BUILD YOUR OWN AIRCRAFT IN XPLANE 11- PLANEMAKER

BY DAVE ROTHWELL

THIS DOCUMENT IS IN "BETA" – PLEASE FEEL FREE TO SUGGEST IMPROVEMENTS

BUILD YOUR FIRST AIRCRAFT IN PLANEMAKER

SIMPLY FOLLOW THE INFORMATION ON THE IMAGES TO REPRODUCE THE DEFAULT CESSNA 172 IN XPLANE. THE INTERFACE IS SLIGHLTY "UNWELCOMING" AT FIRST BUT YOU WILL GET THE HANG OF IT. FOLLOWING THIS EXAMPLE YOU SHOULD BE ABLE TO GRASP ALL THE CONCEPTS YOU NEED TO DESIGN A COMPLETELY NEW AIRCRAFT FROM SCRATCH.

REMEMBER TO SAVE OFTEN ..

PLEASE DO NOT EDIT ANY DEFAULT AIRCRAFT: LETS MAKE ONE YOU CAN HAVE FUN WITH

You might need to ZOOM IN on this document to see some of the details

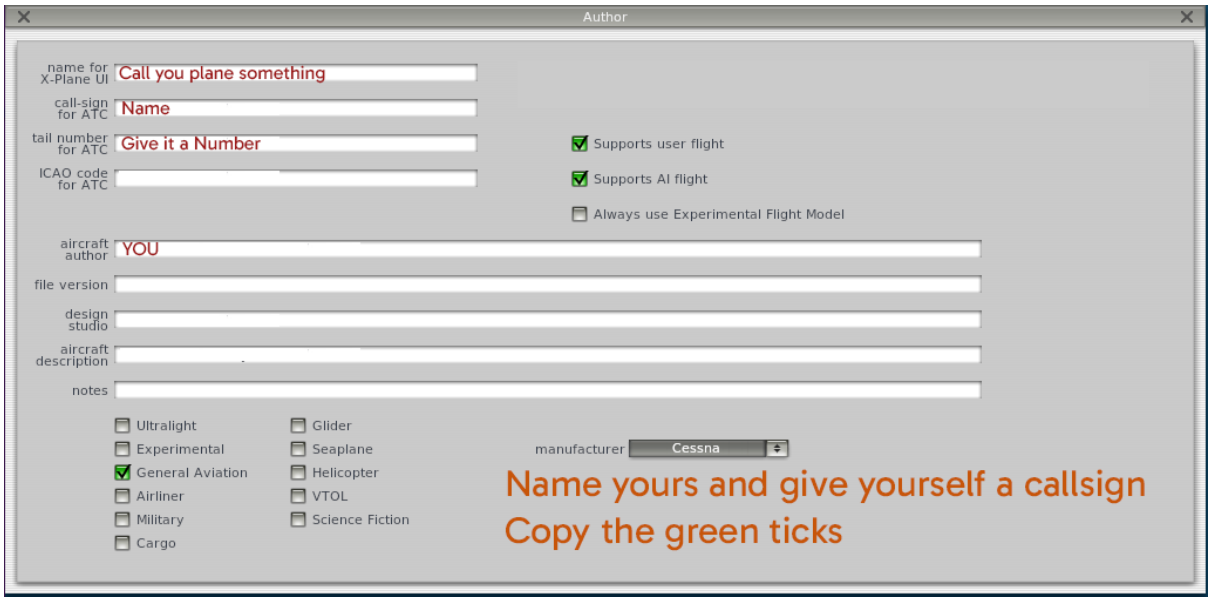
CTRL and ROLL your middle mouse button to ZOOM IN.

Planemaker can be found in the XPlane default folder. On Uni PC's that is on the C: Drive

Open Planemaker **IMPORTANT - - START A NEW PROJECT** – **FILE/NEW** and **SAVE AS - -**

in **A NEW FOLDER** in the **EXTRA AIRCRAFT** folder Ie: C:\X-Plane 11\Aircraft\Extra Aircraft\ **YOURFOLDER (**call it something unique to you**)**

OPEN **THE AUTHOR TAB** RENAME YOUR PLANE



Your plane will ONLY be saved in that folder on that PC. If you want to keep it for another machine you will have to copy it across – SIMPLY COPY AND PASTE YOUR FOLDER

THERE ARE LIMITED UNDO FUNCTIONS SO SAVE OFTEN IF YOU MESS UP REOPEN THE MODEL WITHOUT SAVING

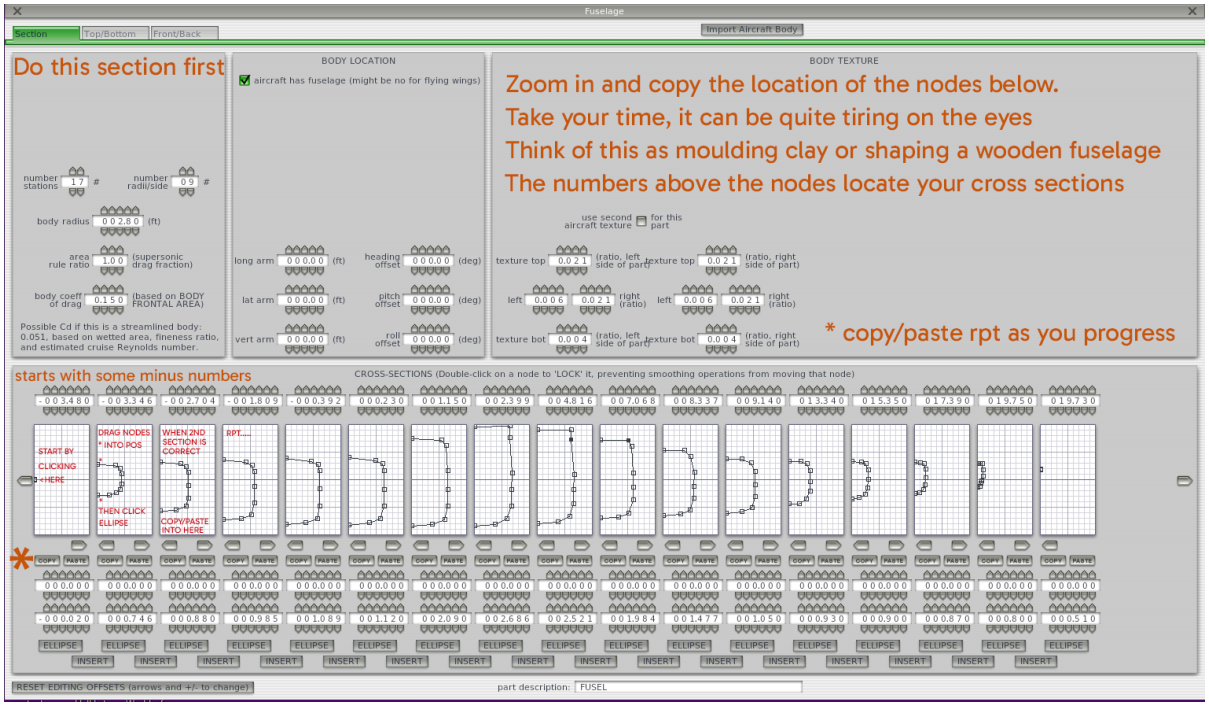
Press **SPACEBAR** to toggle between SOLID and WIREFRAME model use **WSAD** keys to rotate your model

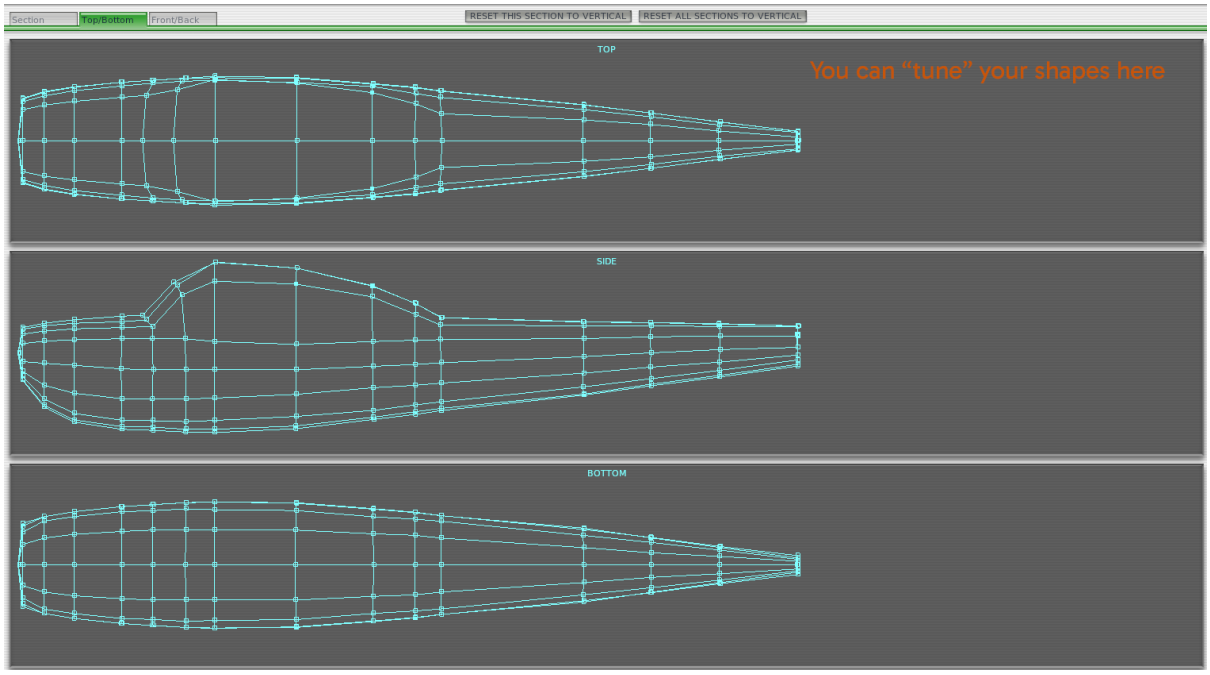
DON'T BE put off by the complicated interface... you'll get used to it – CLICK THE STANDARD TAB to access the screens you see below you. This first bit is the hardest....

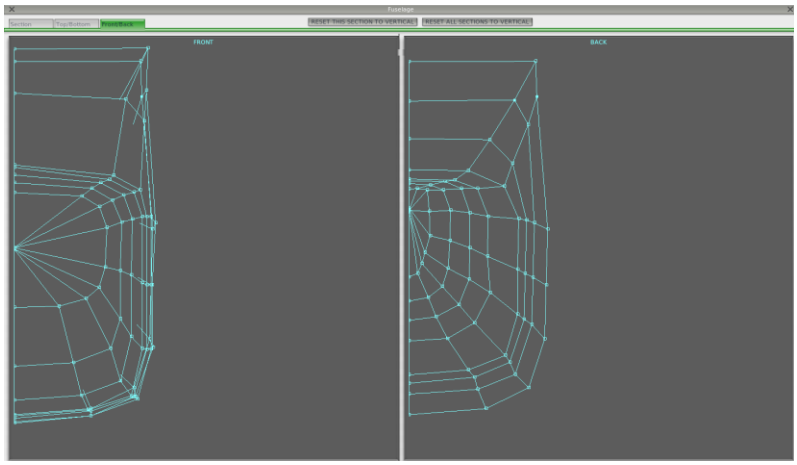
Build the **fuselage** first. Enter the numbers exactly as drag the nodes (dots) into place to copy the Cessna shape. A bit like moulding clay/carving wood USE THE COPY AND PASTE FUNCTION after getting a section right... SAVE IT then work on/reshape the next section. DONT press those silver L/R arrows. that ADDS a section. The numbers ABOVE the sections mark how the location of the fuselage segment. .take your TIME 😊get one right, copy it, change it, rpt..

Click the numbers and type in the values - or use the grey up and down buttons...

ZOOM IN TO SAVE YOUR EYES

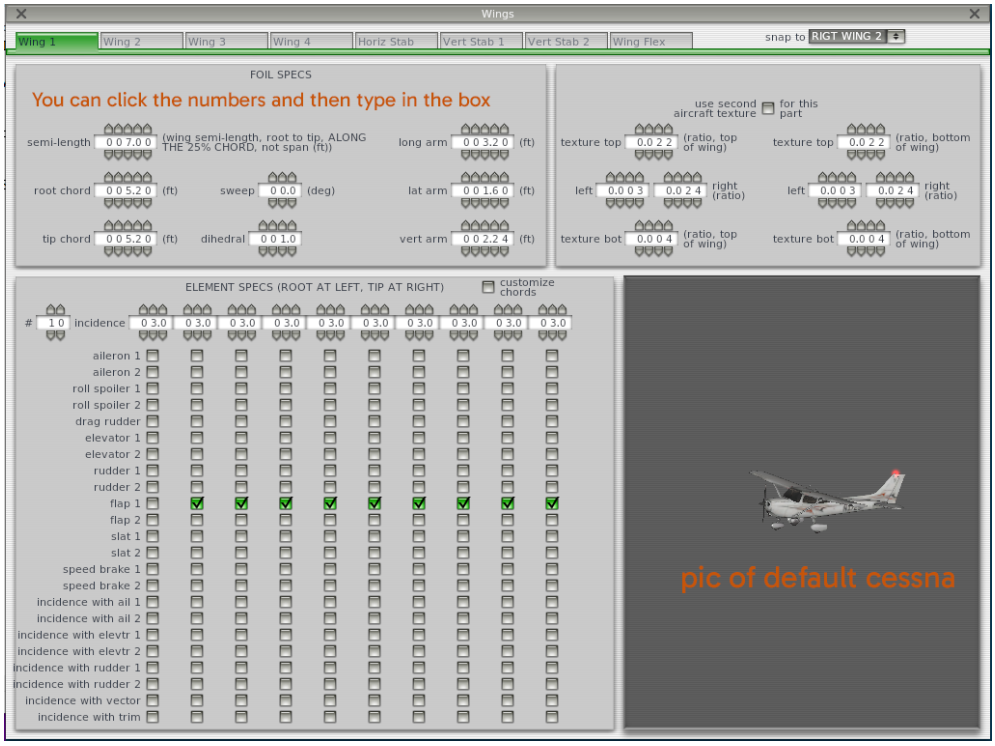

Fuselage
Import Aircraft Body
Do this section first
BODY LOCATION
aircraft has fuselage (might be no for flying wings)
BODY TEXTURE
Zoom in and copy the location of the nodes below.
Take your time, it can be quite tiring on the eyes
Think of this as moulding clay or shaping a wooden fuselage
The numbers above the nodes locate your cross sections
* copy/paste rpt as you progress
starts with some minus numbers
CROSS-SECTIONS (Double-click on a node to 'LOCK' it, preventing smoothing operations from moving that node)
START BY CLICKING +HERE
DRAG NODES * INTO POS
THEN CLICK ELLIPSE
WHEN 2ND SECTION IS CORRECT
COPY/PASTE INTO HERE
RPT....
RESET EDITING OFFSETS (arrows and +/- to change)
part description:
FUSEL


Top/Bottom
RESET THIS SECTION TO VERTICAL
RESET ALL SECTIONS TO VERTICAL
TOP
You can "tune" your shapes here
SIDE
BOTTOM

