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[1.3] Pilot Assistant: Atmospheric piloting aids - 1.13.2 (May 28)



[1.3] Pilot Assistant: Atmospheric piloting aids - 1.13.2 (May 28)

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By Crzyrndm, November 14, 2014 in [Add-on Releases](#)

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Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 14,
2014 (edited)

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NOTE: Usage of [Dynamic Deflection](#) is highly recommended to maximise stability

Pilot Assistant

3 basic aids for use in atmospheric flight (that is, forwards, not upwards). Works with any atmospheric model so long as the craft has enough control authority to be controlled.

- Heading Hold - craft will bank to a controlled angle and attempt to match heading with the target given
- Altitude hold - craft will pitch to a controlled angle and climb/descend to the target altitude
- Climb speed - craft will pitch to an angle that gives the desired ascent or descent rate in m/s
- Yaw Control - Smooth co-ordinated turns and damping of yaw oscillations
- Airspeed Control - Set an airspeed target and Pilot Assistant will manage the throttle to maintain that target
- Keyboard adjustment of targets with bindings corresponding to standard vessel controls
- Ingame binding list and

Each function is controlled by cascaded PID controllers with fully configurable gains and limits. These may need retuning to suit different craft depending on their aerodynamic stability.

Surface SAS and SAS Tuning

- Surface SAS holds orientation relative to surface
 - Fully tweakable PID gains for stock SAS and Surface SAS
 - Pitch/Roll/Heading angles in Surface SAS can be set by hand
 - SSAS axis controls deactivate separately under user input, so there is no listing to one side when you are just pitching up/down.
-

PID Information

 **Reveal hidden contents**

Pilot Assistant 101 - How to fight the wobble

There are two general causes for Pilot

Assistant making your vehicle oscillate (wobble), over-reaction and under-reaction.

Over-reaction results in fast sharp oscillations, and typically happens when your craft has a lot of control authority (high speed, low altitude, lots of control surfaces). Under-reaction results in more of a slow "cartoon drunk" sway and occurs for all the opposite reasons.

The simple fix is to increase or decrease the amount of "reaction" Pilot Assistant has

- First, identify the controller related to the axis that is misbehaving.
- If you are having problems that look like over-reaction, **increase** the **scalar** term slowly (smaller craft may also want to decrease K_d)
- If you are having problems that look like under-reaction, **decrease** the **scalar** term slowly (larger craft may also want to increase K_d)
- Remember your control situation changes a lot as you fly. A typical SSTO will have you fighting over-compensation at low altitude and under-compensation at high altitudes
- If problems persist, feel free to ask for advice

Keybindings

Since Pilot Assistant overrides many functions that would normally be dealt with through keyboard input, many applicable keys have been repurposed to make Pilot Assistant easier to use

➤ **Reveal hidden contents**

➤ **Reveal hidden contents**

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Edited July 26, 2017 by Crzyrndm



Quote

Chaumas, Mikki, ricus and 35 others like this



My Mods:

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Moskit

Trust me I'm an engineer.



Posted November 14, 2014

Report post

Whoah! Great addon!



Members

+ 16

34 posts



Quote



Translations by *CEBULA Translations*: ✕ ▾

- Polish localization of [Kerbal Space Program 1.3.0](#)
- Polish localization of [Contracs Window + \[8.0\]](#)

starkline

Deep in a CO Mountain



Members

+ 5

39 posts

Posted November 14,
2014 (edited)

Report post



This is fantastic! I just gave it a whirl with one of my go to space planes and worked a treat. It seemed to work pretty well right out of the box with FAR. Admittedly, it took a few attempts to figure out what all the valued were doing, but once I sorted that, I was able to set a course and let it ride.

Thanks for making this one. It will make flying around Kerbin so much more enjoyable.

A few thoughts that I had while testing it out:

- It would be nice to have the option of using blizzy's toolbar vs. the stock launcher, but that's minor.
- The assistant didn't quite seem to know how to handle flaps with FAR. That said, I'm not sure how much of an issue is because by

the time you want flaps, you should probably be taking the stick yourself.

