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FLIGHT MODEL CHANGES AND UPDATES

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---== UPDATE FL2078: SCHNELLBOMBER ==---

By: Robert & Grumpy

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

Please visit the FL2078 Warbirds forum post for detailed performance charts at:

<http://bhlanding.ient.com/warbirdsforum/viewtopic.php?f=8&t=830>

--= Junkers Ju 88 =--

We are happy to announce that the Schnellbomber (fast bomber) Ju 88A-4 and the night fighter Ju 88C-6 have been fully remodeled. They should now be closer to real life performance. See further down for details. The A-4 now finally has a forward firing 20 mm cannon!

--= Bf 109 series =--

All Bf 109's have had their engines and dragco corrected. The Bf 109's previously had their engines built on min RAM horsepower data from ww2 engine charts. Adjusting the dragco to these data caused the Bf 109's to have a fairly correct speed at mid altitudes but they have been unhistorically fast at low altitudes. The engines of all Bf 109's have now been rebuilt implementing max RAM horsepower numbers, and their dragco has been increased to match these. As such the Messerschmitts should now be closer to historical speed performance at low altitudes. The rebuilds of the German Daimler Benz engines also affect the Bf 110's, C.202's, C205, and Ki-61's, with a similar effects. Below are a few examples:

--= F6F-5 =--

The temperature gauge has been corrected.

--= B-24 Liberators =--

Possible fix to the Ai wing fluttering issue at low altitudes. We'll know for sure once the update is released since the Ai wingmen in the real Warbirds version differ from the Ai wingmen in the programmer's version (in which the Ai's don't have the fluttering issue).

--= Ju 87's =--

Engines updated with better altitude performance (with max RAM) from more detailed Jumo 211J engine power charts found when remodeling the Ju 88's.

--= Single engine bombers Vehicle Info =--

All single engine bombers have had their Vehicle Info updated. Players can now read up on the max speed, climb performance, turn rate, max recommended dive speed etc of these planes. The Vehicle Info is accessible from the Tower menu.

--= New skins =--

Several new skins by Iart7 have been included in the update. See the post below for pictures. The planes with new skins:

Bf 109G-6/RVI, D3A2, F4F-3, Ju 52, Ju 88A-4, Ki-43-II, P-38G, SBD-5.

--= Skin fixes =--

Fixes to bugged skins for a few planes.

==== THE JUNKERS JU 88 SERIES FULL REHAUL ====

Designed with a sleek fuselage and powered by the Jumo 211J engines, capable of 1272 hp at 1.25 ata, and a 1 minute WEP of 1465 hp at 1.40 ata, the Ju 88 was one of the fastest bombers of WW2. In the 1930's it was developed as a Schnellbomber (fast bomber), intended to outspeed contemporary fighters. However once Ju 88 came into actual use, the Spitfires and Hurricanes of Great Britain could outmatch it speed wise. The Junkers bomber was designed to be used both as a dive bomber and a level bomber, and flew missions for Germany at all fronts. The Finnish airforce also operated the Ju 88 against the Russians.

--= Ju 88A-4 =--

The A-4 could carry a payload of up to 6600 lb (3000 kg), or be equipped with two torpedos for ship hunting. The defensive armament is fairly weak and consists of a single 7.92 mm MG 81J in the nose, a dual 7.92 mm MG 81Z in the gondola, and a 13 mm MG 131 in the dorsal position. The Ju 88A-4 does however host a forward firing 20 mm cannon controlled by the pilot, which can be used to give a nasty surprise to enemy fighters flying in front of the Ju 88. The A-4 also has dive brakes, allowing it to be successfully used as a dive bomber.

--= Ju 88C-6 =--

The C-6 was designed as a fighter-bomber version of the Ju 88 but was most commonly used as a night fighter. It uses the same Jumo 211J engines as the A-4, but has had it's nose glazing exchanged for an all metal nose, and the gondola removed for less drag. The C-6 is 10-12 mph faster than the A-4 due to a lower total dragco. This Ju 88 version is well armed with 3x 7.92 mm forward firing machineguns and 3x 20 mm cannons. While it can't turn fight with normal fighters, it's toughness, armament, and speed advantage on other bombers, makes it a potent bomber interceptor. The C-6 was also used against shipping during WW2.

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Version 4.33 R2 FL2077 03/05/2020

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---== UPDATE FL2077: FALLSCHIRMJÄGERS OF THE IRON ANNIE ==---

By: Robert, Grumpy, Bollok, and Sleepy

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

Please visit the FL2077 Warbirds forum post for detailed performance charts at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=754>

--= Ju 52/3mg8e "Tante Ju / Iron Annie" =--

We are happy to announce that the Ju-52/3mg8e transport plane has been fully remodeled. It should now be closer to real life performance. See further down for details.

--= F6F-3 Hellcat =--

The Grumman F6F-3 Hellcat has been added to the Warbirds roster. See further down for details.

--= Skins =--

Several new skins from Iart7 have been included in this update. These will be shown in the Warbirds forum post. The planes with new skins are the:

B5N2, Fw 190D-9, P-40F, P-40N-5

--= Fw 190's =--

Corrections to the dragco and engine setup for all Fw 190's. The dragco was previously too low due to the engines being modeled at min RAM performance instead of max RAM. All Fw 190's are now generally somewhat slower at the deck, matching historical speed numbers, and have more horsepower at higher altitudes. Fw 190 pilots need to be aware that it will be somewhat harder to outrun enemy fighters when down low, and keeping one's energy is now more important. The new higher dragco also has a small detrimental effect to the Fw 190's sustained turn rate, except at high altitudes where the higher dragco is balanced out by the increase in available horsepower. All Fw 190's still handle the same way as before, so there are no changes to how they maneuver.

* FW 190D-9 dive speed reduced to historical 480 mph IAS, down from 510 mph which was a previous data error.

--= P-47-25 Thunderbolt, 44-1 fuel =--

* The P-47D-25 is now using 150 grade (44-1) fuel. This allows for a manifold pressure of 72" Hg at WEP, up from 65" Hg. This also allows Bst1, 52" Hg, to be run for 20 minutes, up from 15 minutes. The P-47D-22 still has a WEP of 65" Hg, using normal grade fuel.

* Correction to all P-47 service ceilings. Now set for 38500 ft for the P-47C, and 39000 ft for the P-47D's.

--= P-51D Mustang =--

Bst1 now usable for 25 min since the P-51D is using 150 grade fuel. This from calculations and comparing with several other engines.

--= Lavochkins and Yakovlevs =--

Stall speed corrections. These Russian fighters now stall at 2-3 mph less. This applies to the:

La-5F, La-5FN, La-7, La-7-3, Yak-3, Yak-9D, Yak-9U

--= F6F-5 Hellcat =--

Trim shake issue fixed. The F6F-5 would previously shake uncontrollably and lose a wing at auto-trim above 440+ mph.

--= F4U Corsairs =--

Minor handling tweak for all Corsairs for better stability.

--= B-17 Flying Fortresses =--

* Fuel capacity for the B-17G has been set to 1700 gal, down from 2780 gal. The Tokyo tanks have been removed since the B-17G should never need 12.6 hours of fuel time in Warbirds. 7.7 hours of fuel should be more than enough. This saves 6480 lb of weight.

* External bomb load limited to 2x 250 lb for the B-17F and 2x 500 lb for the B-17G. This since the game code doesn't simulate extra drag from external bombs. As such the B-17's would otherwise get full extra payloads without the significant speed loss this should cause. The extra drag was the reason why B-17 groups rarely used these external loadouts in real life. The small external bombs still allowed for the B-17's in Warbirds is as such a compromise.

* hitmap fix for the engines.

* The nose is now fully visible from inside the cockpit for the B-17G.

--= B-24 Liberators =--

Both B-24's have had their auxiliary 2x 225 gal tanks removed. The new max fuel load is 2343 gal and saves 2700 lb of weight since the B-24's don't need these auxiliaries in Warbirds.

--= Roll rate correction to match NACA 868 data, making the below mentioned fighters more agile =--

- * The F4F and FM-2 Wildcats have had their roll rate increased by ~25 deg/sec. This makes the Wildcats significantly more agile.

- * The Brewster Buffalos have also had their roll rate increased by ~25 deg/sec.

- * The Hawk 75, P-36 and P-40 Hawks have had their roll rate increased by ~20 deg/sec.

- * The P-47 Thunderbolts have had their roll rate increased by ~10 deg/sec.

- * Minor correction increase to the P-38F,G,J Lightnings roll rate by a few deg/sec.

- * The F6F-5 has had it's roll rate improved compared to the F6F-3 NACA 868 data. The F6F-5 had spring loaded control tabs for the ailerons.

--= Hitpoints balance changes for all medium and large bombers =--

- * Elevators will be unchanged.

- * Rudders increased by 33%.

- * H-stab and V-stab increased by 19%.

- * Rear- and central fuselages increased by 15%

- * Ailerons, wings, flaps, and gear unchanged.

- * Fuel tanks increased by 25%

- * Engine Oil hydraulics increased by 33%

- * Engines increased by 10%.

- * All transport planes get a -50% penalty to rear- and central fuselage hitpoints (C-47, L2D-3, Ju 52).

--= Cockpit gauge needles corrected --=

The throttle, engine temperature, and flaps position indicator gauges have been corrected for several flightmodels.

* The throttle gauge needle now correctly points at 75 when you're at 75% throttle, 100 when at 100% throttle etc.

* The engine temperature gauges have also been set so that the needle now points at the edge of the gauge range when at 144 degrees for all planes fixed. There should now be no more confusion or guessing of how close you are to overheating when flying without the HUD.

* All planes affected now has the flaps indicator needle go to the max position at full flaps. This makes it easier to see your flaps position on the flaps gauge.

More flightmodels will have their gauges corrected with each update. The models fixed in this update are the:

P-36's, P-38's, P-39's, P-40's, P-47's, P-51's, F4F's, F4U's, F6F-5, Buffalos,

--= Japanese boost names updated =--

A big thank you to Qweqwe for the translations.

* Koushou-Shutsuryoku = Rated/Military Power

* Kinkyuu-Shutsuryoku = Emergency Power

* Rishou-Shutsuryoku = Take Off Power

--= Vehicle information =--

The performance numbers in the Vehicle info has been updated, where applicable, for all flightmodels that have had corrections in this update. Pilots can find the Vehicle information button at the Tower menu.

---== THE JUNKERS JU 52/3MG8E "TANTE JU / IRON ANNIE" FULL REHAUL ==---

The Junkers Ju 52 started of as an airliner flying through the Alps and other routes around the world, and was in military use in the Colombia-Peru war of 1932, in the Spanish civil war and until the fall of the Reich. It was sturdy, draggy and very reliable. The /3mg8e version is powered by the improved BMW 132T-2 engines, which are capable of 820 hp for Take off, and 685 hp at 5000 ft for rated power. The high drag profile of the Tante Ju means this plane is not in a hurry compared to the C-47. The Ju 52 also does not have protected fuel tanks, meaning that it is vulnerable to hits in the wings. This German transport plane is easy to fly and the handling is quite forgiving. It is able to climb up to 20000 ft, and has it's best cruise speed at 5000 ft. The Ju 52 carries 12 Fallschirmjäger, while the C-47 can carry 28 paratroopers. The Ju 52 has an advantage over the C-47 though in that it can defend itself against interceptors. While the Dakota is unarmed, the Iron Annie has a 7.92 mm Mg firing out of each side of the fuselage. The earlier versions of the Ju 52 were also armed with a 7.92 mm Mg in the dorsal

position, but the /3mg8e had this position upgraded with a 13 mm machinegun. A Ju 52 is usually still a snack for a Fw 190, but against lighter armed fighters the Iron Annie definitely has the potential of biting back.

---== THE GRUMMAN F6F-3 HELLCAT NEW FLIGHTMODEL ===---

The F6F-3 first engaged Japanese Zeros in November 1943 over Tarawa. Being the predecessor of the -5, the -3 is of course somewhat inferior in performance. The -3 is powered by the R-2800-10 "Double Wasp" engine, able to produce 2000 hp. The F6F-5 uses the -10W version which allows for water injection, and makes for a speed difference of 10-25 mph between the two versions, depending on altitude. While the F6F-5 rolls slightly better thanks to spring-loaded control tabs, they -3 and -5 are otherwise quite identical in handling, with the -3 being almost 100 lb lighter. The advantage of the F6F-3 is that it enters the RPS tour at RPS4, while the F6F-5 enters in RPS5. Historical entry dates are August 1943 vs July 1944 respectively.

The F6F was a carrier fighter built to be large and tough, able to boom n zoom fight against the A6M Zero, and showed to be superior of the two. The Hellcat is quite heavy though and should avoid going into a turn fight against Spitfires, Bf 109's or J2M's. When flying with a wingman, F6F pilots can use it's ruggedness, decent speed and 6x .50 cal's well even against land based top fighters of the era. While the Hellcat turns better than a Corsair, it is not a great 1v1 duel plane against nimbler opponents.

<S>

/Robert

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Version 4.33 R2 FL2075 12/04/2019

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---== UPDATE FL2075: LIBERATION DAY ===---

By: Robert, Grumpy, Bollok & Jabo

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

You can find detailed performance charts in the Warbirds forum's updates section

--= Consolidated B-24 Liberator series full rehaul =--

The B-24D and B-24J have been fully remodeled and they should now be closer to real life performance.

--= Hitpoints for B-17 and C-47 =--

The fuselage hitpoints have been reduced by 10%. Also the hitpoints of the wings and engines of the B-17 have been reduced by 10%. This affects the B-17F, B-17G, C-47 and L2D3. The best strategy for fighters is still to aim for the engines, not the fuselage.

--= P-38F Lightning =--

Engine temperature rise tweaked for Nominal Power and WEP for an overall improvement.

--= B-17's =--

Dive speed fixes. B-17F elevator heaviness at high speeds increased, now heavy to operate from 220 mph. B-17G structural dive speed limit decreased from 320 to 305 mph due to it's heavier weight. It's elevator becomes heavy to operate at 270 mph.

--= Lancasters =--

* Further tweak to the G-limit. Estimated to ~2.65 G's at 64500 lb.

* Fuel consumption at +6 lbs (Bst1) now set to 143.5 gal/h per engine, was previously at 170 gal/h.

--= New skins =--

Two new beautiful skins for the Ki-43-Ic. One default skin and one selectable.

--= F4U-1A Corsair =--

The cockpit has been fixed. Previously the gunsight was sometimes shifting textures when looking around inside the cockpit.

--= Nose texture fixes =--

The nose and centre fuselage 3d model textures have been missing for nearly half of the flightmodels when viewed from inside the cockpit. This update brings nose texture fixes for the:

Ki-27b, P-40E, P-40F.

--= Cockpit fixes =--

- * Fixed the slip indicator for the C-47 & L2D, it will now yaw in the correct direction.
- * Buffalos now have a correct oil temperature gauge
- * P-40's oil temperature gauge also corrected. The P-40 horizontal indicator now rolls correctly, but pitch is not working. At least better than before.

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Version 4.33 R2 FL2074 10/24/2019

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---== UPDATE FL2074: THE FLYING CIGAR ==---

By: Robert, Grumpy, Bollok & Jabo

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

You can find detailed performance charts at the FL2074 post in the Warbirds forum at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=672>

--= Mitsubishi G4M "Betty" series =--

The G4M1 and G4M2 have been fully remodeled and they should now be closer to real life performance. The further down for details.

--= Nakajima Ki-43-Ic Hayabusa "Oscar" =--

A new flightmodel has been added to Warbirds, the Ki-43-Ic, which can be flown from the start of RPS1. Previously there was only the mid-war Ki-43-II available. See further down for details.

--= New skins by Iart7 =--

The Fw 190D-9 model has recieved two new beautiful skins, the "Yellow 10" and "Brown 4". These have been created by Iart7.

--= Hitpoints tweak for unprotected fuel tanks =--

Planes that didn't have self sealing fuel tanks will now have a hitpoints penalty to the part of the plane that hosted the unprotected tanks. As an example the P-36C will have less hitpoints for the center fuselage, while a plane like the A6M Zero or G4M Betty will be more vulnerable to damage to their wings. The planes affected are the:

P-36C, Hawk 75, A6M Zeros, Ki-27b Nate, J2M Jacks, B5N2 Kate, D3A Val, TBD-1 Devastator, G4M Betties.

--= Avro Lancasters =--

G-limit fix. Bomb bay door drag and landing gear drag has also been increased. This from comparing with available B-24 and B-17 data. It is now recommended to fly with the bomb bay doors closed until near the target.

--- P-47 series ---

WEP time limit fix, now at 5 minutes. Was found to be incorrectly set.

--= Nakajima L2D3 transport =--

Engine sound corrected.

--= Ju-52 transport =--

Propwash and control sensitivity fix to reduce the tendency of suddenly plunging into the ground or over-pitching.

--= Fw 190 series =--

* Small nose sensitivity fix, making the nose slightly less twitchy.

---== THE MITSUBISHI G4M BETTY SERIES FULL REHAUL ===---

The Japanese Mitsubishi G4M was nicknamed "The flying cigar" by it's pilots. This was in reference to the G4M's cylinder shaped fuselage, looking like a giant cigar. The American pilots later nicknamed it "The one time lighter". This was however in reference to far less positive traits. The G4M airframe was quite well built, and taking bullets into the fuselage or non-critical parts of the wings it was just as durable as the American bombers. However the Japanese command set up very high specifications

regarding effective altitude and max range for the bomber to be built, and to meet these demands it had to be designed without self sealing fuel tanks in order to save weight and carry more fuel. This design was very successful while the Japanese had air superiority, but against the American planes it quickly became apparent just how vulnerable the unprotected fuel tanks of "The flying cigar" were to machine gun fire, with many Betties easily catching fire, their crew facing a burning fate. Nevertheless the G4M was quite a fast and effective bomber with great range, good controls and had a hard hitting 20 mm cannon mounted in the tail, and later in the dorsal turret, for defense. An enemy fighter pilot underestimating the defensive armament of a Betty can quickly find himself in a ball of fire instead. The G4M Betties fielded strong engines and could quickly get to high altitude. They could also carry a torpedo for ship hunting.

--= The G4M1 =--

The G4M1 first flew in combat in September 1940. It weighed roughly 26500 lb (full fuel, no bombs), and was equipped with two strong MK4A Kasei 11 engines, each able to produce 1548 hp for take off power, and 1380 hp at 13100 ft. This is quite good compared to the American B-17 and B-24, fielding engines capable of only 1200 hp at WEP. The defensive armament consists of 1x 7.7 mm MG's at various stations, which isn't much, but the tail holds a 20 mm cannon, making the Betty a dangerous foe to attack from behind.

--= The G4M2 =--

The G4M2 was an improvement to the G4M1, arriving mid-1943. It had redesigned wings with an external underwing coating to somewhat protect the fuel tanks. The G4M2 was heavier than it's predecessor and weighed around 32300 lb at full fuel, no bombs. It had a fully rotating dorsal turret though with an extra 20 mm cannon for defense, and it's engines were the improved Mk4P Kasei 21 engines. These used a water-methanol injection system and had an impressive power output of 1880 hp at 4400 ft, and 1735 hp at 16800 ft, compensating more than well for the heavier weight of the G4M2.

---== THE NAKAJIMA KI-43-IC HAYABUSA "OSCAR" NEW ADDED FLIGHTMODEL ==---

While the A6M Zero is famous from the naval carrier battles where it was involved, The Ki-43 served with the Japanese Army Air Force in larger numbers than any other fighter, and was used on every front where the JAAF was engaged. Performance wise the Ki-43-Ic is very similar to the A6M2, and it can almost be seen as a land based Zero. A duel between the two would be a close one indeed. Their engines had in effect the same performance, but were produced under different names, the Nakajima Ha-25 for the Ki-43-Ic, and the Sakae 12 for the A6M2. The A6M2 is slightly faster and better armed with cannons, albeit with a short clip. The Ki-43-Ic is only armed with one 7.7 mm and one 12.7 mm machine gun, but has protective rubber coating on the fuel tanks and is not as vulnerable to enemy fire as the Zero. Also the Hayabusa's ailerons don't get as heavy at high speeds as for the A6M Zero. Against most opponents the Ki-43-Ic can confidently engage in a turn fight and come out on top and it is very agile.

Like the Zero, the Ki-43 has no pilot armor, so don't stay on the six of a bandit if another bandit is coming up from behind. The best tactic against the Ki-43-Ic is often to boom n zoom.

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Version 4.33 R2 FL2073 09/18/2019

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---== UPDATE FL2073: FLYING FORTRESSES ===---

By: Robert, Grumpy, Bollok & Von Sleepy

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

You can find detailed performance charts at the FL2073 post in the Warbirds forum at:

<http://bhlanding.iement.com/warbirdsforum/viewtopic.php?f=8&t=648>

--= Boeing B-17 Flying Fortress series =-

The B-17F and B-17G have been fully remodeled. They should now be close to real life performance and can use a larger payload than before. The B-17F can now carry 9600 lb of bombs, the B-17G 12800 lb of bombs as per their historical max loads. Previously they were both limited to only 6400 lb of bombs.

--= Hitmaps =--

The hitmaps of all twin/four engine bombers have now been fixed. They will more accurately cover the correct parts of the bombers. Below can be seen an example with the black-squared hitboxes of the G4M previously quite out of place vs now with the hitmap fixes. If you aim straight for the elevator you will now actually hit the elevator etc.

