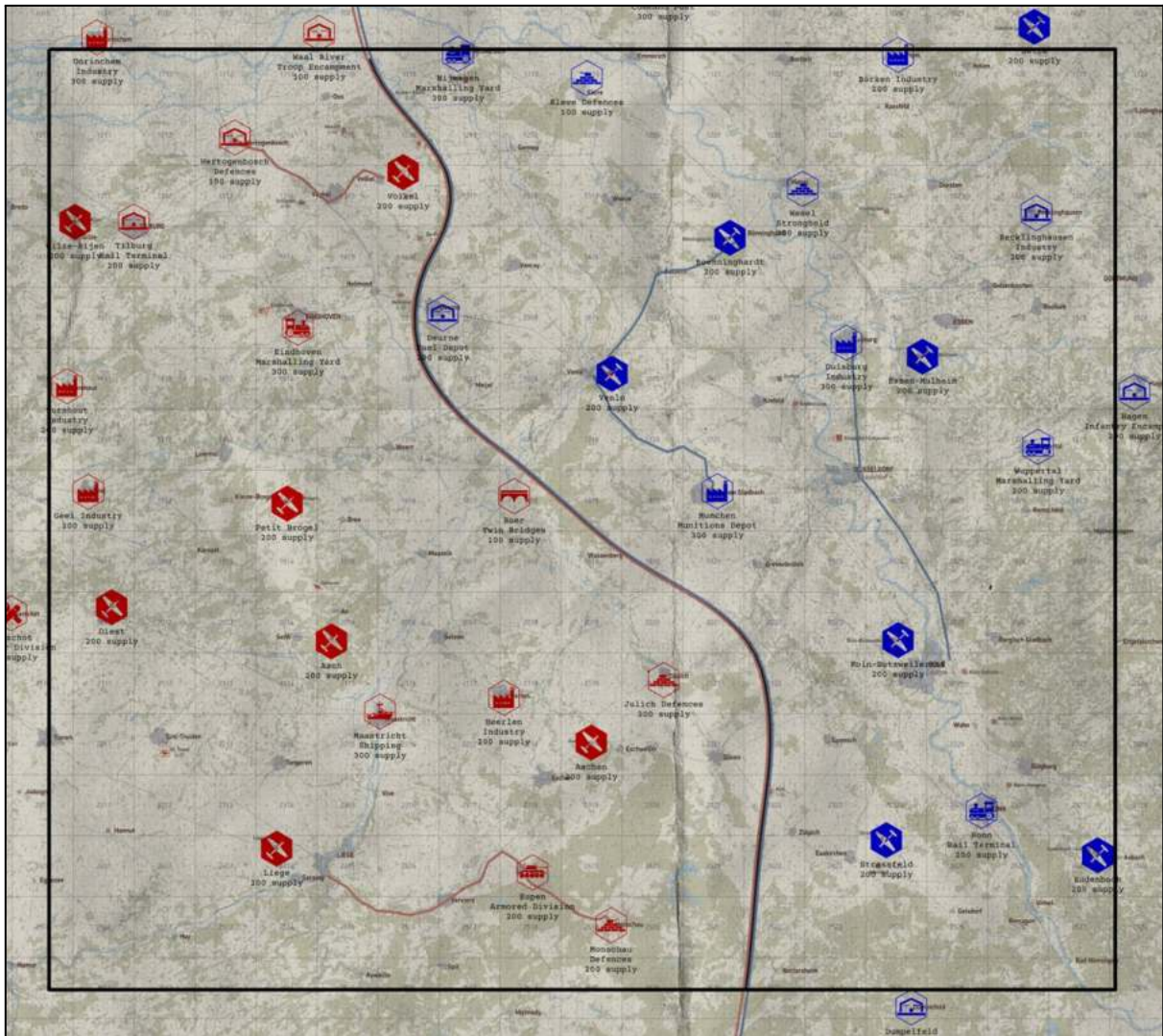




Combat Box "Apollo" Project

Dynamic Campaign Documentation, v0.7



With special thanks to all those who contributed to this project. This is a group effort including the Combat Box admin team, community members, and special guests. Without your inputs we wouldn't be where we are today – thank you!

Original design document by John "Sketch" C.

Updated by Alonzo, Sketch and Stilgar. Most recent update March 2023.

Why build a dynamic campaign?

Combat Box has always featured historically inspired, hand-crafted late-war missions. The team created the server with one goal: build a server that we'd want to fly on. While we've been successful and Combat Box is a "top-3" IL2 server, the individual missions feel more like a "capture the flag" sandbox than a cohesive war simulation. We now want to build something new – a true dynamic campaign where pilot actions have persistent effects over the course of the war.

