Bartels AutoEngineer®
Version 4.6
Release Notes

This document contains information about the new features introduced with Bartels AutoEngineer Version 4.6. Forward compatibility from earlier versions to Bartels AutoEngineer Version 4.6 is ensured, but not backward compatibility.

Bartels AutoEngineer Version 4.6 Release Notes
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1   General

1.1   Bartels AutoEngineer Product Line

The following software configurations are available with Bartels AutoEngineer Version 4.6:

- Bartels AutoEngineer Light

- Bartels AutoEngineer Economy

- Bartels AutoEngineer Professional

- Bartels AutoEngineer HighEnd

Bartels AutoEngineer Professional is the standard BAE software configuration. BAE Professional is available for PCs with Windows, Linux, or DOS operating systems. The Schematic Editor of BAE Professional is *freely available* and can be operated in stand-alone mode. Demo software configurations of BAE Professional (fully-featured except for data output) are available free of charge for test and evaluation purposes.

With BAE Version 4.6, the number of simultaneously accessible layout documentary layers in BAE Professional has been increased from 12 to 100.

Bartels AutoEngineer Light is a new shareware price-level BAE configuration for educational purposes and/or semi-professional users, available for PCs with Windows, Linux or DOS operating systems. BAE Light has full BAE Professional functionality, however, limited to a maximum PCB layout size of 180mm * 120mm and a maximum of two signal layers for manual routing and Autorouter.

With BAE Version 4.6, Bartels AutoEngineer Educate/Entry has been renamed to Bartels AutoEngineer Economy BAE Economy is a low-price BAE configuration for educational purposes and/or small business users, available for PCs with Windows, Linux or DOS operating systems. BAE Economy has full BAE Professional functionality, however, limited to a maximum PCB layout size of 350mm * 200mm and a maximum of four signal layers to be simultaneously routed by the Autorouter. All other restrictions previously applied to BAE Educate/Entry (no bus definitions on SCM symbol level, no layout polygon mirror mode definitions, only 9 predefined layout documentary layers, minimum Autorouter grid 1/40 inch, no availability of Neural Autorouter and Neural Rule System) have been dropped from BAE Economy.

Bartels AutoEngineer HighEnd with its advanced features and functions such as high speed kernel, cross-probing, rule-driven Neural Autorouter, etc. is available for workstations and for PC systems (Windows NT, Windows 95/98, Linux).

The following software modules are *optionally* available with the workstation-based BAE systems:

- Bartels AutoEngineer IC Design

- Bartels AutoEngineer Mixed Mode Simulator

Bartels AutoEngineer IC Design (BAEICD) is a complete CAD/CAM system for the physical design of integrated circuits (gate arrays, standard cells, custom ICs and/or ASICs). BAEICD consists of a series of system components such as IC Mask Editor, IC Autoplacement, IC Autorouter, IC DRC (Design Rule Check), and GDS-II and CIF standard interfaces.

Bartels AutoEngineer Mixed Mode Simulator (BAESIM) is a compiler-driven simulator for mixed analog/digital circuits. BAESIM provides direct access to the net list data generated with the BAE Schematic Editor.

1.2   System Requirements

General System Requirements

A VGA or higher resolution monitor with a screen resolution of at least 800*600 pixels and a mouse or a corresponding pointing device are required on any BAE platform.

Up to 40 Mbytes hard disk space are required for installing the BAE software.

Operating System

BAE Professional, BAE Economy, and BAE Light versions are available for Linux (Kernel 2.0.x), Windows 2000, Windows NT 4.0, Windows NT 3.51, Windows 98, Windows 95, Windows 3.x, and MS-DOS.

BAE HighEnd systems are available for Hewlett-Packard 9000/7xx workstations with OSF/Motif and/or X11, and for PCs with Linux (Kernel 2.0.x), Windows 2000, Windows NT 4.0, Windows NT 3.51, Windows 98, and Windows 95 operating systems.

PC System Requirements

PC systems should be equipped with a Pentium (80586, 80686) or at least a 80486DX processor. Any compatible processor such as AMD-K6 or AMD-K7 (Athlon) will also do.

A minimum of 8 Mbytes RAM is required for DOS and Windows 3.1 systems (16 Mbytes RAM recommended). A minimum of 16 Mbytes RAM is required for Windows 9x/2000/NT and Linux systems (32 Mbytes RAM or more for Windows recommended).

The BAE software is usually provided on CD-ROM, i.e., a CD-ROM drive is required to install the software.

A hardlock key is used to protect BAE Economy, BAE Professional and BAE HighEnd Windows and DOS versions against software piracy. I.e., a printer port (LPT1, LPT2, or LPT3) is required to run these BAE versions under DOS and/or Windows.

On Linux systems, either a printer port (for the hardlock key) or an Ethernet card is required for checking the software authorization of BAE Economy, BAE Professional and/or BAE HighEnd.

1.3   Documentation

Both the **Bartels AutoEngineer User Manual** and the **Bartels User Language Programmer's Guide** have been completely revised and are provided in HTML and PDF format (in the baedoc directory of the BAE CD-ROM).

1.4   Installing on Windows and DOS Platforms

Preparing for Update Installations

The BAE library and User Language directory contents are replaced when performing update installations. Thus it is strongly recommended to backup any user-specific data from these directories before installing the BAE update, and to restore the required data afterwards.

The bsetup.dat file from the BAE programs directory is always re-installed when performing BAE Update Installations. Thus it is not necessary to run the time-consuming batch for compiling the BAE User Language programs provided with the BAE software. However, user-specific BAE parameter settings stored with the existing bsetup.dat file will get lost and must be restored after successfully installing the BAE software using the **bsetup** utility program (or the Setup function available from the BAE main menu of the Windows/Motif versions). Customer-specific User Language programs developed and compiled under the previously installed BAE version must also be re-compiled after performing the BAE Update Installation.

Running the Windows 9x/2000/NT Install Program

Under Windows 9x/2000/NT, the BAE setup program for installing BAE Demo, BAE Professional, BAE Economy, BAE Light, and BAE Schematics should start automatically after inserting the BAE CD-ROM to the CD-ROM drive. If this doesn't happen, simply start the setupen.exe program from the CD-ROM using the Run function from the Windows Start menu. Please follow the instructions of the setup program.

The setup ends with the BAE software configuration. Please select the BAE configuration which is authorised for your machine (Demo, Professional, Economy, SCM only, etc.; see also **table 1**).

To install BAE HighEnd, simply run the setup program and then copy the files from the baew32he directory of the BAE-CD-ROM to the BAE programs directory created by the setup program.

