

A WW2 Air Combat Game

DOGFIGHT

Game design by
Phil Sabin

FULL CIRCLE



A game for owners of

WING LEADER

Please Note: You will need to own
Wing Leader: Victories or Wing
Leader: Supremacy in order to play
Dogfight.



Figure 1: My first playtest of *Full Circle* used my home made *Angels One Five* board with tiles from an aerial photo in varying orientations, which is ideal for low level battles. I pitted a squadron of Hurricanes against a squadron of Dornier 17s sneaking in at 1,500 feet escorted by a squadron of Bf 110C-1s. The counters are from J.D.Webster's *Achtung Spitfire*, and the 1.5 cm light grey blocks are from GMT's *Europe Engulfed*. The picture shows the end of round 6. One Hurricane flight hit the bombers in a head-on pass on round 5 but it has fallen to airspeed 1 as it circles to escape the vengeful 110s. The other Hurricane flight has curved round into a perfect position for a rear quarter dive out of the sun against the Dorniers, but the top cover flight of 110s has dived down to level 3 and airspeed 3 ready to bounce the British fighters in turn. The Hurricanes risked attacking regardless and scored a second hit but were then hit by the bouncing 110s. The other Hurricanes hit the Dorniers twice more on round 16 but suffered a hit in the process, so the handicap of 2 produced a 4-4 draw.

| DOG FIGHT Full Circle | | | | | | | | | | | |
|--------------------------|---|---|----|------------|----|----|----|------------|----|----|----|
| Airspeed 1 | | | | Airspeed 2 | | | | Airspeed 3 | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Escort Energy and Status | | | | | | | | | | | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Bomber Progress | | | | | | | | | | | |

Figure 2: Thanks to Lee's counters, the tracks in *Full Circle* look far better than the tracking dice of *Dogfight Deluxe*. In this Spanish Civil War scenario, the slow R-Z bombers gain no progress despite being at level 7 (the highest level for I-15 escort). I-15 flight A is at airspeed 2, while flight B is at airspeed 1 and has been inverted to show that its ammo is low. The faster I-16s have traded height for speed and accelerated to airspeed 3, but their counter has been reversed to show they have taken 1 hit.

INTRODUCTION

Dogfight: Full Circle is the latest edition of my free total conversion using the counters and Aircraft Data Cards (ADCs) from Lee Brimmicombe-Wood's *Wing Leader* series of WW2 air combat boardgames from GMT. As in earlier iterations, it zooms in to portray the aerial duels around bomber formations in greater grand tactical detail than in *Wing Leader* itself, thereby giving more scope for player skill in flight manoeuvres than in Lee's necessarily more abstract system. *Dogfight* has always included a significant 3D element in addition to Lee's 2D side-scrolling portrayal, and this latest *Full Circle* edition circles all the way back to the top down perspective used in my simple and generic *Angels One Five* design (published in 2015 by Victory Point Games) and in my more tactical *Wing Leader* conversion *Fighter Duel Deluxe*. It hence marries Lee's rich portrait of the visual and technical diversity of WW2 aircraft with a fuller and more intuitive model of the 3D reality of these contests. Google 'Philip Sabin YouTube' for my detailed new gameplay video of a complete small scenario set over Spain in 1936, illustrating rules mechanisms and tactics. *Full Circle* uses a 6 and a 10 sided die (D6 and D10), with rolls of '0' counted as '10'.

THE BOARD AND TRACKS

Dogfight: Full Circle is played on a 24 x 18 hexgrid, split into four 6 x 18 sections. The hexes should be at least 3.5 cm across (more if possible). You may print 12 copies of the 6 x 6 hex tile on p.10 onto coloured card, or copy and expand parts of the map from an existing game. Each hex represents an area 500 yards across, and contains 5 different altitude steps each of around 1,500 feet. These steps are numbered 0 to 4, and are shown by piling the matching number of small wooden blocks from a block wargame beneath each aircraft counter. The hexes are big enough to accommodate piles of blocks side by side. The entire board represents a moving corridor of airspace 4.4 miles wide, 6.8 miles long and 1.4 miles high.

Each aircraft counter occupies a specific hex at one of the 5 altitude steps, and faces a single adjacent hex. Step 0 may be just above the ground or up to 30,000 feet higher, depending on the height of the bombers. The altitude level of each step for use with Lee's ADCs is found by adding 0 to 18 to the step number. If a round ends with the lead bombers on the front board section, the back section is moved to the front to accommodate their forward flight. Half hexes at the front and back count as off the board, and any fighters on the back section when it cycles forward count as having flown off the board.

Two track sheets on pp.11-12 track board altitude, rounds, hits by each side, the escort handicap, bomber progress and the status and energy of each fighter flight. Each of the 70 energy points represents kinetic energy equivalent to 125 feet of height. They form 4 bands corresponding to airspeeds of 1, 2, 3 or 4 hexes per round, representing 136 mph, 272 mph, 408 mph and 544 mph. To show airspeeds on the map without unsightly tracking dice, counters due to move only 1 hex next round are put at the back of their hex if possible, while those due to move 3 or 4 hexes are put at the front.

THE AIRCRAFT

There are 1 to 3 bomber groups, 0 to 4 flights of escorts, and 2 to 6 flights of interceptors. Fighters may be a mix of types classed as fighters on the ADCs. Bombers may be any single type able to carry bombs. Fighter-bombers are considered bombers rather than fighters for all purposes. Each bomber group usually represents between 6 and 18 aircraft. Each fighter flight usually represents between 3 and 9 aircraft depending on formation type and pilot quality.