We want to have a diverse plane set and for players to value their virtual lives. But we also want the game to feel welcoming to new and returning players. We want players who are playing the campaign to be able to fly alongside players who aren't, and we want players who value their pilot life to be as effective as pilots who are simply logging onto a highly populated server for some guaranteed action.

The new Combat Box campaign combines high quality hand-crafted objectives with a persistent war simulation and detailed pilot career tracking. The campaign is integrated with CB Radio, our SRS voice bot, to assist players and act as a force multiplier. The war ebbs and flows with player actions dictating the pace of the war, the movement of the front line, and even the available aircraft at each airfield.

Feature set

Dynamic Campaign

The Apollo campaign engine tracks airfields, airplanes, objectives, convoys, supply levels and the movement of the front line. Apollo even tracks damage down to the individual 'block' in the campaign, including civilian buildings. As the war progresses, towns, airfields and objectives will become visibly more damaged. Players interact with objectives and when they do, it influences the outcome of the war.

Unique Missions

Players who choose to "opt in" to career mode will 'possess' one of three pilot characters – RAF, USAAF or Luftwaffe. Players are able to choose between different types of missions, based on the current status of the war and their preferences. The missions range in difficulty and include rewards, campaign effects, and other consequences. Squadrons can fly missions together as a group by sharing mission cards before they begin their sortie.

Pilot Progression through Fame

The Apollo stats system does not represent the player, but the pilot the player possessed instead. This is the "opt in" feature that is unique to our campaign. The player's pilot is awarded when successful, and players are able to see their pilot's success by viewing their pilot's details page. Players will want their pilot to stay alive as long as possible to gain as many points for their pilot as possible. These points are called fame, and the more fame a

pilot has, the more recognition he will receive (including promotions, awards, and more). Players will make legends out of their virtual pilot. Legends will be remembered in the museum, right next to the first Apollo mission to the moon.



What your possessed pilot could look like when famous. Image by Grifforik.

Allowing Passive Players

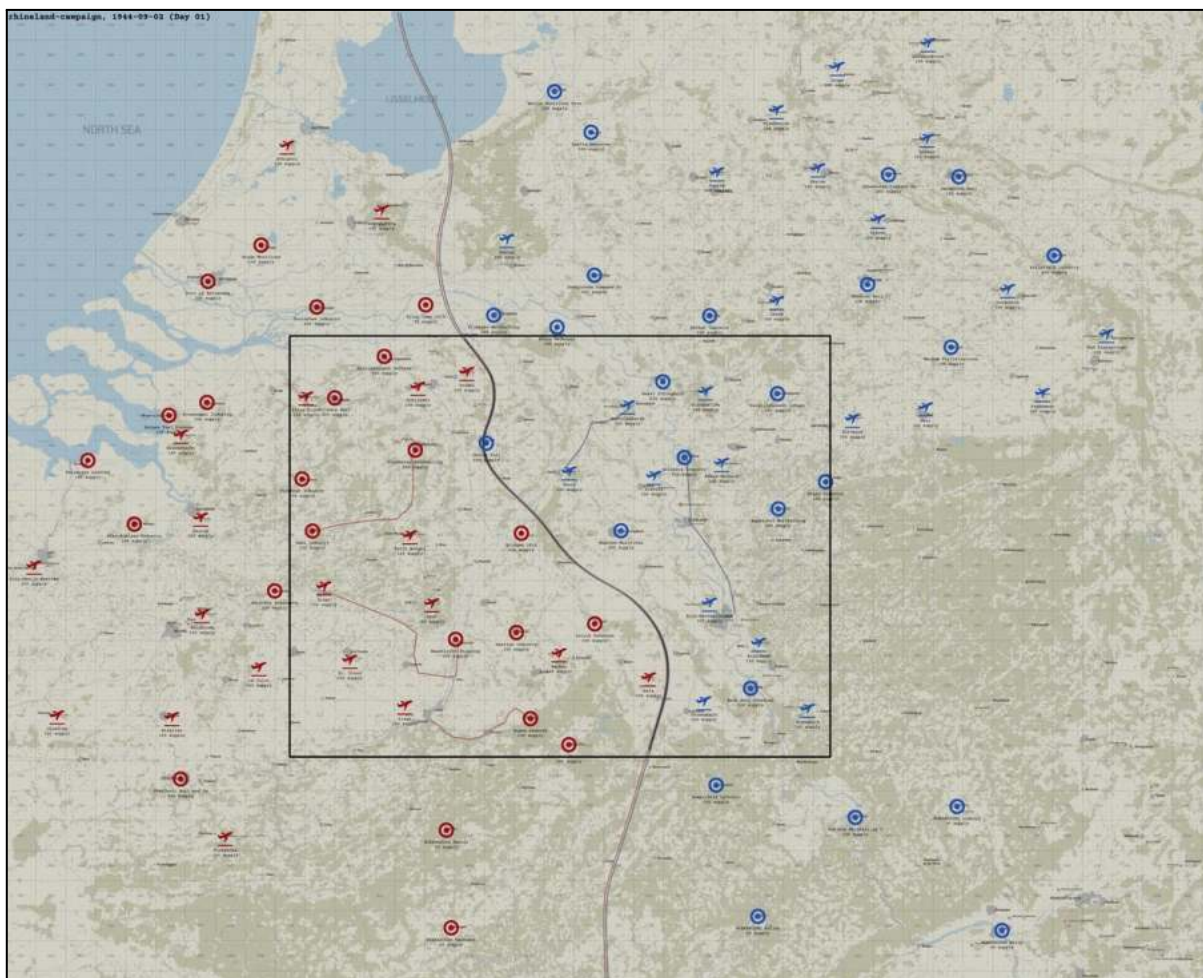
Players don't have to opt in and can just get into the server for a quick dogfight. When they do, they still possess a pilot automatically. In this way, they are influencing the dynamic campaign, and they can return to their pilot if they choose to opt in. Of course, their pilot character will not become famous and passive players influence the outcome of the war less so than their opted in counterparts.

