The FSCaptain Assignments Feature

Version 1.8.0

Note: All specifications are subject to possible change. Every effort will be made to keep existing facilities unchanged while we add new features, but in some cases, that may not be possible.

Contents

Introduction

The FSCaptain Assignments feature provides for the many work tasks that pilots may encounter in their careers that fall outside the normal point-to-point structure of scheduled civil aviation. We refer to assignments within the FCDU as "missions" because of the line-space limitations of the FCDU, but both terms mean the same thing. The FSCaptain Assignments system is not related in any way to the FSX "Missions" system. You will accomplish your Assignment tasks in free flight, in a normal flying environment.

This feature is still under development, but it's to a point where we can offer a preview in FSCaptain 1.8.0. Based on feedback we intend to further develop and extend the system so that it's more complete for its official debut in the next major release of FSCaptain after 1.8.0.

Because this is a preview – an "Early Adopter" feature – we've decided to not place the system under the normal restrictions in the FSCaptain trial version. Although without a valid registration code you will still be limited to the standard "trial" airports with the FSCaptain ATP simulation, with the new Assignments feature you can get and execute assignments from any airport in the world until our "End of Free Assignments Date" of May 30, 2018! Thereafter, non-customers will be able to continue to fly Free Assignments from our standard "trial" airports.

The Assignments feature is designed with two primary goals in mind: *simplicity* and *freedom*.

By *simplicity* we mean that it's easy to find and fly an assigned mission. In contrast to the normal operation of the FCDU in an average FSCaptain flight on a Mission assignment there's only one page you will find all the important information and controls for each task you fly. Several other helpful pages are accessible, but your interaction with the FCDU will be minimal. You do not need to "book" an assignment flight in the Administrator to fly it. Your interaction will be completely in the cockpit with the FCDU and its "Mission" page. Simplicity.

By *freedom* we mean that you are not concerned with the company policies and procedures that you normally need to worry about when you are flying an assigned task. Assignments are **goal-oriented.** You succeed (and get points) by accomplishing a task. It may not be easy to *do*, but it is simply and clearly *defined*. Your performance won't be graded on any of the factors normally associated with an FSCaptain flight – like company procedures and passenger comments. You are free to fly the mission any way *you* feel is necessary and proper and if you accomplish the task and return safely you will be rewarded. *Freedom*.

Remember, assignments are defined by goals not procedures. You are free to use any aircraft you see fit to accomplish the goal – although certain assignments are not offered to inappropriate aircraft. You are free to fly any way you want. There is no "hand-holding". You are responsible for every aspect of the mission – planning, go/no go decisions, and flying – and even bombing, strafing, and surviving in a combat mission! You also hold all responsibility for taking along

enough fuel – there is no Fuel Auto Load here! You don't have to worry about watching the clock on most assignments - although some few may be time-sensitive in that you may be given a certain time in which to complete the task, or a certain time that must be spent on the task.

Assignments are integrated into your normal FSCaptain airline career. You may accept and fly an assignment for any airline you are working for, and the record of the assignment and the score will become a part of your career like any other FSCaptain flight.   You may well have a mix of "normal" FSCaptain point-to-point flights mixed in with mission completion flights in your log. The normal rules for career advancement apply to these flights as well – time and score. When an assignment is logged as completed the time is recorded and a score computed based on whether (and perhaps how well) you met the objectives defined for the assignment.

You might ask, "How do custom assignments fold into a normal ATP airline career?" If you're flying as part of a "Flag Carrier" airline, then you likely won't want to tow an advertising banner around the Space Needle, or go whale-spotting. But if your airline is an air-taxi service or a bush airline, you might.

One VA has quickly picked up on the Assignments feature to incorporate FSCaptain flights for one of their special short-term campaigns. In Autumn 2017, WestWind Airlines (who can be found at www.flywestwind.com) simulated relief efforts for the island of Puerto Rico in the aftermath of Hurricane Maria.

This 'campaign' was in two phases, the first being high-density airlift operations from the SE United States to two large airports in Puerto Rico, as well as low-density airlift and airdrop operations from those airports to outlying areas in the island (Airdrop Assignments can occur to non-airport locations.).

While their first phase into Puerto Rico was conducted under normal FSCaptain (ATP) guidelines, the folks at WestWind Airlines were able to come up with some Mission Assignments to handle the rest! You can find these Assignments in the FSCaptain forum at http://fscaptain.proboards.com

So, it's not inconceivable that even a Flag Carrier would allow some of its officers to work on relief efforts… or medical pickups… or other humanitarian tasks.

The current state of FSCaptain Assignments is fairly static, but soon-to-come plans will allow for more randomness in departure airport and other factors… which will give a very flexible use for Assignments!

Starting an Assignment

Sounds great! So, you want to fly an assignment? How do you do that? Here we will explain how that works. This may seem a little tedious to get started, but understanding the rules by which assignments are offered to you or not will help you find them!

An "assignment" is actually a script written to define a certain goal and perhaps to animate certain vehicles, objects, and special effects to help (or hinder!) you from accomplishing that goal.

Specific assignment scripts are tied to an airport where they are offered. You will get into the cockpit and turn on the FCDU, and when you do it will look to see if any mission scripts are available at the airport where you are parked.   There may be scripts which you are not qualified for in a particular airplane or for other reasons. Here are the things it looks at and matches:

- A mission always specifies a minimum and maximum volume class of aircraft. For example, an assignment to deliver 10,000LB of cargo would not be appropriate for a 4-seater GA airplane. Likewise, a pickup at a 2000FT grass strip will not be offered for a jet.
- It may call for a specific model of aircraft. This is rare, but it sometimes is necessary.
- It may call for a particular engine class. Some missions are only appropriate for helicopters for instance.
- The assignment may require the completion of a prerequisite mission first.
- The assignment may require the existence of a particular add-on product. For example, many combat missions will require VRS Tacpack (www.vrsimulations.com) and/or the freeware **FSX@War** product.

Each script at an airport will be matched against these criteria, and if it passes, it may be offered to you on the FCDU. Or it may not - some missions may only rarely be offered, others much more frequently. (This is an attribute of the script called "priority".) Generally, assignments which you have completed before may be offered again, but usually not until all other eligible assignments you haven't yet done from that airport have been offered.