--= Hitpoints =--

With the hitmap fix, the hitpoints of all bombers have also been recalculated. The hitpoints are now set based on the hitmap volume size, construction material, known toughness/weakness etc for each part of each specific bomber airplane, rather than the previous generic hitpoint pool applied for all twin/four engine bombers, regardless of dimensions. The four engine bombers will have similar hitpoints as before, so players shouldn't notice too much change. The C-47, L2D and Ju-52 transports will be notably tougher than before since they are actually quite large, while the twin engine medium bombers will generally see an increase in hitpoints for the tail sections and be slightly tougher overall than before. The pilot will be somewhat better covered which should reduce the one-ping kills of bombers unless

shooting at the cockpit from a realistic angle. You'll need to HO a buff from straight in front or slightly above, and it will be harder to get a pilot kill from underneath. This should better protect players who climb to altitude compared to lawnmower buff players.

The engines are now generally a bit more fragile than before, making the tactic of shooting at the bomber's engines an actual viable strategy. Previously the engines of four engine bombers had over twice the hitpoints of the fuselage of most fighters, making it a waste of ammo and nearly impossible to disable a large buff by going for the engines. Attacking the engines of a bomber was a preferred tactic in real life for ww2 fighter pilots, and while the engines are still fairly tough, it should now also be a viable tactic in game. This also promotes flying buffs at altitude since you can then easily dive out to put out an engine fire. If using lawnmower tactics an engine fire will be fatal as you can not dive out.

The hitpoints of all fighters and single engine bombers have already been fixed in previous updates, in the same manner as the bombers, but they have now been retweaked by using a better formula. For the vast majority of fighters there is no notable change, but larger fighters like the P-38's, Mosquitos, Bf 110's etc will now be notably more durable.

--= Slats drawbacks =--

Leading edge slats were previously modeled a bit too generously with full benefits but to modest drag/induced drag penalties. This has now been tweaked and all planes using leading edge slats will bleed a bit more energy when pulling high G's, which will affect their sustained turn rate negatively. The affected flightmodels are the: Bf 109's, Bf 110's, La-5's, La-7's, MiG-3, and Swordfish.

--= Stall speed reductions =--

A few flightmodels have had their stall speed slightly reduced for better historical accuracy. These are the:

- * Hurricanes: 3-4 mph reduction
- * Bf 110's: 4 mph reduction
- * A6M3 & A6M5: 2 mph reduction (The A6M2 was already correctly set)
- * P-47's: 4 mph reduction
- * F6F-5: 3 mph reduction
- * F4U's: 2 mph reduction

--= Trim span =--

A few flightmodels have had their manual trim span allowance slightly increased to allow for better trim settings when cruising and climbing manually (not using auto-pilot). This affects the P-38's, D3A2, B5N2, and Swordfish

--= Vehicle info =--

All fighters have had their sustained turn rate data updated in the Vehicle info menu. The turn data is now based on tests made at 12000 ft with 75% fuel. Previously they were made at sea level with only 50% fuel. The higher altitude turn tests should be more in line with ww2 turn tests which were usually done at mid altitudes. Please note these are sustained turn tests, i.e. turning for 5+ laps without losing altitude, and can not be compared to ww2 tests that only checks the turn rate and radius at the instant turn.

--= Skins =--

- * The Spitfire Ia *87 oct now has a better looking default skin.
- * The Spitfire Vb now has the "133 sqn RAD Don Blakeslee" skin as it's default.
- * The Bf 109E-1 now has the "Red 14" skin as it's default, and a new "Yellow 10" skin.
- * The Bf 109E-3 now has the "Yellow 15" skin as it's default.

--- Spitfire XIVE ---

The Spitfire XIVE now has 3 boost stages, with a +18 lbs manifold pressure boost stage added for Bst2.

--= Fw 190A-1 and Fw 190A-2 =--

The A-1 and A-2 have had their engine WEP setup rebuilt. The WEP stages of these planes were previously estimated to generous in BHP and have now been set according to better speed data found.

--= MiG-3 =--

The MiG-3 now has the correct max AoA benefit modeled from having leading edge slats. This should improve it's turn rate, although it's still best used as a boom n zoom plane, not a turn fighter.

--= Mosquito series =--

Except for now having more hitpoints with the hitpoint fix as written above, the Mosquito series now also have the boost stage info standardized in the HUD (type of boost, manifold pressure, minutes before overheat).

--= Fowler and Slotted flaps dragco fix =--

The planes with fowler and slotted flaps have had their dragcos recalculated with more accurate methods used, based on NACA and RAE test results. Generally these planes will now experience less drag than before when deploying flaps at smaller angles, and as such will have better use of them in a turn fight. The affect FM's are the: P-38's, P-47's, F4U's, F6F-5, Bf 109's, Bf 110's, Ju-87's, J2M's, Ki-43, Ki-44, Ki-84, N1K1-J, B5N2.

---== THE BOEING B-17 FLYING FORTRESS SERIES FULL REHAUL ==---

The B-17 Flying Fortress is an iconic bomber and has been featured in several movies. It was a large four engine bomber armed with an arsenal of .50 cal machine guns facing in every direction. The Flying Fortresses were though adversaries for the Axis fighters and forced the Luftwaffe to arm their interceptors with heavier cannons. Still, without fighter cover, even the B-17's took heavy losses when deep into Germany, but once the Mustangs could provide escort all the way to target and back, the dwindling numbers of Luftwaffe fighters could do little to prevent the Allied bombardments of Axis facilities. Both the B-17F and the B-17G are powered by four Wright R-1820-97 Cyclone engines, each able to produce 1240 hp at 15000 ft. The engines have a very good high alt performance, and a clean B-17 might even be able to outrun several interceptors, those with poor high alt performance, at the Fortress' maximum altitude. A clean B-17 at low fuel can get above 37000 ft. The Flying Fortresses are now able to use external 1600 lb or 2000 lb bombs under the wings, and has a wide array of loadouts. The B-17F can carry up to a limit of 9600 lb of bombs, while the B-17G has an impressive max payload of 12800 lb. As such they now carry their historical max payloads, while previously both B-17's in Warbirds have been limited to only 6400 lb. The B-17 is quite easy to fly and the stall is mild. Do note though that the B-17's are now realistically modeled, and players can no longer fly at zero throttle for an extended time without stalling out.

Also do note: The structural G limits are now set to realistic numbers. Do not go into a steep dive with heavy up-pitch trims. Reduce the trims or the pull out might break the plane apart. Remember this is a heavy bomber, not a fighter.

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Version 4.33 R2 FL2072 07/26/2019

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wb3dx11_64.exe : A Test Dx11 64Bit version of the WarBirds executable

---== UPDATE FL2072: THE BIPLANE THAT COULD ==---

By: Robert, Grumpy & Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

For detailed performance graphs, please visit the FL2071 forum post at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=595>

--= Fairey Swordfish Mk.II =--

Full rehaul for the Fairey Swordfish Naval torpedo bomber, which is now modeled as the improved Mk.II version. See below for details.

--= New skins =--

Beautiful new skins available, made by IArt7.

* Bf 109E-4Aa: Trop "Schwarze 3" and "Schwarze 8", 2./JG 27, Libya '42.

* Bf 109K-4: Bf 19G-4 "Rote 7".

* Hawk 75: RAF "T", Dinjan, India '42.

* Me 262: Updated default skin and new "Red 7" and "White 17" skins.

* MiG-15: Updated default skin and four new Russian/North Korean/Chinese skins.

--= Single engine bombers hitpoints =--

All the naval single engine bombers have had their hitpoints recalculated based on their structure, materials, armor, and size of their respective hitmaps.

--= New terrain flash pictures =--

Several new flash pictures have been created by IArt for the "Free Flight" terrain selection menu.

---== THE FAIREY SWORDFISH MK.II FULL REHAUL ==---

The Swordfish, nicknamed "Stringbag", was a biplane torpedo bomber designed for British naval operations. It was thought to be of an outdated design with a top speed far below that of contemporary monoplanes, but still this biplane saw great success in the war and sunk more tonnage of Axis shipping than any other Allied aircraft in WW2. This was the torpedo bomber that stopped the famous Bismarck in it's tracks, and was kept in service until the end of the war.

The Swordfish Mk.II has a top speed of only 152 mph, clean config at WEP, due to it's high drag profile, and it's Pegasus XXX engine has a max output of 815 hp. The operational ceiling is also quite low at ~13 000 ft. This could be quite discouraging facts but there are several reasons why the Swordfish was so successful in the war. For one the stall speed is very low, and it's easy to both land and take off. This also means that a skilled Swordfish pilot can really dodge enemy fighters, using the low stall speed and great turning ability to survive until escort fighters can fend off the attackers. It's an easy plane to fly, and was even considered to easy to fly to be a trainer for British cadets. Secondly the Swordfish was able to withstand quite a beating and keep flying, bringing it's crew home safely. Not a single Swordfish was lost when attacking the Bismarck, despite heavy flak fire that hit several of the planes, one of them returning home with 175 holes.

What makes the Swordfish Mk.II a good naval bomber though is it's ability to carry quite a diverse set of payloads. It can carry up to 1500 lb of bombs in various combinations, like 1x 500 lbs with 8x 100 lbs, or 6x 250 lbs. It can also carry a torpedo, 8x rockets, a sea mine or a drop tank. If the pilot doesn't mind it's low top speed then this is a great plane for hunting different kind of ships and conducting naval strikes against land bases with.

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Version 4.33 R2 FL2071 06/28/2019

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---== UPDATE FL2071: NAVAL STRIKE FORCES ==---

--= TBD-1 Devastator =--

This update brings a rehaul to the "Devastator" naval torpedo bomber. It has been fully remodeled and should now quite closely match real ww2 performance. Pilots will note a significant change in performance since the TBD-1 now has it's historical Pratt and Whitney R-1830-64 Twin Wasp engine rated at 900 hp, not a 2150 hp engine as it was previously modeled with. See further down for details.

--= D3A2 Val =--

This update brings a rehaul to the "Val" naval dive bomber. It has been fully remodeled and should now quite closely match real ww2 performance. Note that it has now been modeled as the improved D3A2 instead of the D3A1. See further down for details.

--= B5N2 Kate =--

This update brings a rehaul to the "Kate" naval torpedo bomber. It has been fully remodeled and should now quite closely match real ww2 performance. See further down for details.

--= New skins =--

Beautiful new skins available, made by IArt7. These are Desert and Winter camo for the Mig-3, as well as a German skin and an updated default skin for the Fokker D.XXI.

--= Rear gun accuracy fix =--

Slight fix to the dispersion for all single engine dive bombers defensive machine guns, as well as the Bf 110's. The accuracy of the defensive guns will now have a more comparative dispersion relative to each other, based on type of gun and mount.

--= Engine torque fix =--

The Bf 110's and P-38's will now have torque applied correctly from respective engine regarding yaw. If only the right engine is running the airplane will now yaw to the left and vice versa.

--= P-51D no Rockets =--

The rockets have been removed from the P-51D. This since rockets were never used for the Mustang in the European theater, and in the Pacific theatre they were only used on rare occasions from Spring 1945.

==== THE DOUGLAS TBD-1 "DEVASTATOR" FULL REHAUL =====

The TBD-1 Devastator was a major step in performance compared to the earlier biplane bombers of the US Navy and was in service by 1937. Although quite underpowered for its loaded weight, this torpedo bomber made a good record of itself early in the Pacific war and was used in many different roles up until Midway 1942. In this battle the TBD-1's suffered heavy casualties without sinking a single carrier. This was in part due to the Devastator's slow speed and poor armor, but the largest factor was the absence of fighter cover and the significant faults with the Mark 13 torpedos, which often failed to

explode or ran to deep. The TBD-1's were removed from active service after Midway, replaced by SBD's and TBF's, and thereafter instead used as trainers.

While an improvement from the earlier biplanes, the TBD-1 is inferior performance wise to the Japanese carrier bombers. The engine is relatively weak, it's radial R-1830-64 Twin Wasp engine capable of only 900 hp at sea level, and the Devastator's climb rate and maneuverability is poor. To put it simple the TBD-1 is quite a dog, and the SBD and TBF were better replacements. That being said, the TBD-1 can carry 3x 500 lb bombs, making it effective against enemy ground targets. The bombardier view also allows it to level bomb. (Please note that the previous TBD-1 Devastator flightmodel in Warbirds had somehow been given a ~2150 hp engine and has been significantly overperforming compared to it's historical data up until this update).

---== THE AICHI D3A2 "VAL" FULL REHAUL ===---

The Aichi D3A1 made entry in 1940 and featured a 1070 hp Kinsei 44 engine. In Autumn 1942 it was replaced by the D3A2, which fielded the stronger Kinsei 54 engine able to produce 1300 hp. The "Val" was a potent dive bomber with a speed and climb performance outmatching that of any American naval bomber. It was quite maneuverable and sometimes used in a backup fighter role, although underarmed for this duty. The D3A2 had a fairly sturdy construction and sunk many ships during ww2, most often used in a combination with the B5N2 Torpedo bomber. The weakness of the D3A2 is that it's payload is quite small, able to carry only a 250 kg bomb and 2x 60 kg bombs. It is a good choice though for the pilot who wants a naval bomber able to more quickly get to the target at altitude, and with it's large wings the D3A2 can even turn with a Zero, although it's not as maneuverable or fast as the A6M fighter. This does however allow the "Val" pilot a chance of defending himself against enemy fighters. Also of note is that the D3A2 has a high service ceiling of 35700 ft.

---== THE NAKAJIMA B5N2 "KATE" FULL REHAUL ===---

This Nakajima torpedo bomber was quite a modern asset when it entered service in 1937, and it's performance easily outshone that of the TBD-1 Devastator. The B5N2 "Kate" was powered by the Sakae 11 engine, producing 1000 hp at sea level, and was also 800 lb lighter than the TBD-1. Used in combination with the D3A "Val", the "Kate" sunk many ships during the war and was used to bomb Allied ground targets as well. With adequate fighter cover the Japanese B5N2 and D3A2 were potent naval bombers, but started to suffer heavier casualties as Allied air dominance grew stronger with each year of the war. While not having as good speed and climb performance as the D3A2, The B5N2 can carry a higher payload, use torpedos and has a bombardier view, allowing it to level bomb. The "Kate" has no forward firing guns and while it's single defensive 7.7 mm rear gunner could bring an enemy fighter down with enough hits, don't count on this as a reliable defensive tactic. The "Kate" also has poor armor. Fortunately the B5N2 is fairly light with a large wing area and can turn just as well as the

D3A2, allowing it to use its tight turning radius to survive until help arrives. All in all the B5N2 is as good a choice for carrier operations as its American counterparts.

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/Robert

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Version 4.33 R2 FL2070 05/31/2019

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---== UPDATE FL2070: Heroes of Midway ==---

By: Robert, Grumpy, Bollok, Sleepy & Jabo.

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

See the forum post for detailed performance graphs at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=564&p=4219#p4219>

--= SBD-5 Dauntless =--

This update brings a rehaul to the Dauntless dive bomber. It has been fully remodeled and should now quite closely match real ww2 performance. See further down for details.

--= TBF Avengers =--

Small torque reduction for the TBF-1 and TBF-1C. Minor defensive gunner accuracy fix for both Avengers.

--= Ju-87 Stukas =--

Defensive gunner accuracy fix for the Ju-87D and Ju-87G. The -D rear gunner previously fired in a too steady line while the -G rear gunner had to large dispersion.

==== THE DOUGLAS SBD-5 DAUNTLESS FULL REHAUL ====

The SBD (Scout/Bomber/Douglas) Dauntless dive bomber was very well fitted for its role in the Pacific Theatre, and was an important leap in performance compared to the earlier TBD Devastator. Not only did SBD's sink several Japanese carriers, but they also supported the infantry and made a surprisingly good account of themselves against Japanese fighters and bombers alike. The SBD pilot and his gunner, Leppla and Liska, became famous for shooting down seven Japanese Zeros/bombers in two days. In the Coral Sea encounter USN planes downed 91 Japanese adversaries, 40 of those were shot down by SBD's. The SBD was often unofficially named the SBF, the "F" standing for Fighter. While a single Dauntless doesn't have the speed or roll rate to really duel a dedicated fighter 1v1, a group of them can definitely defend themselves against A6M Zeros thanks to the SBD's ruggedness, defensive twin .30 cal machine guns, 2x .50 cal in the cowl, and surprisingly good turn rate. The Dauntless has a wingloading of only 28.9, lower than a Spitfire IXe, but lacks somewhat in power/weight ratio compared to real fighters.

The area where the Dauntless shines though is dive bombing. It can start its dive from above 20 000 ft, and has dive flaps to help regulate the airspeed. The max permissible speed is as high as 425 mph (IAS), which makes it harder for enemy fighters to intercept the bomb run of an SBD. The payload is decent but the ammo for strafing is quite limited. The chance of surviving the sortie and fighting back against interceptors is impressive though for a single engine bomber, and the Dauntless earned a good reputation in the Pacific Theatre.

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/Robert

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Version 4.33 R2 FL2069 05/09/2019

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==== UPDATE FL2069: AVENGERS - PACIFIC ENDGAME ====

By: Robert, Grumpy & Bollok.

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

See the forum post for detailed performance graphs at:

<http://bhlanding.iement.com/warbirdsforum/viewtopic.php?f=8&t=553&p=4181#p4181>

--= TBF Avenger series =--

The Avengers have been fully remodeled and should now more closely match real ww2 performance. See further down for details.

--= Yakovlev series=--

The Yak-3, Yak-9D and Yak-9U have had their Oswald factor recalculated and improved (Wing efficiency factor which governs the liftco vs induced dragco ratio). They now retain their energy better which also slightly affects their sustained turn rate positively.

--= Lavochkin series =--

The La-5F, La-5FN, La-7 and La-7-3 have also had their Oswald factor recalculated and improved. They now retain their energy better which also slightly affects their sustained turn rate positively.

--= MiG-3 =--

The Mikoyan-Gurevich MiG-3 has had both it's roll rate and Oswald factor reassessed and improved.

--= Macchi series =--

The C.200, C.202 S.III, C.202 S.VII and C.205 have all had their roll rate greatly improved. The C.202 S.III now rolls just slightly inferior to a Bf 109F-4, while the C.205 rolls just slightly inferior to a Bf 109G-6/RVI. All the Macchis have also had a minor improvement to their Oswald factor.

--= 1 minute WEP improvement =--

Planes with a 1 minute WEP limit were previously set to heat up from 74-144 degrees in exactly one minute (1.17 deg/sec). As such, depending on current engine temperature, the engine would often overheat within 30 seconds or even less. The 1 minute limit WEP's will now instead rise by 0.78 deg/sec, allowing for 1.5 minutes of WEP usage before overheat when fully cooled, and usually ~1 minute usage even after having run on military power for a while. This should also reduce the risk of accidentally overheating the engine.

* This improvement affects the:

J2M2, J2M3, N1K1, Ki-84, C.202 S.III, C.202 S.VII, C.205, Ju-87D, Ju-87G, Bf 110C-4, Bf 110G-2, Bf 109E-1, Bf 109E-3, Bf 109E-4Aa, Bf 109G-6, Bf 109G-6/RVI

--= P-38 Lightnings =--

* The P-38J can not carry rockets anymore, this wasn't an available loadout until the P-38L.

* the P-38L can now dive at a 40 mph higher speed before compression occurs, this thanks to better data found on the effect of the dive-flaps.

--= IL-2 =--

Slight correction to muzzle location of the guns.

---== THE TBF AVENGER SERIES FULL REHAUL ==---

The Grumman Avenger first made combat entry at the Battle of Midway 1942, and soon became one of the best American single engine carrier bombers of the Pacific War. As Grumman switched production to the F6F Hellcat, General Motors took over the production renaming the plane to "TBM". The TBF had a crew of three with both a .50 cal top turret and a .30 cal ventral gunner. The ventral gunner was also the radioman/bombardier and had a full arsenal of the most advanced radio equipment used in a single engine plane of WW2. The Avenger was rugged, large and handled like a truck. With 4x 500 lb bombs the TBF-1C weighed in at 16425 lb. It's powerful 1700 hp Wright R-2600-8 engine and huge 490.02 square feet wing area meant that it had almost the hp/weight ratio and wingloading of a F4F-4 Wildcat though. This actually allows a clean Avenger to turn with many contemporary fighters except the nimbler ones. It's a handy defensive strategy, especially against the heavier late war fighters, although the Avenger is clearly inferior to fighters regarding top speed, climb rate and roll rate so should avoid dogfights if possible. The TBF's have a diverse set of loadouts and can also carry a large drop tank in the bomb bay for long range scouting missions.

--= TBF-1 =--

Powered by the 1700 hp Wright R-2600-8 engine the TBF-1 is a very good single engine bomber for it's era and can be used successfully for both torpedoing ships, deploy sea mines, dive bombing, or level bombing from the bombardier view. It is armed with a single forward firing .30 cal machine gun that can be used for strafing if needed.

--= TBF-1C =--

The -1C made entry in 1943 and is very similar to the -1, but has an improved forward armament of two .50 cal machine guns. This makes it better for strafing purposes and also allows it a fair bite against enemy planes who underestimate the turn rate of an unladen Avenger (It also has a higher airspeed

velocity than an unladen swallow). The TBF-1C can also use two wing drop tanks for long range bombing missions.

--= TBM-3 =--

*** Not yet in the game, might get released at a later date.***

The TBM-3 was built by General motors and made combat entry at the start of 1945. It has a 200 hp stronger Wright R-2600-20 engine as well as the option to carry rockets and a better bomb load. An important difference is also the new engine's better high altitude performance, allowing the TBM-3 a 32 000 ft ceiling as well as a better top speed up high. This enables the TBM-3 to ingress above 25 000 ft, where American escort fighters have a distinct speed advantage over the Japanese fighters.

