dL4Term

Reference Guide

Revision 4.2

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How to Use This Book

Chapter Introduction

This guide is written for dL4Term users. It describes dL4Term installation and configuration. It is assumed that the user is familiar with Windows operating systems. If you are using Windows for the first time, you may want a comprehensive overview of the Windows operating system. See your Microsoft documentation for details on Windows operating system.

The terms and conventions used in this guide are described below.

General Conventions:

pfilter {**-c** *character-set*}	Values that you must supply are shown in italic type for clarity and to distinguish them from other elements of the syntax. In this example, *character-set* must be replaced by an actual character set name.
pfilter {**-c** *character-set*}	The right and left brace characters ({optional items}) indicate an item that is optional
WINDOW (**ON** | **OFF**)	Selection of one of a group of items is shown within parenthesis separated by |. Choose only one; in this example, the legal syntax is **WINDOW ON** or **WINDOW OFF**. The parenthesis is not part of the syntactical form.
Choose	Carry out a menu command or a command button in a dialog box by clicking it with the mouse or pressing the appropriate keys.
Choose the OK button	Click the OK button with the mouse or press the **ENTER** key on the keyboard to carry out the action of the dialog box or close the message window.

Mouse Conventions

This guide assumes that you have not swapped the left and right mouse buttons in the Windows Control Panel. Unless otherwise specified, any mention of a mouse button is referring to the left mouse button.

The following terms are used in this guide to describe actions you take with the mouse:

Point	Move the mouse until the tip of the mouse pointer rests on the screen object you want to point to.
Click	Point to the item you want to select and then press and release the mouse button without moving the mouse.
Double-click	Point to the item you want to select and then press and release the mouse button twice in rapid succession without moving the mouse.
Drag	Press and hold down the mouse button while you move the mouse. When you have moved the mouse pointer to the position you want, release the mouse button.

Keyboard Conventions

The following conventions are used to define the keys and key combinations:

- Key names appear in capital letters and are referred to by their names only, without the word "key". For example, press **ALT** means press the key labeled "Alt".
- A plus sign (+) between key names means you hold down the keys in the order that they are listed and press the last key. For example, **CTRL+D** means hold down the **CTRL** and the **D** keys together.
- A comma (,) between key names means you press and release each key in turn. For example, "press **ALT**,**P**" means press **ALT** and release it then press **P** and release it.

How to Use dL4Term

Chapter Introduction (Features)

dL4Term is a Windows 95/98/NT/2000 program that gives the user the ability to establish telnet connections to any host system on the network. The connection may be established by entering a Host name or the name of a login Script. The Host name may include a service name or port number. Login Scripts may be used to automate connection and launching an application. dL4Term fully supports the dL4 GUI mnemonics when used with dL4 for Unix.

dL4Term is a telnet client, but unlike other telnet programs, dL4Term does not emulate a specific character oriented terminal, such as a Wyse60 or VT100. Instead, it offers its own set of character-based and GUI (graphical user interface) features. The feature set that is understood is the set of UniBasic/dL4 mnemonics, including colors, fonts, protection and dL4 version 4 GUI mnemonics.

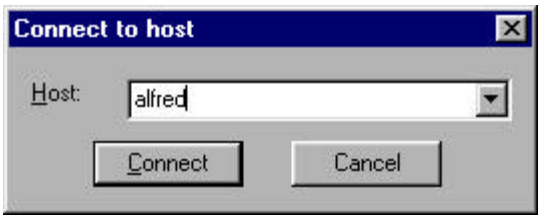
dL4Term operates on the same principle as other emulators, in that it recognizes specific character sequences to invoke its features. It differs in the sense that it cannot be instructed to recognize, and thereby emulate, the hard-coded character sequences of specific terminals. When connected to a Unix host, for example, dL4Term supports shell, vi, IQ, UniBasic and dL4. In essence, dL4Term is a GUI (graphic user interface) oriented terminal model with multiple windows and graphic controls such as buttons and list boxes. It also supports displaying multiple fonts or graphics in any of the windows belonging to the GUI "terminal".

Using dL4Term, GUI programs can run under either dL4 for Windows or dL4 for Unix and still produce the same Windows style user interface. These GUI features can also be used without using dL4. All of the GUI functions are controlled by character sequences thus allowing any Unix application to produce and control a Windows-like user interface (See Appendix). For character oriented Unix applications such as "vi", the GUI terminal model includes all necessary character terminal functions such as cursor positioning, line insertion/deletion, protected characters, and auxiliary printers.

dL4Term can be installed and used on any Windows 95, Windows 98, or Windows NT 4.0 system that supports telnet (TCP/IP) connections to a Unix host. A standard telnet connection is used to communicate with host systems. Unix terminal configuration files are supplied and must be installed on each Unix host before using vi (terminfo), dL4 for Unix, UniBasic, or IQ for Unix. For GUI programming in UniBasic and languages other than dL4, the dL4Term user guide describes each of the character sequences used by dL4Term.

Connecting to a Host System

Pull down the “Connect” menu and click on the “Connect” item. The “Connect to host” dialog box will be displayed.



The list box will contain previously entered names and all script names. Enter/select the host name or login Script name and click the “Connect” button. If a host name is entered, a TCP/IP connection on port 23(Telnet) is selected by default. To access other services or ports, the service or port may be specified by adding a colon and the service name or port number. For example: `bruce:echo` or `robin:25`

Disconnecting

Pull down the “Connect” menu and click on the “Disconnect” item. dL4Term will remain running awaiting a new connection.

Using Copy and Paste

The mouse may be used to select an area of the screen to copy to the clipboard. Click the upper left corner of the area to be copied and drag the mouse arrow to the lower right corner of the area to be copied. The selected area is highlighted. Release the mouse button and then press the right mouse button (or else pull down the “Edit” menu) and select the “Copy” item. The selected area is copied to the Windows clipboard.

Items in the Windows clipboard may be pasted to the current dL4Term host application. Press the right mouse button (or else pull down the “Edit” menu) and select the “Paste” item.

Using an Auxiliary Printer

Many applications have features that print to auxiliary printers attached to or available to your Windows system. Refer to the chapter Configuring Screen and Keyboard Options for information on configuring an auxiliary printer.

Using Scripts

Login scripts can be used to automate connection to a Host system and starting an application. A script will present a dialog box if needed for input of a user name and/or password. To create a Login script, select the “Scripting” item from the “Connect” menu. Refer to the chapter Scripting for more information on creating scripts.

Installing dL4Term

Chapter Introduction

dL4Term consists of dl4term.exe and various supporting utilities and libraries. This chapter provides all of the information you need to install dL4Term on your hard disk from the installation diskettes or from a downloaded installation file.

