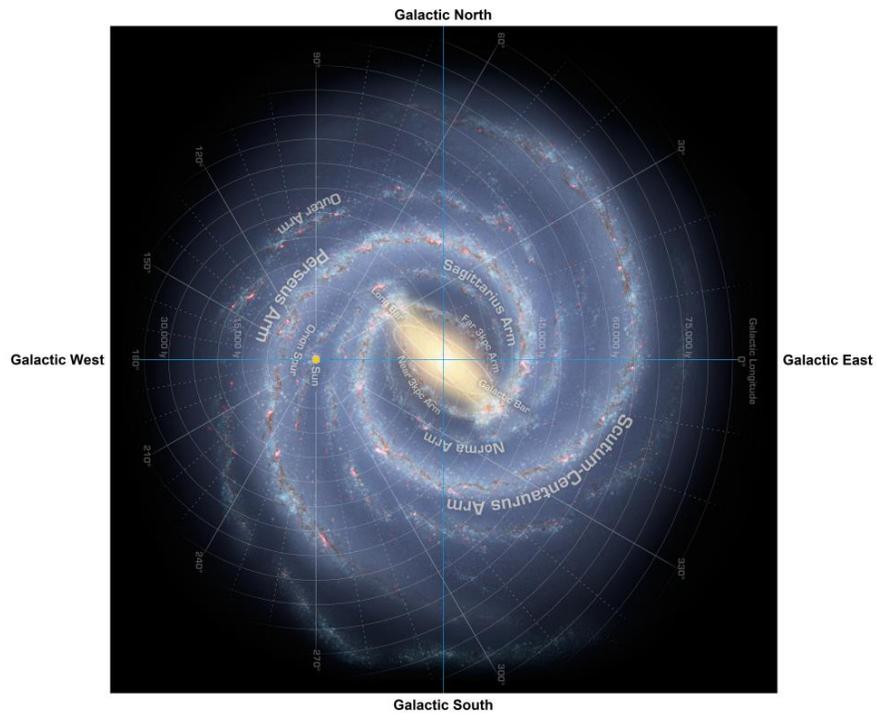


AN ATLAS OF PIPER'S GALAXY



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1. “A Star Map of Federation and Empire”

From John F. Carr's biography, we know that H. Beam Piper had experience with surveying, and he also appears to have been familiar with topographic maps.¹ Taken together, these suggest that he had more than the average layman's knowledge of geography. In this regard, Jerry Pournelle once wrote that Piper's “extensive notes have never been found; yet I know that he kept a well-organized set of loose-leaf notebooks, with entries color-coded; a *star map of Federation and Empire*; a history of the System States War; and other materials...Somewhere out there is a gold mine.”²

Since Beam was apparently working to a map for his Future History, he must have had some definite ideas on where certain planets were located in relation to each other. However, while he included quite a few distances in his stories (*Space Viking* in particular), these are few compared to the number of planets in the Terran Federation (500), the Systems States Alliance (130), the Sword-Worlds (12) and the First Galactic Empire (1,365). Moreover, directions are hardly ever given.

Nevertheless, from the meager data he provided, plus what we can deduce from his historical models, it might be possible to create star maps of Beam's Federation and Galactic Empires. Of necessity, these will be tentative and imperfect charts. Not only due to lack of data, but because there are inconsistencies and outright errors (many seemingly deliberate) scattered throughout Piper's stories.

2. Galactic Orientation

In “Ministry of Disturbance”, Emperor Paul XXII says that the First Galactic Empire is located “on the western side” of the galaxy.³ It is likely that this is a holdover from the time of the Terran Federation, when interstellar travel first occurred, and large-scale mapping began. Probably under the aegis of “The Astrographic Commission”, which dictates how discovered planets and stars are named,⁴ and thus how they will appear on Federation charts. So the orientation for Piper's galaxy should locate Sol on the left, or western, side. The galactic equator (if we can call it that) would be a horizontal line running through Sol and the center of the Milky Way, while the ‘prime meridian’ would be a vertical line, probably running through the galactic core.

