate system, has a file called CARS.FILE that can be used to produce the reports shown here.*

By using Ultimate RECALL commands such as LIST, SORT, COUNT, and SELECT, plus selection criteria and modifiers based on attribute definitions that have been previously set up, you can select and display only the information you need for your reports.

For example, assuming that the appropriate attribute definitions have been set up, you can create a report that sorts the cars in the CARS.FILE with automatic transmissions, sorted by make (manufacturer), by entering the following statement:

```
:SORT CARS.FILE BY MAKE WITH TRANS = "Auto"
MAKE TRANS
```

Figure 8 displays the report that is produced in response to the query shown above.

```
PAGE   1                                  16:19:19  10 JUL 1991

CARS.FILE... MANUF'R... TRANSM..

SOMERSET     Buick      Auto
LEBARON      Chrysler   Auto
ACCORD       Honda      Auto
XJS          Jaguar     Auto
CRESSIDA     Toyota     Auto

5 items listed.
```

Figure 8. Ultimate RECALL Report 1

You could modify this Ultimate RECALL statement to include additional information in your report. For example, to print a report of cars with automatic transmissions that includes colors, quantities of each color, and subtotals for each car, you could enter the following statement:

```
:SORT CARS.FILE BY MAKE WITH TRANS = "Auto"
BREAK-ON MAKE DESC COLOR TOTAL QUAN
```

Figure 9 displays this report.

```
PAGE   1                                10:50:04  17 JUL 1991

CARS.FILE... MANUF'R... DESCRIPTION..... COLORS. QUAN
                                                    *
SOMERSET     Buick      2-door front-wheel   Black      2
                                             Blue       4

             ***                                        6

LEBARON      Chrysler   Convertible front-wh White      3
                        eel
                                             Black      1

             ***                                        4

ACCORD       Honda      4-door front-wheel   Grey       1
                                             Blue       1
                                             White      0

             ***                                        2

XJS          Jaguar     Convertible          Green      1
                                             Red        0

             ***                                        1

CRESSIDA     Toyota     4-door front-wheel   Beige      0
                                             White      2
                                             Burg       1

             ***                                        3

***                                                    16

5 items listed.
```

Figure 9. Ultimate RECALL Report 2

Ultimate UPDATE

Ultimate UPDATE is used to create a data entry screen for updating a database file. You can then display the screen and use it to enter and update file items. Using the command UPDATE, you can develop customized Ultimate UPDATE screens without needing any programming experience.

Ultimate UPDATE includes the following features:

- validates data entry based on parameters specified in attribute definition items
- allows you to selectively update file information based on criteria you provide
- provides for updating of secondary files
- allows you to create screens as needed, or you can save often used screens in PROCs
- allows you to specify an update screen on multiple pages
- provides a standard set of editing keys for a consistent user interface
- allows you to use word processing features for editing during data entry
- uses language and syntax similar to Ultimate RECALL, with its English-like vocabulary and flexible command construction
- allows you to specify placement of each attribute to be updated
- allows you to easily specify that data can only be displayed, not updated; or that it can be displayed and updated, but not deleted
- provides for BASIC subroutine interfaces before and after data entry

Figure 10 shows an Ultimate UPDATE screen for CARS.FILE that allows an operator to add new car models and to update the data for models that already exist on file. Figure 11 shows the Ultimate UPDATE statements (which are stored in a PROC) that were used to create the screen.

For further information, please refer to the *Ultimate Recall and Update User Guide.*