Each group or flight is represented by 2 counters – a half inch square plan view counter on the hex board, and a side view counter from *Wing Leader* on the track sheet. Christian Lemoisson has posted plan view counters for nearly all plane types on the Boardgame Geek page for Craig Taylor's *Air Force*, or you may use ready-made counters like those in J.D.Webster's *Fighting Wings* games. Numbers on the square counters match the order of ID letters on the *Wing Leader* counters (which should show 2 planes if possible). Bomber counters simply track flight progress. Fighter counters track energy and are also reversed if the flight is hit or inverted if it runs low on ammo. Fighters with 2 hits, or 1 hit and low ammo, or no ammo, reverse and invert their counter and will break off when next activated.

INITIAL SET-UP

Decide the number and types of groups and flights on each side, the board's height in levels and the interceptors' maximum initial altitude level. All bombers must be at a level where they may carry bombs. Fighters whose speed rating at the lead bombers' altitude is less than that of the bombers may not serve as escorts and start on the front board edge even on rolls of 4-6 if interceptors. Dice to find from which of the 6 directions the sun is shining and put a marker in that board corner. If a direction directly ahead of or behind the bombers is selected, the sun is considered to be behind high cloud or too high to affect the combat.

Bombers fly at step 1, or at step and level 0 if flying very low. The lead group starts facing forward with progress 2 in the most central full hex just ahead of the divide between the two central board sections. Other groups begin in the adjacent hexes to its left or right rear, with the second group in the more central hex. With 3 groups of B-17s or B-24s, the second or third group (whichever is down-sun) may fly at step 2 to simulate a stepped combat box. The escort player may opt to cut board height by 2 levels if possible, but the interceptors' maximum altitude falls by just 1 level. The escorts set up heading forward within 5 hexes of the lead bomber group and up to 2 levels above it. Their energy equals 4 times the bombers' speed rating minus 3 if the lead bombers are at levels 0-6. Either side may add 1 to the maximum deployment altitude of some fighter flights if an equal number deduct 1. Fighters with a higher top altitude band must be chosen first when increasing altitude and last when decreasing altitude. Due to service ceilings, fighters may never be 8 or more levels above the lowest level of their climb rating 3 band, and if their adjusted deployment altitude exceeds this bottom level by more than a D6 roll, that flight must deploy at least 1 level lower.

Roll a D6 after escort deployment. On 1-3 the interceptors begin on the front board edge, on 4 or 5 on the side edge to the left or right of the bombers respectively, and on 6 on either (not both) of these side edges. The front edge includes hexes next to unplayable half hexes, while the side edges do not include hexes on the front board section. Interceptors set up in board edge hexes facing a non-board edge hex closer to the lead bombers. Their energy equals 4 times their own speed rating at their starting altitude minus 3 if at levels 0-6. Only one group or flight may begin in each hex. There is no interceptor phase on round 1.

| Fighter 11P | | | | Heavy Bomber 11P | | | | Fighter 11P | | | |
|-----------------------|------------|-----------|------------|------------------------------|------------|-----------|------------|------------------|------------|-----------|------------|
| P-51D Mustang | | | | B-17G Flying Fortress | | | | Fw 190A-8 | | | |
| Altitude | Speed | Turn | Climb | Altitude | Speed | Turn | Climb | Altitude | Speed | Turn | Climb |
| 18+ | 6 | 6 | 3 | 21+ | 3 | 3 | 8 | 15+ | 5 | 5 | 12 |
| 5-17 | 7 | 7 | 2 | 0-19 | 4 | 4 | 8 | 4-12 | 6 | 6 | 7 |
| 0-4 | 7 | 7 | 1 | | | | | 0-5 | 6 | 6 | 10 |
| Firepower: 2 | Drop Tanks | Rear View | Defence: 7 | Firepower: 0 | Drop Tanks | Rear View | Defence: 1 | Firepower: 3 | Drop Tanks | Rear View | Defence: 4 |
| Protection: 4 | Gun Pods | Gun Pods | AT&F: 7 | Protection: 5-8 | Gun Pods | Gun Pods | AT&F: 1 | Protection: 4-6 | Gun Pods | Gun Pods | AT&F: 1 |
| Bombing: T | | | | Bombing: 9 | | | | Bombing: T | | | |
| United States (11) 14 | | | | United States (11) 43 | | | | Germany (10) 21 | | | |

Figure 3: ADCs from *Wing Leader* specify each aircraft type's firepower, protection and perhaps defence ratings, and its speed, turn and climb ratings at different altitude levels. **To improve realism in combination with my new system for climb rate variation, reduce fighter altitude band 0-6 to 0-5, and fighter altitude bands 0-7 and 0-8 to 0-6.** Only fighter types may be used as fighters in the game, but any types with a bomb rating may be used as bombers. Some fighters (like the P-51D and Fw 190 shown) may have a rear view canopy, and they may also have optional add-ons such as gun pods or gyro gunsights which are discussed on p.7 below. The back of some ADCs show other optional variants which may be used by player agreement. The full set of Lee's updated ADCs is at <http://www.airbattle.co.uk/>.

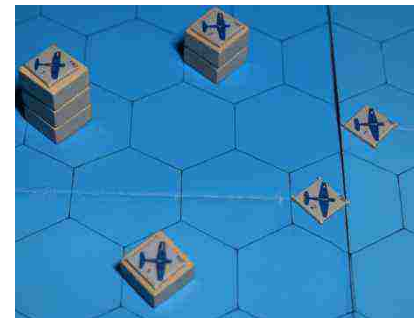


Figure 4: This simple blue 3.5 cm hexgrid works well for low level battles over the sea, here with counters from J.D.Webster's *Whistling Death*. The two squadrons of Avenger torpedo bombers begin in the board centre just above the waves, and will gain no progress at this height despite their speed rating of 3. Their escorts begin with energy of only 9 (4x3 -3) instead of 21 had they been able to use their own speed ratings instead, so like the bombers they are placed at the back of their hexes to show their initial airspeed of 1. Their maximum starting level is 2 (0+2), but the player opts to raise one flight to level 3. This must be the Corsairs because their top altitude band is 16+ as against 15+ for the Hellcats. One F6 flight is dropped to level 1 to compensate, while the other Hellcats have no partner to balance and so are deployed at their standard altitude of 2. (They could have begun lower.)

