



MAIN FEATURES

- Highly detailed custom model made with 4K Substance Painter PBR textures
- 100% animation/clickable objects – nothing is inoperable*
- 14 liveries total
- KAP140 Auto Pilot
- Full Comms/Navs stacks (KX 155 TSO) & KR 87 TSO ADF & DME
- GNS530 GPS(Xbox & PC) -Standard
- PMS50 GTN750 with GPS toggle switch(PC ONLY) – Mod required
- TDS Sim GTNXI with GPS toggle switch(PC ONLY) – Mod required
- Dual Airspeed/Attitude/Altimeter/CDI/Oil Temp-Press & CHT Gauges
- Single RPM and Manifold gauges with dual needles
- Multiple fuel options with tips/main l/r cross-feed and transfers with quantity gauges
- Manual Fuel Pumps with sound
- Dimmable interior lighting FX- Gauges/Pedestal/Pilot/Co-Pilot/Cabin/Panel
- Exterior lights with custom FX
- Swappable Pilots with clickables
- Animated Visors
- Animated canopy with speed limitations(15kts)
- Nose and Rear Cargo with luggage and load capabilities
- 16 Functioning Circuit Breakers
- 2 Checklists included with documentation 1 for MSFS and 1 for GTN750
- Tested by Owner/Pilot of an original Ryan Navion
- Realistic flight dynamics with weight and balance & COG options
- Failures available
- Airframe De-Icing/Prop De-Icing
- New Propeller Simulation - NPS
- Computational Fluid Dynamics - CFD
- Camair 480 Engine Nacelles by Fast Cow Productions
- Safety chocks/pitot flags and intake covers with clickable
- Clickable Pilots
- Trim Indicators
- Magnetos/Starter Switches
- Air flow control
- Startup Smoke and exhaust FX
- Rain FX/ Icing FX



Introducing..

Welcome to Hangar Studios 713 by B4Gunner

I have been developing mod's for a little under a year now for MSFS 2020 and wow has it been a great experience! I love it. I grew up in an aviation family with my father who was an airline heavy maintenance mechanic, specifically the DC-9's. I was once a pilot many years ago, but due to an injury I was limited to only getting my private license and then decided to further my education in Aviation management. I was around planes most of my life, specifically when I decided to become a flight attendant and flew on numerous airplanes at that time. I couldn't wait to get into the jump seat and see what the real action was - if the airline captain would allow it(crew movement flights and such(super rare)). It was a lot of fun and I got to see the world, well at least some of it. I have many stories, but that is for another time. This time is set away for the Camair 480 Twin Navion, which I have developed in a little over two months. I currently have two freeware aircraft on my website, a scenery and some liveries for other developer's planes. None of those compare to the quality and time spent with my newly found knowledge and expertise in this plane's development – (Sorry Chad, I'll get back to that part later)

This is where my story starts. Once upon a time.... Nah you don't want to hear that. I'll save it for my Discord – It's under Hangar Studios 713, come join me if you want to learn about my other projects in the works. I know I switch gears pretty quick, so try to keep up.

Facebook, of all places is where this story starts, Chad Hawthorne – Owner/Pilot of the Ryan Navion N4888K is the one to blame to get me hooked on Navions. He simply posted in a Microsoft page I happened to be following. He asked if there were any developers out there that anyone knew of that could perhaps build his plane. His exact plane. I raised my hand and said I know a thing or two. So we hit it off from day one and the more I developed his plane the more I found out about how the Navion's act in the wild. We went from fat, dumb and happy – to smooth, lean/mean flying machine in 3 months. You can see his plane in my website (Freeware section) with all of the goodies added with it being a part of history, literally. This was just after I started my 1st scenery to learn the SDK a little bit quicker and dabble in Blender and perhaps try out a livery or two. What was I getting myself into? The community over at FS2 Discord & Jonx helped me out slowly but surely with all of the important questions, the rest I had out to figure out myself.

So here we are on page 2 of this little story and introduction to me, B4Gunner, a solo developer to do it all. I learned textures partly from a few hours with 270 INC and small dabble of aircraft flight mechanics from GotGravel, as I didn't want to bother these guys because they were fast developing with some amazing work. I can't thank them enough.

