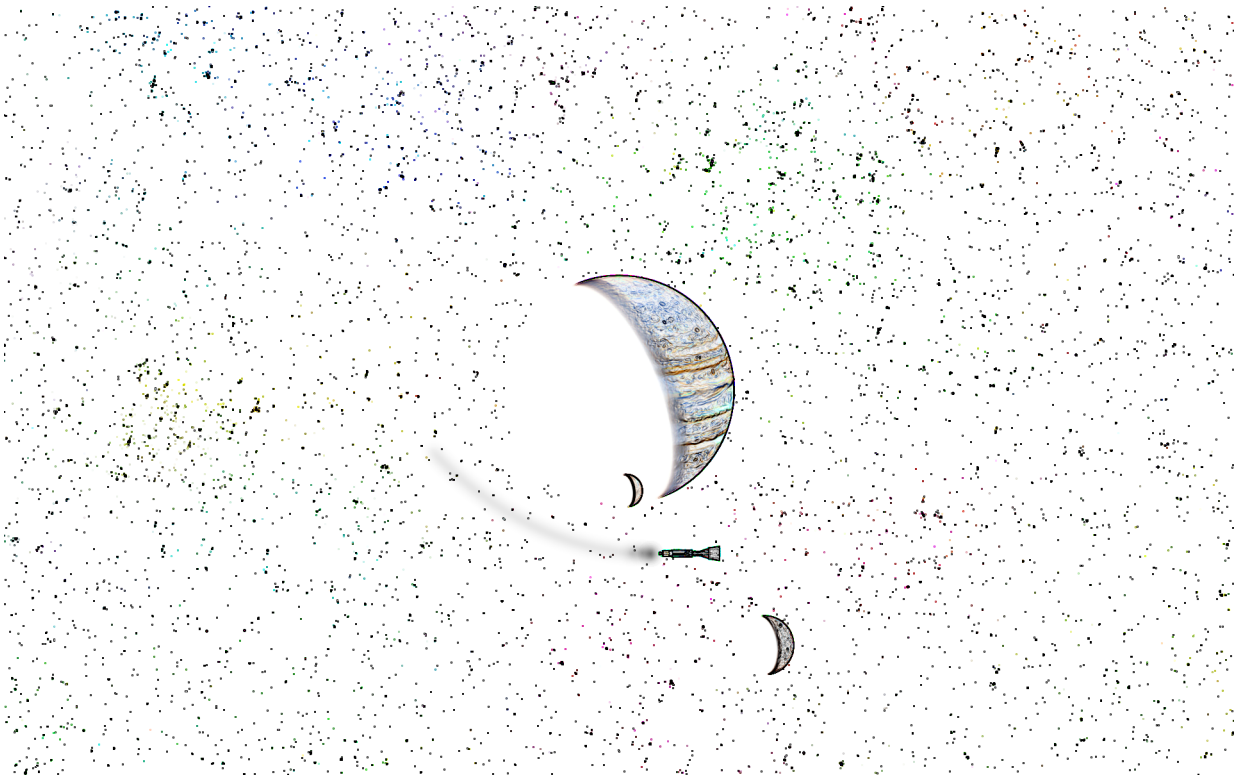
Jovian Rally



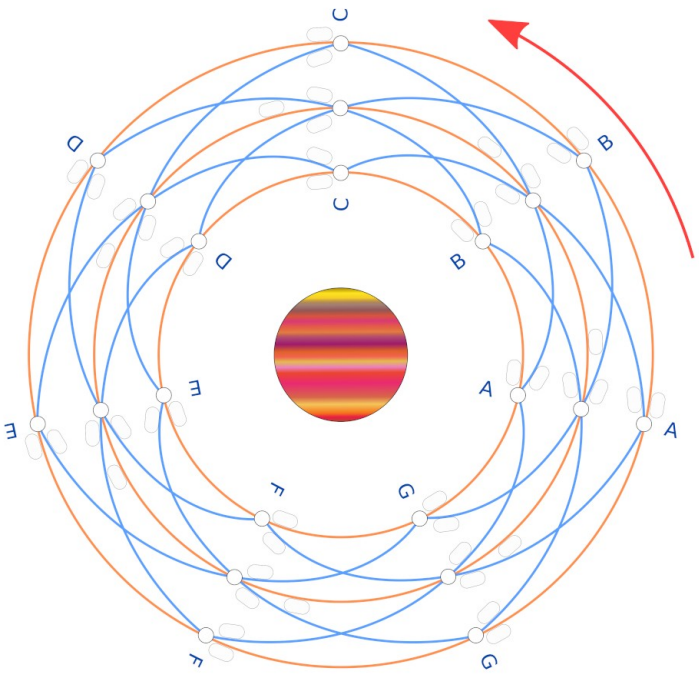
-- pre-release ruleset --

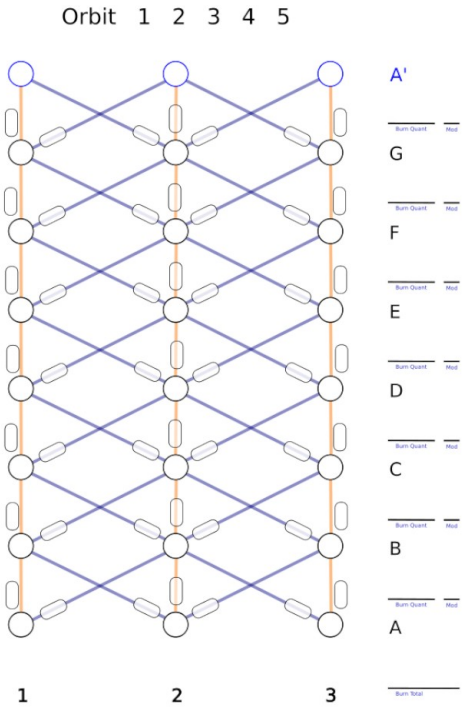
Paper and Dice version. Electronic version pending

Jovian Rally

Jovian Rally is a mini-game within Traveller where players can experience an epic sporting event on a planetary scale. High performance vehicles that are little more than cockpits bolted to rockets are navigated by elite pilots on a treacherous course. Imagine the Monte Carlo Grand Prix in space. It is a highly publicized, highly anticipated event that brings enthusiasts from many parsecs away.

Jovian Rally can be played by a group, or solo, with NPCs, or by characters with sufficient piloting skills. Play over the internet is possible with a die roll server. Each course is unique and provides over 20 billion possible flight paths. There are ample opportunities for plot hooks, intrigue, gambling, and of course winning the grand prize. The game itself is compact and governed by a very few straight forward rules based on real world trans-lunar orbital mechanics. Play is fairly quick but may be extended by adding as many heats as desired. The course itself may be easily modified by adding rows and columns to the flight plans.





The Game:
There are 21 moons orbiting a gas giant connected by 49 trajectories. Each trajectory costs a fixed propellant mass in Kg. Racers are challenged to visit all 21 moons and return to the starting point using the available trajectories with a limited propellant mass. The most efficient racer wins.

