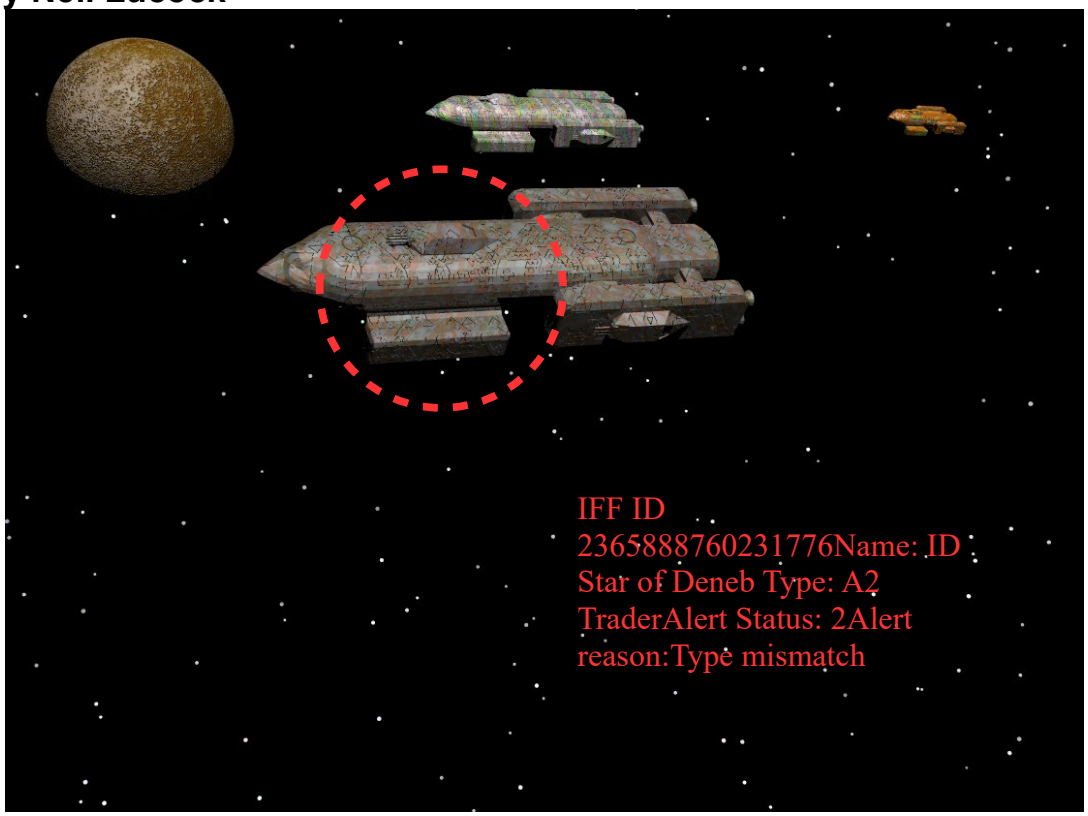