Minimum System Requirements

dL4Term Requires:

- A 386-based processor or better with a minimum of 8 megabytes of ram.
- dL4Term requires Windows 95, Windows 98, or Windows NT version 3.51 or later and will not run on Windows 3.11 or earlier.
- 2 megabytes of free disk space for installation or 1 megabytes of installed disk space.
- A mouse or other pointing device is recommended.

Licensing

dL4Term can only be used with a valid license. Read your dL4Term license for terms and conditions in using dL4Term.

Copying dL4Term Disks

Before you install dL4Term on your hard disk, DCI recommends making a copy of the setup disks as a backup.

Installing dL4Term from diskettes

To install dL4Term, perform the following steps:

1. If Windows is not running, reboot your system and start Windows.
2. Remove any previous dL4Term release.
3. Insert the dL4Term Setup disk in the appropriate floppy disk drive.
4. Run the program ‘DL4TERM.EXE’ on the diskette ("A:DL4TERM.EXE") and follow the displayed instructions. See your Microsoft Windows operating system documentation for instructions on how to run programs.

The program group created by the installation process includes an icon to run dL4Term using the command line interface and a README icon to display the README file. The README file describes recent changes in dL4Term and contains a list of the installed files.

Installing dL4Term from an installation file

To install dL4Term, perform the following steps:

1. If Windows is not running, reboot your system and start Windows.
2. Remove any previous dL4Term release.
3. The installation file is a self-extracting setup program. Run the installation file and follow the displayed instructions. See your Windows operating system documentation for instructions on how to run programs.

The program group created by the installation process includes an icon to run dL4Term using the command line interface and a README icon to display the README file. The README file describes recent changes in dL4Term and contains a list of the installed files.

Removing dL4Term

If the dL4Term program group has an uninstall icon, double-click the icon to uninstall dL4Term. Otherwise, see your Windows operating system documentation for instructions on how to uninstall an application.

Host System Configuration

Chapter Introduction

To use dL4Term with the DCI language products, terminal definitions must be installed on the host Unix system. The system administrator should perform the following steps:

1. Copy each of the files from the dL4Term Samples directory to the Unix host system using FTP in binary mode. Any other method that will copy files without translation is acceptable.
2. As root, compile the file ‘dl4term.tic’ using the following command:

   ```
   tic dl4term.tic
   ```

   This command will compile and install a terminal definition for use by “vi” and other “curses” based programs that use terminfo. If “termcap” support is needed (such as for some applications under Linux), the command

   ```
   cat dl4term.cap >>/etc/termcap
   ```

   can be used to add dl4term to the termcap database.
3. Perform the product specific steps listed in the following sections.

dL4 for Unix

To use dL4 for Unix with dL4Term, copy the file ‘dl4term’ to the directory ‘/usr/lib/dl4/term’. After copying the file, use the following command to make it readable by all users:

```
chmod 444 /usr/lib/dl4/term/dl4term
```

If the dL4 terminal definition files were installed in a directory other than ‘/usr/lib/dl4/term’, simply change the commands to use the actual directory. Note that this terminal definition file can only be used with version 4.1 or later of dL4 for Unix. Alternate terminal definition files, dl4term.dl43 and dl4term.chwin, are provided for earlier versions of dL4 or applications that depend on side effects of the character window driver.

UniBasic

To use Unibasic with dL4Term, copy the file ‘term.dl4term.iris’ or ‘term.dl4term.bits’ to ‘/usr/lib/ub/sys/term.dl4term’. If applications use the 'FM' and 'FX' mnemonics to enabled and disable protected characters, copy the file ‘term.dl4term.iris’. If applications expect the 'BP' mnemonic to both paint and enable protected characters, copy the file ‘term.dl4term.bits’. After copying the file, use the following command to make it readable by all users:

```
chmod 444 /usr/lib/ub/sys/term.dl4term
```

If the Unibasic terminal translation files were installed in a directory other than ‘/usr/lib/ub/sys’, simply change the commands to use the actual directory.

IQ for Unix

To use IQ for Unix with dL4Term, execute the following command to append the dL4Term definition to iqcap:

```
cat dl4term.iqcap >>/usr/lib/iq4/iqcap
```

If IQ for Unix was installed in a directory other than '/usr/lib/iq4', simply change the command above to use the actual directory.

VI and other Unix Applications (Terminfo and Termcap)

The terminal definition compiled and installed in step 2 above is compatable with Unix "curses" based application programs that use "terminfo". If any applications use "termcap", then dl4term.cap must be installed as described in step 2.

On most Unix host systems, the environment variable TERM will be automatically set to the required value of "dl4term" when a dL4Term user logs onto the system. If not, the user's '.profile' or other shell initialization file should be modified to set TERM to "dl4term".

Configuring Screen and Keyboard Options

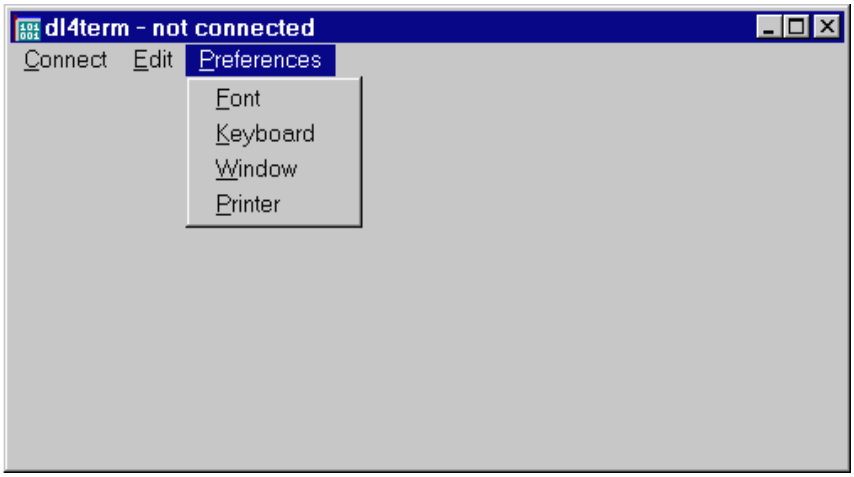
Chapter Introduction

When dL4Term is first installed, it uses a default configuration. This default configuration can be modified in the following areas:

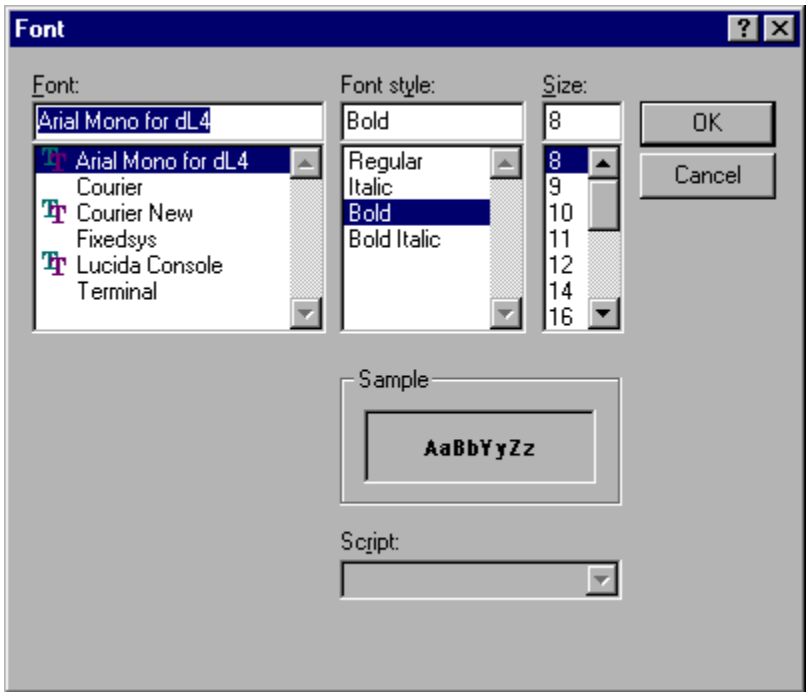
- Display window size
- Font characteristics
- Keyboard translation

Configuring the Main Display Window

The main display window of dL4 can be configured in many ways. You can change the font, the font (character) size, the number of lines or columns available, the number of lines or columns displayed, and the default foreground and background colors. To change the font or font size, choose the "Preferences" menu as shown below:

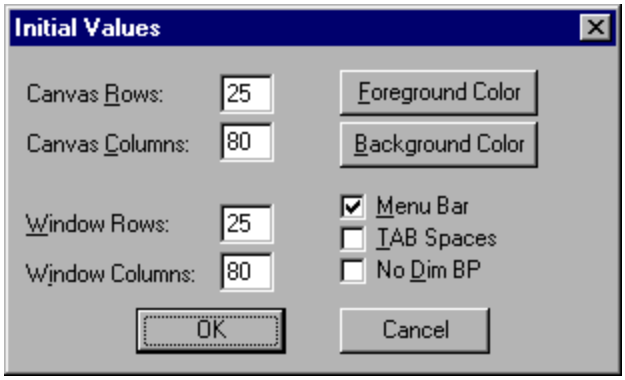


Then choose the "Font" item to display the following font dialog.



You can select a different font or font size by choosing the desired font name and/or size. The "Sample" window lets you preview the selected font and font size. After selecting a new font and/or font size, choose the "OK" button to exit the dialog. The features will not change until the next entry into dL4Term. Choose the "Cancel" button to continue using the existing font. If the "OK" button is chosen, the selected font and font size will be applied to the new main window and to the main window of any new dL4Term sessions.

To change the window size or default colors, choose the "Preferences" menu and then choose the "Initial Values" item. The dialog below will be displayed:



The "Canvas" is the virtual display on which all dL4Term screen output is drawn. The "Window" is that portion of the "Canvas" that is actually displayed on the screen. If the "Window" is smaller than the "Canvas", scroll bars will be displayed so that the user can select which portion of the "Canvas" is visible. The "Window" cannot be larger than the "Canvas". To change the "Canvas" or "Window" size, simply select the appropriate row or column box and enter the new value. The “Menu Bar”, “TAB Spaces”, and “Dim BP” check boxes control display options. If you choose the "OK" button, the row, column, and check box options will be written to the registry and used by all future dL4Term sessions. The window of the current session will not be changed.

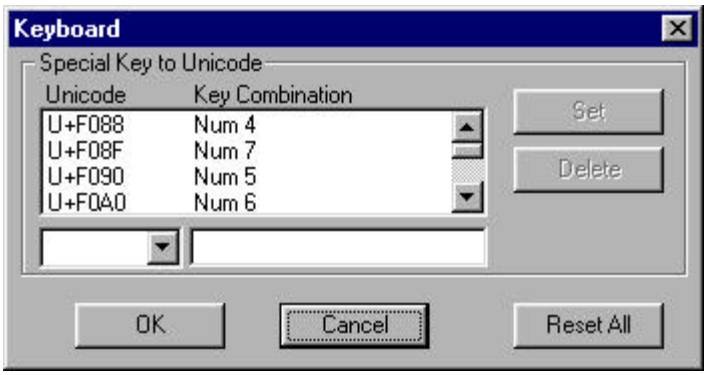
The “Initial Values” dialog has three check boxes to control special options. The "Menu Bar" check box controls whether the "Edit" and "Preferences" menus are displayed in a menu bar or as part of the system menu. If the “TAB Spaces” check box is enabled, the TAB function of the dL4 PRINT statement will clear all skipped characters when moving to a new position. If the “Dim BP” check box is enabled, characters in protected fields will not be displayed in reduced intensity. The values of the “TAB Spaces” and “Dim BP”

check boxes should not changed unless required by a dL4 application. Note that any change will not effect the current session.

The default foreground and background colors can be changed by choosing the "Foreground Color" or "Background Color" buttons. In either case, a color dialog will be displayed. If you choose the "OK" button within the color dialog, the specified color will be written to the registry and used by all future dL4Term sessions. The window of the current session will not be changed.

Configuring Keyboard Handling

To change the keyboard translation, first choose the "Preferences" menu, then choose the "Keyboard" item to display the following dialog:



To add a new key combination translation to the "Special Key to Unicode" table, perform the following steps:

1. Choose the box under the "Unicode" column of the table and enter the hexadecimal value to which the key combination will be translated.
2. Choose the box under the "Key Combination" column and type the desired key combination. All of the keys in the key combination must be pressed at the same time.
3. Choose the "Set" button to add the new definition to the table.

To delete a key translation from the "Special Key to Unicode" table, select the table row that defines the key and then choose the "Delete" button. The drop down list in the "Unicode" box is used to set the Unicode value using the value associated with an input action.