Running the MS-DOS/Windows 3.11 Install Program

For installing BAE Demo, BAE Professional, BAE Economy, and/or BAE Schematics under Windows 3.11 or MS-DOS, or BAE HighEnd under Windows 9x/2000/NT, Windows 3.11, or MS-DOS, the CD-ROM must be inserted to the CD-ROM drive, and the drive and directory must be set accordingly. E.g., to install the BAE software from CD-ROM drive D, insert the BAE CD-ROM to CD-ROM drive D, and enter the following commands to the DOS prompt:

```
> D: <CR>
> install <CR>
```

Once the install program has been started, the instructions issued on the screen should be followed carefully. First you will be asked for the BAE user interface language (e.g., English, German, etc.) and for the operating system host platform (DOS, Windows NT, Windows 3.x, etc.).

The install program provides different modes for performing either new Installation or Update installations. The Update install mode is strongly recommended when just updating from earlier BAE Versions; this will prevent the install program from overwriting special BAE system and setup files ending on .dat, .def, and .fnt (otherwise, user-defined color tables, aperture tables, fonts, layer definitions, library access path settings, and menu setups stored with these files might get lost!).

After selecting the install mode, you will be prompted to specify the destination directories for installing the programs, the libraries, the User Language source files, and the examples and test jobs. You can exclude certain destination directories by deleting the corresponding path names. Thus more experienced BAE users can e.g., suppress the installation of the BAE example jobs, or re-install certain parts of the BAE software later. For security reasons, the install parameter settings will be verified with user query before starting the installation process. The destination directories will be created automatically on request. The install program automatically copies the BAE software files to the selected destination directories on the hard disk.

At the end of the install process, the install program asks for the licensed BAE software configuration in order to install the correct software authorization file (see **below**). When installing the DOS version, the user will also be asked to select the graphic device driver to be installed (see **below**).

Installing the Software Security Module

The BAE PC software for Windows and DOS (except for BAE Demo, BAE Light, and BAE Schematics) is protected by a hardlock key (dangle) which must be plugged onto one of the parallel ports (LPT1, LPT2, or LPT3) of your PC. Switch off your computer before mounting the hardlock key shipped with the software, or otherwise the dangle might be damaged by high voltage! If you have connected a peripheral device such as a laser printer to the hardlock key, then you must *always switch on the peripheral device before switching on your computer* to avoid hardlock key check problems.

The BAE PC software provides the license files according to the available software configurations as shown in the table below. You will be asked to select the BAE software configuration (and thus the appropriate license file) when installing the BAE software. Make sure to select the BAE software configuration to be installed and/or authorized on your computer.

Table 1: BAE Software License Files

Software Configuration	License File Name	Note
BAE Demo	demo.cfg	SCM and Layout no Hardlock Key, no (CAM) output
BAE Light	*see note*	SCM and Layout no Hardlock Key customer-specific CFG file is provided on purchase
BAE Economy	economy.cfg	SCM and Layout
BAE Professional	autoeng.cfg	SCM and Layout
BAE HighEnd	highend.cfg	SCM and Layout
BAE Schematics	schema.cfg	SCM only no HardlockKey
BAE Layout	layout.cfg	Layout only required/provided only for updating from BAE Versions older than BAE V4.6

The router.cfg license file matching the BAE software configuration authorized on your computer must be available in the BAE programs directory. I.e., to install the correct license file you can also copy the desired CFG file to router.cfg within the BAE programs directory instead of selecting the valid BAE configuration during BAE software installation

BAE Demo software is intended for evaluation purposes only. BAE Demo cannot produce any CAM or User Language output, and it will mask Layout plan elements in order to prevent from processing with productive software configurations afterwards. I.e., the BAE user version are not able to read Demo jobs, however, we are able to convert these jobs.

Selecting the BAE DOS Graphic Device Driver

With the Windows versions of the BAE software there is no BAE graphic device driver installation required since BAE Windows software runs under the graphic interface of the corresponding operating system.

The DOS versions of the BAE software are shipped with a series of graphic device drivers. During installation you will be asked to select an appropriate BAE graphic device driver. Table 2 provides the list of graphic device drivers supplied with the DOS PC software of the Bartels AutoEngineer. Please select the graphic device driver matching the video adapter and/or graphic card installed with your computer. It is recommended to install the standard VGA driver VGA480, if you are not sure about which driver to select since VGA480 is assumed to run on almost any PC system, and you can always select a different driver (e.g., with higher resolution) later (see below).

Table 2: BAE Graphic Device Drivers

Graphic Driver	Type	Resolution	Chip Set/Manufacturer
CCD480.DEV	PGA	640x 480	IGC (Cad Card)
EGA350.DEV	EGA	640x 350	Standard
EGA480EW.DEV	EEGA	640x 480	EGA Wonder
EGA480GE.DEV	EEGA	640x 480	Genoa, ATI
EGA600EW.DEV	EEGA	800x 600	EGA Wonder
EGA600GE.DEV	EEGA	800x 600	Genoa, ATI
EGA600PA.DEV	EEGA	800x 600	Paradise
QPC1024.DEV	-	1280x1024	Datapath QPDM
QPDM768.DEV	VGA	1024x 768	AMD QPDM
QPDM1024.DEV	VGA	1280x1024	AMD QPDM
VGA480.DEV	VGA	640x 480	Tseng ET3000 / ET4000
VGA600.DEV	VGA	800x 600	Tseng ET3000 / ET4000
VGA768.DEV	VGA	1024x 768	Tseng ET3000
TSENG768.DEV	VGA	1024x 768	Tseng ET4000
VESA600.DEV	VESA	800x 600	various
VESA768.DEV	VESA	1024x 768	various
MACH768.DEV	-	1024x 768	ATI Mach 64
MACH1024.DEV	-	1280x1024	ATI Mach 64
MACH1200.DEV	-	1600x1200	ATI Mach 64
MGA600.DEV	-	800x 600	Matrox Millenium/Mystique
MGA768.DEV	-	1024x 768	Matrox Millenium/Mystique
MGA1024.DEV	-	1280x1024	Matrox Millenium/Mystique
MGA1200.DEV	-	1600x1200	Matrox Millenium/Mystique
TIGA.DEV	TI	variable	Texas TMS34010 / TMS34020

The graphic driver .dev file matching the video adapter and/or graphic card of your computer must be copied to the bae.dev file in the BAE programs directory. This is achieved either by selecting the correct driver during BAE software installation or by manually copying the desired .dev file in the BAE programs directory to bae.dev.

