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. In fact, these rules can be easily adapted to any combat simulation boardgame you 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. In this article, we begin with movement scales.

The following system bridges movement between ground combat and spaceship combat. It lets space fighters move seamlessly between the two arenas with ease. 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.

SLIDING SCALE

Imagine, if you will, a 10,000 km wide area. That's an area 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 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. (If you want to be realistic.)

A real fighter could easily slow down, turn, dodge artillery, and battle within a 10,000 km hex, or even just 20 km. However, in Knight Hawks, a fighter acting in such a way would be a sitting duck waiting for destruction. A

Scaled Movement

Scale #	Turn	Hex Size (km)	kph/Hex	Recommended Combat Level
1	6 sec	1 m*	.6	Character
2	12 sec	10 m	3	Mount/Slow Vehicle
3	24 sec	100 m	15	Aircar
4	48 sec	1 km	75	Jet Copter
5	1.6 min	10 km	375	Jet Fighter
6	3.2 min	100 km	1,875	Space Fighter
7	6.4 min	1,000 km	9,375	Spaceship
8	12.8 min	10,000 km	46,875	Starship
9	25.6 min	100,000 km	234,375	Starship
10	51.2 min	1 m km	1.17 m**	Starship

* 2 hexes on scale 1 equal one square on a character map.
** You may enter the void in the tenth hex of movement per turn on scale 10.

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. Attacking . To do this, a movement scale is needed.

Using the movement scale, 1 million km hexes are the largest scale (scale 10), used only for 51.2 minute turns, used only for vessels approaching 1% the speed of light. 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, 1 square equals 2 hexes.) 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.

To use the 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 trav-

> 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 you started at. Next turn, you begin the combat turn for your new scale.

eled. Doing this, you will enter the void on the fifth hex of movement per turn on scale 10.

CHANGING SCALE

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.

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.

Change scale when any vehicle or spaceship slows to under 1 hex movement or increases to more than 9 hex movement on the current 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 get +1 MR in atmospheric flight for each 0.6 g up to 6.

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 sheets are 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 scale. The Scaling Map also comes with a list of reminders allowing you not to need to reference this article.

Because gee forces maintain a constant as the ship decelerates, ADF and MR do not change significantly when

changing scale. Determining the exact gradient of momentum change would require an inordinate number of calculations, so it is automatically approximated through the change in scale through distance covered and time per turn. There is no need for the player to make any calculations in relation to it. Just let the scale take place.

If movement slows to below 1 hex on the current scale, the vehicle may still be considered to be moving on a lower scale and visa versa. When slowing to a lower scale, use the Scaling Map to represent the last hex of reduced movement on the previous scale. You are now considered to be moving at 9 hexes per turn on the lower scale (10 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 hex on a larger hex map). Continue to track movement on the higher scale when you move past 10 hexes on the lower scale.

Example: You are traveling at 4 hexes per turn on scale 5 and your ship has an ADF of 5. 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 4. You have 1 ADF left to spend in this turn and you want to slow down a little more, so you slow to 8 hex movement on scale 4 (4,800kph). 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 begin movement immediately on the scale you choose, starting with a hex at the edge of the large hex (or any hex 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 103 hexes on scale 3 or 10 hexes on scale 4. The key is in the difference in turn time.

When you increase or decrease the timeframe in which to act, how fast this 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 move down one scale

TURNS

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 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 roleplaying opportunities

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 or on every turn on scale 9.

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. ❖

> **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.
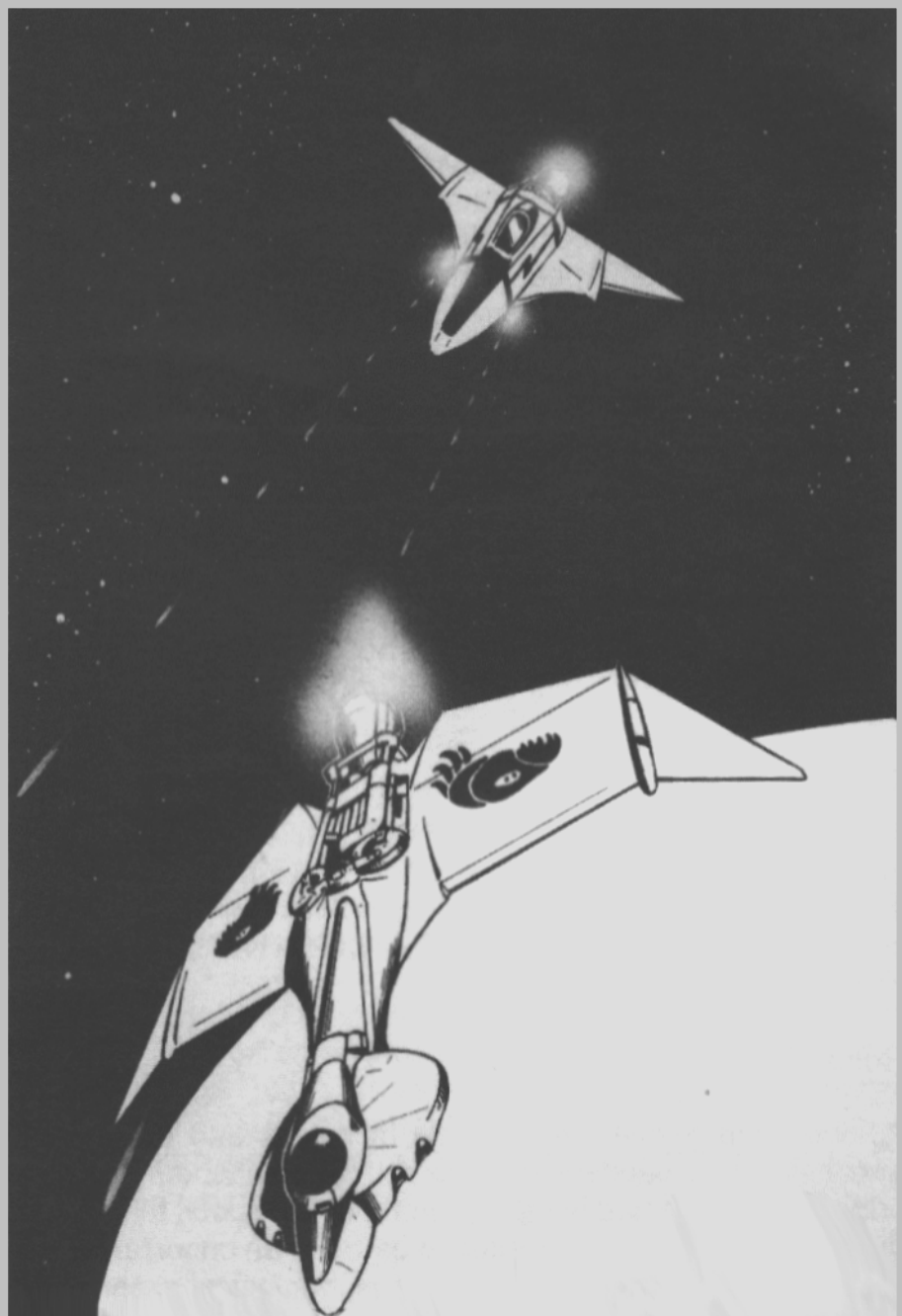
SCALING MAP