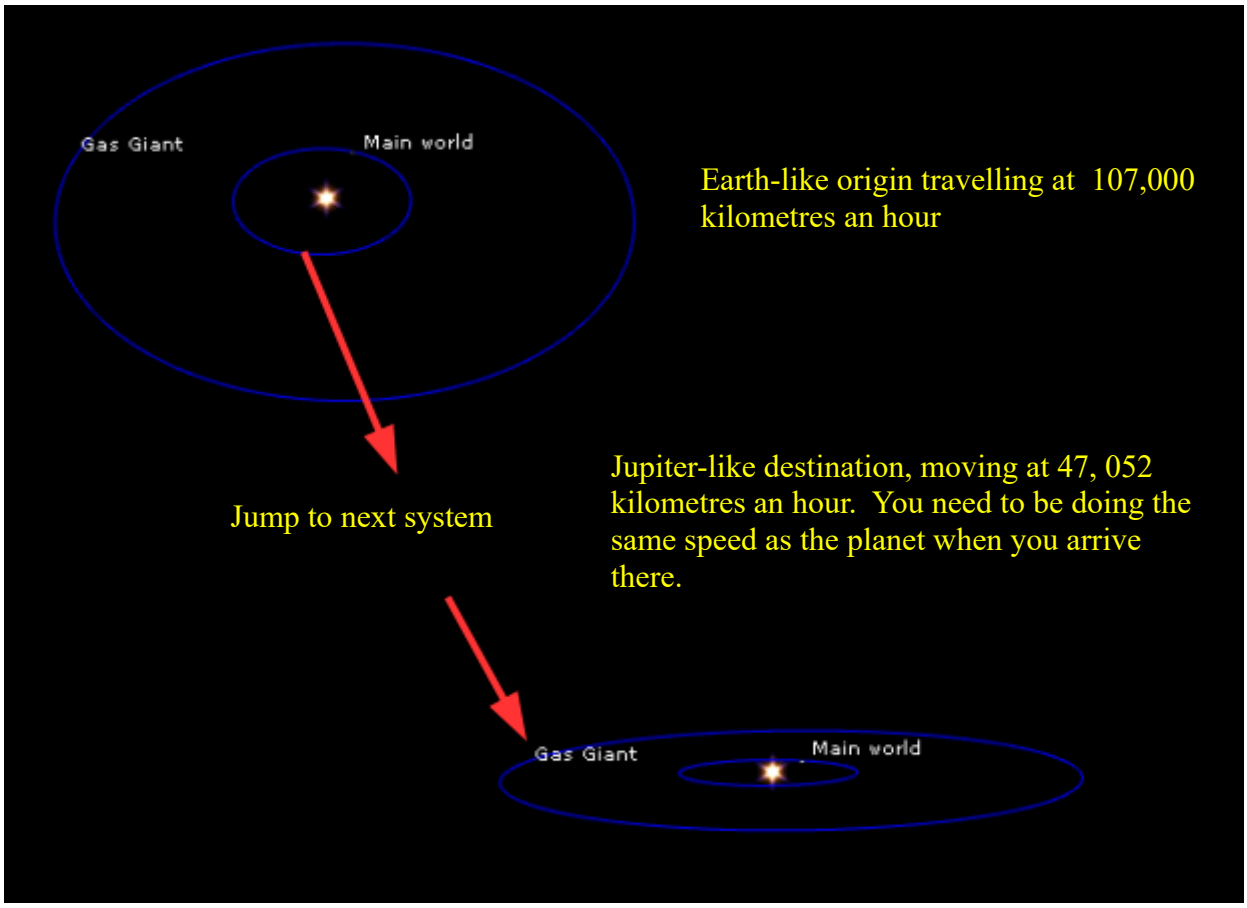
Traffic Control and Navigation