If you are playing along right now and want to start a mission, we suggest placing yourself at Olympia, WA – KOLM – in a small to medium sized aircraft. Perhaps a C208 or a DC-3. There are many missions from that airport for aircraft for "tiny" to "medium" volume class airplanes. (Remember the five sizes for FSCaptain airplanes: tiny, small, medium, large, and huge.)

Important Note: In order to be used with the Assignments system, an aircraft must be completely defined to FSCaptain, including a valid Load Map. Also, just because an assignment is offered doesn't guarantee the airplane can actually accomplish it – that's up to you to verify!

Let's assume we have placed ourselves at KOLM in a BN-2 Islander, a good medium sized aircraft that is appropriate for most of the missions available there. When we turn on the FCDU and log in, we see this familiar page:

For those familiar with FSCaptain this is the standard Preflight menu, although those that book their flights from the Administrator don't see this.

However, there is a difference from normal. In the middle right, we see the option "Select MISSION>". If there are no assignments (missions) available to you at your current airport for your current airplane, you would see "View INFO>" here. But we see we have missions available! To see a list of the missions available here, just click the line-select key to the right of "MISSION>".
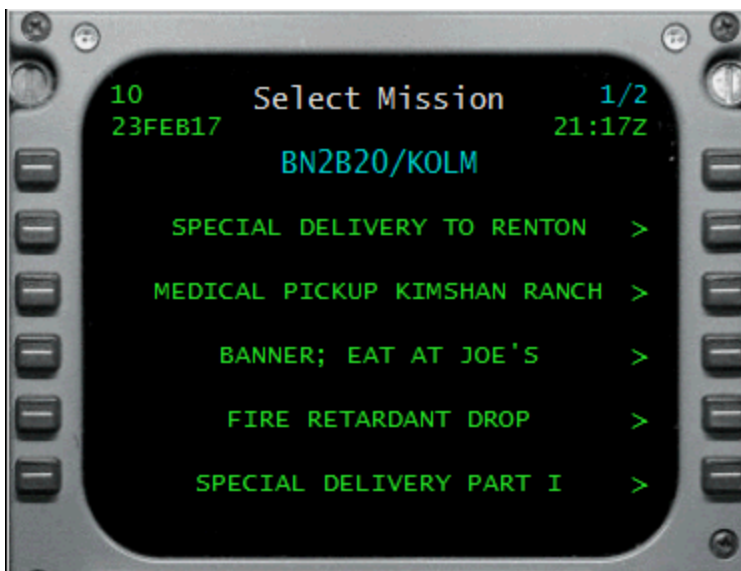
We see a list of five possible assignments we could select. Up in the top right corner we see the text "1/2" which is the FCDU's standard way of telling us there's another page which we could access by using the NEXT key. But in this case, let's pick the top mission, the "Special Delivery to Renton".

Once we click on the LSK to the right of that mission, we see the next page pop up:

This page gives us some basic information about the assignment, and gives us the option to accept it, or decline it. If we decline, the assignment will be temporarily removed from our list and we'll be returned to the assignment selection menu.

If we accept it, the mission script will start executing and you can start flying the assignment.

Note: the words *Mission* and *Assignment* both mean the same thing here, and you'll see us using them interchangeably – we use Mission in the FCDU for reasons of space.   But the official name for this FSCaptain system is the Assignments system, because we did not want to cause any confusion with the FSX "Missions" system which is a separate thing entirely.

Flying the Assignment

This is the standard "Mission" tracking page. The only one you'll have to use while on a mission. All prompts and selections are made from this page. There's no FO nagging you about setting lights or altimeters. Simplicity.

This mission is the first offered at KOLM for tiny to medium class airplanes because it's very simple and almost any airplane can do it – except for some big jets which are too big for these smaller airports.

To see how this works, let's go ahead and accept this mission. Then the page changes somewhat:

We are on the first phase of this mission, which is to load the aircraft. Some missions do not have a load phase and you won't see this page but when an assignment has something to load you'll be prompted to "Open the Door" which you do using the normal Flight Simulator command to open the main exit.

You will also need to take a few moments to adjust your aircraft's fuel levels. Remember – Assignments do not adjust your aircraft's fuel. You're the Captain... *this is up to you.*

We are now on the mission! That's all there is to starting one. What we see is:

The description now has a title in cyan. We see we've been assigned FLT 5725 (this is after all an FSCaptain flight!) and we are in the LOAD phase.

Now let's talk a little about assignments so we can understand what's going on. There are five different classes of assignments, based on what's expected of each kind of operation:

- **Survey** missions are probably the simplest. You will be tasked to fly to a certain area, you may or may not be required to spend a given amount of time in that area, then you fly back and land. Mission accomplished! (It sounds easy, but in a military setting where hostile fire is present, you may *not* return.) However, "recon" types are not only for military missions. For example, a banner-towing assignment is really a "recon" type mission: you fly to the spot where your banner is to be shown, fly around a while, then fly back. This is good for a patrol for forest fires or whale watching, for other examples. Your grade is determined by getting there, waiting inside a defined area, and getting back. These types of missions can also be referred to as "Loiter" or "Reconnaissance" missions.
- **Delivery** missions are similar in concept to typical flights. You are expected to load up a cargo (or PAX or both) at your current airport, fly somewhere else, unload the cargo, then fly somewhere else (either back to the origin or elsewhere.) A simple concept. Success is doing what is required.
- **Pickup** missions are like the reverse of delivery ones. You leave your current airport empty and fly to a destination where you pick up cargo (or PAX or both) then fly to a third location (which could be where you started but not necessarily.) This particular example mission is a "Pickup" class. - "pickup 4 PAX and 200LB cargo at Astoria." But other pickup missions may be much more involved – for example a medical evacuation or rescue mission is a pickup class assignment. Again, your grade will be determined by getting the job done. You either do, or you don't.
- **Airdrop** class missions are the same pattern as delivery missions, but instead of landing to unload, you drop it from the airplane. There are many examples – dropping parachutists or paratroops. Or dropping smoke flares to designate a target. Or fire retardant to fight fires (there is such a mission from KOLM in fact.) Your grade will be largely determined by how many of your items hit the target.
- Last but not least, **Attack** missions. These are only offered to aircraft that are specially designated to FSCaptain as "combat-capable". The basic requirement is like a Survey mission: fly to a designated area and back. But your grade will be supplemented by how many enemy vehicles or structures you damage or destroy. You will also likely face opposition that could damage or shoot you down. So even if you don't hit anything, your "objectives met" points will be well earned.