One reason to add a new translation to the "Special Key to Unicode" table is to redefine standard Windows keys. For example, **ALT+F4** normally causes a Windows program to exit. In the dL4 environment, it might be desirable to treat **ALT+F4** as an **ESCAPE** character, which interrupts the application. This could be done in the "Special Key to Unicode" table of the keyboard dialog, by entering "1B" (assuming **ESCAPE** is used as the **ESCAPE** input action) in the Unicode box, pressing the **ALT** and **F4** keys while in the "Key Combination" box, choosing the "Set" button, and then choosing the "OK" button. Warning: redefining **ALT** key combinations may confuse the user by interfering with expected Windows behavior.

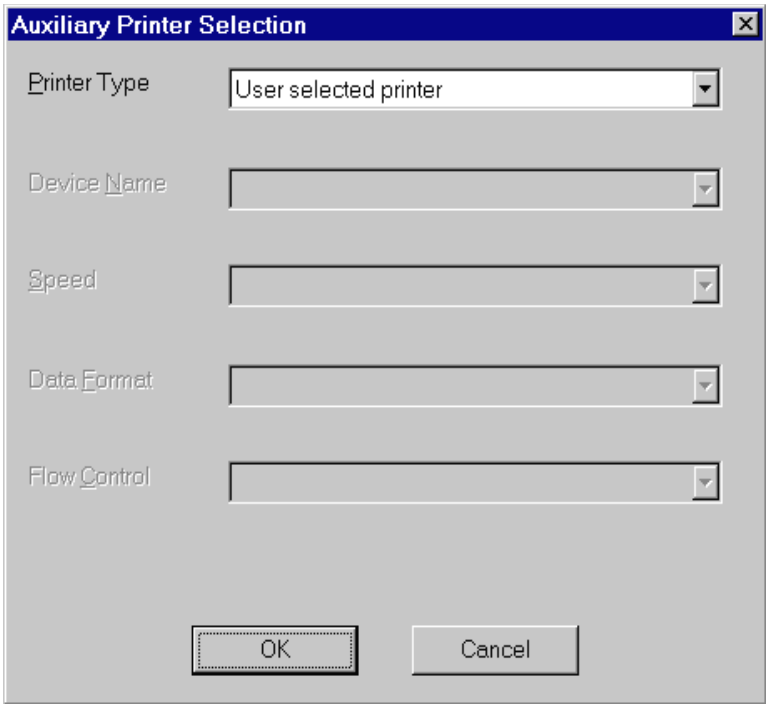
In the list box, a “Key Combination” value of “VK=xxx” indicates a key combination which isn’t supported by the keyboard.

Choosing the "Reset All " button will set the table to default values.

After making your changes to the "Special Key to Unicode" table, choose the "OK" button to exit the dialog and apply the changes. Choose the "Cancel" button to continue using the existing keyboard configuration. If the "OK" button is chosen, the new configuration will be applied to the current main window and to the main window of any new dL4Term sessions.

Configuring the Auxiliary Printer

Many applications have features that print to auxiliary printers attached to or available to your Windows system. To select an auxiliary printer, first choose the "Preferences" menu, then choose the "Printer" item to display the following dialog:



Select a printer type from the “Printer Type” drop down box. The supported types are:

- None (ignore data sent to the auxiliary printer)
- Default printer (send data to the Windows default printer)
- User selected printer (allow the user to select a printer each time a new document is printed)
- Printer (select a specific Windows printer as the auxiliary printer)
- Device (select a device such as LPT1: or COM3: as the printer)

If “Printer” is selected as the printer type, then the “Device Name” drop down box will be enabled and a printer name should be selected from that list. If “Device” is selected as the printer type, the “Device Name”, “Speed”, “Data Format”, and “Flow Control” drop down boxes will be enabled. These options should be set as required or the system default values for the selected device will be used.

The “Default printer”, “User selected printer”, and “Printer” types support all of the mnemonic character sequences and other formatting features of the dL4 Page Printer driver. The mnemonic characters can be used to control the current printer font (‘FONTFACE’), font size (‘FONTSIZE’), and other printer functions. If the “Device” printer type is selected, all auxiliary printer data is sent directly to the selected device without any formatting or translation.

Selecting a Locale

See your Microsoft documentation for instructions on how to configure Windows locale information.

Moving Configuration Parameters Between Systems

Window size, default font, and keyboard handling configuration can be copied by exporting the registry key

HKEY_CURRENT_USER\Software\DynamicConcepts\dL4Term\WinTerm

or, if system-wide settings have been created, by exporting the key

HKEY_LOCAL_MACHINE\Software\DynamicConcepts\dL4Term\WinTerm

and then importing the export file into the registry of the target system. Login scripts can be copied by exporting the registry key

HKEY_CURRENT_USER\Software\DynamicConcepts\dL4Term\Scripts

or, if system-wide settings have been created, by exporting the key

HKEY_LOCAL_MACHINE\Software\DynamicConcepts\dL4Term\Scripts

and then importing the export file into the registry of the target system.

Registry keys can be exported and imported with the Windows **REGEDIT** utility. See your Microsoft documentation for instructions on how to use **REGEDIT**.

Scripting

Chapter Introduction

Login scripts can be used to automate connecting to a system and starting an application. A script will present a dialog box if needed for input of a user name and/or password.

What Scripts Can Do

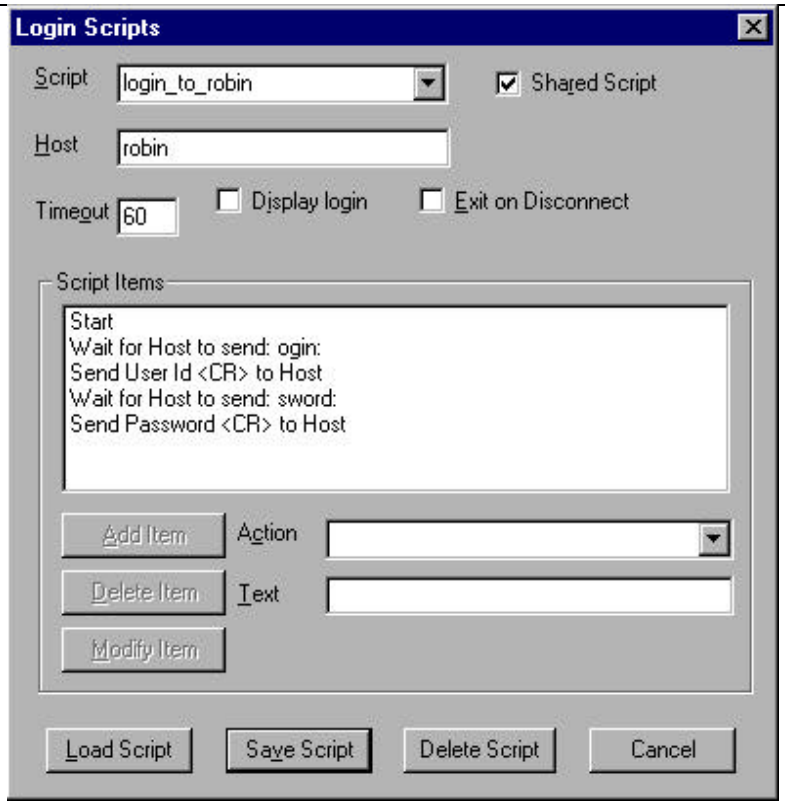
The “Scripting” function of the "Connect" menu makes it possible to create and modify login scripts. Login scripts are used to automate telnet sessions. A script can establish a telnet session, log on to the host session, and then start an application. A script consists of one or more actions selected from the “Action” drop down box. A typical script to log into a Unix system is:

```
Start
Wait for Host: ogin:
Send User Id <CR> to Host
Wait for Host: ssword:
Send Password <CR> to Host
```