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/Robert

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Version 4.33 R1 FL2068 05/09/2019

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Bug fix: Manned Ack rate of fire

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Version 4.32 R9 FL2068 04/19/2019

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Bug fix: Gunner rate of fire for a given weapon matches pilot

Offline damage/weapons will match current Online

Weapon changes by Robert:

I've set the NS-37 to 240, which gives 4.17 rps or 250 rpm.

The MG 81J to 40, which gives 25 rps or 1500 rpm.

The MG 81Z to 20, which gives 50 rps or 3000 rpm. (twin barreled, pretty much two MG 81J's fixed together).

I've also set the 7.62 mm MG 81J/Z projectile weights to the same weight of 0.80 as normal 7.62 mm's ammo. There's no reason the MG 81's ammo should be twice as heavy since they have the same damage values as other German 7.62 mm guns.

The M4 Cannon now does 40 dmg, up from 30.

The 3 inch RP-3 rocket now does 240 dmg with blast radius of 220. Up from 200 dmg - 200 radius.

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Version 4.32 R8 FL2068 03/22/2019

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---== UPDATE FL2068: ROLLING OVER RUSSIA ==---

By: Robert, Grumpy & Bollok.

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

--= Lavohkin series =--

The Lav's all have had their roll rate improved. According to German tests of a captured La-5, the Lavochkin could outroll the Bf 109. The Lavochkin flightmodels were currently way to sluggish in the roll and have now been set so that they can out roll the Bf 109. This change applies to the La-5F, La-5FN, La-7 & La-7-3.

--= Yakovlev series =--

The Yak's were also found to have a to sluggish roll rate. The Yak-3 can now roll fairly evenly with the Bf 109, while the Yak-9D and Yak-9U roll somewhat slower than the Yak-3 since they are larger and heavier. They all roll much better now than before though.

--= Fw 190 series =--

All Fw 190's have had their roll rate slightly improved since it was somewhat below ww2 trial data. The Fw 190's with four cannons in the wings now also roll slower than the versions with only two cannons in the wings.

--= Bf 109 series =--

Further fine-tuning of the elevator authority with increasing airspeed. At neutral elevator trim the Bf 109's can now on average pull 5.5+ G's at 300 mph, and 2.8 G's at 400 mph. This varies slightly between the Bf 109 versions depending on weight and model.

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Version 4.32 R8 FL2066,FL2067 03/12/2019
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---== UPDATE FL2067: TANK BUSTERS OF THE EASTERN FRONT ==---

By: Robert, Grumpy, Bollok, Jabo and Sleepy.

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

--= Ilyushin IL-2 Shturmovik =--

Full rehaul of the IL-2 dive bomber flightmodel. See further down for details.

--= Junkers Ju-87 Stuka series =--

Full rehaul of the Ju-87D-3 and Ju-87G-1 dive bomber flightmodels. See further down for details.

--= Messerschmitt Bf 109 series =--

The elevator heaviness with increasing airspeed has been found to be slightly to severely set. The Bf 109G should be able to pull around 5.5 G's at 310 mph IAS, but could currently only pull 4.5 G's at this speed. This is an issue for all Bf 109's. As such the elevator is now set to increase slightly less in heaviness so that Bf 109's can now pull ~5.5 G's at 310 mph IAS as they should, and will of course also have slightly more pitch control at higher speeds.

---== THE ILYUSHIN IL-2 SHTURMOVIK FULL REHAUL ==---

One of the most iconic Russian airplanes of ww2 was probably the IL-2 Shturmovik, often called "The flying infantryman". It was the most numerous built plane of Russia and was a specialized dive bomber, fielding the powerful Mikulin AM-38F engine which provided 1720 hp at sea level. It was very poor at high altitudes though and the IL-2 had a service ceiling of only 18000 ft (5500 m). The Shturmovik's whole center fuselage structure was made of armor, and the armor covered both the fuselage, engine and pilot, ranging between 5-12 mm thickness. The pilot was also protected by a 65 mm armored windshield. There were several occasions of German fighter pilots reporting their bullets bouncing off the Shturmovik. The German veteran pilots learnt to attack the IL-2 from down and under, destroying it by hitting the hydraulics system of the belly. Against ground targets only 20 mm cannons really posed a threat to the IL-2, and enemy fighters attacking from behind was a far greater concern.

While the pilot was well protected, the rear gunner was more easily killed by enemy fire and the tail section was made of wood and more susceptible to damage. Often times rear gunners were recruited from the Gulag death-camp prisons. Roughly 10750 IL-2's were lost in action during 1941-1945. The Ilyushin IL-2 was on many occasions used in air-to-air to attack German bombers and Stukas. It was effective as a Stuka-killer since the defensive machine gun of the Ju-87 had trouble penetrating the thick armor of the IL-2 and the Shturmovik had a better power-to-weight ratio than the Ju-87 at low altitudes, allowing it to outturn the German dive bomber when down low. The job it was made for though was to support the Russian ground troops by attacking artillery positions and German tanks. The Russian accounts of German tanks destroyed by the IL-2 in battles were often greatly exaggerated, but the Shturmovik definitely made an important difference in the war and was the demise of many German tank crews.

---== THE JUNKERS JU-87 STUKA SERIES FULL REHAUL ===---

The Junkers Stuka dive bombers spread terror in the opening stages of ww2 by attacking ground targets with it's dive sirens screaming and easily recognisable inverted gull wings. It was a very sturdily built plane able to sustain a high G-load and was generally quite easy to handle at all speeds. As long as it had fighter escort the Stuka was very good at it's job. In the Battle of Britain though the Ju-87B's were often unescorted and fell prey to the British fighters, taking heavy losses when intercepted. The Ju-87D-3 that fought over the Eastern front was more heavily armored than previous versions and had the new Jumo 211-J engine, allowing for 1240 hp at 5000 ft, and with a short duration take off power of 1410 hp. It could also carry a much higher payload of 1800 kg (3968 lb) at overload conditions. At the Eastern front the Ju-87's often had escort and were very effective at killing tanks and other ground targets. Stukas even sunk several Russian battleships and cruisers. They racked up ground-kills for very few losses and the most decorated pilot of Germany was a Stuka pilot, Hans-Ulrich Rudel, accounted with the destruction of 519 Russian tanks and sinking the "Marat" battleship. As the tide of the war turned though Germany soon had a harder time providing adequate fighter escort for the Stukas, and their losses started to amount when faced alone against Russian fighters. The Ju-87's still kept busting many tanks, but now at a much higher cost. The Stukas have a very gentle stall behaviour, and are decently agile and can defend themselves as long as they have energy and altitude to sacrifice. They have a much better high altitude performance compared to the IL-2 Shturmovik. Once low n' slow though their low power-to-weight ratio means that they'll have a very hard time turn fighting and maneuvering. A positive trait is that the Ju-87D's/G's are well armored and can withstand more damage from the front than a normal fighter would.

--= The Ju-87D-3 =--

This version had upgraded armor and could carry a very high payload for a single engine plane. In overload conditions it could be armed with a single 1800 kg bomb or 1x 1000 kg bomb under the fuselage and 2x 500 lb bombs under the wings. It could also use drop tanks for long range missions. The

climb rate in overload condition though is only 1.5-2.5 m/s (300-500 ft/min), but the extra payload can be well worth it once at the target.

--= The Ju-87G-1 =--

A development of the D-3, the Ju-87G-1 used two heavy 37 mm BK cannons with 12 rpg instead of bombs. This version fielded the same Jumo 211-J engine as the D-3, and was a very effective can opener against Russian armored ground vehicles.

---== UPDATE FL2066: TIFFIES ==---

By: Robert, Grumpy & Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

Detailed performance charts of the new Typhoons are available at the Warbirds Forum at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=486>

--= Hawker Typhoon Ib's =--

Full rehaul of the Hawker Typhoon Ib 1942 and 1944 flightmodels. See further down for details.

--= Vehicle info =--

The vehicle info has now been updated for all fighters. Which of the P-51D and Fw 190D-9 has the highest top speed? Can a Bf 109E-4 really outturn the Spitfire Mk.II? One can now find performance numbers for top speeds at various altitudes, stall speeds, climb time to 16400 ft, sustained turn rate at sea level, service ceiling etc in the updated vehicle info for all the ww2 fighters. All performance numbers are from meticulous tests of the flightmodels in Warbirds. The vehicle info is accessed from the Tower menu.

--= P-38 Lightning series =--

Manual elevator trim span slightly increased.

--= Macchi series =--

The Macchis had specifically designed uneven left vs right wing spans in order to counter the torque effects. As such the Torque effects for all Macchis have been somewhat reduced.

==== THE HAWKER TYPHOON IB SERIES FULL REHAUL ====

The Typhoon was nicknamed "Tiffie" by its pilots. It is probably best known for its ability of intercepting the Focke Wulf 190. The Napier Sabre IIa was very powerful for an inline engine and required a large air intake for RAM cooling. It was very effective at high speeds but couldn't produce as many horsepowers at low speeds where the air RAM cooling effect was distinctively reduced. An effect of this was that the Typhoon Ib was hampered in the climb, compared to the max power output of the Sabre IIa engine, although it still held quite a decent climb rate. The Hawker Typhoon was a heavy fighter at 11083 lb but the wings were very thick for ww2 standards, just like for the Hawker Hurricane. This allowed it a surprisingly good stall speed and turn rate for its size. The drawback, just like for the Hurricane, was a higher drag profile which affected the top speed of the Tiffie. It also had a fairly slow roll rate. The high dragco issue became a larger problem as top speeds were increasing as the war progressed, but the Typhoon underwent several drag reducing changes, allowing it a top speed not too far from the fastest fighters of WW2. The Hawker company later produced the Hawker Tempest, which was designed with much thinner wings. The thick robust wings of the Typhoon allowed it to outturn other late war fighters of equal size. The Tiffie had a quite sudden stall though. The Typhoon was also able to carry a heavy payload and excelled as a fighter bomber, especially since its engine was tooled for low altitudes. A low altitude environment is where the Tiffie is at its best, and its pilots should avoid to fight above 20000 ft if possible.

--= The 1942 version =--

The Hawker Typhoon Ib engine was initially restricted to +7 lbs of manifold pressure. At this setting the engine was capable of 2090 hp at 8500 ft, which still was a respectable power output for an inline engine. While the Fw 190A-4 is somewhat faster at WEP, The Focke Wulf can only run at WEP for 3 minutes, while the Tiffie can use +7 lbs boost for 60 minutes, which allows it to eventually run with the Fw 190A-4 while also being the better turn fighter. For a 1942 fighter though the Typhoon's sustained turn rate isn't impressive and the Tiffie pilot will usually do best with boom n' zoom tactics, depending on the opponent.

--= The 1944 version =--

This version of the Typhoon Ib was cleared for using WEP at +9 lbs manifold pressure, which allowed the Napier Sabre IIa engine to produce 2200 hp at 6000 ft. This alone resulted in an increase of ~11 mph top speed when below 17000 ft. Even more importantly the 1944 version had several drag reducing fixes, like shortened exhaust stacks, that resulted in an additional 18-20 mph increase in top speed. As such the 1944 version is ~30 mph faster than the 1942 version, depending on altitude. These improvements also have a positive effect on the sustained turn rate, giving the later Tiffie version a better power/weight and power/dragco ratio. As such the 1944 model Typhoon can hold a much better

sustained turn rate than the 1942 version, and is one of the better turn fighters of the late war era. By 1944 the Typhoon could also be equipped with 2x 1000 lb bombs and 8x RP-3 rockets.

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Version 4.32 R8 01/29/2019

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Stutter/Pause during flight online bug fixed

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Version 4.32 R7 FL2065 01/03/2019

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---== UPDATE FL2065: COBRA KAI ===---

By: Robert & Grumpy

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

Please visit the Warbirds forum for detailed performance diagrams on the new flightmodels at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=449&p=3583#p3583>

--= P-39 Airacobra series =--

Full rehaul of the P-39D, P-400 and P-39Q flightmodels. See further down for details.

--= J2M Raiden (Thunderbolt), "Jack" series =--

Full rehaul of the J2M2 and J2M3 flightmodels. See further down for details.

--= I-16 =--

The flightmodel is now set to use SAE system by default since the cockpit gauges do not use the metric system.

--= N1K1-J =--

Stall speed reduced by 2 mph, was discovered to be too high. Military power at Bst1 and WEP at Bst2 now have a maximum of 60 min and 15 min total usage per sortie (3600 sec and 900 sec). This to simulate the Methanol injection tank capacity. Bst1 and Bst2 are still limited to 30 min and 1 min stints respectively before engine overheat.

--= Ki-84 =--

Military power at Bst1 and WEP at Bst2 now have a maximum of 60 min and 15 min total usage per sortie (3600 sec and 900 sec). This to simulate the Methanol injection tank capacity. Bst1 and Bst2 are still limited to 30 min and 1 min stints respectively before engine overheat.

==== THE BELL P-39 AIRACOBRA SERIES FULL REHAUL =====

The Bell P-39 saw combat at nearly all fronts of the war. While the RAF and USAAF were not impressed with it due to its poor high altitude performance, owing to the lack of a supercharger, the Russians loved the Airacobra as an air-to-air fighter in the low altitude fighting environment of the Russian/German front. The P-39 is an unconventional fighter in that it has the Allison V-1710 engine installed behind the pilot. This allows for a quite narrow nose shape, causing lower drag than normal and allowing for a higher top speed. The armament is heavy with several machineguns and a massive 37 mm cannon in the nose. This cannon can bring down any fighter in a few hits but has a slow rate of fire, making it hard to hit a fast maneuvering target. The P-39 has a very good dive speed and can turn decently but should avoid a tail chase against nimbler early/mid war era opponents. The controls are responsive at all speeds, with only the roll rate suffering a bit at higher velocities. While being relatively heavy for its era, like most American WW2 fighters, the Airacobra is well armored and can take more hits than normal planes of its size. With the engine in the back it is quite vulnerable to engine damage though. The best traits of the Airacobras is that they are overall quite decent in most respects and have an impressive top speed at low altitudes for the dates they enter the war. The P-39 pilot should generally strive to bring the enemies below 10000 ft, keep a high speed boom n zoom approach, work with wingman tactics and avoid taking the fight at high altitudes.

--= P-39D =--

The P-39D entered combat in early 1942, powered by the Allison V-1710-35 engine with a maximum WEP 56" Hg output of 1470 hp at sea level. This fighter can run with a Fw 190A-1 below 5000 ft and is very competitive close to sea level, although its engine chokes above 14000 ft and it gets outclassed by most fighters at high altitudes.

--= P-400 =--

The P-400 was the export version and is very similar to the P-39D but with a 20 mm cannon replacing the 37 mm cannon. The difference in armament makes it around 170 lb lighter than the USAAF version.

--= P-39Q =--

Delivery of the P-39Q to combat units started in late 1943 and this version has the Allison V-1710-85 engine, which is a bit weaker at low altitudes but has a 3000 ft higher FTH (full throttle height). Furthermore the P-39Q carries less fuel, 87 gal vs 120 gal, and as such is lighter than the P-39D. It also has several aerodynamical improvements which gives it a higher top speed than its predecessors and this Airacobra version can run with most 1943-1944 fighters down low. For its era it can turn quite well. Even though its high altitude performance is slightly improved compared to the P-39D, the P-39Q rapidly loses power above 17000 ft.

==== THE MITSUBISHI J2M RAIDEN (THUNDERBOLT), "JACK" SERIES FULL REHAUL ===--

The Mitsubishi J2M2 entered combat in June 1944. It was a new more advanced fighter, designed by Jiro Horikoshi, the same man that earlier had designed the Mitsubishi A6M Zero. It was a formidable opponent when it arrived, but the Japanese army pilots were often fresh and lacked proper training, and the J2M Kasei 23a engine proved very difficult to maintain for the ground crews. The Japanese pilots were also outnumbered by more than 1:4 numbers at the time the J2M arrived and as potent as this fighter was, it had all the odds against it from the get go. That being said a fully functional J2M Raiden with a good pilot behind the stick is definitely a very competitive fighter, and fairly similar in performance to the Ki-84 and the N1K1. While American late war fighters will out run it, the Raiden easily out turns and out climbs them. While it is a lightweight late war fighter, the stall speed is fairly high. The controls also become heavy with increasing airspeed. Thanks to its raw power/weight ratio though it is a great turner in a low n slow dogfight. The armament is also quite good and it can pack a punch. The J2M pilot really needs to save the WEP for crucial moments though, since the engine problems it suffered means the J2M will quickly overheat if run at too high manifold pressures. Most late war opponents will want to apply boom n zoom tactics against the J2M, while the Raiden pilot usually wants to make it a turn fight, depending on the opponent.

--= J2M2 =--

Powered by the Mitsubishi MK4R-A Kasei 23a engine, the Raiden has an impressive max output of 2000 hp at 6000 ft. This WEP output is however only available for 1 minute before the engine temperature gets to high, and at military power the engine will produce 1740 hp at 9200 ft. It is decently armed by 2x 7.7 mm MG's in the nose, and 2x 20 mm cannons in the wings. It also has pilot back armor and windscreen armor, allowing its pilot to engage bombers without having to worry about a single machinegun bullet hitting the cockpit.

--= J2M3 =--

Very similar to the previous version, but more heavily armed with 4x 20 mm cannons in the wings. This Raiden can pack a good punch and is effective against both fighters and bombers. The additional wing cannons do have a negative impact on the roll rate.

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Version 4.32 R7 FL2064 11/27/2018

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---== UPDATE FL2064: SAMURAI OF THE SKY ===---

By: Robert, Grumpy & Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge)

Please visit the FL2064 post at the Warbirds forum for detailed performance charts:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=423&p=3459#p3459>

--= Ki-61-I Hien (Flying Swallow), "Tony" series =--

Full rehaul of the Ki-61-Ib and Ki-61-Ic flightmodels. See further down for details.

--= Ki-84-Ia Hayate (Gale), "Frank" =--

Full rehaul of the Ki-84-Ia flightmodel. See further down for details.

--= N1K1-J Shiden, "George" =--

Time increased before the oil tank goes empty when leaking oil, now on par with other radial engines.

--= F6F-5 Hellcat =--

Flaps now also have a 20° setting. This to better represent the complex flaps mechanism of the Hellcat which had the flaps lower to varying angles, depending on the planes relative airspeed.

--= F4U Corsair series =--

Landing gear dragco has been reduced down to more logical numbers. The landing gear still causes much drag when extended and reduces acceleration in a dive, but no longer unrealistically so. This fix will make it easier to take off from carriers with heavier loads.

--= Global fighter hitpoints rehaul =--

When looking into the hitpoints setup for fighters in Warbirds it was quickly evident that they had been set quite arbitrary (note: understatement) for the various fighters by several different designers during the long life of this flight simulator. The lightly constructed A6M Zero could take the same amount of bullets as the huge P-47 Thunderbolt, a plane renowned for its ruggedness. Even fighters of the same series could have completely different hitpoint setups relative to each other. Firstly all hitmaps have been completely rebuilt based on blueprints and "x-ray" drawings of all the WW2 fighters in Warbirds. Now all hitpoints for all plane parts like the rudder, elevator, wings, engine, fuselage, stabilizers etc have been thoroughly recalculated based on the hitmap size of the parts, the materials the fighter was constructed of in real life, reported fragility/ruggedness, blueprints etc. A fighter with a radial engine will now be more durable to engine damage than an inline engine'd fighter. Laminated wooden parts are somewhat more durable to machinegun fire than metal/duraluminium ones. A larger plane will generally have more overall hitpoints than a smaller plane, although of course a larger plane is easier to hit due to its size. A fuselage with an extra sturdy inner construction will be tougher than a really lightly constructed fuselage. Self sealing fuel tanks can now sustain more damage than non-self sealing fuel tanks etc etc. Hopefully this extensive work, that has been ongoing since before the summer of 2018, will now result in a more realistic relative damage modeling between the fighters than what Warbirds has ever seen.

--= New Skins =--

There are four beautiful new skins made by IArt7.

* F4U-1A: Lt. "Ike" Kepford and Lt. Tommy Blackburn skins

* F4U-4: Thomas Hudner skin

* Me 262: New default skin

---== THE KAWASAKI KI-61 HIEN (FLYING SWALLOW), "TONY" SERIES FULL REHAUL ===---

The Japanese Ki-61 made its combat debut in early 1943 and was a leap in design compared to earlier Japanese fighters. It was nicknamed "Tony" by the Americans since it resembled an Italian plane, and it is indeed quite similar to the Macchi C.202 in appearance. This is partly due to the fact that the Ki-61 was also fielding a license built German DB 601Aa engine (Kawasaki Ha-40), the same engine as used by the Messerschmitt Bf 109E-4Aa and Macchi C.202. The problem is just that this engine was outdated by

several years when the "Tony" arrived in 1943, and this fighter was as such quite underpowered compared to the US planes it was up against. Even worse the Japanese built their engine version lighter than the original, resulting in constant reliability problems. Being underpowered aside, the Ki-61 airframe is very well designed. This plane can outdive American fighters and also hold a tight turn radius. It is very maneuverable at slow speeds and is provided with armor plating behind the pilot, which wasn't very common in earlier Japanese fighters. Another good trait of the Flying Swallow is that it has quite good armament. In a fürball the "Tony" can do really well, but will have trouble against faster opponents of it's era if the enemy pilots keep their speed up.

--= Ki-61-lb =--

Armed with 4x 12.7 mm machine guns and weighing 6504 lb at full load. It's top speed is 363 mph at 20000 ft and it can bring 2x 250 kg bombs as well as use drop tanks.

--= Ki-61-lc =--

In all aspects similar to the earlier Ki-61 with the exception fielding 2x 20 mm cannons in the wings instead of 2x 12.7 mm machineguns. The Ki-61-lc is only slightly heavier and can pack a good punch.

