Chapter

26

The TTCN Table Editor (on UNIX)

This chapter contains reference information about the Table Editor, used for editing various TTCN tables.

The functionality of the Table Editor, the menus, windows and quick-buttons are described in this chapter. The TTCN Browser is described in chapter 25, *The TTCN Browser (on UNIX)*. How to analyze and find tables is described in chapter 27, *Analyzing TTCN Documents (on UNIX)*.

For an overview of the TTCN suite, see chapter 3, *Introduction to the TTCN Suite (on UNIX), in the TTCN Suite Getting Started*.

> **Note: UNIX version**
>
> **This is the UNIX version of the chapter. The corresponding Windows chapter is chapter 31, *Editing TTCN Documents (in Windows)*.**

Introduction to the TTCN Table Editor

The Table Editor is used for editing the various TTCN tables. It is possible to have any number of tables open for editing at any given time.

The TTCN suite supports all of the standardized, non-compact tables that are defined in ISO/IEC 9646-3. The compact Test Case Dynamic Behaviour table (ISO/IEC 9646-3, clause C.3) and the concurrent TTCN tables are supported, as well as the modular TTCN tables to be added in the upcoming new TTCN version.

The compact tables for constraints (also in Annex C of ISO/IEC 9646-3) are not supported.

On screen, the TTCN suite presents all tables exactly as defined in ISO/IEC 9646-3, apart from some minor additions to the regular dynamic behaviour tables (for test cases, test steps and defaults), to the compact test case dynamic behaviour table, to the ASN.1 type by reference tables, to the test suite constant declarations by reference, and to the import tables.

These changes have been introduced to aid the automatic generation of the TTCN document overview and index tables. For more information, see "Generating the Test Suite Overview Tables" on page 1151 in chapter 25, *The TTCN Browser (on UNIX)*. However, in the printed GR form the TTCN document is presented according to the ISO standard (that is, the additions are not present in the printed version).

As a visual aid, dotted lines separate rows in a table. Again, this is not present in the printed GR form.

The TTCN suite always displays the optional comments column and comments footer of a table, even if they are empty.

You can use both menu choices and keyboard shortcuts for editing tables. It is also possible to search and replace text patterns. By providing a Data Dictionary, the Table Editor supports semi-automatic generation of send and receive statement lines. In the Data Dictionary, you select the components in a send or receive statement from lists of PCOs, types and constraints. The TTCN suite prevents you from selecting incompatible items.

The Table Editor also shows the analysis status of the table contents.

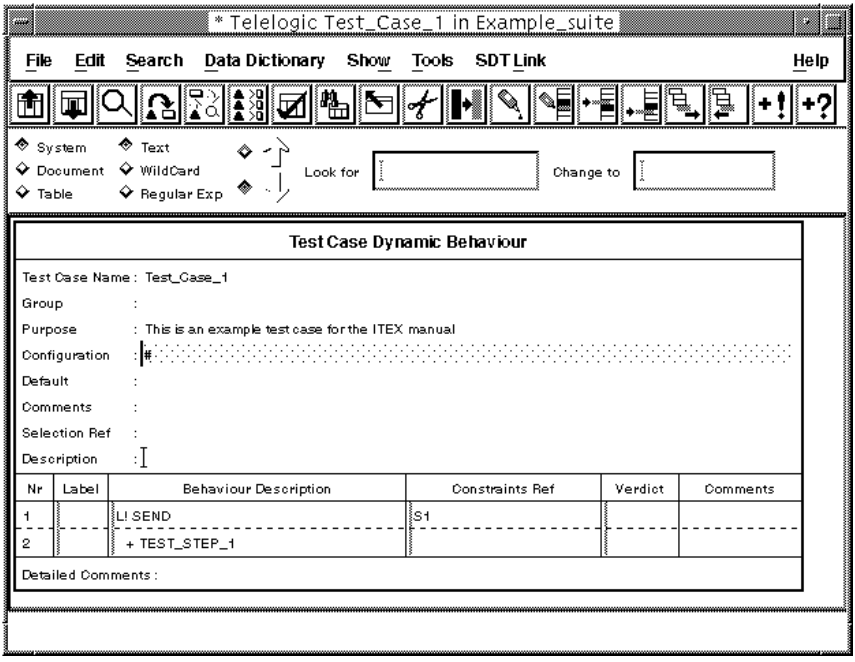

Figure 206: A TTCN Table Editor for a test case

Opening a Table

Tables are opened from a Browser when you double-click on a selected table name, or with the popup menu. For more detailed information see "Opening a Table" on page 1114 in chapter 25, *The TTCN Browser (on UNIX)*.

