Bartels AutoEngineer®
Version 7.6
Release Notes

This documentation contains information about the new features introduced with **Bartels AutoEngineer Version 7.6**. Forward compatibility from earlier versions to **Bartels AutoEngineer Version 7.6** is ensured, but not backward compatibility.

Bartels AutoEngineer Version 7.6 Release Notes
Published by: Bartels System GmbH, Erding
Last printing: October 2010

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Contents

1   General

1.1   Installation

Installation Guide

The Bartels AutoEngineer® Installation Guide (file `inst_en.htm` from the `baedoc` directory of the BAE-CD-ROM) provides detailed **Bartels AutoEngineer** installation instructions for all supported hardware and software platforms.

1.2   User Interface and General Functions

Mouse Buttons (Windows)

The BAE **Windows** versions have been modified to support the two thumb buttons of 5-button mouses by mimicking ⟨ and ⟩ key inputs. This allows for the assignment of user-specific funtions to the thumb mouse buttons through key programming. On default, the **STEPUP** and **STEPDOWN** **User Language** programs for changing layers during edit operations are assigned to the ⟨ and ⟩ keys.

Element Historie

The BAE modules have been modified to automatically load the last element if no project file was specified upon module startup. The LASTLOAD_STD parameter for deactivating this behaviour has been added to **bae.ini**, and an option for setting this parameter has been added to the Settings / Settings dialog.

Element Name Selection

The title bars of the element name selection dialogs of numerous functions have been modified to display the element type and the active project file name instead of the `Element Name ?` prompt.

Element Preview (Windows)

The TOPELPREVIEW_STD parameter for assigning a default element preview mode for schematic plans and layouts has been added to **bae.ini**. Changes to the element preview mode in the element preview dialog are now kept for the duration of the current session.

List Manipulation

The behaviour of the Move button for moving list entries in a series of BAE dialogs has been modified. Previously, the from and to positions for the list entry movement had to be specified after clicking the Move button. Now, the element to be moved has to be selected before the Move is clicked. The new list position can then be selected in a scrollable list. This simplifies and/or allows for the manipulation of long element lists such as menu extension lists, PDF output definition lists, etc.

Tree View Menu (Windows)

The Tree View Menu Window option for opening the tree view menu in its own window has been added to the Tree View Menu function which can be activated through View / Toolbar or by clicking the BAE logo in the toolbar.

Tear Off Menus (Motif)

A "Tear Off" button has been added to the menus and submenus of the BAE **Motif** versions to allow for menus and/or submenus to be undocked from the menu bar.

Toolbar Functions

The M, D and G functions for moving, deleting and group-selecting multiple elements converted selection coordinates to input grid coordinates prior to element selections, thus sometimes causing unintentional element selections. This behaviour has been changed. The selection of existing elements is now carried out in gridless mode, and the input grid is only considered when selecting a new position for an element.

The E (Edit) button for activating an input loop for editing polygons and traces has been added to the toolbar. The E activates the display of corner point and segment center point grippers. A corner is inserted when picking a segment between grippers. I.e., the E provides access to the Move Corner, Move Segment and Insert Corner function. The input angle lock is automatically released during E button input loops.

Clicking the M or E toolbar buttons with the right mouse button activates the new Mouse Drag Mode menu with the Click to Move and Drag & Drop input mode options for subsequent move and/or edit operations. Click to Move is the default input mode for selecting elements and placement positions via mouse click. Drag & Drop selects elements via mouse click and releases them at the new position when the mouse button is released (unless the center or right mouse button for activating the display or context menu is clicked inbetween, in which case the left mouse button must be clicked to select the new placement position).

The I (Information) button for activating the View / Query Element has been added to the toolbars.

Menu Definitions

An option for assigning element classes to menu entries has been added to the **bae.ini addmenuitem** command for adding menu entries. The system automatically deactivates menu entries if the currently loaded element type is not in the list of valid menu entry element types.

Documentary Layers

The BAE Main Menu Setup dialog has been modified to allow for the specification of a color palette and layer menu output index for documentary layer definitions. Documentary layers without output index assignments are automatically assigned to free index output positions. This feature allows for frequently used documentary layers to be placed at the top of the documentary layer selection menus and/or to group documentary layer definitions within layer menus according to their functionality.

Default Element Name

The Default Element Name control for specifying the default name for layout elements has been modified to support a * element name specification for automatically generating the default layout element name from the project base file name (without directory path and file name extension). The lement name is converted into lowercase, trimmed to a maximum length of 40 characters, and invalid element name characters are converted into underscore signs (_).

Please note that the default element name setting provides a default for element name selections and for the generation of new layouts and/or net lists. Existing layout element names (in renamed/copied project files) and **Packager** parameter settings are not affected by the Default Element Name setting and may have to be typed in and/or selected specifically after changing the Default Element Name settings.

Message Prompt Dialog Boxes (Windows)

Dialog popup windows for warning messages and simple user prompts are now opened at the current mouse position rather than at the center of the primary monitor screen to simplify user interactions when working with more than one monitor.

All confirmation dialogs with Yes/ No buttons and no Cancel button have been modified to accept Esc key inputs instead of No button clicks.

Message History

Arrow and arrow down control for paging through the last 50 system messages have been added to the status message area at the bottom of the BAE window.

Default Settings

The BAE module startup sequences have been modified to load parameters from the file `baebase.ini` after loading `bae.ini` parameters and before loading `baeuser.ini` parameters. This allows for the configuration of company-specific parameter settings in addition to user-specific settings in multi-user installations. `bae.ini` can be used to load (or at least keep a documentation of) default parameters settings. `baebase.ini` can be used to load company-specific parameter settings. `baeuser.ini` can be used to load user-specific parameter settings. A non-default. `baebase.ini` file and path name can be specified through the `BAE_BASEINI` environment variable.

Input Grid

The toolbar and middle mouse button functions for selecting a specific input grid have been modified to switch automatically to grid-based input mode if grid-free input mode is selected.

The `c` key function for setting arc center points did not consider additional coordinate start points from the `View` / `Other Functions` / `Corner Scan` function. This problem has been fixed.

Polar Coordinates

The `Polar Coordinates` option of the `Jump Absolute` context menu functions for placing elements and corner points has been modified to allow for the specification of polar coordinate center points different from the element origin. Setting the polar coordinate center point to a position different from the element origin provides new options for constructing elements. The `Pick Center` button can be used to set the polar coordinate center point interactively (e.g., when using the `p` key for coordinate snaps).

Variants

The maximum number of project variants has been increased from 30 to 99.

Display Performance (Windows)

Screen redraws in **Windows** versions with **Desktop Window Manager (DWM)** have been modified to be carried out in buffered mode. This increases the graphic display performance on **Windows Vista** and **Windows 7** systems significantly.

Update Library

The `File` / `Update Library` functions of the **Schematic Editor** and the **Layout Editor** have been modified to display a dialog with listings of copied and/or missing source library elements. This feature provides more control over library update procedures as it displays specific information such as a listing of project library elements which are not defined in the central library.

Main Menu

The confirmation prompt of the `Exit BAE` main menu function has been removed.

Command Line Parameters (BAE HighEnd)

The `gedscm` module argument for starting both the **Layout Editor** and the **Schematic Editor** for a project and activating the message system for cross-highlights, etc. has been added to the BAE command line syntax for starting **BAE HighEnd** from the command line. The optional element name specification in the command line refers to the layout element to be loaded by the **Layout Editor**. The `gedscm` argument can be specified in the **Windows** registry entry for the DDB file type to trigger the start of both **Layout Editor** and **Schematic Editor** when double-clicking a DDB file name. If the `gedscm` argument is used in other than the **BAE HighEnd** version, then the system behaves as if `ged` was specified and starts only the **Layout Editor**.

Eagle Interface

The `sbaedmp.ulp` and `lbaedmp.ulp`ULP programs for importing **Eagle** schematics and layout data (see `eagleulp` directory on the BAE CD) have been modified to combine symbol and/or part names with library names when creating macro names for projects which are using identically named macros from different libraries. The `MACLIBEXT` parameter in the ULP program headers can be used to force the use of library names in macro names to ensure macro name compatibility for different projects.

The `NCPINIGNORE` parameter has been added to the `sbaedmp.ulp` header. The default setting for `NCPINIGNORE` causes pins with `NC` (not connected) prefix to be ignored when transferring the design data. This is to prevent the **Packager** from creating single pin nets for such pins (as this would create short-circuits if other nets are subsequently routed over these pins).

Layout macro name queries through ULP programs in the **Eagle** schematic editor are not always returning correct macro names. The `lbaedmp.ulp` ULP program has therefore been modified to create a `projectname_p.txt` file with a layout part macro name list when exporting layout data. `sbaedmp.ulp` uses the information from the `projectname_p.txt` file to set correct `$plname` values for layout part macro assignments. For this to work, the **Eagle** layout data export must be carried out before the schematic data export.

Symbol origins were shifted towards element boundaries when transferring **Eagle** symbols and part macros with their origins placed outside their element boundaries, thus resulting in the incorrect placement of symbols and/or parts. An automatic symbol and part macro boundary extension facility has been implemented in the **Eagle** export scripts to fix this problem.

