



# DECwindows Motif Supplemental Guide for Simplified Chinese Support

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**Hewlett-Packard Company  
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The HP DECwindows Motif/Hanzi for OpenVMS Version 1.5 documentation set is available on CD-ROM.

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# Preface

This manual provides information for end users and programmers who want to use and develop internationalized applications in Simplified Chinese (Hanzi) locales on the HP DECwindows Motif system.

## Audience

This manual is for both new and experienced end users and programmers who are interested in the Simplified Chinese variant of the DECwindows Motif system.

## Organization

This manual is organized as follows:

### Chapter 1. Character Sets

It describes the Simplified Chinese character sets supported in DECwindows Motif.

### Chapter 2. Codesets

It describes the Simplified Chinese codesets.

### Chapter 3. Locales

It describes the Simplified Chinese locales.

### Chapter 4. Fonts

It provides information on Simplified Chinese fonts.

### Chapter 5. Keyboards

It provides information on Simplified Chinese keyboards.

### Chapter 6. Chinese Input Methods

It describes how to input Simplified Chinese characters.

### Chapter 7. Other Chinese Features

It provides descriptions on other Simplified Chinese features.

## Related Documents

The following documents supplement information in this manual:

1. *DECwindows Motif Internationalization Guide*
2. *OSF/Motif User's Guide Revision 1.1, Open Software Foundation, Prentice Hall, Englewood Cliffs, New Jersey 07632.*

3. *OSF/Motif Style Guide Revision 1.1, Open Software Foundation, Prentice Hall, Englewood Cliffs, New Jersey 07632.*
4. *X Window System, Third Edition, Robert W. Scheifler and James Gettys, Digital Press, 1992.*
5. *Programmer's Supplement for Release 5 of the X Window System, Version 11, David Flanagan, O'Reilly & Associates, Inc.*
6. *Codes of Chinese Graphic Characters for Information Interchange, Primary Set (GB2312-80), National Standards Bureau of China, Beijing, 1980.*
7. *Chinese Character Input Standard, GB18030-2000, National Standards Bureau of China, Beijing, 2001.*

## Conventions

The following typographical conventions are used in this manual:

- |  |   |
|--|---|
| mouse                                    | The term <i>mouse</i> is used to refer to any pointing device, such as a mouse, a trackball, a puck, or a stylus.   |
| MB1 (Select)<br>MB2 (Drag)<br>MB3 (Menu) | MB1 indicates the left mouse button, MB2 indicates the middle mouse button, and MB3 indicates the right mouse button.   |
| \$                                       | A dollar sign represents the DCL prompt.  |
| PF1 x                                    | A sequence such as PF1 x indicates that you must first press and release the key labeled PF1, then press and release another key or a pointing device button. |
| [Return]                                 | A key name enclosed in brackets indicates that you press that key on the keyboard.  |
| [Ctrl/C]                                 | This symbol indicates that you hold down the first named key (in this case, [Ctrl]) while pressing the key that follows the slash (in this case, [C]).        |

# 1. Character Sets

DECwindows Motif supports the following Simplified Chinese (Hanzi) character sets:

- GB2312-80
- Extended GB
- GBK and GB18030-2000

## 1.1. GB2312-80

The GB2312-80 character set is a standard published by the State Bureau of Standardization of the People's Republic of China (PRC) in 1980 and put in force in May, 1981.

GB2312-80 defines 7,445 characters, including 6,763 Chinese characters in the following categories:

- Graphic symbols

GB2312-80 defines 682 graphic symbols placed in rows 1–9.

- Level 1 characters

GB2312-80 defines 3,755 frequently used characters placed in rows 16–55.

- Level 2 characters

GB2312-80 defines 3,008 less frequently used characters placed in rows 56–87.

The GB2312-80 code table is divided into 94 rows (Qu), numbered from 1 to 94. Each row has 94 columns (Wei), also numbered from 1 to 94. Figure 1-1 illustrates the GB2312-80 character set.

Figure 1-1. GB2312-80 Character Set

<i>Row 1</i>	<b>Rows 1-9</b> GB 2312 Special Characters
<i>Row 10</i>	<b>Rows 10-15</b> Reserved
<i>Row 16</i>	<b>Rows 16-55</b> GB 2312 Level 1 Chinese Characters
<i>Row 56</i>	<b>Rows 56-87</b> GB 2312 Level 2 Chinese Characters
<i>Row 88</i>	<b>Rows 88-94</b> Reserved

## 1.2. Extended GB

The extended GB character set provides 8,836 (94 x 94) code points for defining user-defined characters. The 8,836 code points are divided into two regions:

- User-Defined Area — Spans rows 1–87 and provides 8,178 code positions.
- User-Defined (reserved) Area — Spans rows 88–94 and provides 658 code positions. This area is where users define special and frequently used user-defined characters.

The extended GB code table is similar to the GB2312 code table. It is divided into 94 rows and each row has 94 columns.

## 1.3. GBK and GB18030-2000

The GBK character set is an extension to the GB 2312-80 character set. GBK includes all of the Simplified Chinese (Hanzi) characters specified by the ISO 10646 standard

(also known as the GB13000:1.93 character set) that are not already included in GB 2312-80. GBK is therefore defined as a normative annex of GB13000.1-93.

The GB18030-2000 character set, defined by the Chinese National Standard organization, further extends GBK by means of 4-byte code points. That is, the GB18030-2000 character set has 4-byte encoding in addition to the 1-byte and 2-byte encoding of GBK.

GB18030-2000 incorporates GBK support for the Hanzi characters specified by Unicode Version 3.0 and the ISO/IEC 10646-2001 standard.



## 2. Codesets

DECwindows Motif supports the following Simplified Chinese codesets:

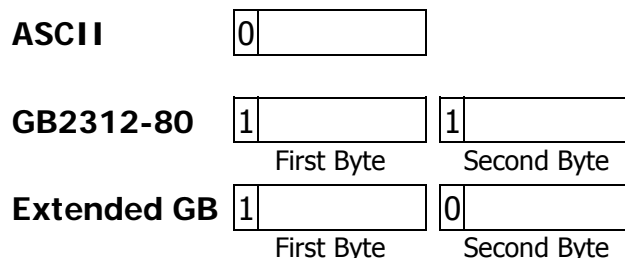
- DEC Hanzi
- GB18303

### 2.1. DEC Hanzi

The ASCII, GB2312-80 and extended GB character sets are combined to form the DEC Hanzi codeset.

DEC Hanzi, or Simplified Chinese and denoted as `dechanzi`, uses a 2-byte data representation for symbols and ideographic characters defined in the GB2312-80 character set. To differentiate GB2312-80 codes from ASCII codes, the most significant bit (MSB) of the first byte is always set on while that of the second byte is on for GB2312-80 and off for extended GB as shown in Figure 2-1.

Figure 2-1. DEC Hanzi Character Encoding



The first byte of a 2-byte code determines its row number, while the second byte determines its column number.

The following formulas illustrate the code of a GB2312-80 character or an extended GB character in relation to its row and column numbers.

GB2312-80 character:

$$\begin{aligned}\text{First byte} &= A0 + \text{row number} \\ \text{Second byte} &= A0 + \text{column number}\end{aligned}$$

Extended GB character:

First byte = A0 + row number

Second byte = 20 + column number

For example, if a character is positioned at the first column of the 16th row on the GB2312-80 code plane, its encoding value is calculated as follows:

First byte = A0 (hex) + 16 = B0 (hex)

Second byte = A0 (hex) + 01 = A1 (hex)

The resulting encoded value is B0A1.

Similarly, if a character is positioned at the first column of the 16th row on the extended GB code plane, its encoding value is calculated as follows:

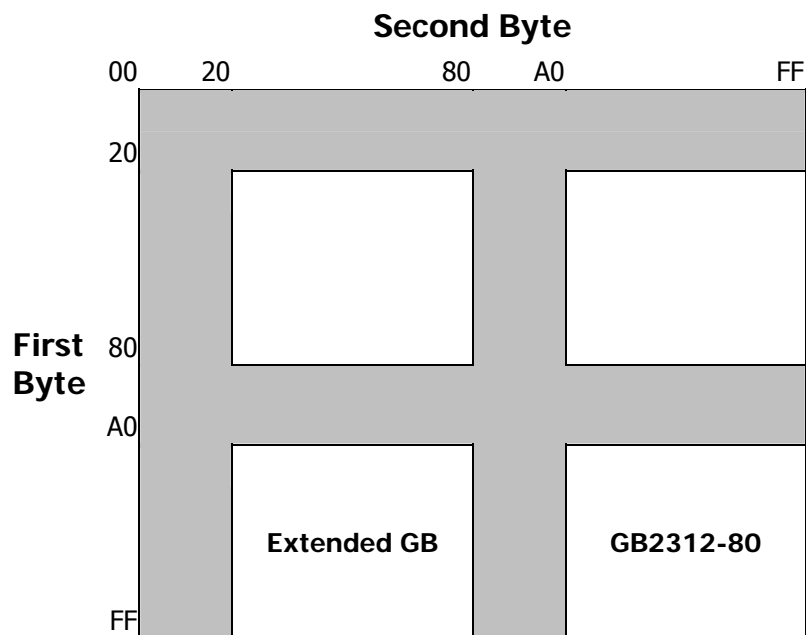
First byte = A0 (hex) + 16 = B0 (hex)

Second byte = 20 (hex) + 01 = 21 (hex)

The resulting encoded value is B021.

Figure 2-2 illustrates the division of a 2-byte code space and the position of the Chinese character sets.

**Figure 2-2. GB2312-80 and Extended GB Code Space**



## 2.2. GB18030

The GB18030 codeset provides 1-byte, 2-byte, and 4-byte encoding with the following structure:

<b>Number of Bytes</b>	<b>Encoding Range</b>	<b>Code Points</b>
1 byte	0x00 to 0x7F	128
2 bytes	0x81 to 0xFE 0x40 to 0xFE (except 0x7F)	23940
4 bytes	0x81 to 0xFE 0x30 to 0x39 0x81 to 0xFE 0x30 to 0x39	1587600

GB18030 1-byte code supports ASCII characters.

GB18030 2-byte code supports all the CJK characters (Chinese, Japanese, Korean) in the Unicode Version 2.1 Standard.

GB18030 4-byte code supports Unicode Version 3.0 additions. The 4-byte code also leaves a large number of unassigned code points available for future use.

## 3. Locales

### 3.1. Supported Locales

DECwindows Motif supports different Chinese locales for different countries and areas. These include People's Republic of China (PRC) and Hong Kong. Table 3-1 shows the valid Simplified Chinese locales.