---== THE NAKAJIMA KI-84-IA HAYATE (GALE), "FRANK" FULL REHAUL ==---

Entering combat service in Aug 1944, the KI-84-1a was a formidable fighter plane. Unfortunately for Japan their plane production was vastly inferior in numbers compared to the fighter production of the U.S.A., and the Ki-84 suffered constant maintenance problems in the harsh conditions of war, with especially the engine often experiencing reliability problems. When fully functional though, this fighter made a good account of itself even against the outnumbering odds the Japanese pilots faced. The top speed of the Ki-84 can match several of the fastest fighters of WW2, although the pilot needs to be careful of running the WEP for too long. It has good firepower with 2x 12.7 mm machineguns and 2x 20 mm cannons. The stall warning is good and the rudder and aileron controls are functional even at higher speeds. The elevator quickly gets heavy above 300 mph IAS though, requiring the pilot to use elevator trim to pull out of a high speed dive. The "Hayate" can also engage enemy bombers, having a shielded windscreen protecting the pilot against machinegun rounds. What makes the "Frank" a great fighter is foremost the combination of a high top speed coupled with it's maneuverability and great sustained turning ability. High speed turns aren't it's best trait due to thin wings and a low max AoA. In slower sustained turns though it can easily outturn American late war fighters, and the Ki-84 is fairly on par with a Spitfire XIVe in turn rate.

Overall this is a very well designed fighter that can compete with the cream of the crop. Pilots facing the Ki-84 can engage it in high speed turns, but should often be wary of getting tangled in, depending on their own ride. For fast fighters that can't turn with the Ki-84 the key is patience and surviving when

extending away from it, as the "Frank's" engine will quickly overheat when running at WEP, allowing one to eventually create distance. Fighters with great diving performance can also outdive the Ki-84. Against most late war opponents the Ki-84-la pilot should try to make it a climbing turn fight, but can also resort to boom n zoom energy tactics depending on the foe. All in all the Nakajima engineers produced a great fighter, but Japan had to few of the "Hayates" to make an impact on the outcome of the Pacific war.

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Version 4.32 R6 FL2063 11/06/2018

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---== UPDATE FL2063: THE PEREGRINE FALCON AND THE DEMON ==---

By: Robert, Grumpy & Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge)

Please visit the Warbirds forum for performance details of the new flightmodels.

<http://bhlanding.ient.com/warbirdsforum/viewtopic.php?f=8&t=408&p=3396#p3396>

--= Ki-43-II Hayabusa (Peregrine Falcon), "Oscar" =--

Full rehaul of the Ki-43-II flightmodel. This was a very maneuverable and fast turning Japanese fighter, very similar to the A6M3 Zero. See further down for details.

--= Ki-44-IIc Shôki (Demon), "Tojo" =--

Full rehaul of the Ki-44-IIc flightmodel. This fighter was different from other Japanese fighters in that it had small thin wings and was designed for speed rather than turning ability. See further down for details.

--= Fully revised hitmaps =--

The hitmaps for nearly all fighters were earlier in an awful state. The hitmaps have lately been retweaked one by one. In this update though the hitmaps have now been carefully redone for all fighters that were still awaiting to be corrected. Affected fighters:

Brewster Buffalos, Polikarpov I-16, Macchis, Fokker D.XXI, MiG-3, Hawker Typhoons, P-39 Airacobras, J2M's, Ki-43, ki-44, Ki-61's & Ki-84.

--= Ki-27b "Nate" =--

A few minor corrections to the flightmodel.

--= Bf 110's =--

Slight increase to manual trim allowance.

--= Polikarpov I-16 "Ishak" =--

Landing gear brake efficiency reduced. The I-16 was reported to have quite poor brakes.

--= MiG-3 =--

Fuel tank system retweaked (93.8 gal fuselage tanks, 2x 39.6 gal wing tanks).

--= De Havilland Mosquitos =--

Wheel brakes tweaked so that the plane won't nose over as easily.

--= British early fighters =--

The .303 cal machine guns have all been set to the primary trigger. This since these early British fighters only used a single button to fire all guns at once. This fix affects the:

Hurricane I, Hurricane I *87 octane, Sea Hurricane Ib, Spitfire I, Spitfire I *87 octane and Spitfire II.

--= Spitfire IXa =--

Now has the neg G's cutout performance like the Spitfire Vc. This since the Spitfire XIa also used the "Miss Shillings Orifice" quick fix for the carburetor, not the Bendix Stromberg carburetor like the Spitfire IXe.

==== THE NAKAJIMA KI-43-II HAYABUSA (PEREGRINE FALCON), "OSCAR" FULL REHAUL =====

The Ki-43-II was a Japanese land based fighter designed for superior maneuverability. It was light and had a good wingloading, fielding the Nakajima Ha-115-II radial engine capable of 1174 hp at 2800 m

(9200 ft). This engine is quite similar to the Sakae 21 engine of the A6M3 "Zero", and in fact the Ki-43-II is very similar to the A6M3 in both speed, climb and turning performance. It has a low top speed for it's era, but has an excellent turning performance. It's dive performance is very poor so the Hayabusa will have a hard time catching Allied fighters diving out. The armament is also quite weak with only 2x 12.7 mm machine guns in the nose. That being said though at slow speeds it's an excellent fighter that can easily outmaneuver and out turn fighters of the same era, and it was quite liked by the Japanese army pilots. It's butterfly low drag flaps are also great for turn fighting.

==== THE NAKAJIMA KI-44-IIC SHÔKI (DEMON), "TOJO" FULL REHAUL ====

The Shôki was very different from traditional Japanese fighter design in that it was built for speed, not turning performance. It's a large nosed fighter with small and very thin wings, fielding the strong Nakajima Ha-103 radial engine capable of nearly 1600 hp at 2100 m (~7000 ft). It could match a P-38G in top speed up to 5200 m (~17000 ft). The most impressive performance of this fighter is it's climb rate though, outmatching most fighters of WW2. It's armament is decent with 4x 12.7 mm machine guns and the short wingspan gives it a good roll rate. In contrast to the Ki-43, the Ki-44 is a very good diver and can sustain high speeds. It has no armored windscreen so machine gun fire from bombers can be dangerous. The thin small wings of the Ki-44 hampers it's turn radius at high speeds, but it's relatively light weight and strong engine still ensures that this bird is a decent turn fighter at slower speeds, especially in a spiral climbing turn. The low drag butterfly flaps also help improve it's turning performance. Overall the Ki-44-IIC Shôki is a quite competitive fighter, and had the Japanese Army pilots been better trained then it would have been a much more dangerous opponent for the U.S. pilots.

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Version 4.32 R6 FL2062 10/16/2018

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==== UPDATE FL2062 TURNING ON A DIME ====

By Robert, Grumpy & Bollok

All made possible by Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge)

Detailed performance charts can be found at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=391>

--= Nakajima Ki-27b Nate=--

The Ki-27b has been fully remodeled. While lacking top speed and firepower, it is the best turning ww2 monoplane in Warbirds. See further down for details.

--= Propeller wash =--

The Propwash of all remodeled flightmodels has been retweaked. The wind washing over control surfaces, as a result of the propeller spinning, has now been set on a basis of the engine's horsepower. Earlier all planes just used a few standard numbers for propwash. Hopefully the propwash should now be more accurate for each individual flightmodel. A high propwash from a strong engine means more reactive controls at especially lower speeds (For the elevator and rudder) while a low propwash results in less reactive controls. For a majority of the airplanes this change will be quite subtle and hardly noticeable, while fighters with a very strong/weak engine will see a slightly more notable change in reactivity. The P-38's and Bf 110's will be most notable, and will now be more stable, as with better understanding of the propwash code Bollok found out that these twin engine fighters had been given a twice as high propwash value as they should have.

--= De Havilland Mosquito series =--

The Mosquitos were previously modeled with a stall speed based on Power OFF values. They have now been remodeled based on Power ON values like the other flightmodels. This results in a 14-15 mph lower stall speed. As such they will now be significantly more agile and able to keep a tighter turning radius.

---== THE NAKAJIMA KI-27B NATE FULL REHAUL ===---

The Ki-27 is a Japanese fighter that entered service a few years prior to WW2. It was used effectively against early Polikarpov I-16 fighters as it was easily able to outturn them, and had a similar top speed until the I-16's got stronger engines. The Ki-27b is an extremely light monoplane fighter at 3523 lb with 200 square feet wings. As a comparison the A6M21 Zero weighs 5555 lb. The Nate has a weak engine though producing only a max power of 780 hp at 11480 ft. The drawbacks of this fighter is its low top speed, fragile construction, non self sealing fuel tanks, it has no pilot armor and is very underarmed, fielding only two 7.7 mm machine guns in the nose. This Nakajima fighter's dive speed performance is also quite poor. The positive traits on the other hand is its great maneuverability and outstanding turning performance, being able to outturn any competition in Warbirds. Owing to the Ki-27b's low weight it also holds an impressive climb rate for its era.

The best way to fight the Ki-27b is by booming and zooming, and for fighters with cannons to even go HO against it. Just remember to veer off before you collide! Don't be a dweeb! Defensively diving out is also a good option, but it should be fairly easy to outrun the Nate if you keep a good situational awareness. As the Nakajima pilot you want to make it a close quarter turn fight. Enemy pilots who try to turn fight with you will be in for a rude awakening, especially those in a Zero, P-36C or Hurricane who put too much trust in their fighter's turning performance. The Ki-27b's good climb rate means that spiral climbing can

also be used as an effective combat tactic. Just be aware that you might need to put a steady stream of bullets into an enemy plane before it goes down.

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Version 4.32 R5 FL2061 09/04/2018

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Ability to issue negative formation lengths to wingmen restored.

---== UPDATE FL2061: ZERSTÖRERS ==---

By: Robert, Grumpy and Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge)

You can find detailed performance graphs at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=362>

--- Messerschmitt Bf 110 Zerstörer series ---

Full rehaul of the Bf 110C-4 and Bf 110G-2. See further down for details.

--- Bf 109K-4's ---

The MW50 WEP has been reduced from 1.98 ata to 1.80 ata. This since the absolute majority of Bf 109K-4's used B4 fuel and not C3 fuel during their service. As such both Bf 109K-4's have had their engine setup rebuilt from the DB 605DC to the DB 605DB engine. This results in ~10 mph loss at Bst2, but the K-4's gain ~5 mph at lower altitudes, at Bst1, due to better low alt power output when using manifold pressures at 1.45 ata and lower with the DB 605DB engine.

--- Lavochkin series ---

- * Liftco increased for a lower stall speed for all La5's and La7's. From 102 to 95 mph IAS at 7015 lb.
- * Wing efficiency somewhat reduced to better simulate the effects of leading edge slats.
- * Flaps liftco adjusted, slightly lowered at smaller angles.
- * Small dragco increase for the La7's. From 413 to 411 mph top speed at 20 000 ft.
- * Stall behaviour slightly harsher than before. All in all though the Lavochkins will turn a bit better now.

--- Hitmap fixes ---

Reworked hitmaps for the Focke Wulfs, Mustangs, Zeros, Hawks, Macchis, Lavochkins, Wildcats and Hellcat.

--- P-40F ---

Cockpit fix, the cockpit of the P-40F should be rendered at it's correct location with this update.

==== THE BF 110 ZERSTÖRER SERIES FULL REHAUL ====

The Messerschmitt Bf 110 was designed as a twin engine long range fighter for escort missions, and as a fighter-bomber. In the invasions of Poland and France this Messerschmitt saw good success, but did not fare as well in it's fighter role in the Battle of Britain. The British fighters were simply faster and more agile. This plane can be very effective as a bomber-killer or fighter-bomber though, packing a heavy punch and able to carry payloads of 2x1000 kg bombs. Against Bf 110's, a bomber is in big trouble without escort. It is quite hard to dogfight nimbler opponents 1v1 with the Zerstörers, but they are not terrible at turning and if working in wingpairs the Bf 110's can actually be lethal by using Thach weave tactics, letting their big guns speak. Smart Bf 110 pilots would do well to enter the combat area at a higher altitude than their opponents, allowing them to pounce on bombers or avoid bad match-ups. If left unmolested, the Zerstörers can also be very effective at dive bombing and strafing fields.

--- Bf 110C-4 ---

The Bf 110C-4 is equipped with two Daimler-Benz DB 601B engines, which are the similar to the engines used by the Bf 109E-3, but with a different propgear ratio. It is armed with four 7.92 mm MG's and two 20 mm cannons. The Bf 110C-4 is not as nimble as the majority of early era fighters but is decently fast unless matched against Bf 109's or Spitfires. This Messerschmitt is best used as a bomber-killer or for jabo missions, but can be effective if boom n zooming through fürballs or going head on. The single rear-facing 7.92 mm MG can bring down an enemy if lucky, but shouldn't be counted on as an adequate defence.

--- Bf 110G-2 ---

The Bf 110G-2 packs a very heavy punch with two 30 mm cannons and two 20 mm cannons, and can be even better armed with two extra 20 mm cannons in a gunpod, air-to-air rockets or even a devastating 3.7 cm BK cannon. The engines are of the DB 605B model, with the same power output as the DB 605A engine used by the Bf 109G-6. The Bf 110G-2 is best used for killing bombers and for jabo missions, but enemy fighters need to beware as this Zerstörer will often kill with a single burst. It has a somewhat

upgraded defensive armament with a double barreled 7.92 mm MG, the MG 81Z, but still shouldn't rely on this gun for defence. Contemporary fighters will usually have a higher top speed than this Messerschmitt so always keep a good situational awareness, and while smaller fighters will out turn the Bf 110G-2, it can actually turn inside many of the heavier late war fighters.

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FL2060 08/21/2018

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---== UPDATE FL2060: ADLERTAG ==---

By: Robert & Grumpy

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge)

--= Bf 109 series =--

After months of remodeling and getting this series as close to historical performance as possible, we are happy to finally announce the full rehaul of the whole Messerschmitt series. See further down for details.

--= Yakovlevs =--

Slight roll rate improvement for the Yak-9D, Yak-3 and Yak-9U.

--= Lavochkins =--

Slight wing efficiency reduction fix due to data found that leading edge slats increases induced drag when extended. This fix affects all the La5's and La7's.

--= Focke Wulfs =--

The Fw 190A-8, F-8 and D-9 have had their Bst2 renamed from "MW50 injection" to "MW50 injektion" with correct German spelling.

--= Macchis =--

The C.202's and C.205 have had minor fixes in dragco and engine setup from better data found while remodeling the Bf 109 series.

--== THE BF 109 MESSERSCHMITT SERIES FULL REHAUL ==--

There were no other aces in ww2 with as many kills as the German Bf 109 pilots. The Messerschmitts were used at all fronts by the Germans and even scored a very impressive tally in Finnish hands against the Russians. There has been a lot of propaganda after the war where Allied countries claimed their fighters were far superior to their German adversaries, but make no mistake, the Bf 109 is a very potent fighter that has several outstanding traits, while also having some apparent drawbacks. The Messerschmitt is a small lightweight fighter and can definitely give a Spitfire a good run for the money in a slow speed turnfight and is very maneuverable below 300 mph. Especially the F's and K's hold a great sustained turn rate due to their high power/weight ratio, but even E's and G's are quite decent. The small wing area is fairly well counteracted by the leading edge slats, allowing this fighter a high max AoA and surprisingly low stall speed for it's wingloading. While the normal Bf 109's are a bit lightly armed, the G-6/RVI and K-4/RIV versions pack a heavy punch with their added gondola cannons in exchange for a decrease in speed, climb-, turn- and roll rate. The Messerschmitts have a major Achilles heel in that their elevator, rudder and aileron controls quickly become heavier with increasing airspeed. As such a Bf 109 can turn with a Spitfire below 250 mph IAS but is fairly equal to a P-51D above 300 mph IAS, and above 400 mph IAS a P-51D can easily get on the Bf 109's six. There are several accounts of German Bf 109 pilots crashing when trying to follow a British fighter in a low altitude dive due to inability of pulling out of the dive, and a known tactic used by British pilots was to roll over, dive and then pull out in order to evade a Bf 109 on their six. A Bf 109 pilot in Warbirds will do well to be ready with the elevator trim to get out of a dive or to tighten the turn in high speed dogfights. Heavier fighters will do well to keep their speed high when fighting a 'Schmitt. A Warbirds player probably needs a bit of a learning curve to get skilled in this German fighter, but the Messerschmitts are definitely very competitive fighters that have the ability to bring down any opposition, especially with an Experten in the cockpit who knows how to manage his Bf 109's strengths and weaknesses.

--= Bf 109E-1 =--

The E-1 is lightly armed with 4x 7.92 mm MG's and has a max output of 1134 hp at 4100 ft with it's DB 601 engine. The 1.40 ata boost can be used for 1 min stints with a 2 min cooldown, while 1.30 ata can be used for 5 minutes.

--= Bf 109E-3 =--

The E-3 has an improved DB 601 engine with a better high altitude performance, and replaces the wing 7.92 mm MG's with 20 mm MG/FF cannons.

--= Bf 109E-4 =--

This version is very similar to the Bf 109E-3, but has slightly better MG/FF/M cannons instead of the MG/FF cannons of the E-3.

--= Bf 109E-4 Aa =--

The best known Bf 109E version, the E-4 Aa has the DB 601Aa engine which can produce 1212 hp at 4000 ft for 1 minute stints. There are several 1939-1940 era fighters that can turn tighter than the 109E's, but the 'Schmitts can usually outrun these opponents. Still, if on the six of a Spitfire, the Bf 109E's can keep inside it's turn for several laps. The Hurricane outturns the Bf 109E's though.

--= Bf 109F-1 =--

The F's might be the pinnacle of the Messerschmitt series and sees the wing cannons removed for a single nose cannon. The Bf 109F's and future 109's have redesigned wings with a better wing efficiency and lower drag than the E's, and can also bring a droptank. The F-1 benefits from a good power/weight ratio with the DB 601N engine capable of producing 1243 hp at 6900 ft for 5 minute stints.

--= Bf 109F-2 =--

Very similar to the F-1, but with the 20 mm cannon replaced with a 15 mm MG/151/15 cannon and 200 rounds instead of 60 rounds.

--= Bf 109F-4 =--

The best F version equipped with the even further improved DB 601E engine. It also has a 20 mm MG/151/20 cannon with 200 rounds instead of the 15 mm cannon of the F-2. The F-4 has great top speed for it's time and can turn with most 1941 era fighters at low speeds.

--= Bf 109G-2 =--

The G-2 fields the DB 605A-1 engine which has a better high alt performance than the DB 601 engine. Problems with engine reliability resulted in the G-2 being restricted to 1.30 ata though. As such it's has a better top speed above 20000 ft than the F-4, but is generally a bit more cumbersome at lower alts than the F's.

--= Bf 109G-6 =--

The G-6 has the DB 605A-1 engine like the G-2, but is cleared for use of 1.42 ata with a max output of 1529 hp at 6800 ft at 1 minute stints. It has improved armament with 2x 13 mm MG's replacing the 7.92 MG's and packs a better punch. It's a bit heavier than the F's though and slightly worse in turn fight at low alts, but is a good high alt performer.

--= Bf 109G-6/RVI =--

This is a G-6 with added gondola cannons in the wings, packing a heavy punch and is a great tool against bombers. This added firepower comes at the expense of a ~5 mph slower top speed and decreased climb-, turn- and roll rate due to the added 474 lb weight of the wing cannons.

--= Bf 109G-14 ASM =--

An improvement to the G-series, the G-14 ASM has an engine tooled for high alt performance, and more importantly can use the MW50 methanol/water injection. This allows a markedly increase in max power output and it can keep it's WEP for 10 minutes before the engine starts to overheat (total MW50 capacity is 20 minutes). This Bf 109 version is a serious threat to any opposing fighter of it's era.

--= Bf 109K-4 =--

This is the ultimate version of the Bf 109 series. An added feature is the choice of using the heavy 30 mm MK/108 cannon instead of the standard 20 mm cannon. The DB 605DC engine can produce 1988 hp at 1400 ft with MW50 injection and C3 fuel, which gives the K-4 a power/weight ratio even greater than the Spitfire XIV, and can definitely match the Spit XIV in a sustained low n' slow turn fight. The top speed matches any late war fighter below 20000 ft and if the German pilots of ww2 hadn't been constantly outnumbered 1v5 or even 1v10 in the era of the K-4, this version would probably have made a much better tally for itself. The Akilles heel of the Messerschmitts is the heavy high speed handling though, and in the 1944-1945 era where speeds are much higher than in the earlier years of ww2, this is an even more significant drawback for the K-4 pilot that often will need to try to lure the often heavier enemy fighters into a slow speed dogfight.

--= Bf 109K-4/RIV =--

Like the G-6/RVI, The K-4/RIV has added firepower from it's gondola wing cannons at the expense of top speed and agility.

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Changes in version 4.32 R4 FL2058 06/11/2018

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---== UPDATE FL2058: NAVY BLUE ==---

By: Robert, Grumpy and Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has shared a vast amount of aerodynamical knowledge).

--= F4U Corsair series =--

The whole F4U series has been fully remodeled. See further below for details.

--= Propdrag change =--

The amount of drag generated by the airscrew when at idle throttle or engine off has been lowered globally for all remodeled fighters. This means that the braking effect is somewhat reduced when chopping the throttle mid-air, but more importantly the fighters can glide for a longer distance (a bit closer to real life numbers) when the engine is dead.

--= Macchi C.202's and C.205 =--

The C.202 Fulgore and the C.205 Veltro have had their engines and dragcos corrected. They are all now ~8 mph slower than previously, this according to better speed data found. Also the C.205 now only has 1 minute of WEP instead of 5 min, as per Daimler-Benz 605A engine data (The C.205 used a license built DB 605 engine). Both the C.202's and the C.205 have had their climb rate slightly improved to match historical data though.

