



What's New in AAA?

Version 3.4

July 2012

AAA 3.4 contains various enhancements and revisions to version 3.3 as well as bug fixes.

Section 1 shows the enhancements and modifications made to AAA. Major enhancements include new modules and calculations. The second section contains bug fixes.

The AAA Manual describes the installation procedure and all modules. The manual is available in pdf format on the installation CD.

1. Enhancements and Modifications

Differences between AAA 3.4 and AAA 3.3 are:

1. The effect of fuselage slenderness on the apparent mass factor is shown as an output
2. Control surface drag parameters obtained in wind tunnel tests are used to calculate full-scale control surface drag parameters.
3. The X-axis scales are different for the Empty C.G. plot and the Forward-Aft C.G. plot.
4. Aerodynamic center calculations for Nacelles, Stores, Tailbooms and Floats are calculated similar to fuselage methods.
5. More variables have alternate units.
6. The Help system is expanded and updated.
7. Flaps, Ailerons, Elevators and Rudders are added to the Wind Tunnel Drag Module.
8. $D_{f_{\max_w}}$ is now used for non-circular sections instead of $w_{f_{\max}}$.
9. An option to export aerodynamic data to the Aircraft Performance Program (APP) is added.
10. The Component C.G. module is now separated into its respective components.
11. Propeller C.G. is accounted for.
12. Float C.G. is now included in the Component C.G. Module
13. A constant to estimate the dry weight of piston engines is now shown in the Class II Weight Module.
14. In Class II Weight Vought methods are added to all weight calculations (Courtesy Daniel Raymer).
15. The Cost Escalation Factor is updated.
16. Nacelles, tailbooms, stores, floats and ventral fins are now plotted in the airplane three-view and exported to AeroPack.
17. Steady State coefficients are no longer linked to the calculation of the stability and control derivatives and can be included or excluded from the Recalculate module.
18. There is now an option to calculate drag coefficient from the drag trend line in the Recalculate module.
19. The hinge moment derivatives are no longer linked to the stability and control derivatives and can be included or excluded from the Recalculate module.
20. Pitching moment calculations can be included or excluded from the Recalculate module.
21. Methods for estimating the ventral fin center of gravity are now implemented in the software.

22. Methods for estimating pylon centers of gravity are now implemented in the software.
23. The pylon wetted area is now calculated.
24. The three-view will plot only the geometry that is completely defined.
25. The cost escalation factor plot based on first print of Airplane Design Part VIII is replaced with current cost escalation factor plots.
26. The geometry that is not applicable to the aircraft is now grayed out in the AeroPack Module.
27. The program now checks to see if the geometry is defined before exporting to AeroPack.
28. The airplane total center of gravity is now shown in the Total C.G. plot.
29. The airplane empty center of gravity is now shown in the Empty C.G. plot.
30. Stick Force module under Stability & Control now includes the effects of Bob weight and Down Spring.

2. Problem Fixes

This section lists problems found in AAA 3.3 and earlier versions, which are fixed in AAA 3.4.

2.1 Weight

1. Z_{cgmg} and Z_{cgng} are not updated in the Class II Empty Weight Table when they are changed in the Component C.G. module.
2. In the Propulsion System Weight module, D_{prop} is shown in the input parameters as well as the Propeller Table. It should be shown in the propeller table only.
3. User weight does not update if zero is placed in the table and calculate is pressed.
4. The weight of the tail gear according to the Cessna method should be grayed out as there are no methods for approximating the weight of the tail gear according to this method.

2.2 Aerodynamics

1. Canard zero-lift drag does not account for canardvator gap effects.
2. Twin vertical tail rudder drag plot does not account for two rudders in Class II Drag.
3. For a glider, if Plot C_{Lmin} is zero, the program gives a message that it cannot plot for jets and the Class I drag polar is not plotted.
4. Transonic $C_{L\alpha}$ for lifting surfaces is calculated incorrectly for Mach Numbers greater than the force break Mach Number.
5. Values of $c_{l\alpha_{rw}}$ and $c_{l\alpha_{tw}}$ are incorrect in the legend of the Lift distribution plot if switched from rad^{-1} to deg^{-1} .
6. The warning message that pops up in Aerodynamics>Lift>Wing> $C_{L_{wmax}}$ >Surface $C_{L_{max}}$ does not match variable name. $C_{L_{max_{wclean}}}$ should be $C_{L_{wmax_{clean}}}$.
7. The labels for the lower axis overlap when C_{Lmin} for plotting is larger than 0.05.
8. The C_{Lmin} for plotting for jet aircraft cannot be set to zero without a warning message.
9. Fuselage Aerodynamic Center Shift is slightly off when compared to manual calculations.
10. \bar{C}_{m0f} is slightly off slightly off when compared to manual calculations.