Renaming a Table

A table can be renamed either by using the *Rename* command in the Browser (for more information see "Renaming Dynamic Items" on page 1113 in chapter 25, *The TTCN Browser (on UNIX)*) or by editing the table name in the table itself. This choice also exists for objects in multiple-object tables.

Navigating and Editing Text in a Table

The Table Editor facilitates fast and efficient editing. The input focus determines which field is open for editing at any given time.

Setting the Input Focus

The input focus is automatically set on the name field of the table when it is opened. Reset the input focus by using the following shortcuts:

To move to:	Use this key combination:
Next field	<Tab>
Previous field	<Shift+Tab>
Next part of the table	<Ctrl+Tab>
Next field in same column	<Ctrl+down arrow>
Previous field in same column	<Ctrl+up arrow>
Field on the left	<Ctrl+left arrow>
Field on the right	<Ctrl+right arrow>

You can also use the mouse for setting the input focus. However, note that a middle-click only moves the focus to that field but it is not possible to edit text. To do this, you have to left-click in the field.

Editing Text in a Table

To edit the text in a field, you set the input focus and start typing. The table fields will expand automatically to accommodate the text and you can add a line break by simply pressing <Return>. To move the insertion point in the same field, you can either use the mouse or the following shortcuts:

To move the insertion point:	Use this key combination
Down	<Ctrl+N>, <down arrow>
Up	<Ctrl+P>, <up arrow>
Left	<Ctrl+B>, <left arrow>

To move the insertion point:	Use this key combination
Right	<Ctrl+F>, <right arrow>
To the beginning of the line	<Ctrl+A>
To the end of the line	<Ctrl+E>
Left and extending selection	<Shift+left arrow>
Right and extending selection	<Shift+right arrow>

If you initially type with very high speed, race problems may arise and you will be notified with a beep. This means that the text typed in will not appear correct in the buffer. If this happens often, you should make a brief pause between typing the first and consecutive characters.

Cut, Copy and Paste Text

To cut, copy and paste text in the fields, you can use the following shortcuts. Note that you do not use the same commands or shortcuts as when editing entire rows in a table.

To do this:	Use this key combination:
Delete one character forward	<Ctrl+D>
Cut selected text	<Cut>, <Shift+Delete>
Cut text to the end of the line	<Ctrl+K>
Copy selected text	<Copy>, <Ctrl+Insert>[a]
Paste cut or copied text	<Paste>, <Shift+Insert>
Paste the most recently cut line	<Ctrl+Y>

a. <Ctrl+Shift+Insert> also works.

Note:

The paste buffer for text is not the same as the one used for entire rows in the body of a table.

Caution!

The TTCN suite has no undo function. This means that `<Undo>` has no effect.

Editing Rows in a Table

Rows can be added, deleted, copied, etc. in the bodies of all TTCN tables that contain more than one column. The ASN.1 tables only have a single column with a single row and therefore adding, deleting and copying rows is not applicable. However, you can still copy and paste the contents of these tables as text.

You cannot add or remove rows in table headers and footers, as the formats of these parts of a table are defined by the TTCN standard.

Selecting Rows in a Table

In the dynamic behaviour tables, you select a single row by clicking the row number.

You select a *behaviour tree* of rows by `<Ctrl+Shift>`-clicking.

You select rows in the body of a table by `<Ctrl>`-clicking. Selecting a row does not deselect other selected rows.

To deselect a row, you select it again.

> **Note:**
> Setting the input focus will also deselect all selected rows.

Cutting, Copying and Pasting Rows

Rows in a table may be cut, copied and pasted. This not only possible among tables of the same or similar type, but also across different types of tables.

Edit > Cut

Removes selected row or rows from the table and stores them in the clipboard.

Edit > Copy

Copies selected rows to the paste buffer. Any number of rows may be selected.

Note:

The paste buffer used for entire rows in the body of a table, is not the same as the one used for text.

Edit > Delete

Deletes the selected row or rows.

Caution!

The TTCN suite has no undo so this command is irreversible.

Inserting Rows

Edit > Insert Row

Inserts a new row before a selected row. Only one row may be selected.

Edit > Insert Row After

Inserts a new row after a selected row. Only one row may be selected.