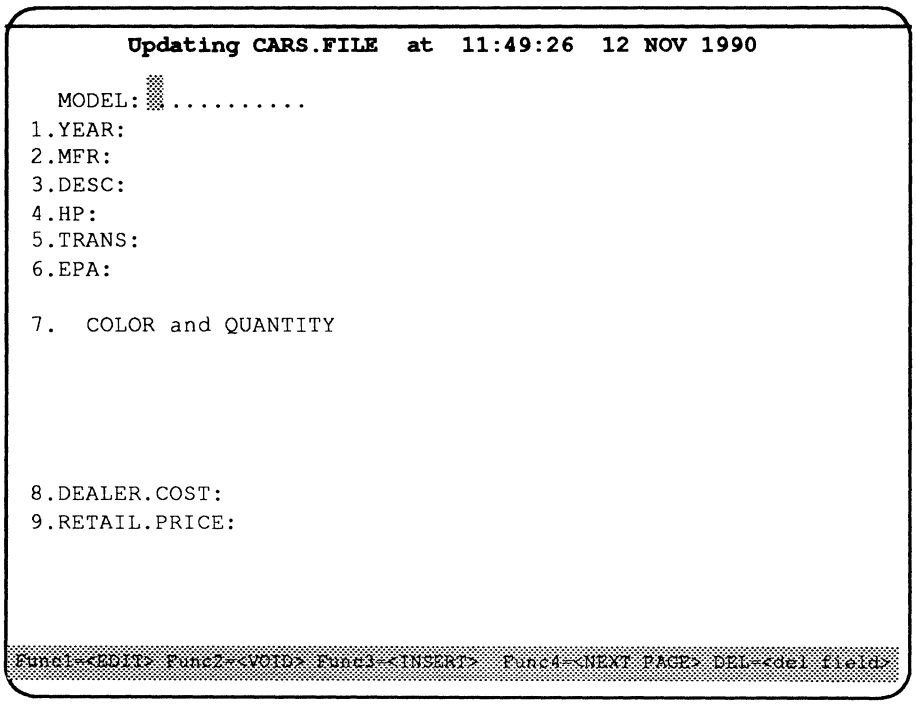


Figure 10. Ultimate UPDATE Screen

```
001 PQ
002 H UPDATE CARS.FILE @(10,2):ID0
003 H HEADING "Updating CARS.FILE  at  'TC'"
004 H UYEAR
005 H UMAKE
006 H UDESC
007 H UHP
008 H UTRANS
009 H UEPA
010 H WINDOW @93,11,15):"  COLOR and QUANTITY"
011 H @(5):UCOLOR @(16):UQUAN END-WINDOW
010 H UDEALER.COST
011 H URETAIL.PRICE (LS
010 P
```

Figure 11. PROC Used to Create Ultimate UPDATE Screen Shown in Figure 10

UltiCalc III

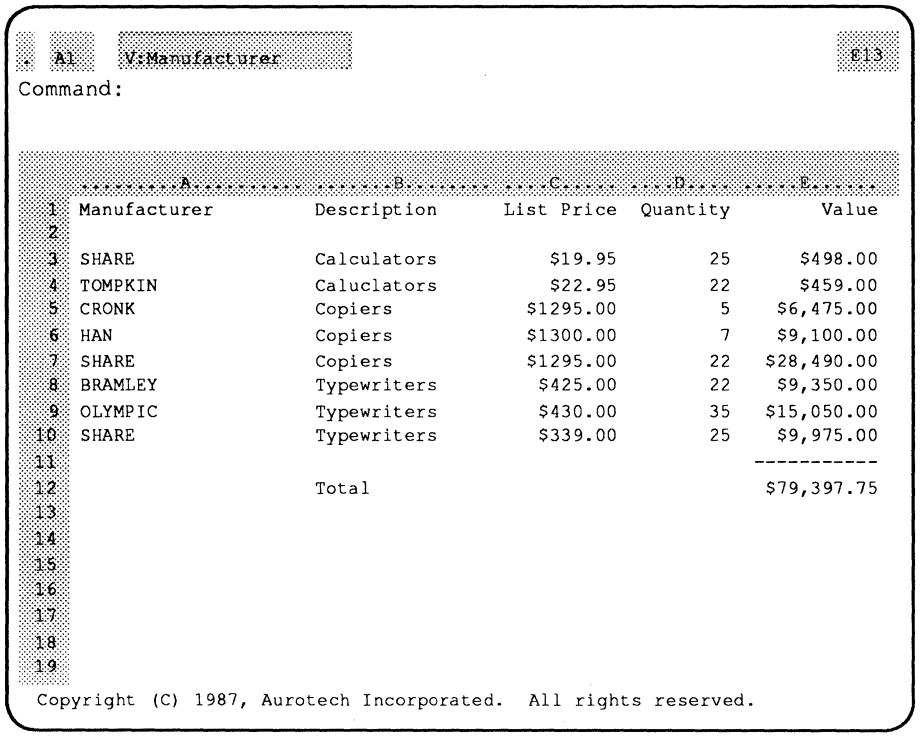
UltiCalc III is an optional financial planning tool designed for nontechnical users. It uses a spreadsheet format based on similar, very successful programs, and incorporates many of the same capabilities. In addition, UltiCalc III allows you to access and manipulate data from anywhere in your system's database, not just from the spreadsheet you are using.

An UltiCalc III spreadsheet contains 702 columns and 999 rows yielding 701,298 different locations. Each location may contain a single data element of any type. No distinction is made between numeric and non-numeric data except that non-numeric data is treated as zero if used in arithmetic operations.