- **Course Setup**
  Lay out the course trajectory values. (Kg propellant) See Sample in this Document.
  Roll one D6 x 2 [2, 4, 6, 8, 10, 12] for each of the 49 trajectories,
  and record the Kg values in the oval boxes on each trajectory line.
  These values are the fixed cost in propellant and will not change during this competition.
  You may keep using this course, or create a new one for each event.

- **Pre-flight Propellant Dump**
  Racers begin with 200 kg propellant on A2. Before starting, Racers may dump propellant to lighten their craft. This gains a scoring & attack advantage. This is done openly, and repeated till all players are ready to start the race. Each player may dump only once more at the end of the second round. (row G of the first orbit) How low can you go?

- **Movement**
  It takes 9 Rounds to finish the race. A Round ends when all racers have taken their turn. Movement is forward only on marked trajectories. Moving through a trajectory to the next moon is referred to as a “Burn”. Each racer’s turn consists of three trajectory Burns to intercept three moons. Racers subtract the burn cost from their tank. Be efficient. Don’t run out of gas!

- **Risky Maneuvers**
  Racers may engage one “Risky Maneuver” per turn at the end of any one of their three Burns. To engage a Risky Maneuver, declare the intention, roll 2D6, and apply the table results. Rolling 10, 11, or 12 adds a fourth trajectory to this turn. Pull ahead of the competition!