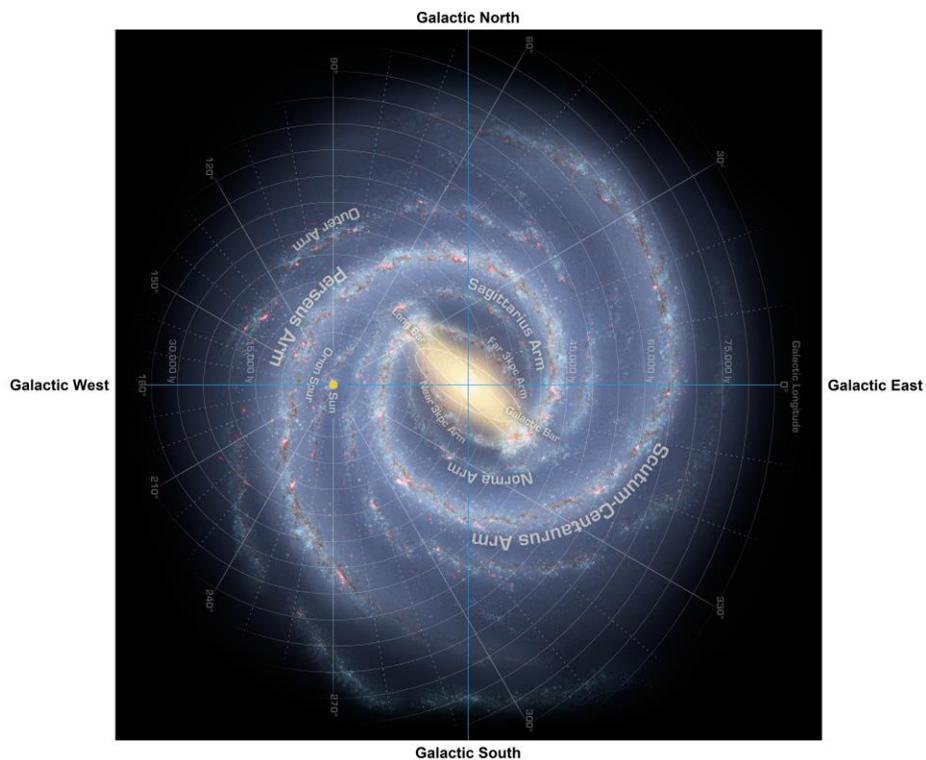


Figure 1. Piper's Milky Way galaxy, with Sol “on the western side”.⁵

3. From the New World to 'New Worlds'

Piper was proud of “the Good Ol’ U.S. of A.,” and “always made a big deal out of July 4th!”⁶ And when we compare his galactic orientation with a standard map of the world, the American continents seem to make a pretty good parallel with the western arms of the galaxy. Particularly the Orion Arm, which of course is where we Terro-Humans reside. The Orion Arm is about 10,000 light-years long, a great curve running from the galactic northeast to southwest to south.⁷ In a roughly parallel fashion, the Americas run in a great 10,000 mile long curve from the northeast (Greenland) to the southwest (Mexico) and then turn southeast and south (through Central and South America) to Tierra del Fuego.⁸

Thus, the New World seems to parallel the ‘new worlds’ which will be discovered as Terro-Humanity moves out into the galaxy. The interarm gaps separating the Orion Arm from its neighbors to the east and west, the Sagittarius and Perseus Arms, would then parallel the Atlantic and Pacific Oceans on either side of the Americas.⁹