- Screen space being at a premium, it would be nice to have resizable window for the display. This being an initial release, however, my guess is that you've thought of that. Regarding the on screen display, I'd love to see something similar to Kerbal Engineer's ver. 1 displays? This is a mod that I imagine keeping the window open for long periods of time when flying to spots on Kerbin, and Engineer's displays look nice and don't take up lots of space.
- Might I suggest making a quick readme, or in game help menu, that makes it more clear as to what the PID tuning values do. Trial and error is always fun, but in some cases the values seemed minimally effective. Other times small changes made a big impact. That said, it worked reasonably well with the default values, so maybe a "reset to stock values" button would be helpful.

Hopefully, my comments are constructive, and not regarded as criticisms. This is an awesome feature for the community!

Cheers!



Quote



Crzyrndm

Capsule Communicator



Members

+ 1,091

2,131 posts

Posted November 14,
2014 (edited)

Report post



starkline said:

- It would be nice to have the option of using blizzy's toolbar vs. the stock launcher, but that's minor.
- The assistant didn't quite seem to know how to handle flaps with FAR. That said, I'm not sure how much of an issue is because by the time you want flaps, you should probably be taking the stick yourself.

Hopefully, my comments are constructive, and not regarded as criticisms.

I prefer the stock applauncher because there is no requirements for anything else. Being able to switch to blizzy's would be a long way down any feature list I was to draw up (another mod or two to get to feature complete first...).

It won't handle flaps directly (and is not

intended to), but it should be able to compensate for their use if you do activate them.

and yes, that's perfect feedback 🤖

▼ starkline said:

- Might I suggest making a quick readme, or in game help menu, that makes it more clear as to what the PID tuning values do. Trial and error is always fun, but in some cases the values seemed minimally effective. Other times small changes made a big impact. That said, it worked reasonably well with the default values, so maybe a "reset to stock values" button would be helpful.

Erp, just to clear that up (I know they aren't particularly well named...)

I would ignore the values marked as Roll and Elevator. **The important blocks are the Hdg (Heading) and Pitch controllers.**

Hdg: Input - heading, Output - roll angle

Roll: Input - roll angle, Output - surface deflection

Altitude: Input - altitude, Output - vertical speed (it's a fudge so I can use

the same control for vertical speed and altitude)

Pitch: Input - Vertical speed, Output - pitch angle (v0.2 Now outputs AoA)

Elevator: Input - pitch angle, Output - surface deflection

Kp/Ki/Kd - PID parameters for each controller

Out min/Max - Max output for each controller

Clamp Upper/Lower - Integral sum clamps

For example, the Altitude Out Max value is the maximum target climb rate that will be input to the Pitch block.

PID limits can be closed 99.99% of the time. These 4 values should be set and forget for the most part. I'll see if I can make the display without them a little more tall and narrow

tl;dr

Focus on the Hdg Kp/Ki/Kd for the heading controller, or the Pitch Kp/Ki/Kd for the vertical speed controller

I did say they weren't simple aids 🤖

Edited March 12, 2015 by Crzyrndm



Quote



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starkline

Deep in a CO Mountain



Members

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39 posts

Posted November 14,
2014

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Yes, you did say that, and I think I have a better grasp of what's going on after looking over your code on github. After some more playing around with it, I've got to say it's working really well. For me, at least, an already well balanced and stable plane works exceptionally well with very little effort. I don't play using stock aero or NEAR, but FAR is working a treat.

As a final thought on the GUI, I think you nailed it on the head: taller and more narrow with respect to width is more advantageous. I'm sure it's a matter of taste, though.

Cheers



Quote



Dr. Jet

Sr. Spacecraft Engineer



Posted November 14,
2014

Report post



Would be magnificent to see this as a



Members

+ 275

754 posts

MechJeb module. Much smoother control it shows.



Quote

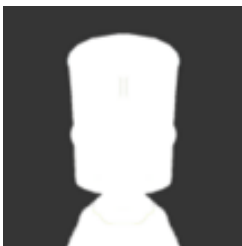


[Dr. Jet's Chop Shop](#) 🐱 [Dr. Jet's Chop Shop - dev thread](#) ; [RealISRU development](#)



JeffreyCor

Senior Rocket Scientist



Members

+ 199

1,517 posts

Posted November 14, 2014

Report post



This seems exactly like something I've been wanting and trying to push MechJeb into doing (with varying levels of success). Will be trying this out today 🤖



Quote



Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 14, 2014 (edited)

Report post



starkline said:

I don't play using stock aero or NEAR, but FAR is working a treat.