- **Electronic Warfare**
  At the end of each round, racers may attempt one illegal* electronic attack on one opponent. The Attacker rolls 1D6. The Defender does the same. The higher roll wins. Failed rolls backfire on the Attacker. The loser doubles their next burn cost and cannot roll a risky maneuver on that burn. Ties favour the lighter tank. Ties with equal tanks favour the defender.

- **Finish Line**
  This is a contest of a pilot’s skill and boldness. Intercept every moon and return to A2.
  The Final Score is the total propellant you burnt, Minus **twice** the total you dumped.
  The lower the score, the more efficiently you piloted. The lowest score wins.

“You’ve never heard of the Millenium Falcon?”
“It’s the ship that made the Kessel Run in less than 12 Kg.”

RISKY MANEUVER TABLE (These effects apply to one burn. Only Roll 2 is permanent)

2 -- Navigation Fault. (1/36) You intercepted this moon but all its trajectories are now off limits to you.
3 -- Missed Target. (2/36) Failed to intercept **this** moon on **this** orbit. (catch it the next time)
4, 5 -- Thruster Misalignment. (7/36) Add 4 Kg penalty points.
6, 7 -- Successful Maneuver (11/36)
8, 9 -- Efficiency Bonus. (9/36) Cut 4 Kg penalty points.
10, 11 – Favorable Syzygy (5/36) Cut the **next** Kg penalty by half. Pull ahead now!
12 – "Slingshot ! " (1/36) The next trajectory is free! Pull ahead now!
(Any modified roll below a 2 results in a 'Navigation Fault')
(Syzygy and Slingshot add a fourth trajectory to a turn.)

Risky Maneuver Mods
As your tank gets lighter, the racer becomes more maneuverable.
At ten kg or less in your tank, +1 to risk rolls.

Clarifications:
A racer can visit any moon as many times as necessary. (Unless a "Risky Maneuver 2" has blocked it.)
Navigation faults only apply to the racer that rolled it.

The Flight-plan score cards are identical to the orbital map but in a more compact format.

Racers record their moves, propellant burns, and modifiers, on their provided Flight-Plan cards. Highlighter pens are convenient for this.

You don't have to declare your three trajectories before rolling risky maneuvers. A favorable roll may alter your plans. Rolling a 10 after burn 2 may make that 12kg burn on your third trajectory more attractive.

The lighter tank advantage in electronic attacks refers to the kg in racer's propellant tanks at the time of the attack at the end of a round. The odds are 7:5

Everyone can see everyone else's propellant and ship status. Like a chess game, nothing is hidden. Bookkeeping might be easier by giving out 200 candies to each player and . . . oh wait, that's too much candy. Maybe 200 walnuts. It's definitely more fun when everyone sees the scores dropping at each move. And it helps in deciding when to engage a "Risky Maneuver" or "Jamming Attack".

Use a spreadsheet to generate the 49 Burn values. The formula is: `=2 * FLOOR(RAND() * 6 + 1)`

Two to three choices over 28 burns (four orbits) gives (7/3) ^ 28 or $2 * 10^{13}$ = ~20 billion permutations

Strategies and Hazards:

Dumping propellant is a significant factor in winning the rally. If you're not running out of gas, You're not really trying.

On your first orbit, every moon you visit is a new one. Take the shortest trajectories and play it safe.

On your final orbit, risky maneuvers save propellant and the only significant hazard is rolling a 3 on a moon you needed.

Be careful not to paint yourself into a corner. On your final orbit, there's no way to touch two moons on the same row or get from row-1 to row-3 in one burn. Too many navigation faults can block off needed moons permanently or box you in. A navigation fault on A2 knocks you out of the race!

If you borrowed wagering money from a man in an expensive suit, pay him back straight away. Else an attorney named Mister Knuckles esq. from the firm of "Knuckles, Truncheon & Groin" (no relation) will hand deliver a notice of inquiry; "Ubi Est Pecunia Lebowski ?"

Enjoy the game in character. Modify it freely. Avoid Mr. Knuckles esq.