Any assignment will go through five phases (although not every phase is used in every type of assignment.

- **Load**: The load phase will only be active for delivery, airdrop or attack missions. You will be prompted to open the doors and load the cargo. (It's up to you to remember to close the door – if you want to!)   For delivery or airdrop missions weight will be added to your aircraft, by standard FSCaptain load rules, if necessary – if the weight is already there it won't be loaded again. Overloading is okay if you can make it work. Adjusting your aircraft's fuel is up to you. We suggest that you handle your estimated fuel requirements before starting the Load process.
- **Outbound:** Once load is complete (if there was one) you are "outbound" until you get to the designated target area. That's it – taxi, fly, land somewhere else, refuel, fly acrobatics, eat lunch, it doesn't matter- you are outbound until you get to the target area. If you end the mission now, it will be recorded, but you will only get the base points since you didn't meet any of the objectives. (You can only "End" a mission on the ground when stopped.)
- **Engaged**: This starts when you enter the target area. Each script will define a target and the area around it, which may vary greatly in size. You will hear a ding from the FCDU the first time you enter the engaged phase. You will stay engaged until you leave the target area. You may also stay engaged regardless of where you are if you have multiple items to drop in a airdrop mission and you still have some to drop. "Engaged" works on the ground too – you are engaged when you land at your destination to unload PAX/Cargo. In this case, you will leave engaged phase when the unload is complete. Likewise, for a pickup class mission, you will exit "engaged" when the load operation is complete.
- **Inbound**: Once you leave "engaged" you are "inbound" to where you are supposed to go. The mission description will tell you. If you turn around and re-enter the target area, and you are not on a load, unload or drop class mission, you will re-enter "engaged". You leave "inbound" only when you land at your destination and stop moving. Then you can finish the mission. If for any reason (such as for instance, damage) you can't make it to your destination, you can "END" a mission anywhere and for some missions you will be able to complete it even if you don't make it back home. Combat missions are often this way – you will not be penalized for getting shot down if you survive the emergency landing. You can "complete" your mission in some farmer's field.
- **Complete**: Once you do all you have to do and land and stop moving (you don't have to shut off engines) you will see the prompt COMPLETE> appear on the FCDU. When you select this option, the flight is ended and recorded in your career log.

Once we open the door, you will be prompted to "Authorize Load", and when you do the weight will be loaded into your aircraft according to the FSCaptain Load Map for it, and the phase will shift to OUTBOUND.   This will change as you enter the various phases outlined above.

A timer has appeared in the lower center. This line is called the "Prompt" line and if there's nothing special to show the FCDU will display how long you have been on the mission. Normally this is colored green, but if this is a "timed" mission it may be white or red. If white, you are on a mission that requires you to spend a certain amount of time in the engaged phase. The description should say how much. The time will turn green when you have met that requirement. If you are on a timed mission that has a limit, the time will stay green until you exceed the limit, then it will turn red. You can still finish the mission for base points and time logged, but the points for objectives met won't be coming to you in this case.

If there's something to do like load or unload cargo, or open doors, or drop your cargo out of the door, you will see a short white message here telling you what needs to be done. When you do it, the timer returns.

We see two options at the bottom. ABORT means to quit the mission and show the Preflight or Offline menu. No record of the flight is made. It's like you never did anything. (You'll be asked to confirm if you picked this, to be sure.)   END means to log the mission even though it is incomplete. You will probably receive base points only, although on an attack mission you will get points for damage you caused also. If it says COMPLETE here instead of END, the objectives have been met, and you can end the mission by selecting it.   COMPLETE is only available after objectives are met and you are landed and not moving.

For an airdrop class mission, when you are in the target area the lower right prompt will change to DROP>. To drop the item(s) click on this line select key. (Flipping the "no smoking" sign if you have one is the same as clicking on DROP>)

You must have your doors open to drop things from your airplane. It will prompt you if you don't.

Note that the system is not computing the right place to drop. It's only telling it's valid to drop. It's up to you to position your airplane so that your dropped item hits the target – which is quite an art for fixed-wing fliers.   Some drop target areas are very small. Some are quite large. But the goal is to get near the target. How near is defined by the script but is typically between 200 and 500 meters.

Getting a drop mission right takes practice.

Notes

We recommend starting any mission containing important animations after a fresh start of the simulator, or at least do not do more than two or three missions in sequence without a restart. We have noticed that in some sim configurations that certain animations and orders given to sim objects simply stop working after a while, but once the sim is re-started, they work fine. We have no solution to this effect at this time other than to restart. If your moving objects don't move and your effects don't affect, try shutting down the sim and bringing it back to see if that fixes the problem. Your mileage may vary.   I have seen this on my development system but it's intermittent and seems to have no pattern except the number of missions run without a restart, which varies.

Behavior of moving SimObjects around the user aircraft: FSX/P3D itself, outside our control, will stop a ground SimObject if it is considered a threat to run into the user airplane.   As anyone who has flown with object collisions turned on can testify this algorithm is flawed, but it tends to affect FSCaptain object animations adversely.   Sometimes a vehicle that's supposed to drive somewhere will "hang" because it's too close to the user airplane. We are researching ways around this.

The Olympia Assignments Sample Pack

As both a demo and test bed, a number of typical assignments have been provided based out of Olympia in the US state of Washington near Seattle. This happens to be one of the airports that you can fly from in the free version of FSCaptain. However, at the present time, there is no limitation on where you can fly an assignment from. This is so testers can test anywhere in the world. Assignments ("Missions" on the FCDU) can be highly location dependent.