1.3   Symbol and Part Libraries

New Library Elements

The following elements have been added to the symbol and part libraries supplied with the BAE software:

Library	Type	Elements
ROUTE	Symbol	att_tpcnt, tag_net_tpcnt, tag_netpins_tpcnt, tag_netarea_tpcnt

Changed Logical Definitions

The

```
newattr "$val" = "!unique!";
```

command which prohibits resistors with different values to be packed into the same layout package has been added to the `ra_dil*pp` and `ra_sil*pp` resistor array definitions in `passiv.def`.

2   Schematic Editor

2.1   General

Polygon Editing

The `Move/Delete Corner` function has been renamed to `Move Corner`. The `Delete Corner` function for deleting mouse-selectable polygon corner points has been added.

The circle center point selection in the `Arc Left` and `Arc Right` functions has been modified to indicate the selected arc direction using a semi-circle at half the arc radius. This allows for the immediate recognition correction (right mouse button context menu) of wrong arc direction selections.

The `Double Select -> Done` mode for automatically terminating the current connection and/or area edit function with `Done` when re-selecting the previous input coordinate has been added to the `Connection/Area Edit` option in `Settings` / `Settings`.

Under **Windows**, a left mouse button double click during pick & place input always selects the current mouse position and triggers the `Done` option, regardless of the `Connection/Area Edit` setting.

Toolbar (Windows)

The toolbar tooltips for symbol and zoom windows have been modified to display any available symbol and window view information.

Element Selection

The mouse wheel can now be used directly to scroll through element selections if `Element Selection` is activated for the `Pick Mode` (previously, the left mouse button had to be pressed down simultaneously to achieve this).

Element Properties

The element property dialog which can be activated through the `p` key has been modified to display read-only name texts such as pin text names in a read-only input field rather than through a label. This allows for such name texts to be copied to the clipboard.

Element Boundaries

The system issued an error message when selecting a placement position outside the current element boundaries with dynamic boundaries not being activated. This behaviour has been changed to allow for dynamic boundaries to be activated through user prompt in such cases.

Workspace Rotation

The `Rotate Workspace Left` and `Rotate Workspace Right` functions for left-rotating and/or right-rotating the currently loaded element with its workarea boundaries and fixed placements by 90 degrees has been added to the `Settings` / `Workspace` submenu which is also available through the `F12` key.

BAE ASCII Import

The `sbaedmp.ulp` **User Language** program for exporting schematic plans from **Eagle** which is included in the `eagleulp` directory of the BAE CD has been modified to support the specification of a scaling factor in the header. Changing the scaling factor from `1.0` to `1.0/1.27` reduces the schematic sheet accordingly, but places symbol pins in a millimetre grid which is usually a more convenient pin placement grid for interactive changes in the **Bartels AutoEngineer**.

EDIF Import

The `File` / `Import/Export` / `EDIF Data Import` function for importing schematic EDIF data sometimes converted bus tap names and bus tap positions incorrectly. This problem has been fixed.

Error Display

The `Error Display` parameter for controlling the display of antenna segments and symbol and label pins connected to antenna connections has been added to `View` / `Settings`. The `Highlight` error display mode is the default setting for highlighting such elements. The `Pattern/Dash` mode displays error elements using hash patterns and/or dash line patterns. The `Pattern/Dash` mode can be used to distinguish error elements from group-selected elements. The selected eror display mode setting does not affect the display of error elements in plot outputs.

Packager Error Messages

The Filter and Exclude input fields for specifying filter strings for selecting or deselecting error messages to be displayed have been added to the Utilities / Packager Error List dialog. The message filter is activated by pressing the Update button. Auto buttons are provided with the filter input fields for specifying a filter pattern which filters the type of the currently selected error list entry. This feature can be used to search for specific errors such as missing definitions without having to look through dependent errors such as missing pin assignments.

2.2   Symbols, Labels

Symbol/Label Pick

Some interactive symbol functions such as Assign Value(s) which allowed for unintentional label picks have have been modified to to block label picks.

Some interactive label functions which allowed for unintentional symbol picks have been modified to block symbol picks.

Pin Connection

The Autoconnection option has been added to the p pin data dialog for pins on symbol and label macro level. When placing a symbol or label, the system automatically activates the Add Connection function and creates a first connection point for pins with Autoconnection activated unless such pins are directly placed onto an existing connection segment. Alternatively, the `scm_pin_autocon` can be used to select a pin marker macro for Autoconnection. This is useful for labels as it eliminates a lot of interactions otherwise necessary to name a net.

Please note that the undo/redo mechanism treats the symbol/label placement and the pin connection drawing as separate procedures.

The `scm_pin_autocon` rule has been added to the `labelpin` pin marker definition from the `stdsym.ddb` symbol library which is delivered with the system.

Symbol Data Query

A scrollable info field for displaying symbol attributes and symbol pins with part pin names, marker names and net names has been added to the symbol element property dialog which can be activated through the p key.

Symbol Search

Referenced symbol macro names are now saved as part attribute entries when saving schematic plans. This enables the View / Find Symbol / Search in List function to display and/or find project symbol macros which are placed elsewhere on the project SCM plan.

The Load Layout Netlist button for loading the layout net list which was created with the last **Packager** run has been added to the dialog of the Search in List function. Loading the layout net list adds the `newattr` attribute assignments from the logical library to the Other Attribute selection. The layout net list loaded through Search in List is kept in main memory. I.e., it is not necessary to load the layout net list again in subsequent Search in List calls of the same **Schematic Editor** session.

Symbol Pin Search

The Search symbol pin and Search layout part pin functions have been added to the View / Find Symbol submenu which can also be activated through the Ctrl-F key. Search symbol pin allows for symbol pin selections from symbol pin lists of mouse-selectable symbols. Search layout part pin searches the symbol pin which matches a selected layour part pin from the physical net list. Both functions carry out an automatic Zoom Window to the position of the selected symbol pin.

Symbol Logic Edit

Layout pin names with more than two characters sometimes overlapped in the pin assignment drawing of the Edit Symbol Logic function, thus preventing from reliably assigning pins. The Edit Symbol Logic function has been modified to automatically scale the pin assignment drawing as required to avoid this problem.

Show Symbol Logic

The line wrapping for long pin lists has been modified and is now guided by the width of the dialog window rather than the width of the BAE window for displaying the symbol logic to eliminate the need for scrolling horizontally in the symbol logic dialog window when displaying symbols with long pin lists.

Block Symbols

The Load Macro symbol context menu function sometimes failed to recognize hierarchy block symbols in cases where the logical library definitions of these symbols contained definitions not required for the block symbol declaration (e.g., such as `newattr` commands). This problem has been fixed.

Symbol Database

The selection boxes and the search mask of the Symbol Database function have been turned into modal dialogs. This allows for other procedures such as creating connections to be carried out between symbol placements with Symbol Database without having to reactivate the Symbol Database function.

The Autoname control element has been added to the Symbol Placement button of the Symbol Database dialog. Autoname allows for the selection of a symbol naming mode different from the default `bae.ini` setting. A single mouse click on a symbol preview list element switches the Autoname display to the next free symbol name corresponding to the name pattern of the selected symbol, thus displaying the new automatically created symbol name prior to the placement of the symbol.

Placement Status (BAE HighEnd)

The cross-hair cursor was not displayed for SCM symbols with plot invisibility settings for which no layout part was placed yet if both the **Schematic Editor** and the **Layout Editor** were open simultaneously in **BAE HighEnd**. This problem has been fixed.

Label Placement

The Import facility of the Place Pin List/Row and Place Texts/Labels functions from the Symbols / Symbol Edit Functions submenu which can also be activated through the e key has been modified to support automatic import and placement of text rows, pin name rows and label name rows. A row processing mode can be selected prior to placement and the row placement coordinates are specified by selecting the first and second row element positions.

Net Name Selection

The NETPLDISP_SCM parameter for limiting the display of SCM sheet names behind net names to less than 200 characters in the net name selection dialog of the Symbols / Add Label function has been added to `bae.ini`. This allows for multi-column net name selection dialogs to be displayed in projects where certain nets are on multiple SCM sheets.

Symbol Generation

The SYMDEFSPNM_SCM parameter for prompting the Symbols / Other Functions / Create FPGA Symbol / CSV File function to place pin names from symbol pin name column of the input file as symbol texts and use the assigned layout pin names to name the SCM symbol pins has been added to `bae.ini`.

Symbol Edit Batch

The Origin Group Load and Group Name Delete batch steps have been added to the File / Library Utilities / Symbol Edit Batch function to allow for the processing of text fields with specific attribute texts which are placed at the symbol origins.

The Pin Rule Assignment batch step for attaching and/or detaching rules symbol pin rules has been added.

The Symbols / Symbol Edit Functions / Call Edit Batch function has been added for applying Symbol Edit Batch command sequences to the currently loaded element. This allows for automatic text class assignments, dummy attribut text placements, etc. to be carried out on new symbols without having to apply the same edit batch on (already edited) symbols of the project and/or library file.

The SCMSAVEBAT_SCM, SYMSAVEBAT_SCM, LABSAVEBAT_SCM and MRKSAVEBAT_SCM parameters for automatically activating edit batches when saving SCM plans, symbols, labels and markers have been added to `bae.ini`. Please make sure that edit batches which are activated when saving an element don't contain any commands which create multiple placements when reactivated (such as Origin Group Load). If a questionmark precedes the batch name, then the system prompts the user to start the batch when saving elements. The LIBBATCALL_SCM parameter for restricting automatic batch calls to elements from the standard SCM library configured through setup has been added to `bae.ini`.