It should be entirely irrelevant which aerodynamic model you play under because it works on raw flight parameters (if it's relatively aerodynamically stable, the default parameters should work reasonably

well for any craft). The only difference is that the stability of craft change between stock and FAR/NEAR (I included the Aeris FAR retune as an example craft that anyone could use to try it out)

RE: GUI

It's current form is really just a "slightly" tidied up version of what I had open for development. Not really intended as a permanent feature, just something that works.

I'll have to have a careful think about how things are being laid out. Not all of the currently displayed data actually needs to be shown to an end user (particularly the control surfaces, which are essentially filling in the role of stock SAS).

Yaw damper (since this can't be used with SAS active...) and AoA limiter take priority on that though

Edited November 14, 2014 by Crzyrndm



Quote



My Mods:

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[Assistant](#)

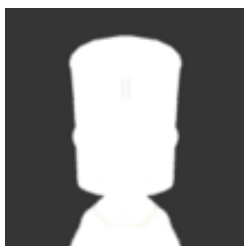
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Hodo

SSTO Space Plane Designer



Members

+ 438

3,667 posts

Posted November 14,
2014

Report post

I am so downloading this when I get home.



Quote



[H.A.R.M. Combat SSTO](#) Been building
SSTOs in FAR+DRE since August 2013!

Crzyrndm

Capsule Communicator



Members

+ 1,091

2,131 posts

Posted November 14,
2014 (edited)

Report post

Updated to 0.2

- Pitch controller replaced by AoA (Angle of Attack) controller. The only difference you will see is that you can now limit target AoA's directly instead of pitch (very useful in FAR/NEAR)
- Yaw Damper added. Will be active while either heading or vertical velocity are in use. Zero out tuning parameters (Kp/Ki/Kd) if you don't want it running
- Fixed the altitude and AoA output limiters to display intuitive values (ie. max +ve climb rate uses a +ve value)

I think I'll go see about making a user guide that explains all the values a little

better

EDIT:

<https://github.com/Crzyrndm/Pilot-Assistant/wiki>

Atleast lists what each controller does and which values are commonly important. I'm finding it difficult to write anything pertaining to actual usage hints though.

Edited November 14, 2014 by Crzyrndm



Quote



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Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 15,
2014 (edited)

Report post 

Updated to 0.3

- Massive GUI cleanup. A lot less screen space occupied, more sense to labelled values (I hope)
- PID values for control surfaces are hidden by default as they are minimally important to tuning
- Vertical control now defaults to vertical speed. Climb rate will be

locked in automatically when activated (gives a smoother activation)

- .version file included for AVC users
- Lots of little fixes

New GUI

[Javascript is disabled.](#)

[View full album](#)

Edited November 15, 2014 by Crzyrndm



Quote



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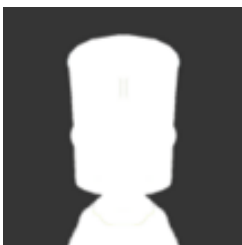
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Wanderfound

Mach 6 is my launchpad.



Members

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4,893 posts

Posted November 15, 2014

[Report post](#)



Nifty; this is looking like it might be able to replace my current SAS/PID Tuner setup. Is it possible to set it to mimic a non-wobbly SAS (i.e. a one-button "hold the current roll/pitch/bearing until disturbed")?



Quote



Kerbodyne SSTO Division:



<http://forum.kerbalspaceprogram.com/threads/90747-Kerbodyne-SSTO-Division-Omnibus-Thread>

Videos:

<https://m.youtube.com/user/TheWand>

Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 15, 2014

Report post



Bearing yes.

Pitch and roll currently not, or atleast not directly. Vertical speed can be controlled directly instead of pitch, roll it's only possible currently to hold the wings level (set heading Kp/Ki/Kd = 0) as a constant roll value (changes in set heading control roll angle, but thats probably not what you're looking for)



Quote



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JamesL86

Rocketeer

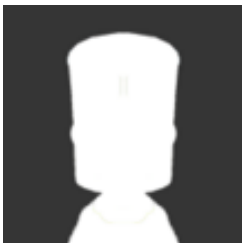


Posted November 15, 2014

Report post



Oh neat! Its a KSP analog of an autopilot system in real aircraft. I use



Members

+ 36

80 posts

to use this type of thing all the time in Microsoft Flight Simulator. Now if I could just find some other programs to do stuff similar to this for other types of craft such as rockets, I might actually be able to replace MechJeb entirely.