Understanding the campaign

Play area and campaign days

The campaign begins in September 1944 and follows the course of the war across Europe, starting from a predefined position and front line, and takes place across the entire IL2 Rhineland map. There are many airfields and strategic locations that might be included during the full course of the campaign, more than would make sense for fun gameplay for an individual mission. The campaign generator manages the supply state and front-line for the entire campaign map, but chooses a specific “gameplay area” for each day’s mission. The campaign progresses through ‘days’ where a campaign day is an IL2 mission that is two hours long. Some campaign elements, such as aircraft availability, are affected by the date. Each campaign day includes randomized weather, time of day, and wind direction.

The mission generator looks at the front line and positions the day’s mission in approximately a 160 km x 140 km area centered on the front line. This play area is automatically moved to track the “most contentious” point on the front line – the point where opposing forces are most heavily concentrated. The play area moves at most 20 km each day, to give continuity between one day and the next.



Visualization of campaign progress. Image by Psyron.

Supply and supply levels

'Supply' is the core mechanic we use to track the 'health' of airfields and objectives in the campaign. Most player actions and campaign mechanics ultimately come down to having an effect on supply. Airfields and objectives are both considered "supply points" within Apollo.

- Small objectives have a maximum of 100 supply
- Medium objectives and airfields have a maximum of 200 supply
- Strategic objectives have a maximum of 300 supply

At objectives and airfields, and especially at large, strategic objectives, there is a lot of defensive flak protecting that position. But AAA skill, number of guns, and respawn time is affected by the supply level at the objective or airfield. It may be a valid tactic for players to level-bomb an objective in order to knock its supply down a bit, then go back the next day with precision strikes once the AAA has been softened up.

Airfields and strategic objectives are supply generators, and supply moves between supply points in order to repair and reinforce positions. The supply system and resupply calculations are discussed in more detail below.

Airfields

Previous Combat Box missions have included protected airfields, where vulchers are kicked from the server. **The campaign does not include any safe airspace.** In fact, player airfields are highly strategic and likely to be attacked by the enemy. That said, they are well defended and have considerable anti-aircraft capability. With the current size of the campaign play area, both sides usually have five or six airfields available on any particular day in the campaign. This should mean that players at least have a choice about taking off under fire, or moving to a safer airfield.

Airfields close to the front line are mostly abandoned by their side due to the nearby fighting. Players cannot spawn at these airfields, but they do contain a repair / refuel / rearm truck, marked by yellow smoke, and players can finish their sortie at these airfields if they wish.

Airfield locations contain multiple spawn points to account for the different wind directions to ensure pilots can take off using the best runway for that day's weather conditions. Some airfields feature upwards of four spawn points, others just a couple. The active runway is marked with signal fires, and you can "request airfield conditions" on SRS channel two to get an update from the airfield controller.