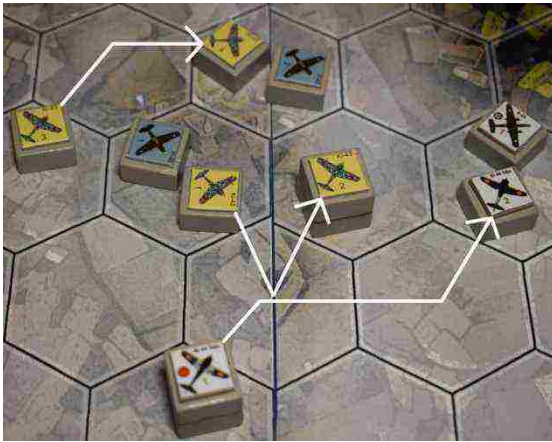


Figure 5: For higher altitude battles, I use tiles made from Tim Allen's striking maps from the VPG edition of my own *Angels One Five*, with the hexes blown up to 4.5 cm across. Here is a clash at levels 6-10 over China in 1943, with 2 flights of Oscar IIs and 1 flight of Tojos intercepting a squadron of B-25Ds escorted by 2 flights of the new P-40Ns. Christian Lemoisson's print and play counters (in white) work well as a complete solution or to show planes not in your *Fighting Wings* collection.

The first Ki-43 flight made a beam attack on the bombers last round, before these flew on 2 hexes as their progress cycled from 4 back to 0. A Warhawk flight then got on the Oscars' tails but failed to score for the moment. Both flights are at airspeed 2, so if the Japanese pilots make a level 120° left turn the P-40s will be able to stay on their tails and attack again. The Oscars opt instead to climb 1 step to cut their move to 1 hex, and attempt a tight turn. Their initial altitude of 7 is 1 too high for the +1 low altitude bonus, so with a turn rating 1 higher than their speed rating there is no net modifier. On a D6 roll of 3 they just manage to make a second turn and enter the hex to their original left front. The Warhawks will have to roll 5 or 6 to avoid being out-turned and left behind.

The other Ki-43 flight is at airspeed 3, and it opts to fly level, turn right in its first hex and stop short in its second hex to engage the other P-40 flight. Had this been its full move it could have turned again onto the Warhawks' tails, but since the same g limits apply as for a full 3 hex level flight, the Oscars may not turn the same way in 2 successive hexes. They must lose 6 energy by throttling back before making their 60° deflection attack.

The Tojos are also at airspeed 3, and are higher at level 8. They opt to dive 1 of the 2 steps allowed at this airspeed, so as to attack the B-25s 3 hexes in front. The Ki-44s could fly ahead 2 hexes before making their 1 allowed turn when climbing or diving 3 hexes, and so attack the bombers from directly behind. However, only the B-25s would benefit from the bonus for being in the same heading, due to their potent tail guns. The Tojos hence turn right in their first hex and use the weaving exemption to turn back left in their second hex before making a beam attack on the bombers. Fighters flying 4 hexes may make 3 successive weaves after their 1 permitted turn, but the bombers prevent the Ki-44s weaving again even if they wanted to. This turn constraint applies in all hexes containing bombers, so fighters overshooting slow bombers after a tail attack usually have to climb or dive to leave their flight path.

SEQUENCE OF PLAY

The game lasts up to 40 rounds, recorded on the track sheet on p.12. Each round represents 7.5 seconds of action, and has 3 phases:

Interceptor Phase (from round 2): The interceptor flights are activated in turn, with any combat resolved after each flight's move.

Bomber Phase: The bomber groups fly automatically in turn, and any combat with interceptors is resolved.

Escort Phase: The escort flights are activated in turn, with combat resolved after each flight's move.

Each side's fighters must be activated in a set order based on their ID numbers. If a round ends with the lead bombers on the front board section, the rear section cycles to the front.

FLIGHT

Bombers fly forward 1 hex (2 hexes if their speed rating is 7-9) and increase their progress as shown below, depending on the lead group's altitude and speed rating. If their progress passes 5, it is reduced by 6 and the bombers move an extra hex this round.

| ADC Speed Rating | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--------------------|---|---|----|----|----|----|----|----|----|
| Rise at Levels 7+ | 0 | 0 | +1 | +2 | +4 | +6 | +2 | +4 | +6 |
| Rise at Levels 0-6 | 0 | 0 | 0 | +1 | +2 | +4 | 0 | +2 | +4 |

Fighters may fly level or climb or dive up to half as many steps as their airspeed (rounding up if diving and down if climbing). They fly as many hexes as their airspeed, or 1 less if climbing. They may turn 60° after entering each hex, but due to g forces planes which fly 3 hexes level may not turn in successive hexes this round while planes which climb or dive 3 hexes or fly 4 hexes may turn just once. Weaving turns which reverse a turn in the immediately preceding hex this round are exempt from this g limit, but even weaving turns are banned in hexes containing bombers at the fighters' final altitude.

Fighters which fly just 1 hex may attempt a tight turn after turning normally. Roll a D6, and add the modifier on p.5. Add 1 at levels 0-6, deduct 1 at levels 12-15, and deduct 2 at levels 16 or above. (All modifiers use the flight's initial altitude.) If the modified score is 3 or more, the flight makes a second turn in the same direction and moves 1 hex ahead with no further turn. Tight turns are banned if either hex has bombers or flown friendly fighters at the final altitude.

Planes may pass through occupied hexes but they may not end their flight in the same hex and step as friendly planes which have already flown this round. They may freely end in the same hex and step as enemy planes. To increase firing opportunities, fighters not climbing or at airspeed 1 may end their flight 1 hex early if in the same hex and step as enemy fighters (not bombers). They suffer the same g constraints as if they had made their full move, and they must throttle back fully unless the enemy fighters' heading differs by 180°. Bombers never leave the board, but fighters may dive off the board from any step instead of flying normally. They must do so if they stall or cross the board edge or if their energy marker was reversed and inverted before their current activation.