These are written in the FSCaptain Assignments scripting language and can be seen in the file KOLM.cfg in the FSCaptain\Contracts folder. A few assignments for other airports, including some that are a logical part of the KOLM missions are also in files in that folder. Any set of valid scripts in a file named by an airport will be offered to pilots at that airport.

The rudimentary (but hopefully very accurate) syntax of the language and its capabilities are in a very long set of comments in the file Default.cfg in the Contracts folder, along with some test scripts that will be offered at KAVL my home airport. If you are interested in developing your own at this early point, be aware that the system is still evolving and the language parameters my change slightly. You can use mission types in the KOLM.cfg file as the starting point for your own, and also there is a set of simple missions in the L20A.cfg file for Air America in Laos, illustrating a more semi-military style. See the ASL section in this documentation for more examples and explanations.

Why have a "Contracts" folder?

Strictly speaking, Assignments are a type of flight that can be offered individually, or as part of an FSCaptain "Contract." A Contract is a multi-flight arrangement that can be conducted as multiple ATP flights, or as multiple Assignments. So in the future, a Contract could require you to fly *one million pounds* of cargo from Airport A to Airport B using ATP rules within a time constraint… or another Contract could require you to fly several Fire Retardant Drops within a time constraint….

The Assignments:

Number 10101: Special Delivery to KRNT.

This is probably the first mission testers will see. It's pretty simple and will serve to introduce a newbie to the style of doing these missions.

You have to load up a very special cargo of a human liver and its attendants, and fly it to Renton WA for delivery to a waiting ambulance where they will take it to the hospital for an emergency transplant. This is a "Delivery" class mission and it is timed – you have 60 minutes to complete it.

This should be more than enough time even for a slow airplane. The mission can be flown in any from a tiny airplane to medium one (that is, from a C-172 size to a DC-3 size.)

There's one special requirement: the KRNT airport must be the stock version. (This is so the placement and movement of the ambulance will be appropriate.) If it is not the stock on a particular user's system, they will not see this assignment offered. There is deliberately no special vehicles or animations at KOLM for any of these missions – in case someone has a custom version and therefore wouldn't be able to fly any of them.

Number 10105: Medical Pickup at WN00.

Another medical assignment, but this one is not timed; however, it presents another challenge: you must land and takeoff from a 1300-foot dirt strip. So, a helicopter would work, or a STOL aircraft. I have used the UH-1 Huey, the BN-2 Islander, and the PC-6 Pilatus Porter for this. I should task Travis to try the C-208 to see how well it would work.

This is a "Pickup" class mission. You fly 50 miles north to WN00, pick up the patient, and fly them to KSEA. It's pretty simple. The one wrinkle (other than the short strip) is that the pickup vehicle may not arrive at the airport before you do. This introduces the concept of a "proximity object" - one that the user must get close to before the mission can continue to the next phase. If you land before the red car with the patient gets there, you'll have to wait until it drives up and stops and then taxi close to it (within 50 meters).

The same situation occurs when you land at KSEA. You must find the ambulance waiting and taxi up to it to unload.

Number 10110: Eat at Joe's.

This is the intro to a third class of mission: the Survey class. (Also known as Recon or Loiter.) Where you are assigned to fly around an area for some time. In this case, you take off from Olympia with a banner behind your airplane and are to fly around the Space Needle (do they still call it that?) for 30 minutes. The only real challenge (besides not hitting the antennas on the hill to the north or the Seattle skyline to the south) is the boredom of flying circles for 30 minutes. It's surprisingly hard to do it well. Banner towing is not a piece of cake. (Note there is no actual banner in this mission, because no such object exists in the stock FSX/P3D that we know of.)

Number 10120: Fire Retardant Drop.

And here we are at the fourth class, the "Airdrop" class; the most intrinsically challenging of the non-combat assignment classes. (Other missions may set up in challenging places and in challenging conditions, or may not, but an airdrop is seldom easy to do successfully unless the target area is huge.)

We are assigned to drop 4000 pounds of retardant on a small but dangerous fire only 6 miles from the airport. Note this is a big load, and small or tiny airplanes will be hard pressed to handle it. I typically fly it in a DC-3. It's assigned for any from Small to Large size airplanes. No Tiny or Huge.

It's very short and easy to see the fire once you get within a few miles. The target zone is only 500 meters wise and the drop zone is 300 meters. These are fairly small because the target is easy to see, and the smoke lets you know when you are over it to drop. I did a video of running the mission, so it can be used as a tutorial for an Airdrop: https://youtu.be/wFrlqstKCig.

(You might expect to logically see an example of the fifth class, the attack class here. But as combat missions are quite special and require special set-up to work, we'll go ahead with civilian missions for a while, then we will address the combat style missions when we talk about the set-up required.)

Number 10201 – Special Delivery Part I

This is an example of a multi-location chained assignment sequence. This is a simple delivery to KAST – Astoria. But once you are there, completion of this assignment, plus being located at Astoria, will allow you to pick up part II of the mission right there at KAST.

This is a two-part series that may appear to be shady. You are to deliver this package to a green car waiting as Astoria. It drives away after the delivery and that's it, but you are reminded to look for a special mission here at KAST that requires a STOL or Helicopter.

Number 10202 at Astoria (KAST) – Special Delivery Part II

This is only available at KAST, and only after you have completed the prerequisite mission 10201. You don't have to get it immediately after doing 10201 though. Any time you are at KAST and 10201 is logged as complete in your career log you are eligible for 10202. But you can only fly it once.

When you look you will see this mission and when you accept it the same green car reappears, and you load up a mysterious package to be delivered to a difficult place (STOL or Helicopter required!) You won't know it till you get there, but this isn't even an airfield but a short pasture on an island!

You begin to get the idea this is not an above-board mission when you are constantly reminded to ask, "no questions" in the mission text.

As you approach the target area you may notice a small boat anchored near shore. You land, and should see the white pickup waiting for you there. You deliver the package and the pickup drives away. You are then to fly back to KOLM, mission completes there. But aren't you tempted to see what the truck and boat do? It should be easy to loiter around and track them, especially if you used a helicopter to do this delivery.

If you loiter over the boat once the truck gets there, you may find yourself in a bit of unexpected trouble!