--= Fw 190 series =--

The whole Fw 190 series has now a somewhat harsher stall behavior. In real life the Fw 190's had no washout for the wings and the stall when maneuvering was very sudden and violent with nearly zero warning.

--= F6F-5 Hellcat =--

The F6F-5 has gotten a complete engine rehaul and dragco retweak. This since better engine and speed data was found when remodeling the F4U's, and the Hellcat used a near identical engine as the F4U-1D. The F6F-5 was actually just as fast as a F4U, and it's a misconception that the F6F-5 was slower. This was discovered in ww2 when Vaught lent Grumman a F4U-1 to help find out why the F6F was underperforming in speed tests, and in the trials it was found that the Hellcat could pretty much fly side by side with the Corsair at full throttle. It was simply an instruments error that had the F6F's gauges show a lower velocity than it really had. The Hellcat is now generally 5-6 mph faster than before and ~15 mph faster at WEP at low altitude. This also improves the F6F-5's sustained turning performance at the deck when using WEP, due to it's now better power/weight ratio and less drag. The 60" Water injection WEP has a total tank capacity for 14 minutes use, at 5 minutes stints.

--= The left engines are the right engines =--

A coding error has been found that affects all FM's with multiple engines. Previous programmers, far far back in time, seems to have mistakenly reversed the engine hardpoints, so if you hit the ground with the left wing, the right wing engines will take damage instead. This only affects damage from hitting the

ground though and not bullet damage, which uses hitboxes to calculate damage. As this coding error does not have much impact on the game it will be fixed for each multi-engine plane one at a time when it's time for said plane to get a full rehaul of it's flightmodel. For now the P-38's have had their hardpoints corrected.

==== THE F4U CORSAIR SERIES FULL REHAUL ===

The F4U Corsairs are known for their impressive records in the Pacific theater but also made a good account of themselves over Europe. They were used by several countries even after the war. The F4U's are designed for carrier operation and are heavy birds with powerful radial engines. The stall speed is fairly high at 97 mph at 12000 lb, and the roll rate is similar to a P-51 although somewhat worse at high speeds. The Corsairs are primarily boom n zoom fighters, with 6x .50 cal machine guns, but they can turn quite sharply for a few laps at speed thanks to their thick wings and good max AoA. The controls get sluggish at very high speeds though. The F4U's have an excellent wing efficiency and retain their energy well, and the -1D and -4 can even hold a sustained turn quite fine with their good power/weight ratios. Going into low n' slow maneuvering vs nimbler opponents can be dangerous as the Corsair flightmodels now have a more realistic, and notably higher, stall speed than before. All in all the Corsairs are very potent fighters and should excel when their pilots keep the speed high and work with wingmen for boom n zoom tactics.

== F4U-1 ==

The F4U-1 fields the Pratt & Whitney R-2800-8 engine with a power output of 2000 hp at 1750 ft. The -1 has fuel to spare and is quite heavy at 12738 lb. Against opponents of the same era this fighter is fast and does best at boom n zooming wingman tactics. The power/weight ratio is not superb so sustained turn fighting is inadvisable unless matched against the Fw 190 or P-47.

== F4U-1A ==

The F4U-1A is 75 lb heavier than the -1, but has the R-2800-8W engine which can use water injection at 60" Hg WEP (5 min stints, 9 min total tank capacity). The max power output is as such improved to 2250 hp at 900 ft and the -1A has a 15-20 mph faster top speed than it's predecessor. The -1A can also carry a drop tank for long range operations.

== F4U-1D ==

The F4U-1D also fields the R-2800-8W engine but carries notably less fuel and weighs in at 12086 lb, which is 726 lb lighter than the -1A. This results in a better climb rate and sustained turning ability, being fairly on par with a P-38L in a turnfight. For long range operations the -1D can carry two droptanks and also has a good variety of ground attack ordnance with rockets and heavy bombs.

--= F4U-4 =--

The F4U-4 didn't see duty until the very end of the war but was a great improvement to the Corsair series. It had full metal alloy wings to save some weight, and was equipped with the new P&W R-2800-18W engine with a four blade propeller. This beast of an engine could produce 2450 hp with water injection (5 min stints, ~11 min tank capacity). While being 337 lb heavier than the -1D, the -4 still has a better power/weight ratio at WEP and can almost challenge a C.205 Veltro in a sustained turn. The F4U-4 is ~18 mph faster than the -1D at the deck and ~60 mph faster at 26000 ft, since the -1D has a lower FTH (Full Throttle Height). The -4 can carry the same ordnance as the -1D.

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Changes in version 4.32 R2 05/30/2018

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Background music reworked

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Changes in version 4.31 R7 fl2057 04/17/2018

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----= UPDATE FL2057: FORK-TAILED DEVILS =----

By: Robert, Bollok and Grumpy

All made possible by: Bcamel (creator of the program used to model the airplanes), and Idunno (who has previously shared a vast amount of aerodynamical knowledge).

Please visit the Warbirds forums for detailed performance charts at:
<http://bhlanding.iient.com/warbirdsforum/viewforum.php?f=8>

--= P-38 Lightning series =--

The whole P-38 series has been fully remodeled. See further below for details.

--= Spitfires =--

* All Spitfires have had their pitch authority at high speeds slightly lowered to reduce the risk of overstressing the airframe due to the G's spiking.

- * Slight PitchDiv raise to all Spitfires in order to decrease the nose bounce when pulling G's.
- * The Spitfire Vb now suffers from neg G cutout like the Spit I & II. The "Miss Shilling's Orifice" wasn't standard carburetor equipment until the Vc model.
- * The Spitfire IXa didn't have the Bendix-Stromberg carburetor, and as such now has the same neg G behaviour as the Spit LF Vc. (the "Miss Shillings Orifice" installment)
- * Both Seafires now have the tail hook enabled.

--= N1K1-J ==

- * Now has a featherable propeller (this is done automatically when the engine is turned off). This improves it's gliding distance with a dead engine due to reduced propeller drag.
- * Flaps dragco increased somewhat.

--= P-51 series ==

- * Slight PitchDiv raise to the A-36 Apache, Mustang Mk 1, P-51B and P-51D in order to decrease the nose bounce when pulling G's.

==== THE NEW P-38 LIGHTNINGS ====

The P-38's fought against the Axis airforces in several theaters during ww2. The Lightning really shined in the Pacific with boom n zoom tactics against the slower Japanese fighters, but even in Africa/Europe the P-38 had a positive kill-to-loss ratio. The Germans nicknamed it "Der Gabelschwanz Teufel" (The Fork-Tailed Devil). While being active in the Pacific to the end of ww2, in Europe it was phased out by Jimmy Dolittle in second half of 1944, in favour of the P-51 Mustang. The reason was mainly the fact that the Lightning had problems with a high rate of engine failures, it cost over twice the money to produce compared to a P-51 and had bad cockpit heating that was better suited for the warmer Pacific theater. The P-51 also had a longer fuel range and was faster.

Some of the P-38's weaknesses, that J. Dolittle also was concerned about, is that the Lightning has a quite slow roll rate and compresses in a high speed dive due to it's aerodynamics disturbing the airflow around Mach 0.67. On the bright side the P-38 has good firepower and ammo capacity though with 4x .50 cal's and 1x 20 mm cannon. These are all located in the nose so convergence isn't a problem. The two engine propellers are counter rotating and as such this fighter doesn't suffer from torque like single engine fighters do. The Lightnings also have a nice selection of ordnance and are potent in ground attack roles. A common misconception about the Lightning is about it being an "unagile" fighter. Many people and also flight simulators has this wrong as if the P-38 should be turning like a truck. It definitely

shouldn't. The P-38 not being agile has to do with its poor roll rate and weight, making it unsuitable for low n' slow maneuver combat like going into scissors. When it comes to turn fighting though this twin engine fighter has a good power/weight ratio and a large wing area with a 16% root thickness ratio. The long wing span also helps with induced drag and when using the combat setting at 8° for its Fowler flaps, this bird can hold a turn quite well. It's not like a Spitfire or A6M Zero, but can definitely hold its own against many opponents. The P-38's best envelope is as a high altitude interceptor, and as such a P-38 pilot would generally benefit from doing bomber escort or in other ways taking the fight up high. While being able to fight down low, at high altitude is where the "Fork-Tailed Devil" shines and can take it all the way up to 39000 ft.

--= P-38F =--

The P-38F is powered by the Allison V-1710-49/53 engines, producing 1225 hp each. For its era this is the fastest American fighter above 15000 ft, and also the best climber. The turn rate is comparable to that of a C.205 Veltro or F6F-5 Hellcat. The firepower is good and it's a great fighter for boom n' zooming while also able to turn a few laps with the bandit. Avoid low n' slow maneuver fights though as the roll rate is poor and it's a heavy bird. A wise Lightning pilot fights the enemies between 20000-39000 ft.

--= P-38G =--

The P-38G is very similar to the P-38F but 120 lb lighter and can run at 41" of manifold pressure for a longer time with its V-1710-51/55 engines. It has the same max power of 1225 hp though. An important difference is that the P-38G can use an 8° combat flaps setting which improves the Lightning's turn rate quite a bit.

--= P-38J =--

The J-version had notably improved engines, the Allison V-1710-89/91, capable of producing 1570 hp. It has a slightly higher drag but is 10-13 mph faster than its predecessors. Also the climb rate is improved due to its better power/weight ratio. The weight is around 833 lb heavier than the P-38G though and while being able to turn well, it holds a somewhat larger turning radius. The P-38J can use rockets for attacking ground targets which is a nice addition. The service ceiling is around 40000 ft.

--= P-38L =--

While being the heaviest of the Lightnings, weighing in at 18055 lb, the P-38L has several improvements. The most significant one is the power boosted ailerons. This gives the P-38L a much needed increase to the roll rate at high speeds, and also a slight improvement at lower speeds. The code does not allow for modelling the historical special designed dive flaps of the P-38L, but the flightmodel is instead able to dive 20 mph faster before compression occurs. The L-version's V-1710-111/113 engines are very similar to the P-38J engines and also able to produce 1570 hp. The ordnance is even more enhanced with the P-38L able to carry 2x 2000 lb bombs, making it very effective for jabo missions.

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Changes in version 4.31 R6 fl2055 03/05/2018
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---== UPDATE FL2055: RULE BRITANNIA ==---

--= Spitfire series =--

The whole Spitfire series has been remodeled. See below for details.

--= Brand new airplanes added =--

Several new planes have been built and added to the Warbirds roster. These are the: Yak-9U, Mosquito NF.30, Mosquito B.XVI (bomber), Seafire III and the Hurricane I *87 octane (pre Battle of Britain version limited to +6.25 lbs of boost). Also one of the two Spitfire Mk I's has been converted into an 87 octane pre BoB version. See below for details.

--= P-47D series =--

* All Jugs now have two internal selectable fuel tanks to simulate their internal main- and auxiliary tanks, which were fully separate from each other in real life. The fuel tanks are placed next to each other though so a good burst to the belly could damage both of them.

* Hitmaps have been fully revamped and are now more accurate.

* Minor fix to wing efficiency: 0.91 instead of 0.93.

* Control-delay set to normal values.

--= Yak series =--

* Aileron/elevator control effectiveness, in relation to airspeed, has been tweaked.

--= Sea Hurricane Ib =--

Slight rebuild of the Sea Hurricane's engine setup. Also the bomb loadout option has been removed.

--= Lancaster series =--

The stall speed has been lowered by 10 mph for both Lancasters.

--= Skins =--

Skins have been changed/updated/added for the: Hurricane I, Hurricane Ia, Seafire IIc, Seafire III, Spitfire IXa, Spitfire LF IXe, Spitfire XIVe, Mosquito NF.30, Mosquito B.XIV, Yak-9U, MiG-15. (Also a few sound fixes to some of these flightmodels).

==== THE NEW MOSQUITO NF.30 ===--

This "Wooden wonder" late war version used the two stage Merlin 72 engines which, compared to the NF.II's engines, improved the flight envelope by around 10 000 ft. The NF.30 has a full throttle height (FTH) at 25000 ft. This intruder nightfighter is armed with 4x 20 mm Hispano cannons with 175 rpg.

--= THE NEW MOSQUITO B.XVI =--

The B.XVI also used the two stage Merlin 72 engines and was a fast and potent high altitude bomber for hit n' run attacks. It has a large selection of loadouts which gives it great versatility for different bombing missions.

==== THE NEW YAK-9U ===--

While the Yak-3 and Yak-9D might look similar, the Yak-3 was a significantly smaller aircraft both in shape, wing area and weight compared to the Yak-9D. The Yak-3 was more agile, faster and climbed better while the Yak-9D had more fuel for long range missions. They both used the Klimov VK-105PF engine but the Yak-3 used a version of it which allowed for a better max boost. The late war Yakovlev version, the Yak-9U was based on the heavier Yak-9D but used a much improved Klimov VK-107a engine, producing 1650 hp at 1st FTH compared to the 1300 hp of the Yak-3. The -9U is 12 mph faster at sea level (366 mph) and 33 mph faster at 15000 ft (415 mph). This 1945 Yakovlev version was considered the best in the series, and while being heavier than the Yak-3, the stronger powerplant of the Yak-9U actually gives it a better power/weight ratio and it can as such hold a sustained turn right on par with the -3. The armament consists of 2x 12.7 mm MG's and 1x 20 mm cannon with fairly short clips, but the Yak-9U is an excellent climber, agile and quite fast. It is best used below 13000 ft. It is also competitive in a sustained turn vs other late war fighters although it's small wings result in a fairly large turn radius and high stall speed compared to several other fighters of the same size. All in all though it is able to counter it's ww2 adversaries, the FW 190 and Bf 109, quite well.

==== THE NEW HURRICANE I *87 OCTANE ===--

In every aspect like the normal Hurricane I, except that this is a pre Battle of Britain version running on 87 octane fuel. As such it is limited +6.25 lbs of boost (no +12 lbs WEP). This FM is primarily intended to be used for S3's.

==== THE SPITFIRE SERIES REHAUL ====

The Spitfires are all potent interceptors, generally having a very good power/weight ratio across the range. They are also fast for their respective eras, and thanks to their elliptical wing shape their wings have a wing efficiency superior to fighters of more rectangular wing geometry. The wings have only a root thickness ratio of 13% though, resulting in a low max AoA allowance. This hampers the Spitfires turning radius, and also results in a slightly worse stall speed than for planes of similar wingloading. The Spitfires have excellent all around vision though are quite forgiving in the stall. A drawback is that all later marks in the series have relatively short ammo clips.

--= Spitfire I =--

The Mk.I became famous in the Battle of Britain. While there are some early war fighters that can turn inside it, the Spit I is still very competitive in a turn fight. This coupled with an excellent top speed and 8x .303 cal Mg's makes it a dangerous opponent. It's drawback is that the Merlin III engine loses in performance above 15000 ft. A good tactic for nimble opponents is to engage the Spitfire in scissors or keep inside it's turning radius in high speed turns, although the Spitfire can often find a way to beat it's enemy when flown by a wise pilot.

--= Spitfire I *87 octane =--

This version is in every aspect like the normal Mk. I, except that it is a pre-BoB version and limited to +6.25 lbs of boost.

--= Spitfire II =--

The Mk. II is equipped with the Merlin XII engine, rated at 1302 hp at 14300 ft. It has a similar max boost as the Merlin III up to 9000 ft, but has an improved high altitude performance. The Spit II also has more base BHP when flown at cruise or climb power, meaning that it's faster and climbs better than the Spit I when not in WEP. The Mk.II gave the English pilots a well needed boost in high altitude performance against the German BF 109E's.

--= Spitfire Vb =--

Upgraded with the Merlin 45 engine, the Mk.Vb saw an additional 200 hp increase. This version has had the 8x .303 cal exchanged for 4x .303 cal and 2x 20 mm cannons (60 rpg), which gives it a better punch although the pilot needs to conserve the cannon ammo for sure shots. The Spit Vb is a little heavier than the Mk.II, but the better engine makes up for it regarding power/weight ratio. While being good improvements for the Spitfire series, the Mk.V's faced a dangerous opponent in the Fw 190A during WW2. The Spitfires can easily turn inside it, but the superior speed of the Focke Wulf allows the German pilots to dictate the battle. Against all other opponents the Spitfire Vb can mix it well in a dogfight.

--= Spitfire LF Vc =--

The LF Vb has the Merlin 45M engine. The "LF" prefix indicates that its engine is tooled for low altitude performance, and it's 10 mph faster at sea level than the Mk.Vb. Above 7000 ft though the Vb has a clearly superior performance, and the LF Vc is almost 30 mph slower at 15000 ft. A big advantage with the LF Vc is its increased cannon ammo load, with 240 rounds compared to the 120 rounds of the Vb.

--= Spitfire IXa =--

Taking to the skies in mid 1942, the Spitfire IX series was Great Britain's answer to the German Fw 190's. The IXa has an improved powerplant, with its Merlin 61 engine producing 1525 hp at 15400 ft. While being fairly equal to the Merlin 45 in max output at lower altitudes, it has a two stage supercharger with a much better high altitude performance. The Spit V is probably the better fighter for low n slow dogfighting, as it has equal max power and a lower weight, but for high altitude missions the Spit IXa is clearly the superior interceptor.

--= Spitfire LF IXe =--

The LF IXe was a great improvement to the Supermarine series, and by many considered as one of the best fighters of its era. The Merlin 66 engine was a work of art and could juice out 1742 hp at 9400 ft, and was impressive for a mid 1943 inline engine. The LF IXe could reach around 375 mph at 9400 ft and 406 mph at 21000 ft, which was equal to the Fw 190A-8, although the Fw 190A-8 was faster at sea level. The LF IXe also has an improved armament with 2x .50 cal replacing the 4x .303 cal of the IXa. This fighter has great speed for its era, can pack a punch and outturn nearly every single 1943 fighter thanks to its low wing loading, great power/weight ratio and the high wing efficiency of its elliptically shaped wings. It is certainly a fighter that can be flown with confidence in nearly every match-up.

--= Spitfire XIVe =--

Being powered by the Rolls-Royce Griffon 65 engine and using 150 grade fuel, the Mk. XIVe had an output of an astounding 2200 hp at 9700 ft, which was nearly unequalled in WW2. This fighter is not a beast but rather a monster. When using its +21 lbs WEP the Spitfire XIVe can run like a P-51D, climb with the very best and hold a sustained turn better than all other late war fighters. This will probably be a popular choice for those players who want to suddenly improve their "skill" level. When flying at

normal power or climb power though, the Spitfire XIVE has a power output similar to the LF IXe, and since the XIVE is heavier, the LF IXe is actually a better performer out of WEP. A smart pilot will know to manage the engine temperature though and have the +21 lbs WEP at hand when needed. Pilots facing the Spitfire XIVE can outfly it in scissors if in a nimbler plane, but should avoid a 1v1 turn fight with it. Also if flying with others then using wingman tactics can prevent the XIVE pilot from making it a pure turn fight. The main drawback of the Spitfire XIVE was it's fuel range, although this will usually only be a real issue in the S3 events.

--= Seafire IIc =--

The Seafire IIc is in every respect a naval carrier based version of the Spitfire LF Vc, also fielding the Merlin 45M engine. The notable difference is that the Seafire IIc is 532 lb heavier due to additional naval equipment. It is a very good carrier fighter for interception duty.

--= Seafire III =--

The Seafire III uses the same engine as the Mk. IIc, although it's even heavier than it's predecessor due to the new folding wings mechanism, which was introduced in order to save deck space aboard carriers. The Seafire III has a wide range of loadout options though which makes it better for supporting strike missions.

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Changes in version fl2054

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The earliest flightmodels reworked by the new Flightmodel Team had their stall speed based on Power OFF data. All newer released have been based on Power ON stall speed data, which makes a 6-12 mph stall difference for an average ww2 fighter. This has a notable impact on the fighters agility when pulling G's and on it's turn performance, especially at higher altitudes. All the fighters which were previously based on power OFF data have now been retuned to bring them at a fair playing field with the rest of the reworked flightmodels. Players can notice that the following fighters below will now be more competitive regarding turning performance and high altitude maneuverability.

Apprximate stall speed reductions in this update (mph IAS):

Lavochkin series: 9 mph

P-47 series: 9 mph

Fw 190 series: 8 mph

Yak series: 8 mph

MiG-3: 8 mph

P-51 series: 5 mph

F6F-5: 5 mph

N1K1-J: 2 mph

Note: The P-51's, F6F-5 and N1K1-J were already a few mph below power OFF stall speed, and as such recieved a smaller reduction. The stall speed reductions have no effect on top speed or climb rate etc.---
=== UPDATE FL2053: God Save The Queen ===---

Rockets,bombs loadouts for F86-Sabre and Mig15c

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Changes in Release version 4.31 R4 (01.08.18) fl2053

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By: Robert, Bollok, Grumpy, Idunno

Skins: lArt7 & Bollok

All made possible by: Bcamel (creator of the program used to model the airplanes)

--= De Havilland Mosquito VI =--

Complete rehaul of the Mosquito VI fighter by Bollok. See below for details.

--= Hawker Hurricane series =--

Complete rehaul of all the Hawker Hurricanes and the Sea Hurricane. See below for more info.