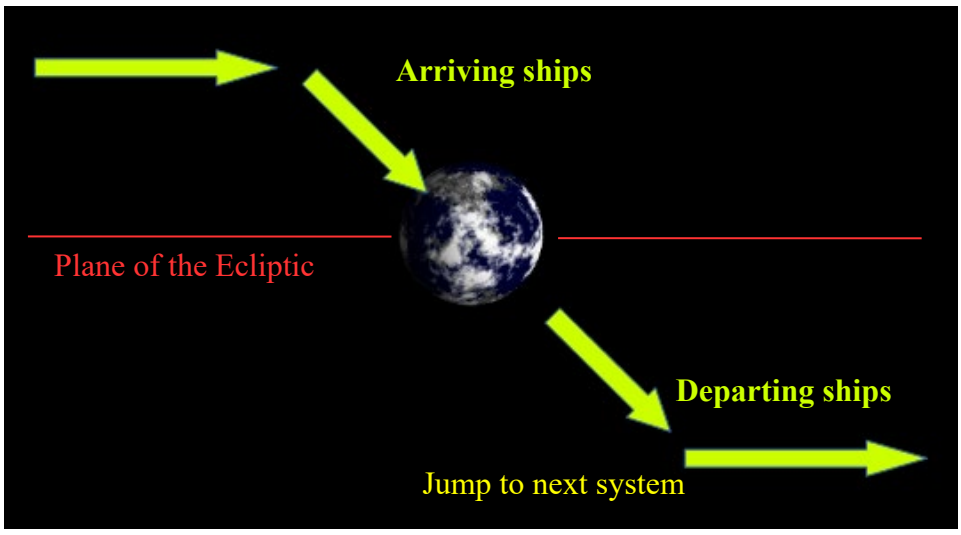
by Neil Lucock



Traveller assumes that when exiting a jump a starship preserves the speed and direction it had when it left the previous system.
If our ship is in Earth orbit, we have to remember that Earth is going around the sun at 107,000 kilometres an hour. The target system may have its planets rotating at right angles to the plane of our origin system, perhaps going faster or slower.
Let's assume we are jumping to Jupiter. It doesn't matter whether the target world is in the same or a different system, the calculations are the same.
Jupiter has an orbital speed of 47, 052 kilometres an hour. That means that between leaving Earth's orbit and arriving around Jupiter we have to get far enough away from Earth to jump safely, cross the distance from our jump exit point, change direction if necessary so we can intercept the target world and also lose 59948 kilometres an hour, otherwise we will just go shooting past the planet.



Our target system may have an optimum place to emerge from jump, but there may be other considerations a pilot must take into account.
Is there a recommended place to exit jump and any locations in the destination system that are forbidden? Some areas may be off-limits. There may be some hazard, or designated military training areas, or just traffic-control rules that you have to follow. Vessels arriving in busy systems will be picked up by System Traffic Control and given an optimal course to their destination. There may be rules, so that ships arriving in system must plot a course 100,000 kilometres above the plane of the ecliptic, (towards Galactic North, or some other local rule) ships departing the system might have to travel 100,000 kilometres below the ecliptic.



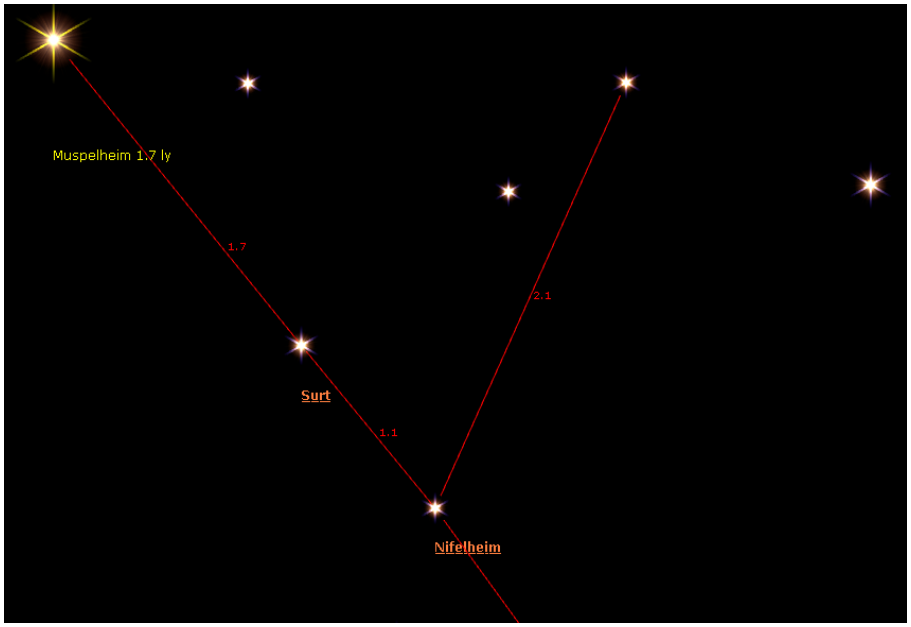
Regulations will tell pilots what they must do if there are no published local rules. If they are contacted by Local Traffic Control, a copy of the local traffic regulations will accompany the message.