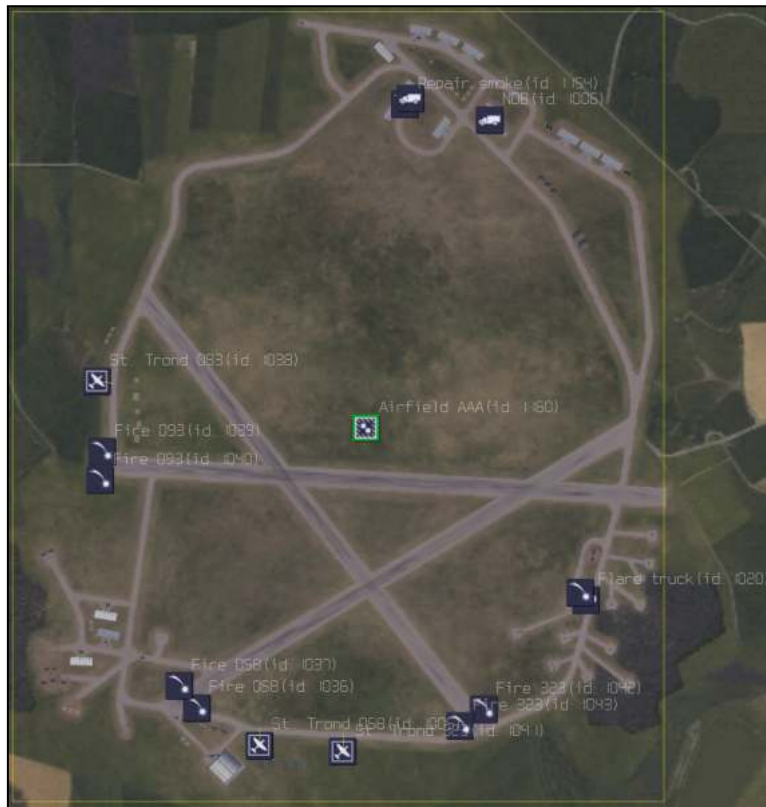


Image of the mission editor showing multiple spawn locations. Only the best location will be chosen for the 'day' in the campaign. Image by Alonzo.

Aircraft availability

The current date in history, as well as supply at each airfield, its distance from the front line, and its runway surface and length determine which airframes and loadouts are available. But:

- Supply dwindles as you get closer to the front line. Because of this, players will get 'worse' airframes at the front line, with more limited loadouts. Rear airfields tend to have more airframe choices, more mods, and better loadouts.
- Player airfields always have Repair, Rarm, Refuel, marked by signal smoke and a fuel truck. If the truck is destroyed, RRR is unavailable for the rest of that day in the campaign.
- Each airfield accommodates both 'casual' players and 'on mission' players. Regardless of where a player spawns, they are taking part in the campaign.
- Players attempting to fly a mission will need to pick the correct loadout. If they alter the loadout, we try to detect it, and warn them that they have the wrong loadout selected (via chat, website, and SRS). **(not yet implemented)**.

1	A	B	C	D	E	F	G	H	I	J	K	L
	Airframe	AvMods	AvPayloads	Country	Min Date	Min Supply	Min Distance To Front Line	Comment				Default Skin
2	a20b	1/3	1..2000	US	1943-01-01	80	0	No 250kg wing bombs				a20bia20b_blank_09.dds
3	a20b	1..10	1..2000	US	1943-01-01	150	20000	Full loadout not available close to front line				a20bia20b_blank_09.dds
4	a20b	1/3	1..2000	GB	1943-01-01	80	0	No 250kg wing bombs				a20bia20b_blank_04.dds
5	a20b	1..10	1..2000	GB	1943-01-01	150	20000	Full loadout not available close to front line				a20bia20b_blank_04.dds
6	p38j25	1/2/4/5	1..4/8/9/10/11/15/18..1000	US	1943-09-01	50	20000	No extra racks, no 1,000 or 2,000 bombs				p38j25p38j25_blank_01.dds
7	p38j25	1/2/4/5	1..2000	US	1943-09-01	160	40000	No extra racks, but big bombs included				p38j25p38j25_blank_01.dds

Airfields are valid targets for player attacks. Many of the best aircraft types are only available when an airfield has a large amount of supply. Doing damage to enemy airfields is a good tactic for reducing the airframes available to them, but remember that airfields are difficult, well-defended targets.

Coalition balancing

Apollo includes a 'soft' coalition balancer that progressively closes airfields when one side outnumbered the other. The balancing starts off gently, closing just one or two airfields that are closest to the front line, but will close all but one rear airfield if one side significantly outnumbered the other.