--= Dive speeds =--

All max dive speed limits have been increased by 8% for all fighters (Except the Spitfires series as they are currently being worked on). This change was made in order to better simulate the actual speed where a ww2 fighter would take damage compared to the max permissible speed as stated in it's flight manual. The stated Mach limit at 10000 ft is used as a base for all fighters. A few examples:

Plane: Old limit - New limit

P-51D: 480 mph --> 518 mph

Fw 190A: 466 mph --> 503 mph

Fw 190D: 510 mph --> 551 mph

N1K1-J: 495 mph --> 535 mph

--= Lancaster series =--

- * The Lanc3 wingman not dropping the GSLAM bomb issue has been fixed.
- * The position of the GSLAM bomb has been adjusted.
- * Max dive speed increased by 8%.

--= Mosquito IV and NFII =--

- * Revision of the flaps pitching effect for a more accurate performance.
- * Max dive speed increased by 8%.

--= Skins =--

New skins for the Mosquito IV and NFII by Bollok, and new skins for the Heinkel He-111 by Iart7.

---== THE DE HAVILLAND MOSQUITO VI REHAUL by Bollok ==---

The Mosquitos or "Wooden Wonders" were built mainly out of wood and proved to be of a superb design in WW2. The Mk VI version was a further improvement that fielded the newer Rolls Royce Merlin 25 engines. While being slightly slower than previous Mosquito versions at base power, the use of 150 grade fuel for +25 lbs boost below 13000 ft results in approximately a 23 mph higher top speed at low altitude. The Mosquito VI is also somewhat heavier as it carries more internal fuel. This is a sleek, fast tactical fighter/bomber often able to get in to target and out unscathed. It can also be used as a strong gun platform in boom n zoom air to air combat and is fairly agile for its size.

---== THE HAWKER HURRICANE SERIES REHAUL ==---

The Hurricanes are well known for their decisive role in the Battle of Britain, and for participating in nearly every theater of WW2. This airplane was designed with a 19% wing thickness ratio at the wing root, which is quite unique for a WW2 fighter. This was due to early British small scale tests showing that the thickness ratio had no effect on an airplane's top speed, an assumption which was later found to be incorrect. The drag from the thick wings takes a toll on the Hawker's top speed, but on the other hand results in quite a low stall speed for its wingloading. The Hurricane also has a great max AoA performance as such, meaning it can hold a tighter high speed turn than most fighters and even keep

inside a Spitfire in a consistent turn, even though the Hawker is heavier than the Spit. This ability was put to good use against the Messerschmitts in the Battle of Britain. Generally the Hurricanes excel as turn fighters while boasting good armament.

--= Hurricane I =--

The Mk I is powered by the Merlin III engine just like the Spitfire Mk I. This single stage engine can produce 1305 hp at 9000 ft. While the Spitfire is faster, the Hurricane has a tighter turning circle. The 8x .303 cal are also quite decent for the early era. This is a purebred fighter aircraft and definitely competitive against contemporary fighters. An enemy pilot underestimating the turn radius of the Hawker will very soon experience hundreds of small calibre bullets riddling his airplane.

--= Sea Hurricane Ib =--

The navy version is 246 lb heavier than the land based Mk I, but its Merlin III is tooled for better WEP performance at low altitudes. The Sea Hurricane can also carry 2x 250 lb bombs or drop tanks. Otherwise it's very similar to the normal Hurricane I, and it's quite agile for a navy fighter.

--= Hurricane IIb =--

The Mk II's are all powered by the Merlin XX engine, which has a two speed supercharger capable of approximately 1470 hp at 7000 ft and 1440 hp at 13500 ft. While being significantly heavier than the Mk I, the Mk II's are still excellent turn fighters but lack in top speed against contemporary fighters. With top speeds constantly increasing during ww2 the thick wings of the Hurricanes were slowly becoming an achilles heel, and as such the Hawkers were commonly used as fighter bombers, a role in which they performed quite well. The Mk IIb carries 12x .303 cal which allow a decent bite against other fighters and are great for strafing ground structures.

--= Hurricane IIc =--

The Mk IIc is 312 lb heavier than the IIb, but is armed by 4x 20 mm cannons. As such it packs a heavy punch against both fighters and bombers. While most fighters can easily boom n zoom against the Hurricane IIc in a tactical fight, the Hurricane IIc pilot can cut a swath if joining a low n slow furball, using the tight turning ability and heavy firepower to its full potential.

--= Hurricane IId =--

The IId is a heavier anti-tank version armed with 2x 40 mm cannons. This version is not well suited for dogfighting but instead excel against enemy tanks. In the African theatre this version was very successful against German tanks and its pilots often painted a can opener on the fuselage. The Russians also loved the Hurricane Mk IId as a ground support fighter.

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Changes in Release version 4.31 R3 (11.09.17) fl2052
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---== UPDATE FL2052: HOLDING THE LINE ==---

By: Robert, Bollok, Grumpy

3d art: IArt7 (skins)

Terrains: -Jabo-

All made possible by: Bcamel (creator of the program used to model the airplanes)

--- P-40 Warhawk series ---

Complete rehaul for all P-40's including the Hawk 75 and P-36C. See below for details.

--- P-51 series ---

* Wing efficiency improved from 0.74 to 0.785 (Oswald factor) for the A-36 Apache, Mustang Mk1, P-51B and P-51D. This means they will retain their energy better when maneuvering.

* The Mustang Mk1 has had it's engine completely reworked due to better data found and proof that the Allison V-1710-39 engine was cleared for 56" Hg WEP instead of being limited to 42" Hg for operating units. This results in a 30 mph increase to top speed at sea level.

Previous Mustang Mk1: Bst1 42" Hg (5 min)

New Mustang Mk1: Bst1 44.5" Hg (15 min), Bst2 56" Hg (5 min).

--- Yakovlev series ---

A code error was found that caused the Yak-9D and Yak-3 to shake uncontrollably. This was a simple typo mistake in it's code and has been fixed.

--- Brewster Buffalo series ---

Small pitchdrag improvement (pitch change agility).

--- N1K1-J ---

Wing efficiency slightly improved from 0.785 to 0.795 (Oswald factor, energy retainment).

--= Skins =--

New beautiful plane skins from Iart7.

Bf 109K-4

B-25H

B-339 Buffalo (x2)

Hawk 75

Mig-3 (x2)

--= Terrains =--

Updates to the Malaysia and Luzon terrains by -jabo-.

== P-40 WARHAWK SERIES REHAUL ==

The various Warhawk versions fought in nearly every theater of the war from the German invasion of France to Pearl Harbor, Russia, Africa, Italy and the Pacific theater among others. While not really known for any defined strengths, they were well designed all-around fighter machines that were able to hold the line against the different opponents they faced in WW2. Probably most known is the "Flying Tigers" squadron which scored an impressive tally in their Tomahawks against the Japanese. The P-40's Allison engine is able to endure oil leaks a bit better than normal inline engines, and the Warhawks are good gun platforms but generally a bit heavier than contemporary fighters. This is not true for the P-36C and Hawk 75 though which were much lighter loaded and great turn fighters below 6500 ft.

--= The P-36C and Hawk 75 (A-4) =--

These radial engine fighters are tooled for fighting below 6500 ft and can turn with an A6M2 Zero while also holding a better top speed than the Japanese fighter at low altitude. Their performance quickly drops off with altitude above this FTH height limit though and these Hawks will struggle when up high. They also have no pilot armor so beware of machine gun fire. The P-36C was the American version with a Pratt and Whitney engine while the Hawk 75 was the export version with a very similar Wright engine and was sent to France, Norway, Finland etc. When fighting at low altitude these are lethal fighters and enemies do wise fighting them up high instead.

--= P-40B Tomahawk =--

The P-40B fielded an inline Allison V-1710-33 engine instead of the radial engine of the P-36. This resulted in a higher top speed and better performance at altitude. Against Bf 109's etc a Tomahawk pilot

should still take the fight at 15000 ft or lower though. This version saw a weight increase of ~1300 lb compared to it's predecessor, which takes a toll on it's sustained turn performance and climb rate, but it's still a fairly agile bird. It comes with pilot armor though and has better top speed and armament than the P-36C/Hawk 75.

--= P-40E Kittyhawk =--

The P-40E was fitted with the newer V-1710-39 engine which, once cleared for 56" Hg WEP, provided 1470 hp at sea level compared to the P-40B's 1040 hp. The -E is faster than the -B up to 15000 ft. The Curtiss engineers kept loading their P-40's with extra stuff for each version, and the P-40E weighed in at 8342 lb with 145.5 gal fuel. The armament consists of 6x .50 cal's though which packs a strong punch, and below 15000 ft the extra BHP of it's engine somewhat offsets this extra weight. The Kittyhawk is at it's best when working together with wingmen, where it's speed and firepower better comes to it's own.

--= P-40F Warhawk =--

The P-40F was different from the other P-40's in that it had the single stage one speed Allison engine replaced with a Merlin XX, same as the Hurricane II, and was license built by the U.S. as Packard V-1650-1. This is a two speed supercharger engine and as such greatly improves the P-40F's high altitude performance compared to the other Hawks, and makes it the P-40 of choice for high alt escort or intercept missions. The drawback with the P-40F though was the U.S. engineers tendency to keep overloading their fighters with extra equipment, meaning this bird weighs in at 8779 lb at 148 gal fuel. Wingman tactics or making sure to join larger furballs is as such even more important since more nimble fighters will be able to outturn it in duels.

--= P-40N-1 Warhawk =--

The P-40N-1 saw a huge weight cut as it was evident the P-40's were getting overweight and a lot of non vital equipment was removed in order to make it lighter. It only fielded 4x .50 cal's, to the dismay of many pilots. It also only carried 120 gal internal fuel. The engine was the newer Allison V-1710-81 which still produced around 1480 hp, but had it's FTH (Full Throttle Height) at 16400 ft instead of the 11800 ft of the P-40E. While it had a weaker firepower than the -E & -F, the result of the weight cut was a sleeker, faster, better climbing and more agile fighter.

--= P-40N-5 Warhawk =--

Many pilots considered the 4x .50 cal's to be inadequate armament, and re-equipped their Warhawks with 6x .50 cal's again. They also disliked that the P-40N-1 had to be started by a hand-crank by the groundcrew and reinstall the battery driven engine starter among other equipment. The result was once again an increase in weight. At 157 gal fuel the P-40N-5 was still almost 500 lb lighter than the F though and ~40 lb lighter than the P-40E. The -N versions were probably the best P-40 versions and also the most produced. The Hawk design had by then unfortunately reached it's peak and started to fall behind

newer fighters like the Fw 190's, P-51's, N1k1's, Macchi C.205's etc. Nevertheless the Warhawks still held the line at several fronts.

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Changes in Release version 4.31 R3 (11.09.17) fl2051

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Fix ground objects to be destroyed hollow box indicators

---=== FM UPDATE FL2051: ===---

Fix for Lancs, hurri1s,zero

New Terrains from JABO

Malaysia

Luzon

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Changes in Release version 4.31 R2 (11.01.17) fl2050

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New chase view (alt-v). Chase view now moves more naturally around based on the direction of flight. To force the "old" chase view use the dot command

.OLDCHASEVIEW 1

---=== FM UPDATE FL2050: PACIFIC WAR ===---

By: Robert, Bollok, Grumpy and Idunno.

3D art: Madcat (N1K1-J cockpit).

All made possible by: Bcamel (creator of the program used to model the airplanes)

This info along with detailed performance graphs can be found at:

<http://bhlanding.iient.com/warbirdsforum/viewtopic.php?f=8&t=213>

--= P-40B (only the -B model, not the whole series) =--

Complete rehaul of the P-40B Tomahawk. The whole P-40 series will be remodeled at a later date. See below for details.

--= A6M Zero series =--

Complete rehaul of the "Zekes". See below for details.

--= N1K1-J George =--

Complete rehaul of the "Shiden". See below for details.

--= F4F & FM2 Wildcat series =--

Complete rehaul of the Wildcat series. See below for details.

--= F6F-5 Hellcat =--

Complete rehaul of the F6F-5. See below for details.

--= Avro Lancaster series =--

Complete rehaul of the Lancasters.

NOTE! You can no longer chop throttle to 1% without stalling and spinning out in bombardier view. A realistic ww2 bomber needs to maintain enough power to keep above it's stall speed. See below for details.

--= De Havilland Mosquito IV and NFII =--

Complete rehaul of the Mosquito IV and Mosquito NFII. See below for details.

--= Lavochkins =--

Tweaks to handling for better agility (pitchdrag/yawdrag change).

--= Yakovlevs =--

Rollweight slightly increased.

==== THE P-40B TOMAHAWK REHAUL ===

The P-40B is well known for having been used in nearly every theater of the war. While not having any defined strength, it is a well designed all-around fighter machine that was able to hold the line against the opponents it faced in WW2. At full fuel the Tomahawk weighs 7559 lb and is fairly heavy for an early war land based fighter. Its best fighting altitude is at 11000-14000 ft where it can outrun many of its enemies, but its Allison V-1710-33 engine quickly drops off in power above 15000 ft so be careful of fighting at higher altitudes. This plane is well armed and is quite a stable gun platform. While some nimbler fighters can outturn it in 1v1 duels, the P-40B is a competitive fighter when using wingman tactics.

==== THE A6M ZERO SERIES REHAUL ===

The "Zeros" or "Zekes" were very well designed airplanes and the A6M2 was by many considered as the very best fighter of its era. The Zeros have large wings and are very lightweight for being Navy fighters. Few enemies can match them in a turn fight and as long as they still have cannon ammo, the A6M's are quite lethal. A weakness of the Zekes is their low max dive speed and the ailerons become very sluggish above 300 mph IAS. The Allied pilots took good advantage of this by diving and then rolling right. The Zeros light weight also came at a cost. They had no armor and could not sustain much damage. With "no armor" this also means that the pilot will not have any backseat armor anymore. (Pilot armor was unhistorically added earlier because of players complaining about pilot kills). If the enemy hits the Zero pilot in the nugget, then he simply hits the Zero pilot in the nugget, even with .303 machine guns. Now the positive side with not being weighed down by armor like other planes is the gain in turning ability and agility, and with good situational awareness this will often play to one's advantage.

== A6M-21 ==

The A6M2 Reisen is most likely one of the top 3 fighters of its era. With its 990 hp Nakajima Sakae 12 engine it holds a nice top speed and will outturn anything but a Fokker D.XXI. A disadvantage is the float carburetor of its engine, meaning that it will cut out when pushing negative G's. While the carburetor was of a better design than the infamous Merlin III carburetor and able to push a few more negative G's before a cut out, it is still a handicap that can be exploited by enemies who choose to nose over and outdive the Zero. All in all though this fighter can confidently engage any early era opponent and will often come out on top. Just don't get target fixated and remember it's often better to break off a target if another bandit is sneaking up on you, as the Zero has zero armor.

== A6M-32 ==

The model -32 and -52a fielded the improved Nakajima NK1F Sakae 21 engine. Another difference from its predecessor is the clipped wings which allows for a better roll rate, while the disadvantage is slightly

less lift from the wings. The A6M3 "Hamp" is not much heavier than the A6M2 and an overall improvement as it has a faster top speed and more cannon ammo. Unfortunately though the Zeros did not evolve as fast as the fighters of other countries, and had their golden era with the model 21. The "Hamp" is still a potent fighter though in it's period and holds a great advantage in the turn.

--= A6M-52a =--

The model 52a was a further improvement and was faster still than the earlier versions. It kept the shorter wingspan of the model 32 but with rounded wingtips, which has a positive effect regarding induced drag and wing efficiency. It also had a somewhat improved design of the flaps and slightly higher max dive speed. The model 52a was 471 lb heavier than the model 21 though which somewhat impaired it's agility. Also the opponents it faced were usually significantly faster and could thus dictate the fight against the A6M-52a, which had pretty much reached it's limit in terms of design. When fighting in the model 52 it can be hard to get a good guns solution on a contemporary era enemy that boom n zooms well, but if one can join a low and slow fürball then the A6M-52a can still very much shine.

---= THE N1K1-J GEORGE REHAUL ===--

This fighter is a very potent opponent, and has been called one of the best fighters of the war. The 4x 20 mm cannons pack a strong punch and the "George" or "Shiden" has a good power/weight ratio. Be sure to always use it's excellent butterfly flaps when in a turn fight, as their superior Fowler like design gives great extra lift for little drag penalty. They can be lowered to 9° below 280 mph IAS and to 15° below 249 mph IAS. While several of the later war planes hold a better top speed than the N1K1-J, the Shiden can really mix it in a turn fight. Since it has laminar wings and a fairly high stall speed it can be a challenge to scissor fight vs lighter opponents though, but the N1K1-J is well rounded and can usually find a way to fight most opponents. A weakness of the Shiden was that the engine easily overheated when going full power, so save it's one minute WEP for really critical moments.

---= THE F6F-5 HELLCAT REHAUL ===--

The Hellcat was the U.S. Navy's answer against the Zeros. It had good armament and could easily outspeed the them, while holding a respectable climb rate for it's heavy weight. The F6F-5 could dictate the fight against the Zeros which had a hard time catching it. The limited razorback 6 o'clock view means that one will usually find more success in the Hellcat when fighting together with wingmen and watching out for each other. Being a heavy U.S. Navy fighter, the F6F-5 will struggle against lighter land based opponents like the Spitfire or Bf 109 in 1v1 duels, but when fighting in groups you can overcome their faster turn rate by covering each other and let the guns speak. For it's era the Hellcat is a good plane and especially so for a CV fighter.

=== THE WILDCAT SERIES REHAUL ===

The Wildcats are all rugged and heavy U.S. Navy fighters. If flown in groups with sound wingman tactics, it can give the more nimble Zeros an even fight. Once the American pilots learned how to fight to its strengths and Thach weave, the Zero's reputation as nearly invincible started to fade. Using the Wildcats in 1v1 duels vs more agile opponents can be dangerous though. As with the Hellcat the razorback cockpit leaves a limited back view, and looking out for each other's six is recommended.

== F4F-3 ==

The F4F-3 has nice armament and can dive well while actually holding a decent turn rate. Below 3000 ft it can even outrun the A6M2 when using full power. Since it's a U.S. Navy fighter it is quite heavy for its era so don't engage in climbing turns. Keep the fight flat, work in teams and dive out if needed.

== F4F-4 ==

The F4F-4 uses the same engine as the F4F-3 and comes with heavier armament but also added weight due to the extra guns, ammo and a new folding wing design, intended to save space on the carrier deck. Many pilots preferred the lighter F4F-3 version which could climb and turn better. That being said, for intercepting enemy bombers and strafing, the F4F-4 is the better choice.

== FM2 ==

The FM2 arrived later than the F4F's and used the stronger Wright R-1820-56 engine, designed for better performance below 10000 ft. The FM2, while being surpassed as a dogfighter by several contemporary era planes, was used successfully in ww2 as a submarine and ship hunter and its pilots held it in good regard. It is faster at lower altitudes and can carry heavier ordnance than the other Wildcats, while being only slightly heavier than the F4F-3.

=== THE DE HAVILLAND MOSQUITOS REHAUL - By Bollok ===

The Mosquitos or "Wooden Wonders" were built out of wood and proved to be of a superb design in ww2. Powered by the strong Merlin engines the Mosquitos had a high top speed and were often able to outrun enemy fighters, allowing them to get in, strike the target and get out unscathed. The Mosquito flightmodels were previously in a terrible state, with an abysmal wing efficiency of nearly 30%. The new Mosquito flightmodels are instead sleek, fast and agile for their size.

--= NFII =--

The NFII was a nightfighter with onboard radar equipment. It was fast and deadly with 4x 20 mm cannons as well as 4x .303 cal's in the nose, and powered by Merlin 23 engines. While turn fights should generally be avoided, this fighter now retains its energy well and is a fast bird that can boom n zoom in and out of dogfights. Just fight smart and be aware of being jumped from above.

---= Mosquito IV =---

The Mk IV has no armament, but is instead a very fast hit n run tactical bomber, and was using the same Merlin 23 engines as the NFII. It excels in smart bomb runs where it can get in and out before enemy fighters can chase it down.

==== THE AVRO LANCASTERS REHAUL - By Bollok ====

The Lancaster I and III have been fully rebuilt to real life data performance and reports. An important note is that the Lancaster can now stall and spin out in bombardier view if the pilot completely chops the throttle just to get extra seconds over target. A real airplane can not fly below its stall speed so remember to always maintain enough throttle to keep the speed in the safe zone. The Lancasters will stall at 110 mph IAS at 50000 lb, and 125 mph IAS at 65000 lb. The Lancasters could carry a very large payload for a ww2 bomber and the Lanc I used the Merlin XX engines while the Lanc III was upgraded with Merlin 28 engines. The defensive armament of .303 mg's is somewhat weak but still has a good bite if the enemy comes to close. The Avro Lancasters can dive at a high speed, for a bomber, and ww2 Lanc pilots regularly used this to their advantage to escape pursuing Luftwaffe fighters. These are the first heavy bombers remodeled by the new Flightmodel Team and hopefully we will soon finally not only have realistic fighters, but also bombers that fly as close to the real thing as possible.

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Changes in Release version 4.31 R0 (10.18.17) fl2049

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Fuel leak and consumption rate bugs fixed.

----- FL2049 UPDATE: QUALITY DESIGN FROM ITALY -----

By: Robert, Grumpy, Idunno and Bollok.

3D Art: Madcat and Iart7

All made possible by: Bcanel (creator of the program used to model the airplanes)

--= The Macchi series =--

Complete rehaul for all the Macchi flightmodels. See below for details.

--= Spitfire wing break issue =--

The root cause has finally been found to be in the elevator authority settings, allowing even small joystick flicks to spike the G's well past the breaking point at high speeds. The elevator authority curve vs. speed has now been set to more realistic levels. This fix applies to all Spitfires.

--= Yak-3 and Yak-9D =--

Further tweaks to handling (pitch drag), making the Yakovlevs more agile.