ENERGY

At the end of their flight, fighters gain 12 energy points for each level dived and lose 12 for each level climbed. If they ended in a different heading to their initial heading, they lose the points shown at the foot of the first table below. If they made 2 non-weaving turns (including a successful tight turn or separate opposing turns in hexes 1 and 3), they lose the points shown on the second table below. Either or both turn penalties may apply. Tight turn attempts have no extra cost. Weaving in successive hexes does not increase drag because it models normal flight against the grain of the hexgrid.

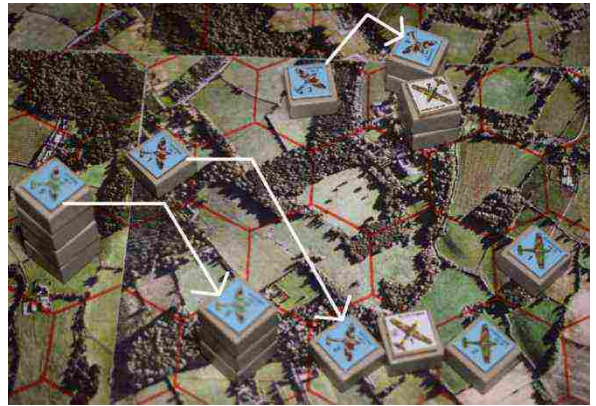


Figure 6: Here is a battle at levels 3-7 over Sicily in July 1943. Two flights of Italian MC.202 Folgore intercept 2 squadrons of heavily-laden Hurri-bombers escorted by 3 flights of Spitfire Vs, with the British planes again being from *Achtung Spitfire*. One Folgore flight made a beam attack on the rightmost Hurricanes earlier this round before the fighter-bombers flew on their usual 1 hex at this height.

| Current Airspeed | | 1 | 2 | 3 | 4 | |
|------------------|-----|-------------------|------|------|------|-----|
| Altitude | 0-6 | Energy Adjustment | | | | |
| | 7+ | | | | | |
| ADC Speed Rating | 2 | 1 | +4-C | -2 | -8 | -16 |
| | 3 | 2 | +4-C | -1 | -6 | -12 |
| | 4 | 3 | +4-C | 0 | -4 | -10 |
| | 5 | 4 | +4-C | +3-C | -3 | -8 |
| | 6 | 5 | +4-C | +4-C | -2 | -6 |
| | 7 | 6 | +4-C | +4-C | -1 | -4 |
| | 8 | 7 | +4-C | +4-C | 0 | -2 |
| | 9 | 8 | +4-C | +4-C | +3-C | -1 |
| | - | 9 | +4-C | +4-C | +4-C | 0 |
| Net Turn Penalty | | 0 | -1 | -2 | -3 | |

| ADC Turn Rating minus Speed Rating | +2/+3 | +1 | 0 | -1 | -2/-3 |
|---|-------|----|----|----|-------|
| Extra Energy Loss for 2 Non-Weaving Turns | -2 | -3 | -4 | -5 | -6 |
| Modifier for Tight Turn D6 Roll | +2 | 0 | -2 | -4 | NA |

Fighters also gain or lose energy due to thrust and drag as shown on the first table above. Results in blue deduct the climb rating (C) and mean that fighters must also roll a D6 (re-using the tight turn roll if one was made). If the unmodified roll exceeds the highest level at which the flight's climb rating is 1 (now never more than 6), it loses 1 energy point if at climb rating 1. If the roll plus the highest level at which the climb rating is 1 exceeds 6 plus 1 for each level the flight was above the lowest level for its initial climb rating, or if the result was +3-C at climb rating 3, the flight gains 1 energy point. These tweaks combine to create a range of initial climb rates from 2,300 to 4,000 feet per minute, and reduce climb rates gradually with altitude instead of in two big jumps. You may tabulate outcomes for each level and plane type in your game to save calculations during play.

Flights may opt to lose up to 6 points by throttling back, and they must do so if they stopped short for a non head-on engagement. Energy adjustments are all based on the flight's initial altitude and airspeed. All adjustments are combined before applying the net change. Energy gains above 70 are lost. Fighters whose energy falls below 1 stall and dive off the board without firing. The airspeed 1 band has been expanded at the expense of the airspeed 2 band so that even the slowest fighters can climb without stalling.

The first Spitfire flight at level 4 and airspeed 3 is best placed to cover the Hurricanes by counterattacking the Folgore. It turns right towards them in its first hex, flies 2 more hexes to reach them, and ends by turning forward again for a 60° deflection shot. Since it is back in its original heading it escapes the -2 penalty for a net turn at airspeed 3, but since the second turn does not count as a weave because it did not immediately follow the first, the Spitfires must pay the 3 points which it costs agile fighters with a turn rating 1 greater than their speed rating to make 2 non-weaving turns. Drag costs them another 3 energy points since they are well above their maximum level speed at this low altitude, so the flight's energy falls from 30 to 24, dropping it squarely back to airspeed 2.

The second Spitfire flight has only 15 energy points but is keen to engage the other Folgore passing at 2 o'clock high. The Spitfires pull up to the right and on a roll of 4 they easily manage a tight turn for a deflection shot thanks to their net +1 modifier at this height. They began just within their climb rating 1 band of 0-4, so the +3-C result gives them 2 energy points from engine thrust. The D6 roll only equalled rather than exceeding their top height of 4 at climb rating 1, and the +4 bonus is wholly offset by starting 4 levels above the lowest level for their initial climb rating. The bad news is that the severe 12 energy point cost of the climb is increased by 1 for making a net turn at airspeed 2 and by a further 3 for the tight turn with an agility of +1, so the Spitfires lose 14 energy points and end with just 1. The player only now realises that had the tight turn roll been 5 or 6, the planes would have stalled and left the fight.