Setting up the DOS Environment

It is strongly recommended to add the BAE programs directory path to the PATH environment variable. Load the autoexec.bat file to your text editor and check whether autoexec.bat contains a PATH statement or not. If there is already a PATH statement defined in autoexec.bat, then just add the following program path link to the PATH statement (assume BAE programs directory c:\bae):

```
;c:\bae
```

If there is no PATH statement defined in autoexec.bat, then insert the following PATH statement (assume BAE programs directory c:\bae):

```
PATH=c:\bae
```

You can also insert the following command at the end of the autoexec.bat file in order to include the BAE programs directory path name with the PATH variable:

```
PATH c:\bae;%path%
```

The config.sys file must contain the statements

```
BUFFERS=<b>
FILES=<f>
```

where the number <b> of buffers should be at least 30, and the number <f> of files should be at least 20.

Note that you must reboot your computer if you made any changes to the config.sys or autoexec.bat. Otherwise you might not be able to start BAE.

1.5 Installing on Linux and UNIX Platforms

Preparing for Update Installations

The BAE library and User Language directory contents are replaced when performing update installations. Thus it is strongly recommended to backup any user-specific data from these directories before installing the BAE update, and to restore the required data afterwards. The same backup and restore process should be applied to BAE programs directory files with extensions .dat (except for bsetup.dat; see next paragraph), .def, and .fnt when just updating from earlier BAE versions since these files can contain user-defined color tables, layer definitions, Gerber aperture tables, and character fonts which will be overwritten during update installations. The router.cfg file must also be saved and restored when updating from authorized BAE versions.

The bsetup.dat file from the BAE programs directory will always be re-installed when performing BAE Update Installations. Thus it is not necessary to run the time-consuming batch for compiling the BAE User Language programs provided with the BAE software. However, user-specific BAE parameter settings stored with the existing bsetup.dat file will get lost and must be restored after successfully installing the BAE software using the **bsetup** utility program (or the Setup function available from the BAE main menu of the Windows/Motif versions). Customer-specific User Language programs developed and compiled under the previously installed BAE version must also be re-compiled after performing the BAE Update Installation.

Linux Installation

The baelinux directory on the BAE CD-ROM contains the TGZ archive files baelinux.tgz, and baelinus.tgz (and baelinp.tgz and baelinps.tgz for hardlock key support) with different BAE builds for operating BAE Demo, BAE Professional, BAE Economy, and BAE Light under Linux. Each of these TGZ files contains the directories bin (programs and setup files), baelib (symbol and part libraries), baeulc (User Language source files), and baejobs (examples and test jobs). The BAE software is supposed to run on all common Linux system with Kernel 2.0.x (S.u.S.E. 6.0 or later, RedHat, etc.). The TGZ files baelinhe.tgz and baelinhs.tgz contain the binaries for BAE HighEnd. An additional file named baeeng.tgz including the English BAE user interface setup is also provided.

We strongly recommend that you have a look into the readme file from the baelinux directory of the BAE CD-ROM before installing the BAE Linux software. The readme file contains a list of the provided BAE Linux archive files and latest information and important instructions for installing the BAE Linux software.

baelinus.tgz must be installed on Linux systems without Motif. baelinus.tgz contains a *statically* linked BAE version including all system and Motif libraries (libc6/glibc, lesstif/Motif1.2) required to run BAE on any Linux Kernel 2.0.x distribution.

It is recommended to use the more efficient *dynamically* linked BAE version from baelinux.tgz (linked to libc6/glibc and lesstif/Motif1.2) on Linux systems where Motif is already installed. The statically linked version from baelinus.tgz can always be used on Linux systems which fail to run the dynamically linked version.

To install the BAE Linux software, simply mount the CD-ROM drive with the BAE-CD-ROM (e.g., under /cdrom), change to the directory where you want to install the BAE software, and unpack the appropriate archive file (e.g., baelinux.tgz) using the tar command as in

```
> tar -xzfv /cdrom/baelinux.tgz <CR>
```

The -z option is used to filter the TGZ file through the gzip utility. If your tar command does not support the -z option, simply use gzip and tar as in

```
> gzip -dv /cdrom/baelinux.tgz <CR>
> tar -xfv /cdrom/baelinux.tar <CR>
```

To install the dynamically linked BAE HighEnd version, simply extract the baelinhe.tgz file *after* installing baelinux.tgz. To install the statically linked BAE HighEnd version, simply install baelinhs.tgz *after* installing baelinus.tgz.

A configuration file is provided with productive BAE Linux versions. This configuration file (router.cfg) must be saved to the BAE program directory (bin, see above) To activate BAE Demo, the demo.cfg configuration file must be copied to router.cfg, to activate BAE Schematics, schema.cfg must be copied to router.cfg (see also **Table 1**).

BAE is pre-configured with a German user interface. The English user interface can be activated by extracting the baeeng.tgz archive file from the CD-ROM baelinux directory to the destination directory.

UNIX Installation

The BAE HighEnd archive files for UNIX workstation are provided in specific BAE-CD-ROM directories such as baehp for the HP version. These archive files contain the directories bin (programs and setup files), baelib (symbol and part libraries), baeulc (User Language source files), and baejobs (examples and test jobs). An additional file named baeeng.tgz including the English BAE user interface setup is also provided.

The BAE HighEnd archive files for HP workstations are provided in the baehp directory on the BAE CD-ROM. Please see the readme file in the baehp directory for latest information and instructions on how to install the BAE HP software.

To install the HP software, simply mount the CD-ROM drive with the BAE-CD-ROM (e.g., under /cdrom), change to the directory where you intend to install the BAE software, and unpack the baehp.tgz archive using the tar command as in

```
> tar -xzfv /cdrom/baehp.tgz <CR>
```

This installs the BAE HighEnd software with OSF/Motif interface. To activate the BAE HP software for X11, the baehpx11.tgz file from the baehp directory on the CD-ROM must be installed in the destination directory after installing baehp.tgz.

A configuration file is provided with productive BAE UNIX versions. This configuration file (router.cfg) must be saved to the BAE program directory (bin, see above) To activate BAE Demo, the demo.cfg configuration file must be copied to router.cfg, to activate BAE Schematics, schema.cfg must be copied to router.cfg (see also **Table 1**).

BAE is pre-configured with a German user interface. The English user interface can be activated by extracting the baeeng.tgz archive file from the CD-ROM baelinux directory to the destination directory after installing the UNIX software.

Setting up the Linux/UNIX Environment

The access rights must be set properly (i.e., execute for the programs, read access to the libraries, read/write access to the job files, all rights for the system administrator, special rights for the library manager, etc.). The user must have read access to the BAE program directory files ending on .cfg (for authorization check) and read/write access to the files with extensions .dat and .fnt. The user must also have write access in the working directory to enable temporary file creation.