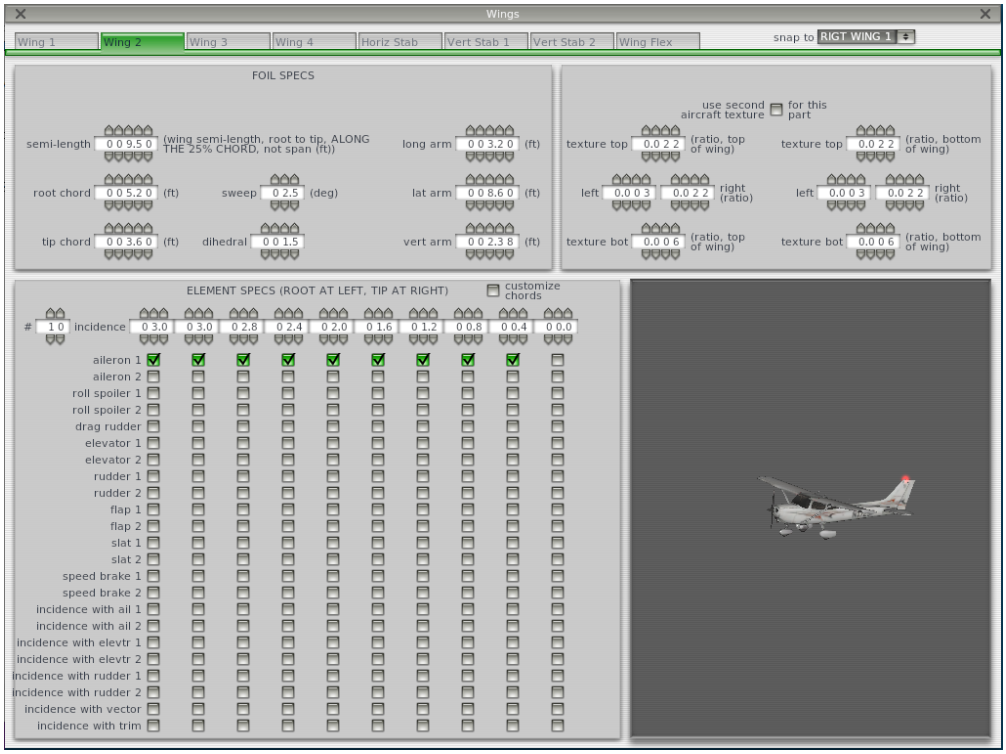

FRONT
BACK

WINGS

This first wing section is where the FLAPS are situated – green ticks

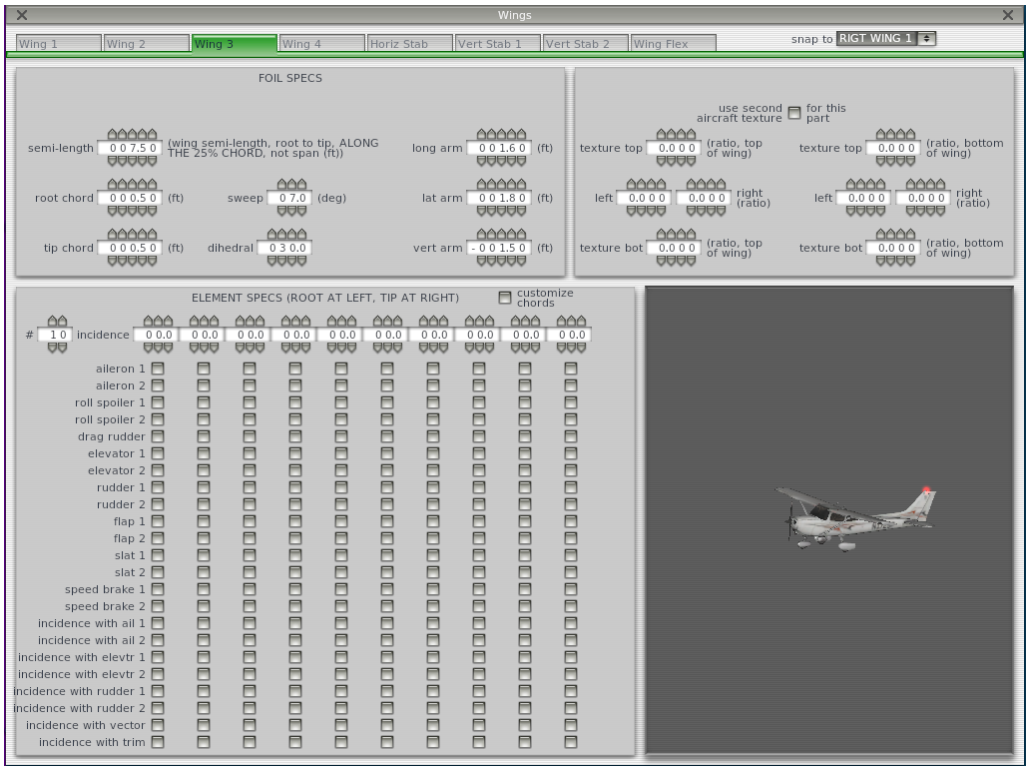


The second is where the ailerons are

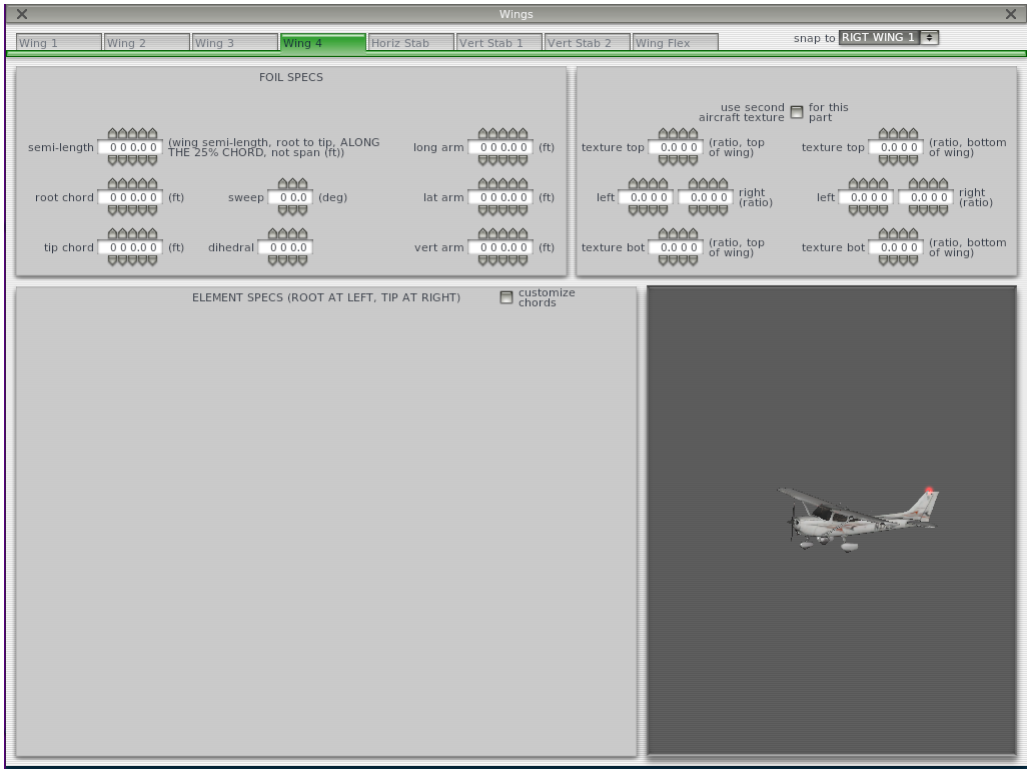


Wing 3 is the STRUT under the wings – they join on to Fuselage

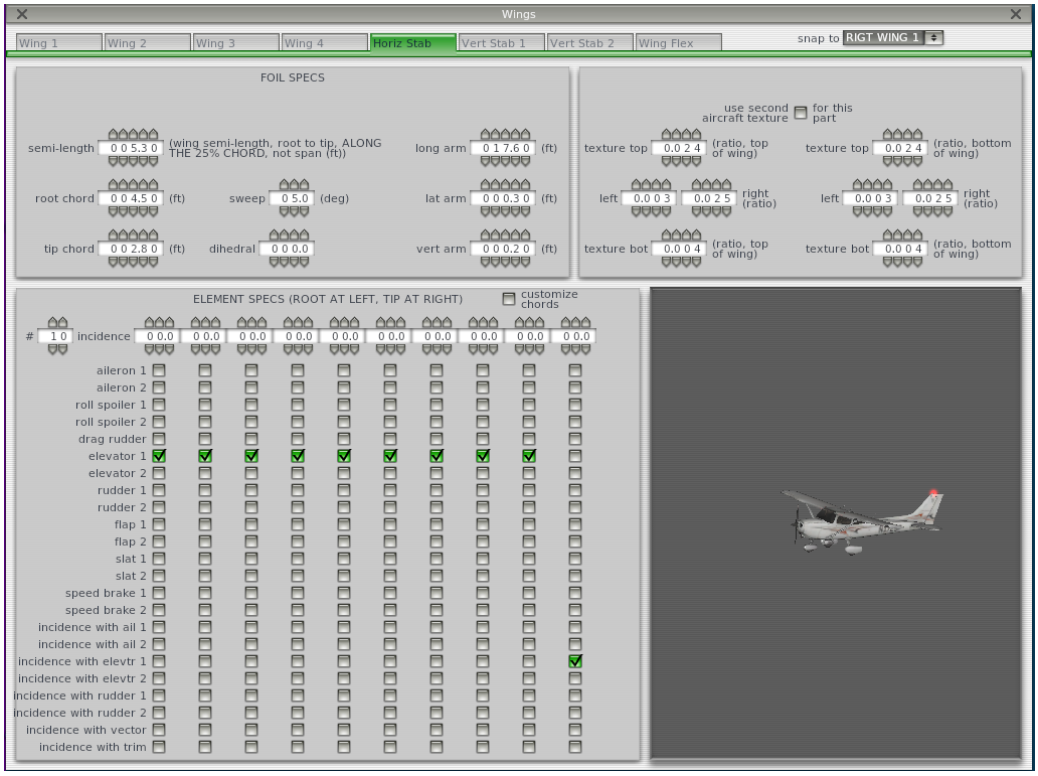
WING 3

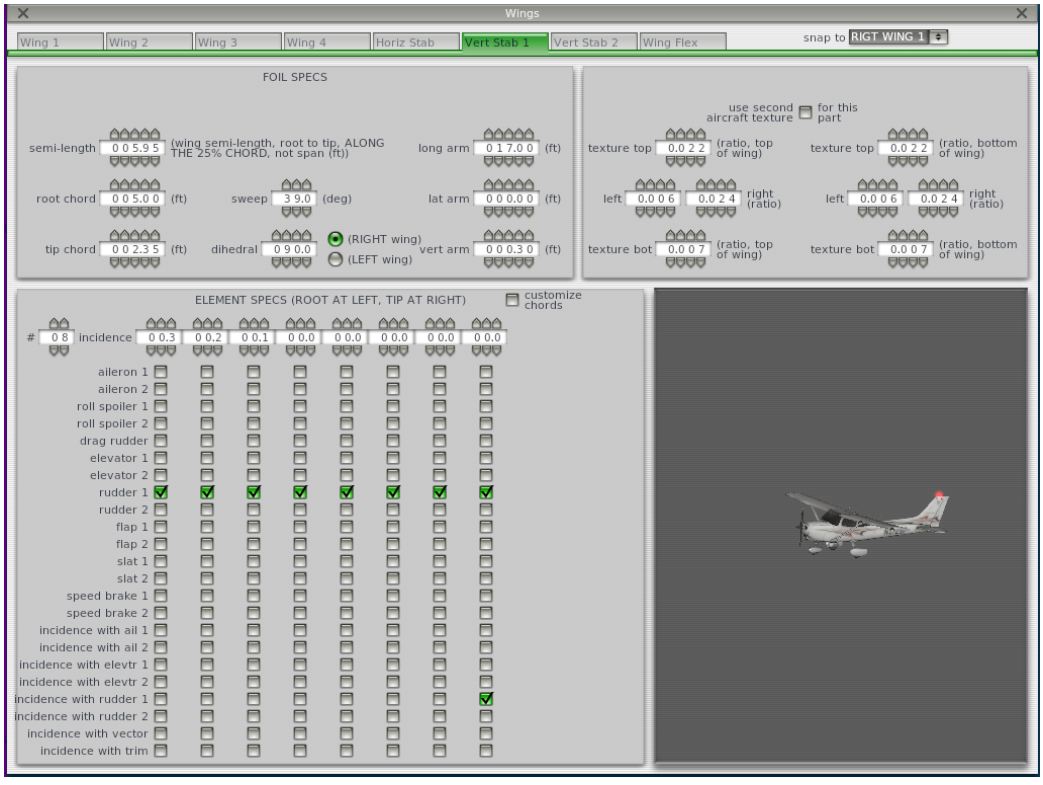


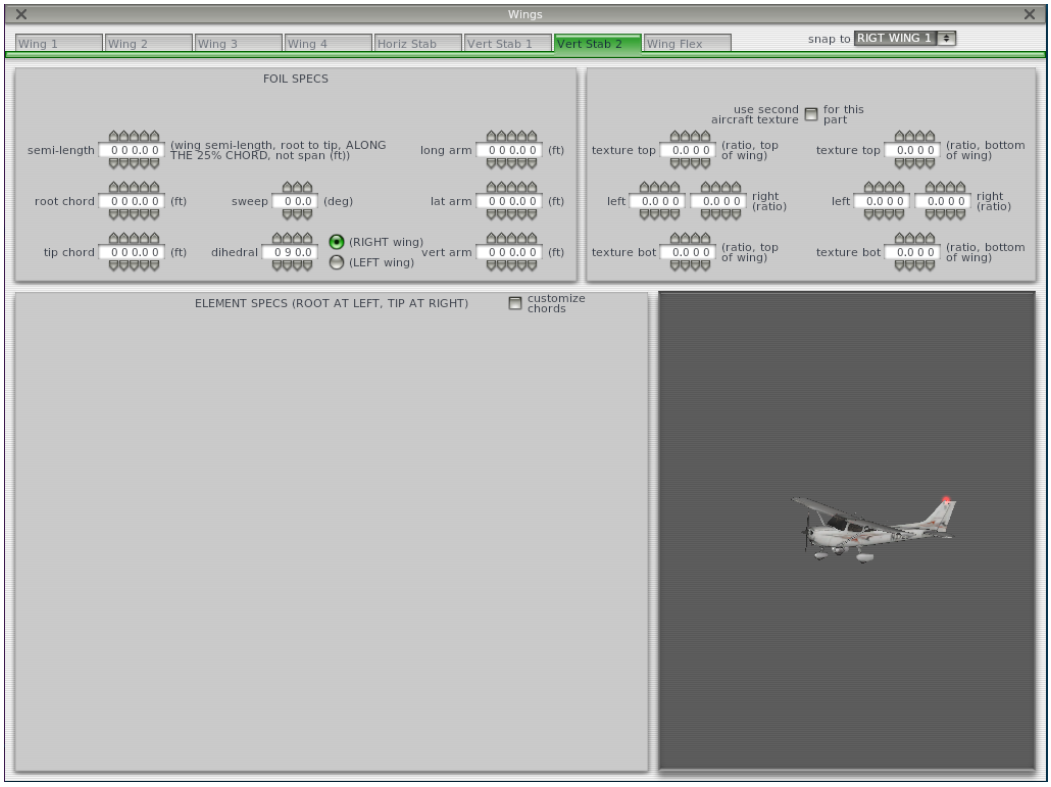
There is no wing 4..



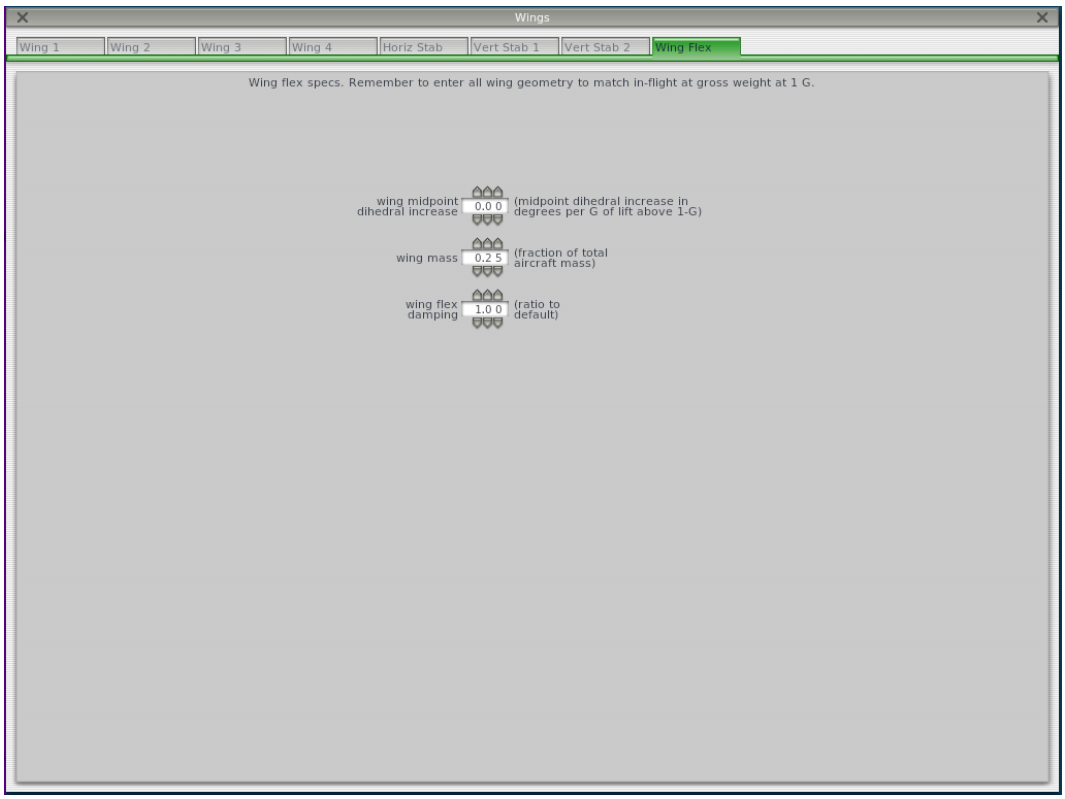
HORIZONTAL STAB.