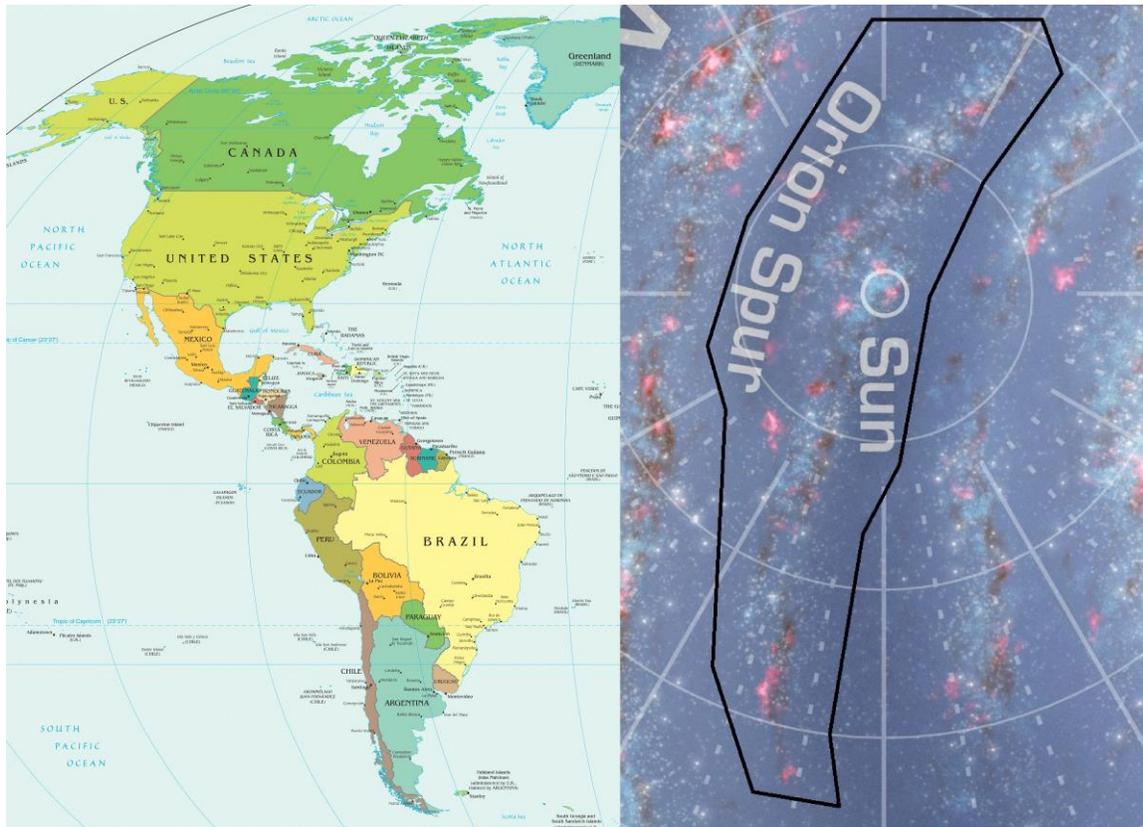


Figure 2. Close up of the Orion Arm in the western galaxy, compared with the Western Hemisphere.¹⁰

4. The Anglo-American Terran Federation

The side-by-side comparison in Figure 2 reveals that the location of Sol, in the north-central Orion Arm and near its inner or eastern edge, is roughly analogous to the East Coast of North America. Specifically, it's not too far south of the locations of Jamestown, Virginia (where the first successful English colony was established) and Washington DC (capital of the United States). This can help to explain Piper's use of Anglo-American models for the Terran Federation. It has an American-style President and Constitution, but also a British-style Parliament,¹¹ and its chartered planetary companies (like the CZC on Zarathustra) parallel historical firms like the British East India Company.¹² Beam also used Anglo-American models for Federation events. The Uller Uprising is modeled on the Sepoy Mutiny in India,¹³ and the System States War seems to combine the American Civil War with elements from the Pacific Theater of WWII, fought mainly between the US and Japan.¹⁴

5. American and Federation Expansion

Given Sol's position, the early expansion of the Terran Federation will be chiefly along the Orion Arm's eastern edge. This parallels the expansion of the English colonies along the eastern seaboard of North America. And since the interarm gaps are largely (though not totally) devoid of stars, the Federation's later expansion will be mainly deeper into the Arm; to the north, northwest, west and southwest. This parallels American expansion deeper into the continent. To the northwest (the old Northwest Territory; now Michigan, Ohio, Indiana, Illinois, Wisconsin and a large slice of Minnesota), west (Kentucky and Tennessee) and southwest (Alabama and Mississippi).

In Figure 3 below, I have also included US attempts to expand north into Canada (unsuccessful) and south into Florida (successful). Because if the British and Spanish (and their successors the Canadians and Mexicans) had not been in the way, the US would have expanded roughly equally in these directions as well, rather than mainly westward across the continent. And with no enemy civilizations in the way, I presume this is how the Federation expands; more or less equally in all directions, rather than mainly westward across the width of the Orion Arm.

Until now, my mental image had Sol at the exact center of the Federation. But as it expands deeper into the Arm, Sol gradually loses its central position, becoming offset to the east, just as Washington did as America expanded. As we will see, this later plays a role in Odin becoming the capital of the Galactic Empire.