Edit > Insert Tree Header

Inserts a new Tree Header row before a selected row. Only one row may be selected. This command only works in dynamic behaviour tables.

Edit > Insert Tree Header After

Inserts a new Tree Header row after a selected row. Only one row may be selected. This command only works in dynamic behaviour tables.

The <Ins> Key

The `<Ins>` key (on the right-hand keypad) can be used for inserting rows. If you press this key while input focus is in the header or footer of a table, a new row is appended after the **last** row in the body of the table. If the input focus is set on a field in the body of the table, `<Ins>` will

insert a new row **after** the field that has the input focus. The input focus will be transferred to the corresponding field in the new row.

Indenting Rows in Behaviour Descriptions

TTCN *behaviour* tables include a number of commands and shortcut keys that simplify indenting behaviour lines.

> **Caution!**
>
> Do not use the <Tab> character to represent indentation in behaviour trees.

Edit > Increase Indent

Increases the indentation of selected behaviour lines by one position. This command can only be used to indent behaviour lines.

- Keypad <+>
  Pressing <+> (*Plus*) on the right-hand keypad (the normal <+> key does not have this effect) will indent the field that currently has the input focus.
- <Ctrl> + Keypad <+>
  Pressing <Ctrl> together with the *keypad* <+> key will cause **selected** behaviour lines to be indented one position, i.e. it has the same effect as the *Increase Indent* command.
- <Shift> + Keypad <+>
  Pressing <Shift> together with the *keypad* <+> key will cause an entire **branch** in the behaviour tree to be indented one position.

Edit > Decrease Indent

Decreases the indentation (i.e. *undent*) of the selected rows by one position. This command can only be used on behaviour lines.

- Keypad <->
  Pressing <-> (*Minus*) on the right-hand keypad (the normal <-> key does not have this effect) will undent the field that currently has the input focus.

- <Ctrl> + Keypad <->
  Pressing <Ctrl> together with the *keypad* <-> key will cause **selected** behaviour lines to be undented one position, i.e. it has the same effect as the *Decrease Indent* command.

- <Shift> + Keypad <->
  Pressing <Shift> together with the keypad <-> key will cause an entire **branch** in the behaviour tree to be undented one position.

Selecting Branches in Behaviour Descriptions

TTCN *behaviour* tables include the following short-cut key that simplifies the task of selecting behaviour lines.

- <Shift+Ctrl> + Left Mouse Button
  Pressing <Shift+Ctrl> together with the left mouse button while the cursor is pointing to a behaviour line, will select that behaviour line and all the subsequent behaviour lines that are in the same branch of the behaviour tree.

Showing the Indentation Level

Show > Show Indent

Causes the indentation level of behaviour lines to be displayed in the line number column of behaviour tables. Choosing this command again will cause the display to revert to line numbering.

Searching and Replacing

From the Table Editor, you can search for and replace text, either on system, document or table level. You specify the search in the search bar of the Table Editor and start the search (and replace) from menu choices in the *Search* menu.

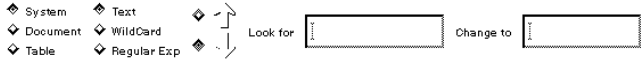

Figure 207: The TTCN Table Editor search bar

Specifying Search and Replace Settings

Delimiting the Scope of Search

You can search for text on three levels:

- *System* means all documents of the associated document – except for any Flat View document – or only the associated document if it is a Flat View.
- *Document* means the associated document only.
- *Table* means the current table only.

Selecting the Type of Search

There are three types of search patterns:

- *Text* means ordinary literal strings.
- *Wildcard* means a pattern with * and ?.
- *Regular Exp* means regular expression.

See also "Regular Expressions" on page 1123 in chapter 25, *The TTCN Browser (on UNIX)*.

Selecting the Search Direction

The search direction can be forward (down arrow) or backward (up arrow).

Specifying the Text to Search For

You specify the text to search for in the *Look for* field. If you search for text using a regular expression, you will be notified if you try to use an incorrect regular expression.

Specifying the Replacement Text

You specify the replacement text (or replacement pattern, if the type of search is regular expression) in the *Change to* field.

If you search and replace using regular expressions, the replacement pattern must be compatible with the search pattern. If it is not, you will be notified.

Something important to note about regular expressions, is that the actual replacement text is a result of a combination of the search pattern, the match found and the replacement pattern. This means that the actual replacement text may not literally match the text in the *Change to* field. However, the actual replacement text will be presented in the status bar when you start searching and a match is found.