**Table 3-1. Simplified Chinese Locales**

<b>Codeset</b>	<b>Locale</b>
DEC Hanzi	zh_CN
	zh_CN.dechanzi
	zh_HK.dechanzi
GB18030	zh_CN.GB18030

#### **Note**

zh\_CN is an alias for zh\_CN.dechanzi.

You can select the locale through the Language Menu of Session Manager. If you are using the Common Desktop Environment (CDE), you can select the locale using the language menu on the CDE login screen.

The applicable locales are shown in Table 3-2.

**Table 3-2. Chinese Language Names**

<b>Locale</b>	<b>Language Name</b>
zh_CN	Chinese China
zh_CN.dechanzi	Chinese China (DEC Hanzi)
zh_CN.GB18030	Chinese China (GB18030)
zh_HK.dechanzi	Chinese Hong Kong (DEC Hanzi)

# 4. Fonts

## 4.1. DECwindows Fonts

DECwindows Motif provides Chinese DECwindows fonts in various sizes and typefaces for 75 dpi (dot-per-inch) display devices. Table 4-1 lists the screen fonts for Simplified Chinese.

Table 4-1. Simplified Chinese Screen Fonts

Typeface	Glyph Size	Bounding Box	Remarks
Screen	15 x 16*	16 x 18	Mandatory font, defined in GB5199.1-85
	22 x 22*	24 x 24	Mandatory font
Songti	15 x 16*	16 x 16	Optional font, defined in GB5199.1-85
	22 x 22*	24 x 24	Optional font
	32 x 32*	34 x 34	Optional font, defined in GB6345.1-86
Heiti	15 x 16	16 x 16	Optional font
	22 x 22*	24 x 24	Optional font
	32 x 32*	34 x 34	Optional font, defined in GB12036-89
Fangsongti	22 x 22*	24 x 24	Optional font
	32 x 32*	34 x 34	Optional font, defined in GB12034-89
Kaiti	22 x 22*	24 x 24	Optional font
	32 x 32*	34 x 34	Optional font, defined in GB12035-89

### Note

The fonts marked with an asterisk are supplied by China Standard Technology Development Corporation (CSTDC) of People's Republic of China.

In addition to these Chinese fonts, several miscellaneous screen fonts are also provided for use in Hanzi DECterm and the Motif toolkit.

No 100 dpi Chinese fonts are provided in the kit. To allow you to use the Chinese fonts on 100 dpi display devices, a font alias file is provided to map the 75 dpi font names to 100 dpi font names.

## 4.2. XLFD Font Names

You must specify the DECwindows font names in X Logical Font Description (XLFD) format in your application programs or in the application resource files. You can specify wildcards "\*" for any fields in the font names.

You can use the following font names for both 75 dpi and 100 dpi display devices. If you want to state the display resolution explicitly, you can specify 75 or 100 in the X- and Y-resolution fields, that is, the second and third asterisks in the following XLFD names.

- Screen family font names in XLFD format:

```
-ADECW-Screen-Medium-R-Normal--*-180-*-*M-160-GB2312.1980-1  
-ADECW-Screen-Medium-R-Normal--*-240-*-*M-240-GB2312.1980-1
```

- Songti family font names in XLFD format:

```
-ADECW-Songti-Medium-R-Normal--*-160-*-*M-160-GB2312.1980-1  
-ADECW-Songti-Medium-R-Normal--*-240-*-*M-240-GB2312.1980-1  
-ADECW-Songti-Medium-R-Normal--*-340-*-*M-340-GB2312.1980-1
```

- Heiti family font names in XLFD format:

```
-ADECW-Heiti-Medium-R-Normal--*-160-*-*M-160-GB2312.1980-1  
-ADECW-Heiti-Medium-R-Normal--*-240-*-*M-240-GB2312.1980-1  
-ADECW-Heiti-Medium-R-Normal--*-340-*-*M-340-GB2312.1980-1
```

- Fangsongti family font names in XLFD format:

```
-ADECW-Fangsongti-Medium-R-Normal--*-240-*-*M-240-GB2312.1980-1  
-ADECW-Fangsongti-Medium-R-Normal--*-340-*-*M-340-GB2312.1980-1
```

- Kaiti family font names in XLFD format:

-ADECW-Kaiti-Medium-R-Normal--\*-240-\*-\*M-240-GB2312.1980-1  
 -ADECW-Kaiti-Medium-R-Normal--\*-340-\*-\*M-340-GB2312.1980-1

Table 4-2 shows the font names, in XLFD format, of several miscellaneous Chinese screen fonts.

**Table 4-2. XLFD of Miscellaneous Chinese Screen Fonts**

<b>XLFD Font Name</b>	<b>Character Set</b>
-ADECW-Screen-Medium-R-Normal--*-180-*-*M-80-ISO8859-1	ISO Latin-1
-ADECW-Screen-Medium-R-Normal--*-180-*-*M-80-DEC-DECctrl	DEC Display Control
-ADECW-Screen-Medium-R-Normal--*-180-*-*M-80-DEC-DECsuppl	DEC Supplemental
-ADECW-Screen-Medium-R-Normal--*-180-*-*M-80-DEC-DECtech	DEC Technical
-ADECW-Screen-Medium-R-Normal--*-180-*-*M-80-DEC-DRCS	DEC DRCS
-ADECW-Screen-Medium-R-Normal--*-240-*-*M-120-ISO8859-1	ISO Latin-1
-ADECW-Screen-Medium-R-Normal--*-240-*-*M-120-DEC-DECctrl	DEC Display Control
-ADECW-Screen-Medium-R-Normal--*-240-*-*M-120-DEC-DECsuppl	DEC Supplemental
-ADECW-Screen-Medium-R-Normal--*-240-*-*M-120-DEC-DECtech	DEC Technical
-ADECW-Screen-Medium-R-Normal--*-240-*-*M-120-DEC-DRCS	DEC DRCS

### 4.3. Bitmap Font Samples

Figure 4-1 through Figure 4-4 illustrate samples of Chinese fonts.

Figure 4-1. Songti Font Sample



Figure 4-2. Heiti Font Sample



Figure 4-3. Fangsongti Font Sample





Figure 4-4. Kaiti Font Sample



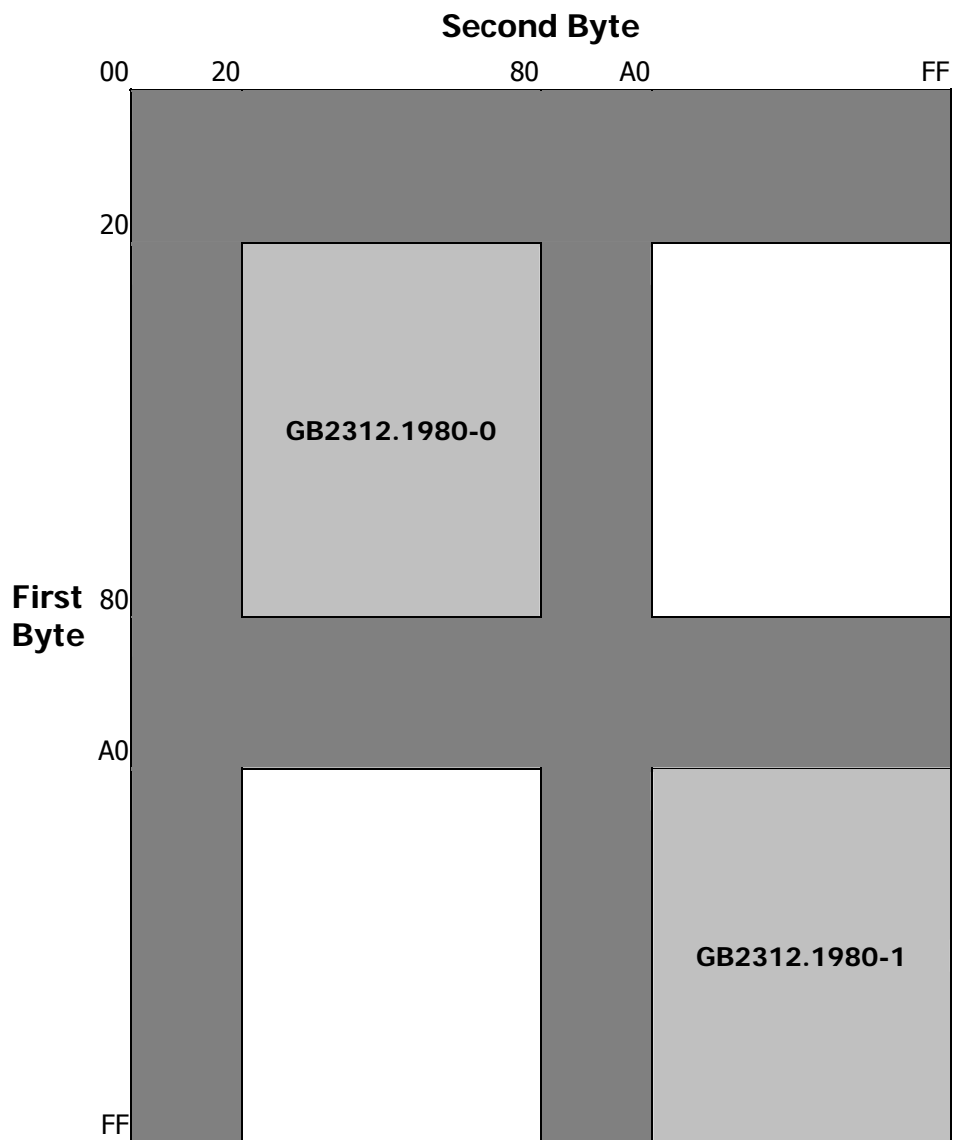
## 4.4. Font Encodings

For Simplified Chinese, the X Window System defines two encodings for the GB2312-80 character set as shown in Table 4-3. Figure 4-5 illustrates the GB2312-80 encoding scheme.

Table 4-3. Chinese DECwindows Font Encodings

Encoding	Character Set Registry
GL	GB2312.1980-0
GR	GB2312.1980-1

Figure 4-5. GB2312-80 Font Encoding Schemes



Vendors may adopt different encoding schemes or even different character sets to produce their fonts. The Chinese DECwindows fonts supplied by DECwindows Motif are all in GR encoding. To allow you to run applications on third-party workstations on which only GL-encoded fonts are installed, the DECwindows implementation of X11R6 Xlib supports the conversion of GR encoding to GL encoding for text drawing and measurement, as shown in Table 4-4.