UltiCalc III uses the terminal screen like a window that lets you view any portion of the spreadsheet. This window may be scrolled in any of four directions or directly positioned at any desired coordinate. The size of the window depends on your terminal characteristics. If your terminal is 80 characters wide, UltiCalc displays 80 columns; if your terminal is 132 characters wide, UltiCalc III displays 132 columns.

Figure 12 shows a sample spreadsheet.

For further information, please refer to the *UltiCalc III Reference Guide* and *UltiCalc III Training Guide.*



. A1 V:Manufacturer E13

Command:

	A	B	C	D	E
1	Manufacturer	Description	List Price	Quantity	Value
2					
3	SHARE	Calculators	$19.95	25	$498.00
4	TOMPKIN	Caluclators	$22.95	22	$459.00
5	CRONK	Copiers	$1295.00	5	$6,475.00
6	HAN	Copiers	$1300.00	7	$9,100.00
7	SHARE	Copiers	$1295.00	22	$28,490.00
8	BRAMLEY	Typewriters	$425.00	22	$9,350.00
9	OLYMPIC	Typewriters	$430.00	35	$15,050.00
10	SHARE	Typewriters	$339.00	25	$9,975.00
11					----------
12		Total			$79,397.75
13					
14					
15					
16					
17					
18					
19					

Figure 12. UltiCalc III Spreadsheet

UltiPlot

UltiPlot is a powerful graphics package, with which you can produce a wide variety of professional-looking graphs, including

- line graphs
- bar charts
- pie and exploded pie graphs
- scatter plot graphs

UltiPlot helps you transform complex information from your database into clear, effective graphs that can greatly enhance your presentations. Within minutes, you can create one of several types of business charts to illustrate marketing studies, financial analyses, sales projections, and other applications. The graphics you produce with UltiPlot can be printed either on your screen (if you have a terminal with graphics capabilities), or on a graphics-equipped printer.

UltiPlot's flexibility allows you to mix styles within the same graphic and do any of the following:

- mix bar, line, and scatter formats on one chart
- plot both horizontal and vertical formats
- print multiple graphs on one page
- add heading and footer captions

There are four UltiPlot commands, which are included as part of every Ultimate system:

PIE	creates pie charts from unsorted data
PLOT	creates line graphs or bar graphs from unsorted data
SPIE	creates pie charts from sorted data
SPLOT	creates line graphs or bar graphs from sorted data

UltiPlot uses the standard Ultimate system dictionaries. For example, the following command creates a pie chart showing sales by day for the month of January (the SALES file is included in the TRAINING account).

```
SPIE SALES BY DATE WITH DATE GE "01/01/87" AND
LE "01/31/87" DATE SALES.AMOUNT (P
```

Figure 13 displays the pie chart created by this UltiPlot command.

For further information, please refer to the *UltiPlot Training Guide* and *UltiPlot Reference Guide*.

Note: *The original of the graph in Figure 13 was printed on a Printronix dot matrix printer, which has the UltiPlot device name* PTX.