Logical Definitions

The functions for placing symbols and/or groups from other DDB files have been modified to copy the logical library definitions for the copied symbols from the source file if these definitions are not yet in the project file. This simplifies the transfer of schematic groups with symbol macros which are not defined in any of the standard libraries.

2.3 Connections

Signal Router

With the Signal Router deactivated in the Settings / Settings dialog, the Unroutes option can be used to create dotted lines with `open` group name assignments to indicate connections opened due to symbol and/or group movements. These dotted lines serve as visual aid for manually rerouting open connections.

Bus Connections

Moving bus segments with connected bus taps sometimes caused incorrect contact area highlights at some of the connected bus taps. This problem has been fixed.

The Add Connection input loop kept the bus status for implicit bus definitions through connections to symbol bus pins and assigned that bus status to subsequently in the same input loop created connections even if those connections were not tapped to a bus. This problem has been fixed.

Bus Taps

The Tap Bus function has been modified to support the selection of texts from lower hierarchy levels when setting the bus tap name. This allows for symbol texts describing pin functions rather than non-descriptive logical pin names to be selected for naming bus taps.

The bus tap pick function has been modified to treat bus tap texts with the same priority like bus tap graphics to improve bus tap pick accuracy when working with small display zoom factors settings.

The Rerouting and No Rerouting modes for activating and/or deactivating automatic bus-tap connection re-routing during bus tap repositioning have been added to Connections / Bus Settings.

Net Highlight (BAE HighEnd)

When working with multiple **Schematic Editor** and **Layout Editor** windows, the **Schematic Editor** net highlight menus were not correctly re-activated after highlighting unnamed nets and changing to a different SCM plan within the same project (a new **Layout Editor** net highlight request was required to update the **Schematic Editor** menus). This problem has been fixed.

With highlight focus activated, an explicit screen redraw operation was required to reset net highlights. This problem has been fixed.

2.4   Graphics

Draw Assistent

Buttons for generating regular polyangulars, interpolated ellipses and ovals (i.e., rectangles with semicircles ends at the smaller sides) have been added to the Utilities / Draw Assistant function.

The element-specific DRAWASSIBOX_SCM parameter for controlling whether the draw assistant should be automatically started when loading elements of a specific class has been added to **bae.ini**.

Move Segment

The **Layout Editor** options for adjusting neighbouring segments to the moved segment have been added to the **Schematic Editor** Settings / Settings dialog and corresponding context menu functions.

Dimensioning

The functions from the Graphic / Other Functions / Drawing Utilities submenu have been modified to use a comma instead of a dot in front of the decimals of measuring texts depending on the COORDTMODE_SCM setting from **bae.ini**.

The Text Prefix and Text Suffix for optionally inserting a measurement text prefix and/or suffix have been added to the Distance Measure context menu which can be activated during the selection of the measurement position. The measurement text is automatically centered and the measurement lines are automatically clipped to accommodate measurement text prefix and/or suffix specifications. New **bae.ini** parameters for configuring a default measurement text prefix and/or suffix have been added. These prefix and suffix defaults can be filled with spaces/blanks to create a visible gap between measurement texts and measurement lines.

The X Dimensioning and Y Dimensioning measurement functions have been modified to draw an arrow from the measurement origin to the measurement text. The measurement arrow can be activated and its appearance can be configured through the right mouse button context menu and through new **bae.ini** parameters.

The measurement object pick facility of the Delete Measurement/Ruler function has been modified to allow for selections through both text and graphic elements of the measurement object. Previously, a measurement object had to be selected by clicking one of its graphic elements.

Bitmap Data Import

With Antialiasing activated, the File / Import/Export / Bitmap Input submenu functions created polygons with enlarged or missing antialias segments in the bottom left and/or top right corner of the polygon. This problem has been fixed.

2.5   Text, Attributes

Text Placement

Control elements for text height, text plot width text angle, text mirroring, text alignment and text frame mode specifications have been added to the text input dialog of the Add Text function and the T toolbar buttons to allow for those text properties to be specified prior to placement.

Symbol Attribute Texts

The Move Name and Move Attribute context menu functions have been modified to keep the old text position rather than requiring a new text positioning if a zero text size is specified for fading out the text.

Text Alignment

The Utilities / Draw Assistant function has been modified to allow for texts to be vertically centered. This is especially useful when applying the Pin Text function for placing pin documentation texts.

Mirrored vertically center-aligned texts were displayed at incorrect pick position offsets. This problem has been fixed.

Multiline Texts

Pen width and rule assignments to a single multiline text element are now automatically transferred to all other texts elements of that multiline text.

Rule assignments to multiline texts could get lost when editing these texts. This problem has been fixed.

The multiline text edit field of the p key element properties dialog has been modified to display the full text instead of just the selected line for editing. The Rel. Line Spacing input field for specifying line spacing relative to the text height has been added (previously, the line spacing could only be specified through the TXTLSPACE_SCM parameter in **bae.ini**).

Symbol Attribute Replacement

The Symbols / Other Functions / Set Attributes / Replace Attributes function for carrying out project-wide attribute substitutions has been added. This allows for an attribute value to be directly substituted with a different attribute value, or for assigning an attribute value depending on the setting of a different attribute (e.g., to assign a layout package type depending on a resistor value). The attribute assignement process can be restricted to symbol and symbol macro name patterns. The RPLATTRL_SCM parameter for keeping a list of processing attribute names with parameter defaults for the input dialog has been added to **bae.ini**.

The Symbols / Other Functions / Set Attributes / Transfer $rpname to $rbname function for carrying out the project-wide transfer of **$rpname** to **$rbname** attribute values has been added. Transfer $rpname to $rbname processes all symbols with **$rpname** attribute value assignments and **$rbname** text definitions on symbol macro level and lists both the number of processed symbols and the number of unprocessed symbols (with **$rpname** attribute value, but without **$rbname** text).

2.6   Group Functions

Group Selection

The Edit / Group Elements submenu functions have been modified to Select and/or Deselect only those elements which are not yet selected and/or deselected, respectively. This simplifies the selection and/or deselection of multiple overlapping elements as they can simply be picked through repeated clicks at the same pick point.

The Edit / Other Functions / Select / Group Name function has been modified to select all elements without group name assignment if an empty string is entered.

The Edit / Group Elements / Connection Routes submenu with new functions for selecting and/or deselecting not only single connection segments but connections to the next symbol/label pin and/or t-connection. These new group functions are also available through the right mouse button context menu for connection segments.

The Net function for selecting and/or deselection all connections and symbols which are connected to the selected connection segment has been added to the Edit / Other Functions / Select/Deselect submenu. The Net group operations are also available through the right mouse button context menu for connection segments.

Group Movement

The c shortcut key for temporarily releasing the angle lock has been added to the Move Group function. The previous angle lock mode is restored upon completion of the Move Group function.

During Move Group operations, the distance to the selected start point is now displayed together with the current group coordinates in the status line while moving groups.

The functions for moving groups of connections has been modified to move bus taps connected to group connection ends with the group even if the connected bus tap segment is not selected to the group and if the group is moved parallel to the bus segment. This avoids the generation of additional connections to the old bus tap positions, thus simplifying the movement of bus-connected symbols alongside the bus.

Group Element Mirroring

The context menus which are activated when pressing the m and n keys from outside any other function have been extended by functions for setting and/or resetting the mirroring mode of group-selected symbols, labels, and texts.

Group Loading

The Edit / Other Functions / Load without Hierarchy / Sheet function has been modified to process connections by placing them as graphic lines. This allows for complete schematic plans to be loaded into other schematic plans or block symbols as pure schematic drawing without function.

Group Settings

The Edit / Group Display Mode function has been renamed to Group Settings and activates a dialog with group parameter settings which allows for the Display Mode to be selected and the new Angle Release parameter to be set. Angle Release provides an option for automatically releasing the angle lock during Move Group operations.

Group Placements

The Group Load 0,0 option for loading groups and placing them at the origin of the currently loaded element has been added to the right mouse button context menu of the file element favourites toolbar functions/buttons for opening/loading elements.

Layout Group Placement (BAE HighEnd)

The Edit / Other Functions / Place Layout Group function for placing the layout parts for currently group-selected schematic symbols as a group on the layout has been added. The system tries to place the layout parts according to the schematic symbol placement. This is useful when part group with discrete components. The Input Grid, Part Expansion and Part Outline Layer parameter settings are taking into consideration by the Place Layout Group function.

Attribute Selection

With special `!not_set!` attribute value selections, the Edit / Other Functions / Select / Attributes function selected all symbols with attribute text assignments for the selected attribute rather than selecting only the symbols without such attribute text assignments. This problem has been fixed.

Element PDF Layers

The Settings / Rule Attachment / Set Group Rules / PDF Layer function has been added for assigning PDF layer names to group selected elements. These assignments are considered by PDF batch outputs with PDF Layer option. **Acrobat Reader** displays a PDF output element which is assigned to both its own PDF layer and to its element type specific PDF layer only if both PDF layers are activated.