Texturing got much easier around Christmas time last year when I decided to introduce myself to the awe-inspiring world of Substance Painter. I watched a couple hundred videos on the how to's and the settings, and and and... Well if you know Substance Painter, then you know. It can be frustrating at first with no guidance, but I seemed to manage pretty well. I got my feet wet with my second plane which I finished in about a month and a half. The Navion Super. That is a fun plane to fly! Over 250 knots capable of STOL all day long. I once landed it on a football field. I even mastered completely taking one of Asobo's planes and putting the cockpit(TBM), so to say, into one of my own(Super) with literally no custom code. Think G3000's with WTT, you can take that plane anywhere and FAST. I definitely have to revisit that plane as with Chad's Navion and make my sim world a better place.

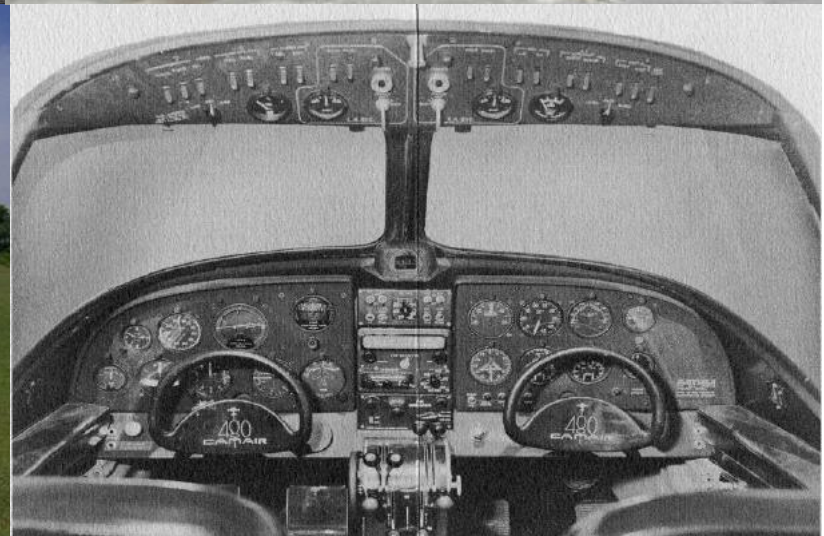
Did I mention the plane that got me into this mess to begin with? The F117A Nighthawk. I said I grew up in an aviation world right? Yeah, that plane always mesmerized me and I was going to do it next, but I couldn't do it justice, just not yet. I've been developing that plane since my birthday last year. It's come so far, but still has a ways to go. The model is done and it flies like a champ – wobbles and all. Just kidding, I want to perfect it with the integrated systems of my own. Just think, a drag chute, ejection seat, Air to Air refueling, emergency tailhook(It actually has one IRL), canopy, GBU-27 Paveway III bombs, and yes.. sounds and much, much more.

So here we are if you followed me this far, you must be interested into what kind of character has the time to finish an entire fully integrated plane in 2 months, not working with a team, flying solo? A disabled, single dad whose youngest son just finished High School. I've been "working" on this plane day in and day out for 60+ days straight except for graduations and other things life has given me for just about 12+ hours a day. Being Mr. Mom is a full time job in itself, but I wouldn't give it up for anything else right now.

Do what you love and love what you do. That's what has driven me to try to perfect this plane before release. I think I did an excellent job, but you be the judge of that. Nobody else is reading this unless you bought it or are lucky enough to have helped me along the way. So enough about me, let's talk Camair 480 Twin Navion.

Inspiration

WARNING: All likeness and Camair 480 logo are taken straight off the internet and a little help from Chad's plane and my ingenuity to make it look and feel new(er) & cool enough for a 70+ year old plane