Sequence of play:

Propellant dumps
Round One
- Racer-1 Turn-1
  - Burn-1 + Optional Risky Maneuver (only one per turn)
  - Burn-2 + Optional Risky Maneuver
  - Burn-3 + Optional Risky Maneuver
- Racer-2 Turn-1
  - Burn-1 + Optional Risky Maneuver
  - Burn-2 + Optional Risky Maneuver
  - Burn-3 + Optional Risky Maneuver
- Racer-3 Turn-1
  - Burn-1 + Optional Risky Maneuver
  - Burn-2 + Optional Risky Maneuver
  - Burn-3 + Optional Risky Maneuver
- Optional Electronic Attacks (in any order as effects are simultaneous)
- End Round One

Round Two. ""
- (Second and Final propellant dump option)

Round Three. ""
Round Four. ""
. . .
Round Nine
Lowest Score Wins

As applied to Traveller Campaigns:

The game mechanic is based on the “Delta-V Budget” maps compiled by Nasa/JPL and the well known "Travelling Salesman Problem". Dumping unnecessary propellant, picking the optimum route, and choosing the right moment for risky maneuvers win the game.

“So, your Travellers need a break and would like to attend a rally. They can role-play the racers, they can bet on the outcome, they can run afoul of the local crime boss or the wealthy oligarchs watching from their super-yachts. Perhaps the job was to transport one of the racers and her craft (concealed under a tarp – No peeking !) to the competition in secret to avoid industrial espionage, sabotage, or other hazards. Maybe she is a teenage prima donna daughter of a friendly stranger with lots of tattoos and a missing finger. Good luck keeping her happy and out of trouble.”

The ships used for racing are specialty designs and have no equivalent in the Traveller inventory. They are stripped down, ultra-light weight, expensive toys for the super rich. No two look alike and there’s lots of shiny dichroic glass and multi-spectral metalline lacquer. Even the losers look cool. Think of them as Formula-One or Drag Racers. You never see those anywhere off the track.

There is absolutely no wagering permitted at racing competitions.
Betting on racing events is a violation of local laws and will incur a hefty fine levied by the “Association of Legitimate Businessmen”. The persistent rumours that gambling takes place in shady orbiting sky-hotels and nearby super-yachts run by organized crime syndicates and corrupt oligarchs are completely false and anyone overheard talking about it is very clumsey and likely to fall down a flight of stairs... or two. Capiche? wink

One way to include a wagering mechanic is charging 1000cr per kg dumped. The winner takes the pot.

*Yes, electronic warfare is illegal, but it’s hard to prove, everyone does it, and no one reports it.