Starting the Search and Replace

Search > Search

Starts the search from the current position. If you search in the current table, selected text will be skipped. If the Table Editor is empty, the search will start from the beginning or end of the document or system, depending on the scope and direction that you have specified.

Search > Replace

Replaces currently selected text with the replacement text. If you searched using regular expressions, the replacement text will be presented in the status bar when a match is found.

You can also replace manually selected text. This only requires that *Text* or *Wildcard* is selected and that the *Change to* field contains some text. Note that you cannot manually make an empty selection, but it is possible to search and find an empty match that you can replace.

Search > Proceed

Searches for and replaces text sequentially. If text is selected, it will be replaced and after that the search will proceed.

Search > Replace All

Replaces selected text and then continues the search and replace from the current position. If the Table Editor is empty, the search will start from the beginning or end of the document or system, depending on the scope and direction that you have specified. The number of replacements will be presented in the status bar.

Exporting and Importing Objects

Generate Exports and *Generate Import* assist in the use of the Modular TTCN feature of exporting and importing objects to and from other documents.

Tools > Generate Exports

Fills the TTCN Exports table with rows that provide access to the objects of the current document. Only rows that are not already present will be added (at the end of the table), so it is supported to repeat this operation at a later time to detect if any object has been added since the last time. *Generate Exports* is only available when the Table Editor contains a TTCN Exports table.

Tools > Generate Import

Fills the Import table with rows that enables access to the objects of the document to import from. Only rows that are not already present will be added (at the end of the table), so it is supported to repeat this operation at a later time to detect if any object has been added since the last time. *Generate Import* is, naturally, only available when the Table Editor contains an Import table.

Browsing in the Table Editor

With the *Previous Table* and the *Next Table* commands, you can easily browse the contents of the TTCN document.

File > Previous Table

Replaces the table shown in the Table Editor with the previous table in the document. To open the table five tables before the current, use `<Ctrl>` + *Previous Table*.

File > Next Table

Replaces the table shown in the Table Editor with the next table in the document. To open the table five tables after the current, use `<Ctrl>` + *Next Table*.

See also "Context Sensitive Popup Menu" on page 1177 and "Finding Tables by Name" on page 1196 in chapter 27, *Analyzing TTCN Documents (on UNIX)*.

Generating Behaviour Statements

In TTCN *behaviour* tables it is possible to get lists of user defined objects (e.g. constraints, timers etc.). Through these lists, you can generate a statement.

When you invoke the following commands, a row in the table should have the input focus.

Data Dictionary > Add Send Statement

Generate a Send statement by selecting a PCO, a type and a constraint.

This functionality requires that the TTCN document is analyzed. The PCOs, types and constraints with major reference problems or missing type references will not be presented in these lists.

Each list is split in two parts. The upper part contains the items corresponding to the selected items in the other lists. The lower part contains the rest of the items.

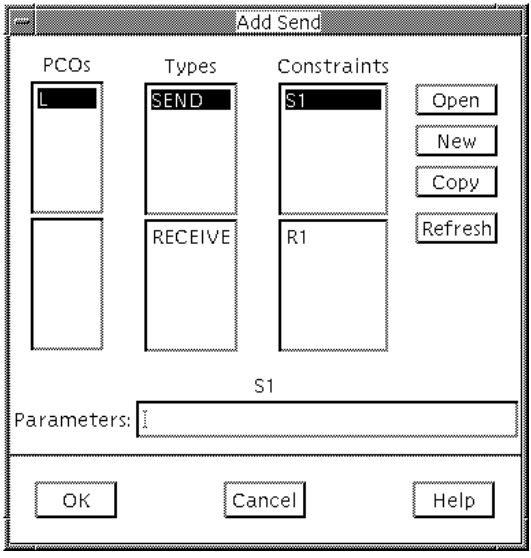

Figure 208: Add Send statement dialog (receive is analogous)

- *PCOs*

  Select a PCO or CP in this list and the *Types* and *Constraints* lists will be split accordingly.

- *Types*

  Select an ASP, PDU or CM type in this list and the corresponding constraints and *PCOs* lists will be split accordingly.

- *Constraints*

  Select a constraint in this list and the corresponding Types and PCOs will be split accordingly.

- *Open*

  The selected constraint will be opened.

- *New*

  A new constraint of the selected type is created. The new constraint will be opened.

- *Copy*

  A new constraint which is a copy of the selected constraint is created. The new constraint will be opened.