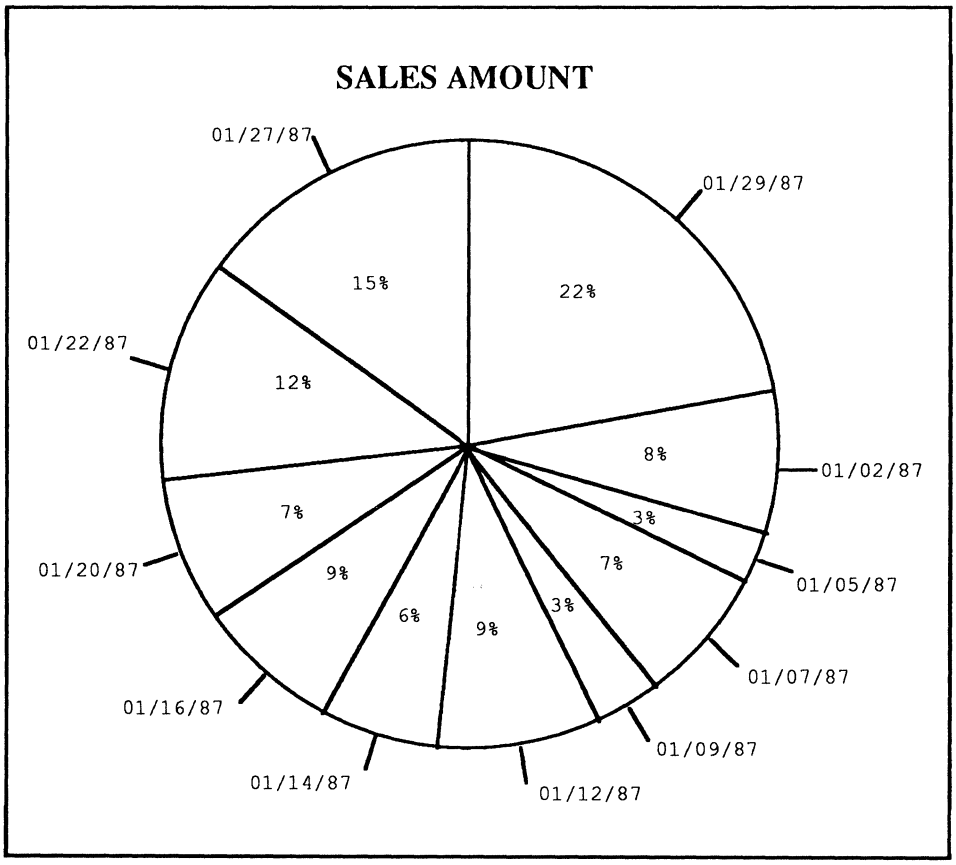


Figure 13. UltiPlot Pie Chart

Office Tools

The Ultimate Operating System provides a full range of office tools:

- two editors
- UltiMation - an office automation package
- UltiWord - word processor that uses commands for editing
- UltiWriter - word processor that uses function keys for editing

Editors

The Ultimate Operating System includes two text editors: a full screen editor and a line editor. Both editors permit online modification of such items as BASIC programs, data files, and file dictionaries. The screen editor edits by moving the cursor anywhere in the document and making changes directly in the text. The line editor uses typed commands to change specified lines; text is not changed by directly overtyping it.

The screen editor has the following features:

- sophisticated cursor movement throughout the entire item
- use of function keys for editing
- insert and replace editing modes
- windows in which two items can be viewed at once
- a clipboard for copying between items, and for cutting and pasting
- ability to search and replace up to nine different phrases at one pass
- ability to permanently store and recall frequently used commands

The line editor has the following features:

- assembly formatting
- optional hexadecimal display
- ability to locate and replace text
- ability to insert text
- ability to merge lines from the current item or from other file items
- ability to prestore and recall frequently used commands

The screen and line editors are completely compatible; an item created with one editor can be retrieved and edited with the other.

Figure 14 illustrates the keystrokes necessary to create an attribute definition item using the screen editor; Figure 15 illustrates the same process using the line editor. Although the keystrokes are slightly different, the finished results are identical.

For further information, please refer to the *Guide to the Ultimate Editors*.

Note: *The ↵ in the examples indicates the RETURN key is pressed.*

```
                                        COL 006  LINE 0011  PAGE 0001
Enter E)xit no-save  U(pdate  S)ave & exit
....▒...1....T....2....T....3....T....4....T....5....T....6....R..
0001 A↵
0002 12↵
0003 Comments↵
0004 ↵
0005 ↵
0006 ↵
0007 ↵
0008 MCD↵
0009 L↵
0010 10↵
0011▒<F15>S
```

Figure 14. Creating an Item in the Screen Editor

```
:ED DICT NAMES DTX↵
New item
Top
.I↵
001+A↵
002+12↵
003+Comments↵
004+<CTRL-^>↵
005+<CTRL-^>↵
006+<CTRL-^>↵
007+<CTRL-^>↵
008+MCD↵
009+L↵
010+10↵
011+↵
Top
.FI↵
```

Figure 15. Creating an Item in the Line Editor

UltiMation

UltiMation is an office automation tool that can replace your written telephone messages, notes, memos, address lists, calculator, and calendar. UltiMation includes the following applications:

- address manager
- appointment calendar
- calculator
- mail manager
- note pad
- telephone message center

UltiMation can use distribution lists and direct a message to all users on the distribution list.

Figure 16 is an example of the telephone message entry screen.