Table 4-4. GR to GL Font Encoding Conversion

Convert From	Convert To
gb2312.1980-1	gb2312.1980-0

## 4.5. Specifying Fonts in DECwindows Applications

Table 4-5 shows the default fonts used in the Motif Toolkit:

Table 4-5. Simplified Chinese Default Fonts

XLFD Font Name	Character Set
-ADECW-Screen-Medium-R-Normal--*-180-*- *-M-80-iso8859-1	ISO8859-1
-ADECW-Screen-Medium-R-Normal--*-180-*- *-M-160-GB2312.1980-1	GB2312.1980-1
-ADECW-Screen-Medium-R-Normal--*-180-*- *-M-160-GB2312.1980-UDC	GB2312.1980- UDC
-ADECW-Screen-Medium-R-Normal--*-180-*- *_*_*_*	Fontset

To override the default fonts of a Simplified Chinese DECwindows application, you should specify the ISO Latin-1, GB2312-80 and extended GB (UDC) fonts as well as the Chinese fontset when creating widget instances.

# 5. Keyboards

## 5.1. Supported Keyboard Types

DECwindows Motif supports the following types of keyboards for Simplified Chinese input methods:

- LK201-C
- LK401-C

## 5.2. Keyboard Layouts

The following figures illustrate the layouts of the Simplified Chinese keyboards.

Figure 5-1. LK201-C Keyboard Layout

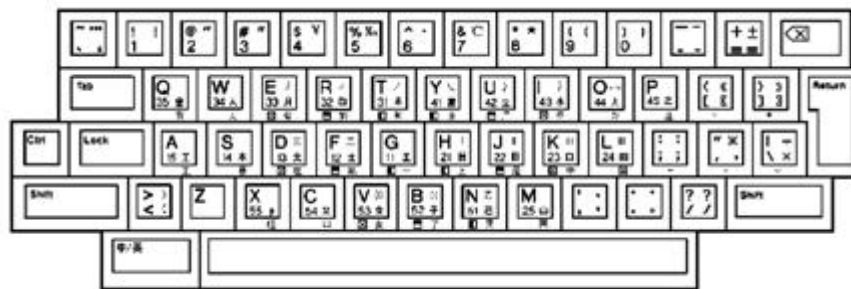


Figure 5-2. LK401-C Keyboard Layout

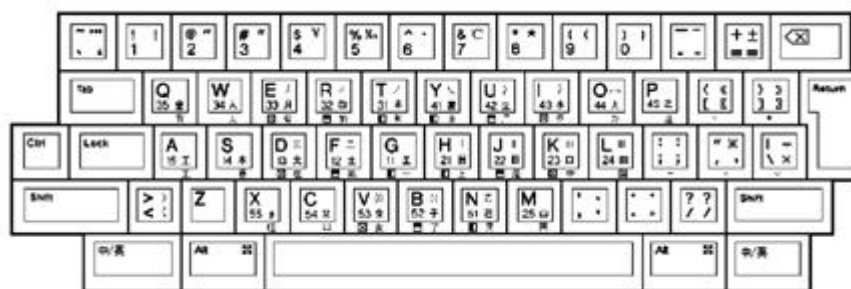


Figure 5-3. Numeric Keypad for 5-Stroke Input Method

PF1	PF2	PF3	PF4
7	8	9	-
4 拊 ㄥ	5 折 乙	6	'
1 横 一	2 竖 丨	3 撇 丿	Enter
0	.		

## 6. Chinese Input Methods

DECwindows Motif supports the following input methods for entering Simplified Chinese characters:

- 5-Stroke (五笔画)
- 5-Shape (五笔字型)
- PinYin or Phonetic (拼音)
- QuWei or Row-Column in GB2312-80 (国标区位码)
- Internal Code (内码)
- Unicode Value (统一码)
- Telex Code (电报码)
- Intelligent ABC or ItABC (智能 ABC)
- Phrase (片语)
- Symbol (符号)

In addition to these input methods, DECwindows Motif provides the DECW\$IM input server. It allows you to configure, manage and use the Simplified Chinese input methods.

This chapter describes:

- Each of the input methods listed above.
- How to activate, deactivate and customize the input methods and the input server.
- How to switch between input methods.
- How to work with input methods under the DECwindows Motif interface.

### 6.1. Activating Chinese Input Methods

You must activate a Simplified Chinese input method for response to the requirements of applications that are internationalized for the Simplified Chinese language. This section describes the steps you follow to activate a Simplified Chinese input method.

### 6.1.1. Input Server

Input methods are implemented by the `DECW$IM` input server. The `DECW$IM` input server is an X client process that runs on a standard X server. This means that the `DECW$IM` input server can run on any system that can access your X display device.

The `DECW$IM` input server provides input method services to the R6 X library (Xlib) supported by DECwindows Motif. You can write internationalized applications using the standard R6 application programming interface and communicate with the input server.

The `DECW$IM` input server is a multilingual input server because it gives you the means to use and manage input methods for Traditional Chinese, Japanese and Korean, as well as Simplified Chinese. This manual focuses on the Simplified Chinese input methods.

### 6.1.2. Starting Input Server

The `DECW$IM` input server requires that you perform the following prerequisite steps:

- Set the current locale to Simplified Chinese.
- Stop any other input server process running on the system.
- Set the pre-editing style, or interaction style, to either Off-the-Spot or Root Window as described in [Section 6.3.2](#).

There are several ways to start the `DECW$IM` input server:

- Automatic Startup

If the Simplified Chinese language is selected on the CDE login menu, the `DECW$IM` input server starts automatically by default. When you log in, the following command procedure runs:

```
CDE$SYSTEM_DEFAULTS : [ CONFIG.XSESSION_
D]0020IMS_START.COM
```

The value of the `DTSTARTIMS` symbol determines whether the command procedure will automatically start the input server.

- Using a Command

If you want to start the `DECW$IM` input server by hand, enter the following command:

```
$ SPAWN/NOWAIT/INPUT=_NL: MC DECW$IM
```

If you want to start `DECW$IM` from a remote system, log in to the remote system and enter the following command:

```
$ SET DISPLAY/CREATE/NODE=<display-name>  
$ SPAWN/NOWAIT/INPUT=_NL: MC DECW$IM
```

In the `<display-name>` field, enter the display name for your workstation.

After you activate an input method, applications that have been internationalized to support that input method can communicate with the input server to obtain input method services. You must start these applications after the input server starts.

### **Note**

---

Applications that are started before the input server cannot connect to it. However, if the application contains an `XmText` or `XmTextField` widget with the `reconnectable` resource set to `True`, the application is able to establish a connection with the input server if the application starts before the input server or when the application is running and the input server stops and restarts. For more information, see `XmText(3X)` and `XmTextField(3X)`.



### 6.1.3. Input Server Window

The `DECW$IM` input server window provides an options menu, including the Class/Input Method Customization menu item. If you select Class/Input Method Customization, it displays the Customize Class dialog box. The Customize Class dialog box and its sub-dialog boxes are described in [Section 6.5](#).

The title bar of the input server window is used to indicate the current state of the input server as described in [Section 6.4](#).

## 6.2. Switching Input Method

By default, a client application starts in the English language input mode. If the `DEW$IM` input server is active on your system, use the [Ctrl/Space] key sequence to shift from English input mode to non-English input mode. When you use [Ctrl/Space] to shift to non-English mode, keyboard character input is transmitted to `DEW$IM`, which converts the input using a selected input method and transmits the converted input to the client application.

The key sequences in this section can be customized by means of the Customize Input Method dialog box.

To select the Simplified Chinese input method under `DEW$IM`, use the appropriate key sequence from Table 6-1. First, press the invocation key for the input method class ([Shift/F6] for Simplified Chinese), and then an input method invocation key (any of [F5] through [F12]). Keep in mind that you do not repeat the invocation key for the input method class if you are switching input methods within that class. For example, use the [Shift/F6][F11] key sequence to invoke the 5-Shape input method under Simplified Chinese, but to switch from 5-Shape to 5-Stroke within Simplified Chinese, use only [F6].

**Table 6-1. Key Sequences Used to Select DEW\$IM Input Methods**

<b>Input Method Class</b>	<b>Input Method</b>	<b>Default Key Sequence</b>
Simplified Chinese		[Shift/F6]
	Intelligent ABC	[F5]
	5-Stroke	[F6]
	QuWei/Internal	[F7]
	PinYin	[F8]
	Telex Code	[F9]
	Phrase	[F10]
	5-Shape	[F11]
	Symbol	[F12]

## 6.3. Motif Interface for Input Methods

You can interact with the DEW\$IM input server through a Motif-style user interface. This interface allows an input method to provide feedback about the data being edited to compose a character, list choices for selection, provide options for customizing the input server, and so on.

### 6.3.1. Input Areas

The X Input Method specification defines the three input areas shown in the following table:

**Table 6-2. Window Input Areas**

<b>Region</b>	<b>Description</b>
Auxiliary area	An option menu that helps you customize the input methods and the input method window.
Status area	Displays critical information about the internal state of the input methods.
Pre-edit area	Displays the intermediate text that is being composed. Also displays a list of valid candidates for the input key sequences.

## 6.3.2. Interaction Styles

The use of the input areas depends on the interaction style (or pre-edit style) selected for the application. The Simplified Chinese input server supports two interaction styles:

- Root Window
- Off-the-Spot

You can specify the priority of the interaction styles for DECwindows Motif applications by using the `VendorShell` resource, `XmNpreeditType`. By default, the resource value is set to:

```
"offthespot,root,overthespot,onthespot"
```

This list is in priority order. The first style in the list is used in an input method. If that style is not available, the second is used, and so on.

To set a preferred interaction style, you can do one of the following:

- Use the Session Manager's Options menu in the DECwindows session. From the Session Manager's Options menu, select the "Input Method..." item, and then click on one of the pre-edit styles in the Input Method Options dialog box.
- Use the Style Manager's Keyboard control in the CDE session. Click on the Style Manager Keyboard control, then click on the Input Methods button in the Style Manager Keyboard dialog box, and then click on one of the pre-edit styles in the Input Methods dialog box.

The `XmNpreeditType` resource is set to a priority list beginning with the pre-edit style that you have chosen. After that, the applications you invoke start up with the new setting.