Note that the strings "ogin:" and "ssword:" are arguments to the "Wait for Host:" action and must be entered in the “Text” box. When the script is used, dL4Term will display a dialog box for the user to enter a user id and password. The script will then attempt to log into the system. If the attempt fails, the script will timeout in 60 seconds (the "Wait failed if Host sends:" action can be used to detect a failed login without waiting for a timeout).

How to Create a Script

Login scripts are created by pulling down the “Connect” menu and click on the “Scripting” item.. The dialog box below is displayed.



Type a meaningful name in the “Script” text box.

Type the name of the host system that you are connecting to in the “Host” text box.

Scripts can either be shared by all users or belong only to the current user. Set or clear the "Shared Script" check box to control how a script is saved. All scripts are saved in the registry under the key Software\DynamicConcepts\dL4Term\Scripts in either HKEY_LOCAL_MACHINE (shared scripts) or HKEY_CURRENT_USER (personal scripts). Scripts can be copied between systems by exporting and then importing the script registry entry in Regedit.

The “Display” check box controls whether host output is displayed while the script is running. The "Exit on Disconnect" check box, if set, causes dL4Term to exit when the telnet session ends.

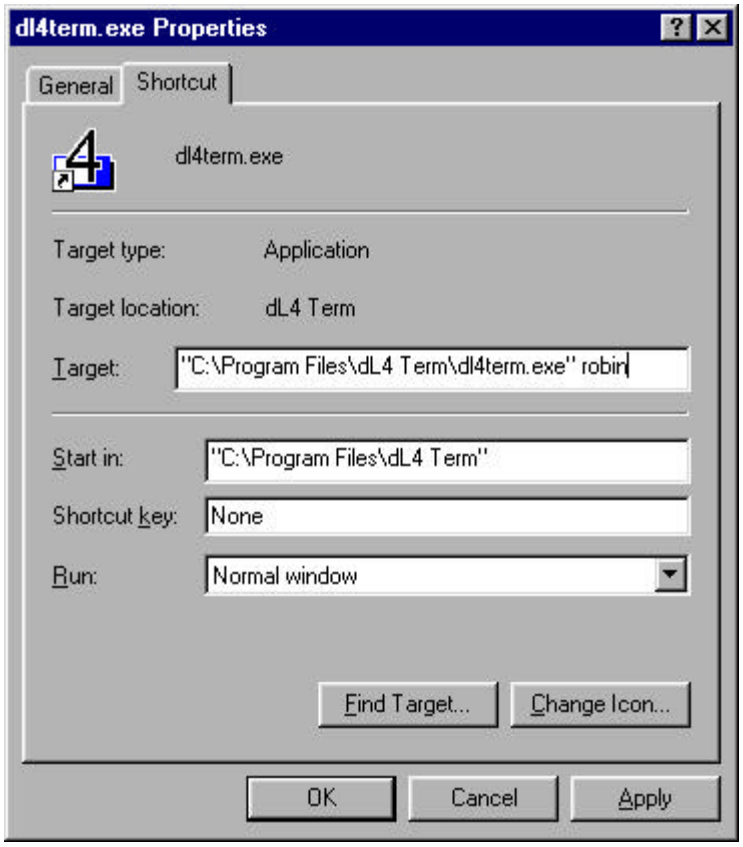
The script is created by selecting an action from the “Action” drop down box and clicking the “Add Item” button. The action is moved to the “Script Items” text box. If a “Wait” or “Send Text” action is selected, text may be typed into the “Text” box. This text will be moved to the “Script Items” text box along with the action item.

Action items may be deleted from the “Script Items” text box by highlighting the item and clicking the “Delete Item” button.

When the script is complete, click the “Save Script” button and the script will be saved as the meaningful name entered in the “Script” text box.

How to Create an Icon for a Script

Shortcut icons can be created to automatically start a telnet session using dL4Term. Simply create a shortcut to dL4Term and then modify the shortcut properties to add a system or script name to the target string. If the target string is quoted, add the system or script name after the closing quotation mark and separated by a space. The following example shows the properties dialog for a user that connects to the system `'robin'`.


dl4term.exe Properties
General
Shortcut
dl4term.exe
Target type:
Application
Target location:
dL4 Term
Target:
"C:\Program Files\dL4 Term\dl4term.exe" robin
Start in:
"C:\Program Files\dL4 Term"
Shortcut key:
None
Run:
Normal window
Find Target...
Change Icon...
OK
Cancel
Apply

Appendix: Terminal Programming

Chapter Introduction

Terminal programming for dL4Term is performed by sending or receiving encoded Unicode character or mnemonic values. Unicode is an international standard for a 16 bit character set. Mnemonic values are special Unicode characters used to perform operations (such as clearing the screen) or to represent special characters such as function keys. The mnemonic values used by dL4Term are identical to those used by the dL4 programming language.

Input Programming

After keyboard translation (see "Configuring Keyboard Handling" in the chapter Configuring Screen and Keyboard Options), all input characters typed in the terminal windows are sent to the host system. All input characters are Unicode values. Unicode values that are equivalent to ASCII characters (values between 0 and 127) except for control-A (decimal value 1) are sent without any special encoding. All other characters, including control-A, are encoded and sent as five character sequences beginning with a control-A and followed by the upper case hexadecimal value of the character. For example, pressing function key four results in the Unicode mnemonic character 'F4' (hexadecimal value 0xf144) being transmitted as the string "\1\F144" or, in hexadecimal values 01 46 31 34 34. A table of Unicode mnemonic characters is included "Mnemonic Value Table" section.