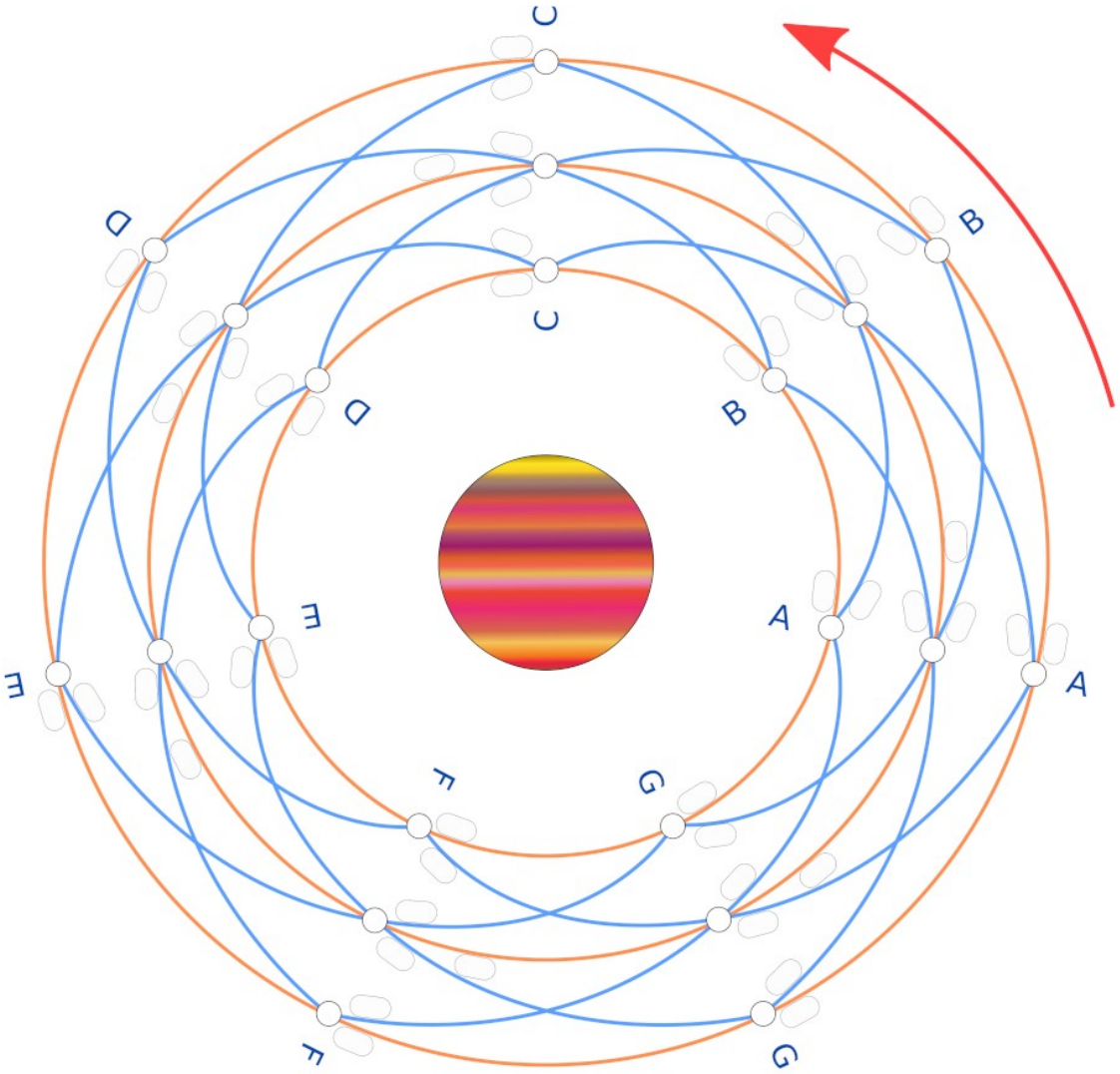
The game is designed to be highly configurable. You may shorten or lengthen the course by adding or subtracting rows and columns. You may lower the total tank capacity. The “Risky Maneuver” table may be altered to suit the Traveller’s preferences. Game masters may include a timer to keep the game moving quickly. A larger orbital map suits as a game board for miniatures and role play. Setting a win condition score (below 30) may earn the fabulous cash grand prize!

To add rows and columns in a modified course, keep to the default criss-cross format.
The starting propellant quantity formula: (ROWS) * (COLUMNS+1) * (7)
where 7 is the average burn cost.

