Description of New Features and Bug Fixes at Version 4.03d

			Description
1	New	Change by Length Mode	A new edit mode has been added that allows components to be changed by their length property, rather than by hard point position or by part. Example would be editing the length of a track rod to control Toe angle. Accessed by *'change mode'* menu.
2	New	User scaling and shifting of SDF's	A user can set their own scale and shift factors for each standard suspension derivative (SDF). These factors can be applied by corner such that left and right hand sign corrections can be set to user standards. These corrections are in addition to any units corrections.
3	Bug Fix	Switching from Shark to Raven modules	Previously problems occurred moving from the Shark module to Raven and back. This has now been resolved.
4	New	Graphical results to SDF's	The graphical elements that have a plotable results such as length or angle can be listed in the SDF text results. They appear under a separate list for front and rear graphics. As you add new graphical elements to a template they will appear added to the relevant menus.
5	New	User Defined SDF's	Users can create their own suspension (SDF) results. These are formed via a text editor string recognition process. User SDF's can be built up from standard SDF's, point positions, graphic results, point forces and point types.
6	New	Auto-load data	A feature has been added that allows the user to track a text file on the system, such that when this file is changed by another application the user is optionally prompted and new hard point co-ordinates extracted from it. Point extraction/identification is by point label matching. It is anticipated that this feature will be expanded in the future to cover other model properties such as bush stiffness.
7	New	ISO view	New default view option added. ISO view added to existing 3 orthogonal views.
8	New	Graph y-increment	Option added to graph y-axis plotting. Previously the axis increment was always derived by dividing the axis range by 6 to get the increment size. This can now be switched to a defined increment value. Together with user control of min/max values allows complete control over graph axes settings.
9	Bug Fix	Part Labels	In some instances it was possible for the application to crash when drawing part labels when in compliant mode due to no of bushes defined. This has now been resolved.
10	New	Graphics picking	To aid in picking points and graphical elements an option has been added to switches pick sensitivity on/off individually for certain graphic element types. Settings are stored in the users ini file.

11	New	Bump Stops	An optional separate force vs length element has been added to use as a non-linear bump stop. Its property of force at discreet points allows non-linear properties to be modelled. The bump stop rate is derived from the local slope of the curve and included in the relevant stiffness matrix. Solver switches are available to optionally include pre-load and rate of the bump stop.
12	New	Default Side	A user definable setting has been added such that for a single corner model the –ve Y side can be used rather than the previous +ve Y side. This is an optional setting, if left unaltered users will continue to work with the +ve Y side as default.
13	Bug Fix	SDF graphs	Previously it was possible to specify more results than could be plotted by the SDF graphs. This caused spurious results display. This has now been fixed.
14	New	Batch Runs	The program has been extensively re-structured to enable running in a non-graphical batch mode. Commands can be entered as a text string (rather than menu picking), and these commands "batched" from a file to provide standard run cases. Batch mode can either be entered directly from a Dos/Command window or through a suitable desk top icon. The command line argument TEXT or BATCH is used for this.
15	Bug Fix	Virtual compliance rig	A number of improvements have been made to the data quality produced by the virtual compliance rig. These include corrections to wheelbase TCP gradient and the addition of the 'roll' splines.
16	New	Rack Pinon Gear	A new data variable has been included for the rack gear pinon radius to enable hand-wheel angle to be determined for a certain rack travel.
17	New	Tyre vertical Force	Tyre vertical force has been added as a 'standard' SDF result. Thus it can now be plotted or listed in the SDF ouputs.
18	New	New SDF's	New SDF's added include 'roll angle', 'handwheel angle' and 'steering travel' these have been separated from 'wheel travel' to aid plotting options.
19	New	New SDF's	Spring forces and bump stop force have been added to the SDF results list. Two entries are given for each (1) and (2) since a model can have two of these elements in.
20	Change	User Language	The editing of the user language settings has been protected for a specific user by a password access. Relevant admin staff should request the form of this password.
21	New	Solver Options	Solver switches added to optionally include spring, tyre and bump stop rates from the stiffness arrays.
22	New	Turning Circle	Turning circle radius has been added to the default SDF list. Calculation is based on a simple average of the steered wheels intersection with the rear wheel axis.
23	New	Formatted	The text results identified as 'Formatted SDF Results' can now