Output Programming

Output programming consists of sending Unicode characters, dL4 mnemonics, and mnemonic parameters to dL4Term. Both Unicode characters and dL4 mnemonics (see table below) are sent using the following encoding: character values between 2 and 127 (ASCII characters) are transmitted as is; all other characters are sent as five character sequences beginning with a control-A and followed by the upper case hexadecimal value of the character. For example, the clear screen mnemonic ('CS') has a hexadecimal value of 0xf090. It is transmitted to dL4Term as the string "\1\F090" or, in hexadecimal character values, as 01 46 30 39 30.

Many dL4 mnemonics have numeric or string parameters. These parameters must be encoded and transmitted to dL4Term prior to sending the mnemonic character. Numeric parameters are encoded as variable length sequences: the first character is always a Field Separator (decimal 28, octal 34) character, followed by the decimal value of the parameter as ASCII digits, and terminated by a comma (",") character. Thus, the decimal value 15 is encoded as "\34\15," or, in hexadecimal character values, as 1C 31 35 2C. A common example of using numeric parameters is in cursor positioning. To position dL4Term to column 10, row 5, the mnemonic string '10,5 MOVETO' must be transmitted. This string is encoded as "\34\10,\34\5,\1\F0FF' or, in hexadecimal character values: 1C 31 30 2C 1C 35 2C 01 46 30 46 46.

The encoding of string parameter values is more complex than that of numeric parameters. The first 15 characters of a string parameter are encoded as a length mnemonic followed by the parameter value string. The length mnemonic is a Unicode character with the value 0xe200 + L where L is the number of parameter characters. Both the length character and the value characters are then encoded using the rules for Unicode/mnemonic characters described above (either "c" or "\1\xxxx"). String values of more than 15 characters are sent using the same format for the first 15 characters and then followed by similar sequences

to append additional characters to the parameter. These appending values uses a special length mnemonic of 0xe210 + L where L is the number of characters. The length L must be between 1 and 15 characters. Using these rules, the string parameter value “Test” can be encoded as “\1\E204Test”.

Mnemonic Value Table

The dL4 mnemonic values shown in the table below are used to control dL4Term and to represent special input values such as function keys. A more detailed description of the mnemonics can be found in the dL4 programming manuals.

Mnemonic	Hex Value	Meaning
IOIHIR	0xf000	IO INPUT HANDLING IRIS
IOIHSM	0xf001	IO INPUT HANDLING SMBASIC INPUT
IOIHSR	0xf002	IO INPUT HANDLING SMBASIC READ RECORD
IOIHSI	0xf003	IO INPUT HANDLING SIMPLE
IOBE	0xf004	IO BEGIN INPUT ECHO
IOEE	0xf005	IO END INPUT ECHO
IOBI	0xf006	IO BEGIN TRANSPARENT INPUT
IOEI	0xf007	IO END TRANSPARENT INPUT
IOBO	0xf008	IO BEGIN TRANSPARENT OUTPUT
IOBD	0xf009	IO BEGIN DESTRUCTIVE BACKSPACE
IOED	0xf00a	IO END DESTRUCTIVE BACKSPACE
IOBS	0xf00b	IO BEGIN BACKSLASH ON ESCAPE
IOES	0xf00c	IO END BACKSLASH ON ESCAPE
IOCI	0xf00d	IO CLEAR INPUT BUFFER
IOBC	0xf00e	IO BEGIN ACTIVATE ON CONTROL CHARACTER
IOEC	0xf00f	IO END ACTIVATE ON CONTROL CHARACTER
IOBX	0xf010	IO BEGIN XON XOFF PROTOCOL
IOEX	0xf011	IO END XON XOFF PROTOCOL
IORS	0xf012	IO RESET ALL
IOBF	0xf013	IO BEGIN FUNCTION KEY INPUT TRANSLATION
IOEF	0xf014	IO END FUNCTION KEY INPUT TRANSLATION
IOTE	0xf015	IO TOGGLE INPUT ECHO
GRIDENGLISH	0xf020	SET COORDINATE GRID BY ENGLISH
GRIDMETRIC	0xf021	SET COORDINATE GRID BY METRIC
GRIDFONT	0xf022	SET COORDINATE GRID BY FONT
FONTFACE	0xf024	SET FONT TYPEFACE
FONTSIZE	0xf025	SET FONT SIZE
FONTWEIGHT	0xf026	SET FONT WEIGHT

FONTCOLOR	0xf027	SET FONT COLOR
PENSTYLE	0xf02c	SET PEN STYLE
PENWEIGHT	0xf02d	SET PEN WEIGHT
PENCOLOR	0xf02e	SET PEN COLOR
BRUSHCOLOR	0xf034	SET BRUSH COLOR
TALEFT	0xf038	SET TEXT ALIGNMENT LEFT
TACENTER	0xf039	SET TEXT ALIGNMENT CENTER
TARIGHT	0xf03a	SET TEXT ALIGNMENT RIGHT
TADECIMAL	0xf03b	SET TEXT ALIGNMENT DECIMAL
BACKCOLOR	0xf03c	SET BACKGROUND COLOR
LINETO	0xf03f	DRAW LINE TO
RECTTO	0xf03e	DRAW RECTANGLE TO
RECT	0xf040	DRAW RECTANGLE
ELLIPSE	0xf041	DRAW ELLIPSE
RB	0xf087	RING BELL
ML	0xf088	MOVE LEFT
TF	0xf089	TAB FORWARD
MH	0xf08f	MOVE HOME
CS	0xf090	CLEAR SCREEN
S1	0xf091	SPECIAL CODE 1
S2	0xf092	SPECIAL CODE 2
S3	0xf093	SPECIAL CODE 3
S4	0xf094	SPECIAL CODE 4
ES	0xf095	END WRITE STATUS LINE
SF	0xf097	STATUS LINE OFF
WS	0xf098	BEGIN WRITE STATUS LINE
K0	0xf099	SET CURSOR OFF
K1	0xf09a	SET CURSOR BLINKING BOX
K2	0xf09b	SET CURSOR STEADY BLOCK
K3	0xf09c	SET CURSOR BLINKING UNDERLINE
K4	0xf09d	SET CURSOR STEADY UNDERLINE
BG	0xf09e	BEGIN GRAPHICS MODE
EG	0xf09f	END GRAPHICS MODE
MR	0xf0a0	MOVE RIGHT
RD	0xf0a1	READ CURSOR POSITION
EF	0xf0a2	END PROGRAM FUNCTION KEY
CU	0xf0a3	CLEAR SCREEN UNPROTECTED
CL	0xf0a4	CLEAR TO END OF LINE
CE	0xf0a5	CLEAR TO END OF SCREEN