The Settings / Rule Attachment / Select Elements / PDF Layer function has been added for group selecting elements by PDF layer name. The PDF layer name input control provides a list of all existing PDF layer names thus doubling as a facility for looking up used PDF layer names.

2.7   Plot Output

EPS/PDF Output

The Symbol Attribute Annotations option for adding notes with symbol attributes to the PDF output has been added to the EPS/PDF Output function. Symbol attribute notes are displayed as bright dashed frame in the output. When hovering over this frame, a window appears which displays the part name, the symbol and layout part macros and attribute assignments/values. Symbol attribute notes are not included when printing and/or plotting the PDF file. The attribute display sequence is controlled through the `bae.ini` parameters for the Assign Value(s) function. The Comments option can be used to include attribute name comments in the symbol attribute notes. For labels, the comment includes the label macro name and the names of the schematic sheets on which the corresponding net name is used.

The layout netlist created during the last **Packager** run is considered when creating symbol attribute note outputs to ensure that part attributes which are created using the `newattr` command in logical library definitions are included in the symbol attribute notes.

2.8   Hierarchical Circuit Design

Crosshighlight (BAE HighEnd)

The **Layout Editor** has been modified to support the cross-highlight of unnamed nets and block-specific named nets of block reference symbols of schematic blocks which are loaded with the Load Block Plan option of the Load Macro symbol context function onto a schematic sheet. The **Layout Editor** highlights the nets of the currently loaded block reference.

A **Packager** run with BAE Version 7.4.047 or later is required for block reference cross highlights to work.

3   Packager

3.1   Error Messages

Message Display

The message output screen of the **Packager** is now erased whenver the screen is full of error and/or warning messages and subsequent messages are listed from the top of the erased screen rather than scrolling the screen with every new message added at the end of the list. This increases the performance of **Packager** runs with many messages significantly. The facility for scrolling through the complete message list is reactivated when the **Packager** run is completed.

Error Handling

The **Packager** has been modified to refrain from immediate termination when encountering errors which can be temporarily ignored by either not processing the error element or by using appropriate default values. All error messages are listed at the end of the **Packager** run and no layout net list is created in that case. This is helpful at the beginning of a project which still contains many errors, as it reduces the number of switches between **Schematic Editor** and **Packager** which are necessary for finding and fixing any errors.

Symbol Pin Assignment

The `Respectively no pin named 'x' on part macro 'y'!` text has been added to the `No assignment for symbol pin 'x' found!` error message for implicit 1:1 pin assignments without `xlat` command as a hint that a missing or incorrectly named layout part pin may have caused the error.

Part Naming

The **Packager** has been modified to issue a warning message if the generated net list contains a part with the name `#` as this is also the default part name assigned by the layout group functions in case of part name conflicts.

Library Access

The **Packager** has been modified to issue warnings rather than terminating with error messages if library files and/or alternative libraries files as specified through the library path parameter settings are not present. This allows for the **Packager** run to complete without having to correct library paths if a project contains all required library elements (as may well be the case if project files are transferred between different users and/or BAE host systems).

3.2   Part Processing

Multi Gate Parts

The **Packager** has been modified to set gates without `$rbname`/`$rpname` assignments which are packed into layout parts which already contains gates with `$rbname`/`$rpname` assignments implicetely to `swap internal` to eliminate invalid swap pin data error messages.

Test Point Generation

The feature for removing part pins from the net list by assigning `n.c.` net names triggered the generation of test point parts for these non-existent nets. This problem has been fixed.

The Settings / Reset Test Point Generation function for deactivating the test point generation has been added.

The `$tpcnt` net attribute has been added to allow for the specification of the number of test points to be generated for a net. A test point counter is added at the end of the generated test point names (`_1`, `_2`, etc.). The att_tpcnt, tag_net_tpcnt, tag_netpin_tpcnt and tag_netarea_tpcnt symbols for setting and/or assigning the `$tpcnt` attribute have been added to the ROUTE symbol library.

Variant Part Groups

Using the `$rlext` attribute for selecting alternative definitions triggered incompatible definition error messages when packing variant symbols into layout parts due to `$vgrp` attribute settings. This problem has been fixed. The `$rlext` attribute can now be used together with the `$vgrp` attibute provided that identical `$rlext` values are set for the grouped/packed variant symbols.

3.3   Attributes

Net Type Assignments

Net type assignments through the `$nettype` attribute have been modified to allow for net types to be prioritized by preceding net type attribute values with `!` without causing warning messages and/or `mixed` net type assignments being carried out. This is useful if schematic net types are defined through net areas and a special net type needs to be assigned to specific nets such as the power supply in this net area.

Pin Attributes

The **Packager** has been modified to automatically assign the `$sym` attribute with the reference names of corresponding schematic symbols to net list pins. This makes it easier to identify the gates of a multi-gate part in the **Layout Editor**.

The **Packager** has been modified to automatically assign the `$blkname` (block name) and `$blkrname` (block reference name) pin attributes to net list pins from hierarchical blocks. These attributes are required for, e.g., the cross-highlight in **HighEnd**.

4   Layout Editor

4.1   General

Polygon Editing

The `Move/Delete Corner` trace and area functions have been renamed to `Move Corner`. The `Delete Corner` trace and polygon functions for deleting mouse-selectable trace and polygon corners have been added.

The circle center point selection in the `Arc Left` and `Arc Right` functions has been modified to indicate the selected arc direction using a semi-circle at half the arc radius. This allows for the immediate recognition correction (right mouse button context menu) of wrong arc direction selections.

The `Settings` / `Settings` and context menu options for selecting the neighbouring segment processing modes in `Move Segment` operations are now also considered by the functions for moving area segments.

The `Double Select -> Done` mode for automatically terminating the current trace and/or area edit function with `Done` when re-selecting the previous input coordinate has been added to the `Traces/Area Edit` option in `Settings` / `Settings`.

Edit/Angle Direction

The `Shorter Side Toggle` mode of the `Angle Direction` parameter from the `View` / `Settings` dialog has been modified to automatically pick the direction change option with the minimum direction change.

The `Move Corner` mode of the `Octagonal` parameter from the `View` / `Settings` dialog has been modified to insert diagonal segments only opposite to the edit direction to allow for the insertion of multiple corner points through a single menu function call.

Airline Display

New controls and options for activating and/or deactivating the airline display for single pins have been added to the `Settings` / `Settings` dialog, thus allowing for airlines to be displayed only for, e.g., solder side or part side pins.

Pin airline display mode changes only affect pins but not any of the traces connected to those pins. Therefore, it doesn't make sense to deactivate the pin airline display if working with `Corner` options for airline calculations.

The **Autorouter** considers both pin and net airline display modes, thus a whole range of additional options for partial pcb board autorouting are pssible. Net airline display modes can be changed whilst autorouting is in process whereas pin airline display modifications automatically trigger the termination of the current autorouting process.

The `Traces` / `Net List Utilities` / `Highlight Nets` submenu functions for saving and loading net visibility modes have been modified to save and load pin visibility modes as well.

Toolbar (Windows)

The toolbar tooltips for zoom windows have been modified to display any available window view information.

Element Selection

The mouse wheel can now be used directly to scroll through element selections if `Element Selection` is activated for the `Pick Mode` (previously, the left mouse button had to be pressed down simultaneously to achieve this).

Element Properties

The element property dialog which can be activated through the `P` key has been modified to display read-only name texts such as pin text names in a read-only input field rather than through a label. This allows for such name texts to be copied to the clipboard.

The `mil` option (1/1000 Inch) has been added to the `mm` and `Inch` unit options for displaying coordinates and dimensions through the element properties dialog.

Element Boundaries

The system issued an error message when selecting a placement position outside the current element boundaries with dynamic boundaries not being activated. This behaviour has been changed to allow for dynamic boundaries to be activated through user prompt in such cases.

Workspace Rotation

The Rotate Workspace Left and Rotate Workspace Right functions for left-rotating and/or right-rotating the currently loaded element with its workarea boundaries and fixed placements by 90 degrees has been added to the Settings / Workspace submenu which is also available through the F12 key.

Netlist Import

The CONPLCROSS_GED parameter for configuring a `.csv` file part macro cross reference list has been added to `bae.ini`. The part macro cross reference list can contain lines with semicolon-separated source net list part macro names and corresponding BAE layout library part macro names. The BAE part macro name field can contain a comma-separated list of alternative part macro types.

The first rejected alternative library prompt for a missing part macro has been modified to ask whether all subsequent missing part macros should also be ignored. This feature can be used to suppress missing part macro prompts when generating missing part macro lists.

The File / Import/Export / Net List Import function activated an automatic **Packager** run on the project data which was loaded prior to the net list import process if the CONCAPACK_GED parameter from `bae.ini` was set. This problem has been fixed. The automatic **Packager** run is now applied to the project data for the successfully imported net list data.

BAE ASCII Import

The BAE/ASCII Input function has been modified to support power layer definitions when importing `.dmp` files.

Variants

The AUTOSVAR_LAY parameter for automatically setting the last active schematic plan variant when loading a layout has been added to `bae.ini`. This eliminates the need for manually activating the correct layout variant when switching to the **Layout Editor** or **CAM Processor** after changing the variant in the **Schematic Editor**.