Control of objectives

Objectives are controlled by one side until either the front line moves past the objective and it is captured, or the objective is damaged enough to reduce its supply value to zero. Objectives do not change side in one mission roll, they first become neutral for one day in the campaign and can then (depending on the position of the front line) switch to being controlled by the side that owns their territory.

After an objective is captured, it is immediately repaired to 20% supply level, unless it is close to the front line in which case it is repaired to 10%.

At the completion of a 'day' of the campaign, damage done to objectives is used to reduce the supply at that objective. Objectives and airfields resupply each other by moving supply from well supplied to weakly supplied points. Supply only moves 'towards' the front line, however. Airfields are useful in that they can bring in supply by air, effectively creating 'free' supply rather than moving it from somewhere else on the map.

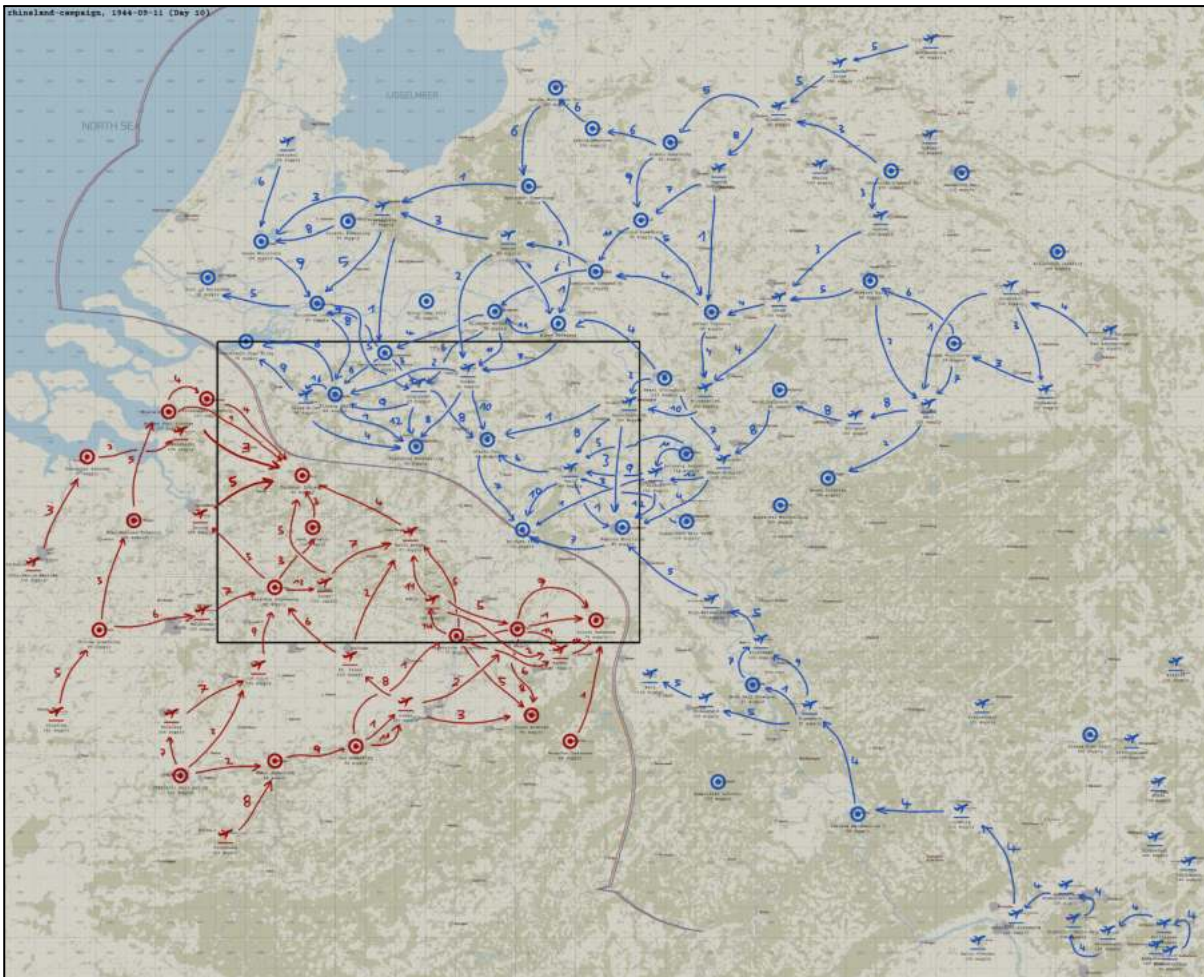
Moving the front line

Once player actions are processed, we calculate the new 'supply' value for each objective. Then we recalculate the position of the front line. Objectives and airfields radiate 'influence' across the map and, using the previous day's front line as a starting point, we move along the front line calculating the new midpoint for "no man's land" between the two sides. We then move the front line to match the new midpoint.