Quote



Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 15, 2014

Report post



Hah, yes this is most definitely based on the autopilot functions in a light aircraft



JamesL86 said:

Now if I could just find some other programs to do stuff similar to this for other types of craft such as rockets, I might actually be able to replace MechJeb entirely.

These two mods might be what you're looking for

[http://forum.kerbalspaceprogram.com/threads/50736-0-25-\(Oct-12-14\)-Automate-Vertical-Velocity-and-Altitude-Control](http://forum.kerbalspaceprogram.com/threads/50736-0-25-(Oct-12-14)-Automate-Vertical-Velocity-and-Altitude-Control)

<http://forum.kerbalspaceprogram.com/threads/85838-0-23-5-%28Jul13-14%29-RCS-Landing-Aid-Kill-your->

[horizontal-velocity-to-land](#)



Quote



My Mods:

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[Assistant](#)

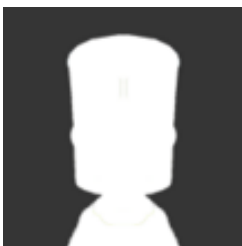
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GabeTeuton

Rocketry Enthusiast



Members

[+ 16](#)

100 posts

Posted November 15, 2014

Report post



Once again, so much THANK YOU, or well, THANK YOU SO MUCH!

My hero!



Quote



YAYYYYYYYYYYYYYYYYYYYYYYYYYY!!!! Love



this game! Definately need to check KOS mod... Since it was presented to me, it almost instantly became a MUST BE!

<http://forum.kerbalspaceprogram.com>

steve_v

Grumpy Sparky

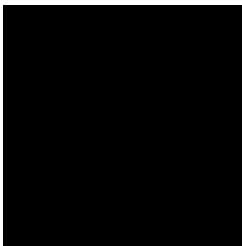


Posted November 15, 2014

Report post



First & foremost, this is awesome. Cascading PID controls make flying a



Members

+ 2,121

3,021 posts

Location: /dev/chair

whole lot more enjoyable 🤖

That said, recon you could put a lid on the log spam?

eg: "Yaw: 0.00176889268017035" ad infinitum...

Makes reading logfiles a tiny bit annoying.



Quote



Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 15, 2014

Report post



steve_v said:

That said, recon you could put a lid on the log spam?

Oh, my bad. That was not meant to make it to release...



Quote



My Mods:

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Crzyrndm

Posted November 15, 2014 (edited)

Report post





Members

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Ok, the log spam should be gone (🤖)
plus a few other little changes

Version 0.4

* Integrated yaw damper into the heading control system. Can now be used to add rudder input with some retuning. Default is still only yaw damping.

For active rudder control: make Ki slightly > 0 and tweak the max yaw values to suit. Pure yaw damper is $K_p/K_i/K_d$ all $= 0$

* More GUI cleanup

As far as functionality goes, I'm not too sure there's a whole lot more to be added here.

Edited November 15, 2014 by Crzyrndm



Quote



My Mods:

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[Assistant](#)

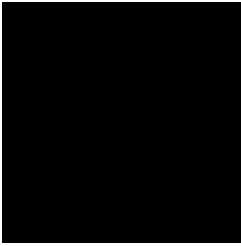
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steve_v

Grumpy Sparky



Members

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Location: /dev/chair

Posted November 16,
2014 (edited)

Report post

▼ **Crzyrndm said:**

As far as functionality goes, I'm not too sure there's a whole lot more to be added here.

How about a way to save the PID constants? (ideally per-craft) Flying with FAR I need to nerf the AOA / V.speed controller response on every launch.

Edited November 16, 2014 by **steve_v**



Quote



Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 16,
2014

Report post

I knew it would be something simple like that. Per craft isn't likely unless I start adding modules, but maybe some configurable presets would do the trick.