### **Note**

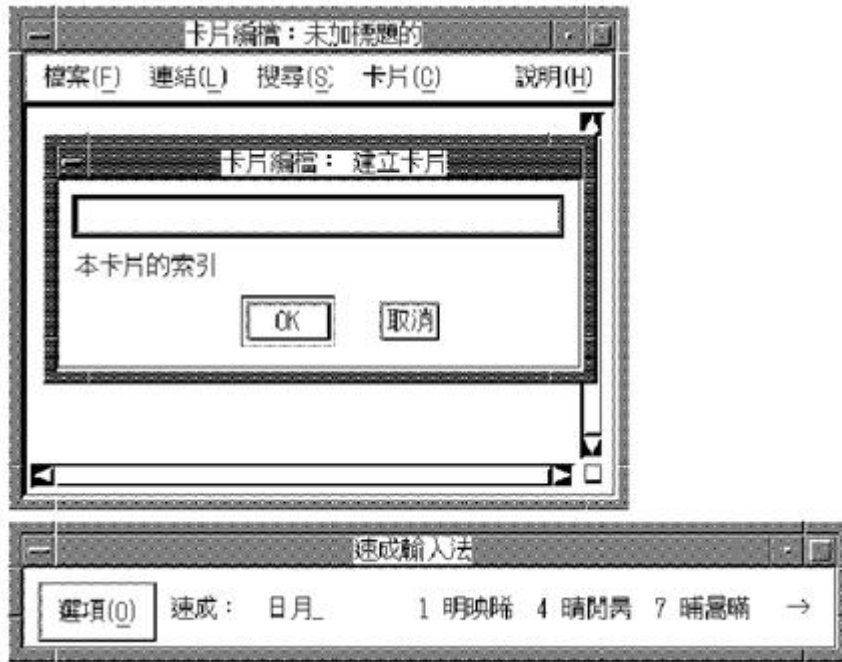
---

Some applications, such as DECterm, may provide their own user-interface to handle interaction styles. Those mechanisms may override the methods described here.

### 6.3.2.1. Root Window Interaction

Choose the Root Window interaction style if you want to display the pre-edit data in a separate window from the application window.

Figure 6-1. Root Window Interaction Style



### 6.3.2.2. Off-The-Spot Interaction

To display the pre-edit data in a fixed location of the application window, choose the Off-the-Spot interaction style. With this interaction style, the input server creates the input area at the bottom of the application window.

Figure 6-2. Off-the-Spot Interaction Style



## 6.4. Operations of Input Server

When the input server is started, no application is connected to it and the input server window displays "无连接" (no connection) in its title bar. When an internationalized application is started in a Simplified Chinese locale and gets focused, the name of the current interaction style is displayed in the title bar of the input server window to indicate that the application is connected to the input server, and the string "英语:" is displayed on the status area to indicate that the input mode for the application is English. If you invoke a Simplified Chinese input method, the input state displayed on the status area is updated accordingly. If you shift the input focus to a non-internationalized application window, the title of the input server window changes to indicate there is no connection again.

The input server can maintain multiple input states for each input context or application window. Thus, when you shift the input focus to an application window, the input server restores the previous input state for that application window. For example, if you are using an application window under the 5-Stroke input method, then shift the input focus to another application window under the PinYin input method, when you bring the previous window back in focus, the 5-Stroke input method will be active.

## 6.5. Customizing Input Server

The input server has different levels and different methods of customization. Under the `DECW$IM` input server, the input server window provides an options menu containing the following selections:

- Class/Input Method Customization that displays a dialog box for customizing input methods
- Help that displays online help for the `DECW$IM` input server
- Save Current Settings that saves values for use by the `DECW$IM` input server
- Exit

If you select Class/Input Method Customization, it displays the Customize Class dialog box. The Customize Class dialog box has further sub-dialog boxes. This series of dialog boxes enables you to do the following:

- Select a class of input methods that is appropriate to the locale of the client application. For a Simplified Chinese locale, you select and activate the Simplified Chinese class.
- Select and activate one or more input methods within a class. The DECW\$IM input server supports multiple input methods for Simplified Chinese.
- Establish an input method class as the default.
- Establish an input method as the default for its class.
- Customize the 5-Shape and Intelligent ABC input methods.
- Customize key sequences used to invoke input methods.
- Customize error bell volume.

Changes you make to the DECW\$IM input server settings are written to the DECW\$IM.DAT file in your login directory.

Systemwide default settings for the DECW\$IM input server are stored in the resource file, DECW\$SYSTEM\_DEFAULTS:DECW\$IM.DAT, and in the configuration file, DECW\$SYSCOMMON:[DECW\$DEFAULTS.SYSTEM.XIM]DECW\$IM\_MODULES.CONF. The system administrator can modify these files to make systemwide changes.

### 6.5.1. Customizing Input Method Class

If you select Class/Input Method Customization from the DECW\$IM options menu, it displays the Customize Class dialog box. The Customize Class dialog box enables you to activate, deactivate, and customize the Simplified Chinese and the other input method classes. The following table briefly describes each of the Customize Class dialog box selections. For a full description of the dialog box selections, see the DECW\$IM input server online help.

**Table 6-3. Customize Class Selections**

<b>Selection</b>	<b>Description</b>
Active Class	Displays the input method classes that are currently active on the system. Select one or more of these classes to customize or delete.
Invocation Key	Displays the key sequence used to invoke the selected input method class. Use the checkboxes under the display to change the invocation key.
Bell Volume Slider	A bell rings when an error is made during character composition. Drag the slider to adjust the volume of the bell.
Options pull-down menu	Select "Get System Defaults" to reset the Customize Class dialog box.
Add...	Opens a dialog box that allows you to select and activate a currently inactive input method class.
Delete	Deactivates a selected input method class. The class and its methods are made inactive and not available to applications.
Customize...	Opens a dialog box that allows you to activate, deactivate, and customize the input method modules associated with a selected input method class. The Customize Input Method dialog box selections are similar to the Customize Class dialog box selections described in this table.
Set Default	Establishes the selected input method class as the default.
OK	Saves the customizations to become effective the next time you start the input server. Closes the dialog box.
Apply	Same as OK, except that the dialog box does not close.
Cancel	Closes the dialog box without making any changes.
Help	Displays help on this dialog box.

## 6.5.2. Customizing Input Method Module

If you click on the Customize button in the Customize Class dialog box, the Customize Input Method dialog box is displayed. The following table briefly describes each of the Customize Input Method dialog box selections. For a full description of the dialog box selections, see the DECW\$IM input server online help.

Table 6-4. Customize Input Method Selections

<b>Selection</b>	<b>Description</b>
Active IM	Displays the input method modules that are currently active on the system. Select one or more of these input methods to customize or delete.
Invocation Key	Displays the key sequence used to invoke the selected input method module. Use the checkboxes under the display to change the invocation key.
Options pull-down menu	Select "Get System Defaults" to reset the Customize Input Method dialog box.
Add...	Opens a dialog box that allows you to select and activate a currently inactive input method module.
Delete	Deactivates a selected input method module. The method is made inactive and not available to applications.
Customize...	Opens a dialog box to change settings depending on the selected input method.
Set Default	Establishes the selected input method module as the default.
OK	Saves the customizations to become effective the next time you start the input server. Closes the dialog box.
Apply	Same as OK, except that the dialog box does not close.
Cancel	Closes the dialog box without making any changes.
Help	Displays help on this dialog box.



## 6.6. 5-Stroke Input Method

The 5-Stroke input method makes use of the basic strokes to construct the Chinese characters. A *stroke* is a segment of continuous line or curve that constitutes a Chinese character. The following table describes the five categories of strokes:

Table 6-5. Stroke Categories

Category	Description
Horizontal strokes or 横 (一)	horizontal lines and left-to-right ticks (提)
Vertical strokes or 竖 (丨)	vertical lines and right-to-left hooks (竖左钩)
Slash or 撇 (丿)	slanting lines and curves drawn towards lower-left
Back Slash or 捺 (丶)	dots (点), slanting lines and curves drawn towards lower-right
Zip-zap Curves or 折 (乙)	including different types of joints or corners which can be drawn in single continuous strokes

Using the 5-Stroke input method you can input single Chinese characters and Chinese terms. Approximately 5,000 terms can be input using this method.

### 6.6.1. 5-Stroke Input Mechanism

To input a Chinese character using the 5-Stroke input method, enter its 5-Stroke code through the numeric keypad according to the writing order. The following table shows the codes representing the five categories of strokes:

Table 6-6. 5-Stroke Codes

Stroke	Code	Key
一	1	[KP1]
丨	2	[KP2]
丿	3	[KP3]
丶	4	[KP4]
乙	5	[KP5]

[Figure 5-3](#) illustrates the numeric keypad layout on a Chinese LK201-C or LK401-C keyboard for entering 5-Stroke codes.

The following are the general rules of writing order for Chinese characters:

1. Write from top to bottom.
2. Write from left to right.
3. Write from outside to inside.
4. Write the inside radical before drawing the last stroke of the outside radical (for example, the last stroke of "囿" is "—").

### 6.6.1.1. Single Character Input

If a Chinese character is composed of exactly five strokes, simply enter the strokes according to the writing order. If it is composed of fewer than five strokes, then press [KP0] to signal the end of input. If the character is composed of more than five strokes, enter the first four strokes and the last stroke. The following table shows some examples:

**Table 6-7. Input of Single Characters with 5-Stroke Input Method**

Character	No. of Strokes	Write Order	5-Stroke Code	Key Sequence
用	5	丿, 乙, 一, 一,	35112	[KP3][KP5][KP1][KP1][KP2]
五	4	一,  , 乙, 一	12510	[KP1][KP2][KP5][KP1][KP0]
总	9	丶, 丿,  , 乙, 丶	43254	[KP4][KP3][KP2][KP5][KP4]

If you are uncertain about the type of strokes or the writing order of strokes, press the wildcard key [KP6] in place of the strokes. For details, see [Section 6.6.5](#).

### 6.6.1.2. Input of Terms

The 5-Stroke input method can be used to input terms. Eight strokes are required for entering terms. Press the [KP7] key before inputting strokes. The [KP7] key signals the system that the subsequent keystrokes are for composing a term instead of a character.

The number of strokes input for each character in a term depends on the number of characters composing the term as shown in the following table:

**Table 6-8. Strokes for Input of Terms**

<b>No. of Chars in Term</b>	<b>Strokes to be Input</b>
2	First 4 strokes of each character
3	First 2 strokes of the first two characters and the first 4 strokes of the last character
4	First 2 strokes of each character
> 4	First 2 strokes of the first three characters and the last character

If a character is composed of fewer strokes than required, press the [KP6] key for the outstanding strokes. If this character is the last character, press the [KP0] key to signal the end of input.