Here is an example visualization of the influence calculation. Allied forces are shown in yellow and red in the heat map, Axis forces in blue and purple. The campaign system has plotted a front-line between these two sets of influence, working its way along the "no-man's land" in

- 'Strategic' objectives at 300 supply can send up to 60 supply 75km
 - 'Medium' objectives and airfields at 200 supply can send up to 40 supply 50km
 - 'Small' objectives at 100 supply can send up to 10 supply 25km
- If a supply point is damaged, it will be able to send less supply. So a strategic objective that has been damaged down to 100 supply can only send 10 supply a distance of 25km. Supply is affected by linear falloff, so the further a point tries to resupply, the less it will be able to send.
 - Supply points need at least 80% supply to donate supplies to nearby objectives.
 - Supply points can *receive* at most 33% supply each day.

Once supplies have moved between airfields and objectives, airfields and strategic objectives receive 25 supply, to a maximum of 200 supply per side across the whole map.



Visualization of supply movement. Image created by Psyron.

Supplies are used to repair objectives and airfields. In general, smaller items will be repaired faster than larger ones. As the campaign progresses, objectives will become visually more and more damaged, as big items such as hangars and industrial buildings take a long time to repair.

Dynamic convoy system

The campaign contains several dozen rail and road convoys. These are activated based on the day's play area, up to two convoys per side. If a convoy arrives at its destination, it will bring a supply bonus to that location. It's in players' interests to attack (and defend!) the convoys. Convoys always travel from better supplied to worse supplied locations, and if they arrive they give a significant supply boost to the receiving point.



Waypoints in a supply convoy.

CB Radio Integration

Each day in the campaign brings a new configuration of the map. The Apollo campaign system automatically creates a CB Radio configuration file, allowing pilots, who use SRS, to get GCI support from *Kenway*, *Longbow* or *Command* as they would expect on a regular Combat Box mission. SRS is a voice communication program that you can get [here](#) and learn more about from the [Stormbirds Flight Sim News](#) magazine.

What to expect, and how you can help

We're excited to be testing our campaign system with the general IL2 player base. There will be bugs, but the campaign system runs decently, generates sensible front lines and campaign states, and tracks player influence as the war wages across Europe.

We're not sure how performance will scale with players – this system is ambitious and uses a lot of server processing power under the hood. Please bear with us in this public tech alpha.

Stats will be tracked using both the career mode website and the normal IL2 stats website. Career mode is what we are building out – it will be the eventual 'leaderboard' and show pilots, fame, awards, and other career-related stats. IL2 stats will continue to be available (for now) so you can get detailed statistics and cross-check against the career mode website.

The best way to get involved is to log in and fly! Join us on our Discord or SRS for voice chat, and use our special "apollo-test" channels to give us feedback.

Change log

Tech Alpha 7 "Career Mode" March 2023

Career mode changes:

- New career mode!
- Full blown web UI powered by next.js
- Discord Login
- Pilot portraits and limited stats
- Mission card
 - Crowd sourced card art
 - Up to 3 planes to choose from, depending on mission type
 - CAP, ground strike, strategic bombing, tank and train hunting and attack/defend convoy missions are all generated
- Mission tracking overhauled. The mission tracker is more sophisticated and will properly track CAP missions.
- Group Operations
 - Share your cards with your friends!
 - Group Operations are tracked just like solo missions, but mission requirements are shared amongst the whole flight.
- Manual added
- Killed/captured pilots are saved for the duration of the campaign

Campaign changes:

- Win condition updated. One side loses if they have fewer than 3 airfields in the active area or if they have less than 700 total supply.
- The campaign back-end now receives bonus events such as bonus supply damage or bonus resupply from the career mode website.
- Deurne is now USAAF, to break up the "big blob" of RAF airfields.
- Supply system overhauled.
 - Both airfields and 'strategic' targets can now generate supply, up to the daily maximum per coalition.
 - The distance supply can move is influenced by the supply level of the 'sending' supply point. A pristine 300 supply strategic objective can send supply 50% further than a medium sized 200 supply objective, and a 100 supply small objective can only move supplies half as far again.