Drill Overview

A drill diameter listing with padstack and part/layout references has been added to the output of the File / Library Utilities / Drill Overview function. This makes it easier to locate tool table drill diameters on the layout.

Menu Definitions

The Parts / Autoplacement, Traces / Autorouter and Parts / Autoplacement menus have been turned into submenus with repetitive input loops to prevent the menu texts of the BAE menu from turning into multi-line texts when working in small client windows.

4.2   Display, Design Rule Check

Color Palette

An extended color selection menu with 512 different additional color values has been added to the standard 16 color selection menu of the View / Change Colors function. Please note that, depending on the operating system platforms and/or graphic device drivers and configured screen color depths, the performance of screen redraw operations may be notably reduced when using non-standard colors.

Highlight Display

The **Layout Editor** has been modified to support Errors and Highlight pattern selections for displaying short-circuit and/or group-selected elements. The Highlight pattern is prioritized when displaying group-selected short-circuit elements.

Pick Marker Display

Inverted drawing mode is now being used for Pick Marker Display (see View / Settings) to improve the visibility of pick points for overlapping areas and for traces which are drawn using true trace width display modes.

DRC Error Display

The Group Selection function for automatically group selecting the elements causing the currently marked DRC error list element has been added to the dialog of the Utilities / DRC Error List / DRC Error List function. Previously group selected elements are deselected when applying the Group Selection option. The Highlight Focus On/Off button for restricting the display to the group selected elements has also been added to the Utilities / DRC Error List / DRC Error List dialog. These features make it easier to locate and process elements causing specific DRC errors, especially when working on densely placed layouts.

The Sort option for sorting error listings by error type, error layer or by clearance violation has been added to the DRC Error List function.

The Toggle Acceptance option for accepting errors and removing their error markers from the display has been added to the DRC Error List function. Accepted errors are listed at the end of the error listing (upon re-display), and an `A` error number suffix is used to indicate accepted errors in the error list. Accepted error markers are saved with the layout, thus ensuring that they are still faded out after carrying out a Batch DRC in subsequent sessions. Please note that accepted error markers have been implemented with BAE Version 7.4.033. Loading accepted errors with earlier BAE versions triggers their error messages to be displayed at the internal layout origin (thus potentially extending the element boundaries of the layout).

The All, In Rectangle and Violation buttons have been added for fading out and/or fading in groups of errors.

The Show All in Layout option has been added for temporarily displaying all accepted layout errors.

The listing produced by the DRC Error List function has been extended by entries for active copper areas without pin connection to the assigned net. This is useful when checking copper areas on split power layers (split power planes).

Constructive parts with net connections have been included in the DRC Error List output.

Advanced DRC (BAE HighEnd)

DRC block fields for net group design rule checks have been added to the block clearance input controls for the net type matrix of the Settings / Advanced DRC function.

The net group DRC has been modified to virtually assign structures without net list connections to the `std` net type rather than ignoring net group DRC settings for such structures and checking them with standard clearance parameters.

The N.C. Net Type parameter for assigning non-netlist elements to a net group DRC net type has been added to the p key element properties dialog. A N.C. Net Type assignment to a part sets the net type only for those part elements which have no net list connection.

4.3   Parts, Placement

Part Data Query

A scrollable info field for displaying part attributes and part pins with logical pin names, padstack macro names and net names has been added to the part element property dialog which can be activated through the `p` key.

The Parts / Other Functions / Part Documentation function for activating a `part_docu` string predicate part documentation saved with Settings / Rule Attachment / Plan has been added. Settings / Rule Attachment / Plan is also available through the right mouse button context menu.

Part Rerouting

The No Trace Move, Trace End Move and Trace Segment Move options for selecting different modes for the rerouting part pin and via connections during Move Part operations without mirroring have been added to the Parts section of the Settings / Settings dialog. No Trace Move does not change trace corner point positions. Trace End Move automatically re-routes trace corner points which are ending on the pins and/or vias of the moved part. The Trace Segment Move default mode automatically re-routes trace corner points which are ending on part pins/vias and, unless the part is rotated, moves neighbouring segments accordingly in order to preserve diagonal connection patterns.

Autoplacement

The placement functions from the Parts / Autoplacement menu have been modified to consider only visible net and pin airlines when calculating connectivity weight factors. Thus it is now possible to autoplace different circuit groups separately with the Clusterplacement functions, even if these groups are connected to each other.

The Clusterplacement function has been modified to place placement part set parts without connections to pre-placed parts as close as possible to the placement start point rather than placing such parts depending on the placement of pre-placed constructive parts.

Part Generation

The Part Generator from the File / Library Utilities / Macro Generator sometimes generated invalid arc graphic elements on the part group layer. This problem has been fixed.

Hierarchy Copying

The Destination Selection option for automatically group-selecting copied parts has been added to the Parts / Other Functions / Copy Hierarchie function to eliminate the need for selecting copied parts for subsequent group operations.

Pin Swap

The Pin Swap function for carrying out a pin swap of the first two swappable pins of the currently placed part has been added to the right mouse button context menu of the part placement functions. This is useful during the placement of, e.g., two-pin parts such as resistors as it allows for pin swaps and corresponding airline updates to be carried out without having to interrupt the part placement operation.

Part List Output

The Complete List option for exporting all parts regardless of any `$noplc` placement status attribute assignments has been added to the File / Import/Export / Part List Output functions.

The PLPSIDE_LAY parameter for adding a field for the part placement side to the output of the CSV/DBF ASCII Format function has been added to `bae.ini`. The `$pdfpside` keyword can be used in part list output templates for the EPS/PDF Output to activate placement side outputs.

The PLPBOTEXT_LAY, PLPTOPEXT_LAY and PLPUPLCEXT_LAY parameters for specifying part side name extensions (e.g., `" T"` for `c100 T, c101 T`) have been added to `bae.ini`.

The Variant List option has been added to the Output Part Set selection of the CSV/DBF ASCII Format and CSV/DBF ASCII Format Counted export functions. Variant List exports the part attributes with all variant attributes, extending the output table with fields for variant names and/or variant numbers. The output is sorted by variants, thus creating a file which corresponds with a concatenation of the files for single variants.

DRC Check Exclude Parts

When applying the Parts / Other Functions / Part/Height DRC / Check Exclude Name function to a part without prior check exclude part assignment, the system now provides a DRC part/error name suggestion for easy confirmation.

The Check Exclude Pick function for mouse selecting the part for DRC check exclusion has been added.

The Check Exclude Report function for listing the layout part pairs which are excluded from the DRC check has been added.

Part Set Selection

The Select Group and Deselect Group buttons for adding or removing group selected parts to or from the part placement set have been added to the part selection dialog of the Parts / Part Set / Part(s) function.

The Parts / Part Set / Attributes submenu with functions for controlling part set selections for net list parts part pin and net attributes has been added.

The next placement part name suggestion facility of the Add Part options for manipulating the active part set has been modified to dynamically adapt to part set changes.

Layout Library Edit Batch

The Parts / Part Edit Functions / Call Edit Batch function has been added for applying Layout Library Edit Batch command sequences to the currently loaded element. This allows for automatic plot visibility settings, pen width assignments, etc. to be carried out on new part macros without having to apply the same edit batch on (already edited) parts macros of the project and/or library file.

Options for horizontal and/or vertical text center-alignment have been added to the automatic pick point text placement function.

The LAYSAVEBAT_GED, PRTSAVEBAT_GED, STKSAVEBAT_GED and PADSAVEBAT_GED parameters for automatically activating edit batches when saving layouts, parts, padstacks and pads have been added to `bae.ini`. Please make sure that edit batches which are activated when saving an element don't contain any commands which create multiple placements when reactivated (such as Polygon Layer Copy). If a questionmark precedes the batch name, then the system prompts the user to start the batch when saving elements. The LIBBATCALL_GED parameter for restricting automatic batch calls to elements from the standard layout library configured through setup has been added to `bae.ini`.

Padstack Generation

The Via w.o. Solder Mask for generating via padstacks without solder mask has been added to the Padstack Generator from the File / Library Utilities / Macro Generator menu. Via padstacks without solder mask are created with a `vh` (via hidden) name prefix.

4.4   Traces, Routing

Trace Edit

Pressing the `Ctrl` key during manual tarce editing on part macro level could cause program crashes. This problem has been fixed.

Point Snap

The pin pick of the `Snap Start Point` option in `Settings` / `Settings` was working with a pick tolerance tolerance different from the part pick when used through right mouse button context menu functions. This could lead to traces being connected slightly off the center of part pins when using the `Add Trace` context function with small zoom factors. This problem has been fixed.

Coordinates picks through the `p` key in `DRC Snap` mode have been modified to pick the exact user input coordinates. This allows for the connection to test point parts which are not included in the net list.

Trace Beautify

The `Traces` / `Other Functions` / `Trace Beautify` function has been modified to eliminate acute trace angles if only the two adjacent trace segments are joined through this operation. Previously, such angles (no matter whether acute or not) were not processed as they were considered to be deliberate corner modifications.

Trace Length Report

The trace length reports and highlight and zoom functions created by the `All Nets by Name`, `All Nets by Length`, `Visible Nets by Name` and `Visible Nets by Length` functions from the `Traces` / `Other Functions` / `Trace Length` / `Length Query` submenu are now displayed in a modal dialog to allow for systematic processing of the displayed nets without having to reactivate the trace length report after modifying a trace.