Once approaching the destination world, the ship will come under the planetary (or starport) traffic controllers. Ships wishing to land on planet may have a flight path sent to them. There might be automated systems to control your approach.
All ships have IFF (Identification, Friend or Foe) transponders. System Traffic Control radar (or the future high tech version) sends out an interrogation. The transponder replies with some details of the ship type and purpose, its owner and various other pieces of information. If this is acceptable, the System Traffic Control will flag the ship as non-hostile and as long as it continues to behave in a way that is consistent with being a trader, it will be left alone. If its behaviour suggests it isn't what it says it is (such as accelerating at 6G), the authorities may decide it is worthy of further investigation. Not having your IFF turned on automatically alerts the authorities.
If your player-characters wander around the universe in a pocket battleship, legitimate calls at planets will attract the attention of the local SDBs. They may instruct them to leave the ship at a safe distance, guarded by the SDBs, and travel to the world in an unarmed shuttle. Planetary authorities don't like private warships in their back yards. This would be a roll on the local Law Level, modified by the tech level of the world in question, and situational modifiers such as bribery, persuasion or some common purpose.
The world may have a very high law level, but if their biplanes can't do anything about your TL14 starship, you can ignore their law level. Of course, acting that way might offend them so they refuse to cooperate with the players.

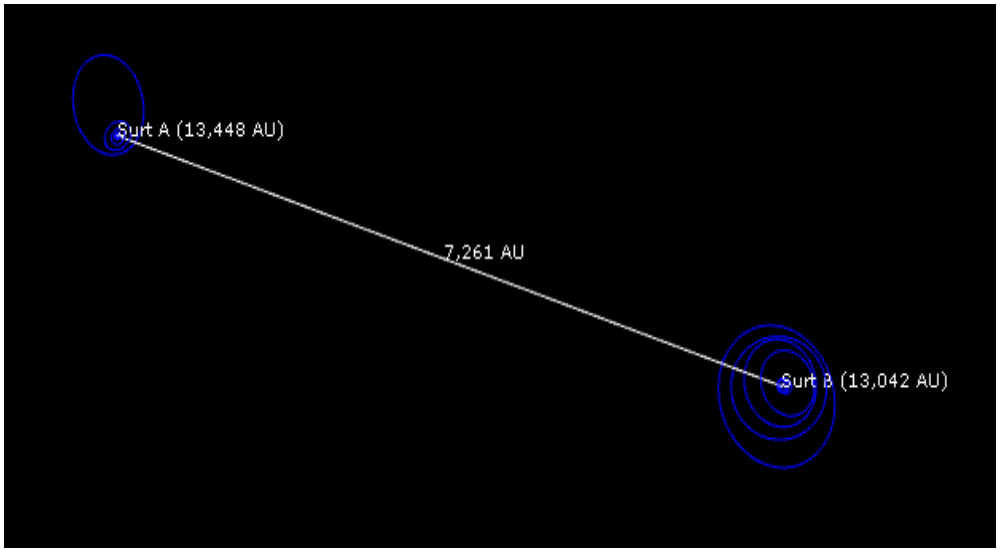
To depart, a pilot needs to request a departure slot and have the ship ready on time. A flight plan will enable the traffic controllers to choose an optimal route, taking into consideration where the ship is planning to go next. It may make sense to delay a couple of hours as you'll get to where you want to be quicker if you don't have to spend time and fuel if you let the planet's rotation do it for you. Once they have left the atmosphere or space port, System Traffic Control will issue a route out.

You may not wish to follow the route provided by System Traffic Control, but disregarding the route will attract attention in busy systems or places with higher law levels. The same applies to visiting places in-system that have no commercial activities. So a ship that arrives saying it is a scheduled passenger liner is unlikely to have any reason to spend 2 days visiting an airless rock on the outskirts of the system, unless there is a known sight-seeing opportunity. A liner would want to get to its destination and unload cargo and passengers. A prospector would have a good reason, although the authorities may insist on seeing a licence.

The amount of infrastructure present will depend on the amount of traffic. E Class Starports might have a beacon, D Class will have one. A C class port might not have construction facilities, but may be very busy, so could have the same systems as an A or B class port. A and B class ports will have a system of navigation beacons and traffic controllers.