- The amount of supply that can move is also influenced by the supply level of the sending supply point, with better supplied points able to both send and receive more supply each day.
- Convoys now only travel from a better-supplied point to a worse-supplied point.
- Objective repair overhauled. Individual block damage is still tracked, but Apollo now always attempts to repair enough blocks that an objective can be killed with “obvious” block damage (bunkers, buildings, etc). Non-obvious damage such as very small ammo stores should not be required for an objective kill. Additionally, Apollo repairs block categories in proportion each time. This means an industrial objective should always have industrial blocks ready for players to destroy.
- Objectives and airfields overhauled
 - All objectives and pop-up objectives now contain more blocks and so should be more easily fully destroyed.
 - Added multiple objectives in the Northeast where there were no objectives nearby, including Schoppingen Long Range Relay Station, Vreden Ball Bearing Factory and Ludinghausen Bridge Blockade.
- Pop-up objectives now spawn slightly less often.

Gameplay changes:

- Durability on “static” tanks has been reduced, so they should be killable with cannon.
- Convoy announcements now also go out via CB Radio on SRS.
- AA overhauled
 - Guns are now chosen with a 25% puffy flak, 50% large calibre tracer, and 25% machine guns distribution.
 - Machine guns respawn faster than large cal tracer guns, which respawn faster than ‘puffy’ flak.
 - AA at player airfields is stronger, with slightly more guns that respawn quicker. Additionally, player airfields with at least 75 supply get ‘high’ skill guns (previously 100 supply was needed).

Bug fixes:

- Default payload ID for aircraft is now 0, instead of 1, so the aircraft selection screen starts with "vanilla" loadout.

Cosmetic changes:

- Wind speed and bearing is now listed in the in-game mission briefing.

Tech Alpha 6 “Midwinter Edition,” February 2023

Campaign changes:

- Apollo now has a win condition! If one side controls fewer than 3 airfields in the active play area, they lose.
- The campaign now switches between seasons based on the date. Players should see the Rhineland campaign begin in autumn and progress through winter, spring, and summer. Mission temperatures are set accordingly, and included in the daily mission briefing.
- More objectives, airfields and convoys have been added to the campaign, especially in the east (territory held by Germany at campaign start). More pop-up targets have also been added.
- We’ve implemented a coalition balancer to encourage more balanced teams.
 - If one side outnumbered the other by more than 10 players, their front-line airfields will be set to “restricted” mode. If the imbalance grows to 20 players, a second set of airfields will be restricted as well.
 - Players can finish their sortie or repair and refuel at restricted airfields, but they cannot spawn new aircraft.
- To encourage players to complete sorties and emphasize the importance of bringing your aircraft home, losing an aircraft now *reduces* supply at the airfield it took off from. This effect cannot take an airfield below 50%, and if a pilot lands at another friendly field there is no penalty.
- “Pop-up” objectives are now slightly more limited, so each side has a maximum of two pop-ups within the play area. Pop-ups that move off the map are cleaned up and removed. Pop-up search areas are now smaller.
- Airfield ownership now follows the “Y is for Yankee” historical rule. If a field was historically British or American, it is set to that country when captured. If the field wasn’t held by either of those sides, it’s set to the closest country upon capture.
- Supply can now move “along” the front line between objectives that are a similar distance from the front. Previously a strict distance check was applied, so if one objective was fractionally closer to the front it could not resupply the other.

Gameplay changes:

- Pilots are now sent a personalized “instant debrief” when they finish their sortie, giving them feedback on how they did and how the sortie ended.

- Pilots who fail to use the designated runway for takeoffs are now called out in chat, for everyone on their side to see.
- Pilots now have a maximum number of lives per campaign day. Most pilots flying normal sorties will never run into this limit, it's intended to avoid strange behaviors where pilots suicide in the name of 'efficiency'
- Airframes now require a minimum runway length at an airfield. The A-20, He-111, Ju-88 and Arado are not available at a handful of the smaller fields due to this.
- Flak is now randomized better to a 'matching' model (based on type and projectile calibre). This should lead to a better variety of guns at each supply point.
- Convoys now always depart in time to reach their destination. Enemy pilots now get two convoy announcements, once shortly after the convoy departs, and once when the convoy nears its destination.

Bug fixes:

- Play area is now always centered on the front line. Depending on the movement of the front the "combat box" previously lagged off to one side, giving an advantage to the side that was pushing forward.
- Locomotives, train wagons, and wagon-mounted AA guns now count against supply if they are destroyed.
- Convoys arriving at their destination should now always award a supply bonus to the destination supply point.