For further information, please refer to the *UltiMation User's Guide.*

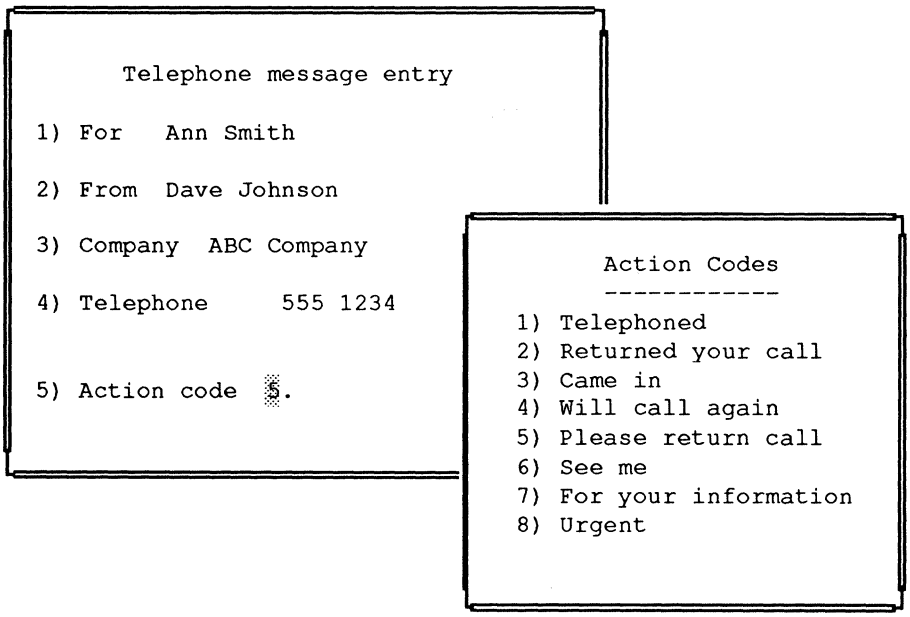


Figure 16. UltiMation Telephone Message Entry

UltiWord

UltiWord is an easy-to-use word processing program that provides you with basic document preparation functions. With UltiWord, you can create letters, reports, and other business documents quickly and easily. UltiWord provides menus from which to select documents, and includes commands that enable you to store, edit, display, or print documents. You can set up UltiWord to output to laser printers or other letter-quality printers.

UltiWord has the following features:

- full screen editing through use of commands
- spelling checker with an online dictionary
- an adjustable ruler
- underlining and bold-face type
- search and replace functions
- headers and footers
- boxes to enclose text or graphics
- automated table of contents and index creation
- mail merge capability, which enables you to insert information from your database, such as names and addresses, directly into form letters or other documents

In addition, UltiWord includes online help to get you started producing documents right away.

Figure 17 is a sample UltiWord screen. Figure 18 shows the output of that item.

All Ultimate systems include UltiWord.

For further information, please refer to the *UltiWord Reference Guide* and *UltiWord Training Guide*.

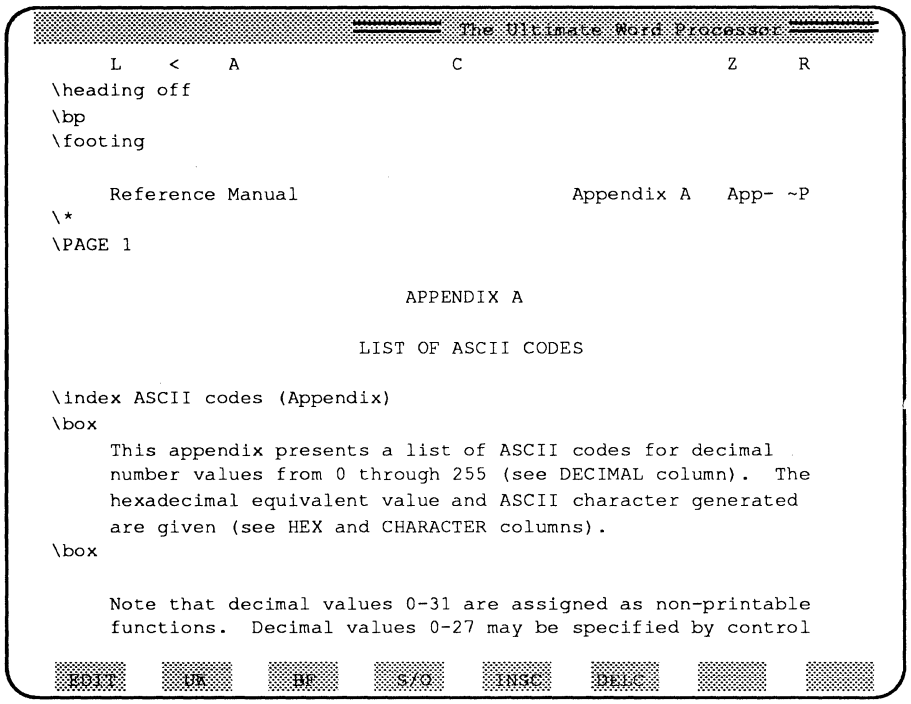


Figure 17. UltiWord Screen

APPENDIX A

LIST OF ASCII CODES

This appendix presents a list of ASCII codes for decimal number values from 0 through 255 (see DECIMAL column). The hexadecimal equivalent value and the ASCII character generated are also given (see HEX and CHARACTER columns).