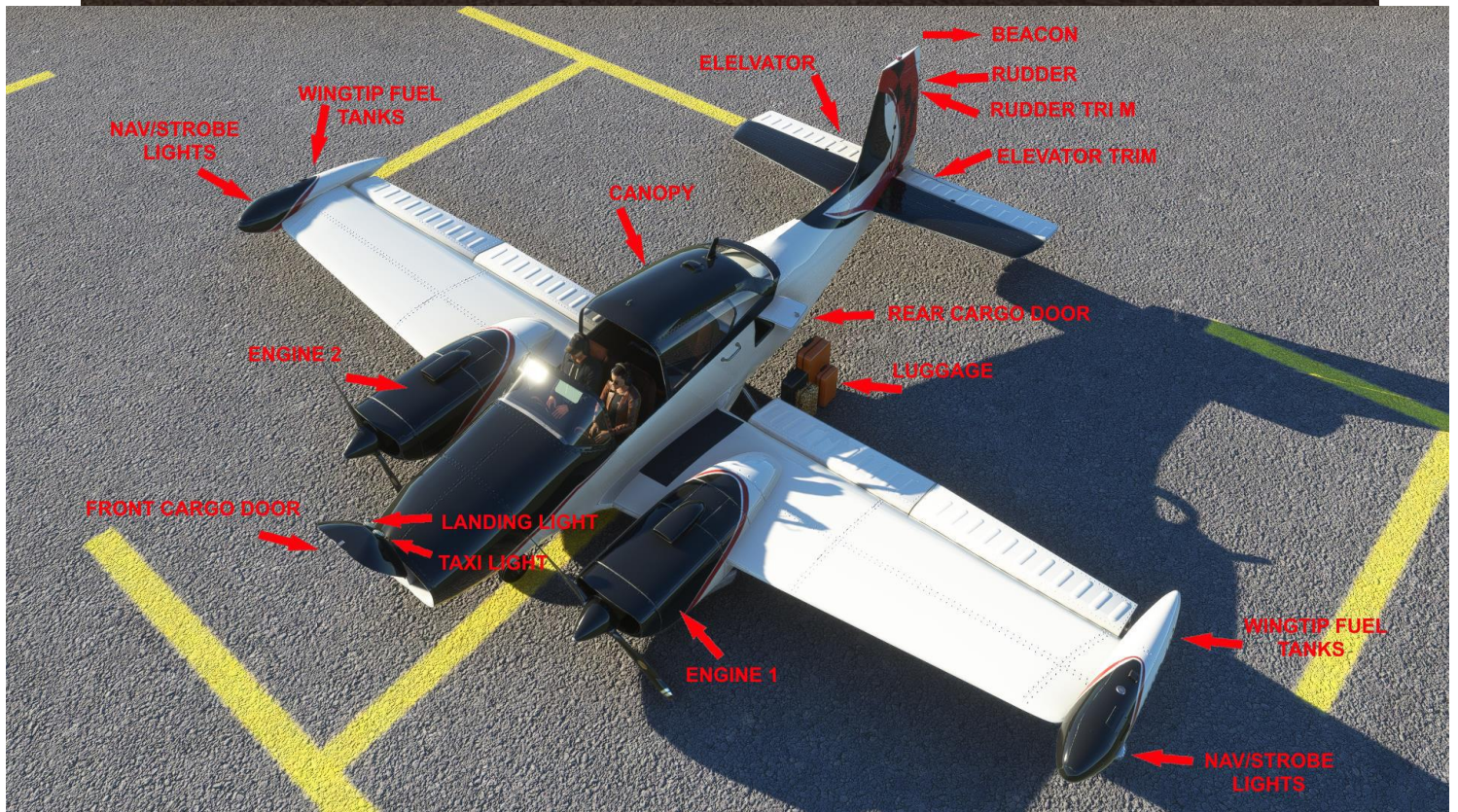
CAMAIR 480

SPECIFICATIONS

Type Certificate							
Certified					Maximum range		
5/12/1955					Greater than 900 miles		
Engines					Rate of climb (gross weight, sea level)		
Continental O-470-B					Greater than 1,750 fpm		
Power rating					Single engine rate of climb		
240 hp at 2,600 rpm					490 fpm		
					Service ceiling		
Maximum takeoff weight					Greater than 21,000 feet		
3,930 lbs					Single engine service ceiling		
Basic empty weight					7,600 feet		
2,950 lbs					Single engine absolute ceiling		
Number of seats					9,100 feet		
4							
Maximum baggage weight					Take-off distance (ground run to Vmc)		
125 lbs (forward)					644 feet		
180 lbs (rear)					Take-off distance (maximum effort)		
					Less than 400 feet		
Fuel capacity					Take-off distance (over 50 foot obstacle)		
39.5 US-gallons plus 68 US-gallons in tip tanks					905 feet		
Oil capacity					Landing roll		
6 US-gallons					580 feet		
					Landing roll (over 50 foot obstacle)		
Never exceed speed					900 feet		
220 mph (191 knots)							
Maximum structural cruise							
180 mph (156 knots)							
Maneuvering speed							
148 mph (129 knots)							
Flap and gear extension							
120 mph (104 knots)							
Stall speed (power on, gear and flaps up)							
74 mph (64 knots)							
Stall speed (landing configuration)							
62 mph (54 knots)							

