The Dawning of the Jet Age

Rules for Jet Combat 1945-1946

David Child-Dennis

Dawning of the jet age

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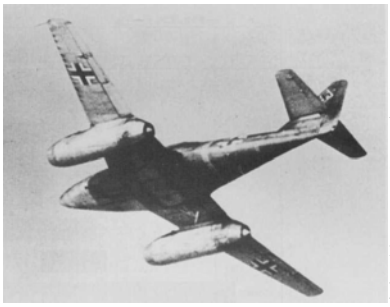
DAVID CHILD-DENNIS

Introduction

One of the great "what ifs" of the Second World War involves Germany surviving long enough to field a large force of operational jets. By the end of the war the Me-262 and Me-163 had been operational for awhile and there were many others either in the experimental stage or on the design board. Jet bombers escorted by jet fighters were certainly not out of the question if the war had gone late into 1945 or early 1946.

But the Allies weren't exactly unprepared either. Several of their jet designs were approaching the operational stage and could have set the scene for some fascinating jet battles over Germany. P-80s escorting B-29s that are intercepted by a variety of German jets is just one of the many scenarios that these rules will allow you to simulate.



Dawning of the Jet Age allows gamers to recreate these hypothetical battles as Allied jets try to counter the German jet fighters already in operation. Like many other games in this series, these rules are designed for a fun and fast game as the basic rules are only a few pages. Gamers should be able to grasp the concepts and be flying in no time at all and the system can also work for large, multiplayer games.

Feel free to add additional rules, jets, or other WW2 prop driven aircraft to your scenarios. The rules are flexible enough that a little more complexity can be added without loss of playability or more time needed to finish a game.

Set Up

Dawning of the Jet Age is designed for 1/600th or 1/300th miniatures, although 1/144th can be used by doubling all measurements.

Print and cut out all of the templates needed to play the game, plus you will need some six sided dice for various rolls during the game. It is a good idea to laminate the templates or print them on cardstock as they will be used quite often during the game. It is also a good idea to produce multiple copies for a number of players to help speed things up during play.

You will need a large mat or surface that will enable the players to maneuver multiple jets on the play area.

Inside this issue:

Design Credits

- *Designer: David Child-Dennis*
- *Layout: Matt Irsik*
- *If you have questions or comments, please email the designer at:*

davidchild@slingshot.co.nz

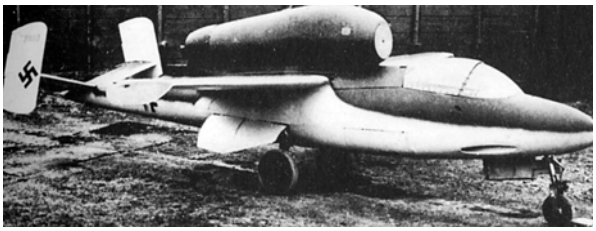
Sequence of Play

Each turn in Dawning of the Jet Age follows a strict sequence of play. Players should go through each phase of the turn in order as listed below to complete one full turn.

1. Place the movement counter face down beside the model aircraft.
2. Place the altitude indicator (red or green) face down beside the aircraft model.
3. Turn counters face up.
4. The fastest aircraft moves first.
5. A following aircraft moves last – regardless of speed.
6. All gunnery takes place.
7. Check for aircraft damage.
8. Bail out if necessary.

Movement

Early Jet engines operated at their best performance around 20,000 feet and above. Therefore, as jet combat would have usually taken place at anywhere between 20,000 to 40,000 feet there needs to be a significant variation in the amount of manoeuvreability at various altitudes. At 20,000 feet, most jets were fairly agile, but as the altitude increased beyond about 27,000 feet, the rate of turn seriously declined, until the aircraft took many miles to turn a complete circle. Thus I have used two separate turning circles (green for up to 25,000 feet and red for above 25,000 feet.) to accommodate this problem.