The top cover flight has the opposite problem of too much altitude, so it dives 1 level while turning right and weaving back left to limit its forward progress. Starting in the thinner air at level 7 means it gains +4-C or 2 energy points, and its D6 roll of 5 plus its top height of 4 at climb rating 1 gives a further point by exceeding 6 plus the 2 levels it was above the lowest height of 5 for climb rating 2. With 12 more points from the dive and no net turn to increase drag, the flight avoids accelerating to airspeed 3 only by throttling back 4 points so that its energy grows only from 17 to 28.

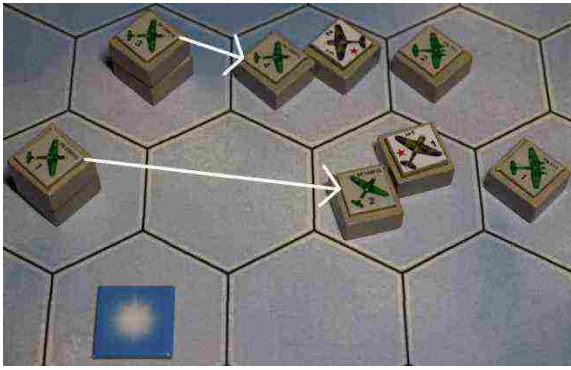


Figure 7: This board based on Tim Allen's generic sky board in *Angels One Five* serves not only for higher level battles over the sea but also for combats over desert or wilderness terrain. Here I use it to show the frozen steppe in a game set at levels 0-4 during the Stalingrad airlift of December 1942. Two flights of the new La-5s intercept 2 squadrons of supply-laden He 111s flying at 1,500 feet escorted by 2 flights of Bf 109F-4s. I count the Soviet pilots as disadvantaged to reflect their high turnover.

One La-5 flight managed to curve around for a diving beam attack on the lead Heinkels out of the low winter sun. It received a +1 bonus for this and another for engaging bombers, but suffered the -1 penalty for disadvantaged pilots. On a D10 roll of 10, the net +1 bonus raised the Soviet score above the 8-10 range for a firepower of 2 against a protection rating of 4-5, so the La-5s inflicted 2 hits. However, the common roll allowed the Heinkel gunners to reach the 10+ needed for a return hit with their defence rating of 0 against the fighters' protection rating of 4 (and gave them an automatic hit regardless). The roll also meant that the La-5s ran low on ammo, and combined with the hit this will force them to break off next round.

The other La-5s managed to attack the other Heinkels head-on, though only by diving and so losing the +1 for a perfectly aligned head-on pass. The 'h' vulnerability of the Heinkels meant that the hit range fell from 8-10 to 8-9, but on a roll of 4 neither side came close to scoring (especially with the disadvantaged pilot penalty).

After the bombers fly on their usual 1 hex at this height, the first Bf 109 flight dives 2 hexes straight ahead from its covering position at level 2 and airspeed 2, and turns 60° left to get directly on the tails of the dispersing La-5s. Its D10 roll is 8, so everything depends on whether it qualifies for the net +1 modifier needed to reach its target score of 9 with a firepower of 1. The same heading bonus gives +1, but the sun attack bonus is negated by the final turn, so the key question is whether the La-5s can evade. Their fixation with the Heinkels is balanced by the friendly fire risks posed by the bombers' defensive guns. The 109s just managed to reach airspeed 3 like the Soviets during their attack dive, and the planes' turn ratings at this low altitude are also equal at 6. The decider is the La-5s' lack of rear view canopies, so they take a second hit before they leave.

The other Bf 109 flight opts to stop short after diving just 1 hex of its 2 hex move and launch a head-on attack which does not require throttling back. The La-5s' firepower advantage is offset by their disadvantaged pilots, so both flights need a roll of 9 or 10 to hit. On 9, the Soviet planes would have twice the chance of depleting their ammo into the bargain, but the actual roll of 2 instead yields no effect.

COMBAT

Fighters which end their flight in the same hex and step as enemy planes fire on them after any energy change. The enemy planes fire back in head-on combat in opposite headings or if they are bombers with a defence rating. (Any rear guns on fighters only limit their own vulnerability.) Fighters (never bombers) may opt to hold their fire, with the moving flight choosing first, but this does not stop return fire. Fighters must hold their fire if the headings differ by 120° or if they have been fired on since their last activation. Bombers fire if they end their flight in the same hex and step as interceptors and not escorts; the interceptors do not fire back even if engaged head-on.

Each side applies its own modifiers to a common D10 roll. Fighters may evade if they have a higher airspeed or turn rating at the combat altitude, or an equal turn rating and rear view canopies. Fighters may not evade if they fired without return fire in their last activation, but they always evade if they suffered return fire of strength 1 or more (which deters their pursuers). Fighters receive the sun attack bonus if they dive and end heading directly down-sun, unless they turned tightly or made any turn (even a weaving one) in the combat hex.

| |
|--|
| +1 for fighters or bombers if the enemy is in the same heading |
| +1 if engaging bombers which have a defence rating, except in head-on combat if the attackers climbed, dived or made any turns |
| +1 if engaging heavy bombers (due to their value and target size) |
| +1 for active fighters diving out of the sun |
| -1 for active fighters making a non head-on attack against fighters able to evade |
| -1 for active fighters which made 2 non-weaving turns or which climbed and ended heading directly up-sun |