P1	0xf0a6	PROGRAM FUNCTION KEY 1
P2	0xf0a7	PROGRAM FUNCTION KEY 2
P3	0xf0a8	PROGRAM FUNCTION key 3
P4	0xf0a9	PROGRAM FUNCTION key 4
MD	0xf0aa	MOVE DOWN
MU	0xf0ab	MOVE UP
P5	0xf0ac	PROGRAM FUNCTION KEY 5
P6	0xf0ad	PROGRAM FUNCTION KEY 6
P7	0xf0ae	PROGRAM FUNCTION KEY 7
P8	0xf0af	PROGRAM FUNCTION KEY 8
BB	0xf0b0	BEGIN BLINK MODE
EB	0xf0b1	END BLINK MODE
BR	0xf0b2	BEGIN REVERSE VIDEO MODE
ER	0xf0b3	END REVERSE VIDEO MODE
BD	0xf0b4	BEGIN DIMMED INTENSITY MODE
ED	0xf0b5	END DIMMED INTENSITY MODE
BP	0xf0b6	BEGIN PROTECTED MODE
EP	0xf0b7	END PROTECTED MODE
BU	0xf0b8	BEGIN UNDERLINE MODE
EU	0xf0b9	END UNDERLINE MODE
BX	0xf0ba	BEGIN EXPANDED PRINT MODE
EX	0xf0bb	END EXPANDED PRINT MODE
FM	0xf0bc	BEGIN FORMAT MODE
FX	0xf0bd	END FORMAT MODE
LK	0xf0be	LOCK KEYBOARD
UK	0xf0bf	UNLOCK KEYBOARD
BT	0xf0c0	BEGIN TRANSMISSION FROM MEMORY
MP	0xf0c1	USE MEMORY POINTER FOR NEXT POSITION
IL	0xf0c2	INSERT LINE
DL	0xf0c3	DELETE LINE
IC	0xf0c4	INSERT CHARACTER
DC	0xf0c5	DELETE CHARACTER
CT	0xf0c6	CLEAR TABS
ST	0xf0c7	SET TAB
AE	0xf0c8	AUXILIARY PORT ENABLE
AD	0xf0c9	AUXILIARY PORT DISABLE
SL	0xf0ca	SEND LINE
LU	0xf0cb	SEND LINE UNPROTECTED
SP	0xf0cc	SEND PAGE

GN	0xf0cd	SET COLOR GREEN
TB	0xf0ce	TAB BACKWARD
PI	0xf0cf	INPUT POSITION INDICATOR
RE	0xf0d0	SET COLOR RED
PU	0xf0d1	SEND PAGE UNPROTECTED
YE	0xf0d2	SET COLOR YELLOW
BL	0xf0d3	SET COLOR BLUE
MA	0xf0d4	SET COLOR MAGENTA
CY	0xf0d5	SET COLOR CYAN
WH	0xf0d6	SET COLOR WHITE
XX	0xf0d7	RESET ALL
SA	0xf0d8	SPECIAL CODE A
SB	0xf0d9	SPECIAL CODE B
SC	0xf0da	SPECIAL CODE C
SD	0xf0db	SPECIAL CODE D
BV	0xf0dc	BOX VERTICAL LINE
BH	0xf0dd	BOX HORIZONTAL LINE
WD	0xf0e2	SET WIDE MODE
NR	0xf0e3	SET NARROW MODE
RF	0xf0e4	RESET FUNCTION KEYS
TL	0xf0e5	TRANSMIT LINE UNPROTECTED
TP	0xf0e6	TRANSMIT LINE PROTECTED
TR	0xf0e7	TRANSMIT SCREEN UNPROTECTED
TS	0xf0e8	TRANSMIT SCREEN PROTECTED
PS	0xf0e9	PRINT SCREEN
BA	0xf0eb	BEGIN TRANSPARENT PRINT MODE
EA	0xf0ec	END TRANSPARENT PRINT MODE
RV	0xf0ed	SET REVERSED VIDEO
NV	0xf0ee	SET NORMAL VIDEO
BO	0xf0ef	BEGIN VISIBLE PRINT MODE
EO	0xf0f0	END VISIBLE PRINT MODE
BK	0xf0f1	BACK TO BEGINNING OF LINE
BC	0xf0f2	BEGIN COMPRESSED MODE
EC	0xf0f3	END COMPRESSED MODE
BI	0xf0f4	BEGIN ITALIC MODE
EI	0xf0f5	END ITALIC MODE
BSO	0xf0f6	BEGIN STRIKE OUT MODE
ESO	0xf0f7	END STRIKE OUT MODE
BBOLD	0xf0f8	BEGIN BOLD MODE

EBOLD	0xf0f9	END BOLD MODE
BSUB	0xf0fa	BEGIN SUBSCRIPT MODE
ESUB	0xf0fb	END SUBSCRIPT MODE
BSUP	0xf0fc	BEGIN SUPERSCRIPT MODE
ESUP	0xf0fd	END SUPERSCRIPT MODE
ALIGN	0xf0fe	ALIGN TO NEXT HORIZONTAL BOUNDARY
MOVETO	0xf0ff	MOVE TO
ADD	0xf100	FUNCTION KEY ADD
BEGIN	0xf101	FUNCTION KEY BEGIN
CANCEL	0xf102	FUNCTION KEY CANCEL
CLEAR	0xf103	FUNCTION KEY CLEAR
CLOSE	0xf104	FUNCTION KEY CLOSE
COMMAND	0xf105	FUNCTION KEY COMMAND
COPY	0xf106	FUNCTION KEY COPY
CREATE	0xf107	FUNCTION KEY CREATE
CUT	0xf108	FUNCTION KEY CUT
DIVIDE	0xf109	FUNCTION KEY DIVIDE
END	0xf10a	FUNCTION KEY END
EXEC	0xf10b	FUNCTION KEY EXEC
EXIT	0xf10c	FUNCTION KEY EXIT
FIND	0xf10d	FUNCTION KEY FIND
HELP	0xf10e	FUNCTION KEY HELP
LOAD	0xf10f	FUNCTION KEY LOAD
MARK	0xf110	FUNCTION KEY MARK
MESSAGE	0xf111	FUNCTION KEY MESSAGE
MODIFY	0xf112	FUNCTION KEY MODIFY
MOVE	0xf113	FUNCTION KEY MOVE
MULTIPLY	0xf114	FUNCTION KEY MULTIPLY
NEXT	0xf115	FUNCTION KEY NEXT
NEXTPAGE	0xf116	FUNCTION KEY NEXTPAGE
NEW	0xf117	FUNCTION KEY NEW
OPEN	0xf118	FUNCTION KEY OPEN
OPTIONS	0xf119	FUNCTION KEY OPTIONS
PASTE	0xf11a	FUNCTION KEY PASTE
PAUSE	0xf11b	FUNCTION KEY PAUSE
PREV	0xf11c	FUNCTION KEY PREV
PREVPAGE	0xf11d	FUNCTION KEY PREVPAGE
PRINT	0xf11e	FUNCTION KEY PRINT
REDO	0xf11f	FUNCTION KEY REDO