480 CAMAIR

Exterior Reference



AVIONICS



AVIONICS CONTINUED



AVIONICS CONTINUED



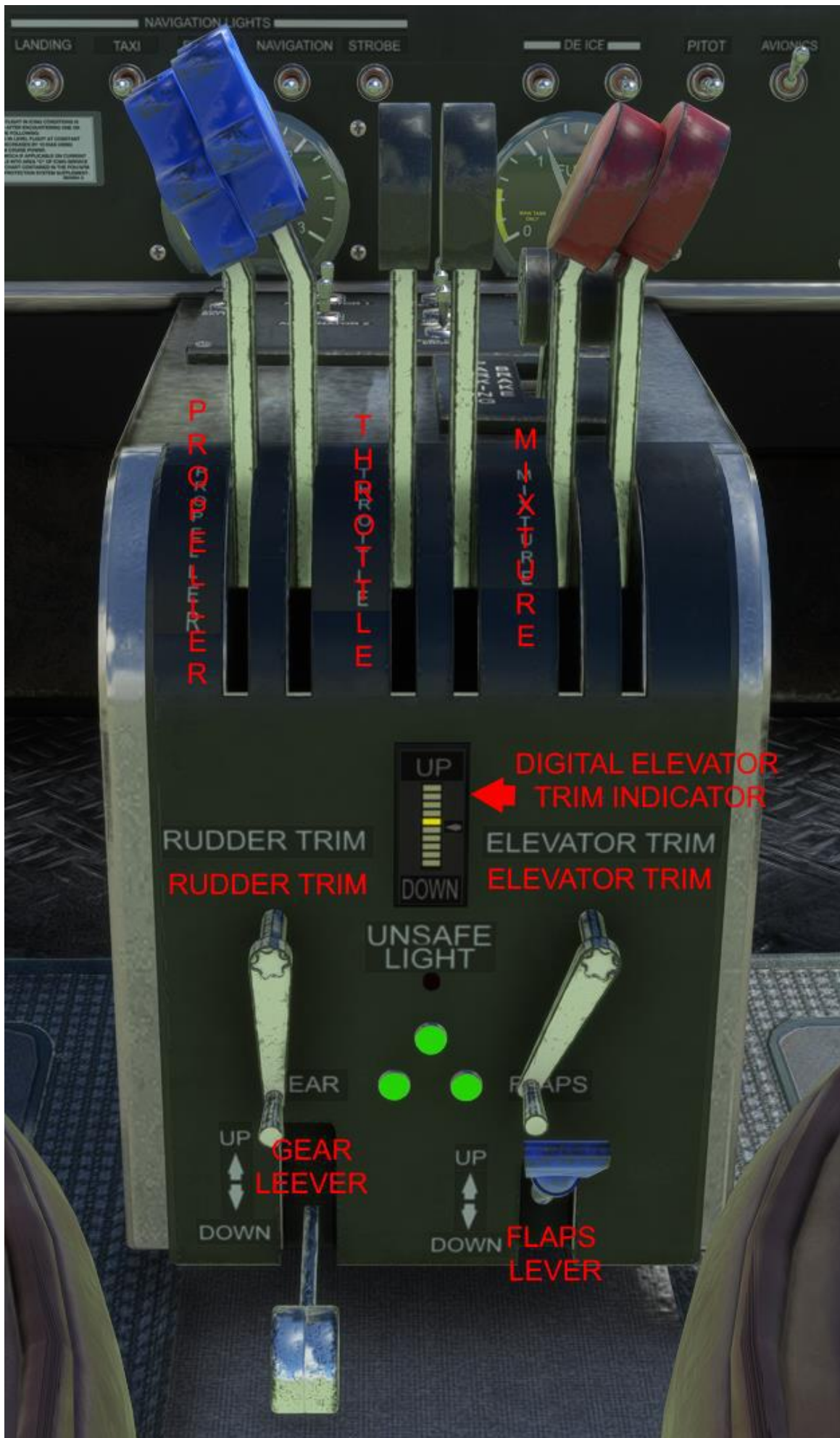
AVIONICS CONTINUED



AVIONICS CONTINUED



POWER/TRIM GEAR/FLAPS CONTROLS



DETAILED TEXTURES



DETAILED TEXTURES



CUSTOM LIGHTING FX WITH DIMMABLE INTERIOR



WORKING CANOPY AND CARGO WITH SPEED LIMITATIONS



CLICKABLE VISORS



ONLINE REFERENCE LINKS

PMS50 GTN750 -	https://pms50.com/msfs/
GARMIN AS530 GPS -	https://static.garmin.com/pumac/190-00181-03.pdf
GARMIN GTX330 -	https://www.salt.aero/wp-content/uploads/2016/04/GTX330_Transponder.pdf