The turning circles are divided into segments, each containing a number. Aircraft may turn through a listed number of segments depending on their perceived maneuverability. The number in each segment is the movement cost in centimeters to move through that segment. Each cost is cumulative. As a player moves a model through each segment, the cost of movement is deducted from the total movement allocation for that aircraft during that game turn. This also reduces their airspeed! The remaining airspeed after completing the turn is simply calculated by subtracting the amount of turning movement from the initial airspeed when the turn began. It is important players make provision for the loss of airspeed when turning, by increasing their airspeed as they enter the turn, just as a jet pilot would have done at that time.

When turning a model aircraft, the player moves it sequentially through each sector of the turning circle until they have reached the desired angle of turn. As the model is turned through each sector, it moves forward the amount of movement allocation shown in the sector, before entering the next sector and repeating the turning cycle. Players will note that the value of the numbers in the sectors decrease as the rate of turn increases. This is to simulate the fact that most turns are a 'tightening cork screw' as aircraft progress through the turn. It is this 'cork screw' movement that is an important aspect of this movement system. Players must also remember that jets of this period lost considerable amounts of airspeed in a tight turn, therefore the minimum airspeed of 5 centimeters must be avoided to prevent stalling.

Example

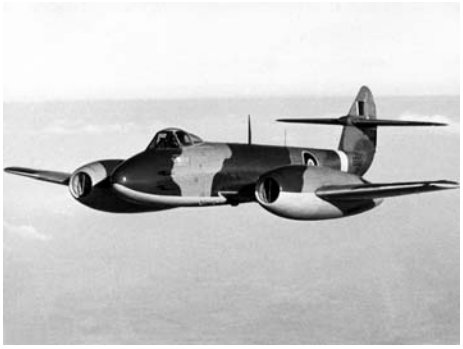
A Vampire within the 'green' altitude turning circle is moving at 25cm and the player wishes to turn through three segments of the turning circle. The model is aligned with the red arrow at the top of the turning circle and then turned 'to face' into the first segment of the circle. It does not matter where in the sector the model is pointed, as long

Movement (cont.)

as it remains aligned with the boundaries of the sector. The player then moves the model 10 centimeters forward from his starting position. Without changing the original heading direction of the turning circle, the player repositions the model into the second sector and moves the model 8 centimeters forward. The total expenditure of movement in completing the turn is 18 centimeters with a balance of 7 centimeters remaining. This means that the Vampire cannot complete the third sector of the turn, due to entering the maneuver with insufficient airspeed. The model is then moved forward the remaining 7 centimeters in a straight line. At the end of this move a speed marker showing '7' is placed beside the Vampire. Thus the aircraft has entered the turn at 25 centimeters and existed the turn at 7 centimeters. This only allows the Vampire to accelerate to 14 centimeters in the following move… making it very vulnerable in combat.

An easy way of achieving the turning movement of models is to place the turning template under the model base when beginning the turn, making sure it's correctly aligned, and then measuring each sector move in relation to the original placement of the template. This will mean moving the model off the template in the first part of the turn, but as long as the model's movement remains in relation to the template sectors, movement is simple and quick to accomplish.

Aircraft may never exceed their maximum movement allocation and every model must make a minimum move of no less than 5 centimeters each game turn or face stalling or crashing. Stalling an early jet aircraft was usually fatal!



Aircraft speed may be increased by up to twice the current movement rate up to the maximum permitted, or decreased by half of the current movement rate. Increasing altitude from green to red zones will cost half the aircraft's maximum movement allocation. Decreasing altitude will cost no movement allocation.

Maximum Aircraft Movement Rates

German

Me 163 50cm

Me262 50cm

He163 50cm

Ho229 50cm

Ar 234 40cm

Allied

Vampire DH100 50cm

Meteor Mk3 40cm

Lockheed P80 50cm

B17 and B24 20cm

May only operate in the green zone

B29 30cm

P51C and P47D 40cm

May only operate in the green zone defending bombers

Aircraft operating at above 25,000 feet use the red turning circle and will be restricted to the following movement options:

At over half maximum movement rates – aircraft will be allowed to turn through only one movement segment per game turn.