Note that decimal values 0-31 are assigned as non-printable functions. Decimal values 0-27 may be specified by control key sequences (see TERMINAL KEY column). A "control key sequence" is entered by holding down the <CTRL> key while pressing a second key (e.g., <CTRL>A). Some of the non-printable characters have a special use in Ultimate systems (see SPECIAL USE IN ULTIMATE column).

Decimal values above 127 (Hex '7F') are not defined in the

Reference Manual Appendix A App- 1

Figure 18. UltiWord Output

UltiWriter

UltiWriter is a powerful and easy-to-use word processing program that provides a simple format and handy menus so that you can quickly create, edit, file, and print documents. UltiWriter greatly shortens your learning curve by duplicating familiar work patterns. For example, UltiWriter gives you your own online desktop for document control, complete with in and out boxes for documents, and file cabinets for document storage. You can create an unlimited number of documents and file cabinets, and keep up to 25 documents on the desktop at once.

Features of UltiWriter include the following:

- full screen editing through use of function keys
- spelling checker with an online dictionary
- search and replace functions
- block select
- automatic pagination
- graphics capabilities
- mail merge capability, which enables you to insert information from your database, such as names and addresses, directly into form letters or other documents
- electronic mail, which enables you to send documents to up to 30 other users simultaneously
- split screen capabilities, so you can view and work on two documents at once
- math capabilities
- a clipboard that allows you to easily move text from one document to another
- language options that let users choose the language in which menus appear, enabling international or multilingual companies to use one system
- style codes that allow users to create and store customized rulers, which can be recalled with a single keystroke whenever a particular format is needed
- boilerplates in which to store often-used text
- automated indexing and table of contents creation,

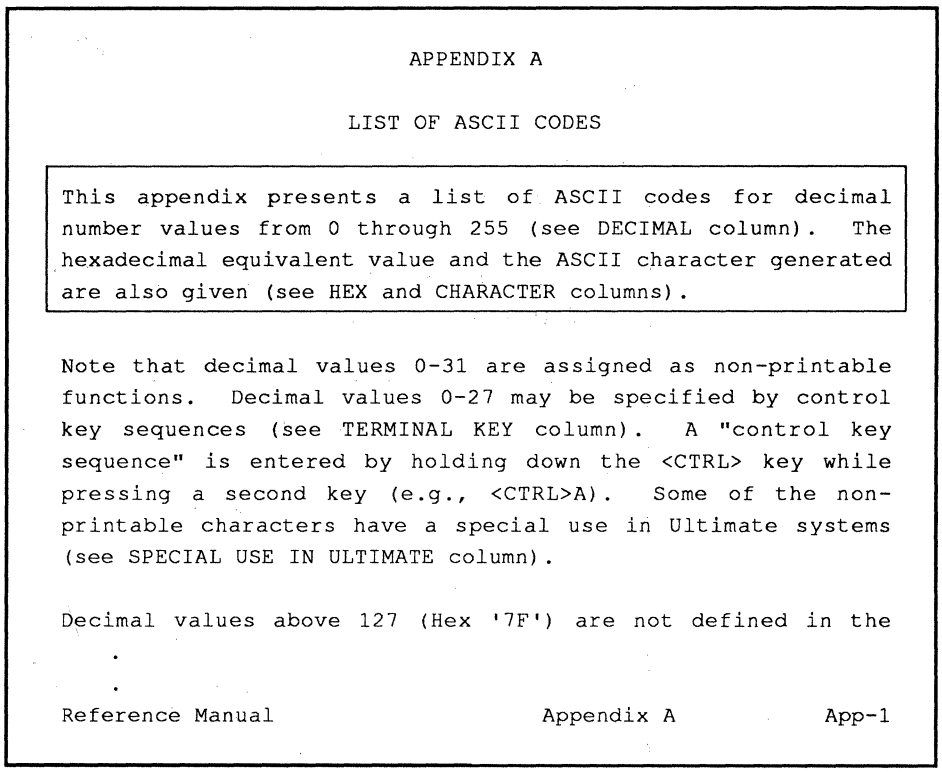
Figure 19 is a sample UltiWriter screen. Figure 20 shows the output of that item.

As of Revision 210, all Ultimate systems include a single-user version of UltiWriter. Multi-user versions are available as an option.