2.3 Performance

Analysis: the rate of climb (RC) in the plot does not match the RC from output parameters in climb performance. The plot uses the power-speed curves, the calculation itself uses power setting and propeller efficiency.

2.4 Geometry

1. Cranked wing fuel volume gives a floating point error if inboard and outboard fuel tank stations are set to zero.
2. If first fuselage station is zero and X_{apex_f} is aft of the first station in Airplane coordinate system, an error occurs.
3. For Fuselage Geometry, when the coordinate system is changed from Fuselage to Airplane, there are a series of error messages, which should not occur.
4. If all the parameters in the Ventral fin module are filled, the AeroPack coordinates would still not become defined.
5. Fuselage Cross Section Dialog displays the cross section upside down. ρ_{fus12} , z_{fus1} , z_{fus12} correspond to ρ_{fus23} , z_{fus3} , z_{fus23} on the dialog.
6. Fuselage Geometry: Z_{fc_w} , Z_{fc_h} , Z_{fc_v} , $Z_{fc_{vee}}$, and Z_{fc_c} should always give coordinates corresponding to the Airplane Coordinate System regardless of coordinate system selected.
7. Y_r resets to zero if airfoils are not specified in the table and Calculate is used.
8. Airfoil geometry is not erased when selecting a different airfoil.
9. When airfoil is selected in the airfoil description in geometry, the following error occurs: “Airfoil File Not Found”, but the airfoil will still be displayed.
10. Airplane three-view is shown even with data missing.
11. Ventral Fin mean geometric chord is not plotted in the correct position.
12. Nacelle incidence is not shown in the airplane three-view.
13. The fuselage cross section is not centered if negative Y values are used as inputs in the fuselage geometry input table.
14. The floats selection in the AeroPack Module should not be toggled on and grayed out by default.

2.5 Propulsion

No Changes

2.6 Stability and Control

1. The thrust X_T and Z_T locations are shown as inputs in the Trim Diagram module even if the power plant is undefined.
2. If there is no nacelle geometry defined and the user goes to the $C_{m\alpha}$ module, AAA shows an access violation and crashes. Also occurs when the user does not go to the nacelle AC module prior to the $C_{m\alpha}$ module under S&C.
3. Trimmed Lift (T from D) module does not give any warnings if flow regime is non-subsonic.
4. $X_{c.g.}$ Goto button points to Class I Total C.G. module instead of pointing to Class II Total C.G. module.
5. The warning that pops up in the longitudinal trim module needs to say for any canard aircraft, which includes three-surface configurations.
6. In the wing location module, propellers are in the list of selectable components that are attached to the wing for jet aircraft.
7. The apex of the lifting surfaces attached to the wing in the Wing Location module does not properly position the lifting surface with respect to the wing.
8. The default range of the Wing Location plot is incorrect.
9. Stick Force module under Stability & Control uses Ruddervator Gearing Ratio for V-tail configurations.

2.7 Dynamics

1. In sensitivity: if $C_{L\alpha}$ is in deg^{-1} and then plotted, changing axis will show values in rad^{-1} instead of deg^{-1} .

2.8 Loads

No Changes

2.9 Structures

No Changes

2.10 Cost

No Changes

2.11 General

1. For an existing file with a propeller, if the engine is undefined, the engine type, aspiration, prop type and number of fans are no longer shown in the propulsion dialog box.
2. In the Flight Condition dialog window, altitude, speed, ΔT and δ_f are not updated when the Return key is pressed.
3. If the second line of an airfoil dat file has 1 instead of 1.0, AAA will not load the airfoil shape.
4. When selecting “Total CG” in the recalculate Dialog of a New AAA file with no flight conditions, AAA will crash.
5. The Recalculate operation will not calculate parameters after it is stopped and “All marked flight conditions” is de-selected.