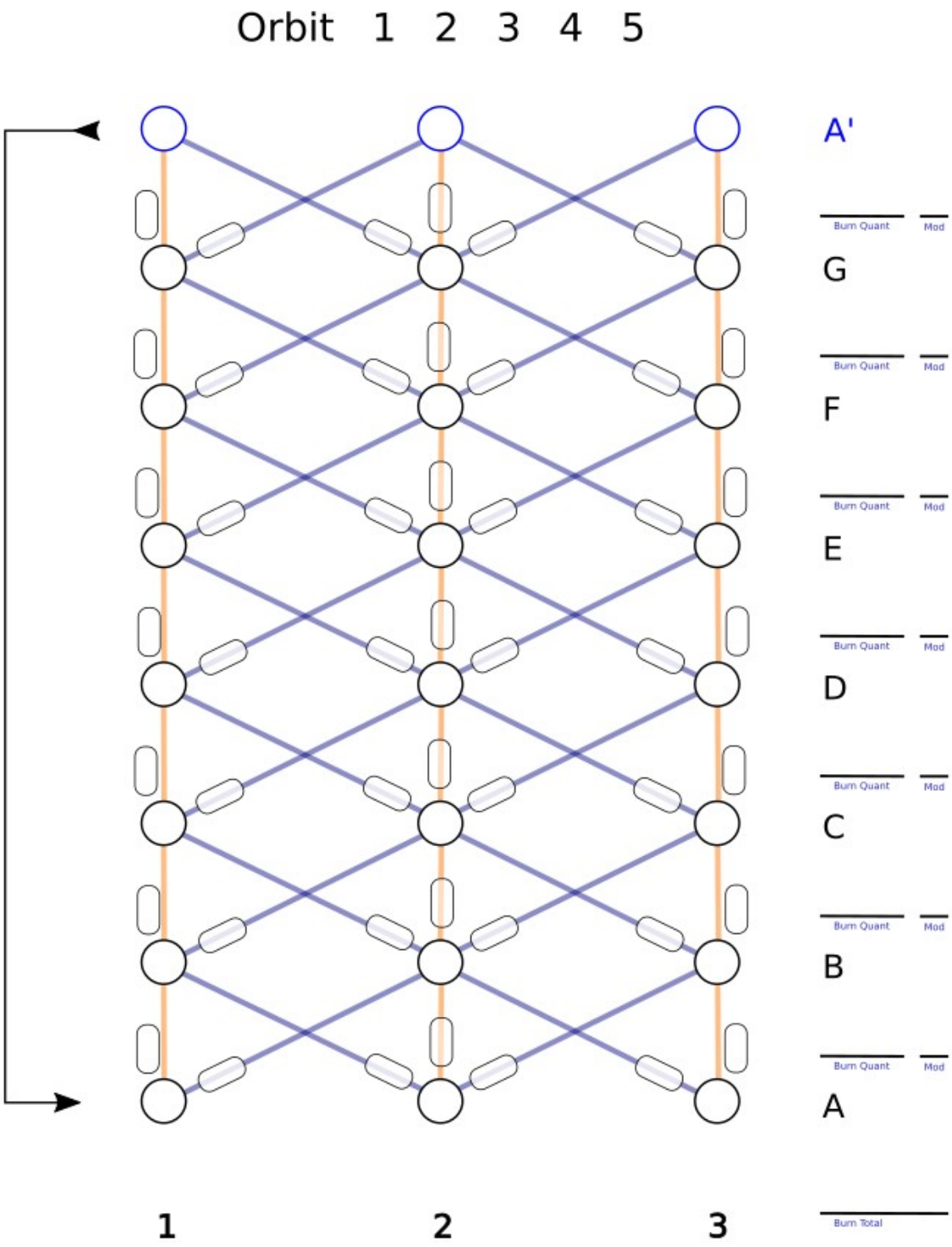
Premium features are being planned and may include; Box Art, STL spacecraft files, Data Cards with art, Large Format Courses/Posters, Software for generating courses and keeping score, javascript/python versions, and other digital goodies.

A companion activity is currently under development where players will design their racing craft based on modular components and style points. (This project is in early stages. Give it another year.)