The Linux/UNIX shell environment variable PATH must point to the BAE programs directory to allow for BAE program call from any other directory. The PATH variable can be set automatically through shell profile execution (shell script .profile, .login, .bashrc, or .cshrc, according to UNIX derivative, respectively).

1.6   Parameter Setup and Program Start

BAE System Parameter

The BAE software versions for Windows and Motif provide an interactive program for modifying the BAE system parameters. Under DOS, however, the **bsetup** utility must be applied as described herein.

With the BAE software, a setup definitions file template named stdset.def is supplied, which will be installed to the BAE programs directory. This file contains the following commands for setting the BAE library access paths:

```
SCMDEFLIBRARY("<libdir>\stdsym");
LAYDEFLIBRARY("<libdir>\laylib");
```

where <libdir> is the path name of the BAE library directory. If the library e.g., has been installed to the directory c:\baelib under DOS or Windows then you should replace <libdir> with this path name in order to provide correct access to the BAE symbol libraries. If the library e.g., has been installed to the directory /usr/bae/lib under Linux or Unix, then you should insert the following commands to the setup definitions file for providing correct access to the supplied BAE symbol libraries:

```
SCMDEFLIBRARY(/usr/bae/lib/stdsym);
LAYDEFLIBRARY(/usr/bae/lib/laylib);
```

The setup definitions file can be transferred to the BAE setup file bsetup.dat using the following **bsetup** program call (assuming stdset.def to be the name of the setup definitions file, and the BAE programs directory to be the working directory):

```
> bsetup stdset <CR>
```

The **bsetup** utility program is also used for defining important system parameters such as the documentary layer definitions and the menu setup. The documentary layer definitions and assignments have major impact on how manufacturing data is generated. Thus it is strongly recommended to get familiar with the features of the **bsetup** utility program before using BAE for the design of real layouts. See **Bartels AutoEngineer User Manual - Chapter 7.2** for details on how to use **bsetup**.

User Language Programs, Menu Assignments, Key Bindings

The BAE software installs many pre-compiled User Language programs to the bsetup.dat file of the BAE programs directory. The corresponding source files are are also provided in the User Language directory (baeulc). See **Bartels User Language Programmer's Guide - Chapter 4** for a complete listing and short descriptions of the BAE User Language programs.

Some of the installed User Language programs define implicit User Language program calls for activating a modified BAE user interface with many additional functions. You can add even more functions, or you can modify and/or reset the predefined menu assignments and key bindings. For more details see **section 11.5** of these Release Note.

Usually, it is _not_ necessary to (re-)compile the User Language programs delivered with the BAE software, since the compiled programs will be installed to the bsetup.dat file of the BAE programs directory. Nevertheless, the User Language directory provides several batch files for automatically compiling all BAE User Language programs. The CPLSLL (ComPiLe with Static Link Library) batch file is recommended for compilation. The compile batch can be started in the User Language directory (baeulc) by entering

```
> cplsll <CR>
```

to an MS-DOS-Prompt (with the PATH variable pointing to the BAE programs directory!) or with the

```
> cplsll.bat <CR>
```

command from a Linux or UNIX shell. The compilation process might last some time according to the power of your computer.

BAE Program Start and DDB File Access

Use the following command to start the Bartels AutoEngineer from a DOS prompt or a Linux and/or UNIX command shell:

```
> bae <CR>
```

Design file access can be simplified by starting and/or running BAE from the design and/or project files directory.

Under Windows, the Bartels AutoEngineer can also be started by selecting the bae.exe file using the Run function from the Windows Start menu or the Program Manager Files menu. Windows also allows for application startup by double-clicking the application from within the Windows Explorer and/or the File Manager, and it is also possible to define an initial working directory for the application to start in. A shortcut to bae.exe can be placed on the desktop or the Windows Start menu to provide an even more convenient method of starting up the Bartels AutoEngineer.

When installing the BAE software under Windows 9x/2000/NT, a BAE program group with shortcuts for starting the BAE main menu (BAE Main Menu) and the BAE program modules (BAE Setup, Schematic Editor, Packager, Layout Editor, Autoplacement, Autorouter, CAM Processor, CAM View) and for accessing the Bartels AutoEngineer User Manual (BAE User Manual) is added to the Windows start menu.

The BAE DDB File option for creating a new BAE DDB file named New BAE DDB File is included with the New function from the Windows 9x/2000/NT Desktop and Windows Explorer context menus to be activated through the right mouse button. The BAE DDB file context menus provide the BAE Schematic and BAE Layout options for loading the selected BAE file to the Schematic Editor and/or the Layout Editor. Double-clicking a BAE DDB file automatically loads the DDB file's standard layout element to the Layout Editor. The system suggests to create a new layout element if the DDB file does not yet contain a layout element with default name.

Please consult your operating system documentation for more information on how to configure applications for startup.

File Access Environment Variables

Environment variable references in file name specifications are automatically substituted. This allows for definitions such as $BAELIB for the symbol library directory and combined specifications such as $BAELIB/laylib or $BAELIB/$STDLIB to be used for path and file name specifications in functions such as Select Library from the Settings/Parameter menu. The environment variables are not evaluated until they are actually referred for file access. Thus they will be stored with design files to be transferred to different computers where they can refer to machine-dependent path specifications defined through corresponding environment variables. Environment variable references are preceded with a dollar sign ($) and must be either entirely lower-case or entirely upper-case. The ~ character refers to the $HOME variable. Undefined environment variable references are substituted with empty strings.

System File Access Environment Variables

The environment variables listed in table 3 are evaluated for advanced configuration of BAE system file access in network installations.

Table 3: BAE System File Environment Variables

Environment Variable	System File Default Name	Contents
BAE_CFG	router.cfg	Configuration File
BAE_BSETUP	bsetup.dat	BAE System Parameters
BAE_ULCLIB	bsetup.dat	User Language Programs
BAE_RULELIB	brules.dat	Rules Database
BAE_LANG	language.dat	Messages Database
BAE_FONTLIB	ged.fnt	Character Fonts
BAE_SCMLIB	scm.dat	SCM Color Tables
BAE_GEDLIB	ged.dat	Layout Color Tables
BAE_CEDLIB	ced.dat	IC Layout Color Tables
BAE_CAMLIB	cam.dat	Gerber Aperture Tables
BAE_WINLIB	baewin.dat baexwin.dat	Windows Position File
BAE_DCOLLIB	bae.col	Display Color Table
BAE_PCOLLIB	baep.col	Printer Color Table

Environment variables must specify complete paths to the corresponding system files. This feature can be used in definitions such as

```
set BAE_WINLIB=d:\bae\user1.dat
```

where access to a machine-specific Windows positions file in network installations with central BAE programs directory is established.