At up to half maximum movement rates– aircraft will be allowed to turn through up to three movement segments.

Aircraft operating up to 25,000 feet use the green turning circle and will be restricted to the following movement options:

At over half maximum movement rates – aircraft will be allowed to turn through up to two movement segments.

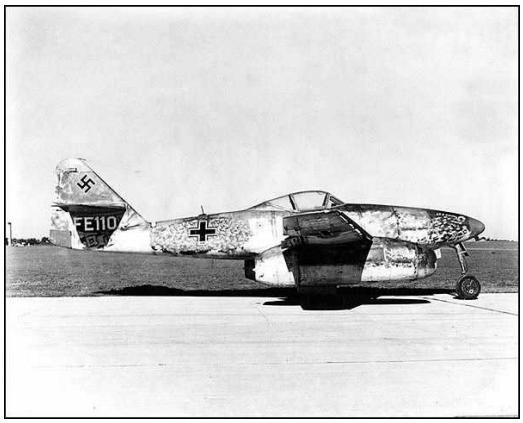
At up to half maximum movement rates – aircraft will be allowed to turn through four movement segments.

Climbing between altitude bands

Jets may climb between altitude bands as required each game turn. They may not change between one altitude band and then back to another in the same game turn. When climbing between altitude bands, it will cost the aircraft half of its maximum normal movement allowance to do so. If the aircraft is moving too slowly to expend this required movement distance, then no altitude band change will be possible. Therefore, a Vampire wishing to climb between altitude bands must have a movement rate of 25cm before it may attempt to do so. No extra movement is expended when aircraft descend from the red into the green altitude band.

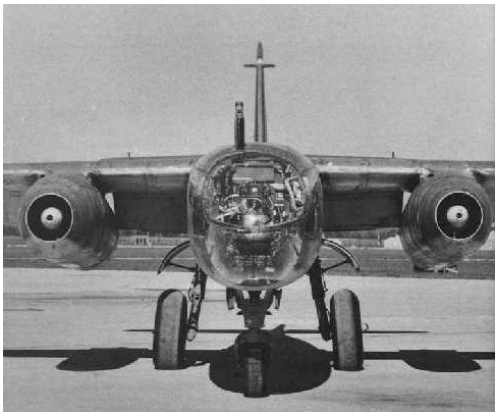
Combat

Gunnery



The gunnery template is designed to achieve two important factors in air combat. The angle of attack and the degree that angle reduced the accuracy of the firing aircraft. The firing player checks to see their model is within gun range (maximum 15cm measured center-to-center of the aircraft bases) of the target aircraft. The gunnery template is placed over the center of the target aircraft and the red arrow is aligned to the direction of movement of the target aircraft. Provided a 15cm line drawn down the center line of the attacking aircraft to the target aircraft crosses the target aircraft at any point, the attacking aircraft may fire at the target aircraft.

The gunnery template has a number of sectors with red and green numbers in each. The red numbered sectors indicate the target is being engaged head on. The green numbered sectors indicate the target is being engaged from the side or rear. Each number represents the penalty subtracted from the firer's dice roll to simulate the difficulty firing from each sector. There are no direct penalties for range given that firing was relatively close and the closing speeds between target and firer are usually high. However, the dice rolled by the target aircraft gives a random factor that takes into account ranging errors and target manoeuvre to avoid being hit.



'Tailing' aircraft

Aircraft that begin their game movement from within 20cm of the target aircraft and are within the green sectors of the gunnery template, may claim to be the 'tailing aircraft'. They therefore move after the target aircraft.

Hitting the target

The system is a modified opposing dice roll off between firer and target. The firer rolls up to three dice, the highest single dice roll being selected, while the target rolls one dice.

20mm and 30mm cannon armed fighters roll THREE DICE.

.50 caliber and machinegun armed fighters roll TWO DICE.

USAF and RAF heavy bombers firing in their defense roll TWO DICE.

All other medium and light bombers roll ONE DICE.