KAP 140 AP	https://www.bendixking.com/content/dam/bendixking/en/documents/document-lists/downloads-and-manuals/006-18034-0000-KAP-140-Pilots-Guide.pdf
KX 155 TSO -	http://heilmannpub.com/KX155.pdf
KR 87 TSO-	https://www.penaviation.com.au/Manuals/KR_87.pdf
TDS Sim GTNXI -	https://tdssim.com/

***DISCLAIMER:** NOT ALL FUNCTIONS ARE AVAILABLE FOR THE OPERATING AVIONICS EQUIPMENT DUE TO MSFS 2020 LIMITATIONS.

I HAVE SUPPORT AVAILABLE @ <https://www.hangarstudios713.com>

DISCORD SERVER HANGAR STUDIOS 713 <https://discord.gg/jhx3REkXwj>

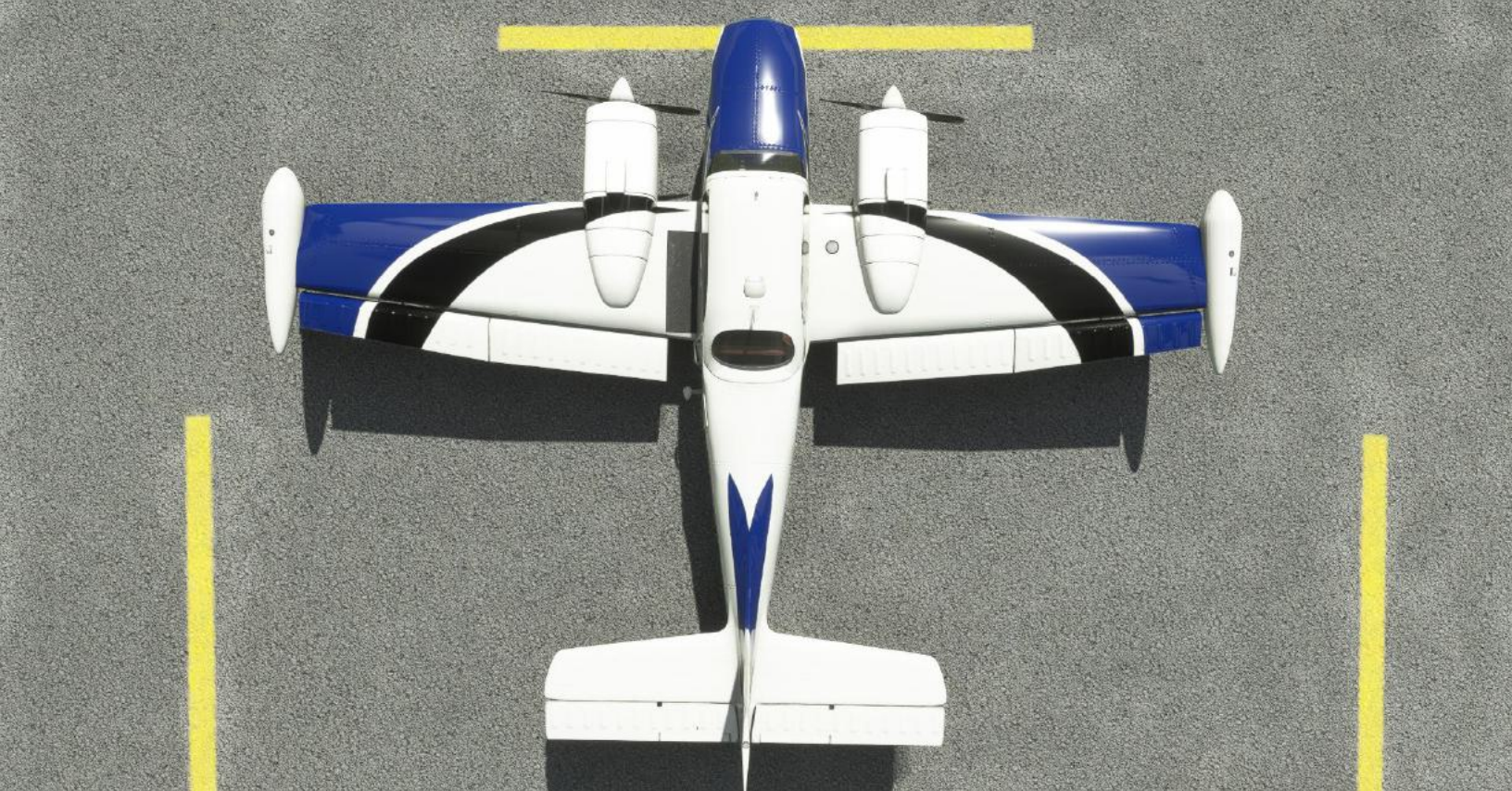
OR EMAIL – b4gunner@hangarstudios713.com