		SDF	be user defined. All settings are configurable by the user into a number of 'standard' format slots such that the number of tables and the variables within a table can be user controlled.
24	New	Control Elements	Two new control elements have been added. These are the positional actuator and the length actuator. These control elements sense a change in length between two specified points and use this via a look-up table as a correction to either point position or part length.
25	Change	Bush Stiffness	Units error on bush rotational stiffness. Previously the wrong correction value was applied for rotational stiffness, this included defaults such as roll bars. This has been resolved for all rotational stiffness' and values should be entered as indicated by labelled units.
26	New	Drive Shaft	An modelling convenience option has been added that enables drive shafts to be added to the template. This provides the geometry definition for applying drive shaft torque's and the resulting hub moments and forces.
27	New	x-axis plotting	The Graph plotting has changed such that the x-axis can now be specified as any parameter from the SDF lists.
28	New	5-link template	The generic 5-link non-steerable suspension that previously featured in the 'getting started' tutorials has been added as default template No. 30.
29	New	Drive Shaft Solver	A solver switch has been added to optionally include loads from the drive shafts.
30	New	Graph Printing	A new graph printing option has been added that allows direct printing of all open graphs from a single menu selection. Graphs can be printed as 1/3/4//6 and 8 to a page.
31	Bug Fix	Value Entries	In some cases entering a long value into a display box would not allow scrolling beyond the visible length. This has know been fixed such that all value and text entries are scrollable.
32	New	Compliance Coefficients text	Previously the compliance coefficients results were only available as bar charts. The option of a simple text listing has now been included.
33	Change	Spring Graphics	The spring graphics have been enhanced to use actual spring properties of free/fitted length rather than a hard coded ratio.
34	New	Drive shaft Efficiency	A drive shaft loss property has been added that is a look-up table of efficiency (%) based on drive shaft angle.
35	New	Vector product	A new graphic element that creates a vector based on the cross product of two specified vectors.
36	New	Gravity Card	A new solver option has been added to calculate the un-sprung mass. A gravity card is applied to part masses and the change in tyre vertical force used to identify un-sprung corner weights.
37	New	Unit Vectors	All graphical length elements that display their global x, y and z components can be switched to show the lengths as a unit

vector rather than actual length.

38	New	Pictures	Optional images have been added to a number of the data sheets. These 'Data Sheet Images' can be switched off via the setup menu.
39	Bug Fix	Compliant hub	Previously it was possible for the inclusion of the compliant hub to produce errors for anti-squat and side view construction lines. This has now been resolved.
40	New	Spacers	A new component 'the spacer' has been added. This allows a template to be modified by the addition of spacers either between a hard point and ground or at a hard point between two parts. These spacers have length and orientation and can be modified to replicate the impact of spacers in a suspension set-up.
41	Change	Rack Bush	Changed the default rack rotation bush stiffness to use the default 'stiff' bush value rather than the 'singularity' value.
42	Change	Singularity stiffness	The default value for the singularity stiffness has been changed to 1.0 rather than 1.0E6 since this was affecting compliance hub moment transfer.
43	Change	Rotation Stiffness	Default rotational rigid stiffness changed from 1.0E8 to 1.0E10 to protect impact on hub compliance.
44	New	Road Profile	Added to Raven module an option to user define the road profile. Left and right wheels can be defined separately.
45	Bug Fix	Front IC centre	Previously the wrong value was displayed for the IC centre 'y' axis. This has now been corrected.
46	Bug Fix	Raven Tyre plotting	The tyre time history plotting incorrectly applied a degree-radians conversion factor. This extra conversion has now been removed.
47	New	User Specific response	For a specific user a number of start-up options have been added that include a two stage ini file and the use of the string <install> to represent the location of the software installed path.
48	New	<install>	All batch running recognises the string <install> as being the software installation path. This aids location/selection of shared batch files.
49	New	Rack Axial Force	New SDF added for the axial force of the rack. Requires not only compliance solution to be 'on' but also a suitable rack model to have been included.
50	New	Hand Wheel Torque	Following on from the addition of the rack axial force SDF this has been extended to a new SDF the 'hand wheel torque'. Again this relies on compliance and a suitable rack model.