System files without environment variable definition are accessed from the BAE programs directory using the default system file name.

1.7 User Interface

Loading and Saving DDB File Elements

When loading a BAE DDB file element, the element's modification time is retrieved. This modification time is checked against the current time when saving the element, and user confirmation request is issued if the DDB file element appears to have been changed, thus providing advanced support and security for BAE network installations where different users might simultaneously modify the same DDB file element.

Undo, Redo

The maximum number of Undo/Redo steps has been increased from 10 to 20. Each Undo/Redo action triggers a status line message indicating the number of the processed Undo/Redo step. The Undo/Redo buffer always holds 20 actions, all of which are set to void upon loading an element.

Windows/Motif Parameter Setup Dialogs

A series of Windows/Motif dialogs have been implemented such as display and general parameter settings in all BAE modules, SCM plot parameters settings, Autoplacement and copper fill parameter settings, Neural Autorouter routing batch setup and routing options, strategy and control parameter settings, and CAM Processor control plot, Gerber photoplot, and drilling data output parameter settings. These dialogs can be activated through the **bae_callmenu** User Language function. The **UIFSETUP** User Language program has been changed to provide menu functions for activating the dialogs in the BAE Windows/Motif modules.

Cascading Windows/Motif Pulldown Menus

Facilities for cascading submenu definitions have been implemented for the BAE Windows and Motif pulldown user interfaces. Submenus can now be attached to menu items. The **UIFSETUP** User Language program has been changed in order to configure cascading menus for the BAE Windows/Motif modules. This allows for easy submenu function location (and activation) without having to activate (and probably cancel) submenus. The function repeat facility provided through the right mouse button has been adapted to support cascading menus. This simplifies repeated submenu function calls significantly.

Element Name Query under Windows

The height of the element name query boxes of the BAE Windows versions has been increased in order to display 20 instead of only 12 element names simultaneously.

BAE HighEnd Data Management

The BAE HighEnd data management functions have been optimized. Large layouts with copper fill areas are loaded and processed much faster.

1.8 Symbol and Part Libraries

New tag symbols for router control attribute assignments have been added to the route.ddb SCM library.

Two layout libraries, smd.ddb and steckver.ddb with additional SMT and connector layout symbols are provided with BAE Version 4.6.

PDF files displaying all graphic symbols of the officially released BAE libraries are provided in the pdflib directory of the BAE-CD-ROM.

A series of useful library management User Language programs for library management (library check, automatic symbol edit, automatic generation of library documentation, etc.) are installed with the BAE software. See **Bartels User Language Programmer's Guide - Chapter 4** for a complete listing of the User Language programs delivered with the BAE software.

2   Schematic Editor

2.1   General

Windows/Motif Parameter Setup Dialogs

The following Windows/Motif parameter setup dialogs have been implemented for the Schematic Editor:

- Settings - Settings: General Schematic Editor Parameters

- View - Settings: Display Parameters

- Plot Output - Settings: SCM Plot Parameters

The **UIFSETUP** User Language program has been changed to provide the menu functions for activating the dialogs under Windows and Motif.

User Language Programs

A series of new SCM functions and features such as

- Windows/Motif parameter setup dialogs (**UIFSETUP**)

- cascading Windows/Motif pulldown menus under Windows and Motif (**UIFSETUP**)

- copy and/or delete DDB file elements (**COPYELEM**, **SLIBUTIL**)

- loading SCM library elements through mouse-selection on current SCM element or through symbol context menu (**SCMMACL**, **SCM_MS**)

- edit and compile logical library definitions of mouse-selectable SCM symbols (**LOGLEDIT**)

- logical library definition file export (**SLIBUTIL**)

- change and replace texts (**SCMTEXT**)

- EPS/PDF output to support colors and A3 plot format (**SCMEPS**)

have been implemented with User Language programs.

2.2   Symbols, Labels

Symbol Pick

The function for selecting symbols for interactive processing has been improved. The symbol which is fully placed within the outline of the other symbol is always picked first, if two symbols are found under the pick position, thus preventing from unintentionally picking frame symbols.

2.3   Connections

Antenna Highlight Mode

Assigning the scm_pin_drc rule on SCM plan or project file level causes pins to be highlighted which only have a short single-segment connection. Usually such pins are highlighted to provide a function for fading out pins which are not to be connected. The scm_pin_drc rule is defined in the scm.rul rule definition file from the User Language directory (baeulc). The **SCMRULE** User Language program supports rule assignments to SCM paln elements and/or project files. SCMRULE can be called through Run User Script or through the Rule Attachment function from the Settings menu if **UIFSETUP** is activated.

Warning

The antenna highlight mode can only be activated if the scm.rul rule definition file (and thus the scm_pin_drc rule) has been compiled with the Rule System Compiler **rulecomp**. **rulecomp** stores the compiled rules to the brules.dat file in the BAE programs directory. I.e., the rules are not saved with the design. When transferring the design onto a different computer, the scm_pin_drc rule must be transferred to this computer as well, or otherwise antenna highlight mode assignments won't work.

2.4   Text, Attributes

Text Visibility on Rotated Symbols

The scm_rot_vis_0, scm_rot_vis_90, scm_rot_vis_180, and scm_rot_vis_270 from the scm.rul rule definition file (see User Language directory baeulc). can be used to control text visibility on SCM symbol level depending on SCM symbol rotation on SCM plan level. Texts with scm_rot_vis_0 rule assignments are only displayed on symbols with zero degree placement rotation angle on SCM plan level, etc. These rules can be used to place and/or display symbol name and attribute value texts depending on symbol rotation modes. The Disolve Rotations and Combine Rotations options from the **SCMRULE** User Language program can be used for easy text rotation visibility rule assignments on SCM symbol level. Disolve Rotations creates four copies of the currently loaded symbol at 0, 90, 180, and 180 degree rotation angles, allowing for rotation-specific text editing. Combine Rotations copies the texts back to symbol and automatically attaches the corresponding rules to the modified texts. SCMRULE can be called through Run User Script or through the Rule Attachment function from the Settings menu if **UIFSETUP** is activated.

Warning

Rotation-specific text visibility modes mode can only be set if the scm.rul rule definition file including the scm_rot_vis_0, scm_rot_vis_90, scm_rot_vis_180, and scm_rot_vis_270 rules have been compiled with the Rule System Compiler **rulecomp**. **rulecomp** stores the compiled rules to the brules.dat file in the BAE programs directory. I.e., the rules are not saved with the design. When transferring the design onto a different computer, the scm_rot_vis_* rules must be transferred to this computer as well, or otherwise text rotation visibility mode assignments won't work.