- *Refresh*

  Recompute the contents of the lists and re-display the dialog. The selection will be preserved.

- *Parameters*

  If the selected constraint has a parameter list, an actual parameter list is specified here.

- *OK*

  A Send statement is generated with the selected PCO (or CP), type and constraint.

Data Dictionary > Add Receive Statement

Generate a Receive statement by selecting a PCO, a type and a constraint.

A dialog which is analogous with *Add Send Statement* will be displayed.

Data Dictionary > Add StartTimer Statement

Generate a StartTimer statement by selecting a timer.

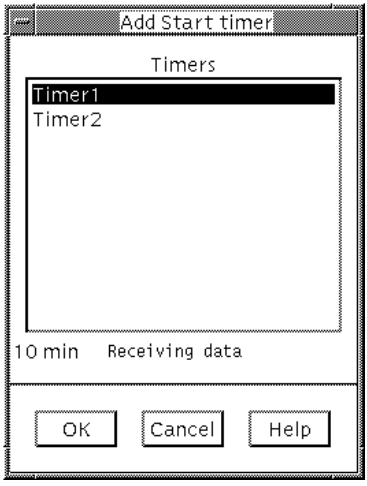

Figure 209: Add StartTimer Statement dialog

- When *OK* is clicked, a StartTimer statement is generated with the selected timer.

Data Dictionary > Add CancelTimer Statement

Generate a CancelTimer statement by selecting a timer.

A dialog which is analogous with *Add StartTimer Statement* will be displayed.

Data Dictionary > Add Attach Statement

Generate an Attach statement by selecting a test step and specifying an actual parameter list (if the test step has a formal parameter list).

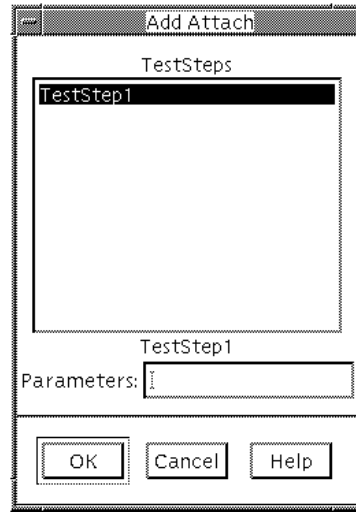

Figure 210: Add Attach Statement dialog

Data Dictionary > Add Timeout Statement

Generate a Timeout statement by selecting a timer.

A dialog which is analogous with *Add StartTimer Statement* will be displayed.

Reverting a Table

File > Revert

Causes all edits to the table **since it was last opened** to be discarded. In other words, the contents of the table are restored to what they were at the point when the table was opened.

This gives the TTCN suite a **limited** undo capability. Note that the analyze status of the table may be set to *not analyzed* by this command.

Creating a New Constraint Table

The *Create Constraint* and *Copy Constraint* commands, facilitate the creation of Constraint tables:

Tools > Create Constraint

Creates a new Constraint table – related to the Type table currently shown in the Table Editor – in a new Table Editor window.

If you use `<Ctrl>` + *Create Constraint*, the new Constraint table will instead be shown in the current Table Editor.

Tools > Copy Constraint

Creates a new Constraint table – that is an exact copy of the Constraint table currently shown in the Table Editor – in a new Table Editor window.

If you use `<Ctrl>` + *Copy Constraint*, the new Constraint table will instead be shown in the current Table Editor.

Generating the Test Suite Overview Tables

The generation of Test Suite Overview Tables is described in "Generating the Test Suite Overview Tables" on page 1151 in chapter 25, *The TTCN Browser (on UNIX)*.

Using Popup Menus

The background popup menu is accessible when you click the right mouse button. When you click the right mouse button and <Ctrl>, the context sensitive menu will be available.

Context Sensitive Popup Menu

The context popup menu contains only one operation, *Find Table*, but in addition it also contains some of the content of the table to be opened by this Find Table operation. The identifier to use in the Find Table operation is retrieved from the field content under the mouse pointer when the context menu was invoked.