Fire inflicts 1 hit if the modified roll is in the range shown below, and 2 hits (or 1 by bombers) if it is higher. Fire always inflicts at least 1 hit if the unmodified roll is 10. Shift 2 columns left if engaging bombers with 'h' vulnerability head-on. Bombers use their defence rating instead of their firepower, except in the bomber phase or in head-on combats when they use their (better) firepower rating if it is higher. Firing fighters run low on ammo if the unmodified combat roll is 10, or if it is 9 unless a common follow-on D6 roll exceeds (not just equals) twice their firepower. Track total hits on the track sheet, and reverse or invert fighters' energy counters to record single hits or ammo depletion. If a fighter flight takes 2 or more hits, or has 1 hit and is low on ammo, or rolls an unmodified 5 or more when firing once low on ammo, it must leave the board when next activated. It does not fire back if attacked head-on before then. Bomber groups fly on regardless of hits, and never run low on ammo.

| Fire power | Targets' Protection Rating | | | | | | |
|------------|----------------------------|------|------|-------|-------|-------|-------|
| | 2-3 | 3 | 3-4 | 4 | 4-5 | 5 | 5-6 |
| 0 | 8-10 | 9-10 | 9-11 | 10-11 | 10-12 | 11-12 | 11-13 |
| 1 | 8-9 | 8-10 | 8-10 | 9-10 | 9-11 | 10-11 | 10-12 |
| 2 | 8-9 | 8-9 | 8-9 | 8-10 | 8-10 | 9-10 | 9-11 |
| 3 | 8-9 | 8-9 | 8-9 | 8-9 | 8-9 | 8-10 | 8-10 |
| 4 | 8-9 | 8-9 | 8-9 | 8-9 | 8-9 | 8-9 | 8-9 |

WEAPON DISTINCTIONS

Due to weak guns, He 51s, A5Ms, Ki-27s and Ki-43s shift 1 fire column right if possible. Fighters do not receive the bonus for being in the same heading when engaging heavy bombers or Wellington, Betty, Helen, Peggy, B-25 or B-26 medium bombers, due to these planes' powerful tail guns. Some Axis fighters may be given gun pods or AARs (not both). Their speed and turn ratings are cut by 1, but gun pods increase their firepower by 1 while AARs cancel the effects of potent bomber tail guns. Some Allied fighters may be given gyro gunsights, which give them a +1 fire bonus at 60° deflection. Jets may only escort jet bombers. On deployment rolls of 1 or 6, jets intercepting bombers whose speed rating is 1-5 deploy on the back board edge instead. Jets at airspeed 1 stall and leave the board unless their energy exceeds (not just equals) twice their height in levels.

DISADVANTAGED PILOTS

Either side's fighter pilots may be disadvantaged by inexperience (common for the USSR throughout and for the Axis in 1944-45). They have a -1 fire modifier and a -2 tight turn modifier. They may never hold their fire voluntarily, and their fire forces disadvantaged pilots to hold their fire only if the flights had the same heading. Fighter pilots also count as disadvantaged if more than half (but not all) fighter flights on the board at the start of the phase were friendly. This reflects poor situational awareness (SA) when friends outnumber foes. Pilots retain SA if all enemy fighters are twin engine G.1s, Whirlwinds, P-38s, Bf 110s, Me 210s, Me 410s, Me 262s or Ki-45s, or if friendly flights without twin engines do not outnumber all enemy flights. Experienced pilots with poor SA may always opt to hold their fire, and they escape the tight turn penalty if they begin in the same hex and step as enemy fighters. They escape the fire modifier and force enemy fighters to hold their fire regardless of heading if engaging bombers, twin engine fighters, active head-on attackers who do not hold their fire, or fighters which fired in their own activation unless these are not evading but would be if all previous fire is discounted. SA in the phase of fire applies, even if it changes later.

VICTORY

After selecting the contending forces and initial altitudes and rolling for sun direction, you should decide an appropriate handicap bonus for the escorts, perhaps by bidding for sides. If the escorts do not merit a bonus of at least 1, decide again with the interceptors scoring 2 points per hit rather than 1. Record the handicap on the track sheet. This handicap system forces the interceptors to engage if they are to avoid defeat, and allows numerical and qualitative asymmetries favouring either side to be offset so that even one-sided scenarios become balanced games. The game ends when all interceptors have left the board or after 40 rounds (5 scale minutes of action). Each side scores 1 point for each hit it has inflicted, with the escorts adding their handicap bonus and the interceptors perhaps scoring an extra point for each hit. The greater the difference in scores, the greater the victory. If the final scores are equal, the game is a draw.

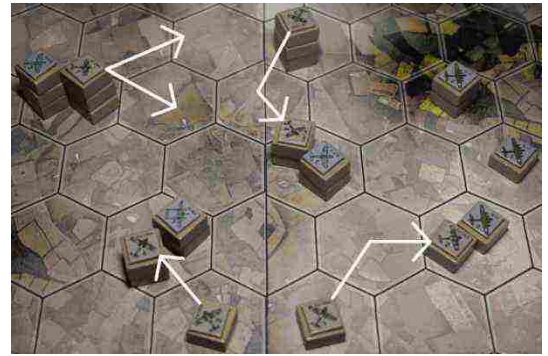


Figure 8: This game at levels 16-20 over Germany at the start of 1944 pits 2 flights of Bf 109G-6s and 2 flights of Fw 190A-4s with AARs against a full combat box of 54 of the new B-17Gs escorted in this leg of their long journey by 2 flights of P-47Cs and 1 flight of the new P-38Js. All the counters are from J.D.Webster's *Over the Reich*. The 4 German flights outnumber the 3 U.S. flights, so suffer from poor SA.

The first 109 flight at level 19 and airspeed 2 has been hit by tailing P-47s. Even though the enemy fighters negate the SA penalty, the -4 modifier at this height means the 109s have no chance of escaping by a tight climbing turn, so they opt to cut their losses and break off the action, thereby improving future German SA.