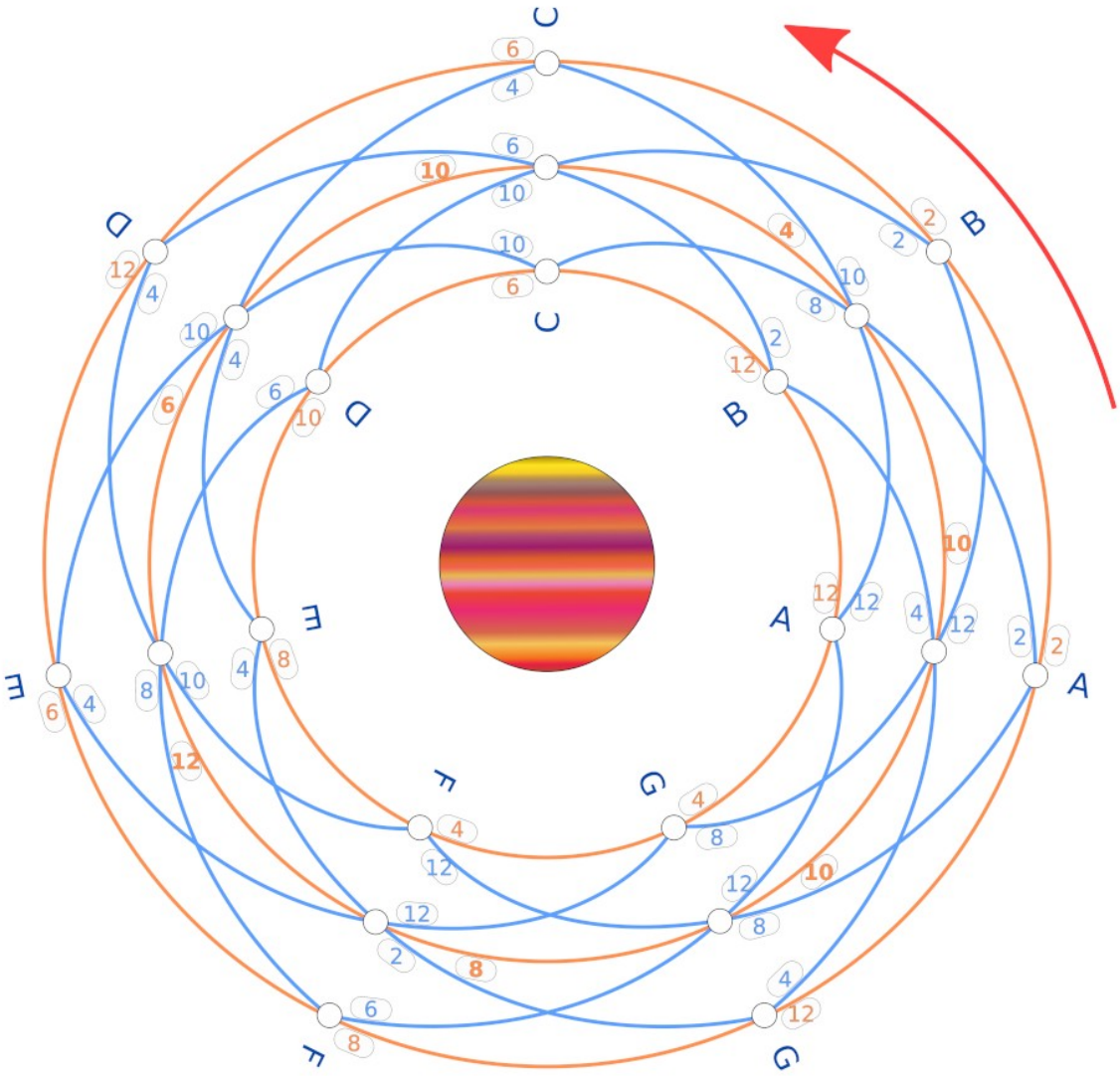
BLANK FORM; ORBITAL MAP



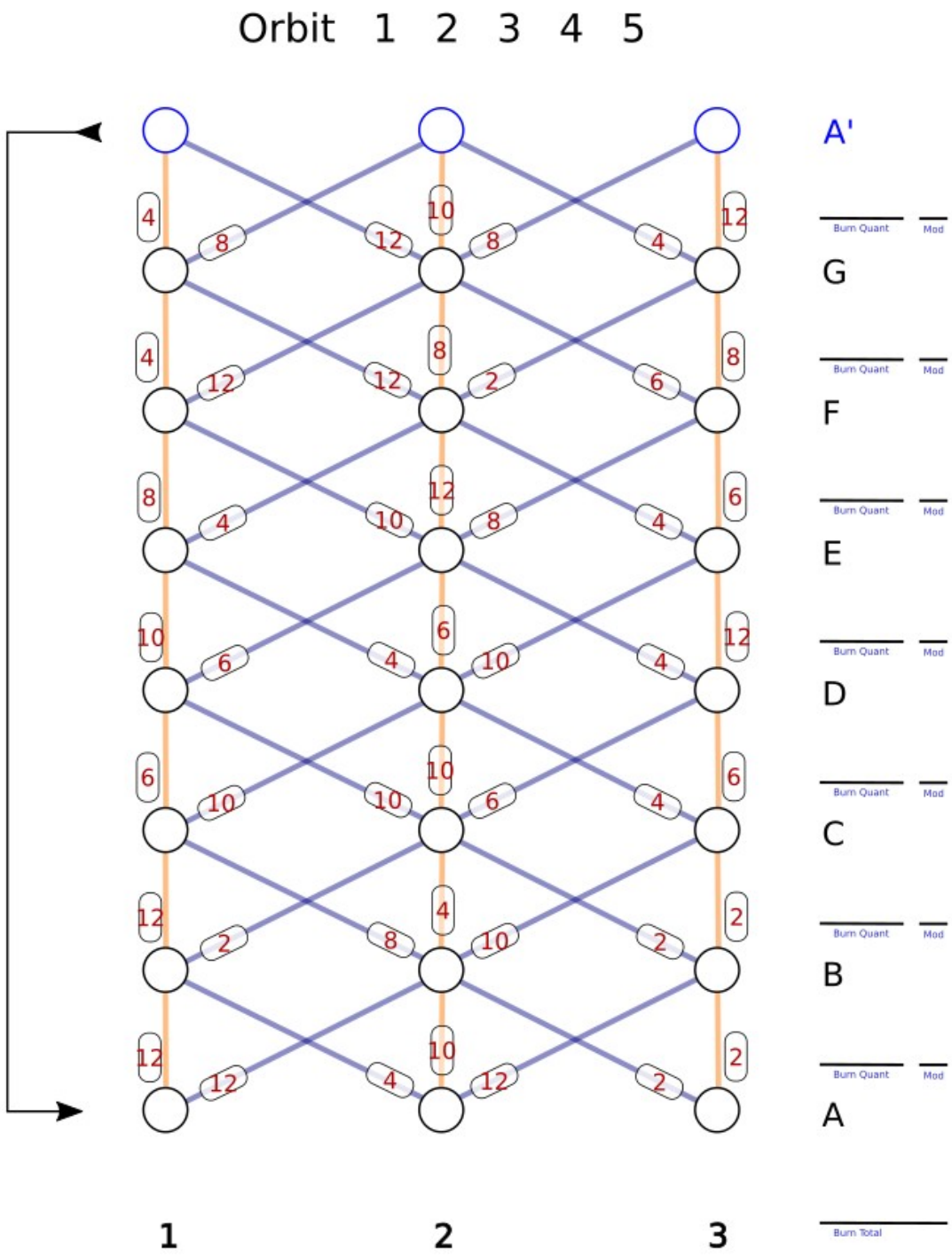
BLANK FORM; FLIGHTPLAN SCORE-CARD. FOUR ORBITS PER PLAYER



PRE-FORMATTED EXAMPLE MAP



PRE-FORMATTED EXAMPLE FLIGHTPLAN



Example Game: Starting at A3*, in four orbits. 21 tagged moons in red:

Orbit-1		Orbit-2		Orbit-3		Orbit-4		
	Burn		Burn		Burn		Burn	
A3	-							
B3	2	**B1**	4	**B2**	10	B1	12	
C3	2	**C2**	2	**C1**	8	C2	2	
D2	4	**D3**	6	**D1**	6	D3	6	
E1	4	**E2**	4	E1	10	**E3**	12	
F2	4	**F3**	8	**F1**	8	F2	4	
G1	12	**G2**	6	G1	4	**G3**	2	
A2	8	A2	10	**A1**	4	**A3**	12	Home !
	36		40		50		50	

Total Cost = 36 + 40 + 50+ 50 = 176 kg propellent used, 24 kg remaining.
176 kg Burnt, minus twice 0 kg Dumped = Final Score 176

I played this game without any “Risky Maneuvers” or “Propellant Dumps”.
Can you beat my score? Remember the **lowest** score wins.

*NOTE – I wrote this example before the “Start at A2” rule.

Links:
The Travelling Salesman Problem
https://en.wikipedia.org/wiki/Travelling_salesman_problem

Delta-V Maps:
https://en.wikipedia.org/wiki/Delta-v_budget

Delta-V Budgets for Moons of Jupiter and Saturn:
https://www.projectrho.com/public_html/rocket/appmissiontable.php#id--Erik_Max_Francis'_Mission_Tables--Delta_V_Required_for_Travel_Using_Hohmann_Orbits--Moons_of_Jupiter

Example Filled out Scorecards Totaling 176