2.5 Group Functions

Group Mirroring

The Mirror Off and Mirror On options have been added to the submenu which can be activated through the right mouse button whilst placing a group with the Load Group, Move Group, and Copy Group. functions, thus allowing to mirror the currently selected SCM group.

Group Macro

The Group Macro function for replacing group-selected symbols has been improved. Attribute assignments and text positions from the original elements are now transferred to the new elements if possible.

2.6 Backannotation

Required SCM symbols and/or parts being deleted from the SCM plan could cause the Backannotation to corrupt the DDB design file. This bug has been fixed. The Backannotation now lists any missing SCM symbols/parts. These must be replaced on the SCM plan to allow for subsequent Backannotation processes to be completed successfully.

3   Packager

3.1   Switching to Layout Editor

For designs without existing layout, layout element creation for the netlist created by the Packager is automatically suggested when switching from the Packager to the Layout Editor.

4   Layout Editor

4.1   General

Program Start

Layout creation is now automatically suggested when calling the Layout Editor from the Packager and the design file does not yet contain a corresponding layout.

Windows/Motif Parameter Setup Dialogs

The following Windows/Motif parameter setup dialogs have been implemented for the Layout Editor:

- Settings - Settings: General Layout Editor Parameters

- View - Settings: Display Parameters

The **UIFSETUP** User Language program has been changed to provide the menu functions for activating the dialogs under Windows and Motif.

Drilling Class Definition

The Mirr. Drill. Class option from the submenu of the Place Drill Hole function allows for the assignment of a mirror mode drill class definition on padstack level. The mirror mode drill class is activated when mirroring the part on which the drill hole is defined, thus supporting mirroring of parts with blind and buried pins. On padstack level, the mirror mode drill class indicator is displayed below the standard drill class. On layout level, only the currently active drill class is displayed.

User Language Programs

A series of new Layout Editor functions and features such as

- Windows/Motif parameter setup dialogs (**UIFSETUP**)

- cascading Windows/Motif pulldown menus under Windows and Motif (**UIFSETUP**)

- copy and/or delete DDB file elements (**COPYELEM**, **LLIBUTIL**)

- loading layout library elements through mouse-selection on current layout element or through part context menu (**GEDMACL**, **GED_MS**)

- split trace segments and adjust trace segment lengths (**GEDTRACE**)

- option for substituting group-selected via types (**GEDVIA**)

- EDIF 2.0 netlist data import (**EDF20CON**)

- EPS/PDF output to support colors, A3 plot format, PDF A4 scaling, mirrored PostScript fonts, All Layer, Border, and Marker mode (**LAYEPS**)

- DXF and EPS/PDF output to support multi-layer selection through popup menu (**LAYDXFDO**, **LAYEPS**)

- CIF data import and export (**GEDIO**, **LCIFIN**, **LCIFOUT**)

have been implemented with User Language programs.

4.2   Display, Design Rule Check

Query Element

The output of the Query Element function from the Display menu has been extended in order to show the padstack symbol names for of the selected part pin, and to display the largest drill diameter used on the selected pin and/or via.

Report

The distance violation entry of the Report function has been split into two entries for copper layer distance violations and documentary distance violations, respectively. A new entry for the number of missing netlist pins has been added. Missing netlist pins can cause an erroneous open connections count. Thus, an indicator is added to the open connections count if netlist pins are missing. The **checklnl** User Language program can be used to track missing netlist pins.

4.3   Parts, Placement

Alternate Part Package Type Assignment

The Alternate Part function from the Parts menu provides the new Previous and Next options for scrolling through the alternate part package type list. This allows for an unlimited number of alternate package types to be provided, thus eliminating the previous limit of only twelve package types to chose from.

4.4   Traces, Routing

Highlight Net

The Highlight Net function has been changed in order to highlight power layer heat-trap circles and isolations of the selected net.

Color support and highlight reset facilities have been added to the Highlight Net function through the Highlight Net (default mode), Color Nets (with highlight color selection), and Reset All (for clearing all nethighlight) options.

Starting a new trace on a passive copper area triggers a highlight for the nets connected to that copper area.

Trace Edit Display Mode

The lay_edit_wide_filldist rule has been added to the layout.rul rule definition file (see User Language programs directory baeulc). This rule can be assigned to layouts to force filled wide trace segments with minimum distance line display during manual routing. The Edit Display function from the **GEDTRACE** User Language program can be used for activating this trace edit display mode through its Filled & Distance option. GEDTRACE can be called through Run User Script or through Other Functions from the Traces menu if **UIFSETUP** is activated.

Warning

Trace edit display modes can only be set if the layout.rul rule definition file (and thus the lay_edit_wide_filled, lay_edit_wide_outline, and lay_edit_wide_filldist rules) have been compiled with the Rule System Compiler **rulecomp**. **rulecomp** stores the compiled rules to the brules.dat file in the BAE programs directory. I.e., the rules are not saved with the design. When transferring the design onto a different computer, the trace edit display mode rules must be transferred to this computer as well, or otherwise trace edit display mode assignments won't work.

Airlines Display

The All Nets and Part Nets functions for selecting either part-specific or global airline display have been added to the context menu which is available through the right mouse button during part placement.

The net name queries of the Set Net Visible and Set Net Invisible options of the Mincon function for net-specific airline display settings have been modified to allow for net name pattern specifications.

On very large layouts (dimensions exceeding 30 Inches) some trace and copper area elements were occasionally excluded from airline display. This problem has been fixed.

Fix/Unfix Traces

Fixing and/or unfixing traces or nets now preserves the corresponding settings for vias.

Part Via Connections

In special cases, the Layout Editor didn't recognize connections through vias on part level. This bug has been fixed.

4.5   Graphic, Copper Areas

Polygon Pick

The polygon selection pick priority for copper fill areas has been decreased to ensure copper area selection in cases where copper fill areas and copper areas overlap at the pick position.

4.6   Group Functions

Group Scaling

The Scale option has been added to the submenu which can be activated through the right mouse button whilst placing a group with the Load Group, Move Group, and Copy Group. functions, thus allowing to specify a scaling factor for the currently selected layout group. Group scaling is performed after placing the group and applies only to placement coordinates and dimensions of the top level group elements.

5   Autoplacement

5.1   General

Windows/Motif Parameter Setup Dialogs

The following Windows/Motif parameter setup dialogs have been implemented for the Autoplacement module:

- Settings - Settings: General Autoplacement Parameters

- View - Settings: Display Parameters

- Auto Placement - Settings: Automatic Placement Parameters

- Copper Fill - Settings: Copper Fill Parameters

The **UIFSETUP** User Language program has been changed to provide the menu functions for activating the dialogs under Windows and Motif.