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.
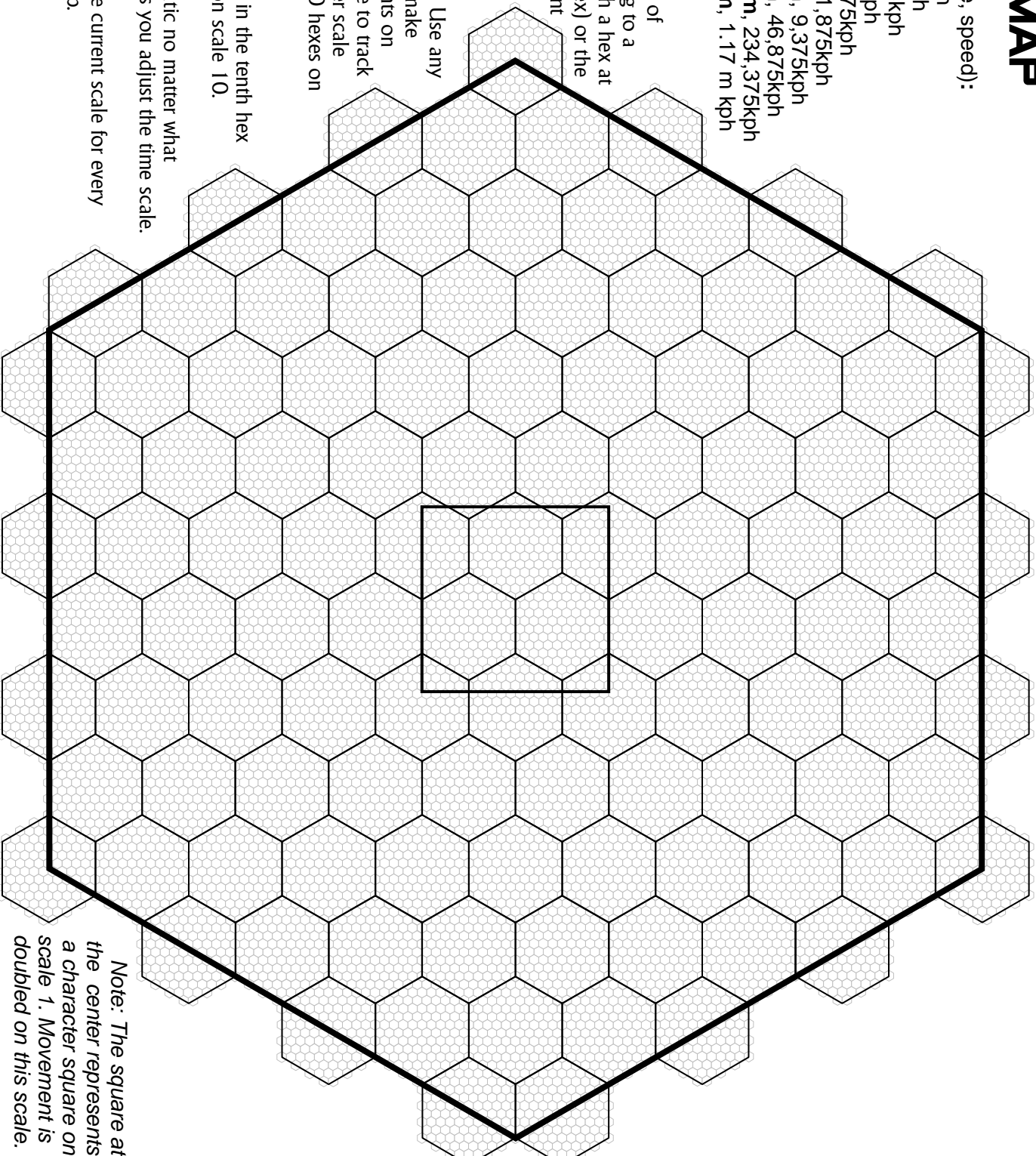
Note: The square at the center represents a character square on scale 1. Movement is doubled on this scale.