STARFLIGHT: SPECTRUM of MOTION

Scaling on the Fly

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A ship comes in at high speed and another ship begins firing against it. They launch fighters that begin battling each other and performing strafing and bombing runs on the larger ships over, under, and along their sides. One Assault Scout performs a maneuver, avoiding rockets in which he changes his vector while firing at one of the larger ships, doing substantial damage. The fighters move from hangar to fast-moving space combat to entering atmosphere, carrying on atmospheric dog fights, then strafing anti-aircraft guns, and then conducting drops of soldiers and robots who now do battle on the ground against each other and the vehicles, all the while transferring the scale of proportion, movement, and turn time.

Author's Note: This article was presented in an experimental state in issue #6 of the Star Frontiersman. Since then, I have changed the scales and added specifics about how to manage the turn times between scales along with a hex map. The 3-D information originally mixed in with that article I decided to revisit in its own article to keep the information focused and easy to absorb. I am reintroducing the scaling aspect of that article here with fixes that help make these rules playable and fun. This article was thoroughly re-examined and playtested. I can attest to its accuracy and ease of play.

There are 3 things that a game needs to simulate realism in space flight: scale, vector, and dimension. The latter two subjects will be covered in detail in later articles and a whole new aspect will be added to your game. These articles will teach you how to carry on great adventures that put you in the action.

The following system bridges movement between ground combat and spaceship combat. This system gives you options. If you think 60,000 km hexes and 10 minute turns is ineffective or unrealistic for battle, then choose one of the scales in this article. You may also use this scaling system to simulate reentry, take-off, and landing procedures.

KNIGHT HAWKS LIMITATIONS

Imagine, if you will, a 10,000 km wide area. That's an area half again larger than the diameter of Mars. This is the traditional single hex in the Knight Hawks game. The problem with that preset scale is that space fighters and many other space vehicles cannot operate effectively in the 10,000 (1 hex) to 100,000 (10 hexes) km range. This artificially limited fighters, reducing their effectiveness. The only weapon they're effective with at that speed and distance is a massive assault rocket, which is essentially a small nuclear warhead. For a fighter, it's like rolling a bolder at your enemies. It packs a punch, but none of the precision of close quarters combat. Forget about hitting another fighter at that range with a laser pod. Might as well try pinning a fly to the wall with a needler pistol.

A real fighter could easily slow down, turn, dodge artillery, and dogfight within a 10,000 km hex, or even just 10 km. However, in Knight Hawks, a fighter acting in such a way would be a sitting duck waiting for destruction. A fighter strafing a large ship should be extremely difficult to hit due to its speed in relation to the defending ship's weaponry. At long ranges, every weapon should have some difficulty fragging a fighter that's essentially a spec of dust on the wind.

A fighter should be able to perform surgical strikes, striking specific systems that larger vessels would not be able to target. They should fight other fighters at much closer ranges than 10,000 km and battle in space or planetside. To do this, a movement scale is needed.

SLIDING SCALE

Using the Scaled Movement table on the next page, 10,000 km hexes are the largest scale (scale 8) for 12.8 minute turns, (or the Knight Hawks scale for 10 minute turns) which should be reserved for only the largest ships. The smallest scale is 1 m for a hex in 6 second time scale for characters on foot. (Double the movement rate for characters when using scale 1. Otherwise, use one of the Alpha Dawn scales.) 6 seconds is more than enough time to take action and conduct battle at the smaller scale

by creatures and machines of human-equivalent capabilities and size. These are the two extremes. One is very, very fast, while the other is very, very slow movement.

Other scales are provided on the Scaled Movement table. Use this table and the Scaling Map at the end of this article to change scale as needed throughout your game. Using this scale will allow you to perform combat maneuvers that have previously been unavailable to you for all vehicle types.

MAPPING

Graphic maps become irrelevant when changing scale, so use non-graphic hex maps, such as the Scaling Map at the end of this article (You may use a computer program with hex scaling that allows you to change hex size in relation to the background graphic). These allow you to change scale without the distraction of strange props.

It is recommended that you have one map for each vehicle or ship. The Scaling Map at the end of this article is made specifically for changing scale around a ship on the fly. Keep a primary map for space flight or ground combat, but use the attached sheet for lower or higher scales on that map.