Parallel Traces

The `Traces` / `Other Functions` / `Parallel Traces` submenu functions generated invalid traces when applied to traces with an arc at the start and/or end. This problem has been fixed.

Trace Edit Display

The fill display options of the `Traces|Other Functions|Edit Display` facility have been modified to activate a circle display (with current trace width and trace layer at the graphic cursor) before setting the first trace corner point. This feature visualizes the current default trace parameter and grid settings and thus allows for visual (pin) clearance checks before setting the first trace corner point.

The functions for moving trace segments have been modified to display any vias at the segment ends and to consider such vias in the design rule check.

Trace Data Query

The `Ctrl` key function for displaying information about the element at the mouse position has been modified to display fixed mode settings for vias and traces.

Trace Width

The default trace widths configured through `Settings` / `Settings` are now appended to the menu texts of the `Thin Default` and `Wide Default` trace edit context menu functions to indicate target trace width settings prior to the application of these functions.

Trace Length Display (BAE HighEnd)

The trace length display during manual routing and in some of the functions from the `Traces` / `Other Functions` / `Trace Length` / `Length Query` submenu failed to take layer swaps to the `Layer n (Parts.)` layer into account when calculating trace lengths for layer swaps from vias to the `Layer n (Parts.)` layer according to `Settings` / `Rule Attachment` / `Layer Stackup` settings. This problem has been fixed.

Trace Impedance

Some PCB board and trace thickness combinations caused value range overflows in the exponential functions of the impedance calculation formulas, thus resulting in non-sensical impedance and/or thickness values. This problem has been fixed through the use of modified internal iteration start values.

Via Placement

The v key via functions have been modified to check whether they have been called from within a trace edit function in which case a trace corner point is set at the current mouse position, an automatic layer swap to signal layer 1 (solder side) or to the top layer (part side) is carried out, and the trace edit function is terminated. This simplifies fanout via placements significantly. The FANOUTLOOP_GED parameter for automatically reactivating the last trace edit function has been added to `bae.ini` to simplify fanout trace and/or via definitions even further.

The Traces / Via Functions / Dot Fill Area has been modified to avoid via positions which might intersect with elements of the fill area net. This prevents the system from placing any vias on the pins of the target net.

The Traces / Via Functions / Create Trace Shield function has been modified to allow not only trace picks but also the selection of polygons to be shielded. The Via Sides option for placing the vias either to the left or inside or to the right or outside the selected trace or polygon element has been added.

Net Visibility Status

Load and Save buttons for loading and saving net visibility selections have been added to the Settings / Settings dialog.

The Pick Net functions for selecting nets for assigning net visibility settings have been modified to allow for multiple nets to be selected. This allows for different nets of, e.g., adjacent pins to be selected without the need of reactivating the net selection function for each net.

Net List Assistant

The Part Nets option for processing the nets of a mouse-clickable part has been added to the attribute-controlled net selection which can be activated through the $ entry. This simplifies certain tasks such as the highlighting of all nets connected to a specific part.

A net info field and a net pin selection box have been added to the net list assistant dialog. The data of the selected net is displayed in the net info field and the net pins with part/pin names and placement status information are provided for selection in the net pin selection box when clicking a net using a single mouse click in the net selection box. Clicking a net pin entry triggers a Zoom Window to the position of the selected pin or activates the Add Part for the part with the selected pin if this part is not yet placed. The heights of the net selection box, the net info field and the net pin selection box can be configured through `bae.ini` parameters. On default, net name double-clicks trigger the Toggle Highlight function instead of Report Net Data if the display of the net info field is activated.

Short Circuit Report

The short circuit pins listed at the top of the Traces / Net List Utilities / Report Pin Status is now sorted by short circuit level names and net names, and the short circuits are numbered. This makes it easier to find conflicting pins and/or nets on PCB boards with multiple short circuits.

Autorouter

The **Autorouter** routing functions have been made available in the **Layout Editor** submenu Traces / Autorouter. When starting an autorouter function, **Layout Editor** switches into autorouting modus which can subsequently be deactivated using the Terminate Router Mode function. Activating the autorouting mode automatically deactivates all other layout modification menu and context menu functions. Activating a **User Language** function or a layout modification through a shoprtcut keykey call terminates the autorouting mode with a corresponding warning.

The **Layout Editor** provides the Single Net Full Router (default function), Single Net Initial Router (Initial routing with channel width 0) and Single Net Optimizer functions instead of the Single Net Route **Autorouter** function. In autorouter mode, the Traces / Delete Net function only removes unfixed traces of the selected net without terminating the autorouter mode. I.e., Traces / Delete Net can be used interactively to provide alternative routing solutions during rip-up autorouting procedures. The Single Net Full Router, Single Net Initial Router, Single Net Optimizer and Traces / Delete Net functions are also available through the right mouse button context menus for traces and part pins. Please note that these functions trigger automatic Load Traces calls if autorouter mode is not active, thus potentially removing unfixed traces which violate current autorouting parameter settings.

Please note that the **Layout Editor** automatically performs an online design rule check when saving routing results. This means that **Layout Editor** autorouting procedures could take longer than in the **Autorouter** if Security Copy is activated.

The **Layout Editor** loads and considers the **Autorouter** control and strategy parameter settings from the [ar] section in `bae.ini`.

4.5   Graphic, Copper Areas

Draw Assistent

Buttons for generating regular polyangulars, interpolated ellipses and ovals (i.e., rectangles with semicircles ends at the smaller sides) have been added to the Utilities / Draw Assistant function.

The element-specific DRAWASSIBOX_GED parameter for controlling whether the draw assistant should be automatically started when loading elements of a specific class has been added to **bae.ini**.

Polygon Edit

The status line prompts and messages for a number of polygon functions have been modified to include net names for power planes and copper fill areas.

Crosspoint Snap

The Crosspoint function of the x key has been extended to allow for the selection of virtual crosspoints (crosspoints of lengthened/extended pick polygon and/or trace segments), thus providing additional drawing options.

The Snap Segment with X Grid and Snap Segment with Y Grid functions for snapping to the X/Y grid cross point of a mouse-selectable line, area or trace segment has been added to the x key. The grid point closest to the segment pick coordinate will be snapped. This feature allows for horizontal or vertical segments to be easily added to angle-free segments.

Dimensioning

The functions from the Areas / Other Functions / Drawing Utilities submenu have been modified to use a comma instead of a dot in front of the decimals of measuring texts depending on the COORDTMODE_GED setting from **bae.ini**.

The Text Prefix and Text Suffix for optionally inserting a measurement text prefix and/or suffix have been added to the Distance Measure context menu which can be activated during the selection of the measurement position. The measurement text is automatically centered, and the measurement lines are automatically clipped to accommodate measurement text prefix and/or suffix specifications. New **bae.ini** parameters for configuring a default measurement text prefix and/or suffix have been added. These prefix and suffix defaults can be filled with spaces/blanks to create a visible gap between measurement texts and measurement lines.

The X Dimensioning and Y Dimensioning measurement functions have been modified to draw an arrow from the measurement origin to the measurement text. The measurement arrow can be activated and its appearance can be configured through the right mouse button context menu and through new **bae.ini** parameters.

The measurement object pick facility of the Delete Measurement/Ruler function has been modified to allow for selections through both text and graphic elements of the measurement object. Previously, a measurement object had to be selected by clicking one its graphic elements.

Keepout Areas

The Full Check and Cross options for keepout areas on signal layers have been added to the p dialog. Keepout areas marked with Full Check are checked against other keepout areas and part/pin level areas/pads on the same layer and thus can be used to keep an area completely free. The Cross option checks whether the keepout area crosses other structures rather than performing a clearance check.

Height DRC

The **poly_partheightignore** rule for specifying the heights of height DRC keepout areas independently from part height settings has been added. This is useful for height DRC areas which are placed on the solder side for the purpose of guarding solder pads.

Layer Change

The Edit / Other Functions / Change Layers function has been modified to support the conversion of documentary layer keepout areas into signal layer keepout areas.

Bitmap Data Import

With Antialiasing activated, the File / Import/Export / Bitmap Input submenu functions created polygons with enlarged or missing antialias segments in the bottom left and/or top right corner of the polygon. This problem has been fixed.

4.6   Text, Drill

Text Placement

Control elements for text height, text plot width text angle, text mirroring, text alignment and text frame mode specifications have been added to the text input dialog of the `Add Text` function and the `T` toolbar button to allow for those text properties to be specified prior to placement.

Part Attribute Texts

The `Move Name` and `Move Attribute` context menu functions have been modified to keep the old text position rather than requiring a new text positioning if a zero text size is specified for fading out the text.

Text Alignment

The `Utilities` / `Draw Assistant` function has been modified to allow for texts to be vertically centered.

Multiline Texts

Pen width and rule assignments to a single multiline text element are now automatically transferred to all other texts elements of that multiline text.

Rule assignments to multiline texts could get lost when editing these texts. This problem has been fixed.

The multiline text edit field of the `p` key element properties dialog has been modified to display the full text instead of just the selected line for editing. The `Rel. Line Spacing` input field for specifying line spacing relative to the text height has been added (previously, the line spacing could only be specified through the `TXTLSPACE_GED` parameter in **bae.ini**).