Please realize I am a one-man operation, but I respond ASAP and look forward to your input/questions

LIVERY VARIATIONS



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Special Thanks

My boys and family – for the support and helping me get around

Got Friends and the FS2 Community – I couldn't have done it without you

PMS50 – GTN750/WTT mod integration

TDS Sim – GTNXI mod integration

Dave McKee – Tester/YouTube Content Creator

Gawin Grimm – Tester/YouTube Content Creator

Chad Hawthorne – Ryan Navion Owner/Pilot – Tester

Gunnerman – GotGravel Discord Admin – Tester

Destroyer121 – SDK/Blender guidance

MtnFly Simulations & Sal1800 – Coding tips and tricks

Fast Cow Production's – New friend & developer to lend an ear & learn together

Multiple discord servers and online forums/YouTube videos

CREDITS

- ✓ 3D MODELING – B4GUNNER
- ✓ CODING – B4GUNNER
- ✓ PMS50 INTEGRATION – PMS50/B4GUNNER
- ✓ WTT FOR PMS50 INTEGRATION –PMS50
- ✓ GTNXI – TDS Sim/B4GUNNER
- ✓ TEXTURES – B4GUNNER
- ✓ FLIGHT SYSTEMS –B4GUNNER
- ✓ LIVERIES – B4GUNNER
- ✓ LIGHTING FX – B4GUNNER
- ✓ SDK & GENERAL ASSETS – ASOBO/MICROSOFT
- ✓ SOUND - ASOBO/MICROSOFT

Tips and Tricks

(Good things to know when using your Camair 480 Twin Navion)

- Follow the checklist when in doubt

Easy Startup procedure

- 1. Turn on Master Battery and both Alternators
- 2. Turn both Magnetos switches to the "Both" Position
- 3. "Crack" the Throttle to at least 7% (Max 50%)- anything less and the Battery will not charge from the alternators
- 4. Full Mixture and Propeller Throttle
- 5. Fuel pumps are automatically driven - No shut off - No Breakers
- 6. Turn the key for the left Engine(1) to start the engine
- 7. Check CHT/Oil Gauges should start rising
- 8. Check RPM level of the props - Should be at least 713 RPM @ 7% - @ 50% Throttle will be "in the green" around 2000 RPM
- 9. Repeat process for Engine(2)

Lighting Interior

- All of the dimmer's work as intended - The only difference is if you want both rear cabin lights on at the same time use the "L" keyboard shortcut, otherwise when you flip the switch for the cabin left/right lights it only controls one or the other at a time not both(on)
- I chose to have some of the "Knobs" highlighted in a reddish orange glow to not only show the position of the knobs frequently used and important(Starters) to match that of the screens in most of the Nav/Comms/AP/ADF - Hope you like that added touch

➤

Fuel/Load

- This is quite nice to have with the gauges when figuring out your loads.
- With the pilot on board by themselves you can have any variation of fuel needed Main/tips(Aux)
- The COG (Center of Gravity) is directly affected by your load of fuel/cargo/passengers
- This can all be set before you leave the from the map screen and Before you click "Fly"