The second 109 flight is also at level 19 and has just reached airspeed 3 thanks to gaining 2 energy rather than 1 on rolls of 4-6 hitherto. It dives down and stops short for a deflection attack on the P-47s covering the bombers. Its net energy gain is just 2 after the deductions for drag, turning and throttling back. The P-47s can evade thanks to their higher turn rating at level 18, and the poor SA penalties continue to affect this combat, so only an automatic hit on 10 will apply and even this will leave the Thunderbolts free to fire later this round. The 109s hence opt to conserve their ammo for a future round.

The first 190 flight at level 17 and airspeed 2 turns in regardless for a tail attack on the low group of B-17s. The 1 point cost of the turn is offset by the automatic 1 point gain on a +3-C result at this height. With the AARs countering the bombers' tail guns, the 190s get a +3 modifier as against +1 for the B-17s. A roll of 8 means that each side takes 1 hit. The encumbered 190s hope that the hail of B-17 fire and the continued threat from the 109s will deter a P-47 counterattack.

The second 190 flight, also at level 17 and airspeed 2, makes a climbing right turn for a deflection attack on the P-38s. The net 12 point energy loss drops it squarely to airspeed 1, and the P-38s with their much higher airspeed and turn rating have no difficulty in evading. However, the distinctive silhouettes of the U.S. planes resolve the Germans' SA problems in this instance, so even with the evasion penalty the 190s' powerful guns will hit on 9 or 10. They miss on a roll of 5, but with no SA penalty the attack will stop the P-38s firing themselves later this round. Growing pilot losses in these high altitude battles will soon leave German fighters disadvantaged regardless of SA, but the Me 262 gives some hope of turning the tide.

DESIGN NOTES

I included extensive design notes in *Dogfight Deluxe* discussing features such as the focus on energy and the leapfrog Igo-Ugo play sequence, so I will concentrate here just on what has changed in this latest *Full Circle* edition. I long dreamed of marrying Lee's distinctions between individual aircraft types with the top down 3D perspective of my own *Angels One Five* game to obtain the best of both worlds, and three strands finally came together to make this dream a reality. One was my realisation when creating my ultra-simple *Fighter Duel Lite* spin-off that piles of wooden blocks offered a great way of showing a small range of different heights. A second was my rediscovery of a home made board with larger hexes than in the published edition of *Angels*, allowing multiple piles of these blocks to fit side by side. The final element was finding the free counter sets by Christian Lemoisson, which allow nearly all of the many different planes in *Wing Leader* to be shown in plan as well as side view if *Fighting Wings* counters are lacking.

My more tactical top down conversion *Fighter Duel Deluxe* already uses off-board tracks to record aircraft energy in fine detail, so it was a short step to doing the same in *Full Circle*. At first I tried having counters move 2 to 7 hexes per round as in *Fighter Duel*, but this made hexes too small to hold entire flights and required a tangled series of turn modes to reflect varying aircraft capabilities and g constraints. The breakthrough came when I realised that moves could be the equivalent of the 1 to 3 columns in *Dogfight Deluxe* and that by making rounds even shorter than the 10 seconds used in *Angels* I could replace the often intricate circling in that game with a much simpler and more intuitive system of gentle 60° or hard 120° turns. Re-purposing the tight turn rolls in *Dogfight Deluxe* allowed agile fighters at low speed to turn 120° in a single hex to escape clumsier opponents.

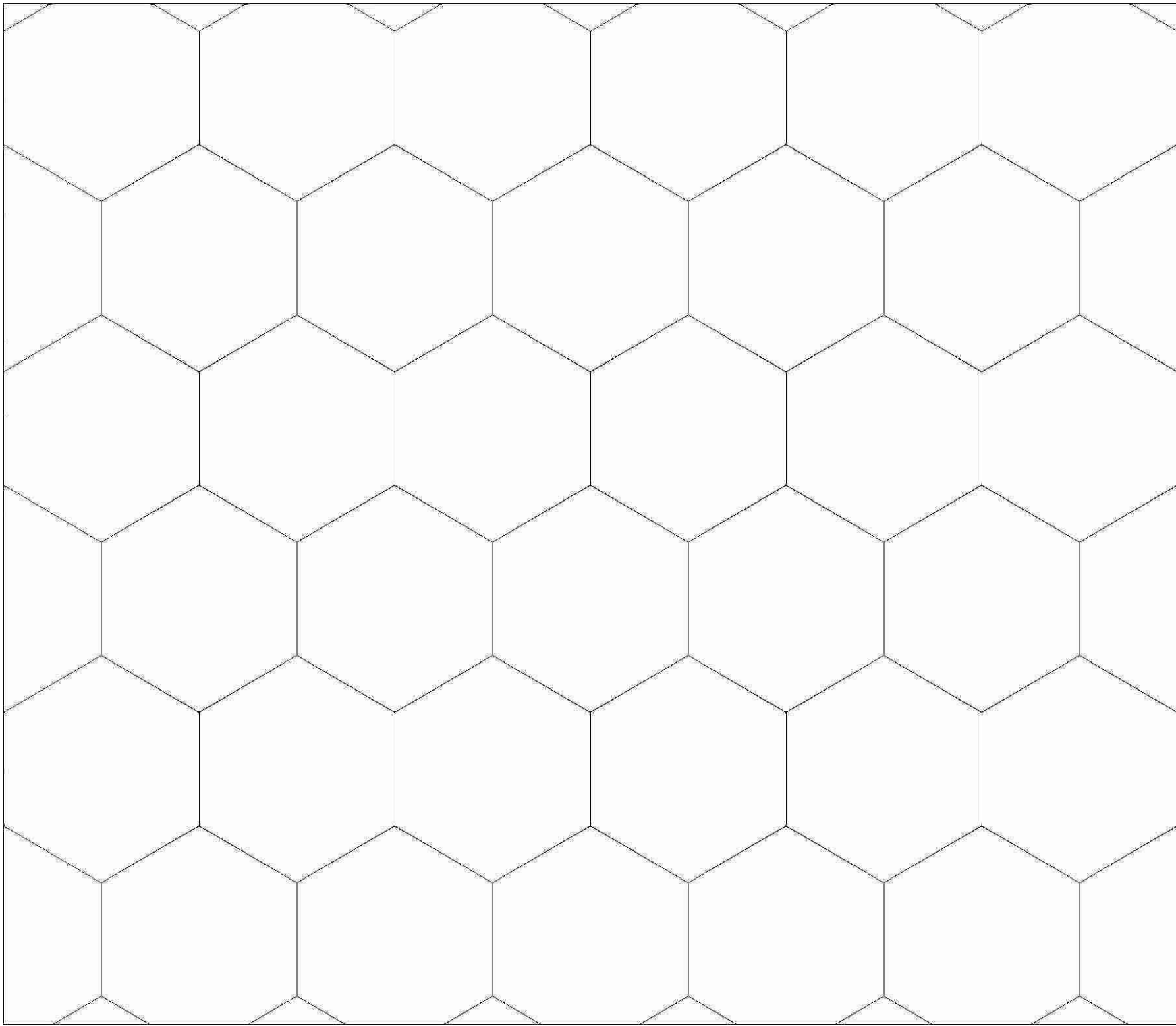
This lower resolution system brought problems of its own given my determination to retain the most-used 5 of the 8 *Wing Leader* levels shown on my side-scrolling *Dogfight* board. Having made careful calculations of kinetic and potential energy to work out how many energy points each airspeed band should contain, I had to fudge the boundary between airspeeds 1 and 2 to allow slow fighters to build up enough speed to climb an entire level in one go. Fighters often bounce back and forth across the boundary between two airspeeds, with the relative time spent at each airspeed creating an average rate of progress designed to mirror their actual maximum speed at that height. My acceleration die rolls are rather fiddly, but they give a much better reflection of how climb rates varied with altitude and across different aircraft types.