Table 6-9. Input of Terms with 5-Stroke Input Method

Term	No. of Chars	Chars	No. of Strokes	Req'd Strokes	5-Stroke Code	Key Sequence
世界	2	世	5	4	1221	[KP7][KP1][KP2]
		界	9	4	2512	[KP2][KP1][KP2] [KP5][KP1][KP2]
工人	2	工	3	4	121(6)	[KP7][KP1][KP2]
		人	2	4	34(0)	[KP1][KP6][KP3] [KP4][KP0]
计算机	3	计	4	2	45	[KP7][KP4][KP5]
		算	14	2	31	[KP3][KP1][KP1]
		机	6	4	1234	[KP2][KP3][KP4]
星期一	3	星	9	2	25	[KP7][KP2][KP5]
		期	12	2	12	[KP1][KP2][KP1]
		一	1	4	1(0)	[KP0]
百货公司	4	百	6	2	13	[KP7][KP1][KP3]
		货	8	2	32	[KP3][KP2][KP3]
		公	4	2	34	[KP4][KP5][KP1]
		司	5	2	51	
一分为二	4	一	1	2	1(6)	[KP7][KP1][KP6]
		分	4	2	34	[KP3][KP4][KP4]
		为	4	2	43	[KP3][KP1][KP1]
		二	2	2	11	
中华人民共和国	7	中	4	2	25	[KP7][KP2][KP5]
		华	6	2	32	[KP3][KP2][KP3]
		人	2	2	34	[KP4][KP2][KP5]
		国	8	2	25	

### 6.6.2. 5-Stroke Input Procedure

When the 5-Stroke input method is invoked, the string "五笔画" is displayed in the status area. When you input the 5-Stroke code, all the Chinese characters that match the code sequence are displayed in the pre-edit area. Each of the characters is associated with a number and you can select the character immediately using the corresponding numeric key on the main keyboard.

For example, if you press the [KP1] key, all characters starting with a horizontal stroke are displayed in the pre-edit area.

五笔画: 1 1 有 DEF 2 地 FBN 3 来 GOI 4 于 GFK 5 下 GHI  
6 可 SKD 7 面 DMJD 8 而 DMJJ +

If you press [KP2] after that, all characters whose 5-Stroke code starts with 12 are displayed in the pre-edit area.

五笔画: 12 1 地 FBN 2 下 GHI 3 可 SKD 4 机 SMN 5 本  
SGD 6 起 FHNV 7 政 GHTY 8 十 FGH +

You can use the [Delete] key to correct the 5-Stroke code. When you delete digits in the 5-Stroke code, the characters displayed in the pre-edit area are changed to match the remaining 5-Stroke code.

For example, press the [Delete] key once:

五笔画: 1 1 有 DEF 2 地 FBN 3 来 GOI 4 于 GFK 5 下 GHI  
6 可 SKD 7 面 DMJD 8 而 DMJJ +

Press the [Delete] key once more:

五笔画:

### 6.6.3. 5-Stroke Multiple Candidates

Because the same 5-Stroke code can represent more than one Chinese character, multiple candidates are sometimes available for selection when you enter a 5-Stroke code. For example:

将所有区域\_

五笔画: 12345 1 机 SMN 2 榜 SUPY 3 概 SVCQ 4 棍 SJXX 5  
杭 SYMN 6 楞 SLYN 7 麓 SSYX 8 枪 SWBN +

To select a character displayed on the pre-edit area, press the corresponding numeric key on the main keyboard. In the example, press numeric key [3] to select "概". If the desired character is displayed at the first position (in this case, the "机" character), you do not need to press [1] to select "机". You can simply enter another 5-Stroke code and the character will be selected automatically. This character is called the default character.

If there are too many candidates for selection, the candidates are displayed in two or more rows and a plus (+) sign is displayed to signal this. Press [Space], [Next] or [KP9] to display the next row of characters. To display the previous row of characters, press [Prev] or [KP8].

#### 6.6.4. 5-Stroke and Association Mode

To enhance the input efficiency, the Chinese input method maintains a list of built-in phrases in memory. If you select a character from the candidate list and there is a built-in phrase whose first character matches this character, the Association mode is automatically activated. For example:

将所有区域划\_

联想: 1 分

The string "联想:" is displayed in the status area. You can select one of the built-in phrases in the Association mode. After you select the phrase, you automatically exit the Association mode.

If there are many built-in phrases, they are displayed in two or more rows and a plus (+) sign is displayed to

signal this. Press [Space], [Next] or [KP9] to view the next row of phrases. To move backwards, press [Prev] or [KP8].

If you do not want to use any of the associated phrases, enter another 5-Stroke code to exit the Association mode automatically.

### **Notes**

---

1. The Association mode is activated only during single character input. It cannot be activated during term input.
2. The Association mode is activated only if you press a numeric key or the [Return] key to select a single character. If you use a way other than pressing [1] or [Return] to select the default character, the Association mode is not activated.

#### **6.6.5. 5-Stroke Wildcard Key**

The [KP6] key is a wildcard key, which can replace any strokes about which you are uncertain.

For example:

"字" — "\", "?", "乙", "乙", "一"

This example assumes you are uncertain about the second stroke, and so press [KP4][KP6][KP5][KP5][KP1].

Another example:

"化" — "丿", "丨", "?", "?"

This example assumes you are uncertain about the third and the fourth strokes, and so press [KP3][KP2][KP6][KP6][KP0].

### **6.7. 5-Shape Input Method**

The 5-Shape input method is a high performance input method which composes root radicals (字根) to form Chinese characters. By this method, thousands of

Chinese characters and terms can be input by entering one to four root radicals.

In addition to character input, the 5-Shape input method also supports term input. Around 5,000 terms are supported by the 5-Shape input method and each of them can be defined by four radicals.

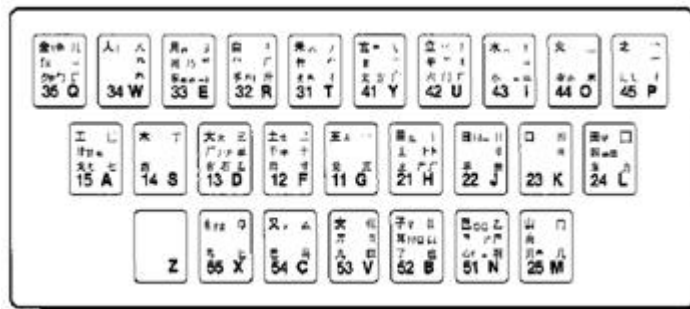
### 6.7.1. Distribution of 5-Shape Radicals

There are altogether 130 root radicals defined on 25 keys on the main keyboard. See Figures 5-1 and 5-2 for the layout of LK201-C and LK401-C keyboards. The 25 keys are divided into five groups, each contains five keys.

Table 6-10. Shape code

	Key 1	Key 2	Key 3	Key 4	Key 5
Group 1	[11]/[G]	[12]/[F]	[13]/[D]	[14]/[S]	[15]/[A]
Group 2	[21]/[H]	[22]/[J]	[23]/[K]	[24]/[L]	[25]/[M]
Group 3	[31]/[T]	[32]/[R]	[33]/[E]	[34]/[W]	[35]/[Q]
Group 4	[41]/[Y]	[42]/[U]	[43]/[I]	[44]/[O]	[45]/[P]
Group 5	[51]/[N]	[52]/[B]	[53]/[V]	[54]/[C]	[55]/[X]

Figure 6-3. Distribution of Radicals







2. The code for the first stroke of a root radical is the same as the group number, while the code for the second stroke is the same as the key number. For example:

The first stroke of the radicals on key [41] such as "文", "方" and "广" is "丶" which is the same as the group number. The second stroke is "一" which is the same as the key number.

3. The key number denotes the number of strokes for constructing the root radicals. That is, the key number equals the number of strokes of the radicals. For example:

The group number of "一" is 1. Therefore, "一" is located on key [11], "二" is located on key [12] and "三" is located on key [13].

### 6.7.2. 5-Shape Decomposition of Chinese Characters

The 5-Shape input method decomposes Chinese characters according to their root radicals. The decomposition can be categorized as follows:

- Left-Right Type (Type 1)

The character can be split into a left half and a right half, such as "汉", "对" and "湘".

- Upper-Lower Type (Type 2)

The character can be split into an upper half and a lower half, such as "华", "字" and "想".

- Miscellaneous Type (Type 3)

The character does not have a clear separation of left-right or upper-lower. Examples include "本", "同" and "这".

The Miscellaneous type can be further divided into Individual type and Inclusion type. Examples of individual type include "本", "天", "册", "司", "头", "进" and "厢". Inclusion type refers to those

characters with one of their root radicals totally or partially included in another root radical, such as "司", "连", "凶" and "回".

### 6.7.3. 5-Shape Distinction Code

If a character is composed of fewer than four root radicals, you need to enter a code which represents the decomposition type and the type of the last stroke, which is called the Distinction code.

Figure 6-5. Distinction Code for the 5-Shape Input Method

字型		左右型	上下型	杂合型
		☐	▣	☒
末笔形		1	2	3
横	1	11(一)	12(二)	13(三)
竖	2	21(丨)	22(  )	23(III)
撇	3	31(丿)	32(彡)	33(彣)
捺	4	41(㇇)	42(㇈)	43(㇉)
折	5	51(乙)	52(㇀)	53(㇁)

For example, the codes for "汀", "洒" and "沐" are all [43] [14]. To distinguish among them, you must enter the distinction code.

Table 6-11. Distinction Code Examples

Character	Last Stroke	Decomposition	Distinction Code
汀	丨 (2)	Left-Right (1)	[21]
洒	一 (1)	Left-Right (1)	[11]
沐	㇇ (4)	Left-Right (1)	[41]

The root radicals available on the main keyboard do not require distinction code. Although the characters which are key names (such as "大") and radical names (such as "上") are composed of fewer than four radicals, no distinction code is required. For example, "厂" can be decomposed into "一" and "丿".

For those characters which do not have a unique writing order, such as "刀", "切", "力", "九" and "匕", you can use zip-zap stroke code (5) for the last stroke. For example, "仇" can be decomposed into "亻" and "九", and you may add the distinction code [51].

For those inclusion type characters, such as "国", "围", "团", "进" and "这", you should take the last stroke of the interior radical. For example, the distinction code for "进" is [23] because the last stroke is [2].

Single dots located near a radical, such as the point in "义" and "太", belong to decomposition type 3. For example, the distinction code of "为" is [43].

#### 6.7.4. Principles of 5-Shape Character Decomposition

The following four principles can be used for decomposing Chinese characters:

1. Writing order.

For example, "远" — it should be decomposed into "辶", "儿" and "辶" instead of "辶", "二", "儿".

2. Priority for larger radicals.

Among the different ways of decomposition, choose the one that results in large radicals. For example, "尺" should be decomposed into "尸" and "丿" instead of "㇇" and "人".

Another interpretation of this principle is that you should choose the decomposition method that creates fewer radicals.

### 3. Separated structure.

If a character can be decomposed as a separated structure or a cross structure, choose the separated structure. For example, "于" should be decomposed as "一" and "十" instead of "二" and "丨".

### 4. Intuition.

If you cannot choose a character decomposition method based strictly on one of the previous principles, apply a reasonable approach based on a combination of your experience and the previous three principles.

## 6.7.5. 5-Shape Input Mechanism

### 6.7.5.1. Single Character Input

Each Chinese character can be composed of one to four root radicals. If it is available on the keycap as a keyname, press the key four times. For example:

"言" — press [41][41][41][41].