Text Conversion

The `Text->Trace/Area` and `Text->Docline` functions from the `Text, Drill` / `Other Functions` menu have been converted into submenus with the `Single Elements` and `Group` options for processing either single mouse-selectable texts or all group-selected texts, respectively.

The `Text->Trace/Area` function has been modified to prioritize text-specific pen width assignments over default pen width settings.

The `Text->Docline` function has been modified to transfer pen width assignments from the processed texts to the generated documentary lines.

Drill Size Setting

The functions for defining drill holes have been modified to optionally proceed with dynamic element boundaries instead of rejecting drill diameter settings which exceed the current padstack dimensions.

Drill Keepout Areas

The function for generating drill holes on padstacks without keepout areas and pads has been modified to prompt for the automatic generation of a keepout area with the specified drill hole dimension on the `All Layers` signal layer to minimize the risk of forgetting DRC keepout area definitions when defining padstacks for constructive drill hole parts such as mounting holes.

Drill Legend

The `File` / `Import/Export` / `Drill Data Output` / `Drill Plan/Legend` function for creating a drill plan with drill diameter legend on a selectable documentary layer has been added to the **Layout Editor**. The drill diameter legend is created as multiline text which can be edited with the text functions.

The `DRLLSTK_LAY` parameter for optionally preceding the drill diameter legend text with a row of padstacks has been added to **bae.ini**.

The PDF layer name is assigned to the elements of the drill plan legend if the layout contains more than one drill class. This allows for (overlapping) drill holes of different classes to be faded in and/or faded out in PDF outputs which are created with the `PDF Layer` option.

4.7   Group Functions

Group Selection

The Edit / Group Elements submenu functions have been modified to Select and/or Deselect only those elements which are not yet selected and/or deselected, respectively. This simplifies the selection and/or deselection of multiple overlapping elements as they can simply be picked through repeated clicks without having to change the pick preference layer.

The Edit / Other Functions / Select / Part Trace Routes function selected only one trace per layer when a part pin was clicked. This behaviour has been changed. Edit / Other Functions / Select / Part Trace Routes now selects all traces of the same layer which are starting on the clicked part pin.

The Edit / Other Functions / Select / Group Name function has been modified to select all elements without group name assignment if an empty string is entered.

Group Movement

The c shortcut key for temporarily releasing the angle lock has been added to the Move Group function. The previous angle lock mode is restored upon completion of the Move Group function.

Group Element Mirroring

The context menus which are activated when pressing the m and n from outside any other function have been extended by functions for setting and/or resetting the mirroring mode of group-selected parts or texts.

Group Copy

The Edit / Other Functions / Copy Matrix has been modified to find group-selected hierarchy block parts matching the `[pn]name` part name pattern for which there are matching unplaced parts in other hierarchy blocks of the same type. In such cases, additional buttons and/or options for placing block copies with automatically named hierarchy block parts are activated. The user is automatically prompted to proceed with either a column or a row matrix placement procedure, if the matrix element specification in the dialog doesn't match the number of hierarchy block instances. Group-selected parts which don't originate from the source blocks are named according to default naming procedures. These features simplify the replication of completely placed and routed hierarchy blocks within a layout.

Group Settings

The Edit / Group Display Mode function has been renamed to Group Settings and activates a dialog with group parameter settings which allows for the Display Mode to be selected and the new Angle Release, Element Snap and Board Outline Layer parameters to be set.

Angle Release provides an option for automatically releasing the angle lock during Move Group operations.

Element Snap provides the Only Visible option which restricts the Parts, Traces, Areas and Text functions from the Edit / Group Polygon submenu and the rectangle selection through the Shift and Ctrl keys to the currently visible elements within the selected polygon and/or rectangle. This prevents from unintentionally selecting and/or deselecting invisible group elements.

Board Outline Layer can be used to specify a documentary layer onto which a loaded/copied board outline is placed as documentary line in case Load Group or Copy Group cause a conflict with an existing board outline. This is useful when creating panelized elements with the Output to DDB File function.

Group Placements

The Group Load 0,0 option for loading groups and placing them at the origin of the currently loaded element has been added to the right mouse button context menu of the file element favourites toolbar functions/buttons for opening/loading elements.

Element PDF Layers

The Settings / Rule Attachment / Set Group Rules / PDF Layer function has been added for assigning PDF layer names to group selected elements. These assignments are considered by PDF batch outputs with PDF Layer option. **Acrobat Reader** displays a PDF output element which is assigned to both its own PDF layer and to its element type specific PDF layer only if both PDF layers are activated.

The Settings / Rule Attachment / Group / Select PDF Layer function has been added for group selecting elements by PDF layer name. The PDF layer name input control provides a list of all existing PDF layer names thus doubling as a facility for looking up used PDF layer names.

4.8   Automatic Copper Fill

Copper Fill Consistency Check

The copper fill functions have been modified to apply extended consistency checks on generated copper fill areas. These checks recognize and eliminate zig-zag structures which may have been created due to limited mathematical precision and might cause connectivity problems such as short-circuits (with subsequent elimination of otherwise valid fill areas), as well as other DRC and CAM output problems.

Heat Trap Generation

The functions for creating heat traps have been modified to adjust heat trap widths automatically to smaller connection pad dimensions. This ensures that fine-pitch SMD parts are connected without causing clearance violations if a wider heat trap connection width is set according to the requirements of power supply parts.

The function for generating heat traps omitted heat trap connectors if opposite connectors were not created due to obstacles close to the heat trap pins and/or vias and if the copper fill isolation distance was set higher than the DRC minimum distance. To improve the heat trap connectivity for such pins and/ot vias, the isolation distance for inner pin parts of heat trap connectors has been reduced to the DRC minimum distance.

Area Deletion

The Clear functions from the Areas / Copper Fill submenu have been modified to automatically redraw the fill area outline after removing fill areas. Previously, a screen redraw was sometimes required to ensure that the fill area outline was correctly displayed after removing fill areas.

Hatch Areas

The Hatch functions from the Areas / Copper Fill submenu have been extended to allow for documentary layer fill areas to be converted to hatch areas. Documentary layer hatch areas are created using documentary lines. It is recommended to set the Hatching Width to the standard plot line width to ensure that the hatching ends in line width the fill area outline.

Note

Trying to load hatch areas onto documentary layers triggers the `File structure damaged!` error message in BAE versions prior BAE Version 7.4.033.

Copper Fill Area List

The Areas / Other Functions / Fill Area List function has been modified to list the copper fill areas of the currently loaded layout in the descending fill priority order in which they will be processed by the Fill all areas function. This provides additional information about the effects of fill priority settings and/or fill priority requirements for nested fill areas.

5   Autorouter

5.1   General

Error Messages

Part-related router error messages such as `Pin out of border!` have been modified to trigger an automatic Zoom Window to the element boundaries of the affected part.

5.2   Autorouter Algorithms

Pin Connection

Gridless routing with Pin Entry Correction option sometimes caused distance violations between generated diagonal pin connection segments and neighbouring pins. This problem has been fixed.

6   CAM Processor

6.1   General

Hyperlynx Output

The File / Import/Export / Hyperlynx Output function has been modified to substitute dots in output names with underscores to relaibly separate part from pin names.

6.2   Control Plot

EPS/PDF Output

The Annotation Output option for including part and pin information notes with PDF outputs has been added to the EPS/PDF Output function. Notes are displayed as bright dashed frame in the output. When hovering over such frames, a window appears which displays the part and/or pin information. Annotation frames are not included when printing and/or plotting the PDF file. Annotations can optionally be restricted to parts which have pads only on the part or solder side, respectively.

The Initial Display option has been added to the layer level names control element for PDF layer outputs in batch definitions. Initial Display can be used to control whether a layer level should be visible or invisible in the PDF initial view.

The Grids dialog for managing display grids on output pages has been added to the output page batch definition facilities of the EPS/PDF Output function. Grids allows for the definition of arbitrary point and/or line grids. It is possible to configure the grids for print output inclusion or exclusion and to assign grid output layer level names to allow for grid display control in PDF viewers.

The Page Output Query and Layer Output Query options for activating page and/or layer output confirmation prompts with default settings have been added to the output file parameters of the EPS/PDF Output batch definitions to allow for the definition of batches with on-the-fly output page and/or output layer selections.

Output to DDB Element

The Output to DDB File function has been modified to save texts as (non-vectorized) text placements in the destination layout element. This enables different layer-specific text mirroring options for multilayer DDB file plots for panelized CAM outputs.

Part attributes are converted to rule system predicates and assigned to $ texts on part level. The Generic Insertion Output function converts these rule system predicates back to part attributes, thus allowing for the generation of correct insertion data with attribute values from panelized insertion data sets.

Bitmap Output

The Monochrome Bitmap Output for generating **Windows** bitmap outputs has been added. The resolution of the bitmap can be specified. For Monochrome Bitmap Output, the Plot Border On option of the Border Mode plot parameter setting suppresses the board outline and restricts the output to elements which are placed inside the board outline. The Multiple Layers output option can be used to include the board outline in the bitmap output if the board outline layer is selected for output.

The CAM-Batch Output function has been extended to allow for the configuration of Monochrome Bitmap Output batch steps.