This mission does some interesting object interactions with some tricks. It uses Hold Until Object Close to spawn a weaponized object ("Veh_SafariTourist_02_Sm") at the same place as the boat when the truck gets within 200 meters. Thus, the combat environment of FSCAI will use this object and fire at the user if they're within range. Since the weaponized object is smaller than the boat it won't be seen, so it will appear the boat is shooting at you. The boat holds in place for several minutes then sails away. When it sails it removes the weaponized object first, so it stops shooting and is never seen. It sails towards the ocean for a very long time. (You will gain no points to loiter any further and discern its outbound direction….)

Number 10205 – Medevac at Elma

This is another medical flight like 10105 was to WN00. The landing strip here is longer and even asphalt, but it is still too short for a large aircraft. The only wrinkle is that the pickup point WN65 is right next to a big nuclear power plant and you are picking up a radiation victim. (Makes you wonder what's going in there right?) But the mission is simple, basically like 10105 except to different places. You'll drop off the patient at the ambulance at KBFI and you can be done with it.

Number 10210 – Night Drop

This is another Airdrop class assignment, this time more challenging than the fire-retardant mission. It illustrates the ability to lock effects and objects to time periods. You have to drop a cargo pod in a remote place in a small drop zone, and the only way you can hope to hit it is to approach the target between midnight and 1AM, and if you get close enough you will see a small fire right at the target. But this is a difficult drop to get on target. You can't see the fire as you get over it, and at night there are few outside clues to help. To make it even more fun, there is high ground within a few miles of the target zone so flying low can be risky too.

Just find the fire, drop your cargo (*what is it???*), hope you hit your target, and return.

Combat Assignments

The main unique things about the FSCaptain Assignment System we have so far discussed (as compared to the built-in FSX/P3D Missions system) is that it works in Free Flight without a canned detailed script, and it is objective-oriented not procedural oriented. And that scripts are, compared to the standard FSX missions, easy to create.

But the really amazing this about this, if you are interested in the ultimate flying challenge, is that FSCaptain for the first time in the MS flight sim world brings all the pieces together and fills in the gaps to provide a total, realistic military-style combat mission capability. For years various companies and freeware teams have been dragging FSX kicking and screaming towards the ability to make it a realistic combat simulator. FSX/P3D gives you the whole world, and with add-ons such as ORBX FTX global and Active Sky Next it provides a highly realistic aviation world with accurate weather. FSCaptain has long offered the enhancement that with its "hazard pack" to intensify some of the real-world dangers of aviation such as icing and storms, mechanical failures and cabin emergencies, and even its own collision detection system. (We should note that unless turned off the whole "hazard pack" is operational while flying all assignments too.)

But this version of FSCaptain with its "assignment pack" comes with a very special add-on program that provides the long-missing ingredient to the puzzle of a true combat sim in FSX/P3D: the ability for *any* SimObject in the world to be configured to shoot at the user aircraft with a variety of user-configurable weapons including guns, AA tracers, AAA flak, and guided missiles! And while all these have visual effects they are *not just visual*. They are actually taking aim and trying to damage or destroy you. Your aircraft can be damaged and even shot out of the sky. No longer are the targets you have been blasting just sitting ducks. This will change the way you fly an FSX combat mission profoundly, if you were doing that before now.

FSCaptain does not provide all this by itself. It works with other existing products and freeware to provide its part: the mission scripting system and the SimObject weaponry.

There have been two products on the market, neither freeware, for several years now that give the user aircraft that is suitably configured the ability to hit and damage or destroy AI SimObjects with a variety of air-to-ground or air-to-air or even air-to-sea weapons such as bullets, bombs, rockets and missiles. These are "Captain Sim Weapon" (www.captainsim.com) and "VRS Tacpack" (www.vrsimulations.com). FSCaptain does not endorse any particular product, but we are aware of, detect, and work with these two products in our scripting and combat systems.

FSCaptain provides with the "Action Pack" a special program named FSCAI which creates what we call the "combat environment." This stands for *Flight Simulator Combat Artificial Intelligence*. It contains configuration files and can assign weapons to any SimObject in your environment. It

comes pre-configured to assign 8 seldom-seen stock SimObjects with weapons – mainly all the Safari vehicles such as the "Safari Truck" and the "Poacher truck" and a few other special ones that are not seen driving around airports typically.

FSCAI is an integral part of FSCaptain, and while FSCAI can run outside of FSCaptain, it's not designed to do so, for several reasons….

But if the combat environment is up and your user airplane gets within range of any of the weapons attached to any of these special objects, they will aim and fire at you with whatever weapon their vehicle is configured with. For example, the stock ground vehicle "Humvee" will have a .50 caliber machine gun it can fire at you if you get close enough. The stock "Poacher Truck" has a ZPU-2 14MM anti-aircraft gun that will fire tracers at you. You will see the tracers. If they hit you will be damaged. If a mission places the "Poacher Truck" object in your sim world and you fly near it in the default C172 for example, it will probably shoot you down. Because the C172 is slow and is an easy target.

There is a freeware project named FSX@War which is a sophisticated system for designing military campaigns and placing them in the sim world, so they can be attacked and destroyed by CS Weapon or VRS Tacpack weapons.   Various volunteers are creating "theaters" as I write this, such as Afghanistan or Iraq or Vietnam. These provide targets. And VRS provides one form of opposition currently: you can place SA-2 SAM sites (radar guided long range AA missiles) and they can shoot at you and blow you out of the air. But all other FSX@War ground, sea, and air targets are sitting ducks – until you use the FSCAI program that is packaged with FSCaptain. It comes pre-configured for all the current FSX@War SimObjects to equip them with weapons to create a realistic high-threat combat environment at all levels, from guns down low, to heat-seeking missiles and tracers at medium altitudes, to radar-guided high-caliber flak at high altitudes.

The combination of an offensive product (CS Weapon or VRS Tacpack), a campaign manager (freeware FSX@War for example) and FSCaptain to provide the missions and ground fire opposition gives the FSX/P3D combat simmer all the pieces in the whole FSX world with its realistic environments.

This is why we have granted unlimited use of the Assignment system of FSCaptain until the "End of Free Assignments Date" of May 30, 2018.