If it is a root radical, press the key for the radical and enter the first, second and last strokes. If the character is defined with fewer than four codes, press [Space] to signal the end of input. For example:

Table 6-12. Entering Root Radicals Themselves

Character	Decomposed Radicals	No. of Radicals	Key Sequence
西	西, 一, 丨, 一	4	[14][11][21][11]
厂	厂, 一, 丿	3	[13][11][31][Space]

There is one exception for the five basic strokes. The characters "一", "丨", "丿", "丶" and "乙" are single-stroke characters and they require two codes for input. To avoid multiple candidates for the same code, the 5-Shape input method requires adding two more codes

([24][24]) to the two required codes. Table 6-13 shows the key sequences for entering these basic strokes.

**Table 6-13. Entering Basic Strokes**

<b>Basic Stroke</b>	<b>Key Sequence</b>
一	[11][11][24][24]
丨	[21][21][24][24]
丿	[31][31][24][24]
丶	[41][41][24][24]
乙	[51][51][24][24]

If the character does not appear on the keycap, follow the decomposition principle as described in the previous section. If it is composed of exactly four root radicals, enter the root radicals according to the writing order. If it is composed of more than four root radicals, enter the first, second, third and last root radicals. If it is composed of less than four radical, enter the radicals together with the distinction code. If the number of codes is still less than four, press the [Space] bar to signal the end of input.

For example:

**Table 6-14. Input of Single Characters with 5-Shape Input Method**

<b>Character</b>	<b>Decomposed Radicals</b>	<b>Distinction Code</b>	<b>Key Sequence</b>
到	一, 厶, 土, 丩	—	[11][54][12][22]
攀	木, 乂, 乂, 手	—	[14][35][35][32]
汉	讠, 又	[41]	[43][54][41][Space]

### 6.7.5.2. Term Input

Around 5,000 built-in terms have been defined in the Chinese input method. The 5-Shape input method can be used to input multiple character terms by entering four root radicals.

**Table 6-15. Root Radicals for Input of Terms**

<b>No. of Chars in Term</b>	<b>Root Radicals to be Entered</b>
2	The first two root radicals of each character
3	The first root radicals of the first two characters and the first two root radicals of the last character
4	The first root radical of each character
> 4	The first root radicals of the first three characters and the last character

Consider the following:

**Table 6-16. Input of Terms with 5-Shape Input Method**

<b>Term</b>	<b>No. of Chars</b>	<b>Character</b>	<b>No. of Req'd Root Radicals</b>	<b>Root Radical</b>	<b>5-Shape Code</b>
经济	2	经	2	纟, 又	[55][54][43][41]
		济	2	氵, 文	
计算机	3	计	1	讠	[41][31][14][25]
		算	1	竹	
		机	2	木, 几	
艰苦奋斗	4	艰	1	又	[54][15][13][42]
		苦	1	艹	
		奋	1	大	
		斗	1	斗	
电子计算机	5	电	1	曰	[22][52][41][14]
		子	1	子	
		计	1	讠	
		机	1	木	

### 6.7.6. 5-Shape Input Procedure

When the 5-Shape input method is invoked, the string "五笔型" is displayed on the status area. You can enter a 5-Shape code through the main keyboard and the data is displayed in the pre-edit area. When a complete 5-Shape

code is entered, the character that matches the code is sent. For example:

```
吊_
五笔型: kmhj
```

To correct the input data, press [Delete] or [Return] to erase the data.

If there is no valid character for the 5-Shape code, the bell rings to signal an error.

### 6.7.7. 5-Shape Multiple Candidates

If there are multiple candidates for a given code, valid candidates are displayed in the pre-edit area.

```
五笔型: bnh_ 1 了 BNH 2 冫 BNH 3 冫 BNH 4 冫 BNH
```

The mechanism of selecting candidates is similar to that of the 5-Stroke input method. For details, see [5-Stroke Input Method](#).

### 6.7.8. 5-Shape and Association Mode

As with the 5-Stroke input method, the Association mode is activated automatically when you select a character from the candidate list. For details, see [5-Stroke Input Method](#).

### 6.7.9. 5-Shape Simple Code Characters

There are three levels of simple code characters; Frequently-Used Characters (Level 1), Level 2, and Level 3.

#### 6.7.9.1. Frequently-Used Characters (Level 1 Simple Code)



Among the 6,000 Chinese characters defined in GB2312-80, there are 25 very frequently-used characters. They are defined on the keys [11] to [55]. To input these characters, press the key associated with the character (such as [11], [25]) and then press the [Space] bar.

The 25 frequently-used characters are:

**Table 6-17. Frequently-Used Characters (Level 1 Simple Code)**

	[*1]	[*2]	[*3]	[*4]	[*5]
[1*]	一	地	在	要	工
[2*]	上	是	中	国	同
[3*]	和	的	有	人	我
[4*]	主	产	不	为	这
[5*]	民	了	发	以	经

### 6.7.9.2. Level 2 Simple Code

The 5-Shape input method has about 600 characters Level 2 Simple Code Characters. To input a Level 2 Simple Code Character, enter the first two radicals and then press the [Space] bar. For example, the 5-Shape code for "帮" is [13][31][52][21] (i.e. DTBH). But since it is a Level 2 Simple Code Character, you can press [13][31] and [Space] to input the character.

The Level 2 Simple Code Characters include:

啊阿爱安暗芭吧百瓣半办帮包保报北  
 本比笔必避陛边变表宾冰并伯泊不步  
 部才财采菜餐参惭灿册查产昌长偿吵  
 炒车晨忱陈称城成呈承持池弛耻赤炽  
 充抽出处春磁此从粗村达答打大呆代  
 胆淡当档刀导到得灯邓迪地第帝电佃  
 甸盯钉锭定订东度断队对多夺朵儿二  
 罚法凡反贩芳方防妨纺放肥分坟粉丰  
 风烽冯凤夫服负妇肝敢肛纲高革格蛤  
 个各给耿攻功公宫贡共垢构估孤姑骨  
 顾怪关官观管光归轨辊果过害汉好恨  
 虹红后呼胡虎互画划化怀换蝗煌晃灰

毁会婚伙或圾基机肌吉极及级几季寂  
 计记际继纪家加尖间艰检渐江匠降胶  
 交角较叫节杰结介届紧进近睛经景久  
 九旧舅就居具决军开楷苛科可克客肯  
 空扣枯宽昆困扩拉来乐累肋类楞离理  
 李历立力联脸良量辽料列林灵另刘六  
 龙娄搂卢卤录吕屡率绿罗妈马嘛慢么  
 玫煤没们眯迷米秘绵面秒民明名末牟  
 姆睦哪奶南男难内能尼你年宁怕炮朋  
 批皮平普妻七岂钱前欠强悄峭切且亲  
 沁轻顷庆秋区曲取杈全劝然让认扔仍  
 如入闰弱洒三扫色砂纱闪商少社审生  
 失时实史式示世事氏收手守曙术屯霜  
 双水睡顺说思肆寺四诉虽孙所他它台  
 太膛提啼天条铁厅听炅瞳同屯驼妥拓  
 外晚宛汪为委胃卫闻无五物务析吸习  
 戏细瞎下仙嫌显现限线相向宵小肖协  
 械懈心信兴行凶胸休秀旭轩喧眩学雪  
 旬寻巡训押呀牙烟炎眼燕央杨洋阳样  
 遥药要也业叶衣姨矣亿忆义因阴引隐  
 蝇哟用由邮友右于愉与玉遇原员约匀  
 允晕杂灾载早澡灶则增曾赠粘斩嶄占  
 站张涨找折这珍贞针阵争芝支知脂之  
 职直止只旨志炙中肿轴宙珠朱烛主注  
 驻妆浊籽子字棕综最昨左作

### 6.7.9.3. Level 3 Simple Code

Approximately 4,000 Chinese characters defined in GB2312-80 are classified as Level 3 Simple Code Characters. To input these characters, enter the first three radicals and then press [Space].

### 6.7.10. 5-Shape Wildcard Key

The [Z] key on the main keyboard is the wildcard key for the 5-Shape input method. When inputting a single character, the [Z] key can replace any root radicals about which you are uncertain.

For example, if you are not sure whether "律" should be decomposed into "彳", "ㄣ", "二" and "丨" (TVFH) or "彳",

"ㄣ", "丨" and "二" (TVHF), you can enter [31][53][Z][Z] and all characters with starting root radicals [31] and [53] will be displayed for your selection. For example:

五笔型: tvzz\_ 1 很 TVEY 2 律 TVFH 3 笋 TVTR 4 魏 TVRC  
5 透 TVPD 6 笞 TVKF 7 箫 TVIJ +

When the wildcard key is used, candidates displayed in the pre-edit area do not include any built-in terms.

### 6.7.11. Entering 5-Shape Code Through the Numeric Keypad

The 25 keys on the main keyboard are usually used to enter 5-Shape code. But you can also enter 5-Shape codes through the numeric keypad.

For instance, the 5-Shape code of "丙" is [11][25][34][43] (GMWI). To enter "丙", you can press [KP1][KP1][KP2][KP5][KP3][KP4][KP4][KP3] on the numeric keypad. The function of [KP0] is similar to the function of [Space].

To enter the wildcard code through the numeric keypad, press the [KP6] key twice.

## 6.8. PinYin Input Method

The 6,000 Chinese characters defined in GB2312-80 are sorted according to the PinYin phonetic representation. Each character has its own PinYin representation that you can use to input the character. To use this input method, you should have basic knowledge of Putonghua (Mandarin) and Chinese pronunciation.

Only single characters can be entered using the PinYin input method. Term input is not supported. But the Association mode is available.

### 6.8.1. PinYin Input Mechanism

Chinese characters represent syllables as well as meanings, and each syllable has a tone. The PinYin representation of a Chinese character is composed of Roman alphabets and a tone mark. To enter the Roman alphabets, use the keys [A]–[Z] on the main keyboard. To enter the tone marks, use the pre-assigned keys for the tone marks as described in the following table:

**Table 6-18. PinYin Tone Marks**

No.	Tone	Tone Mark	Key Label
1	First tone	— (as in "ō")	; (semicolon)
2	Second tone	´ (as in "ó")	' (single quote)
3	Third tone	ˇ (as in "ǒ")	\ (backslash)
4	Fourth tone	` (as in "ò")	[ (left bracket)
5	Light tone	· (as in "□")	] (right bracket)

For example, the PinYin of "发" is "fā". Press [F][A][;]. You can omit the tone mark. In that case, press [F][A].

### 6.8.2. PinYin Input Procedure

When the PinYin input method is invoked, the string "拼音" is displayed in the status area. As you enter a PinYin representation, the data is displayed in the pre-edit area. All characters that match the representation are displayed.