Once the dice rolls have been made and adjusted for any penalties for the angle of attack, the highest dice roll is the winner. If the target manages to out score the attacker, they have successfully survived the attack. If the attacker managed to out score the target, they have hit the target. The lower dice roll is subtracted from the higher to give the minimum dice roll required for the target to survive the damage. In order to survive the target player must roll equal to or better than the required score. Aircraft that fail to survive an attack are shot down and immediately removed from the game.

Example

A Vampire closes in from the 'green' –1 sector on a Me163 'Comet'. Once within range the vampire player rolls three dice ('2', '3' and '6'). The vampire player selects the '6' dice roll and discards the remainder. The vampire player then reduces his dice roll for the gunnery sector penalty (-1) and his dice roll is now '5' to hit and damage the comet.

The Comet player is now obviously concerned and prays for a dice roll of better than '5'. Unfortunately, luck deserts him and he manages to roll a '1'. The difference between the two dice rolls is '4'. The German player must roll '4' or better to survive the hit. He rolls a '3'…. The Me163 immediately explodes with no hope of survival for the pilot…

A New Era Begins in Jet Combat

The introduction of the jet into operational service was a long and intricate process. Materials that had been used previously, had to be re-evaluated, and in many cases redesigned. Probably the most remarkable aspect of airframe construction was the continued use of wood laminates to form a plywood fuselage for the Vampire. The Germans, desperately short of strategic metals, namely tungsten and high-grade steels, even managed to produce compressor blades from wood. I'm unsure as to the species, but because air at high speed is an abrasive liquid, the leading edges of the blades became damaged through abrasion after only a few hours use and required replacement. This may explain some of the conflicting reports about jet performance from German sources.

Jet engines operate in cold air and higher altitudes much better than low-altitude, warm air. The reason being that cold, dry air, compresses more rapidly than low altitude wet air. Water retards the compression process. Modern turbofans have largely overcome this problem and are even able to operate in very high loads of water intake. But, early jet engine performance was degraded in severe wet weather, as is common in Europe.

The average jet could very quickly reach 450+ mph in level flight and 550 + mph in a shallow dive. This presented two major problems. The first was compressibility. Wing, and to a lesser extent, fuselage design was dictated by the undercarriage and gun bay requirements. This resulted in thick wing sections and rounded bulging fuselages. Thus, as the aircraft approached the speed of sound – 750mph at sea level – it became increasingly more difficult to control. Pilots were continuously warned against exceeding a specified 'mach' number, to prevent the loss of control of the aircraft and possible structural failure. Readers might like to compare the design of a modern fighter like an F16 with that of a Me262 or Vampire. The difference in gun and undercarriage placement is obvious.

The second problem – and probably the most important to solve – was getting the pilot safely out at high speed, once the aircraft was damaged. The Germans were the first to introduce an ejection seat, powered by a 30mm cannon cartridge, fired from beneath the pilot's seat, which was fitted to a sliding rail. The resulting detonation, forced the seat up the rail and out of the cockpit. It appears this was somewhat of a dramatic event, which often led to severe spinal bruising. But, it was much preferred to attempting to climb out of a cockpit at 500mph in the hope you could clear the aircraft and safely open the parachute, without hitting the tail-plane.

But what were the advantages of the early jets? The first and most important was their ability to operate at up to 45,000 feet altitude. From mid-1944, the Arado 234 bomber could operate above the maximum altitude of the best piston engine fighters (the P51 and Tempest) and the Allies realized it was only a matter of time before the Luftwaffe would produce a strategic jet bomber more capable than the B29. In essence, the B29, while being the most sophisticated piston engine bomber in the world, when designed in1942, was essentially obsolete by 1944. The entry of the MiG15 into the Korean War during 1951, quickly demonstrated, even the most sophisticated piston engine bombers, could not survive against enemy jet fighters, without themselves having jet fighter escort. The jet fighter forced a major rethink among strategic planners, and ultimately led to the introduction of the ICBM.