So how do I do it here on my system?

You must obtain all the necessary products and configure them. Doing that is outside the scope of this manual.   We will give some general guidance.

First, if you are not interested in blowing things up but just want to dodge bullets and other directed-metal items you don't have to have any of these external products. The FSCaptain Action Pack gives you all you need with FSCAI and scripts for missions from KOLM that are airdrops or surveys in dangerous hostile territory. FSCAI is automatically started whenever a mission calls for a potentially hostile environment – that is, if it is an "attack" class mission, or even if it's not if the Requirement=FSCAI is in the script.

But if you want to attack things (fly attack missions in FSCaptain) you must install either VRS Tacpack (www.vrsimulations.com) and/or Captain Sim Weapon (www.captainsim.com) and you must have at least one airplane configured to equip their weapons. If you are new to combat this can be a steep learning curve. CS Weapon is simpler and less expensive, but VRS Tacpack is more comprehensive and authentic.

If you want to get more in depth, consider the FSX@War freeware project which is under development but in an advanced state where it's very effective at providing a realistic FSX military theater of war. Installing that alongside your offensive weapons package and weaponized airplane(s) and FSCaptain Action Pack with its FSCAI program and you have everything you need to fly realistic challenging combat missions in FSX/P3D.

The FSCaptain Action Pack also comes with missions that are tied to the freeware Vietnam War Project scenery and a FSX@War "pack" for Southeast Asia in the 1960s so that you can fly a career as an Air America pilot. This provides many challenging missions both combat and non-combat. The Action Pack comes with the FSX@War Vietnam pack as a part of it. If you already have the Vietnam War Project scenery layers installed and FSX@War installed just install the Vietnam pack from FSCaptain. We even provide Air America as a canned pre-built airline, ready to go! There is a complete PDF guide to the many and interesting Air America assignments in your FSCaptain\Documentation folder called AirAmerica.pdf.

There is one more requirement to mention. In order to be offered an attack class mission, the airplane you are currently in must be designated as "combat capable". This is done from the Aircraft tab in the FSCaptain Administrator, or manually by adding the statement COMBAT=1 to the aircraft file in the FSCaptain/Aircraft folder.

Surviving (and Winning) Aerial Combat

Overview

It's no secret that FSCaptain when combined with the FSCAI Combat A.I. system makes realistic combat scenarios possible in the FSX/P3D world of simulators for single player and multiplayer alike in free flight mode.   Like we said, in order to have offensive capabilities you must also have either VRS Tacpack (www.vrsimulations.com) or Captain Sim Weapon (www.captainsim.com).

Flying in a hostile environment may be the ultimate challenge to your flying skills. It's certainly not easy. Here we'll give you some advice that you will be very wise to pay attention to.

The combat environment of FSCaptain, FSCAI, is not some simple implementation of hostile action. It has been over a year in development, and is deep, realistic, and comprehensive.   It seeks to give you, the sim combat pilot in FSX/P3D, the same set of challenges faced by real pilots in both historical and modern environments. The dangers you face are serious, but they can often be overcome by very skillful flying and very careful planning based on sound knowledge of the enemy capabilities and how to defeat them. That said, there is nothing you can do to make yourself invulnerable except not accept the challenge. Even the best of us have a bad day.

This version addresses only air to ground and air to sea combat. We are working on the ability to engage AI aircraft in air combat, and expect to see that in a later version.

Know your Enemy

There are hundreds of ground-based air defense systems that have existed, and dozens that are still commonly used today.   The attention of the public is focused on guided missiles, but historically and to this day more aircraft are lost to the more traditional projectile-based systems than fancy stuff. Missiles are deadly and scary, but there are relatively few of them compared to the many guns you will face, some radar-guided. In any accurately designed FSCaptain scenario this will be true also.

Layers. It's helpful to think of an air defense in layers.

At the bottom are the smaller guns – everything from an angry farmer's rifle to the quad-50 improvised units the Viet Cong put together from captured weapons in the Vietnam conflict. In FSCaptain you won't see these guns except you may catch a glimpse of a muzzle flash, and you won't see their bullets. But anytime you fly under 2500 feet or so in the vicinity of the enemy, you can assume the air is filled with invisible lead slugs. A single bullet is not extremely likely to do major damage, although it certainly can – *the so-called "magic BB."*

The next layer is the smaller caliber Anti-Aircraft (AA) guns. These typically fire tracers and you will see them. The one you'll see implemented most often in FSCaptain missions is the Soviet-era ZPU-2 which is effective up to about 5,000 feet. These are 14mm rounds and they can tear a pretty decent sized hole if they hit you. If you are flying a mission that uses the FSX@War package you may also run up against the dreaded ZSU-23, the "Shilka" a radar-guided multibarrel mobile AA gun.

The third layer is the "flak" layer. These are larger caliber AAA (Anti-Aircraft Artillery) and some of them are radar-guided which greatly increases their accuracy and ability to shoot you even in clouds or at night. FSCaptain typically implements the Soviet ZSU-37 which fires a 37mm explosive round up to an effective range of 10,000 feet. In those FSCaptain missions that include FSX@War you may encounter even more dangerous flak, particularly the KS-12 and KS-30 which are effective to 15,000 or even the S-60 which is radar-guided. Flak is visible (and audible if close enough) air bursts near you. There are many flak guns that go higher but FSCaptain does not equip its combat vehicles with them at the present time – although they are provided in FSCAI.

The fourth and most scary layer is the heat-seeking guided missiles. There are many of these too, but in a typical FSCaptain mission you are only likely to see the SA-7 and SA-13, the "Strela" and "Strela II". The SA-7 is a smaller missile that is usually fired by an individual – a MANPAD or Man Portable Air Defense weapon. The SA-13 is usually mounted in a four-tube launcher on a mobile vehicle. Either can give you a very bad day before you even know it. The SA-7 is effective to 7,000 and the SA-13 to 12,000 feet.

Memorize these. You need to know them. Seriously.