Cosmetic changes:

- Inactive airfields should now have the correct aircraft and decoration blocks for whichever side controls that spot on the map.
- Inactive airfields outside the play area are now totally removed from the mission.

Tech Alpha 3 "Black Friday Edition," November 25th 2022

Supply and mechanics changes:

- New "pop-up" objectives feature.
 - A "pop-up" objective is chosen by Apollo when the supply levels in an area are low, for example when fighting has heavily damaged or destroyed nearby

objectives. Pop-ups can be infantry, armored, or engineers, and they have a historical unit name.

- The first day a pop-up activates it is marked with a “search area” on the map, rather than a pinpoint location. Once discovered by the enemy, it will be pinpointed on subsequent days in the mission.
 - Pop-ups do not interact in the supply flow with other objectives, but they do repair a small amount each night. Importantly, pop-ups *do* project influence and can move the front line. If one side successfully defends their pop-up, it can help them push the front.
 - If a pop-up is overrun by the enemy it is destroyed. Destroyed pop-ups never reactivate.
 - Massive thanks to *-332FG-CueBall* for his work implementing dozens of pop-ups across the entire map.
- Apollo now correctly processes “blocks array” damage events from the IL2 logs. This should mean supply (and block) damage to objectives is tracked more consistently.
 - Blocks at objectives should now repair more evenly, rather than single blocks repairing to full overnight. Should make persistent block damage more realistic, and supply and repair calculations more accurate.
 - AA guns now have significantly less supply value than previously (now 1 point, previously 5). AA probably should not be ignored, but destroying buildings and ground targets now consistently has much more impact on the war effort.

Campaign changes:

- Airframes and loadouts overhauled by Talon, Barnacles and Sketch. Some airframes (such as the Tempest) are restricted to a small pool at each field, with a periodic refresh throughout the day in the campaign.
- Soesterberg and Schipol are now controlled by USAAF at the beginning of the campaign. This should reduce the chances of a day in the campaign with only RAF or only USAAF airfields.
- Improved / fixed RRR, NDBs, airfield flak and spawn points at several airfields.
- Corrected situations where influence areas would be plotted incorrectly.

Gameplay changes:

- Apollo now understands historical sunrise and sunset times for each day in the campaign. Missions start up to 30 minutes before sunrise and end up to 30 minutes after sunset, rounded to the nearest quarter hour. This should eliminate pitch-black flying conditions but not entirely remove dawn/dusk conditions.
- Small amounts of turbulence and haze are now present, dependent on wind and cloud conditions. Heavy cloud leads to higher turbulence but less haze, clear skies with low wind to less turbulence but a greater chance of haze.
- Objective altitudes are now shown on the mission map if you mouse-over the objective's icon.

Cosmetic changes:

- IL2 stats website now shows day in campaign, time remaining, and mission map, and should update immediately for each day in the campaign.
- Map graphics on the website now include custom icons by Talon and a special "aged paper" effect by Haluter.
- Apollo now displays campaign credits 10 minutes after mission start.

Back-end changes:

- Corrected tagging of some British guns, which are now a valid AA option for Apollo to choose.

Tech Alpha 2, October 28th 2022

Supply and mechanics changes:

- Airfields within 10km of the front line are now only available for repair, refuel and rearm, and for ending missions.
- Captured (or re-secured) objectives now repair to 25% immediately.
- Supply points (airfields and objectives) only donate supply to nearby friendlies if they have at least 80% supply to begin with.

Campaign changes:

- Added more train and ground convoys.
- Remove Bergen op Zoom fuel storage. Add Ninove Defences.

- Deactivate airfields at St. Trond, Schijndel, Kirchhellen, Krefeld, Kelz and Koln-Wahn.
- Switch to longer runway option at Boeninghardt. Add siren, repair truck, and better AA to Lette.

Gameplay changes:

- Convoys now use randomized timers to determine when to start, not distance-based check zones.
- Convoys now announce their movements to friendlies (3 times) and enemies (once).
- Check Zone and Flak Gun revamp
 - Check zones are now switched on for only 5 seconds, then off for 20 seconds, to reduce server load
 - Flak guns now respawn even if players stay in the check zone and do not reset it
 - Flak respawn timers are now configured via global config
- More cloud options, with overcasts at a higher base for easier work underneath.

Cosmetic changes:

- Permanently inactive airfields are now automatically set to look mostly destroyed.

Back-end changes:

- New "campaign analyzer" code to look back at a previous campaign run.
- Campaign manager now spits out a big 'overview' graphic when initializing the campaign.