The scaling map is in the shape of a larger hex with smaller sub-hexes so that you can get a quick idea of where one ship is on the current scale in relation to a ship on a smaller or larger scale. The Scaling Map also comes with a list of reminders allowing you not to need to reference this article.

Changing scale on the fly is as easy as 1-2-3. Just choose the scale you want, then continue your ADF and MR on the new scale. Continue combat for that turn on the scale at which you started. You begin the combat turn for your new scale in its next turn.

CHANGING SCALE

To use the Scaled Movement table, choose a hex size or speed and use the correct scale for that movement as you note the new turn time. The speed should fall within at least a 1 hex movement for that scale. Each turn time on the Scaled Movement table is labeled with a likely application, such as Character or Spaceship to make scale choice easy.

Example: *To travel 4,200kph, a jet or spaceship must move at 3 hexes per 3.2 minute turn on scale 6. If traveling at 3 hexes per turn on scale 4, the aircraft will be traveling at 225kph.*

You may double the size of the hexes and double the speed traveled instead of the printed hex sizes and speeds on the table. (Do not adjust the turn times.) For example, Scale 1 would be 2m hexes at 1.2 kph per hex traveled.

Depending on distance traveled, closeness of vehicles and vessels, and the limitations on reaction times and weapon ranges, scaling must change to accommodate the circumstances. A rule of thumb should be that turreted weapons attacking HS 1 or smaller units may only do so on scale 4 or smaller, and only on the scale the target is moving, unless the target is not maneuvering. Units not maneuvering or not moving in a direction provoke attacks of opportunity on any scale. On the other hand, targets moving within one hex of the attacker provide a -10 modifier for each hex of speed that the target is traveling when moving through that hex.

Scaled Movement

Scale	Min/Max Size†	Turn Time	#Turns‡	Hex Size (km)	kph/Hex	Recommended Combat Level
1	None	6 sec	2	1 m	.6	Character
or AD 1	None	6 sec	2	2 m*	1.2	Character
or AD 2	VS 1/VS 2	6 sec	2	5m	3	Character
2	VS 1/VS 3	12 sec	2	10 m	3	Mount/Slow Vehicle
3	VS 1/VS 4	24 sec	2	100 m	15	Aircar
4	VS 2/VS5	48 sec	2	1 km	75	Jet Copter
5	VS 5/HS 5	1.6 min	2	10 km	375	Jet Fighter
6	HS 3/—	3.2 min	2	100 km	1,875	Space Fighter
7	HS 5/—	6.4 min	2 (1.5)	1,000 km	9,375	Spaceship
8 (or KH)	HS 20/—	12.8 min (10 min)	—	10,000 km	46,875 (60,000)	Starship

† Minimum/maximum hull size to benefit in combat at that scale. VS (vehicle size) 5-8 equals HS 1.
‡ Number of turns compared to next scale up.
* Accelerate by only 5 hexes to get to scale 2.

You may change scale when any vehicle or spaceship slows to under 2 hex movement or increases to more than 4 hex movement on the current scale. If the ship slows below 1 hex movement or above 9 hex movement on the current scale, it must change scale. This is important when you want to determine what is going on within a single hex and don't wish to turn ships into stationary targets or you are in danger of losing track of ships off the edge of the map. When there is more than one pair of ships in combat (one for each opponent), scale will change frequently and you may need more than one set of maps to express battles going on in other parts of the larger scale. You must declare that your ship is changing scale within a hex when slowing below 1 hex movement or it is considered stopped.

For an easy-to-play game, Just let the scale take place. These rules focus on ease of play. A later article will discuss g-force ratios per scale. For now, you may double your ADF for each scale below 8. For instance, if your ship has an ADF of 3, then it has ADF 12 on scale 6 (3 x 2 x 2). For this reason, the ADF doesn't really matter much below scale 7 for classic Knight Hawks movement, except as it affects a maneuver.