Even though there was no recorded jet-to-jet combat during the Second World War, there remains a great fascination with both historians and gamers alike, as to what would have been the likely outcome, of such an engagement. I hope these rules may give gamers such an opportunity.

These rules are primarily designed for jet-to-jet combat, but can be successfully used in a scenario where Luftwaffe jets engage the USAF daylight raids occurring in 1945. The bombers should be either B17's, B24's or B29's. A bomber flight should consist of 3 models. Piston engine fighters are one model to one actual aircraft. On the practical note of basing aircraft, I have found the small flying bases produced by Games Workshop to be excellent for fighters and the large flying base for bombers. The benefit of using these bases is that they are clear plastic and allow players to see turning circle and gunnery templates through them.

I have restricted the jet aircraft to those that either did enter active operations or could

A New Era Begins in Jet Combat (cont.)

reasonably have been expected to do so by May 8th, 1945.

Germany

Me 163 'Comet'

Me262 'Swallow'

He162 'Volksjaeger'

Ar234 'Blitz'

Ho229 'Flying Wing'

Allied

Vampire DH100

Meteor Mk3

Lockheed P80 'Shooting Star'

Optional Rules & Aircraft Information

The early jets were much less reliable than their piston engine counter-parts and represented a real danger to their pilots. The German jets, although the first to enter operational service, were plagued with engine failure due to the severe shortages of suitable metals.

Me262 (JG7 and JV44)

The main difficulty for this aircraft was a tendency for the cannon to jam under high 'G' loads. To reflect this problem, any gunnery dice roll of '1' means one of the guns has malfunctioned. The player must remove their highest gunnery dice roll and replace it with the next highest.

He162 (III/JG1)

While these aircraft were easy to fly once airborne, they were difficult to take off and land due to the poor performance of the BMW003 engine. One structural weakness was the tail section, which could be broken off the fuselage in a tight turn during combat.

November 1946 - Disregarding advice from Eric "Winkle" Brown of the Fleet Air Arm (FAA), to treat the rudder of the Heinkel He 162 with suspicion due to a number of in-flight failures, RAF pilot, Flt. Lt. R. A. Marks, starts a low-level roll during the Farnborough Air Show, one of the fin and rudder assemblies breaks off, the aircraft crashes before the ejection seat could be employed, killing Marks.

To reflect this problem, the He162 can only be turned safely through 2 sectors at over half maximum speed. If a player attempts to make a tighter turn, they will take a structural failure test dice roll. A '1','2', or '3' and the tail fails and the aircraft is immediately lost. The He162 had an efficient ejection seat (the first in an operational jet fighter) that allows the pilot to escape with a single dice roll of anything but a '1'

Me163B (JG400)

Anyone that flew one of these aircraft was expected to have a very short flying career! They were not only extremely dangerous to fly, but ground crew, and especially re-fuelers, needed to be protected with special rubberized suits. Contact with the skin by even minute amounts of fuel immediately resulted in serious burns causing the skin to literally melt! From Luftwaffe records it appears that there were only eleven of these aircraft operational at any one-time. Any Me163 that suffers combat damage is an immediate loss – no dice roll required. The pilot cannot bail out. When landing, the player must roll a single dice to achieve a safe landing. A '1' results in the loss of the aircraft due to explosion, often caused by unburned fuel igniting with the jolt of landing or an electrical static discharge.

Ho229 (Horten flying wing)

Although first being test flown on 2nd February 1945, this aircraft proved to be the most radical and advanced of all German jet aircraft of the Second World War. The first prototype was lost through engine failure, which in itself, did not reflect on the design. Had these machines progressed into operational service, which could have been as early as May 1945, they would have proven to be a formidable opponent. Even from the limited amount of testing that was completed before the American Army overran the Horten manufacturing plant at Oranienburg, it appears the Ho229 was a quantum leap ahead of anything the Allies possessed or were in the process of designing.