Tips and Tricks Con't

- Once you have selected which version of the plane you want to fly(Livery) you can then go to the Map screen and in the upper left click on the current plane.
- It will then give you options for the following:
 - 1. Aircraft selection
 - 2. Liveries
 - 3. Weight and Balance
 - 4. Failures
 - 5. Customization
- In the section labeled weight and balances this is where you can adjust your load(s) and watch the COG move within its acceptable range
- Also, in this section you can change the COG position - No need for a tablet that does the same exact thing within the sim after you click on "Fly"
- When the payload you want is reached in total Payload = 100% or any variation below 100%(Unless you want to see if it'll handle it(Which it will))
- The COG may or may not be within its range. I highly recommend keeping it in the acceptable range - however it can be moved - twin 240's can handle a lot
- You will always start at out at 50% fuel and a Pilot & Co-Pilot - No matter where you are - Hangar/Taxi/Runway/In air starts etc.. So, if you want to change the COG and see what your total results are this is the menu to do it in.
- Otherwise - you can still do it within the sim, which it's very nice to see the airplane react to the different loads.(But no COG reference)
- Want to over-weight the aircraft quickly? Put 3000 lbs. in the Front Cargo and watch the nose take a real dip
- Want to have unequal fuel in the tips due to a heavy passenger scenario on one side or the other?
- It's possible to watch that happen as the plane shifts with weight - This is especially helpful if you use the simulated programs that require a flight to a destination with cargo/passengers
- Now fuel - You do have the option to switch the fuel from the tips to the Mains - It'll happen automatically by default - You can also turn this to "On". Don't forget to turn it off
- Need the fuel in the Mains to be switched from left to right and right to left it'll keep the fuel coming from the tips but direct it to the main selected

Tips and Tricks

- The fuel Quantity is in Lbs. for the gauges - Keep that in mind when setting your loads and when you go to look at the fuel level in the gauges
- Left is left and right is right for the fuel gauges – also then only show main or tips NOT both at the same time. Use the switch to see how much is in each individual tank.

Canopy/Cargo Animations

- You have the ability to open the canopy or the cargo anytime below 15 Knots. Otherwise, it automatically shuts them both when above 15 Knots. Just click the handle on the roof.
- This is a safety feature I implemented to make sure you don't have 1. Your doors being ripped off 2. Visibility, You can't see much with the Cargo door open from the front and especially if it's at night with your landing/Taxi Lights on, You will be blinded if looking forward from the cockpit

Safety

- The safety for the aircraft security on the ground is the manual in the co-pilot's side pocket when at rest will arm/disarm the wheel chocks and the pitot flag. Any throttle will disable them and stow them

Failures

- There are 26 Failures available to replicate
- Fuel Pumps can be affected in this area only - They do exist, there are two of them with circuits in the code
- This failure will also affect your engine(s) so be careful what you wish for
- All Circuit Breakers work and you can set a failure this way as well

Engines(2) or (1)

- It's a twin - and yes, at certain altitudes you can actually climb with just one engine on. No matter how you play it the Non-Operating engine Prop will always windmill
- Unless at a slow enough speed (below 20 knots) - It will also take off, but expect the speed to come up slow and it'll yaw in the direction of the working engine
- The plane can also climb up to 9,100 feet with one engine. It might take all day, but it can be done.

Tips and Tricks

At varying altitudes, you can save a lot of fuel by trimming out your propellers, throttles and mixture. If you have the GTN750 or GTNXI(PC ONLY) you can check your fuel flow as well. Otherwise, a good rule of thumb is to lean out the throttle to around 80-85% and depending on your altitude lean the mixture from 20-50% anything below 20% can get a bit dicey depending on your altitude and how lucky you are feeling. I know for a fact at 13% you'll cut out at any altitude. This plane is to specs so expect around 900+ NM with full fuel and just one pilot and no cargo leaned out as best you can for speed.

The plane is not oxygen equipped so if you desire to get to max altitude of 20,000', I suggest you bring your own, but it can get there, just might take you a while.

There are signs all over the panel not to do aerobatics, but the Camair 480 is quite capable of some maneuvers. Just remember it is a gravity fed fuel system, so once you go inverted, or take a quick steep dive it will have a much-reduced performance. Good Luck! And have Fun!

Tips and Tricks

Checklists

- Checklist is available and I made another with more accurate readout for the PMS50 GTN750 see documentation in the main Zip File .JSON file labeled Import.JSON

Shutdown procedure

- You can do it one of two ways
- 1. Turning off the magnetos will shut the engine down. Left or right magnetos does have a very slight(very) RPM change as well as Both
- 2. Mixture at or below 7% will also shut down the Engines
- 3. Remember to shut off all electronics and leave it ready for the next person to fly - The sim will do it anyways

Have fun!