My combat system is as similar as possible to that in *Dogfight Deluxe*, with the move to 6 different headings giving a clearer portrayal of oblique attacks and making gyro gunsights easier to model. The halving of round duration compared to *Dogfight Deluxe* is handled simply by returning to a D10 rather than D6 based fire system. For simplicity, I prohibit fighters from firing at 120° deflection or if just fired on or if they wait for the bombers to fly into their hex. I make hits automatic on rolls of 10 so it is worth circling in pursuit or making fleeting deflection attacks. Lucky hits and narrow escapes can bring victory, but a surer tactic is to outmanoeuvre enemy fighters and stop them engaging effectively.

I expected beforehand that expanding *Dogfight* to a fully 3D perspective would require a significant extra overhead in rules complexity, so it was a pleasant surprise to find that I could fit the new rules into just 6 pages, one less than for *Dogfight Deluxe*. The cloud layers which look so atmospheric from a side view are now assumed to lie just above or below the playable levels, and I leave it to players to decide handicaps instead of trying to take account automatically of the nuances of scenario balance. *Full Circle* works best if used alongside an illustrated encyclopedia of WW2 planes, by offering a 3D sandbox for experiments with the many possible match-ups from biplanes to jets and from sea level to 30,000 feet

Unlike previous editions of *Dogfight*, *Full Circle* is intended to complement rather than supersede the existing version of the game. *Dogfight Deluxe* with its fewer and longer rounds plays more quickly and offers a smoother model of climbing and defensive circles. It is a better vehicle for solo play against unescorted bombers, with 3D manoeuvres limited to easily abstracted tactics such as beam attacks. *Full Circle* for its part allows more detailed modelling of the duels between interceptors and escorts, by creating a hybrid of *Dogfight* and its more tactical partner design *Fighter Duel*. It also offers a much more intuitive representation of the 3D reality of the contest than with the earlier layered lateral blocks.

Designing *Full Circle* has made me appreciate even more what a wonderful resource Lee's ADCs are to underpin the modelling of air combat at various scales across the entire period from 1936 to 1945. They are not as detailed as the full page data sheets in J.D.Webster's *Fighting Wings* games, but they offer more comprehensive coverage of the many campaigns, and their simple but well-informed categorisations are invaluable in allowing playable models of air combat dynamics. By uniting the beautiful counters from these two classic game series, *Full Circle* again showcases my approach of capitalising on existing assets in wargame design. Google 'Sabin wargames' for details of my many other recent games.



DOGFIGHT Full Circle by Phil Sabin

| Airspeed 1 | | Airspeed 2 | | Airspeed 3 | | | | Airspeed 4 | |
|-------------------|-----------|-------------------|-----------|-------------------|-----------|-----------|-----------|-------------------|-----------|
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 | 57 | 64 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 | 58 | 65 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 | 59 | 66 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 | 60 | 67 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 | 61 | 68 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 | 62 | 69 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |

Escort Energy and Status

| | | | | | |
|----------|----------|----------|----------|----------|----------|
| 0 | 1 | 2 | 3 | 4 | 5 |
|----------|----------|----------|----------|----------|----------|

Bomber Progress

| Airspeed 1 | | Airspeed 2 | | Airspeed 3 | | | | Airspeed 4 | |
|------------|----|------------|----|------------|----|----|----|------------|----|
| 1 | 8 | 15 | 22 | 29 | 36 | 43 | 50 | 57 | 64 |
| 2 | 9 | 16 | 23 | 30 | 37 | 44 | 51 | 58 | 65 |
| 3 | 10 | 17 | 24 | 31 | 38 | 45 | 52 | 59 | 66 |
| 4 | 11 | 18 | 25 | 32 | 39 | 46 | 53 | 60 | 67 |
| 5 | 12 | 19 | 26 | 33 | 40 | 47 | 54 | 61 | 68 |
| 6 | 13 | 20 | 27 | 34 | 41 | 48 | 55 | 62 | 69 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |

Interceptor Energy and Status

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|

Hits Scored and Escort Handicap

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|

Altitude Level of Step 0

| | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |

Current Round