CAM-Batch Output

The CAM-Batch Output function has been modified to support multi-level directory generation, thus allowing for the specification of output directories such as **output/gerber**.

6.3   Gerber Photo Plot

Power Layer Output

Power layer isolation clearance consistency checks for drill padstacks with keepout areas have been added to the power layout output functions. These checks test whether diameters of circular keepout areas on drill holes exceed the drill hole area (including the power layer isolation distances specified through Settings / Settings bae) and whether there is no corresponding circular isolation area (power plane) drawn on the power layer of the padstack. Warning messages are issued for padstacks violating drill hole clearances defined through keepout areas on signal layers.

6.4   Insertion Data Output

Insertion Data Output

The Generic Insertion Output function has been modified to create output folders for output file names specified through the `FIXPATH` command. Thus it is not necessary anymore to create such output directories prior to Generic Insertion Output calls.

The `OUTPICK` and `OUTLAYER` commands in the output file definitions of the Generic Insertion Output function have been modified to optionally accept the `ALLPARTS` keyword at the end of the command for forcing the output of all parts regardless of any placement status definitions through `$noplc` attribute assignments.

The `QATTRIBUTE` command for defining an attribute status dependent field with two alternative values has been added to the format definition file for the Generic Insertion Output function. This feature allows placement status specifications dependent on `$noplc` attribute settings for insertion data outputs with the `PARTALL` option.

The `OUTTEXTLAYER` command for generating insertion data from texts which are placed directly on the layout (rather than on part level) has been added to the format definition file for the Generic Insertion Output function. For layout texts, part attribute references from the insertion data format specification evaluate to matching rule system predicates, thus supporting insertion data spefiiations through rule system predicates as in layouts and/or layout panels generated with the Output to DDB File function.

7   CAM View

7.1   General

Data Display

The `View` / `Change Colors` function has been modified to support the selection of patterns for the display of layers and/or apertures.

7.2   Data Import

Input Offset

The `Set` and `0,0` buttons have been added to the `Input Offset` option of the `Settings` / `Settings` dialog. `Set` prompts the user to select the input offset using the graphic cursor. `0,0` sets the input offset to the default 0.0, 0.0 value.

A marker cross in origin colors is used to indicate input offsets different from the 0.0, 0.0 default value. The left and bottom hands of the input offset cross are shortened to allow for the input offset marker to be distinguished from the origin marker.

Control elements for setting input offsets have been added to the `File` / `Batch` / `Load` dialog. This allows for the configuration of panelization batches.

The `File` / `Clear Memory` / `All` function has been modified to reset the input offset automatically to the [0.0, 0.0] default value.

Batch Import

The `File` / `Batch` / `Load` function for loading multiple drill and/or Gerber data files has been modified to trigger only a single `Zoom Overview` call at the end of the complete load batch rather than `Zoom Overview` calls after each file has been loaded. This increases the performance significantly if more than one file is loaded.

7.3   Gerber Data

Layout Creation

The `File` / `Create Layout` function for creating layouts from the currently loaded Gerber and drilling data has been turned into a submenu with the `Placement` and `Connectivity` functions. `Placement` is the default setting for direct layout generation. `Connectivity` tries to convert parallel line hatching into fully filled polygons prior to the layout generation to reduce the amount of converted data (and increase the performance of subsequent operations). `Connectivity` also tries to convert interpolated arcs into true arcs. The `Connectivity` optimizations are carried out in main memory to allow for immediate inspection in **CAM View**. With default color settings, the display for converted lines changes from dark grey to blue for `G36/G37` areas.

Layer Assignment

Using the `File` / `Clear Memory` / `Data Set` function for deleting Gerber data sets without flashed structures sometimes caused layer assignment shifts in subsequent data sets. This problem has been fixed.

8   Utilities

8.1   BSETUP

Documentary Layers

The command for documentary layer definitions has been modified to allow for the specification of a color palette and layer menu output index for documentary layer definitions through a comma-separated index number behind the documentary layer text mode specification. Documentary layer output index numbers start at 1. Documentary layers without output index assignments are automatically assigned to free index output positions. This feature allows for frequently used documentary layers to be placed at the top of the documentary layer selection menus and/or to group documentary layer definitions within layer menus according to their functionality.

9   Bartels User Language

9.1   General

This section describes general changes to the **User Language** specification. See Bartels User Language Programmer's Guide - Chapter 2 for a detailed description of the **User Language** specification.

Internal User Language Version

The internal **User Language** version has been changed. **User Language** programs compiled under BAE versions prior to BAE V7.4 won't execute in the **User Language Interpreter** environment of the new **Bartels AutoEngineer** version (error message `User Language program version incompatible!`) and must be recompiled under the new **BAE** version to regain compatibility.

User Language programs compiled under **BAE V7.4** and later can execute in the **User Language Interpreter** environment of the new **Bartels AutoEngineer** version without being re-compiled. However, it is recommended to re-compile these programs as well to ensure that the latest **User Language** features are enabled.

9.2   User Language Compiler

This section describes the news and changes introduced to the **User Language Compiler**. See Bartels User Language Programmer's Guide - Chapter 3 for detailed information on how to operate the **User Language Compiler**.

Warning Messages

The `-t` option for suppressing warning messages related to the compilation of include files has been added to the **User Language Compiler**. `-t0` is the default option for including warning messages related to the compilation of both top level source files and included source files. `-t1` suppresses warning messages related to the compilation of include files, thus simplifying the analysis of warning messages when working with standard include files containing functions and variables which are not used by every program.

9.3   User Language Interpreter

This section describes the news and changes introduced to the **User Language Interpreter**. See Bartels User Language Programmer's Guide - Chapter 3 for detailed information on how to operate the **User Language Interpreter**.

Version Dependancy

The structure of the function and index variable tables of the **User Language Interpreter** has been extended to allow for the new options to be added without compromising **User Language** program compatibility. This means that **User Language** programs compiled under BAE Version 7.4 or later are forward compatible (but not backward compatible) and can be executed in later BAE Versions without having to be recompiled. Thus it is not necessary anymore to re-compile user-specific **User Language** programs when updating from BAE Version 7.4 to future BAE versions.

File Access Errors

The error messages of the automatic file error handling functions of the **User Language Interpreter** have been modified to include the name of the file which was accessed during the erroneous file operation.

9.4   Index Variable Types

This section lists new and changed **User Language** index variable types. See Bartels User Language Programmer's Guide - Appendix B for a detailed description of all index variable types.

New Index Variable Types

The following **User Language** index variable types have been implemented:

IP	Index Variable Type	Short Description
LAY	**L_DRCERROROK**	Layout DRC Error Acceptance
CV	**CV_DATASET**	CAM View Data Set

Changed Index Variable Types

The **CL_ATTRIBUTE** `of` of the **CL_CPIN** index returned only empty strings string for attribute names and attribute values. This problem has been fixed.

The `IDSTR` attribute for querying the error id for error acceptance modes has been added to the **L_DRCERROR** index variable type.

9.5   System Functions

This section lists new and changed **User Language** system functions. See Bartels User Language Programmer's Guide - Appendix C for a detailed description of all system functions.

New System Functions

The following **User Language** system functions have been implemented:

IP	System Function	Short Description
STD	**strlistitemadd**	Add string to string list
STD	**strlistitemchk**	Search string in string list
LAY	**lay_doclayindex**	Layout documentary layer display index
GED	**ged_drcerrorhide**	Set/reset GED DRC error acceptance

Changed System Functions

Support for additional parameter queries/settings has been added to the **bae_getdblpar**, **bae_getintpar**, **bae_setintpar**, **scm_getintpar**, **scm_setintpar**, **scm_getdblpar**, **scm_setdblpar**, **scm_getstrpar**, **scm_setstrpar**, **ged_getintpar**, **ged_setintpar**, **ged_getdblpar**, **ged_setdblpar**, **cv_getintpar**, **cv_setintpar**, **cv_getdblpar** and **cv_setdblpar** functions.

The **bae_peekiact** has been modified to return a type code for the next automatic action in the interaction queue.

The DDB file name and layout net list name parameters of the **cap_layconload** function have been modified to allow for optional name queries to be activated through `?` name specifications.

The pick element type parameter of the **scm_pickelem** function has been extended to support the pick of named symbol and/or label referenzes.

Support for an additional net checking mode has been added to the **ged_drcpath**, **ged_drcpoly** and **ged_drcvia** functions.

9.6   BAE User Language Programs

BAE installs more than 220 pre-compiled **User Language** programs to the `ulcprog.vdb` file of the BAE programs directory. Additionally, the **User Language** *source* files (more than 9 Mbytes; some 300,000 lines) are installed to a special directory (`baeulc`). See Bartels User Language Programmer's Guide - Chapter 4 for a complete listing and short descriptions of the BAE **User Language** programs.

User Language Include Files

The **User Language** include files have been revised and extended by a series of new definitions and functions.

New User Language Programs

The following **User Language** programs have been implemented:

IP	Program Name	Short Description
GED	**GED_PLC**	Part Placement Action

Changed User Language Programs

The **User Language** programs already delivered with the previous BAE Version have been revised and extended by many new features and functions. A series of significant improvements and enhancements have already been mentioned in the previous sections of these Release Notes.