User Language Programs

A series of new Autoplacement functions and features such as

- Windows/Motif parameter setup dialogs (**UIFSETUP**)

- cascading Windows/Motif pulldown menus under Windows and Motif (**UIFSETUP**)

- copy DDB file elements (**COPYELEM**)

- EDIF 2.0 netlist data import (**EDF20CON**)

- DXF and EPS/PDF output to support multi-layer selection through popup menu (**LAYDXFDO**, **LAYEPS**)

- CIF data export (**APIO**, **LCIFOUT**)

have been implemented with User Language programs.

5.2   Display, Design Rule Check

Query Element

The Query Element function, as already known from the Layout Editor, has been added to the Autoplacement Display menu.

5.3   Automatic Copper Fill

Traces Cut Mode

The Octagonal Circles and Octagonal Corners+Circles options have been added to the Traces Cut Mode function from the Copper Fill menu. This allows for full circles and/or trace corners to be isolated like octagons, thus reducing the amount of Gerber data if no Gerber arc commands can be used.

6   Autorouter

6.1   General

Windows/Motif Parameter Setup Dialogs

The following Windows/Motif parameter setup dialogs have been implemented for the Neural Autorouter:

- Settings - Settings: General Autorouter Parameters

- View - Settings: Display Parameters

- Preplacement - Settings: Automatic Placement Parameters

- Autorouter - Options: Autorouting Options

- Autorouter - Control Parameters: Autorouting Control Parameters

- Autorouter - Strategy: Autorouting Strategy Parameters

- Autorouter - Batch Setup: Autorouting Batc Setup

The **UIFSETUP** User Language program has been changed to provide the menu functions for activating the dialogs under Windows and Motif.

User Language Programs

A series of new Neural Autorouter functions and features such as

- Windows/Motif parameter setup dialogs (**UIFSETUP**)

- cascading Windows/Motif pulldown menus under Windows and Motif (**UIFSETUP**)

- copy DDB file elements (**COPYELEM**)

- EDIF 2.0 netlist data import (**EDF20CON**)

- DXF and EPS/PDF output to support multi-layer selection through popup menu (**LAYDXFDO**, **LAYEPS**)

- CIF data export (**ARIO**, **LCIFOUT**)

have been implemented with User Language programs.

6.2   Autorouter Algorithms

Rip-Up Router

The Rip-Up Router efficiency for routing wide traces has been significantly increased.

Once 99.5% routing completion is achieved, the Rip-Up parameters are automatically increased to Rip-Up Trees 6, Rip-Up Level 200, and Rip-Up Retries 10, unless higher values are already set. This helps to avoid the time-consuming Optimizer cleanup passes between Rip-Up passes if only a few open connections are left.

Gridless Routing

A new Gridless Routing option has been added to the Neural Autorouter. This mode allows for traces to leave the routing grid under virtually any condition and for minimum distance routing between off-grid pins, thus achieving significantly better routing results especially for dense SMT boards. This makes the Bartels Autorouter the first PCB router worldwide to combine advanced autorouting technologies such gridless routing, rip-up/retry/backtracking routing and router-triggered pin/gate swaps.

The Gridless Pins/Vias mode routes straight connections to gridless placed pins. This mode doesn't perform gridless routing when routing other connections, i.e., special gridless routing features such as equidistant routing between off-grid pins is not supported.

The distance checking routines of the Gridless Router have been changed to check true geometries instead of surrounding rectangles. This prevents special objects such as L-shaped keepout or copper areas from blocking otherwise routable areas. For performance reasons, however, it is recommended to split L-shaped structures into rectangles if possible.

7   CAM Processor

7.1   General

Windows/Motif Parameter Setup Dialogs

The following Windows/Motif parameter setup dialogs have been implemented for the CAM Processor:

- Settings - Settings: General CAM/Plot Parameters

- View - Settings: Display Parameters

- Control Plot - Settings: Control Plot Parameters

- Gerber Photoplot - Settings: Gerber Photoplot Parameters

- Drilling+Insertion - Settings: Drilling Data Output Parameters

The **UIFSETUP** User Language program has been changed to provide the menu functions for activating the dialogs under Windows and Motif.

User Language Programs

A series of new CAM Processor functions and features such as

- Windows/Motif parameter setup dialogs (**UIFSETUP**)

- cascading Windows/Motif pulldown menus under Windows and Motif (**UIFSETUP**)

- copy DDB file elements (**COPYELEM**)

- EPS/PDF output to support colors, A3 plot format, PDF A4 scaling, mirrored PostScript fonts, All Layer, Border, and Marker mode (**LAYEPS**)

- DXF and EPS/PDF output to support multi-layer selection through popup menu (**LAYDXFDO**, **LAYEPS**)

- CIF data export (**CAMIO**, **LCIFOUT**)

have been implemented with User Language programs.

7.2   Plot Parameter

Plot Parameter Save/Load

CAM plot parameter settings are automatically stored with the currently processed design file when switching to another BAE module. The new Save Parameters function from the CAM Processor File menu can be used to save the current CAM plot parameter settings to a different DDB file. The new Load Parameters function from the CAM Processor File menu can be used to load CAM parameter settings from a selectable DDB file.

Plot Parameter Dialog

A plot parameter settings dialog has been implemented for the Windows and Motif versions of the CAM Processor.

Plot/CAM Origin Reset

The plot parameter dialog of the CAM Processor Windows and Motif versions provides a button for resetting the CAM origin to its default position.

Plot File Name Query

Occasionally, the CAM Processor's plot file name query dialogs didn't display pre-selected plot file names correctly. This bug has been fixed.

Plot/CAM Mirror Mode Indicator

To indicate CAM mirror mode settings, a mirror mode specific example text and an arrow are placed at the CAM origin marker if CAM mirroring and/or rotation is selected.

7.3   Gerber Output

Aperture Table

The maximum number of aperture definitions for each Gerber aperture table has been increased from 200 to 900.

Extended Gerber Output

Extended Gerber output with fixed Gerber aperture tables created invalid aperture tables when processing Special type apertures. This bug has been fixed.

8 CAM View

8.1 General

Windows/Motif Parameter Setup Dialogs

The following Windows/Motif parameter setup dialogs have been implemented for the CAM View module:

- Settings - Settings: General CAM View Parameters

- View - Settings: Display Parameters

The **UIFSETUP** User Language program has been changed to provide the menu functions for activating the dialogs under Windows and Motif.

User Language Programs

A series of new CAM View functions and features such as

- Windows/Motif parameter setup dialogs (**UIFSETUP**)

- cascading Windows/Motif pulldown menus under Windows and Motif (**UIFSETUP**)

have been implemented with User Language programs.