--= P-47D-22 =--

The armament loadout options menu when in tower has been fixed.

--= Minor power jump fixes =--

Engine power when using boost will no longer make a small jump between 80-81 mph IAS. This applies to the: Buffalos, Fokker D.XXI, I-16 and MiG-3.

==== THE MACCHI SERIES REHAUL ====

While the P-40 has been described as "A poor man's Spitfire", the Italian C.202 and C.205 could be described as "A rich man's Messerschmitt", especially since they were fielding license built German engines. After flight trials the Germans even considered to replace their Bf 109's with either the Italian Macchi, Fiat or Reggiane airplanes. They scrapped the idea though due to the Italian planes requiring nearly 15000 man-hours to produce, whilst the production of a Messerschmitt required less than 5000 man-hours. This was also why the Italians had difficulties supplying their frontline squadrons with enough of the newer fighter versions.

The Macchis all use the same wing design and are quite fast and agile interceptors. The main achilles heel of the Macchis is their quite weak armament, which wasn't solved until the C.205 had 2x20 mm cannons added. All in all they should be found to be very competitive fighters. Squadron leader D.H. Clarke was a ww2 P-40 pilot who got to test fly many planes from different countries during his career. This is what he had to say about the Macchis:

D.H. Clarke on flying a captured C.200 Saetta:

"My impression was, and still is, that she was as fast as a Hurricane I, and certainly more manoeuvrable. The take-off run was fantastically short after being used to our heavy P-40's. The handling qualities were finger-light under all conditions. I had some practice dogfights with Hurricane IIs, Kittyhawk III's and Spitfire V's and found I could turn inside all of them. Although they were faster - the Hurricane only just - the Spitfire was the only one which could outclimb the Macchi 200."

D.H. Clarke on the C.202 Fulgore:

"Sleek, supremely fast - the sight of their high, white-crossed fin would have struck fear into our hearts had the Italians pressed home their attacks. The odd pilot proved that the 202 was capable of mixing it in a dogfight - out-turning our P-40s with ease; but the majority would pull away effortlessly into a climbing roll or a roll off the top when things became at all hectic. There is nothing more exasperating, when you are caning fifty-four inches of boost out of an engine, than to see your enemy indulge in carefree aerobatics; but although we did our damndest to get near enough to shoot at them, we seldom succeeded. Their aircraft was superior to ours on all counts. No wonder we wanted to fly one."

--= C.200 Saetta =--

The Saetta (Arrow) fields a Fiat radial engine capable of 960 hp. The all around view is excellent, and it is a quite agile bird able to mix it with any early ww2 fighter. The C.200 carries 2x.50 cal machine guns which is at least decent for it's era.

--= C.202 sIII Folgore =--

The Folgore (Thunderbolt) has a licence built DB 601 engine like the Bf 109E. The C.202's superior aerodynamical design however allows it a higher top speed than the Messerschmitt. Fielding only 2x.50 cal it is quite under armed for the 1941-1942 era, often requiring the pilot to hit an enemy with several bursts, and attacking bombers with it can be a daunting task. The C.202 is a very fast and agile plane though, and a dangerous opponent.

--= C.202 sVII Folgore =--

The sVII had two extra 7.7 mm machine guns added to the wings in order to deal with the weak firepower. While adding 306 lb extra weight, it does provide a small increase in lethality. The drawback is a decreased climb and turn rate. Opinions of the C.202 versions were split among the Italian pilots, with some preferring the sVII, while others preferred the more agile sIII version.

--= C.205 Veltro =--

The Veltro (Greyhound) is the pinnacle of the Macchis and entered service in February 1943. It fields a license built DB 605 engine like the Bf 109G's. The C.205 is faster than the Messerschmitt though due to it's sleeker airframe design. While the earlier Macchis were underarmed, the C.205 instead boasts 2x.50 cal's and 2x20 mm cannons. This plane is fast, agile, climbs well and can pack a good punch. The Veltro is in every aspect "A rich man's Messerschmitt". It should be very competitive in the mid/late era, and also able hold it's own against later era planes.

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Changes in Release version 4.30 R9 (09.18.17) fl2048

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----- FL2048 UPDATE: THE FINNISH/RUSSIAN WINTER WAR -----

By: Robert, Grumpy, Idunno, Bollok, Bcamel and Madcat (cockpit 3d art).

--= Brewster Buffalo series =--

Complete rehaul for all three Brewster flightmodels. See below for details.

--= Fokker D.XXI =--

Complete rehaul for the Fokker D.XXI flightmodel. See below for details.

--= I-16 Ishak =--

Complete rehaul for the I-16 Ishak flightmodel. See below for details.

--= MiG-3 =--

Complete rehaul for the MiG-3 flightmodel. See below for details.

--= All Yaks =--

Reduction of nose sensitivity.

--= All F4U's =--

Fixed incorrect pitch-down behaviour when using flaps position 2.

--= Spitfires =--

* Spit IXa: Fixed the machinegun sound to .303 cal, instead of .50 cal.

* Spit V's: Fixed the engine power fluctuation at 160 mph IAS.

* Fixed the wingbreak issue for all Spitfires. They now have a ~4 neg G tolerance.

--= All P-51's =--

Fixed inherited code error that had the engine placed somewhat to the left of the aircraft's centerline.

--= P-47D-25 =--

The -25 now has rocket loadouts available. The rockets are now also placed at the correct spots under the wing.

--= Revised BHP behaviour below 80 mph IAS =--

Boost engine percent will now scale correctly as air RAM increases, with no sudden fluctuation at 80 mph IAS. This fix applies to the:

Fw 190 series, P-51 series, Yak series.

==== BREWSTER BUFFALO SERIES REHAUL ===

"I remember asking Pappy Boyington about the Brewster Buffalo. I had no sooner finished saying the word 'Buffalo', when he slammed his beer can down on the table, and practically snarled, "It was a DOG!" (His emphasis). Then he slowly leaned back in his chair and after a moment quietly said, "But the early models, before they weighed it all down with armorplate, radios and other ****, they were pretty sweet little ships. Not real fast, but the little ****s could turn and roll in a phonebooth. Oh yeah--sweet little ship; but some engineer went and ****ed it up." With that he reached for his beer and was silent again."

-- B-239 Brewster --

The B-239 was the export aircraft to the Finnish airforce, and was one of the early versions that Mr. Boyington loved. It was a very well designed lightweight fighter with a strong punch of 3x .50 cal and a single .303 cal. Since it was equipped with the same engine as a DC-3, rated at 1000 hp, it lacks in top speed but has nice all around vision, is fairly agile and can easily turn with a Spitfire. It has a very good

dive speed, and the Brewsters were recorded at 518 mph IAS without damage. In the Finnish/Russian winter war these planes had a kill/loss ratio of a staggering 32:1, best of ww2, which partially must be credited to the superiorly trained Finnish pilots, but also thanks to this Brewster fighter. The Finns loved their B-239's "Pearl of the sky" and kept them as their frontline fighters until more modern Bf 109G-2's arrived.

-- F2A-3 Buffalo --

Mr. Boyington's statement is fairly true. The U.S. F2A-3 is a rather overburdened carrier fighter for the early era of ww2, and carries 240 US gal of fuel. While giving it a great range it also hampers its performance. This Buffalo does however pack a heavy hit with 4x.50 cal, and has ammo to spare. With a 1200 hp engine it also has decent speed for its era. The Buffalos have a somewhat undeserved reputation after their failure to fight the A6M Zeros at the outbreak of the Pacific war. This is in big part due to the Allied pilots having no idea what they were up against, and tried to turn fight with the Zeros. Had they instead used their superior dive speed and the later developed thach weave of the F4F's, then they would have been more successful. With good wingman tactics and putting the F2A-3's guns to use, this fighter can put up a strong fight. It is advised against dueling 1v1 against more nimble fighters though. Many Navy pilots regarded the Buffalo as slightly superior to the Wildcat due to its better all around vision and maneuverability, while others preferred the Wildcat.

-- B-339 Buffalo Mk1 --

This is the British Navy/land version of the Buffalo. It has a lower top speed than the F2A-3 due to fielding a 1100 hp engine, but is lighter since it carries 480 lb less fuel. The weaker engine means it has the lowest climb rate of the Buffalo's though. All in all The B-339 and F2A-3 are quite decent Allied carrier fighters, while the B-239 is a very competitive land based early era warplane.

==== FOKKER D.XXI REHAUL ===

A dutch plane that scored a fine tally against the Luftwaffe at the outbreak of war. It did very well in several fights, but the Dutch pilot's were simply outnumbered. Also in Finland the D.XXI had an impressive kill/loss ratio against early Russian airplanes. The Fokker D.XXI weighs only 4519 lb and has very thick wings. It is one of the very best turners in Warbirds. This however, coupled with non-retractable landing gear, takes a heavy toll on its top speed. It is also a bit underarmed, only fielding 4x 7.7 mm MG's. A skilled enemy pilot will keep his speed against this plane, but if the D.XXI pilot can enter a furball or sucker an enemy into a knife-fight, then the Fokker is most probable to come out victorious.

==== I-16 ISHAK REHAUL ===

The Polikarpov I-16 Ishak (donkey) Type 24 fighter is a very small airplane at only 4215 lb and with a 1115 hp engine. It has a good power/weight ratio for early era fighters. It's stubby feature means larger drag, and the top speed is only slightly better than that of a B-239. The climb rate is decent, slightly hampered by the two bladed prop, but the all around vision is excellent, making it very easy to spot threats from behind. Like the Fokker D.XXI, this Russian plane only fields 4x 7.62 mm MG's and needs time on the six of a bandit to bring it down. It also lacks flaps, as the Russian pilots deemed them unnecessary. Luckily though the I-16 Ishak is very nimble and can easily roll with a Fw 190. The turn rate is good and almost that of a Zero. It is a fun plane to fly and can make a good account of itself in the hands of a skilled pilot.

--== MIG-3 REHAUL ==--

The Mikojan-Gurevitj MiG-3 is in all aspects a high altitude energy fighter. It's a poor turner against more nimble planes, but is unmatched in top speed in the early era, especially up high. As with most early Russian planes it lacks in firepower. This somewhat hampers it's role as a hit-n-run fighter and one might need several passes to take a bandit down. If fighting with the MiG-3 at high altitude and keeping the speed up, enemy planes will have a very hard time catching it though, and a disciplined MiG-3 pilot can freely dictate the fight. As such it is a good choice as an early era high alt bomber escort. Avoid any low n' slow dogfights and fly it to it's strengths. Boom n Zoom is the way of the MiG.

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Changes in Release version 4.30 R9 (09.05.17) fl2047

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This updated addresses the issues the P-47's and Lavochkins had with taking off from short airfields. They will now be able to accelerate as normal at low speeds.

The update also contains some minor improvements to the Lavochkin handling, and recalculated dragco for the P-47 series flaps, which were of a single slotted type that causes less drag than plain or split type flaps.

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Changes in Release version 4.30 R8 (08.28.17) fl2046

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----- FL2046 UPDATE: FROM RUSSIA WITH LOVE -----

By Robert and Grumpy.

For detailed speed and climb charts please visit:

<http://bhlanding.ient.com/warbirdsforum/viewforum.php?f=8>

--= Lavochkin series =--

Complete rehaul for the Lavochkin flightmodels. See below for details.

--= Yak series =--

Complete rehaul for the Yakovlev flightmodels. See below for details.

--= Fw 190's =--

Climb rate reduced ~200 ft/min when using the MW50 injection boost (Bst2) for the Fw 190A-8, Fw 190F-8 and Fw 190D-9.

--= P-47's =--

Climb rate reduced for the P-47D's, now set at ~2250 ft/min at bst1 and ~3250 ft/min at bst2 (below 10000 ft). Also similiar climb rate reduction for the P-47C.

==== LAVOCHKIN SERIES REHAUL ====

The Lavochkins are at their best at altitudes below 7000 ft (2100 m), and as such should be quite competitive for the Warbirds arenas style of play. Their performance then quickly falls off with altitude but the second stage supercharger kicks in around 20000 ft, where the La's are actually effective fighters. It is adviced against fighting above this altitude though. The ammo clip is short so disciplined bursts is recommended. They all have a very high stall speed and usually do best as energy fighters, but the Lavochkins are still very maneuverable though with a roll rate second only to the Fw 190. Their high max AoA also means that you initially can keep inside many enemies in a turn for a short period of time. The later La's have great low alt max speed and the climb rate is good. The ability to use WEP for 10 minutes comes in handy for any prolonged fights. Their terminal dive speed is quite low though, but is slightly improved with each version.

-- Lavochkin La5F --

Not the top, nor the worst fighter for it's era. The La5F however finally gave the Russian pilots a fighting chance against the previously far superior German fighters in 1942-1943. It could almost match the speed of the Fw 190 and was able to outturn it. The La5F has a quite decent top speed below 7000 ft and climbs well against contemporary fighters. It rolls great.

-- Lavochkin La5FN --

While the new engine only saw moderate improvement from the La5F, the La5FN was a big jump in development and saw significant aerodynamical improvements regarding drag, greatly enhancing it's top speed. This is a mean and lean fighter able to challenge any opposition of the same era. It has a top speed matching the FW 190A-8 at low altitude, rolls like a ballerina and climbs well.

-- Lavochkin La7 and La7-3 --

The best Lavockin fighter. It uses the same engine as the La5FN, but has even better top speed due to design improvements, easily matching a P-51D at low altitude while also outturning it. The La7's also saw structural improvements that lowered it's total weight and strenghtened the wings, increasing the terminal dive speed, climb rate and turning ability even further. The La7-3 version of the La7's is a marksman's plane, as it has three Berezin cannons instead of the two SHVak cannons. The Berezin cannon has a higher rate of fire, meaning that the La7 3 version packs a much stronger punch than the normal La 7 version, although it will run out of ammo in 1/3 the time.

==== YAKOVLEV SERIES REHAUL ====

Just like the Lavochkins, the Yak interceptors also arrived timely to enable the Russian pilots to finally step toe to toe with the Luftwaffe. These Russian birds excel at 13000 ft and below, and should usually not aim to fight above this altitude. They both have decent turn rates and while the stall speed is quite high, they are manueverable fighters, especially the Yak-3.

-- Yak-9D --

The Yak-9D entered service in late 1942, and is a heavier Yak version with additional fuel tanks. This makes it the Russian choice for mid-alt escort missions while still being a decent dogfighter. The Yak-9D is a bit underarmed with a single 12.7 mm and a single 20mm cannon, but the top speed is fair for it's era. It cannot hold a sustained turnfight with more nimble planes, but can still outturn a P-51.

-- Yak-3 --

This is the true fighter version of the Yakovlevs. The airframe is smaller and lighter than the Yak-9, and it's a very competitive plane for it's era. The armament is improved by an additional 12.7 mm MG, and while being somewhat slower than the La5FN, the Yak-3 will outturn and outclimb it. It is very

maneuverable but the high stall speed means that you should usually avoid low n' slow knife fighting though, and a good tactic is to retain the energy.

Approximate combat entry dates:

La5F: Second part of 1942

Yak-9: October 1942

La5FN: Spring/summer 1943

Yak-3: June 1944

La7: October 1944

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Changes in Release version 4.30 R5 (06.26.17) fl2045

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** NEW FM WORK BY robert, idunno and grumpy **

-- FW 190 SERIES COMPLETE REHAUL --

The Fw190A-1, A-2, A-4, A-8, F-8 and D-9 have all been fully remodeled according to extensive research of historical data. They now turn better than before and should hit historical performance more accurately. See further down for more detailed info.

-- P-51 SERIES COMPLETE REHAUL --

The A-36, Mustang Mk I, P-51B and P-51D have all been fully remodeled according to extensive research of historical data. The snappy stall issue has now been fully fixed and they should hit their historical performance very well. All Mustang versions now also follow the same law of physics. See further down for more detailed info.

-- P-47 SERIES COMPLETE REHAUL --

The P-47C, P-47D-22 and P-47D-25 have all been fully remodeled according to extensive research of historical data. They are now properly gaining from having elliptical low induced dragco wings and are no longer the E-bleed hogs they've been before. They actually retain their energy very well for being 13 000 lb beasts and are now great for high altitude fighting, dive bombing and can now properly outdive any opponent. See further down for more detailed info.

-- FLAPS REHAUL --

42 flightmodels had extreme liftco numbers modeled to their flaps, with the same liftco value no matter the flaps angle. This lowered their stall speed by 13-20 mph even at combat flaps, which also resulted in an unrealistically enhanced turning performance. These flightmodels have now been retweaked to have a more realistic flaps performance with the liftco scaling with flaps angle. They will still certainly benefit from deploying combat flaps in a turn fight, although the effect is not as dramatic as before. Flaps wise they will now compete on the same terms and using the same laws of physics as all the other fighters. The flightmodels affected by this global change are:

Bf 109's, Bf 110's, Fokker DXXI, F4U's, F6F-5, Hawker Typhoon, Hurricane I and IIB, J2M's, Ki-43, Ki-44 Ki-61's, Ki-84, Macchi's, MiG-3, N1k1, P-38's, Sea Hurricane, Fw 190's, P-47's, P-51's.

-- Ki-43 --

Weight upped to 5500 lb, up from 5085,8 lb

-- BF 109's --

elevator trim 0.20, up from 0.15

Rudder trim 0.05, up from 0.04

aileron trim 0.07, up from 0.05

The Bf 109K's and Bf 109G-14 now have 10 minutes MW50 injection WEP time instead of 5 minutes. The total WEP available per sortie is 20 minutes.

-- ALL SPITFIRES --

Negative G limit increased to fix wing break issue. Was previously set to low.

-- F6F-5 --

Stall behaviour remodeled. Stall is no longer as harsh.

-- New engine sound and various engine/weapon sound fixes --

Fw 190 series, a36, P-51mk1

-- Fw 190'S FULL REMODELING --

In general the Fw 190's are potent boom n zoom fighters and not turn fighters since they have a very high stall speed of 110 mph IAS at 9420 lb. The Fw 190's have great all around pilot visibility and are at their best in the low-mid altitude range but have poor performance above 25 000 ft. They all have good speed for their respective eras and roll exceptionally well. A wise pilot makes good use of this. Be careful as the stall comes with little warning so it's dangerous to fly on the verge of stall (the Fw 190's didn't have washout for the wings). They can all use combat flaps below 250 mph IAS and the A-8, F-8 and D-9 has the Mw50 injection WEP option. While a P-51D is faster at most altitudes at WEP, it can only use it's WEP for a few minutes while the late Fw 190's can run their WEP for 10 minutes. This makes them great for prolonged fighting. Their heavy armament makes them suitable for attacking bomber formations.

FW 190A-1

The A-1 is the earliest version of the Fw 190's in Warbirds. It has weaker firepower and is somewhat slower than the A-2, but a bit lighter and as such turns tighter.

Fw 190A-2

An improved version of the A-1. A bit heavier but with a more powerful engine and 20 mm cannons.

Fw 190A-4

Similar to the A-2 but with the biggest difference that the A-4 can carry bombs and a droptank due to wingrack upgrades, while the earlier versions are restricted to guns only. The A-4 engine was supposed to be able to use the MW50 engine injection but logistical problems meant the Fw 190's didn't see this invention until the A-8 versions. As such the A-4 is restricted to normal WEP.

Fw 190A-8

A distinctively heavier variant of the Fw 190s with better armor. The A-8 can carry more ordnance than the A-4 due to an even further improved wing structure and also have the "Sturmbock" option. The A-8 can use the Mw50 injection. This greatly improves the War emergency power by nearly 200 BHP compared to the A-4 and allows it to be run for 10 minute stints due to the cooling effect of the Water/methanol injection. This Fw 190 version is the best for attacking bomber formations.

Fw 190F-8

The F-8 is similar to the A-8, but it has a weaker guns loadout and instead a better arsenal of ground attack options. It has the MW50 injection.

Fw 190D-9

The D-9 has an inline engine instead of a radial engine, and can also use the MW50 injection. This means it cannot sustain oil leaks as well as its radial engine fitted brothers, but instead has a top speed that clearly offsets any such disadvantage. The D-9 version is great for boom n zoom fighter tactics and can even outrun a Mustang below 5000 ft and between 14 000-16 000 ft.

-- p-51's FULL REMODELING ==

In general the P-51's are very fast hit n run fighters due to their laminar wings and great high speed aerodynamical design. The early P-51s are best at low/mid altitudes and has poor high altitude performance. The later versions excel as high altitude fighters/escorts and has great range. They can turn a few laps with other fighters at high speed but should avoid any low n slow turn fighting due to their laminar wings. The short military and WEP time limits means that you need to monitor your engine temperature and sometimes extend to cool down the engine before returning to the fray.

Mustang Mk1

This early Mustang is a British high speed interceptor at its best at mid altitudes. Few fighters of the same era can match its speed at this altitude range. Avoid fighting at higher altitudes.

A-36

The American version of the Mustang Mk1 is the fighter-bomber version of the early P-51's. It comes equipped with dive brakes and excels in its role as a tactical ground striker. It has greatly improved speed below 6000 ft which means it can outrun any fighter of the same era at sea level, but it suffers at mid-high altitudes.

P-51B

The P-51B has an improved roll rate compared to the earlier Mustangs and greatly increased high altitude performance. It can climb to 42 000+ ft. This plane has great range and excels as a high altitude interceptor/escort fighter.

P-51D

The best version of the P-51's in Warbirds. This Pony can use 72" WEP and is among the top fastest, if not the fastest fighter in the sim (depending on altitude). It is great at high altitudes and has improved firepower with 6x 0.50 cal MG's. Another important upgrade compared to the other Mustangs is its bubble canopy which allows for a great 360° view.