WFHGS

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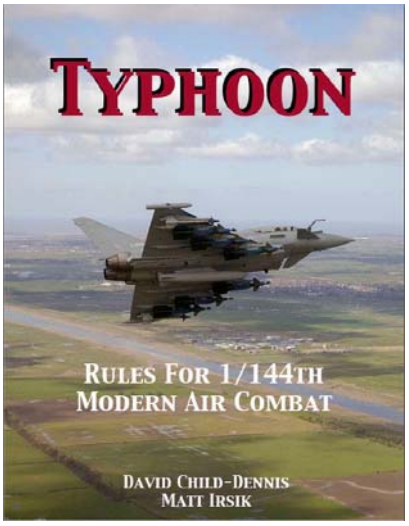
This is another in our series of introductory wargames and others such as the titles listed below are available to download. Dawning of the Jet Age represents a transitional period of air combat, but still very much a WW2 approach in game terms. Yes, the aircraft move faster, but it was still basically WW2 type weapons and tactics. This system should allow players to quickly get into the game and use models that you usually won't find on the tabletop! Although this is a very hypothetical set of rules, the jets portrayed in the rules did fly and several saw combat towards the end of the Second World War. If the war had gone on through the rest of 1945 and into 1946 it would have been a very different picture in the skies over Europe with both Allied and German jets dueling it our for aerial supremacy. Hopefully this set of rules is well received and there is always the possibility in the future of adding more experimental aircraft, scenarios, and additional rules to explore this fascinating era.

Other Air Combat Miniatures Rules

If you've enjoyed Air War-Vietnam there are several other sets of air combat rules that can be downloaded for free. Go to the Downloads section at www.wfhgs.com to learn more.



Quick play rules for modern air combat using 1/144th scale aircraft.

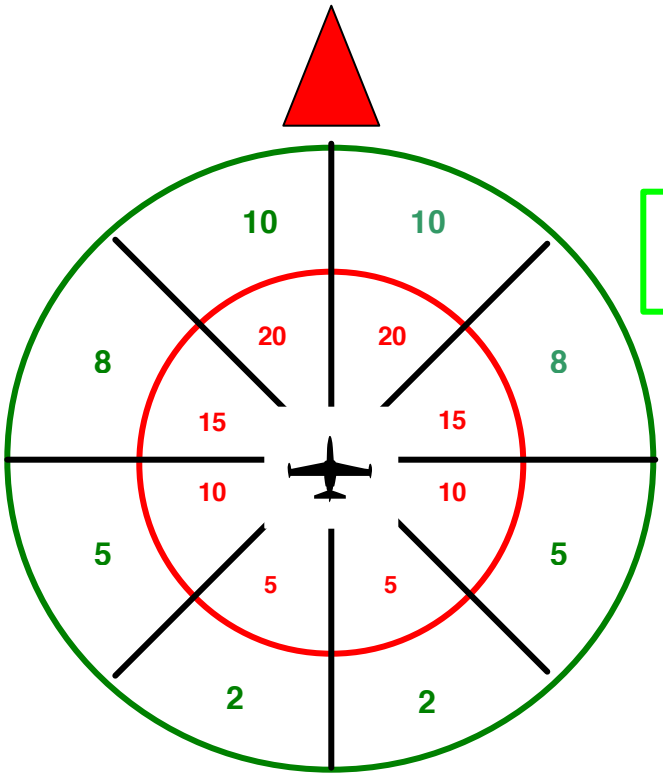
Using the same system as Air War-Vietnam, but for the Korean air war. Another in the series of introductory level air combat rules that give a quick game and is suitable for almost any scale of miniatures.

Operational level game simulating one day in the Battle of Britain for use with miniatures. Suitable for beginners and large groups.