Wings
Wing 1
Wing 2
Wing 3
Wing 4
Horiz Stab
Vert Stab 1
Vert Stab 2
Wing Flex
snap to RIGT WING 1
FOIL SPECS
semi-length 0 0 5.3 0 (wing semi-length, root to tip, ALONG THE 25% CHORD, not span (ft))
long arm 0 1 7.6 0 (ft)
root chord 0 0 4.5 0 (ft)
sweep 0 5.0 (deg)
lat arm 0 0 0.3 0 (ft)
tip chord 0 0 2.8 0 (ft)
dihedral 0 0 0.0
vert arm 0 0 0.2 0 (ft)
use second aircraft texture for this part
texture top 0.0 2 4 (ratio, top of wing)
texture top 0.0 2 4 (ratio, bottom of wing)
left 0.0 0 3 0.0 2 5 right (ratio)
left 0.0 0 3 0.0 2 5 right (ratio)
texture bot 0.0 0 4 (ratio, top of wing)
texture bot 0.0 0 4 (ratio, bottom of wing)
ELEMENT SPECS (ROOT AT LEFT, TIP AT RIGHT)
customize chords
1 0 incidence 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0
aileron 1
aileron 2
roll spoiler 1
roll spoiler 2
drag rudder
elevator 1
elevator 2
rudder 1
rudder 2
flap 1
flap 2
slat 1
slat 2
speed brake 1
speed brake 2
incidence with ail 1
incidence with ail 2
incidence with elevtr 1
incidence with elevtr 2
incidence with rudder 1
incidence with rudder 2
incidence with vector
incidence with trim

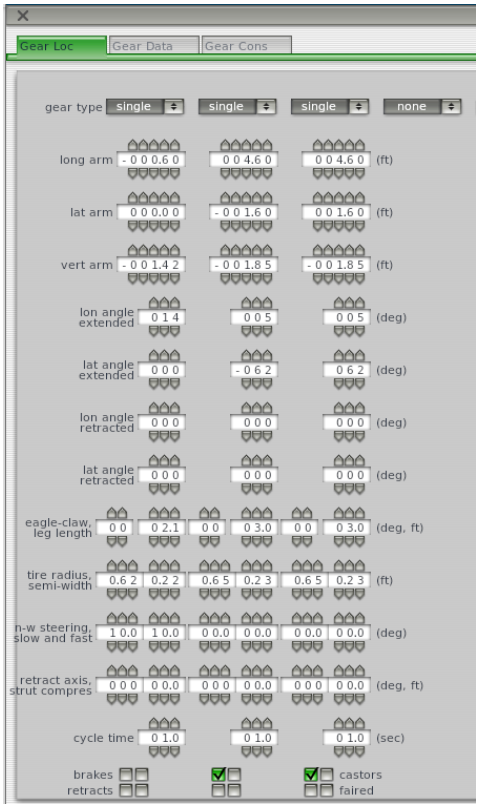

Wings
Wing 1
Wing 2
Wing 3
Wing 4
Horiz Stab
Vert Stab 1
Vert Stab 2
Wing Flex
snap to RIGT WING 1
FOIL SPECS
semi-length 0 0 5.9 5 (wing semi-length, root to tip, ALONG THE 25% CHORD, not span (ft))
long arm 0 1 7.0 0 (ft)
root chord 0 0 5.0 0 (ft)
sweep 3 9.0 (deg)
lat arm 0 0 0.0 0 (ft)
tip chord 0 0 2.3 5 (ft)
dihedral 0 9 0.0
(RIGHT wing)
(LEFT wing)
vert arm 0 0 0.3 0 (ft)
use second aircraft texture for this part
texture top 0.0 2 2 (ratio, top of wing)
texture top 0.0 2 2 (ratio, bottom of wing)
left 0.0 0 6 0.0 2 4 right (ratio)
left 0.0 0 6 0.0 2 4 right (ratio)
texture bot 0.0 0 7 (ratio, top of wing)
texture bot 0.0 0 7 (ratio, bottom of wing)
ELEMENT SPECS (ROOT AT LEFT, TIP AT RIGHT)
customize chords
0 8 incidence 0 0.3 0 0.2 0 0.1 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0
aileron 1
aileron 2
roll spoiler 1
roll spoiler 2
drag rudder
elevator 1
elevator 2
rudder 1
rudder 2
flap 1
flap 2
slat 1
slat 2
speed brake 1
speed brake 2
incidence with ail 1
incidence with ail 2
incidence with elevtr 1
incidence with elevtr 2
incidence with rudder 1
incidence with rudder 2
incidence with vector
incidence with trim

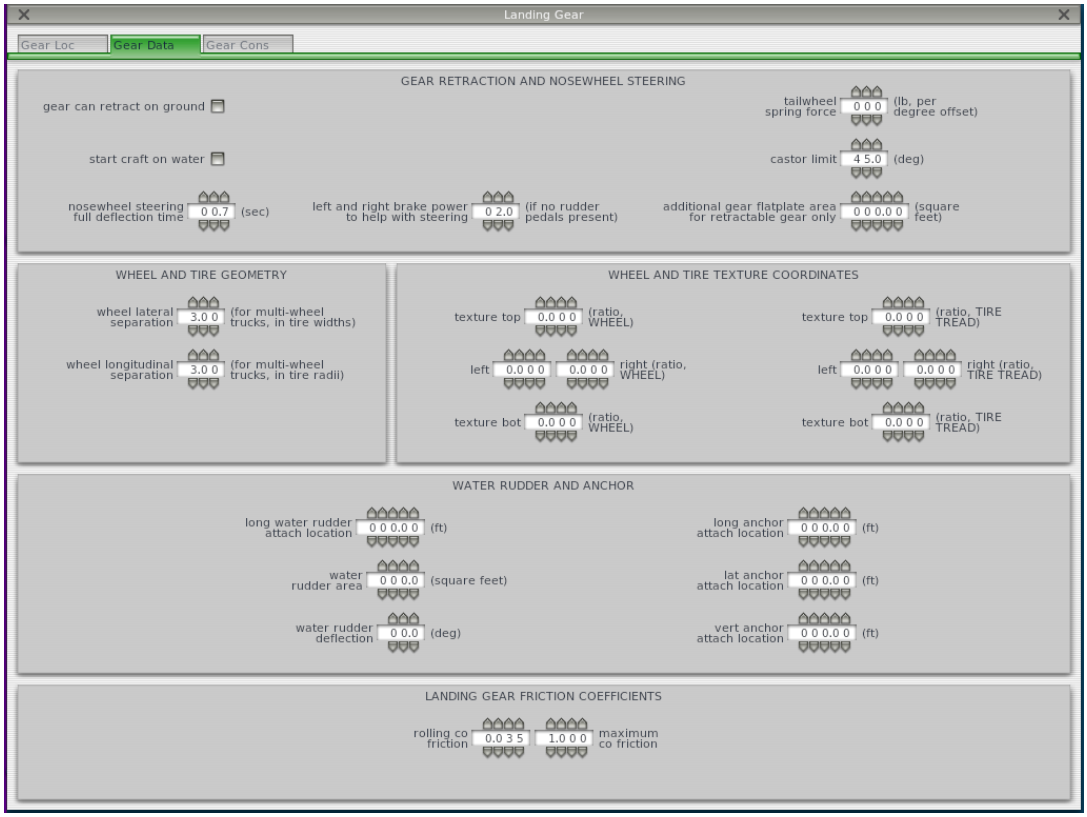


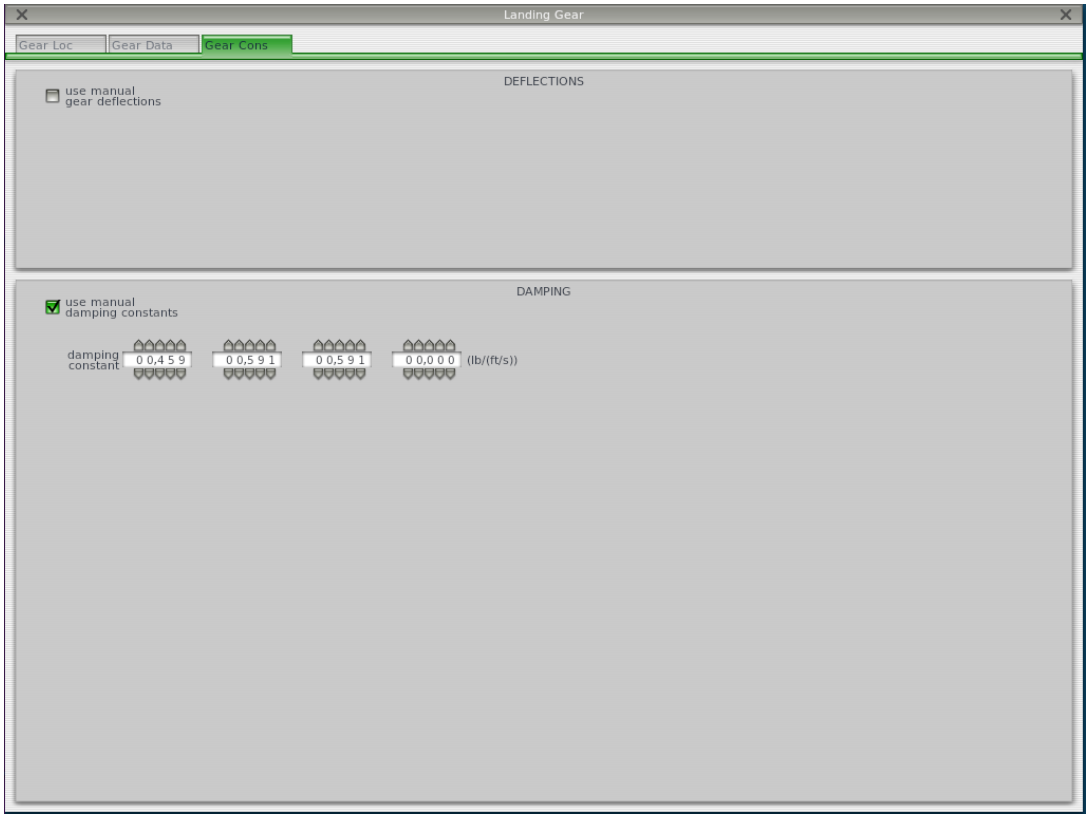
Wing flex



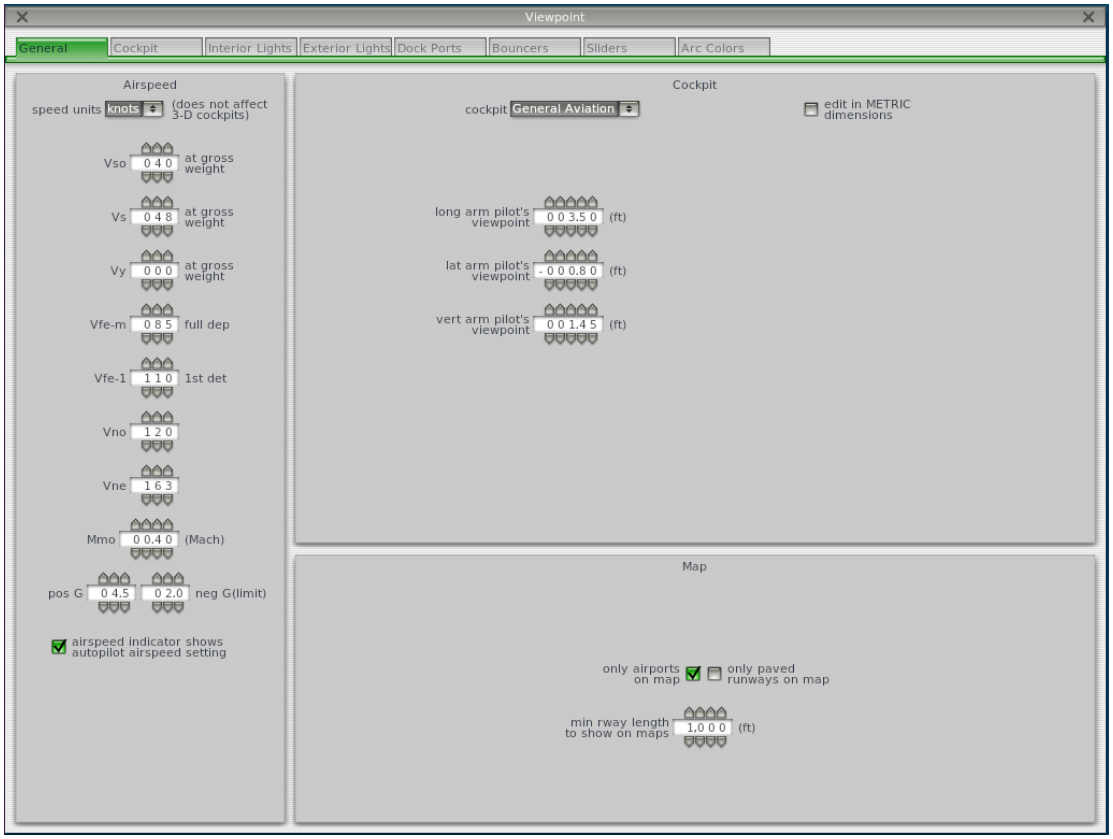
Landing gear.

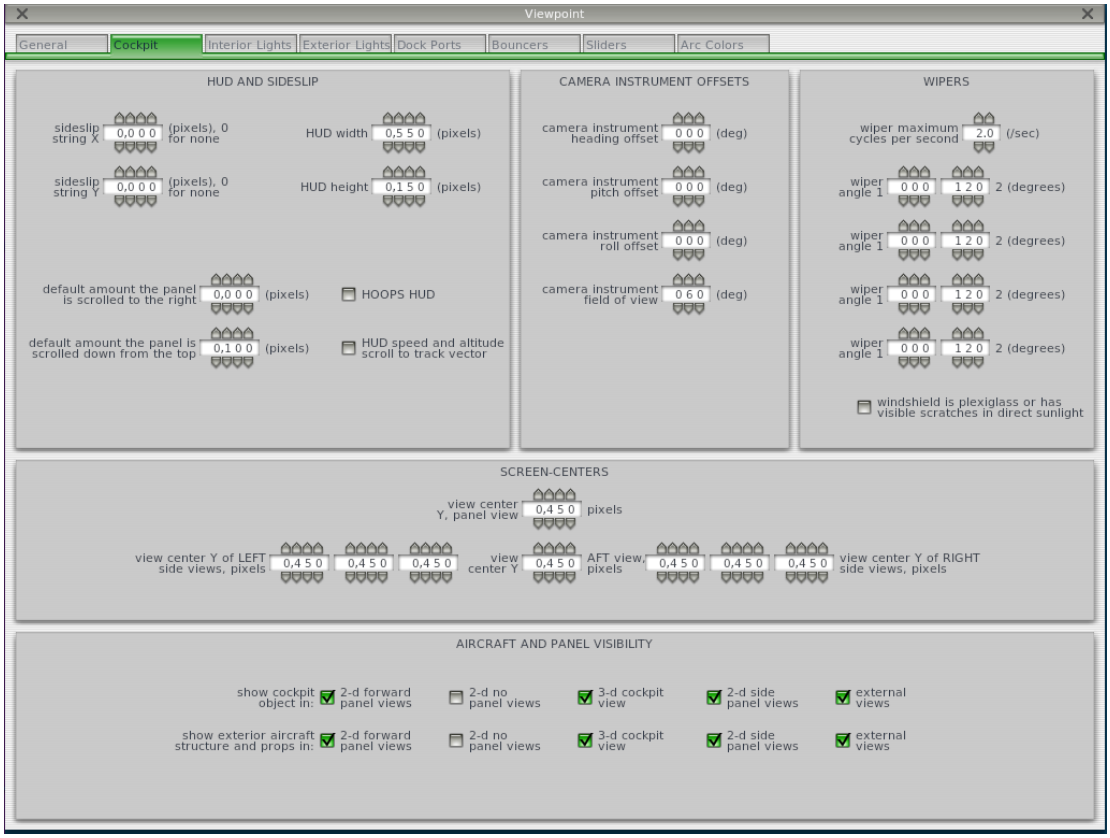

Gear Loc
Gear Data
Gear Cons
gear type
single
single
single
none
long arm
- 0 0 0.6 0
0 0 4.6 0
0 0 4.6 0
(ft)
lat arm
0 0 0.0 0
- 0 0 1.6 0
0 0 1.6 0
(ft)
vert arm
- 0 0 1.4 2
- 0 0 1.8 5
- 0 0 1.8 5
(ft)
lon angle extended
0 1 4
0 0 5
0 0 5
(deg)
lat angle extended
0 0 0
- 0 6 2
0 6 2
(deg)
lon angle retracted
0 0 0
0 0 0
0 0 0
(deg)
lat angle retracted
0 0 0
0 0 0
0 0 0
(deg)
eagle-claw, leg length
0 0
0 2.1
0 0
0 3.0
0 0
0 3.0
(deg, ft)
tire radius, semi-width
0.6 2
0.2 2
0.6 5
0.2 3
0.6 5
0.2 3
(ft)
n-w steering, slow and fast
1 0.0
1 0.0
0 0.0
0 0.0
0 0.0
0 0.0
(deg)
retract axis, strut compres
0 0 0
0 0.0
0 0 0
0 0.0
0 0 0
0 0.0
(deg, ft)
cycle time
0 1.0
0 1.0
0 1.0
(sec)
brakes
retracts
castors
faired