-- P-47's FULL REMODELING ==

These large Thunderbolts with radial engines are great planes for dive bombing and strafing with their 8x 0.50 cal, but do not take them for low altitude fighters. Their low altitude top speed performance is quite mediocre for later war planes and when it comes to dogfighting they rather excel above 25 000 ft. Above this altitude they are superb interceptors/escorts/bomber formation attackers and they can climb to 42 000 ft just like the P-51's. While their turn rate is somewhat better than one would expect, they have a very large turning radius so avoid any low n slow business. The Jugs have elliptical wings and as such great energy retention for their weight so you can turn a bit without losing too much speed, then extend and repeat the boom n zooming. One of their best defensive tactics is that they can outdive other enemy propeller planes. Use this to your advantage when being jumped. The P-47's also roll fairly well at speeds below 300 mph.

P-47C

The early version of the Thunderbolts. It's a quite potent and fast plane for its era but suffers from bad razorback rear vision. It is very well armed though and can tear enemy fighters and bombers apart alike with its 8x .50 cal. Just like its late war counterparts it excels at high altitudes. This is especially true vs earlier era planes. The P-47C climb rate isn't great so keep it level in a fight.

P-47D-22

A better version of the P-47C. It has military power and can use Water injection WEP which greatly adds to the BHP the engine can produce. As with the P-47C, avoid low altitude fighting if possible.

P-47D-25

The best P-47 version in Warbirds. Very similar to the P-47D-22 but carries 65 gal extra internal fuel and has a bubble canopy which allows for great all around pilot vision. This bird competes to be one of the best high altitude escort fighters/interceptors of the war for shorter bombing missions, as its fuel consumption is too high to fit the "deep strikes into Berlin" like the P-51D can. In the Main Arena though the fuel range should be no problem.

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Changes in Release version 4.30 R1 (03.21.17) fl2039

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* New Terrains by JABO

Canyon

Channel 1944

Wasteland

- * Terrain Changes by chunky

Crimea

3 - fixed issue with capture bug

205 - fixed issue with capture bug

213 - moved spawn points to more appropriate locations

262 - fixed issue with bounding boxes causing crashes and damage

Solomon

Fixed bug with Field 18 capture

- * FL2039 CHANGES

ALL FM's

* Controlsurfaceperrate settings set to 60% of previous pitch and yaw numbers, roll has been untouched. This is made to smoothen the controls and reduce the nose bouncing when trying to aim. It will also reduce wing breaking somewhat.

* Tweaked Vortex numbers according to agreed values, based on (Max hp/full weight)x100. This affects yaw from torque.

* Tweaked Proprpm to 66% x military power rpm. This affects roll from torque.

* Rudderoffset removed from several FM's, now set to 0.0000 as it should be. This was only experimental and should have been removed. This is what caused the P-40's (and other fighters) yaw to be so jumpy and erratic.

* Manual rudder trim set to at least 0.20 if it was previously lower, unless other data proves otherwise.

* Manual aileron trim set to at least 0.15 if it was previously lower, unless other data proves otherwise.

* Tweaked various manual trim values due to changes in proprpm and vortex.

* All boost stage info rewritten to be uniform (.ppm). Also temperature rise settings tweaked to be consistent with the HUD info. This was a complete clusterf*** before.

Bf 109G-6/RVI and Bf 109K-4/RIV

Added weight to the gondola versions, new data shows +215kg/+474lb extra weight for these.

http://kurfurst.org/Performance_tests/109G1-6_datasheet/109G_perftable_EN.html

Added rollweight to simulate gondola wing cannons

Reduced roll force to simulate gondola wing cannons

Total effect example: 98 vs 124 deg/sec at 250 mph IAS

All G-6's and K-4's: Sound change: machine guns now sound like 13 mm, not 7.92 mm.

P-51D

Nose heavymult set to -0.2, down from -1.2

MaxpitchAngle set to 24, down from 30. Due to stability issues.

P-38's

.ppc changed, P-38's will now lose pitch authority above 420 mph IAS.

.ppc altered, P-38's will now roll according to historical data.

F6F-5

Nose heavymult set to -0.3, down from -1.0

MaxpitchAngle set to 23, down from 25. Due to stability issues.

PitchDiv set to 17.5, up from 15.0 due to screen bounce issue.

P-47's

Nose heavymult set to 0.5 for all P-47's, was ranging from -2.0 to 1.0 depending on P-47.

MaxpitchAngle set to 24, down from 30. Due to stability issues.

Removed elevator offset, was constantly pitching heavily down.

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Changes in Release version 4.29 R5 (01.06.17) fl2038
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Flight Models

substantially revised

F5F-6

Hellcat

P51D

P47D- Blok 22

and Block 25

Spitfire Mk

1

Hurricane Mk

1B

These revised FMs
all utilise new wing profiles for a more accurate stall speed
and have been set to closely match historic
performance in level speeds / climb rates / sustained turn
rates.

Flight Models

with minor revisions

Ki84-Ia –

changes to weight, speed tolerance, lift and drag, trims and
boost settings

Bf109K4 and

Bf109K4/RIV – changes to weight, fuel
capacity/consumption, propwash. Engine substantially
revised

I-16

Bf109F2

Changes to all

Flight Models

Removed

excessive rolling caused by rudder due to dihedral effect

New Plane Art from MadCat

h75,il6,p36,p40b,tbf1,tbf cockpit, f2a cockpit

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Changes in Release version 4.29 R5 (5.31.16) fl2037

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Corrections to:

Ki84, P51D, 109G14, Spit9e and Typhoon

Speed limit tolerance revised. Be careful diving fast now...parts will break.

New terrain "Channel 1944"

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Changes in Release version 4.29 R5 (4.14.16) fl2036

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New engines for 190A4 and A8

Spit XIV 150octane boost setting removed for upcoming S3 event. Will be reinstated

N1K1 weight increased to match historical data.

New V1 "Buzz Bomb" added as an AI for S3 and special events..

New ME-109G-14AM released.

=====

Changes in Release version 4.29 R5 (4.14.16) fl2035

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Spit9b renamed to Spit9a

Corrected roll rates 109F1/2

Some 109 boost levels corrected so higher level doesn't go under lower levels.

adjusted Inline engine oil leaks to ~3 min oil leak time.

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Changes in Release version 4.29 R5 (4.13.16)

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New features from M4 Tank added for compatibility

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Changes in Release version 4.29 R4 (4.5.16) fl2034

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New FM updates to:

P40B

Spit5 b/c

109s

added 4x50kg bombload to 109F models

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Changes in Release version 4.29 R4 (3.31.16) fl2033

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New FM updates to:

Me-109F1

Me-109F2

Me-109G6

Me-109G6/R6

SpitVb

Do-17

Updated I-16 3d model and cockpit

icons for P40/P39 changed to HAWK/COBRA

Changes in Release version 4.29 R4 (3.22.16)

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Crash bug when switching arenas fixed

New sounds for g-exceeded and over speed

New optional FM enhancements

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Changes in Release version 4.29 R2 (3.16.16)

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New FM Updates to:

Spit Mk1

SpitVc

Me-109F4

Me-109G2

Bugfix for P47D25 excessive yaw.

Guns on Hurri1 switched to one battery.

Loadouts for Lancs renamed to more conventional naming.

Code change to fix Lanc tailwheel breaking when spawning.

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Changes in Release version 4.28 R7 (2.24.16)

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Tweaks to Fall Gelb S3 FMs

NEW British Buffalo Mk1 Released

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Changes in Release version 4.28 R7 (2.18.16)

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New Russian I-16 Ishak and FM. Cockpit still getting finalized but usable.

New Hawk 75 plane with French and Finnish skins.

New Finnish Buffalo B239.

Minor tweaks to TBF and P36 cockpits.

FM adjustments to 109E, 110C, Hurr1, Wellington, P36.

quad SDK 20mm range decreased.

New AI Bomber formation. Using the "ladder" formation you will now get a historically correct "combat box". Your AI will now be more effective and able to bring more guns to bear on an attacker.

Terrain Changes by chunky

Ardennes

1. Moved all airfield GV spawn points off of main field by 1.8-2.1 miles.
2. Moved GV spawn points from several villages where GV battles tend to take place. This was done to reduce the spawn camping occurrences.
3. Added several new spawn point options to all airfields and several villages.
4. Added new base F83 just north of F29 along with a new bridge for GV battles.
5. Moved F27 closer to F5 and added bridge.
6. Moved several villages that were very close to large airfields to approx 4 miles to prevent quick closer.
7. Moved F29 across the gorge and added a bridge.
8. Added bridge between F7 and F31 to aid crossing by GV.

Crimea

1. Made all bridges drivable.
2. Changed several bridge locations to make them drivable.
3. Removed several bridges as they served zero purpose and could not be made drivable.
4. Added several bridges for GV event purposes.

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Changes in Release version 4.28 R3 (2.5.16)

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Bugfix for P51D hitmap

New ME-109 E series FMs

New Me-110 C FM

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Changes in Release version 4.28 R3 (1.7.16)

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Increased P38 Flaps Full Pitch moment.

Adjusted Bomber trim limits to prevent stalling in Norden.

Decreased Ki84 climb rate.

Slowed down the Typhoon to match data.

Increased Spit Vc structural limits slightly

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Changes in Release version 4.28 R3 (12.29.15)

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New Ki84 FM

increased torque on single engine late war fighters.

New P38L and J acceleration tweaks

New version of torque for all multiengine aircraft with engines that turn same way. Added rudder offset to them and reduced yaw and roll components of torque effects.

F4U poor elevator response fix

Typhoon over G fix

B29 fix..better take off ability and 25deg flaps have increased lift and MUST be used to T/O

added 2x150gl DTs to P51D for Pacific VLR missions

Torque changes to Shiden In The Clouds fighters to produce consistent effects

Speed and climb corrections to N1K1, P47D22 and 25

F4U series tweak to lessen AutoPilot shudder in angle climb.

Boost buffer message changes for several USA fighters to make them consistent

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Changes in Release version 4.28 R3 (12.14.15)

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New aircraft with FM's

TBF-1

TBF-1C

MiG-3

F2A-3

ROF adjustments to several MGs including .303 and MG-81

New code changes for high AOA thrust calculations.

Many FM tweaks for most planes.

New custom sounds added as well.

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Changes in Release version 4.24 R3 (10.08.14)

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"Max LOD render for vehicles" button now "sticks" when selected.

Bf109F-2 built and added

MG151/15 built

Bf109F-1 corrected ammo load 60x20mm

M16- ROF increased to represent 4xbarrels...dispersion and tracer interval also increased

P51D "no tracer" loadout dropped.

Changed 109G-2/ETO in drop down to 109G-2

Changed icon over LA series from "LA5/LA7" to just "LA"

Fixed typo in Yak-3 wing tanks.

Fixed heat rates in F4F-3/4 and A6M3 WEP settings

F4F3 and -4 changes:

Center of lift moved forward for improved pitch control

Control surface deflections corrected to real world values

Horizontal stabilizer corrected (mounted upside down)

Fuel changes to reflect real world data

Handling reviewed and corrected to match test reports

Prop high speed efficiency effects implemented

La5F Changes:

Wing modified to reflect no slat configuration

Roll performance corrected to test report data

Center of lift moved forward to improve pitch control

Flap travel increased to reflect actual aircraft

Control surface deflections corrected to real world values

Horizontal stabilizer mounting angle corrected to match technical drawings

Error in engine torque implementation corrected.

Fuel changes to reflect real world values

Wing structural limits corrected to test data (slight strength increase of 3% positive, 5 % decrease in negative)

Damage modeling corrected to match technical drawings for fuel tanks and engine components

Throttle response increased

La5 Fn :

Roll performance corrected to test report data

Center of lift moved forward to improve pitch control

Flap travel increased to reflect actual aircraft

Control surface deflections corrected to real world values

Horizontal stabilizer mounting angle corrected to match technical drawings

Error in engine torque implementation corrected.

Fuel changes to reflect real world values

Wing structural limits corrected to test data (slight strength increase of 3% positive, 5 % decrease in negative)

Damage modeling corrected to match technical drawings for fuel tanks and engine components

Throttle response increased

La7 2 and 3 Changes:

Roll performance corrected to test report data

Center of lift moved forward to improve pitch control

Flap travel increased to reflect actual aircraft

Control surface deflections corrected to real world values

Horizontal stabilizer mounting angle corrected to match technical drawings

Error in engine torque implementation corrected.

Fuel changes to reflect real world values

Wing structural limits corrected account for metal spar in 7 series and to test data.

Damage modeling corrected to match technical drawings for fuel tanks and engine components

Throttle response increased

P38, Typhoon, and Yak hitmap errors corrected

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Changes in Release version 4.21 R1 (09.12.13)

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Fixed fuel leak bug where a fuel hit causes all fuel to drain from all tanks. Now pilot can select which tank to use or leave on auto fuel source.

Adjusted some loadouts and added two new US drop tanks..75gal and 108 gal "paper" tank.

More Buff FMs adjusted ..noted with " * ".

Added Sdkfz 10/4, Sdkfz 7/2 and renamed M16X to Sdkfz 7/1.

More PPVs added.

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Changes in Release version 4.19 R8 (04.24.13)

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Corrected hitmaps on "reworked FMs".

Adjusted "boost" settings

New Plane JU88-Ca variant -heavy fighter added

More PPVs added

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Changes in Release version 4.19 R7 (04.01.13)

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B29 Beta

B29 Available offline - cockpit not completed

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Reworked flight models will have an asterisk "*" in the plane selection listing

WEP now cuts off at 1% instead of 90% throttle

wEP renamed to "BST" in HUD

Gunners reworked so bullet stream comes out of location of muzzle flash, not gunner's view

Engine points from pps used for all prop/engine positions, including detection of prop/ground collision.

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Changes in Release version 4.18 R3 (1.3.13)

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New Aircraft:

1. Bf109 E-3 Primary Battle of Britain variant.

2. Bf109 E-4 Aa will replace current E-4.

3. Spit MkII (Merlin XII) will replace current Mk1a.

3. Lanc 3 Version with more powerfull engines and temporary stand-ins for the Tall Boy/ Grand Slam loadouts

4. IL-2 Soviet ground attack bomber. Has powerful cannon and cluster bomblet loadouts.

5. Wellington Mk1.C Using a G4M 3D model as a sub. Early war British Medium bomber.

Improvements:

1. Bf109 G-6/R6 and K-4 cannon ammunition loadout corrected.

2. F4U-4 and P47 fuel consumption reduced slightly.

3. Lanc1 loadout and FM adjusted for historical values.

4. Bf109 E-1 A0 renamed to Bf109 E-1, corrected flaps to more historical values along with minor adjustments.
5. M16X Quad Flak 38 adjusted for more historical performance, shells now burst at end of flight.
6. Bf109 E-4 Fm adjusted slight decrease in drag.
7. Fw190 A-8 FM adjusted..decreased weight and added Sturmbock loadout of 2x13mm/2xMG151/2xMk108. This loadout and "historical" loadout have the primary fire linked to the 13mm/MG151 while "secondary" fire is linked to outer wing cannon.
8. FW190 F-8 Added 8xSC50kg loadout. Still working on R4M rockets....
9. Me163 airspeed limit increased.
10. B24 FMs tweaked and added multi-WEP option.
11. A6M dive speed adjusted, A6M2/3 350mph limit, A6M5 375mph limit.
12. Weapons ballistics models adjusted.
13. J2M's adjusted FM.
14. Path for .planeskin command fixed for many planes...player skins should now view correctly.
15. Bf109 Flap deployment speeds adjusted.
16. P40E drop tank added.

17. PPVs added for P51B, Mossies, SPit2, Spit14, and II2. Some PPVs reformatted to reduce file size.

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Changes in Release version 4.15 R9 (10.26.12)

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Improvements:

1. 4-eng bombers FM reviewed and adjusted to more historical performance

PREVIOUS VERSION HISTORY

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Changes in Release version 4.15 R8 (9.12.12)

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Improvements:

1. Hitmaps- over 60% reviewed and adjusted/corrected.
2. A36 FM adjusted-flies better now and Dive brakes fixed WEP added
3. B17F nose gun arc fixed FM adjusted
4. Ju87,B5N,D3A,SBD,TBD rear gunner arcs adjusted to correct values
5. Loadouts- Over 50 aircraft have had them adjusted to more realistic options including drop tanks, different bomb loadouts, more bomb loadout options for fighters as well as bombers.
6. M16X- twin 40mm change to quad 20mm for a more realistic weapon system

7. Spit V(i) and (ii) renamed to Spit Vb and Vc
8. invisible ppv fix for p40b and a6m3
9. Over 50 new PPV skins with more to come
10. Ships adjusted for weapons and variants for Mission Building

New Aircraft:

1. Hawker Typhoon-British Ground attack/strike
2. Mustang Mk1-British low level recon fighter with new vfc skin
3. Swordfish-Biplane Torpedo Bomber..using F.2b 3D model as a stand-in (for s3 use)
4. Lanc3- Lanc 1 with adjusted FM and "historical" loadout
5. Hurricane IIB- 12x303mg version
6. Hurricane IID- tank buster version (needed for upcoming s3)
7. Sea Hurricane IB- Mk1 that is CV capable
8. FW190A1- First 190s in combat July-Aug '41
9. FW190A2/A3- early mass production 190s in Fighter/JABO role late '41 to early '43
10. FW190F8- Dedicated ground attack 190. Early '44

11. Me109K4/R4- 109K with 20mm underwing 20mm

12. P-47D-22- Razorback P47D

13. B-25D- "Strafer" version. Represents Pacific Theater conversions of B25Cs to low level attack. Uses skip bombs and para frags.

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Changes in Release version 3.09 R5 (4.20.09) Released 5.14.09

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NEW - Armored Assault terrain Alsace.

NEW - Dawn of Aces terrain DoA2.

NEW - Added New field to ATOLL terrain for enhanced Online play.

NEW - Flanders F1 Map Background, Icons and Map Field Names.

NEW - PPV planeskins for: 352nd "Miss Helen" P51D, B25J/D 320 Sqn RAF, 109G6R6 IEN skin with special Honorary Pilot name, SpadXIII Frank Luke PPV, Se5a RAF 854, Se5a RFC D3542.

NEW - No longer AI only, GOTHA is now a Player flyable a/c with new Flight Model and appropriate weapons.

NEW - Handley Page SUBSTITUTE a/c. New Gotha reskinned in British format and NEW Handley Page Plane selectable and added description text in the Vehicle Information View.

NEW - CL2 Cockpit and Plane 3D model and revised Rear Gunner head position and gunnery view.

NEW - Added Predator and T-6A Texan to selectable aircraft.

NEW - Flight models for all WWI A/C. All Models extensively tested and revised under close supervision of seasoned DoA trainers and Players.

NEW - Carrier take-off performance for SBD, TBD, F4U-1D and F4U-4.

NEW - MAP Circle that denotes Player position in F1 Map view. COMMAND: .showmapcircle <0|1> to turn off/on the map circle.

NEW - Carrier Mission added to Instant Action Offline Missions.

NEW - Tank Battle added to Instant Action Offline Missions.

NEW - MOTD art and ONLINE DISPLAY COLORS - For use in MOTD, Rosters, Scores etc. Preliminary testing in MOTD ONLY.

NEW - Added Contact Us information to Help Section.

NEW - S3, EMC and Changes.txt to HELP Session Menu items.

NEW - Wb3.exe / Application. Includes bug fixes for Mouse and Gunner transition functions, UI functions, Online Zeppelin destruction and many other internal improvements. Adds new training programming infrastructure and new CM/Sdot command "Ackoff".

Fixed: Offline Default field/country selection to prevent unanticipated country color when launching (player still has choice Offline). Works for both AA and WB terrain types.

Fixed - Restructured Se5a Lewis Gun placement/operation as stationary Secondary weapon. Revised all weapon placement and gunflare animation. Secondary weapon toggles to Bombs on commensurate loadout with <backspace> as per all TotalSims a/c.

Revised - ALL B25 bomber models. C model is Status Quo with 3d cockpit/Gun placements in tact, J and H models now have all VEW file art and also show all parts of the a/c from all views and correct degrees of gun traverse.

NOTE: Known "reverse" of r/l side guns on J model as well as minor image overlap from pilot view. Priority items to be corrected.

Fixed - CL2 "scout" loadout.

Fixed - Corrected incendiary loadouts for Se5a, CL2 and F2b.

Fixed - Camel Hitmap for correct Engine fire and all other Hitmap items.

Fixed - Tiger tank 88mm Ammo type, performance, effect animation and Hit Map.

Fixed - Lancaster prop rotation views from external and relative player perspectives.

Fixed: Cluttermultiplier added to Belgium and Alsace terrains to prevent "clumped" clutter items.

Fixed - Malta Custom Mission typo in custommission.dtf now allows for correct saving of Malta Custom Missions.

Fixed - Help session behaviors for certain existing Help Session Items.

Fixed - MAC SPECIFIC - ALL Tower and F1 Map displays for proper coloration.

Revised: CL2 Plane information bdy file.

Improved - Changed text color in Free Flight Terrain descriptions and Genericised HelpText.

Changed - "You are in Country 1" radio buffer message changed to "You are in Country 1 , RED" for all colors and countries.

Added - Promotional screens for "First Run" Installations to promote Online Play.

Changed - Now replacing wb398.exe with latest wb3.exe to finalize and force elimination of Windows 98 support. Also prevents "user error" launches of wrong executable.

NOTE: Windows Operating Systems 98 and Me (all versions) will no longer be supported in conjunction with Microsoft Software support directives. See <http://www.microsoft.com/windows/support/endofsupport.msp>

Removed - Furball site reference from HELP Section Menu items.

Updated - Changes.txt , ChangeHistory.txt and Credits.