If movement slows to below 1 hex on the current scale, the vehicle may still be moving on a lower scale and visa versa. When slowing to a lower scale, continue the maneuver on the lower scale's turn using the Scaling Map to represent the last hex of reduced movement on the previous scale. You are now moving at 4 hexes per turn on the lower scale (5 minus 1 to represent a speed slower than 1 hex on the higher scale). Then use any remaining ADF to make further speed adjustments on the lower scale starting with a hex at the edge of the large hex (or any relative hex on a larger hex map). Continue to track movement on the higher scale when you move past 5 hexes on the lower scale. You may also change scale when traveling at 2 hexes. You will now be moving at 9 hexes on the lower scale.

Example: *You are traveling at 4 hexes per turn on scale 7 and your ship has an ADF of 5 (ADF 10 on scale 7). You choose to slow down by 4 hexes on the current scale, but wish to continue to move on a lower scale. You are now traveling at 9 hexes of movement on scale 6. You have 1 ADF left to spend in this turn and you want to slow down a little more, so you slow to 5 (-5 = 1 x 2 x 2) hex movement on scale 6 (525kph). Then your turn ends.*

When speeding up to a higher scale, there is no need to add or subtract hexes of movement for the next scale. Simply apply 1 ADF to begin movement during the larger scale's turn on the scale you choose, starting with a hex at the edge of the large hex (or any hex representing the lower scale on a larger hex map), unless it is determined that another ship has a chance to attack while your ship is accelerating; then you must accelerate through that ship's line of fire on the scale that the ship can have a firing solution in.

Example: *You are traveling at 7 hexes on scale 3, and you want to increase your speed by 1 hex on scale 5, then you simply start moving at 1 hex on scale 5, though it is considered a speed increase of 10 hexes on scale 3 or 5 hexes on scale 4.*

When you increase or decrease the timeframe in which to act, how fast the ship is allowed to maneuver within that time also maintains importance. Thus, there is no adjustment to maneuverability.

You may move into the hex of an enemy ship so long as you slow to below 1 hex movement on that scale when you reach that hex and move down one scale. If the ship being approached already has a position on a lower scale, use its position on that scale to determine where you come out of the higher scale in relation to it.

TURNS

Actions become easier or harder as you slow down or speed up because of how fast you travel in relation to other objects, known as relativity. This scaling system relies upon relativity rather than a precise change between scales. Thus, between scales there is a substantial difference in time. For this reason, when operating multiple scales of movement and combat, you must track the time and occupy it more specifically for larger scales. The listed turn times are due to reaction times of the vehicle/spaceship at the speed shown. Each scale uses 2 turns for each turn on the higher scale. For example, scale 5 plays out 2 turns for every 1 turn on scale 6, while scale 3 plays out 8 turns in that time.

So if you are operating combat between faster and slower ships, there is a realistic trade-off of effectiveness. The slower ships can attack more frequently but are bigger targets and have less preparation time between attacks, while the faster moving ships will attack less frequently, but also less accurately, and you will be able to utilize the time between attacks more effectively. The time between attacks for faster moving ships can also be used as role-playing opportunities. However, as long as a ship moving on a lower scale is operating within a lower scale's in relation to the turrets on a ship on a higher scale, those turrets may attack on the lower scale.

When there are shorter turns between each longer turn, damage is tabulated for the longer turn at the start of the next turn on the lower scale. However, continue to follow the rules for damage control for Knight Hawks on every second turn on scale 8.