- Enjoy this little bit of Nostalgia for a very rare plane still out in the wild and now you can fly it in the MSFS 2020. Hope you like it and tell your friends
- Thanks for your purchase

B4Gunner @ Hangar Studios 713

VERSION UPDATES

Release Notes 1.0.1

- Added New - Manifold Pressure Gauge, RPM Gauge, Glareshield, Seats, Side Panel, Interior Registration, Circuit Breaker Flags
- Fixed - Interior textures on seats, carpet, canopy, CDI's, various cosmetic fixes\nEngine- Decreased minimum throttle for idle

Release Notes 1.0.2

- Modeled new 3D Engine Created by developer Fast Cow Productions
- New engines textures
- New propellers and nose cone with textures
- All 12 liveries redone
- Modeled new rear cargo door and luggage with animations
- Tested and validated NPS & CFD
- Replaced 3D lettering with new textured decals panel
- Downscaled textures to 2K or smaller if possible that aren't noticeable
- Modification to LOD performance 1.1 Million Polygons to 800K

Release Notes 1.0.3

- Performance improvement deleted LOD01 both models
- Texture improvements both interior and exterior
- Fixed heading bug color
- Interior registration decal improved
- Pilot node visibility enhancements with loading capabilities
- Added wheel chocks and pitot safety flag with speed limitations and clickable

Release Notes 1.0.4

- Performance enhancements to model
- Fixed engine textures for Green-Red-Blue liveries
- Modified textures - total file size effected greatly
- Removed texture flags
- Changed the FX code causing performance issues in aircraft.cfg

Release Notes 1.0.5

- Yellow and Star Liveries re textured
- Deleted Aircraft cfg Effects for FPS performance
- Re calibrated fuel gauges
- Avionics switch now powers on and off all avionics
- Configured aircraft Engines Flight model back to previous version
- New windshield FX
- New icing FX
- Re textured engine nacelles rivets
- Matched up interior to exterior mesh near glareshield
- Deleted duplicate heading compass on both models causing flicker
- Renamed textures
- Fixed CDI animation

VERSION UPDATES CON'T

Release Notes 1.0.6

- Deleted GTN750 Interior Model
- New Swappable Avionics with Clickable
- Replaced Cockpit Textures not to scale
- 4 New Liveries
- Fixed Beacon Light
- Fixed Prop and Nose blur
- Changed Code for Mixture controls

Release Notes 1.0.7

- New Canopy and textures
- New Detailed Interior Textures
- New Windows with FX
- Modified Icing FX
- Fixed Exterior Textures

Release Notes 2.0.0

- Fixed CDI Flags
- Fixed ADF Circuit
- GTN750 Textures
- Fixed Beacon Lighting Bleeding through Canopy
- Multiple Exterior texture enhancements
- Added Circuit textures
- Fixed Flaps HUD Vcockpit
- Fixed ELT Animation
- Fixed Comm-Nav Volume animations
- Enhanced Icing texture to include Windows-Windshield
- Fixed De-Icing rate
- Fixed Mesh and Texture for interior aesthetics

Release Notes 2.1.0

- Fixed Landing FX
- Fixed Windshield
- Fixed Clock Animation
- Added New Visor
- Fixed Glass Avionics
- Added Starter FX

VERSION UPDATES CON'T

Release Notes 2.2.0

- 3 New Liveries
- Edited RPM Efficiency

Release Notes 2.3.0

- XBOX version - Lighting Fix
- PC GTN750 Compatability
- PC GTNXI Compatability

Release Notes 2.4.0

- New Exterior FX for startup
- Fixed Thumbnails
- Included International Descriptions
- Nex Exhaust FX
- Minor Texture Fixes
- CDI2 ONLY VLOC

Release Notes 2.5.0

- New interior rivets mesh/texture
- New Interior light mesh/texture
- Fixed Cockpit Canopy Texture
- Fixed Cargo animation
- Fixed KAP140 Glass
- Fixed take off / landing flight model

Release Notes 2.6.0

- New Windshield
- New Windshield Bracket
- New Windshield Rivets
- New Glareshield
- New Aileron Trim Indicator
- New Rudder Trim Indicator
- New Elevator Trim Indicator
- New Digital Elevator Trim Indicator
- Fixed Right Aileron Weight mesh
- Fixed Interior Top Gauge Light Positions