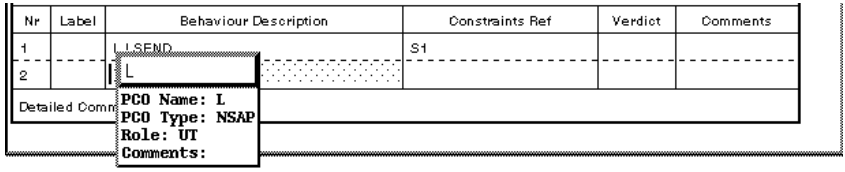

Figure 211: Example use of the TTCN Table Editor context popup menu

Background Popup Menu

The background popup menus are available in all the TTCN suite tables but the appearance differs in accordance with the applicable operations. The popup menus in synchronized behaviour tables and desynchronized behaviour tables have a totally different appearance and will be described below:

Synchronized Behaviour Tables

If the Table Editor contains a behaviour table which is synchronized, the popup menu will display the same menu entries as the *SDT Link* menu. For an explanation of *synchronized* and the commands in the *SDT Link* menu see chapter 36, *TTCN Test Suite Generation*.

Desynchronized Behaviour Tables

If the Table Editor contains a behaviour table which is **not** synchronized, the popup menu will have a different appearance than in the previous case.

The popup menu will contain a sub menu containing all the menu entries of the *Data Dictionary* pull-down menu. It will also contain the following entries:

Cut Focused Row

Removes the focused row from the table and stores it in the clipboard.

Copy Focused Row

Copies the focused row to the paste buffer.

Paste Before Focused Row

Pastes the contents of the paste buffer **before** the focused row.

Delete Focused Row

Deletes the focused row.

Increase Indent

Increases the indentation of the **focused** behaviour line by one position.

Decrease Indent

Decreases the indentation of the **focused** behaviour line by one position.

Increase Sub Tree Indent

Increases the indentation of an entire **branch** in the behaviour tree by one position starting from the **focused** row.

Decrease Sub Tree Indent

Decreases the indentation of an entire **branch** in the behaviour tree by one position starting from the **focused** row.

Insert Row After

Insert a new row after the **focused** row.

Show Error Message

Displays the analysis status message (if any) of the **focused** field.

Find Table

Finds a named table.

Key and Button Bindings

Some bindings operate on the body rows as if they were organized as a tree (work only in the dynamic part of the TTCN document). The indentation level defines the tree structure.

Key	Action
`osfUp`	Move focus to a neighbor field.
`osfDown`	Move focus to a neighbor field.
`osfRight`	Move focus to a neighbor field.
`osfLeft`	Move focus to a neighbor field.
`Ctrl+osfUp`	Move focus to a neighbor field even when editing.
`Ctrl+osfDown`	Move focus to a neighbor field even when editing.
`Ctrl+osfRight`	Move focus to a neighbor field even when editing.
`Ctrl+osfLeft`	Move focus to a neighbor field even when editing.
`osfInsert`	Insert a new row, after focused row if already in body, otherwise last in body.
`osfHelp`	Get help on Table Editors.
`Ctrl+Z`	Run "Analyze & Stop" on page 1183 in chapter 27, *Analyzing TTCN Documents (on UNIX)*
`Ctrl+S`	Search forward with the current settings
`Ctrl+R`	Search backward with the current settings
`character keys`	Start editing field and then apply key.
`Delete`	Start editing field and then apply key.
`...`	Start editing field and then apply key.
`Tab`	Move focus to a neighbor field.
`Shift+Tab`	Same as `<Tab>` but in the opposite direction.

Key	Action
Ctrl+Tab	Navigate in the tool bar, the search bar, the scroll bars and the table
Ctrl+Shift+Tab	Same as <Ctrl+Tab> but in the opposite direction
Ctrl+space	Toggle selection of focused row
KP_Add	Increase indentation level of focused row
Ctrl+KP_Add	Increase indentation level of selected rows
Shift+KP_Add	Increase indentation level of focused subtree
Ctrl+Shift+KP_Add	Increase indentation level of subtree of single selected row
KP_Subtract	Decrease indentation level of focused row
Ctrl+KP_Subtract	Decrease indentation level of selected rows
Shift+KP_Subtract	Decrease indentation level of focused subtree
Ctrl+Shift+KP_Subtract	Decrease indentation level of subtree of single selected row
Ctrl+Shift+osfUp	Move focus to previous row at same indentation level
Ctrl+Shift+osfDown	Move focus to next row at same indentation level
Ctrl+Shift+osfRight	Move focus to last child row of focused row
Ctrl+Shift+osfLeft	Move focus to parent of focused row

Mouse button (OSF names)	Action
Button1	Set focus to the field, and start editing.
Button2	Move focus to the field.
Ctrl+Button1	Toggle selection status of the row
Ctrl+Shift+Button1	Toggle selection status of the subtree with the row as root, move the focus to the field under pointer