8.2 Display

The Display menu was not always available through the middle mouse button. This problem has been solved.

Filled area display instead of occasional outline display is now ensured for all structures loaded onto documentary layers when layer color assignment is configured.

9 Neural Rule System

9.1 General

Rule Definitions

The brules.dat file installed to the BAE programs directory contains precompiled rule definitions. The source files for these rule definitions are also provided (User Language directory; file extension .rul), i.e., the rule definitions can be modified and recompiled with the **rulecomp** Rule System Compiler.

9.2 SCM Rules

BAE Version 4.6 provides a series of new rules for the implementation of special SCM functions. These rules and their applications have already been described in **section 2**.

9.3 Layout Rules

BAE Version 4.6 provides a series of new rules for the implementation of special layout functions. These rules and their applications have already been described in **section 4**.

10 Utilities

10.1 BAEHELP

The **BAEHELP** utility program can be used for accessing the BAE online documentation under Windows 9x/2000/NT.

10.2 COPYDDB

The **COPYDDB** utility program functionality has been re-implemented through the **COPYELEM** User Language program, thus allowing for DDB file element copying from within the BAE modules with built-in User Language Interpreter.

10.3 LOGLIB

The **LOGLIB** utility program funtionality has been re-implemented with the **con_compileloglib** User Language function. This function is facilitated within the **LOGLEDIT** User Language program for editing and compiling Logical Library definitions of mouse-selectable SCM symbols within the Scheamtic Editor.

11   Bartels User Language

11.1 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 version of BAE Version 4.6 User Language has been changed. All User Language programs compiled under earlier BAE versions won't execute in the BAE Version 4.6 User Language interpreter environment (error message User Language program version incompatible!). This means, that each User Language program compiled under earlier BAE Versions must be recompiled under BAE Version 4.6 in order to regain compatibility.

11.2 User Language Compiler

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

11.3 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.

Implicit User Language Program Call

The **BAE_LOAD** User Language program will now also be called automatically after closing the currently loaded element.

11.4 System Functions

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

BAE Version 4.6 provides a series of new and/or improved User Language system functions for activating dialogs, compiling loglib definitions, retrieving part pin information, multi-line text input/display, etc.

New System Functions

The following new User Language system functions are provided with BAE V4.6:

IP	System Function	Short Description
STD	**bae_dialaddcontrol**	BAE dialog element definition
	bae_dialaskparams	Activate BAE dialog
	bae_dialclr	Clear BAE dialog elements
	bae_dialgetdata	Get BAE dialog element parameter
	bae_dialsetdata	Set BAE dialog element parameter
	bae_plainmenutext	BAE menu item text conversion
	bae_postprocess	Run BAE postprocess
	bae_readedittext	BAE text input/display
	con_compileloglib	Compile logical library definition
	ddbgetlaypartpin	Get DDB file layout part pin data
GED	**ged_gethighlnet**	Get GED net highlight mode/color
ICD	**icd_getrulecnt**	Get rule count for specific object
	icd_getrulename	Get rule name from specific object
	icd_ruleerr	Rule System error code query
	icd_rulefigatt	Attach rule(s) to figure list element
	icd_rulefigdet	Detach rules from figure list element
	icd_ruleplanatt	Attach rule(s) to currently loaded element
	icd_ruleplandet	Detach rules from currently loaded element
	icd_rulequery	Perform rule query on specific object

Changed System Functions

New menu codes have been added to the **bae_callmenu** system function parameter to allow for the activation of the new Windows/Motif dialogs (see **section 1.7** of these Release Notes).

The **bae_swconfig** system function has been extended to allow for BAE Light software configuration checks.

The second parameter of the **ged_highlnet** system function has been extended to allow for the specification of a color code for the net-specific highlight display.

The value range for the drill class parameter of the **ged_storedrill** system function has been extended to allow for drill class definitions for mirrored blind and buried vias.

11.5 BAE User Language Programs

BAE installs more than 170 pre-compiled User Language programs to the bsetup.dat file of the BAE programs directory. Additionally, the User Language *source* files (more than 3 Mbytes; some 100,000 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.

Include Files

The User Language include files already delivered with the previous BAE Version have been completely revised and extended by a series of new definitions and functions.

New User Language Programs

The following new User Language programs are provided with BAE Version 4.6:

IP	Program Name	Short Description
STD	**COPYELEM**	Copy DDB File Elements
	LOGLEDIT	Edit/compile logical library definition
SCM	**SCM_MSG**	SCM Message System Action
	SCMMACL	Load SCM Macro
LAY	**EDF20CON**	EDIF 2.0 Netlist Data Import
	LCIFOUT	Layout CIF Data Export
GED	**GEDMACL**	Load Layout Macro
	LCIFIN	Layout CIF Data Import

Changed User Language Programs

The User Language programs already delivered with the previous BAE Version have been completely 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. A series of User Language programs have been equipment with parameter query dialog boxes. New features and functions have been made available through existing User Language program menus wherever appropriate.

The IPC-D-356 test output implemented with the **IPCOUT** User Language program was erroneously shifted by one position from column 31 on. This bug has been fixed.

Menu Assignments and Key Bindings

Some of the BAE User Language programs define implicit User Language program calls (startups, toolbars, menu assignments, key bindings). I.e., with the installation of the BAE software, a modified BAE user interface with many additional functions is activated. You can add even more functions, or you can modify and/or reset the predefined menu assignments and key bindings.

The **BAE_ST** User Language program is automatically started when entering a User Language Interpreter environment (Schematic Editor, Layout Editor, Autoplacement, Neural Autorouter, CAM Processor, CAM View, or Chip Editor). **BAE_ST** calls the **UIFSETUP** User Language program which activates predefined menu assignments and key bindings for the current BAE program module. With BAE Version 4.6, the key bindings and menu assignments defined through **UIFSETUP** were considerably modified. Any changes to the menu assignments and key bindings require modification and re-compilation of the **UIFSETUP** source code only. The **HLPKEYS** User Language program can be used to list the current key bindings. With the predefined menu assignments of **UIFSETUP** activated, **HLPKEYS** can be called from the Key Bindings function of the Help menu. Menu assignments, although obvious from the BAE user interfaces, can be listed with the **UIFDUMP** User Language program. The **UIFRESET** User Language program can be used to reset all currently defined menu assignments and key bindings of the currently active BAE program module. Simply give it a try and run the **UIFRESET** program; we bet you'll be surprised to see the difference (the predefined menu layout can always be restored by calling **UIFSETUP**). The **UIFSETUP**, **UIFDUMP**, and **UIFRESET** programs can also be called from the menu of the **KEYPROG** User Language program which provides additional facilities for online key programming and User Language program help info management.