Landing Gear
Gear Loc
Gear Data
Gear Cons
GEAR RETRACTION AND NOSEWHEEL STEERING
gear can retract on ground
start craft on water
nosewheel steering full deflection time
0 0.7
(sec)
left and right brake power to help with steering
0 2.0
(if no rudder pedals present)
tailwheel spring force
0 0 0
(lb. per degree offset)
castor limit
4 5.0
(deg)
additional gear flatplate area for retractable gear only
0 0 0.0 0
(square feet)
WHEEL AND TIRE GEOMETRY
wheel lateral separation
3.0 0
(for multi-wheel trucks, in tire widths)
wheel longitudinal separation
3.0 0
(for multi-wheel trucks, in tire radii)
WHEEL AND TIRE TEXTURE COORDINATES
texture top
0.0 0 0
(ratio, WHEEL)
left
0.0 0 0
0.0 0 0
right (ratio, WHEEL)
texture bot
0.0 0 0
(ratio, WHEEL)
texture top
0.0 0 0
(ratio, TIRE TREAD)
left
0.0 0 0
0.0 0 0
right (ratio, TIRE TREAD)
texture bot
0.0 0 0
(ratio, TIRE TREAD)
WATER RUDDER AND ANCHOR
long water rudder attach location
0 0 0.0 0
(ft)
water rudder area
0 0 0.0
(square feet)
water rudder deflection
0 0.0
(deg)
long anchor attach location
0 0 0.0 0
(ft)
lat anchor attach location
0 0 0.0 0
(ft)
vert anchor attach location
0 0 0.0 0
(ft)
LANDING GEAR FRICTION COEFFICIENTS
rolling co friction
0.0 3 5
1.0 0 0
maximum co friction

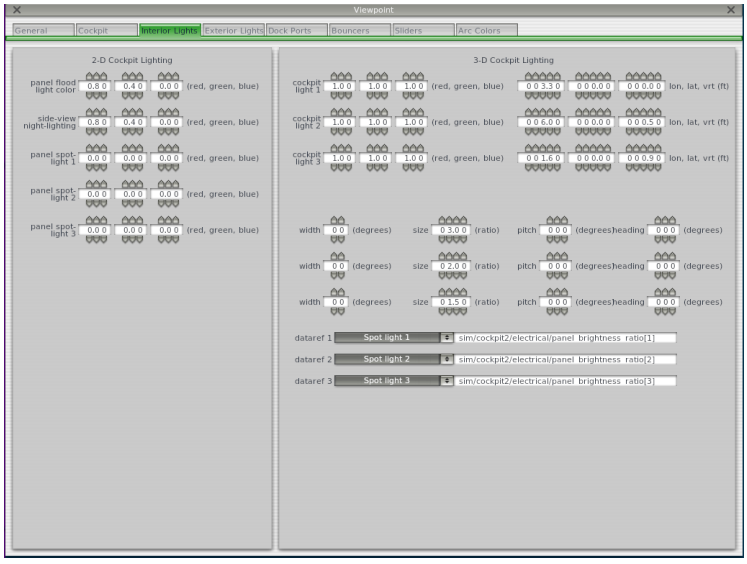


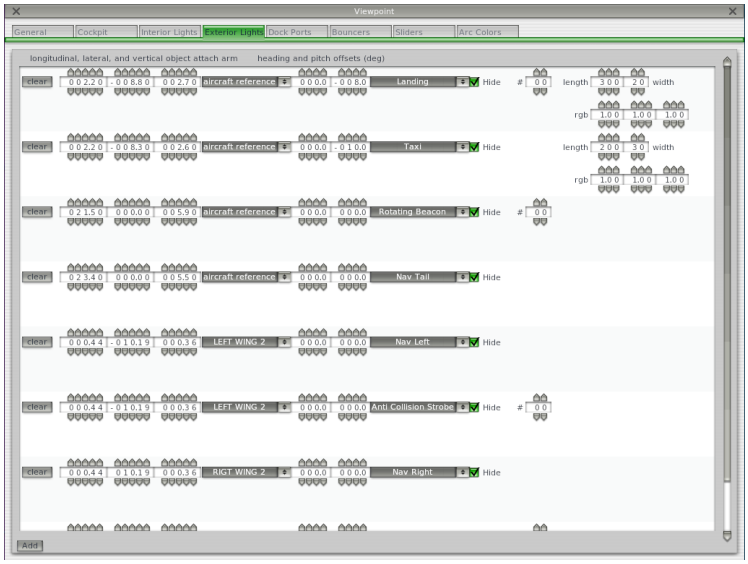
NOW THE VIEWPORT SECTION IN THE STANDARDS TAB