Guns – effective in a 1,000 meter range up to 2,500 feet. Invisible bullets.
AA Guns – effective in a 2,500 meter range up to 5,000 feet. Tracers.
Flak Guns – effective in a 3,000 meter range up to 10,000 feet, but not below 1,000 feet.
SA-7 Missile - effective in a 2,000 meter range up to 7,000 feet, but not below 1,000 feet.
SA-13 Missile - effective in a 4,000 meter range up to 12,000 feet, but not below 1,000 feet.

You can fly under flak or missiles, but you face guns and AA guns down there. Above 10,000 you are safe from everything except SA-13 and the heavier flak, KS-12, KS-30, and S-60 which go up to 15,000. You are pretty safe from everything FSCAI will throw at you above 15,000.

How to Avoid Getting Shot Down

Obviously, the safest thing to do is to stay away from as much of this nastiness as you can. Hopefully your mission text will give you a general idea of where the major threats are. But this isn't perfect, and there is no magic that will help you. Combat vehicles are hard to see from the air. They often hide, for obvious reasons. This reminds me of the advice I was given on how to tell if a snake is poisonous – look for pits under its eyes. If you are that close *you are too damn close already.* The same applies here. Often getting low enough to identify vehicles means you are already in range and they have probably heard you coming and are lining you up in their sights as you approach.

There are some ways around this problem, but you are likely to need help. Read on.

Quite probably your mission is to damage the enemy, and therefore you will have to expose yourself to their defenses. The next best thing to avoidance is to target the air defenses first and take them out, then the rest are sitting ducks. This is not very easy to do, for the above reasons, but again, there are ways – they will be discussed shortly but not before we cover more basics, because the more sophisticated methods are dependent on help being provided by elements of the mission and they may not be there every time and they are not perfect.

But let's talk about the basics of survival in combat against ground defenses.

Despite all the modern technology, the majority of air defense weapons are operated by human beings, and they depend on their eyes, ears, and brains. Moving aircraft are quite difficult to hit from the ground using ballistic projectiles. AA guns have sighting systems and computers to help, but still, lead must be computed accurately and it's often a long way from the gun to the target. This is why there are so many of these type guns – they depend on quantity of lead as much as quality of aim. And at that they are very effective.

Your main techniques all involve speed, distance, and angle. Generally, the faster you are the safer you are – but angle offsets this. A jet roaring by an AA gun at 300 knots is almost impossible to hit unless you are very lucky. But the same jet flying straight at – or straight away from – the gun might as well be stationary no matter how fast they're flying. The only advantage of speed then is that it reduces the time you are in range and exposed. Distance is very important – the further away you are from the shooter the less likely you are to be hit. This is true both in the horizontal and the vertical planes. Stay high, and stay away – except that you often have to violate that rule to get them.

This is where I warn you about a sin I commit – pressing the attack. Unless you have fancy-dancy modern miracle standoff weapons to fire at them accurately from outside their effective range, you are going to have to go at them. That means the closer you are the more likely you will hit them. But the more likely they are to hit you. I have been tagged more than once after the bombs were

dropped. I got them, but they got me too. This is a judgment call, but almost every time I have been the victim of some gunner it's because I got too close trying to be sure I blasted them. That, and the damn missiles.

But let's not talk about them quite yet. Another ally you have against the Mark I eyeball of your opponents is visibility – or lack thereof. The less they see of you the less they can hit you. Take advantage, if possible, of clouds and darkness and even the sun behind you. *Always be sure to turn off all your aircraft lights before you enter the danger zone.* Nothing like giving them something bright to aim at to help them out!

Memorize those numbers for the weapons systems. Only expose yourself to what you absolutely need to.   I have seen videos of sim pilots that seem to love very-low-level bombing runs. Well that's only sane if you are bombing a factory that's *only* protected by flak and/or missiles – it's perfectly sensible and right to go under those. But if there are gunners scattered all round, as there often are, you are exposing yourself to a hail of lead that you are trying to fly through and hope nothing hits you. Good luck with that. Know your enemy – knowledge is power, and survival.

So, now about those missiles. As an attack pilot, I *hate* missiles. I particularly hate the Strela. I have swung underneath a simulated parachute more times than I would like to admit, listening for the distant boom of my former airplane hit the ground, as a result of a most unpleasant encounter with a Strela.

The SA-7/SA-13 is a heat seeking missile. As such, it is not detectable by aircraft. Unlike radar-guided missiles that can be detected and shown on your RWR (if you are flying a modern jet and have one of those handy things) a heat-seeker can only be detected if seen. And they are hard to see, especially in the sim. They leave a white trail of smoke, but it's not huge, and if they aren't fired from inside your current field of view you probably won't see it. In that case you will soon *hear* it – as an almighty BANG following by the beeping of your cockpit warnings. Probably time to pull the old trusty ejection handle.

And of course the real fun thing about them, the most fun thing of all, is that the crew that shoots them doesn't have to aim except in your general direction. The missile uses its on-board IR sensor to lock onto the heat from your engines and it will track you down. This opens up one of the ways, maybe the best way, to beat them. Almost all modern aircraft can launch flares to distract these missiles into locking onto the heat from the flare. VRS Tacpack provides these flares and most Tacpack powered aircraft allow you to drop them.   The FSCAI system that's powering the missile will see these VRS Flares and they may, just may, spoof the missile into going after them. It's way better than nothing. When in range of a Strela, pop flares. Any one of them may save your day.

When I know I am up against these babies, there are only two possibilities: 1) avoid them, or 2) destroy them. Let's talk about that.

How to Destroy Air Defenses

Well at least the *concept* is simple. In the FSCAI world, all weapons are attached to a SimObject. Destroy (or damage) the object, and the weapon won't work anymore. Easy, right?

In the rare case of you going mano-a-mano against a single defender, it's really not too bad. I have even (since this is a sim and my life is not really in danger) gone up against an SA-13 in an A-10, and dodged and/or spoofed four straight missiles. The SA-13 has four tubes, and once they are shot the re-loading process is very time-intensive. They were helpless then, and I just flew in and was able to render them combat-ineffective with the GAU-8. But to have gotten in range of the GAU-8 and made the kind of straight-in approach it requires would have been suicidal until their tubes were empty. A missile would have brought me down long before I got in effective range of the gun. Even using flares, the odds of four straight getting spoofed without me dodging around are not good.