For further information, please refer to the *UltiWriter Training Guide* and *UltiWriter User's Guide.*

```
                                                COL 011  LINE 0001  PAGE 0001
....+....1....+...2T...+....3....+....4T...+....5....+....6....7....7R...+..
          +                          APPENDIX A <
          <
          +                     LIST OF ASCII CODES <
          @FT:ASMFOOT:<
          @BB<
          This appendix presents a list of ASCII codes for decimal
          number values from 0 through 255 (see DECIMAL column).  The
          hexadecimal equivalent value and ASCII character generated
          are also given (see HEX and CHARACTER columns). <
          @EB<
          <
          Note that decimal values 0-31 are assigned as non-printable
          functions.  Decimal values 0-27 may be specified by control
          key sequences (see TERMINAL KEY column).  A "control key
          sequence" is entered by holding down the <CTRL> key while
          pressing a second key (e.g., <CTRL>A).  Some of the
          non-printable characters have a special use in Ultimate
          systems (see SPECIAL USE IN ULTIMATE column). <
          <
          Decimal values above 127 (Hex '7F') are not defined in the
```

Figure 19. UltiWriter Screen



APPENDIX A

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Decimal values above 127 (Hex '7F') are not defined in the

.

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Reference Manual Appendix A App-1

Figure 20. UltiWriter Output

Communications Tools

The Ultimate Operating System provides the following communications tools:

- commands for bisynchronous communications
- UltiLink - an asynchronous communications utility
- UltiNet - networking capabilities

These tools may not be available on all platforms.

Bisynchronous Communications

Bisynchronous communication is provided through a set of system commands. These commands are used to receive and transmit data between an Ultimate system and any other system emulating an IBM 2780 or 3780 communication device.

The following system commands are used for bisynchronous communications:

B-ATT	attaches controller to a port
B-DET	detaches controller from a port
B-LIST	lists the controllers and their attachments, if any
BSC-DIAL	dials number automatically
DISCONNECT	disconnects telephone connection and takes data set out of auto-answer mode
RECEIVE	initiates receive-file request
TRANSMIT	initiates transmit-file request

For further information, please refer to the *Ultimate System Management and Support User's Guide.*

UltiLink

UltiLink is an asynchronous communications utility that is used to transfer data between Ultimate systems. UltiLink works in batch mode, so that you can queue requests to transmit and receive data, then establish the connection at a later time. UltiLink transmits the data, performs error checking, and if your modem supports it, automatically dials and disconnects. It keeps a history file of all its transactions, which can be printed as desired.

UltiLink can work either through a modem or through a direct connection between two systems.

Figure 21 shows a sample of the UltiLink main menu. Many of the functions on the main menu can also be accessed directly from TCL in the UltiLink account.

For further information, please refer to the *UltiLink User's Guide.*

```
ULTILINK-node          Async Network Communications Menu     REV X

TCL Verbs ---     1. Print Documentation
                  2. UltiLink Setup
                  3. System Node File Maintenance
                  4. Enable User Account to use UltiLink
NODE.CONN        10. Attempt line connection with NODE
                 11. Kill line connection on NODE

ACOPY            20. Create File/Item Data Transfer Request
ACOPY-A          21. Create Account Data Transfer Request
ARECEIVE         22. Create File/Item Data Receive Request
ARECEIVE-A       23. Create Account Data Receive Request
ALIST            24. List Data Transfer/Receive Requests

ASTATUS          30. Node/Line Connection Status
                 31. Kill Current Data Transfer

AHISTORY         40. Transferred/Received History listing
                 41. Transferred/Received History clear
                 42. Reset all Data work Files

                       ENTER REQUEST NUMBER:
```

Figure 21. UltiLink Main Menu

UltiNet

An UltiNet networking system is composed of hardware and software. The UltiNet network allows you to connect and transfer data between two or more Ultimate 6000/7000 or LSI™ systems. (A network is a system of computers, terminals, and databases connected by communications lines.)

Each computer that is part of a network is referred to as a system or *host* within the network. The computer to which your terminal is attached is called a *local host system* and other computers within the network are called *remote host systems*.

Each host computer has an ULTINET account, an HDLC communications controller board, and two phantom processes: a Communications-Process and a File-Server. In addition, if more than two computers are configured in the network, or if the network interfaces through a Public Data Network (PDN), a Network Controller is needed.

When a network becomes operational, all remote file transfers are processed through the network equipment.