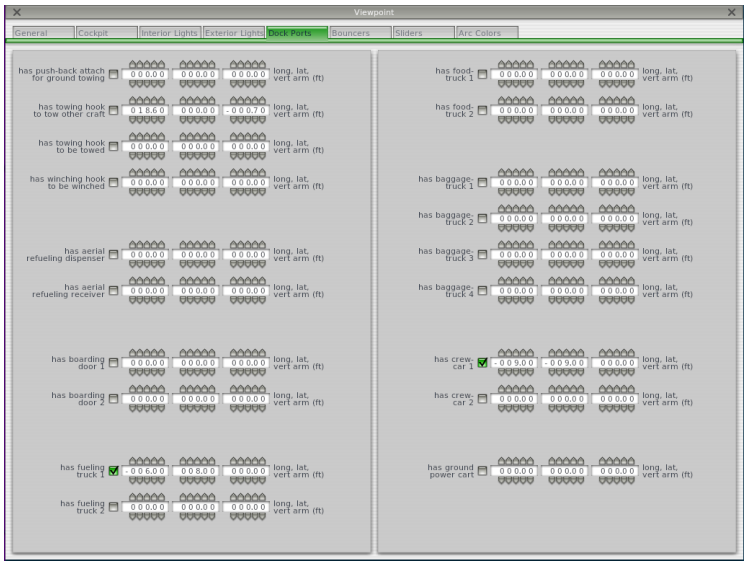




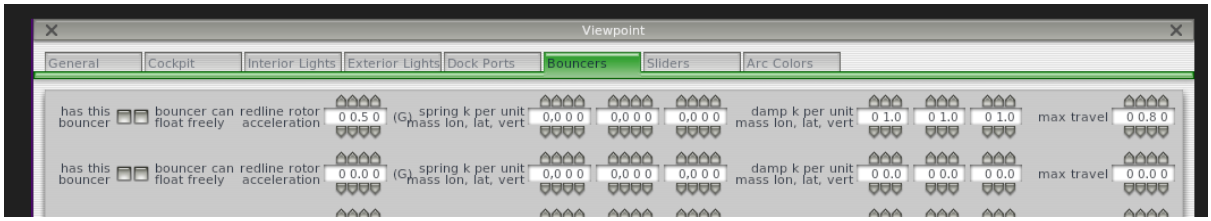
THESE NEXT THREE ARE NOT ESSENTIAL





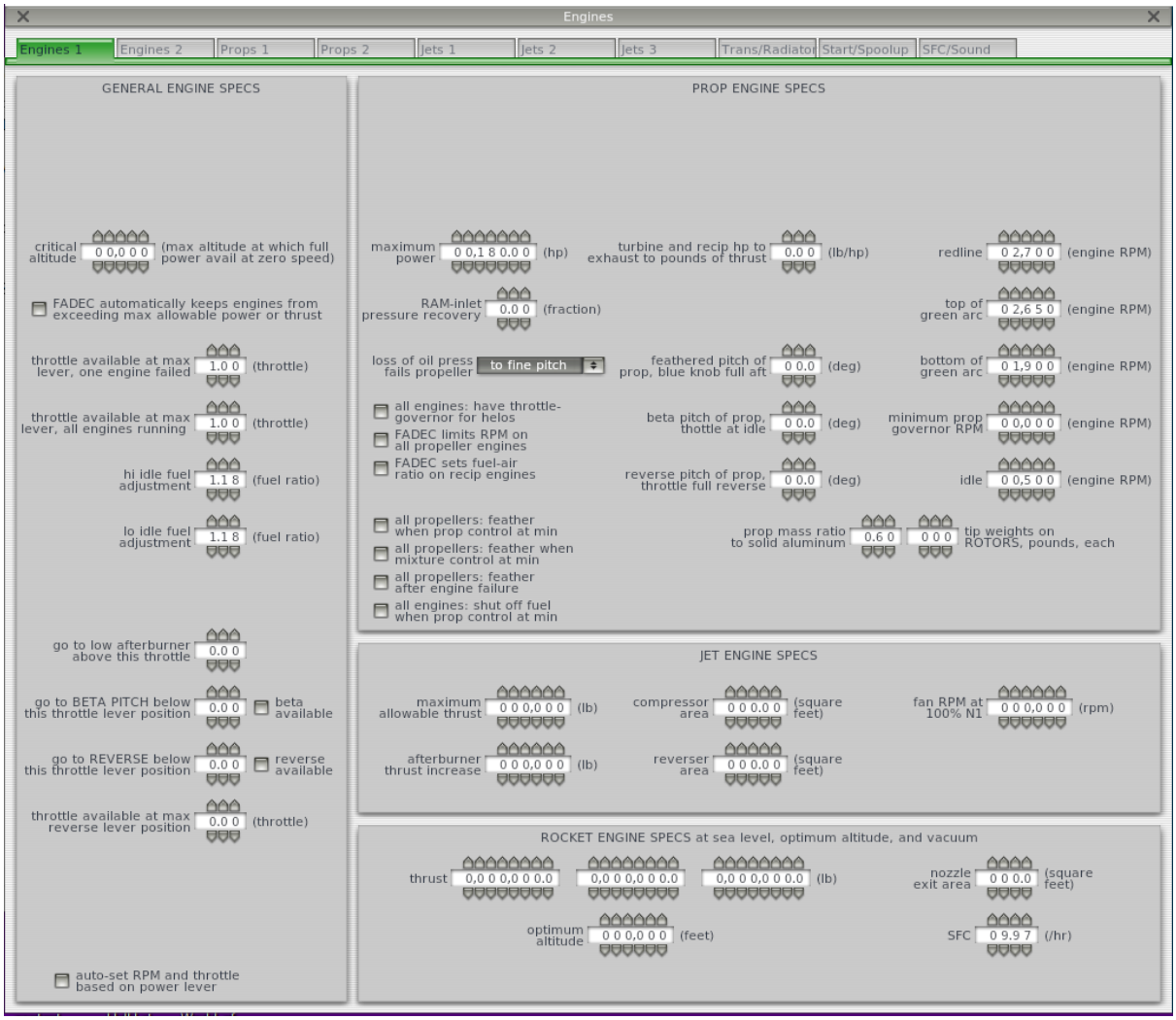


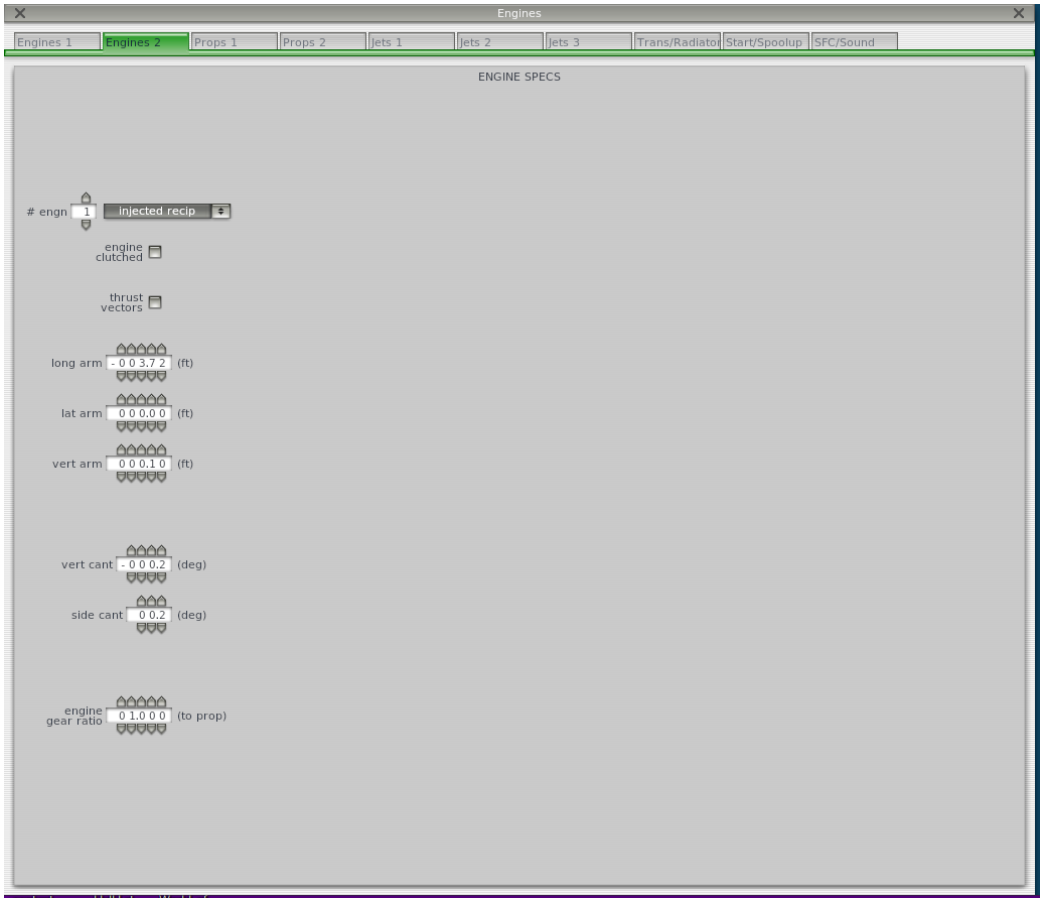
Bouncers tab – just the top line

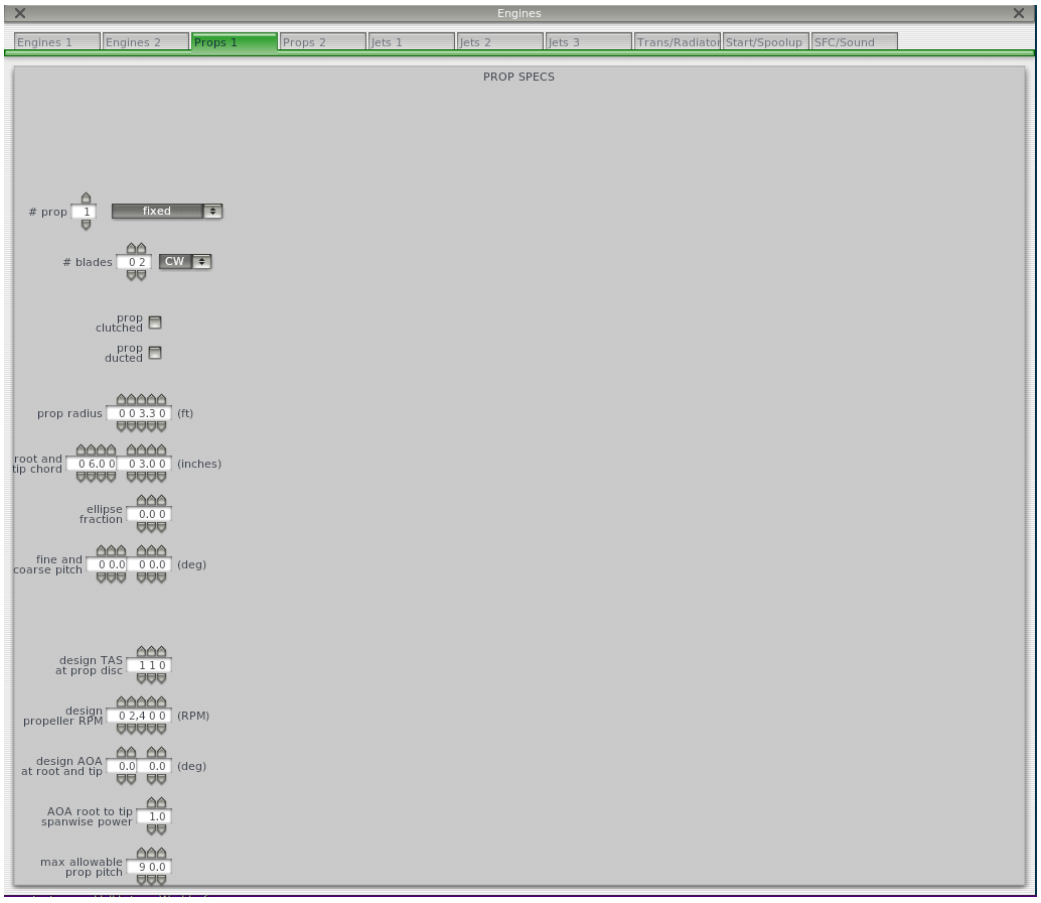


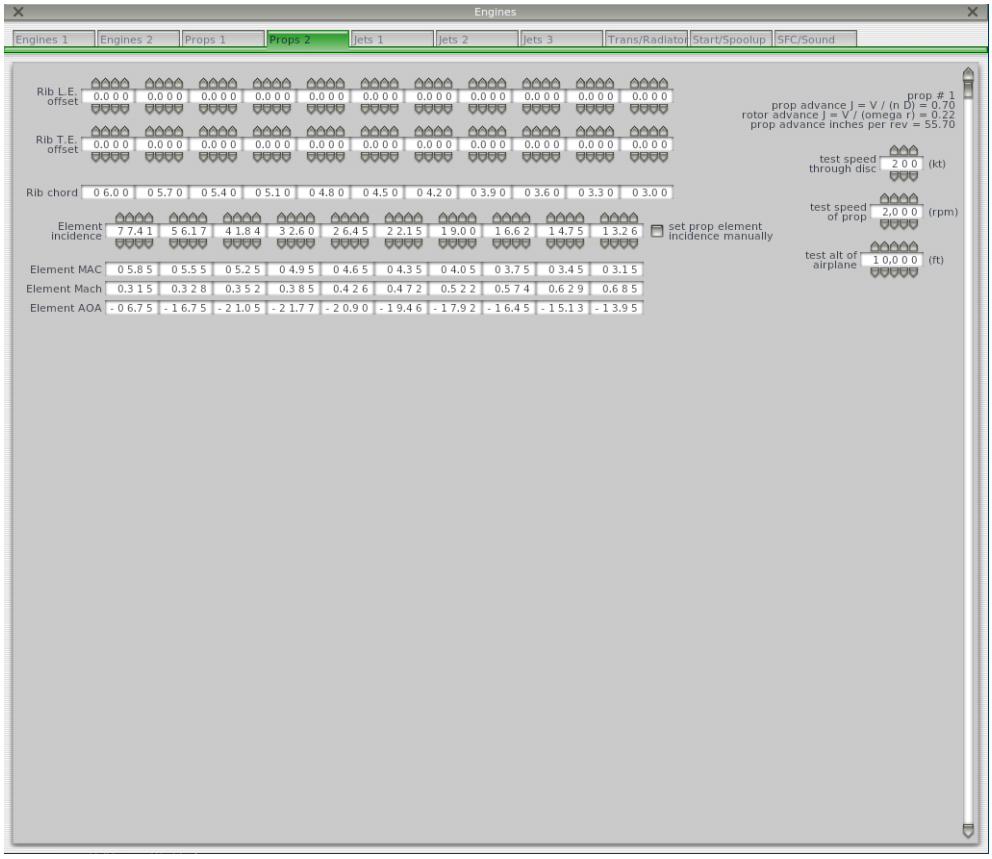
Sliders and ARC Colours can be ignored

ENGINE SPECS

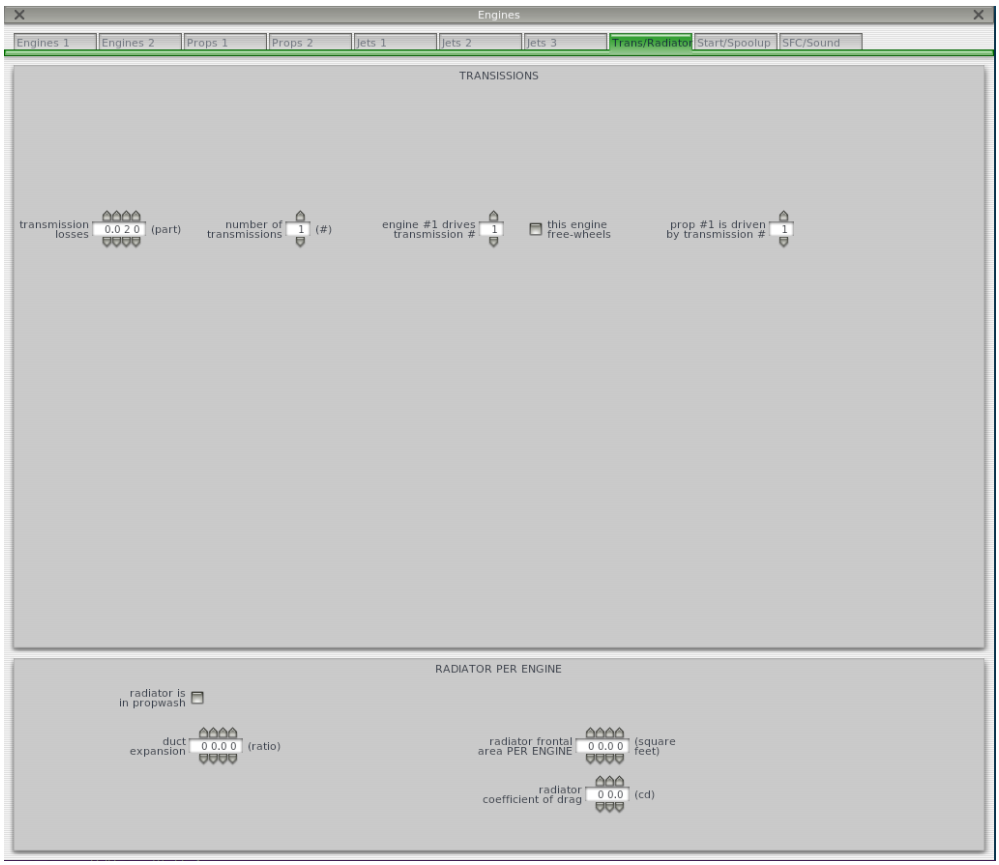

Engines
Engines 1
Engines 2
Props 1
Props 2
Jets 1
Jets 2
Jets 3
Trans/Radiator
Start/Spoolup
SFC/Sound
GENERAL ENGINE SPECS
critical altitude 0 0,0 0 0 (max altitude at which full power avail at zero speed)
FADEC automatically keeps engines from exceeding max allowable power or thrust
throttle available at max lever, one engine failed 1.0 0 (throttle)
throttle available at max lever, all engines running 1.0 0 (throttle)
hi idle fuel adjustment 1.1 8 (fuel ratio)
lo idle fuel adjustment 1.1 8 (fuel ratio)
go to low afterburner above this throttle 0.0 0
go to BETA PITCH below this throttle lever position 0.0 0 beta available
go to REVERSE below this throttle lever position 0.0 0 reverse available
throttle available at max reverse lever position 0.0 0 (throttle)
auto-set RPM and throttle based on power lever
PROP ENGINE SPECS
maximum power 0 0,1 8 0.0 0 (hp)
turbine and recip hp to exhaust to pounds of thrust 0.0 0 (lb/hp)
redline 0 2,7 0 0 (engine RPM)
RAM-inlet pressure recovery 0.0 0 (fraction)
top of green arc 0 2,6 5 0 (engine RPM)
loss of oil press fails propeller to fine pitch
feathered pitch of prop, blue knob full aft 0 0.0 (deg)
bottom of green arc 0 1,9 0 0 (engine RPM)
all engines: have throttle-governor for helos
FADEC limits RPM on all propeller engines
FADEC sets fuel-air ratio on recip engines
beta pitch of prop, thottle at idle 0 0.0 (deg)
minimum prop governor RPM 0 0,0 0 0 (engine RPM)
reverse pitch of prop, throttle full reverse 0 0.0 (deg)
idle 0 0,5 0 0 (engine RPM)
all propellers: feather when prop control at min
all propellers: feather when mixture control at min
all propellers: feather after engine failure
all engines: shut off fuel when prop control at min
prop mass ratio to solid aluminum 0.6 0 0 0 0 tip weights on ROTORS, pounds, each
JET ENGINE SPECS
maximum allowable thrust 0 0 0,0 0 0 (lb)
compressor area 0 0 0.0 0 (square feet)
fan RPM at 100% N1 0 0 0,0 0 0 (rpm)
afterburner thrust increase 0 0 0,0 0 0 (lb)
reverser area 0 0 0.0 0 (square feet)
ROCKET ENGINE SPECS at sea level, optimum altitude, and vacuum
thrust 0,0 0 0,0 0 0.0
0,0 0 0,0 0 0.0
0,0 0 0,0 0 0.0 (lb)
nozzle exit area 0 0 0.0 (square feet)
optimum altitude 0 0 0,0 0 0 (feet)
SFC 0 9.9 7 (/hr)

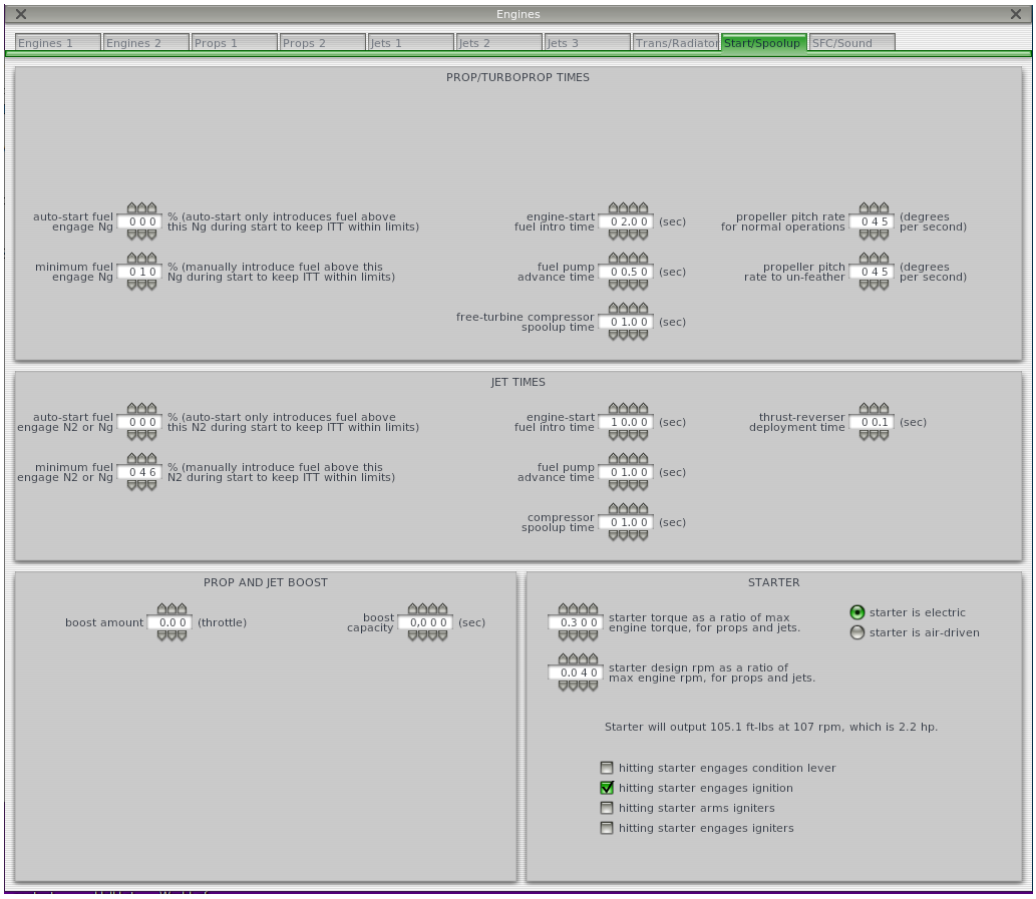

Engines
Engines 1
Engines 2
Props 1
Props 2
Jets 1
Jets 2
Jets 3
Trans/Radiator
Start/Spoolup
SFC/Sound
ENGINE SPECS
engn
1
injected recip
engine clutched
thrust vectors
long arm
- 0 0 3.7 2
(ft)
lat arm
0 0 0.0 0
(ft)
vert arm
0 0 0.1 0
(ft)
vert cant
- 0 0 0.2
(deg)
side cant
0 0.2
(deg)
engine gear ratio
0 1.0 0 0
(to prop)

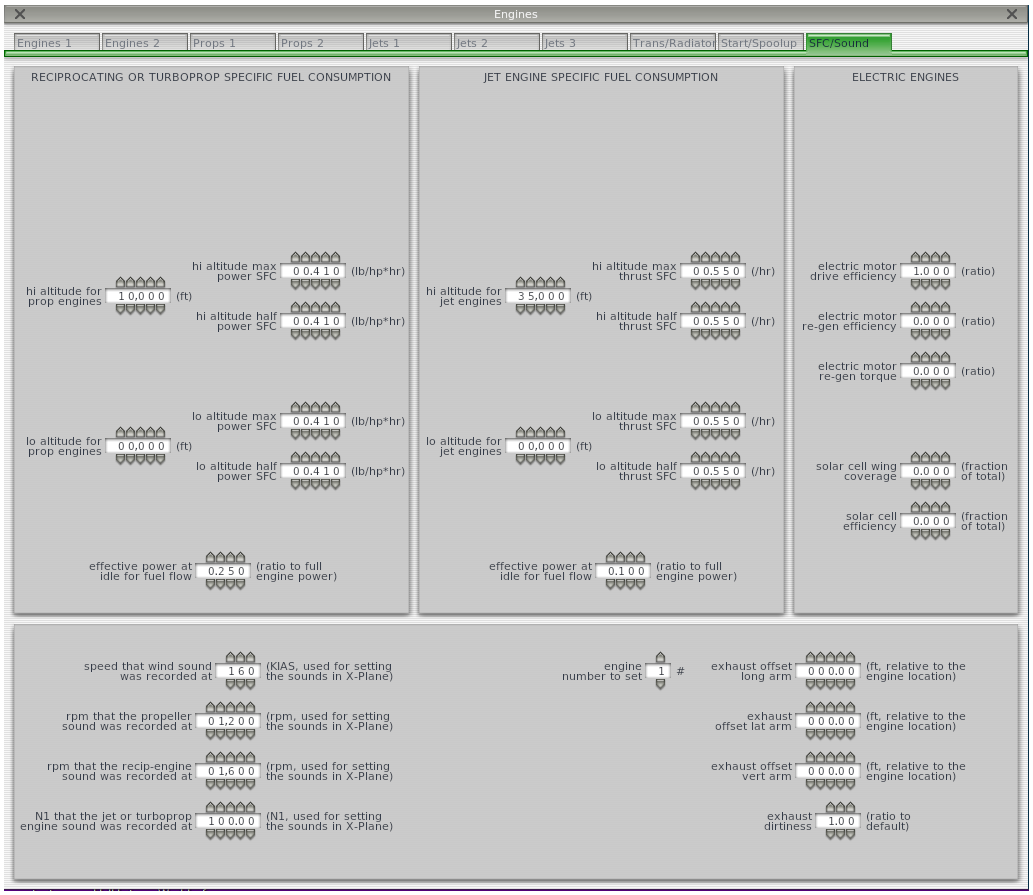

Engines
Engines 1
Engines 2
Props 1
Props 2
Jets 1
Jets 2
Jets 3
Trans/Radiator
Start/Spoolup
SFC/Sound
PROP SPECS
prop
1
fixed
blades
0 2
CW
prop clutched
prop ducted
prop radius
0 0 3.3 0
(ft)
root and tip chord
0 6.0 0
0 3.0 0
(inches)
ellipse fraction
0.0 0
fine and coarse pitch
0 0.0
0 0.0
(deg)
design TAS at prop disc
1 1 0
design propeller RPM
0 2,4 0 0
(RPM)
design AOA at root and tip
0.0
0.0
(deg)
AOA root to tip spanwise power
1.0
max allowable prop pitch
9 0.0



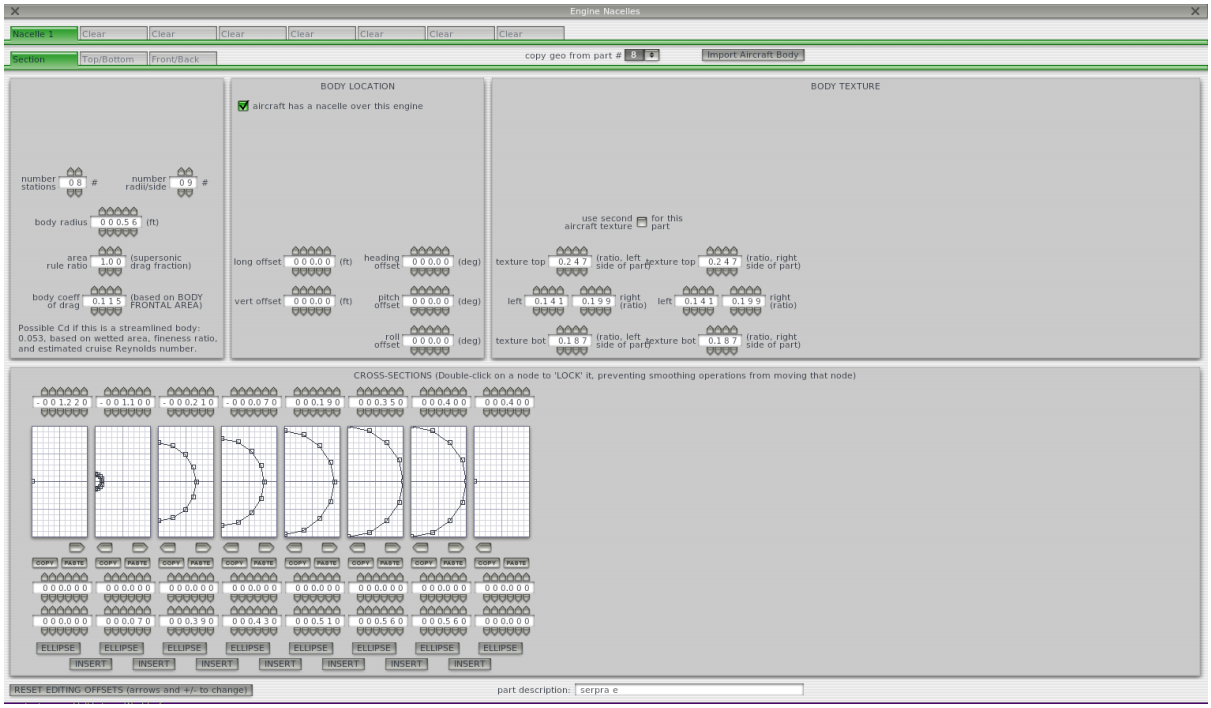
SOME OF THESE ABOVE NUMBERS WILL VARY AS YOU PROGRESS IN THE BUILD. THEY MIGHT BE UNEDITABLE AT THIS TIME