For the other weapons, against just one, you can just brazen it out.   They might get you, but the odds are stacked for you assuming you don't miss on the first pass. This is especially true on your first attack. It can take some time from when they first notice you until they are ready to fire. Take advantage of this time and they might not get off a shot. How long this can take is dependent on the skill of the ground unit. Ground units are assigned different skill levels by the mission script. They vary from 1 (a raw barely trained recruit) to 9 (a deadly expert). An expert can be ready as quickly as 20 seconds after you get in range. Recruits can take 2 or 3 minutes. Also, skill affects accuracy of course also, as well as re-loading times and other things.

But – and this is the big but – they are rarely caught out alone. Any decent air defense has multiple units at each layer. Lots and lots of guns on the ground, many AA guns, some flak, and maybe a few missiles. Flying into all that is, uh, not likely to end well. For you, at least. They may well get a medal or at least an attaboy.

So you have the attack pilot's conundrum: how to get at them without getting too close to them.

There's the modern acronym SEAD – Suppression of Enemy Air Defenses. This is usually a carefully planned assault by multiple units in a carefully choreographed sequence.   In your case, it's likely to be you and maybe a few good friends in a multi-player setting. But you can still do some SEAD, even alone. How depends on the tools you have available.

If you are facing missiles you probably should have some of your own. It's not really fair to put up WWII attack planes against modern defenses unless you as a pilot enjoy pain. In the sim anything is possible, but not everything works well.   I will assume here than your offense is the same time era as their defense.   This mainly applies to such things as missiles and radar-guided AAA.

So, first use your missiles to take out their missiles. It's as simple as that if you can do it. Then use more missiles to take out the flak, then the AA guns, then finally the smaller guns, if you have enough missiles. Hopefully you have the range to stay out of their range.

But this is not as easy as it sounds. You need some help. And the FSCaptain/FSCAI system can provide that help, realistically. Many combat missions have built-in forward air controllers - FACs and/or JTACS. These special units can be on the ground or in the air. They are your eyes. A FAC – Forward Air Controller – can mark air-defense threats or other targets with colored smoke so you can see where they are and bomb them from altitude or target them by other means, depending on the aircraft. A JTAC – Joint Tactical Air Controller – has also the ability to shine a laser beam on a target, and this beam can be sent to the VRS Tacpack system by FSCaptain so that any laser-guided weaponry will be able to hit precisely on target – without you as the pilot ever seeing them at all.

The FAC/JTAC system has realistic limitations and it is not a magic spell to seek and destroy your enemies. First, a FAC/JTAC has a limited visual range. This depends on many factors – mostly the terrain. A FAC in a jungle is not going to see very far, as opposed to one in a desert. The FAC/JTAC is a SimObject given that power by the script. The location of the object will determine what enemies are seen and what are not. The JTAC may report he sees no SAM. That doesn't mean there isn't one – it means he can't see one. Also, if the JTAC unit is destroyed either by enemy action or friendly fire (that is, by *you*) he won't be available to help you.

Yes, you can destroy your own units. It's not good for your score or your reputation, but it does sometimes happen. The mission information should indicate where your friendly forces (if any) are located. Also, the FAC/JTAC can pop blue smoke on friendly positions so you can see roughly where they are. And of course, the JTAC won't lase his friends. But bombs go astray, and they are no one's friend once they leave the aircraft.

But at some point, after all the planning and preparation, you are going to go in for the attack.

First, double-check to be *sure* you *know* where your target is. It's very easy to become disoriented while flying a fast attack plane in a combat environment, even on a clear day; and often in your typical environment here you have to factor in low clouds and high mountains.

Execute the attack as quickly as *swiftly* as you can, using maximum speed. Try to not fly in a straight predictable path if you're being shot at. If possible, attack only once, then get out of there. The gunners will be much readier for you and more accurate on subsequent passes. It's really more important to survive for another try later than it is to hit the target.

Remember you must keep your wings level when releasing weapons or they will not likely hit the target but go wide. Don't release bombs too early or too late or they'll miss short or long.

To be successful takes practice. I recommend a practice range and using it often before you have a go at this for "real."

The ASL – Assignments Scripting Language

FSCaptain Assignments are not at all like the FSX Missions system. That system is highly general-purpose and is based around a complex of triggers and actions. Each mission in the FSX system is "canned" - each path to success is scripted, and other factors such as the aircraft you fly and even the weather is specified in the mission. Despite specifying such exact parameters, the actual language of FSX missions can be set up to control almost anything. The advantage of the system is its flexibility, but it pays for this by being quite complex to set up even a simple mission, and the triggering system is hard to understand.

The FSCaptain system works entirely in free flight. You choose your world environment and the aircraft you will use. The concept is goal-oriented. A clear goal is specified and the system tracks whether you have accomplished it or not. The result (unless you abort the assignment) will be recorded in your regular FSCaptain career log with a score based on your performance. How you accomplish the goal is largely up to you.

An FSCaptain Assignment flight is not tracked like a regular FSCaptain flight. There is no hand-holding. You do not have flight attendants and although you will have first officers with you they are not concerned with your procedures or flying style, only with the condition of the airplane. They will have much less to say than on a standard flight. There is no dispatch office, except to provide weather advisories. You must handle your aircraft's own fuel needs.

The Assignment system is designed to be simple to understand and to write scripts for. In order to achieve this instead of an open-ended set of triggers and actions, we have chosen to implement a set of five patterns which were discussed above. Each assignment pattern (which are also called missions in the FCDU, the terms mean the same thing in this context) is based on up to three geographical points. We are considering enhancements to allow more points per assignment, but the essence of this system is it is designed for short one, two, or three step tasks.

It's surprising how many complex and realistic aviation tasks fit into these five patterns with up to three points.

The result of using this structure is that a simple but realistic and potentially very challenging assignment can be written in only four lines of code. Assignments can be scripted in minutes not hours, depending on how many "extras" you include like animations and effects. But animations and effects are optional – any assignment can do without them and often do.

The language is described fully in the companion document 'The Assignments Scripting Language' available in the FSCaptain Documentation folder.