The synonym definition pointer structure that exists in the Ultimate Operating System is used to access data on a remote system. To access data in a file on another account within a single system, you set up a pointer (called a *Q-pointer*) to that file. Similarly, to access data in a file on a remote system in a network, you need to set up a Q-pointer to that remote file. The Q-pointer to a remote file includes the name of the remote host system, as well as the account and file names.

Once a Q-pointer has been defined on a network, data in the remote file can be accessed transparently through the Ultimate system software, such as TCL, Ultimate RECALL, BASIC, editors, and word processors, and through dictionary conversions and correlatives.

UltiNet is an optional package that is available for Ultimate 6000/7000 and LSI systems.

For further information, please refer to the *UltiNet User's Guide*.

Notes

4 System Architecture

The Ultimate system architecture is implemented in custom software and/or hardware for each model, using virtual memory management and an internal virtual machine.

Virtual Memory

Virtual memory allows the system to view the entire disk as if it were main memory and allows references to data without regard to the location of the data in physical main memory. When data is referenced that is currently not in main memory, the data is automatically brought in from the disk for processing.

The Ultimate Operating System organizes virtual memory into frames (pages); programs and data are stored in the frames. When data is needed for processing, the operating system determines if the frame that contains the data is already in main memory. If it is not, the frame is automatically transferred from the disk (virtual memory) to main memory. Frames that have been modified are written back to the disk as required.

In addition to user programs and data, most of the Ultimate system software is assigned to virtual memory.

The virtual memory feature of the Ultimate system provides access to a programming area not constrained by main memory, but as large as the entire available disk storage on the system.

Frame Sizes

The size of a frame varies from one platform to another. The frame size needs to be considered primarily when creating files or when transferring files between platforms with different frame sizes. Table 2 lists the frame sizes in bytes for each platform.

Table 2. Frame Size in Bytes by Platform

Platform	Frame Size (in bytes)
6000/7000	512
LSI	512
1400	2048
IBM S/370	2048 4096
Ultimate PLUS™	1024

Virtual Machine

Ultimate uses a virtual machine architecture expressly designed and optimized for database management. The Ultimate system architecture includes very powerful instructions expressly designed for character moves, searches, comparisons, and all supporting operations relating to managing variable length attributes and items.

The Ultimate Operating System is written in Pick assembly language, which is a generalized language not tied to any specific CPU type. The assembly language program source code is the same on any Ultimate system, regardless of the underlying hardware. This provides a versatility and portability that makes Ultimate a leader in creating software solutions to users in a variety of areas.

The source code is assembled into object code that is recognized by specific hardware. The following strategies are used to produce the object code:

- firmware - source code is assembled directly into machine code, which is implemented by firmware. This strategy is used on the LSI and 6000/7000 platforms.
- macro-expansion - source code is translated into a series of instructions in the native assembly language of the hardware, which is then compiled into machine code by the native assembler. This strategy is used on the 1400 and IBM S/370 platforms.
- translation - source code is translated into C language code, which is then compiled into machine code by the native C compiler. This strategy is used on all Ultimate PLUS platforms.

Kernels

In addition to the general instructions that make up the Ultimate system, each implementation has code that is specific to the hardware for that platform. This code is not part of the virtual machine and is referred to as the *kernel.* The kernel has traditionally had complete control of the hardware on which it is running. It schedules jobs; executes disk reads and writes, tape operations, spooler and printer jobs; and handles other operations related to hardware.

In Ultimate PLUS implementations, the Ultimate Operating System has no kernel. The implementation relies on the host system operating system to perform the tasks that are usually performed by the kernel; that is, functions normally performed by the Ultimate kernel are handled by UNIX®. In this sense, Ultimate PLUS is an operating environment, not an operating system.

Notes

Ultimate

THE ULTIMATE CORP.

ID Number_____

Reader Comment Form

Ultimate welcomes your comments. If you find a problem or error in this manual, or can suggest an improvement, please complete this form. Please attach additional sheets, if necessary.

Name	Phone Number ( )	System Number
Name of Manual	Document Number	Date
Comments:		

FROM:

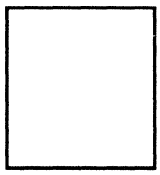
Name: _____ System Number: _____

Company _____

Address: _____

City: _____ State: _____ Zip: _____

Fold and tape. Please do not staple.



The Ultimate Corp.
717 Ridgedale Avenue
East Hanover, NJ 07936
Attn: Technical Support

Fold and tape. Please do not staple.

Ultimate

THE ULTIMATE CORP.

717 Ridgedale Avenue
East Hanover, NJ 07936
201/ 887-9222

System Overview 6924-1