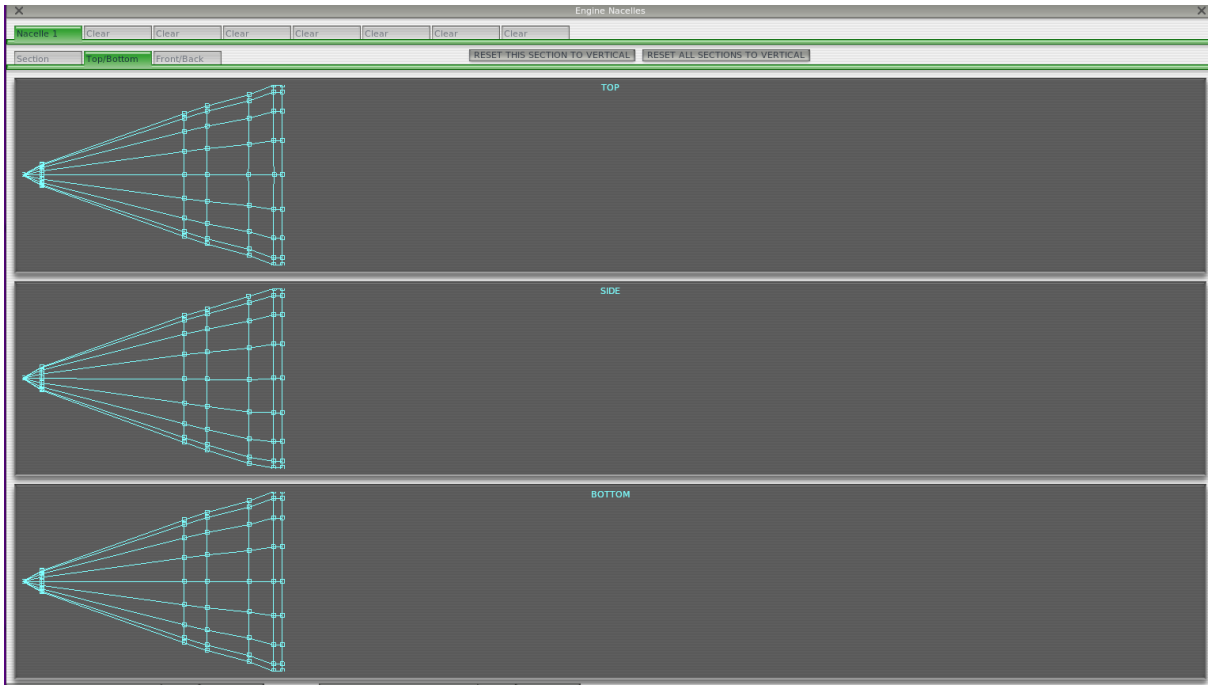



Engines
Engines 1
Engines 2
Props 1
Props 2
Jets 1
Jets 2
Jets 3
Trans/Radiator
Start/Spoolup
SFC/Sound
PROP/TURBOPROP TIMES
auto-start fuel engage Ng
0 0 0
% (auto-start only introduces fuel above this Ng during start to keep ITT within limits)
minimum fuel engage Ng
0 1 0
% (manually introduce fuel above this Ng during start to keep ITT within limits)
engine-start fuel intro time
0 2.0 0
(sec)
fuel pump advance time
0 0.5 0
(sec)
free-turbine compressor spoolup time
0 1.0 0
(sec)
propeller pitch rate for normal operations
0 4 5
(degrees per second)
propeller pitch rate to un-feather
0 4 5
(degrees per second)
JET TIMES
auto-start fuel engage N2 or Ng
0 0 0
% (auto-start only introduces fuel above this N2 during start to keep ITT within limits)
minimum fuel engage N2 or Ng
0 4 6
% (manually introduce fuel above this N2 during start to keep ITT within limits)
engine-start fuel intro time
1 0.0 0
(sec)
fuel pump advance time
0 1.0 0
(sec)
compressor spoolup time
0 1.0 0
(sec)
thrust-reverser deployment time
0 0.1
(sec)
PROP AND JET BOOST
boost amount
0.0 0
(throttle)
boost capacity
0,0 0 0
(sec)
STARTER
0.3 0 0
starter torque as a ratio of max engine torque, for props and jets.
0.0 4 0
starter design rpm as a ratio of max engine rpm, for props and jets.
starter is electric
starter is air-driven
Starter will output 105.1 ft-lbs at 107 rpm, which is 2.2 hp.
hitting starter engages condition lever
hitting starter engages ignition
hitting starter arms igniters
hitting starter engages igniters

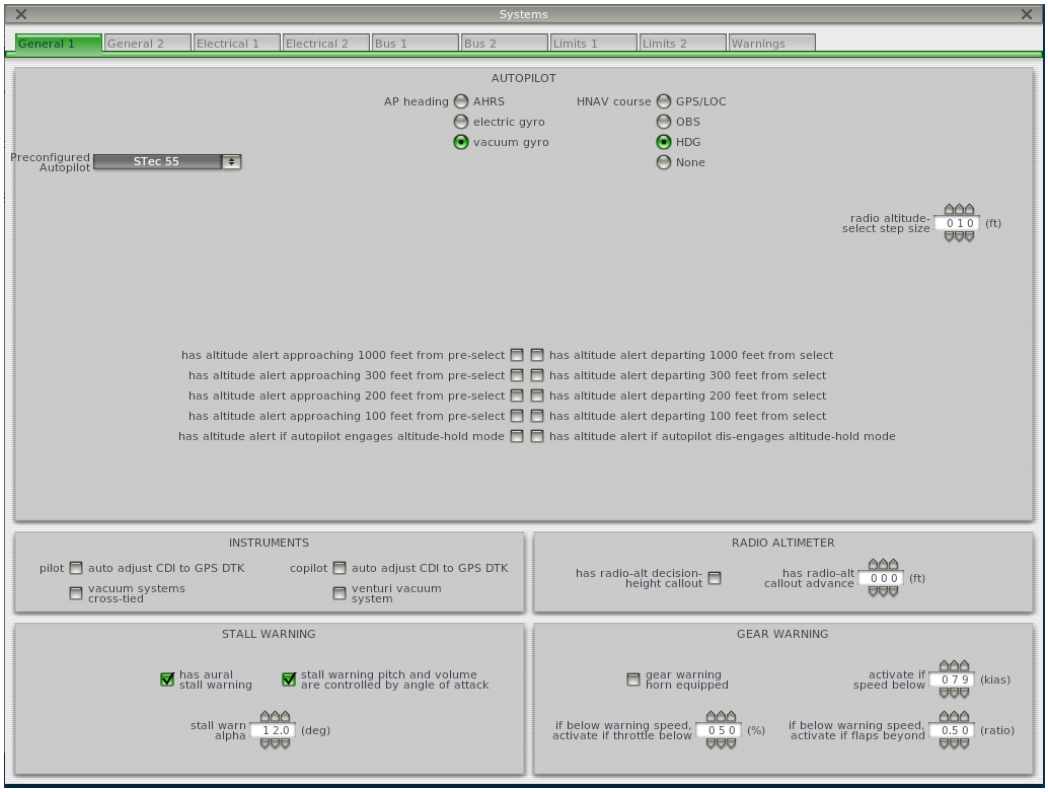

Engines
Engines 1
Engines 2
Props 1
Props 2
Jets 1
Jets 2
Jets 3
Trans/Radiator
Start/Spoolup
SFC/Sound
RECIPROCATING OR TURBOPROP SPECIFIC FUEL CONSUMPTION
hi altitude for prop engines
1 0,0 0 0
(ft)
hi altitude max power SFC
0 0.4 1 0
(lb/hp*hr)
hi altitude half power SFC
0 0.4 1 0
(lb/hp*hr)
lo altitude for prop engines
0 0,0 0 0
(ft)
lo altitude max power SFC
0 0.4 1 0
(lb/hp*hr)
lo altitude half power SFC
0 0.4 1 0
(lb/hp*hr)
effective power at idle for fuel flow
0.2 5 0
(ratio to full engine power)
JET ENGINE SPECIFIC FUEL CONSUMPTION
hi altitude for jet engines
3 5,0 0 0
(ft)
hi altitude max thrust SFC
0 0.5 5 0
(/hr)
hi altitude half thrust SFC
0 0.5 5 0
(/hr)
lo altitude for jet engines
0 0,0 0 0
(ft)
lo altitude max thrust SFC
0 0.5 5 0
(/hr)
lo altitude half thrust SFC
0 0.5 5 0
(/hr)
effective power at idle for fuel flow
0.1 0 0
(ratio to full engine power)
ELECTRIC ENGINES
electric motor drive efficiency
1.0 0 0
(ratio)
electric motor re-gen efficiency
0.0 0 0
(ratio)
electric motor re-gen torque
0.0 0 0
(ratio)
solar cell wing coverage
0.0 0 0
(fraction of total)
solar cell efficiency
0.0 0 0
(fraction of total)
speed that wind sound was recorded at
1 6 0
(KIAS, used for setting the sounds in X-Plane)
rpm that the propeller sound was recorded at
0 1,2 0 0
(rpm, used for setting the sounds in X-Plane)
rpm that the recip-engine sound was recorded at
0 1,6 0 0
(rpm, used for setting the sounds in X-Plane)
N1 that the jet or turboprop engine sound was recorded at
1 0 0.0 0
(N1, used for setting the sounds in X-Plane)
engine number to set
1
#
exhaust offset long arm
0 0 0.0 0
(ft, relative to the engine location)
exhaust offset lat arm
0 0 0.0 0
(ft, relative to the engine location)
exhaust offset vert arm
0 0 0.0 0
(ft, relative to the engine location)
exhaust dirtiness
1.0 0
(ratio to default)

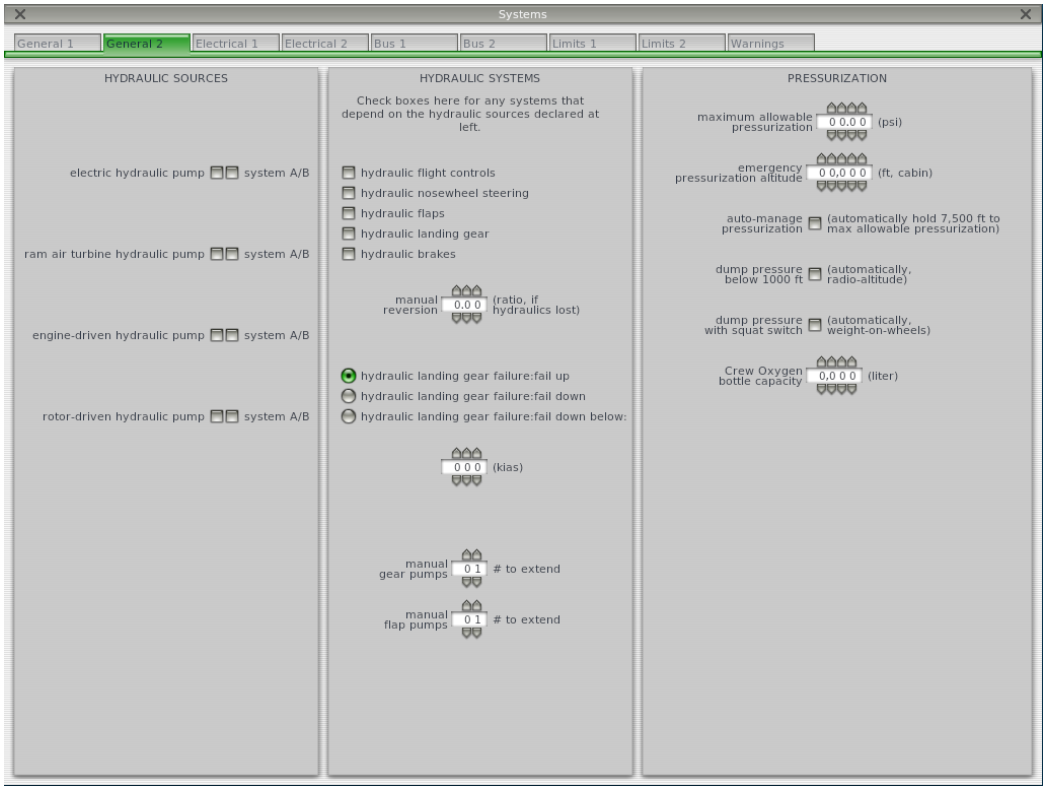
ENGINE NACELLE – TRY THE “ELLIPSE” FUNCTION



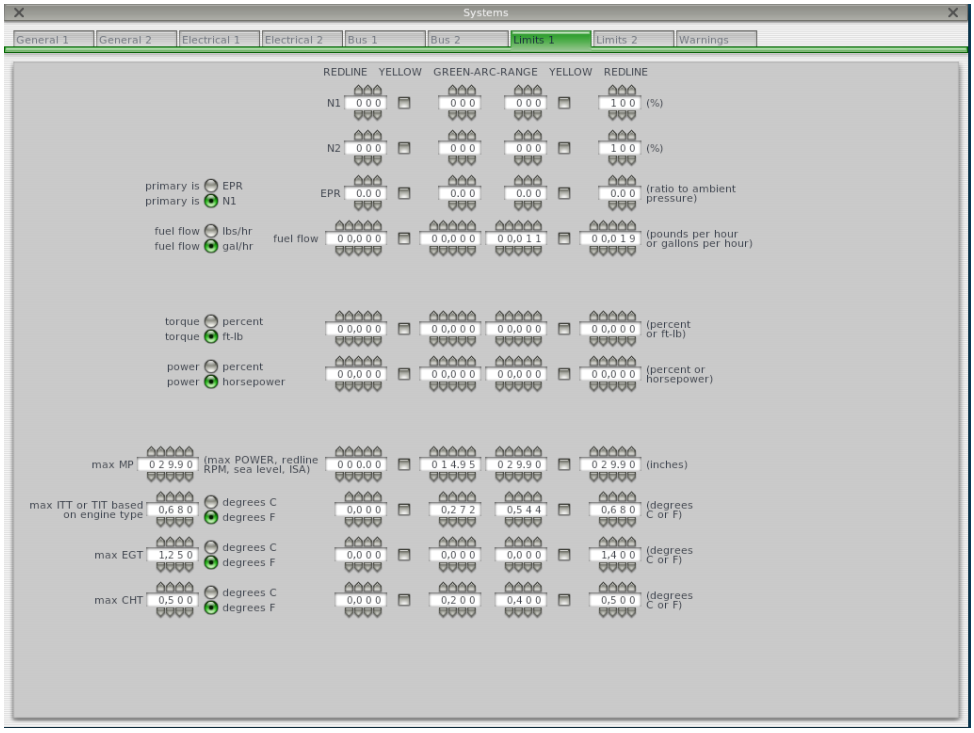


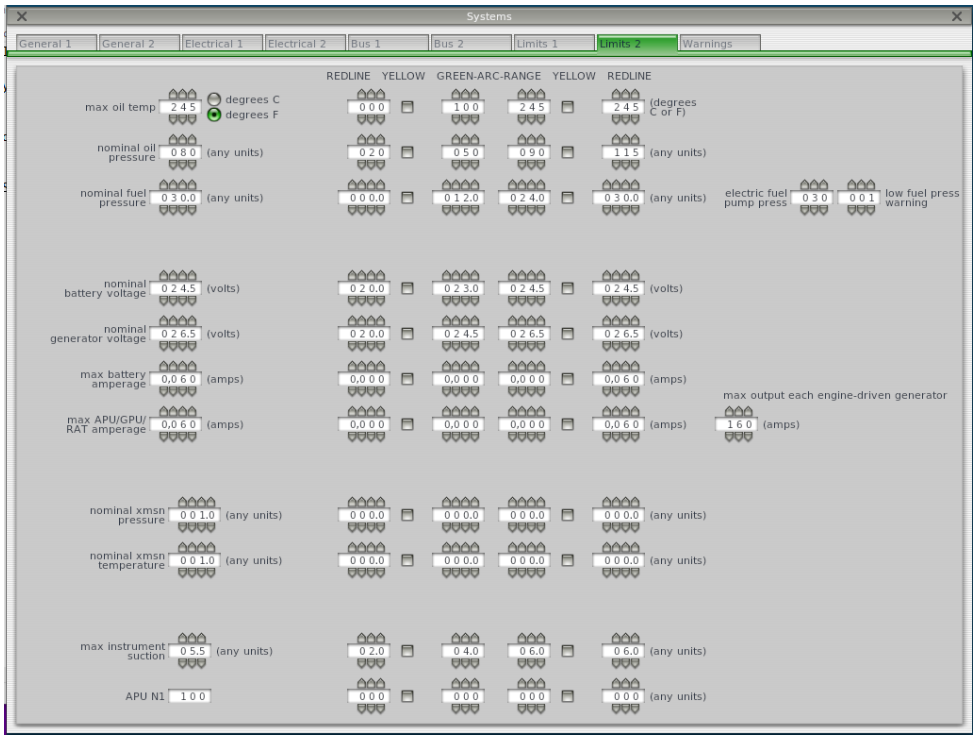
SYSTEMS TAB





GO TO LIMITS 1 AND 2 TAB





WARNINGS TAB IS NOT REQUIRED.