REFRESH	0xf120	FUNCTION KEY REFRESH
RENAME	0xf121	FUNCTION KEY RENAME
REPLACE	0xf122	FUNCTION KEY REPLACE
RESTART	0xf123	FUNCTION KEY RESTART
RESTORE	0xf124	FUNCTION KEY RESTORE
RESUME	0xf125	FUNCTION KEY RESUME
RUN	0xf126	FUNCTION KEY RUN
SAVE	0xf127	FUNCTION KEY SAVE
SELECT	0xf128	FUNCTION KEY SELECT
SETTINGS	0xf129	FUNCTION KEY SETTINGS
SIZE	0xf12a	FUNCTION KEY SIZE
SORT	0xf12b	FUNCTION KEY SORT
START	0xf12c	FUNCTION KEY START
STOP	0xf12d	FUNCTION KEY STOP
SUBTRACT	0xf12e	FUNCTION KEY SUBTRACT
SUSPEND	0xf12f	FUNCTION KEY SUSPEND
UNDO	0xf130	FUNCTION KEY UNDO
F0	0xf140	FUNCTION KEY 0
F1	0xf141	FUNCTION KEY 1
F2	0xf142	FUNCTION KEY 2
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F63	0xf17f	FUNCTION KEY 63
BLACK	0xf180	SET COLOR BLACK
RESETCOLOR	0xf181	RESET FG/PEN/BG COLOR TO DEFAULT
WINDOW	0xf182	CREATE WINDOW
WMODAL	0xf183	CREATE MODAL WINDOW
WCHILD	0xf184	CREATE CHILD WINDOW
WDELETE	0xf185	CLOSE/DESTROY WINDOW
WHIDE	0xf186	MAKE WINDOW INVISIBLE
WTITLE	0xf187	CHANGE WINDOW TITLE
WSELECT	0xf188	SELECT CURRENT WINDOW
WRANK	0xf189	CHANGE WINDOW Z-ORDER
WCANVAS	0xf18a	CHANGE CANVAS SIZE
WOUTPUT	0xf18b	CHANGE OUTPUT REGION SIZE/POSITION
WVIEW	0xf18c	CHANGE DISPLAY WINDOW CANVAS SIZE/POSITION
WSCROLL	0xf18d	SCROLL WINDOW POSITION IN CANVAS
WMOVE	0xf18e	MOVE DISPLAY WINDOW ON SCREEN

WSHOW	0xf18f	MAKE WINDOW VISIBLE
WOUTPUTSIZE	0xf190	RESIZE OUTPUT REGION
WVIEWSIZE	0xf191	RESIZE DISPLAYED WINDOW IN CANVAS
WENABLE	0xf192	ENABLE WINDOW
WDISABLE	0xf193	DISABLE WINDOW
WCBUTTON	0xf194	CREATE BUTTON
WCCHECK	0xf195	CREATE CHECK BOX
WCRADIO	0xf196	CREATE RADIO BUTTON
WCNUMBER	0xf197	CREATE NUMERIC INPUT BOX
WCSTRING	0xf198	CREATE CHARACTER INPUT BOX
WCPRIVATE	0xf199	CREATE CHARACTER HIDDEN INPUT BOX
WCLABEL	0xf19a	CREATE A LABEL FOR AN INPUT BOX
WCTEXT	0xf19b	CREATE MULTI-LINE CHARACTER DISPLAY BOX
WCMEMO	0xf19c	CREATE MULTI-LINE CHARACTER INPUT BOX
WCLIST	0xf19d	CREATE SELECTION LIST BOX
WCEDITLIST	0xf19e	CREATE EDITABLE SELECTION LIST BOX
WCLISTDROP	0xf19f	CREATE DROP DOWN SELECTION LIST
WCEDITDROP	0xf1a0	CREATE DROP DOWN EDITABLE LIST BOX
WCMENU	0xf1a1	CREATE MENU
WCMENUACTION	0xf1a2	CREATE MENU ACTION ITEM
WCMENUCHECK	0xf1a3	CREATE MENU CHECK BOX ITEM
WCMENURADIO	0xf1a4	CREATE MENU RADIO BUTTON ITEM
WCMENUSEP	0xf1a5	CREATE MENU SEPARATOR
WCENDMENU	0xf1a6	END MENU OR SUB-MENU DEFINITION
WCGROUP	0xf1a7	GROUP GRAPHICAL ELEMENTS
WCSELECT	0xf1a8	SELECT CURRENT GRAPHICAL ELEMENT
WCENABLE	0xf1a9	ENABLE USER INPUT/SELECTION TO/OF ELEMENT
WCDISABLE	0xf1aa	DISABLE USER INPUT/SELECTION TO/OF ELEMENT
WCQUERY	0xf1ab	REQUEST GRAPHICAL ELEMENT TO SEND VALUE
WCDELETE	0xf1ac	DELETE A GRAPHICAL ELEMENT
WCACTION	0xf1ad	CHANGE ACTION PERFORMED BY INPUT ELEMENT
WCFOCUS	0xf1ae	SET CURRENT FOCUS TO SELECTED ELEMENT
WCMARK	0xf1af	MARK OR SELECT ITEM
WCUNMARK	0xf1b0	UNMARK OR UNSELECT ITEM
WCSUBMENU	0xf1b1	CREATE SUBMENU
WCSETFONT	0xf1b3	SET FONT FOR CONTROLS
INPUTSTART	0xf1b4	RECORD START OF INPUT
LITNUL	0xf1b5	LITERAL NULL (BINARY ZERO)
LITCR	0xf1b6	LITERAL CARRIAGE RETURN

RESETATTR	0xf1b7	CLEAR ALL ATTRIBUTES (BLINK, DIM, ..)
BACTFN	0xf1b8	BEGIN ACTIVATE ON MNEMONIC CHARS
EACTFN	0xf1b9	END ACTIVATE ON MNEMONIC CHARS
INVERT	0xf1ba	INVERT COLORS IN SPECIFIED RECTANGLE
PGMFN	0xf1bb	PROGRAM FUNCTION KEY (Fn) VALUES
ONCLOSE	0xf1bc	CONTROL WINDOW CLOSE BEHAVIOR