Dawn of the Jet Age
March – May 1945

Turning Circle

Red Turning Circle
Altitude over 25,000 feet



Green Turning Circle
Altitude up to 25,000 feet

Movement Rates

German

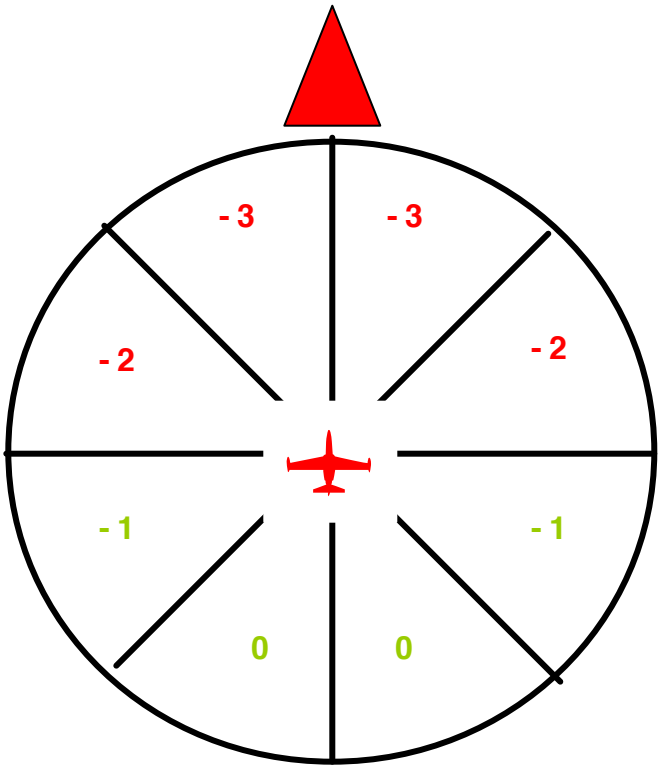
Me163B 'Comet'	50cm
Me262 'Swallow'	50cm
He163 Volksjaeger	50cm
Ho229	50cm
Ar 234 'Blitz'	40cm

Allied

Vampire DH100	50cm
Meteor Mk 3	40cm
Lockheed P80	50cm

- Movement rates can be doubled up to maximum permitted speed, or halved to slow aircraft.
- It costs an aircraft HALF its full movement rate to climb between the green and red altitude zones.
- ADD the number in each movement sector to give the total move distance expended when turning.
- Move the amount shown in each sector directly forward after turning into that sector

Dawn of the Jet Age
March – May 1945



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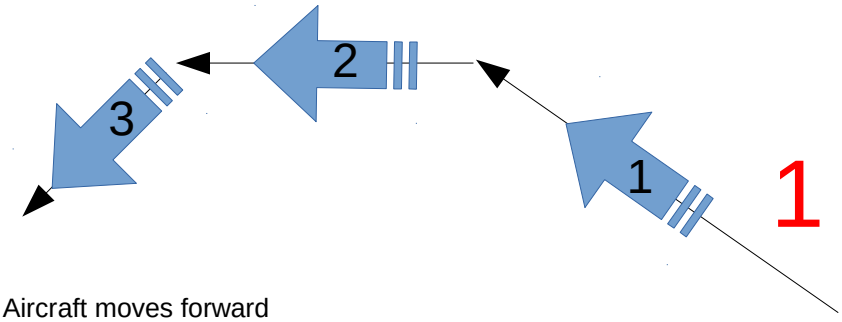
47	47	47	47	48	48	48	48	48	49	49	49	49	49	50	50
50	50	50													

Aircraft Model Turning Diagram
Green Circle up to 25,000 feet

2 Model moves forward 15cms then changes heading to begin third segment of turn.



1 Model moves forward 20cms then changes heading to begin second segment of turn.

3 Aircraft moves forward 10cms and remains on this heading to complete the third turn segment.

Note the corkscrew movement effect as the aircraft loses speed, due to early engine technology and the absence of afterburners. The total amount of movement allowance expended is 45cms, which is close to the maximum move allowed for the faster aircraft.

It's important players place a new movement counter, at the end of the move, showing the aircraft has slowed to 10cms from the original 50cms with which it entered the turn. During the next movement segment, the aircraft can increase it's speed to 20cms (double the speed it finished the turn), provided it does not turn. The aircraft has insufficient speed to continue turning.