For example, when you press [A], all characters with the PinYin starting with "a" are displayed in the pre-edit area.

拼音: a\_ 1 呵 KSKG 2 訶 KUHH 3 啊 KBSK 4 婀 QBSK 5 庵 EDJN 6 阿 BSKG 7 嘎 KDHT +

When you then press [N], all characters with the PinYin starting with "an" are displayed.

拼音: an\_ 1 鞍 AFPV 2 桉 SPVG 3 厂 DGT 4 鹳 DJNG 5 氨 RNPV 6 广 YYGT 7 庵 YDJN +

If no characters match the PinYin you have typed, the bell rings. You can correct the data by using the [Delete] key to erase the last keystroke.

### **Note**

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Even if the PinYin you have typed has only one character, you must still press the [1] or [Return] key to select that character.

### **6.8.3. PinYin Multiple Candidates**

If a PinYin string matches multiple candidates, the candidates are displayed in the pre-edit area for selection. To select one, press the corresponding numeric key. For details, see [5-Stroke Input Method](#).

You can use a tone mark to reduce the number of candidates. Only characters with the specified tone are displayed.

For example, the PinYin of "牛" is "niú". Eight characters are displayed for selection after you press [N][I][U]:

拼音: niu\_ 1 妞 VNFG 2 牛 RHK 3 扭 RNFG 4 钮 QNFG 5 狃 QTNF 6 忸 NNFG 7 纽 XNFG +

If you press ['] after [N][I][U], there will be only one candidate for selection:

拼音: niu2\_ 1 牛 RHK

The tone marks you have entered are displayed by their tone numbers in the pre-edit area. In the example above, the second tone entered by pressing ['] is echoed as "2".

### **Note**

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If you use a tone mark, you do not need to press the [1] or [Return] key to select the character in the first position. The first

candidate is selected automatically when you enter another PinYin.

#### 6.8.4. PinYin and Association Mode

Similar to the 5-Stroke input method, the Association mode is activated automatically when you select a character from the candidate list. For details, see [5-Stroke Input Method](#).

#### 6.8.5. PinYin Multiple Phonetic Representations

It is possible to have multiple PinYin representations for the same character. For example, "调" can be pronounced as "diao" and "tiao". Therefore, you can enter either [D][I][A][O] or [T][I][A][O] for "调".

#### 6.8.6. PinYin Radical Characters

Approximately 20 radical characters are defined in GB2312-80. To input those characters using the PinYin input method, input the PinYin of the first character of the radical name. For example, the radical name of "艹" is "cao zi tou" (草字头). Thus, you would enter [C][A][O].

### 6.9. QuWei and Internal Code Input Methods

When you press the [F7] key, the string "区位/内码" is displayed in the status area. In this mode, the following input methods are available:

- QuWei Code input
- Internal Code input
- Unicode Value input
- Entity Name input

These are distinguished by their input formats.

In these input methods, term input and the Association mode are not supported because each code unambiguously defines one Chinese character. If you make a mistake during input, you can correct the data by

pressing [Delete] to erase the last keystroke, or [Return] to clear the entire code.

### 6.9.1. QuWei Code Input

The QuWei code is the representation of Qu (row) and Wei (column) in the GB2312 or extended GB character set. For example, the character "啊" is placed at the first column of the sixteenth row in GB2312. Its QuWei code is 1601.

To enter a QuWei code, type the code by using the numeric keys ([0]–[9]).

#### 6.9.1.1. GB2312 Characters

The character "啊" is defined in the GB2312 character set and its QuWei code is 1601. To input "啊", enter its QuWei code in one of the following ways:

- 4-digit code — Press [1][6][0][1], and then press [Space] to complete input.
- 5-digit code — Press [0][1][6][0][1], and the character is automatically entered.

If you use the 5-digit code, start a code with [0].

#### 6.9.1.2. Extended GB Characters

The QuWei codes of characters in the extended GB character set are 5-digit and start with [1]. For example, if you press [1][1][6][0][1], the user-defined character at the first column of the sixteenth row is entered.

User-defined characters should be used only under the zh\_CN.dechansi locale.

### 6.9.2. Internal Code Input

The Internal Code input method uses the character codes in the DEC Hanzi or GB18030 codeset. For example, the internal code of the character "啊" is b0a1 in hexadecimal.

To enter an internal code, press [x] first to indicate the Internal Code input method, and then enter a 2-, 4- or 8-

digit internal code in hexadecimal. For example, to input "阿", press [x][b][0][a][1].

### 6.9.3. Unocde Value Input

The Unicode Value input method uses the code point values of the characters defined in the Unicode standard. For example, the Unicode value of the character "阿" is 554a in hexadecimal.

To enter an Unicode value, press [u] first to indicate the Unicode Value input method, and then enter a 4- or 6-digit Unicode value in hexadecimal. For example, to input "阿", press [u][5][5][4][a].

### 6.9.4. Entity Name Input

The Entity Name input method uses the character entity names defined by the World Wide Web Consortium. For example, the entity name of the characters "é", "É" and "€" are "eacute", "Eacute" and "euro" respectively (case sensitive).

To enter a character entity name, press [&] first to indicate the Entity Name input method, and then enter a character entity name. For example, to input "é", press [&][e][a][c][u][t][e]. Similarly, use [&][E][a][c][u][t][e] for "É", and [&][e][u][r][o] for "€"

## 6.10. Telex Code Input Method

Telex Code is a 4-digit code used to define:

- Single Chinese characters
- Terms
- Non-Chinese symbols

It is based on the Standard Telex Code (标准电码本) published by the People's Republic of China. The Telex Code input method is simple and straightforward. You can input characters, terms or symbols by entering their corresponding telex code through the keyboard.



When the Telex Code input method is invoked, the string "电报码" is displayed in the status area. The numeric keys [0]–[9] on the main keyboard are used to enter the codes for characters, terms or symbols.

**Table 6-19. Telex Code Examples**

<b>Character/String</b>	<b>Type</b>	<b>Telex Code</b>	<b>Key Sequence</b>
乎	Character	0039	[0][0][3][9]
十六日	Term	9916	[9][9][1][6]
	Symbol	9949	[9][9][4][9]

## 6.11. Intelligent ABC Input Method

The Intelligent ABC (ItABC) input method is one of the most popular Chinese input methods because it is easy to learn and usually faster than other input methods. Intelligent ABC supports full and mixed input of words, phrases, and short sentences (Quanpin and Jianpin), coordinated input of Chinese characters and other marks (Hunpin), character shape input (Bixing), and combined input of pronunciation elements and Chinese character shapes (Yinxinghunhe).

The following sections describe the various types of input, the input process, and useful features of Intelligent ABC. For a full description of Intelligent ABC and examples of how best to use this input method, see the online help for the input server.

### 6.11.1. Intelligent ABC Basic Input Methods

The Intelligent ABC input method offers you five types of input: Quanpin, Jianpin, Hunpin, Bixing, and Yingxinghunhe.

- Quanpin Input (全拼)

If you are familiar with Chinese PinYin, use Quanpin input. The Quanpin input process is the same as the Chinese PinYin writing process if you use standard Chinese PinYin input.

When using Quanpin input, enter phrases separated by spaces or by marks, such as commas or periods. You can also use normal PinYin input. The system generates an audible warning if the input is greater than the allowed number of characters and marks.

When you use Quanpin input, pay particular attention to phrases without punctuation or syllable-dividing marks.

- Jianpin Input (简拼)

If you are not familiar with Chinese PinYin, use the Jianpin input method.

Under Jianpin input, you use the first letter of each syllable. However, for the syllables zh, ch and sh, use the first two letters. Also, when you select Jianpin input, make frequent use of syllable-dividing marks.

- Hunpin Input (混拼)

Hunpin input is open and comprehensive, allowing a mix of full and simplified input. For example, when a phrase has more than two syllables, some syllables can use Quanpin and some syllables use Jianpin.

Keep in mind that syllable-dividing marks are very important when you select Hunpin input.

- Bixing Input (笔形)

With Bixing input, Intelligent ABC follows the Bixing code of eight strokes. The eight strokes are:

1. heng (横) (including ti (提))
2. shu (竖) (not including shuwangou (竖弯钩))
3. pie (撇)
4. dian (点) and na (捺)
5. zhe (折) (clockwise)
6. wan (弯) (counterclockwise)

7. cha (叉)
8. fang (方)

To determine the Bixing codes, follow the order of strokes observed in calligraphy, but remember that you are limited to a maximum of six strokes. For more information on Bixing code and Chinese characters, see the online help for the input server.

- Yinxinghunhe input (音形混合)

If you are familiar with the Intelligent ABC input method, select Yinxinghunhe input. With Yinxinghunche Input, you can combine PinYin and Bixing input (pronunciation and shape, respectively) to avoid overlapping codes in Quanpin or Jianpin input.

Yinxinghunhe Input has the following format (where "pinyin" can be Quanpin, Jianpin, or Hunpin input):

(pinyin + [bixing description]) + (pinyin + [bixing description]) + ..... + (pinyin + [bixing description])

You must use "pinyin", pronunciation input, when you input multisyllable words. You can, however, omit the [bixing description] value for shape input. When used, [bixing description] must not be more than two strokes.

When you input single syllable words or characters, you can specify the [bixing description] value alone. Also, you can mix "pinyin" and [bixing description] input to avoid overlapping codes in Quanpin and Jianpin input.

### 6.11.2. Intelligent ABC Input Process

The input process you use can take one of the following forms:

- Basic Input Process

The basic input process is a three step process of start, middle, and finish.

**Start** — Press a key to enter the PinYin input process. This initial key is one of the 26 letters (uppercase or lowercase) from the English alphabet. If the initial key is the letter "i", "I", "u", or "v", the input has special meaning (see [Section 6.11.4](#)).

**Middle** — Input sentences. You can use any characters or marks, including numerals, as sentence input. However, for standard alteration, sentence input should conform to the combination rules.

**Finish** — Enter a key signifying end of input. Use a space or punctuation mark to signify the end of word input. Use the [Enter] key to signify the end of character input. Under special circumstances, use [,] or [Ctrl/-].

If there is more than one selection, use the display of candidates on the selection windows. If alteration cannot be completed, the division and formation of words is retained in memory.

- Customize the Intelligent ABC input method
- Define New Words by Intelligent ABC input method

See [Section 6.5](#) for more information.

In the Input Method Customization window, you can click on the customization button to display a pull-down menu. The pull-down menu includes an option labeled Define New Words by Intelligent ABC input method.

If you choose this option, a dialog box displays allows you to add or delete words and phrases. If you add words and phrases, they are saved in the file of user-defined words and phrases. If you input the outer codes of words and phrases after specific alteration of "u" type, the corresponding

words and phrases are returned to the application program.