WHO NEEDS WARNINGS EH?

Some of the tabs have been missed out to keep it simple at this stage. I have all the slides if you need to get more complex. . but at this level you won't need that info.

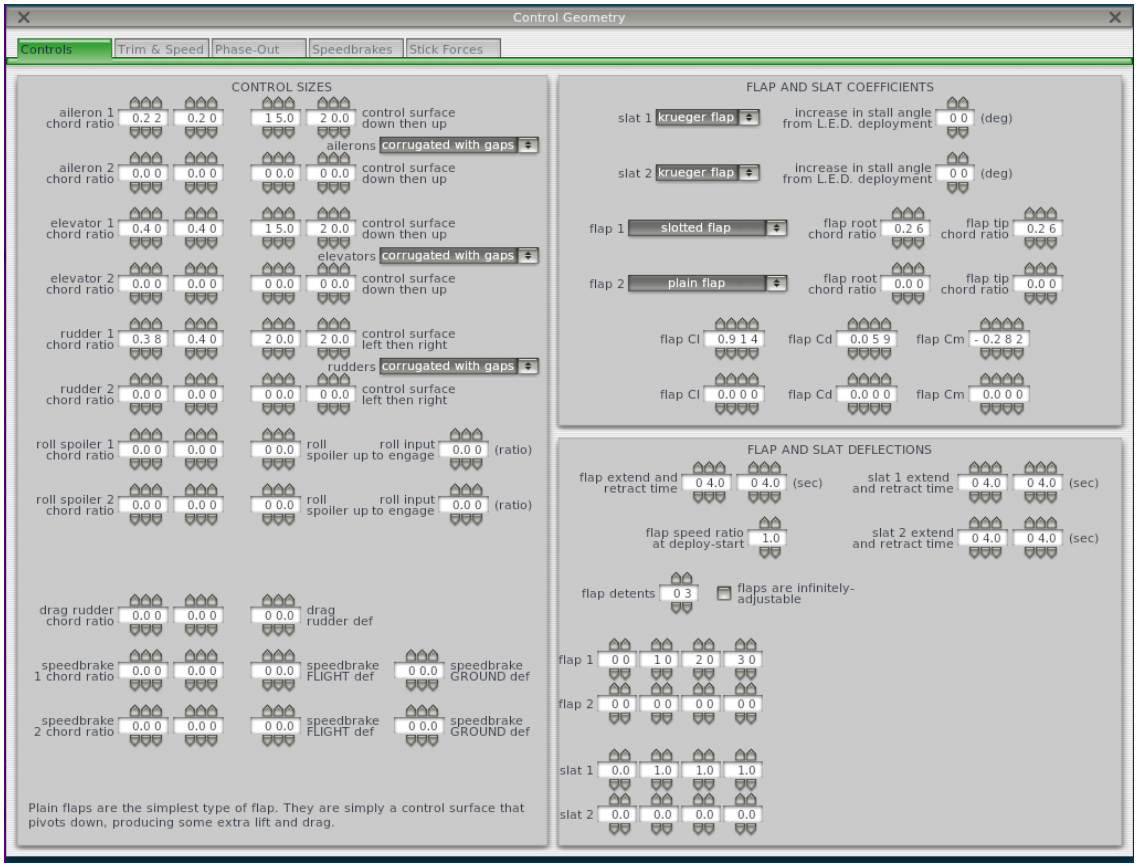
Time for some wings

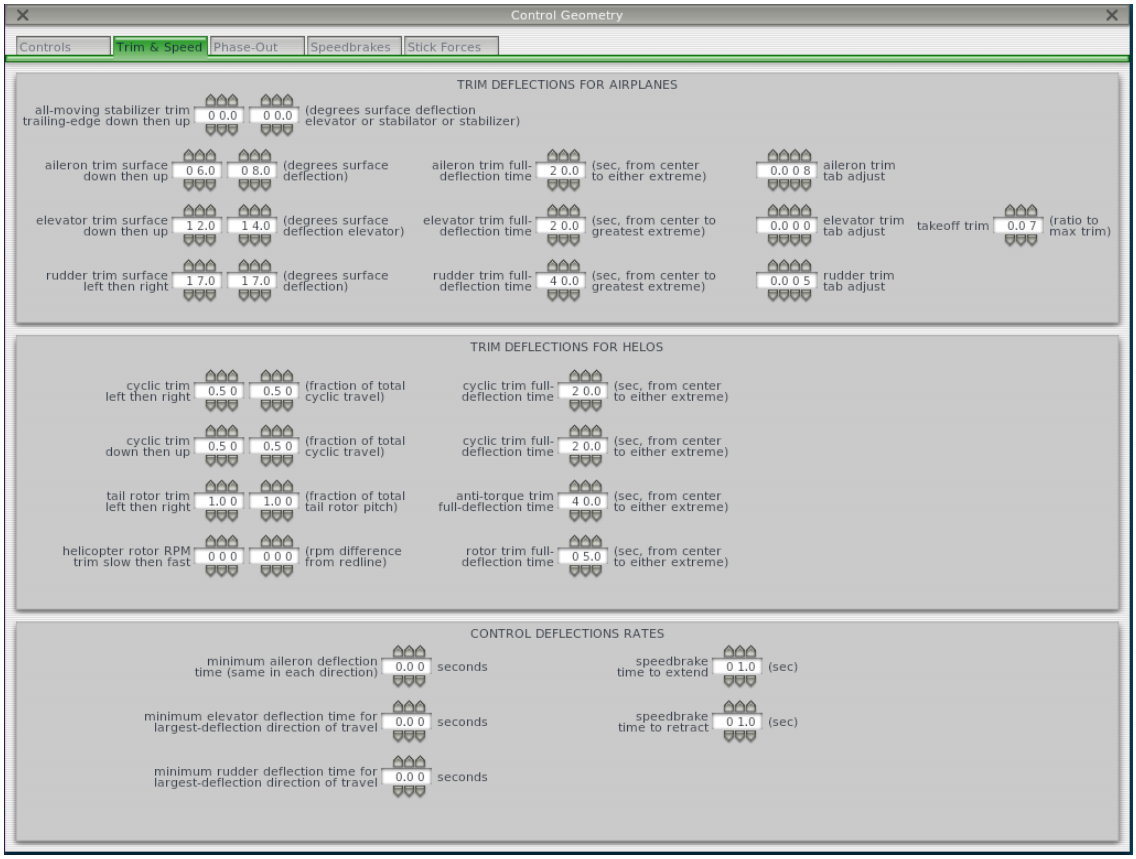
CONTROL GEOMETRY is next…

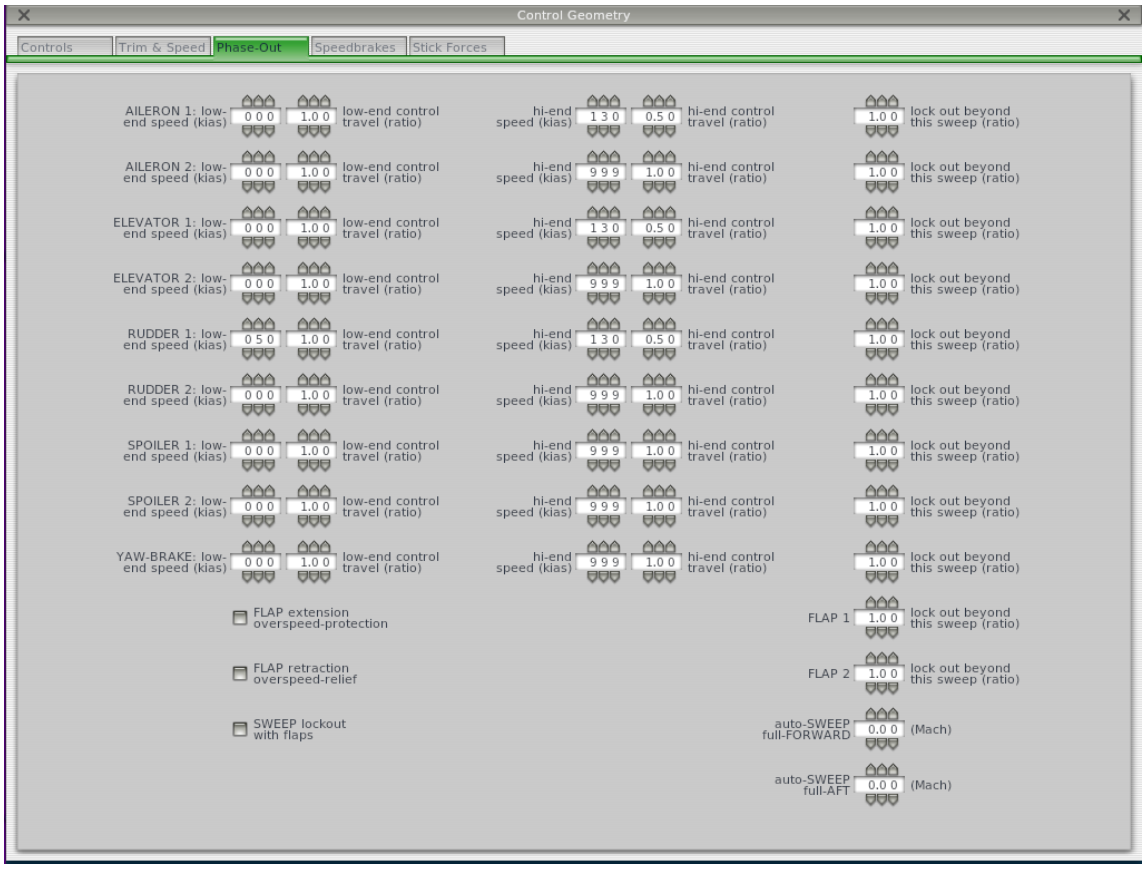
This is an important bit

Oh and save regularly .. if you haven't been

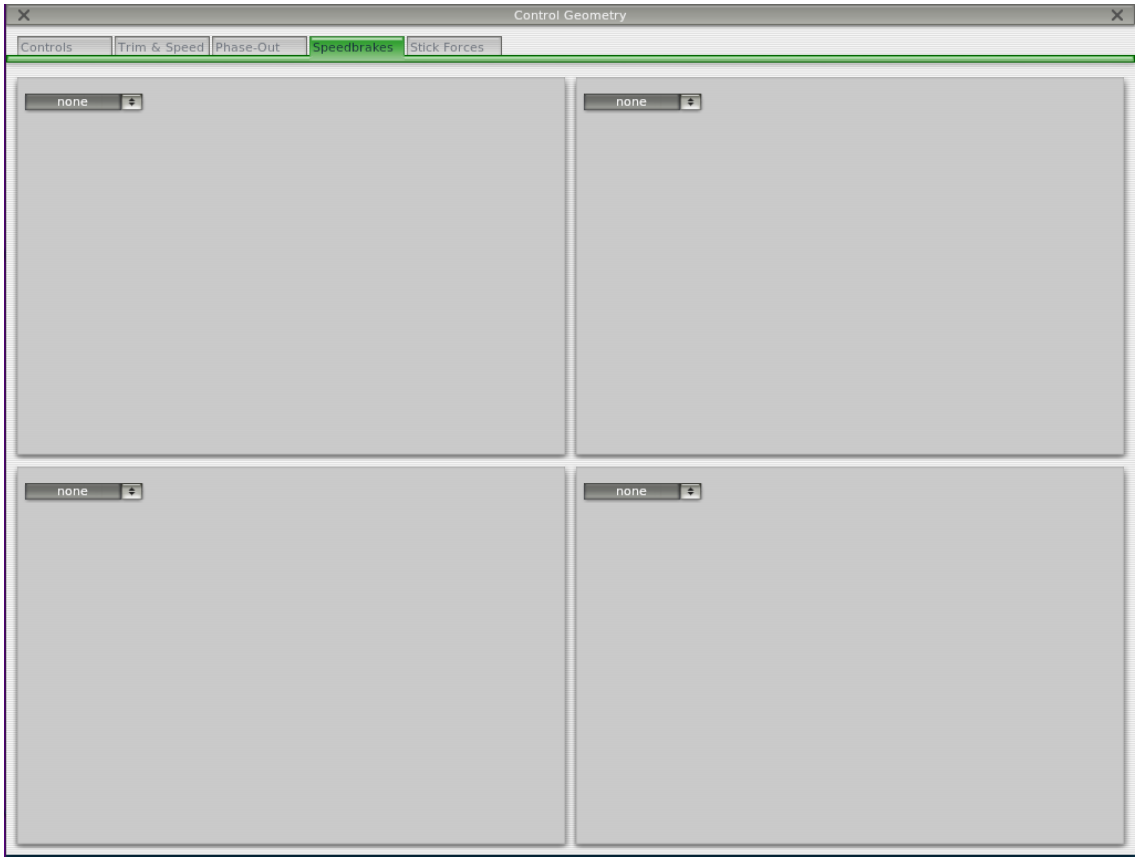
SPECIAL/ select show with STILL/MOVING controls – your plane will come to life..