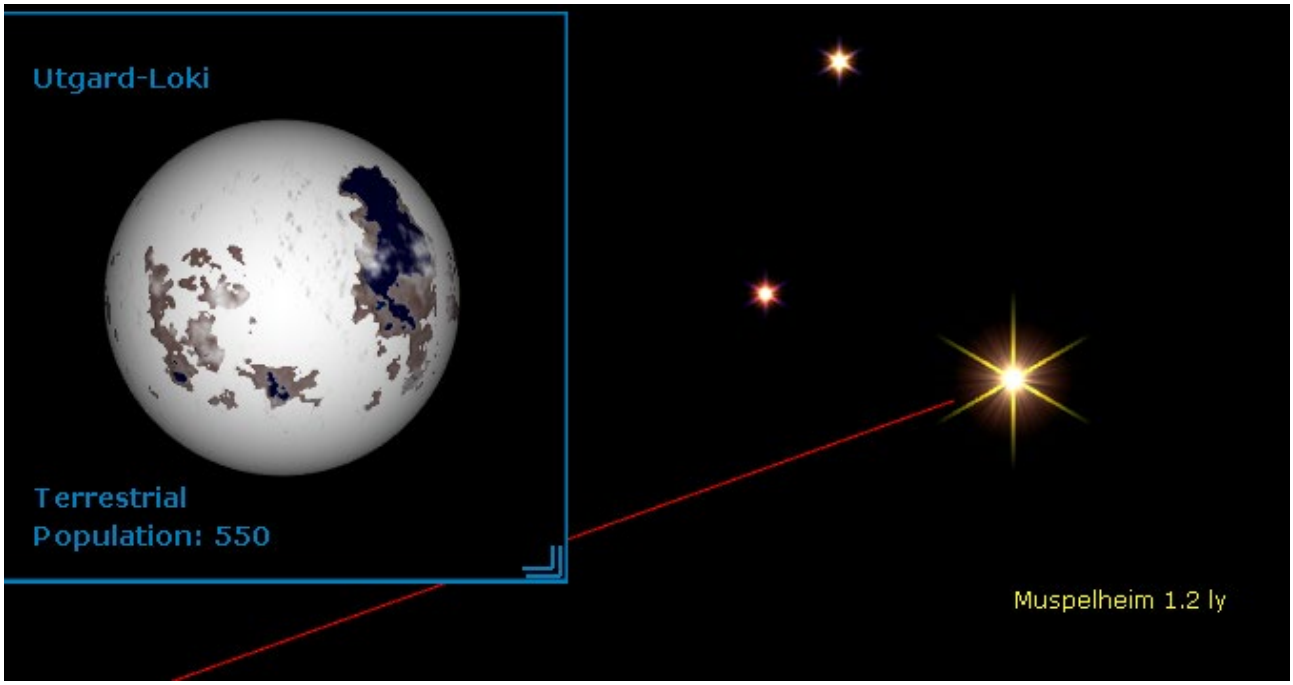


The navigator has to decide on a course that avoids hazards. So, when going from Nifelheim to Muspelheim, there is an unpopulated system in between called Surt. Surt system is actually a binary, a K8V star and a G2V, each with a planetary system with



multiple planets and moons. It's in the navigation database, as the Scout service surveyed it, but no one has seen fit to settle there or extract any resources. The navigation program might assume you want to go there, you have to tell it to steer the ship around (or through) the system. You don't want to encounter a star or gas giant that drops you out of jump. A cautious (or hurried) navigator might just plot a course with a loop by-passing the binary system. A skilled navigator might go directly through the centre of the system. This is clearly more difficult to do, but ought to give you a faster journey. Perhaps a reduction of 10% in the jump time might be appropriate.

So, why has no one settled this system? One reason might be that the amount of fuel (and time) needed to match speeds with any of the planets at Surt are just too great. Muspelheim has a moon called Utgard-Loki around a Gas Giant that is easier to get to, as the Gas Giant has a orbital speed that is nearer to the orbital speed of the main world at Nifelheim, so that was settled rather than any of the worlds at Surt.



Starship graphics were done in Wings 3D. The star systems are screenshots from Astrosynthesis Version 3 by NBOS Software. Artwork and text Neil Lucock 2020