### 6.11.3. Intelligent ABC Input Method Features

The Intelligent ABC input method provides the following features. The online help for the input server fully describes the use of these features.

- Automatic Dividing and Forming of Words

Automatic dividing of words refers to the process of dividing the continuous input of a PinYin passage into several simple paragraphs and converting those paragraphs into Chinese phrases according to grammatical rules.

Forming of words refers to the process of combining several words and word elements into a new word.

- Automatic Memory

Automatic memory is usually used to retain new words such as the names of people or places that do not exist in the word palette. The process is done automatically or with little user intervention. The words of automatic memory are all standard PinYin words and can be used in the same manner as the words in the basic word palette.

- Forcible Memory

Use Forcible Memory to define nonstandard Chinese PinYin words. With this function, you can add new words to your word palette directly.

To retain a new word, you must input both the contents of a word and the code for it. The contents of the word can be Chinese words, expressions, and phrases, and it can consist of Chinese characters and other symbols. The code for a word can be the Chinese PinYin, original foreign language words, or any other symbols you wish to use.

The nonstandard word you define must not be greater than 15 characters. The word code you define must not be greater than 9 characters. You can define up to 400 words.

- **Obscure Recall**

This function allows you to use incomplete information to recall a word that was recently used. You use the [Ctrl/-] key to operate the Obscure Recall function.

Obscure recall is useful when you enter a simple passage containing repetitious content.

- **Frequency Adjustment and Memory**

The frequency of a word refers to the frequency of word usage. The word order of homonyms in the Intelligent ABC standard word palette reflects the regular pattern of its usage. But an individual user may need to adjust the default word order. The Frequency Adjustment and Memory function allows you to make these adjustments under the Intelligent ABC input method.

If you select Word Frequency Adjustment in the property setting, the Frequency Adjustment and Memory function begins automatically.

Because the system uses the most frequently used word as the recognized alteration result, you can use this feature to adjust the frequency and, thus, the alteration result.

The Frequency Adjustment and Memory function handles a word length range of 1 to 3 syllables. For words of single syllables, the word frequency is not adjusted until the words are used twice.

- **Leading Characters and Succeeding Characters**

The system treats a leading character (or prefix) and a succeeding character (a suffix) automatically in the process of forming new words.

Some characters can be used only as leading characters and some words can be used only as succeeding characters. The online help describes these cases.

Intelligent ABC can distinguish leading and succeeding characters and combines the words automatically in the process of input.

- Word palette system

Intelligent ABC has a basic word palette of approximately 60,000 words.

In addition, Intelligent ABC has an automatic screening function. The vocabulary for Automatic Memory is up to 17,000 words. The vocabulary for Forcible Memory is up to 400 words.

#### **6.11.4. Intelligent ABC Usage Notes**

Consider the following when using the Intelligent ABC input method. These usage notes are covered in detail by the online help.

- The Intelligent ABC input method allows you to convert Arabic numerals to Chinese numerals and to simplify input of some common classifiers. See the online help for details on transformation of punctuation marks, letters in numeral input, and normal and emphasized Chinese numerals.
- You can use a multisyllable word to reduce the number of candidates in Chinese character input. The multisyllable word you use can be from the standard palette or from a user-defined palette. The online help provides an example of this.
- If you use the Forcible Memory function to define a word in advance, start your input with the [u] key. Likewise, to input figures and marks, in the normal state enter [v] and the appropriate number ([1] through [9]) of the GB2312 set of characters and marks.
- To type an English word or phrase during input of PinYin, enter [v] as an indication mark, then type the English word or phrase, and terminate with the [Space] key.
- The input of Chinese punctuation marks is same among different input methods. (See the online help for information on automatic input of shuminghao (书名号) under Intelligent ABC.)

## 6.12. Phrase Input Method

The Phrase input method allows you to define a database of frequently used phrases and store that database in a user or systemwide directory.

You associate each of the phrases in the phrase database with a unique phrase code. The phrase code can be any alphabetic label. The associated phrase can be any string of characters that is appropriate to the application's locale. You create the phrase database as a simple text file containing phrase codes and phrases and store it in a user directory or a system directory on a path that is locale dependent.

For example, if you create a phrase database file for use with applications running in the zh\_CN.GB18030 locale, you copy the file to one of the following directories:

- For a systemwide database file that will be used with Simplified Chinese applications using the GB18030 codeset, copy the phrase database to `DECW$COMMON:[DECW$DEFAULTS.SYSTEM.XIM.ZH_CN_GB18030]PHRASE_DATA.TXT`.
- For a personal database file that will be used with Simplified Chinese applications using the GB18030 codeset, copy the phrase database to `PHRASE_DATA.TXT` in the `[.DECW$IM.ZH_CN_GB18030]` subdirectory of your login directory.

Use the following rules when populating the phrase database:

- Use a text editor to create and populate the Phrase input method database files.
- Enter the phrase code and its associated phrase on the same line. Separate the code and phrase with spaces. However, the phrase code itself cannot contain spaces. The associated phrase can contain spaces, but not in the first or last character position.
- A phrase code consists of alphanumeric characters and underscores. The associated phrase can contain any character that is legal in the target locale.



To invoke the Phrase input method, you must use the `DECW$IM` input server to activate the input method and use the default key sequence (or an invocation key sequence that you have defined). For example, if the Phrase input method is active and the client application locale supports it, press the default invocation key, `[F10]`, or a redefined invocation key to invoke the Phrase input method.

When you use the Phrase input method and enter a phrase code as input to the application, `DECW$IM` searches your personal database file, if it exists, and the systemwide database file along the locale-dependent path. If `DECW$IM` finds the same phrase in both databases, it uses the definition in your personal database.

When you enter a phrase code, it appears in the pre-edit area. To correct erroneous input, use the `[Delete]` key and re-enter the code. Press the `[Space]` or `[Return]` key to signal the end of phrase code input. If you enter an incorrect code, the error bell rings. The message, "Requested phrase does not exist", may also display. To correct the problem, make sure that the phrase is in the database file and that the file path and application locale are consistent.

## 6.13. Symbol Input

The Symbol input method is a simple and straightforward way to input 2-byte alphabets, numerals and other symbols. All alphabets, numerals and other symbols that you enter are immediately converted to corresponding 2-byte alphabets, numerals and other symbols.

When the Symbol input method is invoked, the string "符号" is displayed in the status area. Every character typed from the main keyboard is converted to its 2-byte form immediately. The pre-edit area is not used.

# 7. Other Chinese Features

## 7.1. Hanzi DECterm

Hanzi DECterm is a VT382-C terminal emulator. This section describes the Chinese features which are specific to Hanzi DECterm. For the details about the common internationalization features provided by DECterm, please see *DECwindows Motif Internationalization Guide*.

This section describes the Hanzi DECterm in the following areas:

- How to create a Hanzi DECterm
- Terminal emulator features
- Chinese character input/output
- Other VT382-C functionalities

### 7.1.1. Creating a Hanzi DECterm

The terminal type that DECterm will emulate is sensitive to the session language.

To create a Hanzi DECterm through Session Manager, you can set the session language to one of the Hanzi locales, say Chinese China, and then select DECterm from the Applications menu of Session Manager.

The user interface language of Hanzi DECterm always follows the terminal type. The language is independent of the language selection.

### 7.1.2. Customizing DECterm

You may apply to your Hanzi DECterm windows any of the customization features that are currently applicable to the ISO Latin-1 DECterm window except for the customization of the NRCS character sets.

Customized features can be saved and restored in the same way as in ISO Latin-1 DECterm.

### 7.1.3. Font Sizes

Choosing Big Font or Little Font option from Window... of the Options menu will let you choose either the 24x24 or 16x18 Chinese fonts.

### 7.1.4. Terminal ID

Choosing General... from the Options menu will allow you to change the general features, such as the terminal type, for the Hanzi DECterm from the dialog box displayed. Besides, you may also select the following information from the dialog box:

- VT382 ID

### 7.1.5. Interaction Style

Choosing Input Method... from the Options menu will allow you to select the interaction style for Hanzi DECterm. For example, if you want to select the root window interaction style, you can click on the Root Window button and then apply the change. If you click on the ISO Latin-1 Input button, Hanzi DECterm will disable the input of Chinese data until another style is selected.

### 7.1.6. Input Server

Choosing Input Method... from the Options menu also allows you to switch to use another input server for Hanzi DECterm. By default, the `DECW$IM` input server is used. To select another input server, you can click on the Other button and then enter the input server name in the input field.

### 7.1.7. Copying Information

You can choose the Edit menu to copy information within or between DECterm windows. The Cut-and-Paste operation is enhanced to handle mixed ASCII and Chinese characters.

### 7.1.8. Default Character Set

Hanzi DECterm supports GB2312 and all character sets supported by the ISO Latin-1 DECterm.

ISO Latin-1 DECterm uses the DEC Multinational Character Set (MCS) as the default character set. This can be overridden by choosing other options in General... from the Options menu. For Hanzi DECterm, the default character set for 8-bit data is the Hanzi character set GB2312.

In general, Hanzi DECterm cannot display mixed MCS (or ISO Latin-1 Supplemental Graphic Characters) and Hanzi characters. If you really want to achieve this, you can output the data together with the designated character set escape sequences.

### **7.1.9. Chinese Character Input/Output**

You can enter Chinese characters in Hanzi DECterm by invoking any of the Chinese input modes as described in Chapter 6. Mixed ASCII and Chinese characters can be displayed properly in Hanzi DECterm without any special settings.

### **7.1.10. Reconnecting Input Server**

The Hanzi input server provides the Chinese character input capability. If this process does not exist or terminates for some reasons, a message "Hanzi input method does not exist" will display. You can restart the input server again and then use the Reset Terminal option from the Commands menu to reconnect the Hanzi DECterm to the input server.

### **7.1.11. VT382-C Functionalities**

The following functionalities of VT382-C are implemented in the Hanzi DECterm terminal emulator:

- Display characteristics and capabilities
- Text capabilities
  - Level 3 terminal compatibility
    - VT300 mode
    - VT100 mode
    - VT52 mode

- ANSI compatible control functions
- Supporting Terminal State Interrogation (TSI)
- All of the Chinese input methods
- Supporting the following character sets:
  - DEC Special Graphics Character Set (line drawing)
  - DEC Supplemental Character Set
  - DEC Technical Character Set
  - ISO Latin 1 Supplemental Character Set
  - GB2312 80 Character Set
- Control Representation mode
- Supporting sixel graphics
- UDK editing function
- Chinese character display attributes: reverse, underline, bold, blink, double height/width

For the details of the VT382-C functions, please refer to *VT382-C Programming Reference Manual* and *VT382-C User's Manual*.