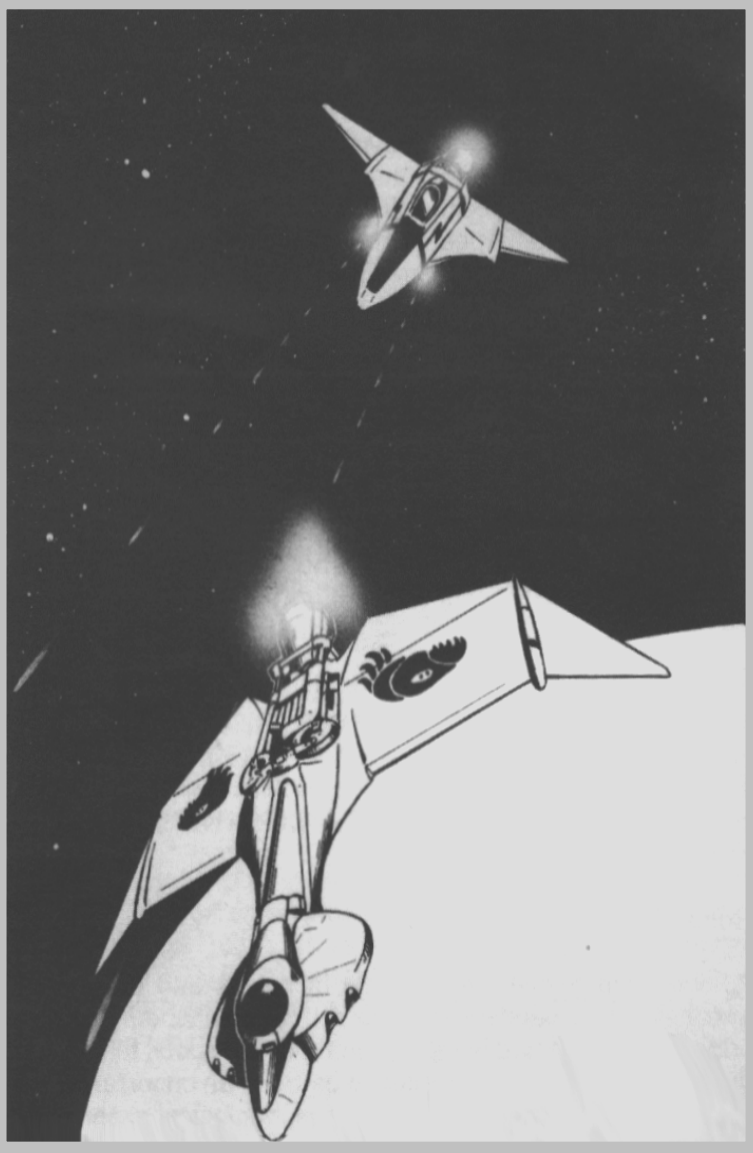
Turns do not change except as they are affected by distance traveled. Things that take 1 round to resolve on one scale take 2 rounds to resolve on the next lower scale. You may choose to divide actions according to a lower scale in order to make sure they are resolved more quickly on a higher scale.

The closer ships are to each other, the faster the action takes place and the more frequently damage happens and the harder it is to avoid damage. So there is no significant difference in how combat is handled between scale 6 and scale 3 (or any other scales) except as affected by reaction times per the discretion of the Referee.

The Referee may also choose to let combat be unaffected by a change in scale. Firing solutions are based upon the speeds of ships and their distance away from each other. When they are closer and slower moving, they will have a faster firing solution, thus, no matter what scale, attacks and counter attacks can still occur every round. However, DCR must still be resolved as described above, making closer, faster combat more deadly.

You now have everything you need to change scale on the fly with these rules. I hope you will now enjoy scaling on the fly in your Knight Hawks and Alpha Dawn games. To discuss this article, go to mystarfrontiers.blogspot.com. ❖

Tip: Ignore the length of turns. All you need to know is that there are 2 turns on the current scale for every turn of the next scale up.