Quote



My Mods:

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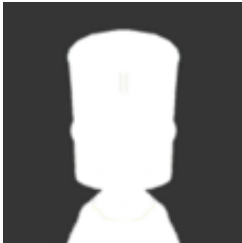
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GabeTeuton

Rocketry Enthusiast



Members

+ 16

100 posts

Posted November 16,
2014



Report post 

Man i'm still using the ver 0.3, today was the first day i tried it, despite you telling me before, 'cause i kind of abandoned ksp for some weeks, and it's working sooooo fineeeee... I just need FAR's AoA for level flight for my desired cruise settings, and then it goes, i didn't updated to 0.4 yet 'cause i started the mission with 0.3 and then realized 0.4 was released but as soon as i finish this mission i'll certainly update, i want to check the new GUI features, my mission timer is t+1.47.32 with no failures whatsoever, in fewer words: IT WORKS LIKE A CHARM...



Quote



YAYYYYYYYYYYYYYYYYYYYYYYYYY!!!! Love  
this game! Definatly need to check
KOS mod... Since it was presented to
me, it almost instantly became a
MUST BE!

<http://forum.kerhalsnacenrogram.com>

steve_v

Grumpy Sparky

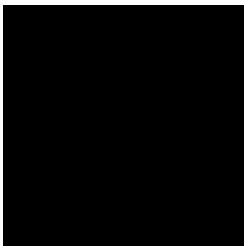


Posted November 16,
2014

Report post 



Crzyrndm said:



Members

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3,021 posts

Location: /dev/chair

I knew it would be something simple like that. Per craft isn't likely unless I start adding modules, but maybe some configurable presets would do the trick.

Presets would suit me fine, even just making the gains persistent and/or putting them in a config file somewhere.



Quote



Crzyrndm

Capsule Communicator



Members

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2,131 posts

Posted November 18, 2014 (edited)

Report post



Updating again 🤖

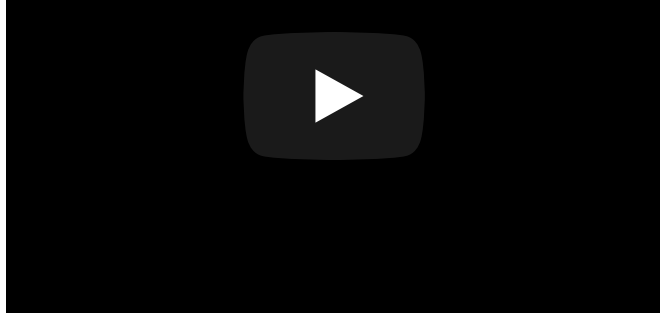
Version 0.5

- * Presets - Create, update, and delete (kind of. The delete function only works if you quit KSP without loading into flight again >.<. Easier just to remove from the presets.cfg atm)

- * Added increment buttons to the PID tuning parameters. Increments are +10% and -9.1...% ($x*1.1$ and $x/1.1$ respectively.

this means it comes

And as a demonstration of the levels of precision achieved by this mod, I was doing some low flying over the oceans yesterday and cleaned off all the aft port control surfaces on the Aeris-3A (totally by accident, was actually trying to improve the tuning...). It managed to finish the turn and return to the straight and level using only the remaining starboard surfaces and the port canard with an altitude clearance of $<0.2\text{m}$ (Aeris-3A has a required altitude of just under 1m) much to my amazement I must add. I didn't think it would manage after the third one disappeared.



Final note:

I have discovered a *slight* bug with the rudder control system when used in coordinated mode, that being it only works for turning in one direction for some reason. The default yaw damping is unaffected by this issue

▼ **GabeTeuton said:**

I just need FAR's AoA for level flight for my desired cruise settings

I don't quite understand what you mean here. It shouldn't need anything from FAR to work.

Edited November 18, 2014 by Crzyrndm

+ Quote



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Posted November 18, 2014

Gfurst

Troublemaker



Members

+ 76

458 posts

Hey there, just saw and tested this mod yesterday, pretty awesome. Been looking for something like this for ages.

Unfortunately I can't input the numbers directly without activating a bunch of action buttons. But its fine eitherway...

Anyway, I thought to suggest for you to move the button to blizzy's toolbar if that available. Just cus you know, it offers more flexibility.



Quote



Gfurst@wordpress.com

Aviation and gaming enthusiast among some other things.



[Overhaul the career mode for better](#)

1

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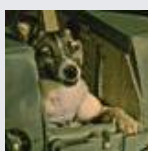
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[1.3] Pilot Assistant: Atmospheric piloting aids - 1.13.2 (May 28)

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