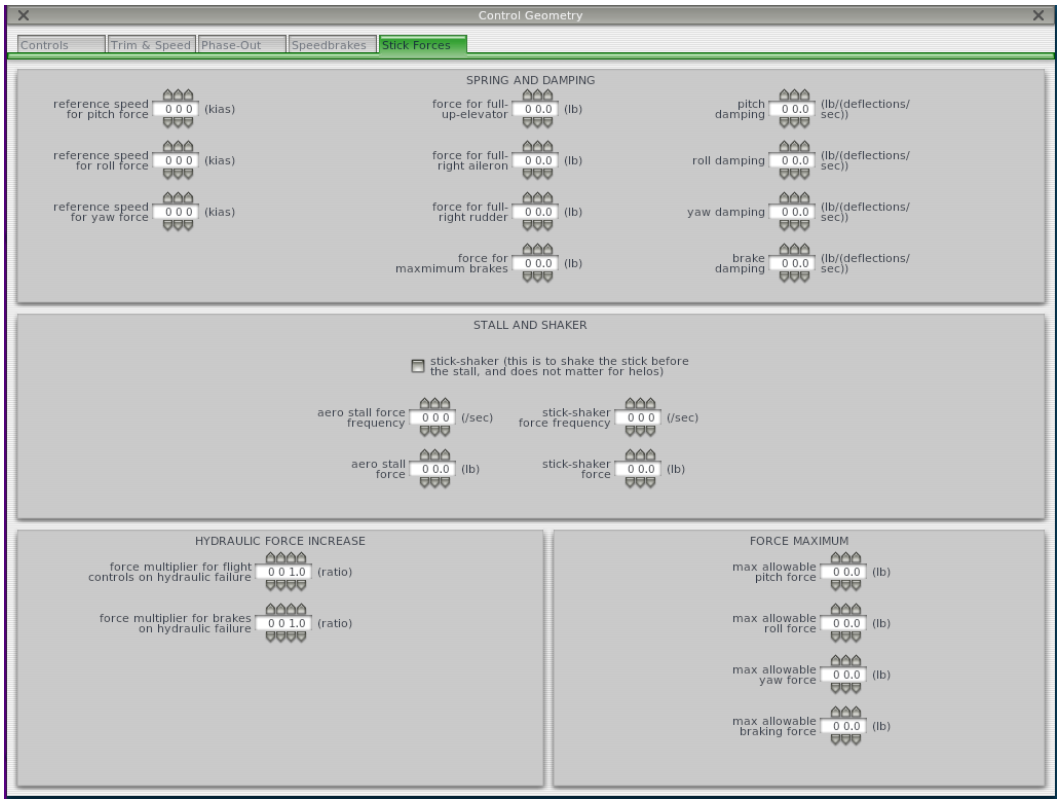




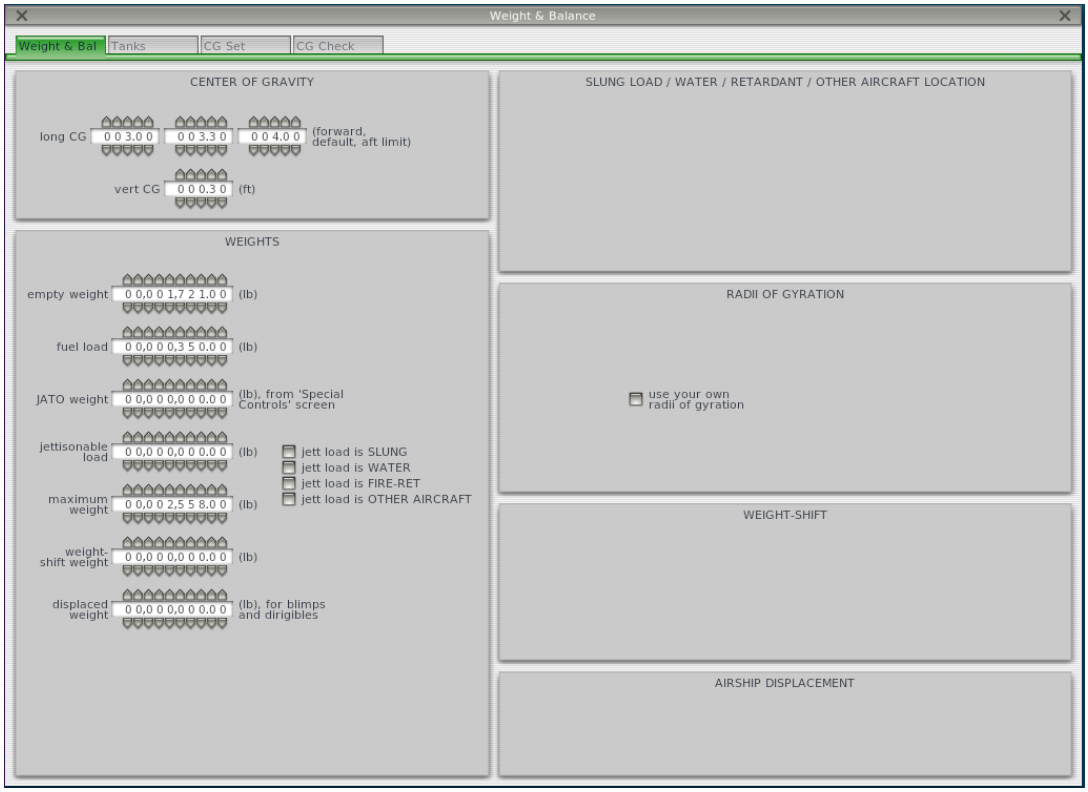


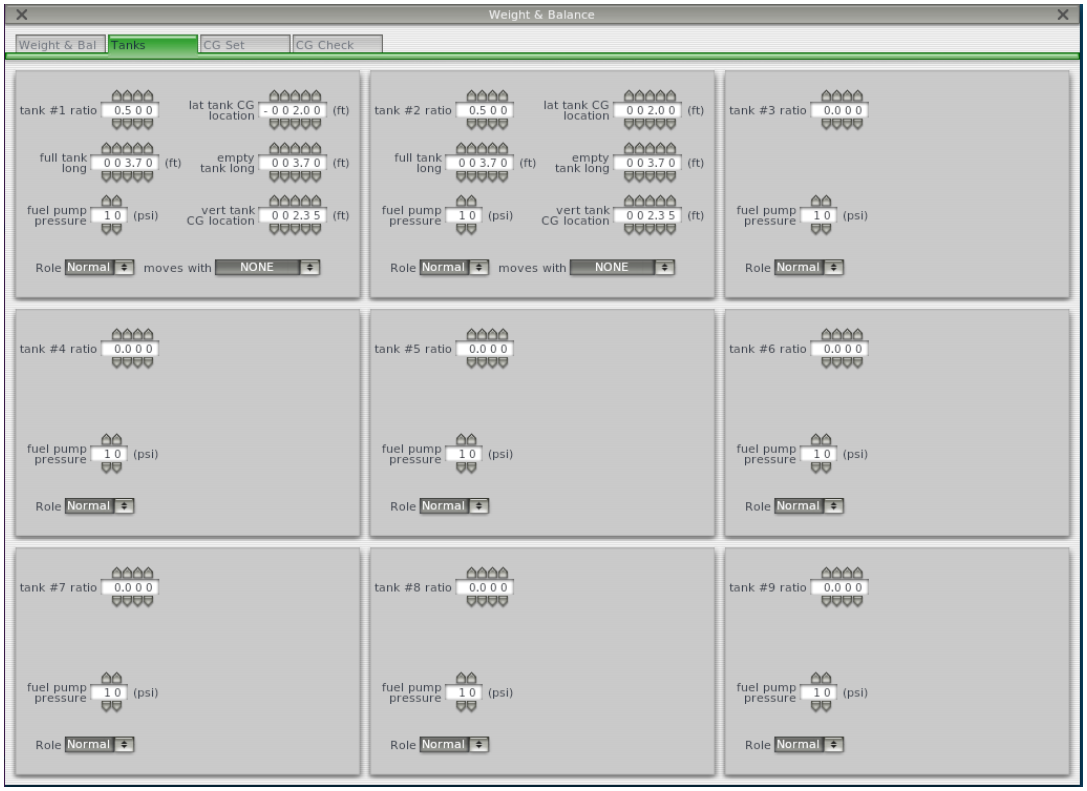
NO SPEEDBRAKES.. who needs SPEEDBRAKES?

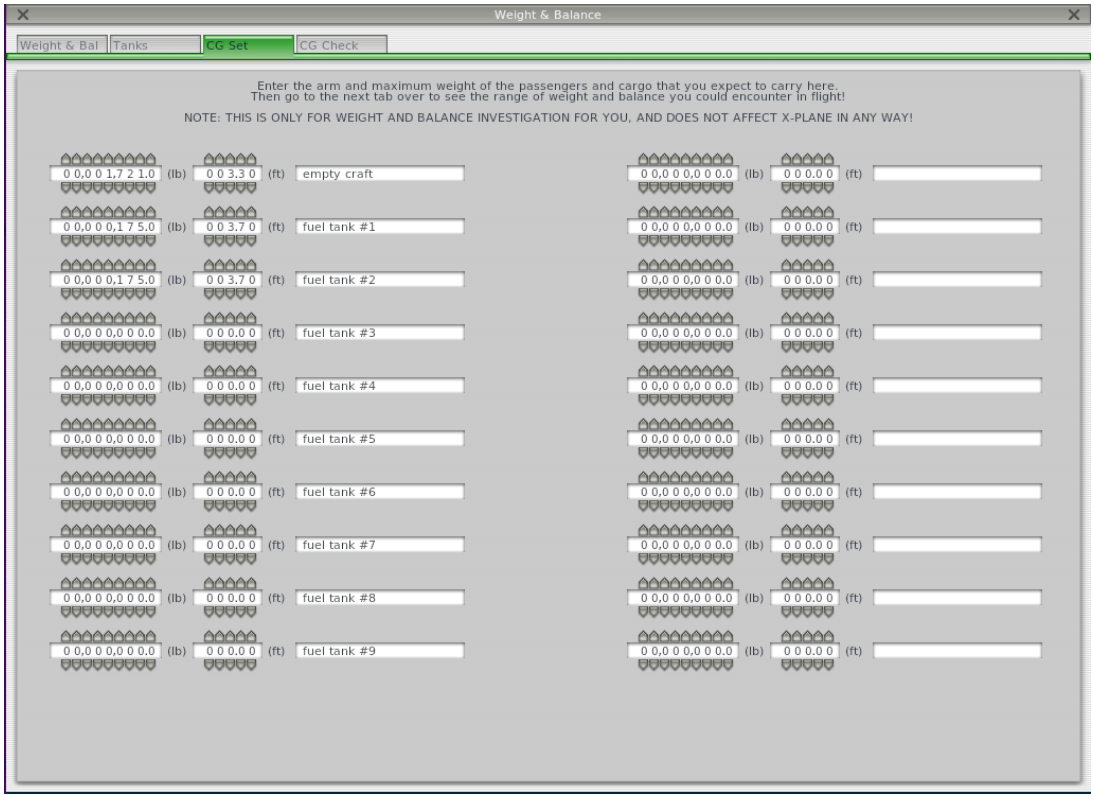


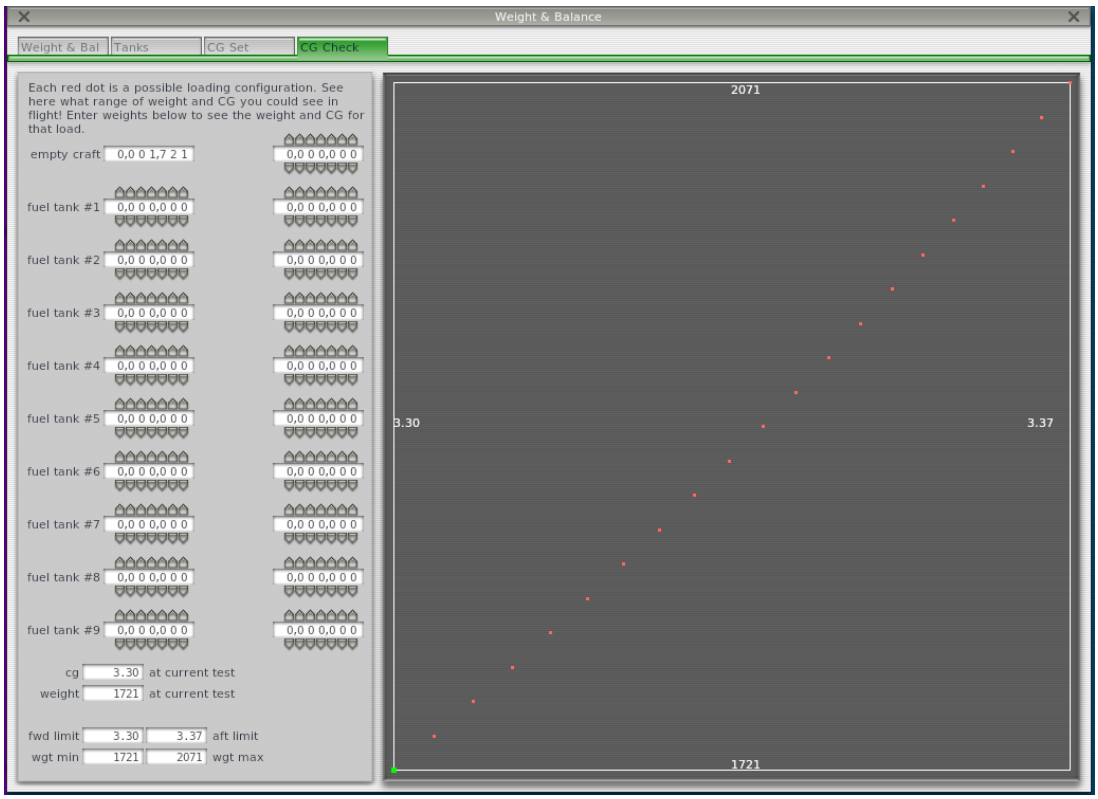


WEIGHT AND BALANCE.


Weight & Balance
Weight & Bal
Tanks
CG Set
CG Check
CENTER OF GRAVITY
long CG
0 0 3.0 0
0 0 3.3 0
0 0 4.0 0
(forward, default, aft limit)
vert CG
0 0 0.3 0
(ft)
WEIGHTS
empty weight
0 0,0 0 1,7 2 1.0 0
(lb)
fuel load
0 0,0 0 0,3 5 0.0 0
(lb)
JATO weight
0 0,0 0 0,0 0 0.0 0
(lb), from 'Special Controls' screen
jettisonable load
0 0,0 0 0,0 0 0.0 0
(lb)
jett load is SLUNG
jett load is WATER
jett load is FIRE-RET
jett load is OTHER AIRCRAFT
maximum weight
0 0,0 0 2,5 5 8.0 0
(lb)
weight-shift weight
0 0,0 0 0,0 0 0.0 0
(lb)
displaced weight
0 0,0 0 0,0 0 0.0 0
(lb), for blimps and dirigibles
SLUNG LOAD / WATER / RETARDANT / OTHER AIRCRAFT LOCATION
RADII OF GYRATION
use your own radii of gyration
WEIGHT-SHIFT
AIRSHIP DISPLACEMENT

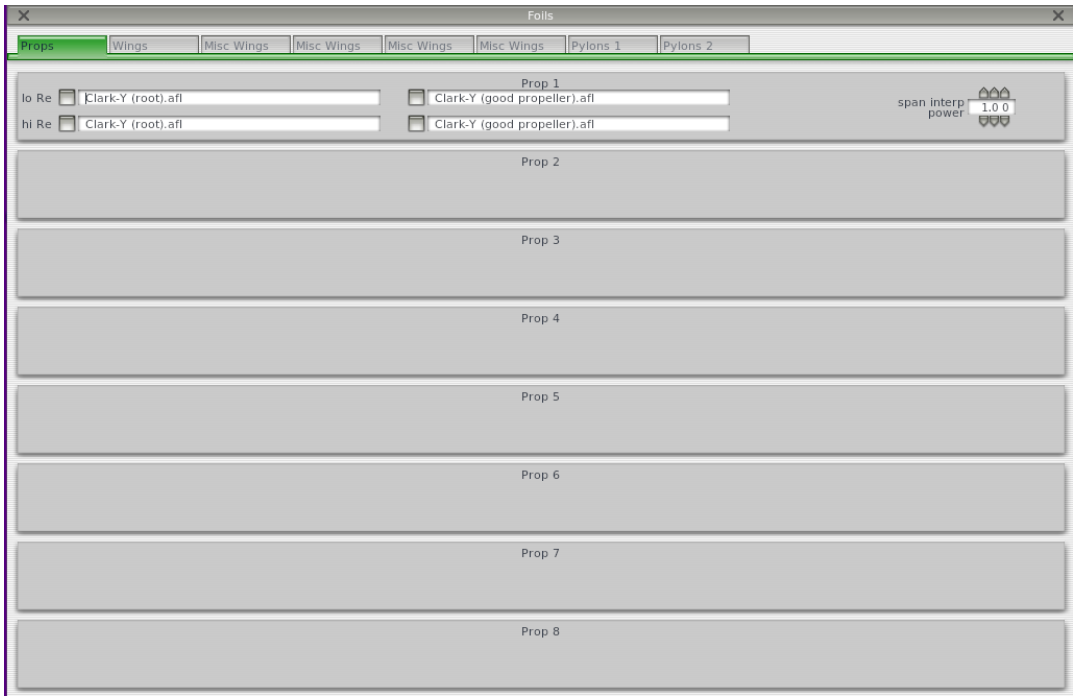

Weight & Balance
Weight & Bal
Tanks
CG Set
CG Check
tank #1 ratio
0.5 0 0
lat tank CG location
- 0 0 2.0 0
(ft)
full tank long
0 0 3.7 0
(ft)
empty tank long
0 0 3.7 0
(ft)
fuel pump pressure
1 0
(psi)
vert tank CG location
0 0 2.3 5
(ft)
Role
Normal
moves with
NONE
tank #2 ratio
0.5 0 0
lat tank CG location
0 0 2.0 0
(ft)
full tank long
0 0 3.7 0
(ft)
empty tank long
0 0 3.7 0
(ft)
fuel pump pressure
1 0
(psi)
vert tank CG location
0 0 2.3 5
(ft)
Role
Normal
moves with
NONE
tank #3 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal
tank #4 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal
tank #5 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal
tank #6 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal
tank #7 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal
tank #8 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal
tank #9 ratio
0.0 0 0
fuel pump pressure
1 0
(psi)
Role
Normal

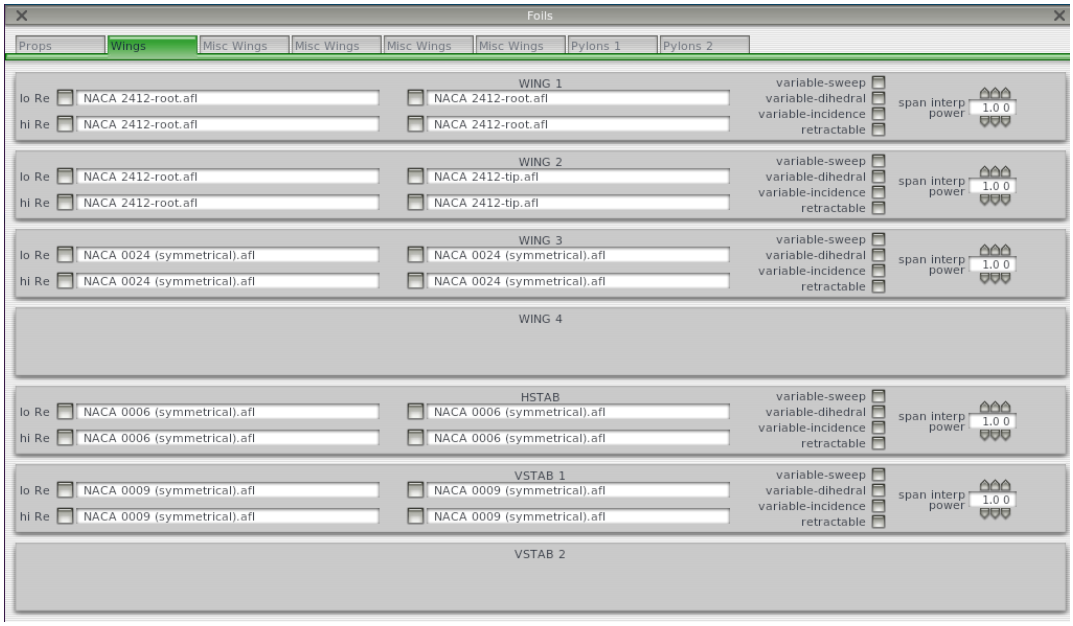




Go to the EXPERT TAB – select AIRFOIL

You only need the first two tabs – props and wings





BACK THIS PLANE UP!! BEFORE YOU ALTER IT/ CHANGE ITS PARAMETERS.

Save it one last time and open XPlane. Select new flight and try out your creation

Would be best to see if it works as you expected. you might have to tweak a few things but if you want to TOTALLY alter some of the settings, SAVE AS and make A COPY of your aircraft. . changing the AUTHOR settings etc. you can then alter power/cg/wings etc

HAPPY EXPERIMENTING – Dave Rothwell