SCALING MAP

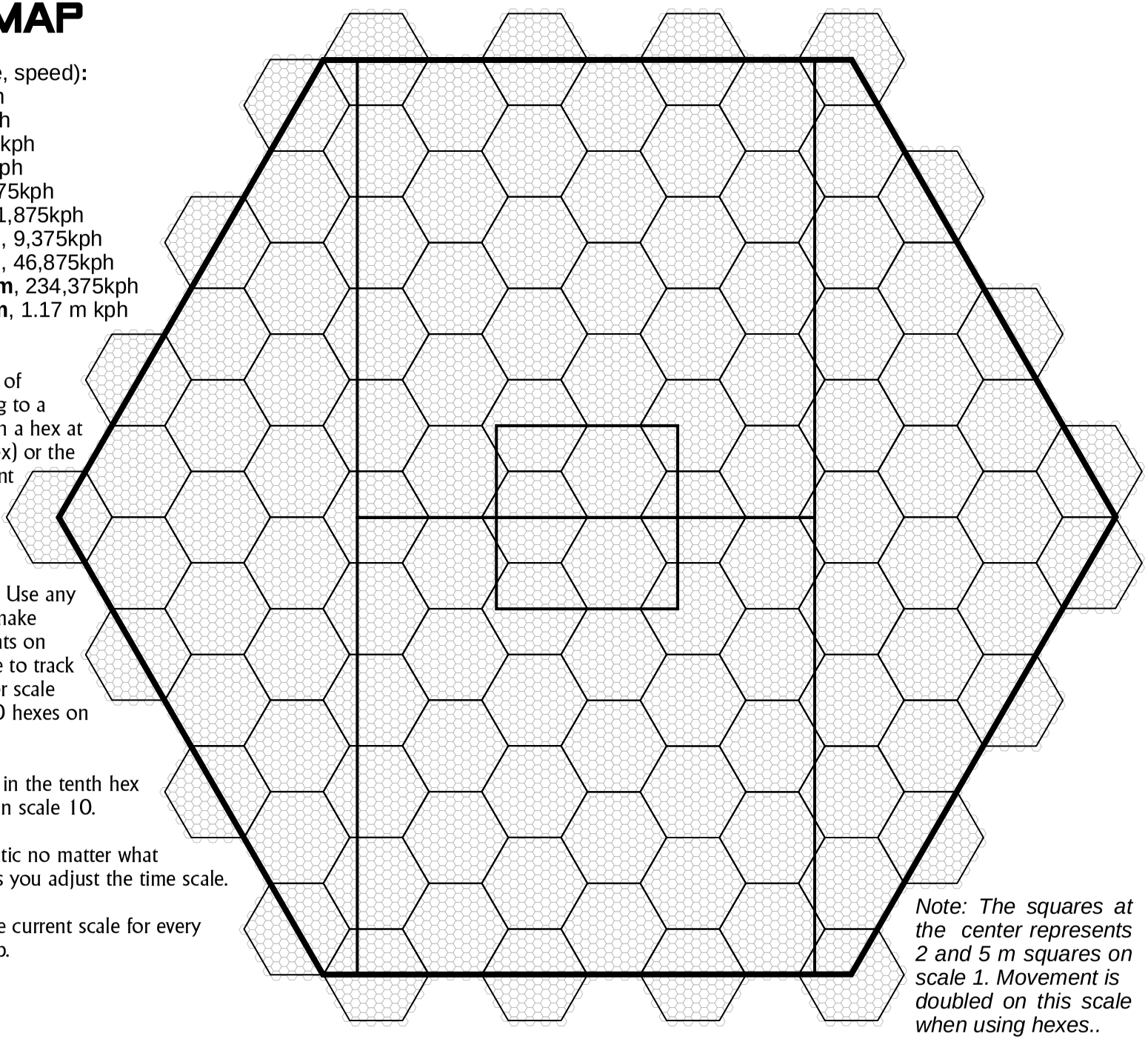
Scale (Turn, hex size, speed)**:**
1 – 6 sec, **1m**, 0.6kph
2 – 12 sec, **10m**, 3kph
3 – 24 sec, **100m**, 15kph
4 – 48 sec, **1km**, 75kph
5 – 1.6 min, **10km**, 375kph
6 – 3.2 min, **100km**, 1,875kph
7 – 6.4 min, **1,000km**, 9,375kph
8 – 12.8 min, **10k km**, 46,875kph
9 – 25.6 min, **100k km**, 234,375kph
10 – 51.2 min, **1m km**, 1.17 m kph

Important Reminders:
This map is the last hex of movement when moving to a lower scale (starting with a hex at the edge of the large hex) or the starting hex of movement when moving to a higher scale. You are now moving at 9 hexes on the lower scale or 1 hex on the higher scale. Use any remaining ADF/MR to make further speed adjustments on the next scale. Continue to track movement on the higher scale when you move past 10 hexes on the lower scale.

You may enter the void in the tenth hex of movement per turn on scale 10.

ADF and MR remain static no matter what scale you use as long as you adjust the time scale.

There are 2 turns on the current scale for every turn of the next scale up.



Note: The squares at the center represents 2 and 5 m squares on scale 1. Movement is doubled on this scale when using hexes..