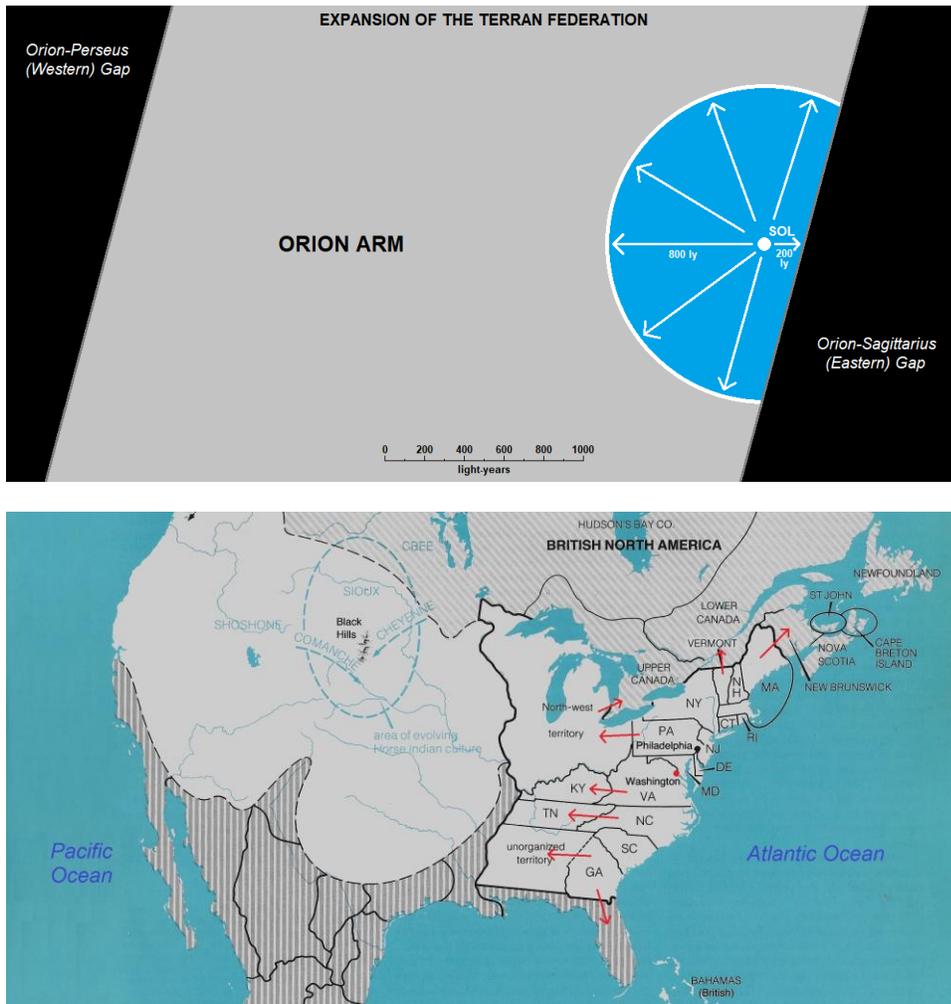


Figure 3. Estimated maximum extent of the Terran Federation, compared with early expansion of the United States. ¹⁵

When Piper began his Future History in 1952, it had recently been discovered that Sol's position in the Orion Arm was "not quite at the inner edge but 100 or 200 light years inside it."¹⁶ Washington parallels this distance fairly well, being about 100 miles west of the Atlantic Ocean (not counting Chesapeake and Delaware Bays).¹⁷ More current maps place Sol 300 to 500 light-years from the inner edge, but in order to stay true to Piper's time, I have located Sol at the upper end of its original range; 200 ly inside the Arm.

Then I gave the Federation an estimated radius of 800 light-years. This may be an underestimate, but I did it because the stated distances to various planets provided by Piper are all much less than 1000 light-years from Sol. For example, Freya at 700 light-years ("When in the Course—"), Fenris at 650 (*Four-Day Planet*), and Zarathustra at 500 (the Fuzzy novels).¹⁸ Another reason was because these distances did not make sense, as the trend is for later-colonized worlds to be *closer* to Terra, rather than farther away. Freya is colonized before Fenris, but is farther from Terra; and that's the case with Fenris as well, which is colonized before Zarathustra, but is farther from Sol. This suggested the presence of at least one of Beam's 'deliberate mistakes'.¹⁹

In any case, the resulting shape of Federation space is a truncated circle, or semicircle; with an east-west diameter of an even thousand light-years, and a north-south diameter of 1600. As seen in Figure 3, this estimated extent seems similar to the expansion of the US out to the Mississippi River. It must be noted that the inner edge of the Orion Arm is not as conveniently straight as I have made it on my simplified chart. But the Arm's irregularities will parallel the bays, capes, peninsulas and other natural features along the American coast. If the gap contains individual stars with habitable planets, and wisps of interstellar gas with such stars, these will parallel offshore islands like Bermuda, and the islands and cays of the Caribbean.²

Parenthetically, this configuration calls into question Otto Harkaman's statement that "the Old Federation...occupies a space-volume of two hundred billion cubic light-years."²¹ In the vicinity of Sol, the Orion Arm was estimated in Beam's time to be about 1300 light-years thick.²² If we multiply the Federation's estimated east-west diameter of 1000 ly by the north-south diameter of 1600 ly, and then by the thickness of 1300 ly, we get a space-volume of slightly more than 2 billion cubic light-years, not 200.

In order for Harkaman's number to be correct, the Federation should have expanded out to roughly 6500 light-years from Sol. In Figure 4 below, this is the large light blue circle which extends beyond the limit of the source map. Multiplying the diameters by the depth (13,000 x 13,000 x 1300 ly) results in a space-volume of 219.7 billion cubic light-years within that circle. But this means the Federation would have not only expanded across practically the entire Orion Arm, it would have crossed the gaps to either side and included large sections of the Perseus and Sagittarius Arms. More importantly, a radius of 6500 light-years grossly violates Beam's Federation stories, in which the mentioned distances from Sol are all less than 1000 ly. That range is delineated by the innermost light blue circle in Figure 4.

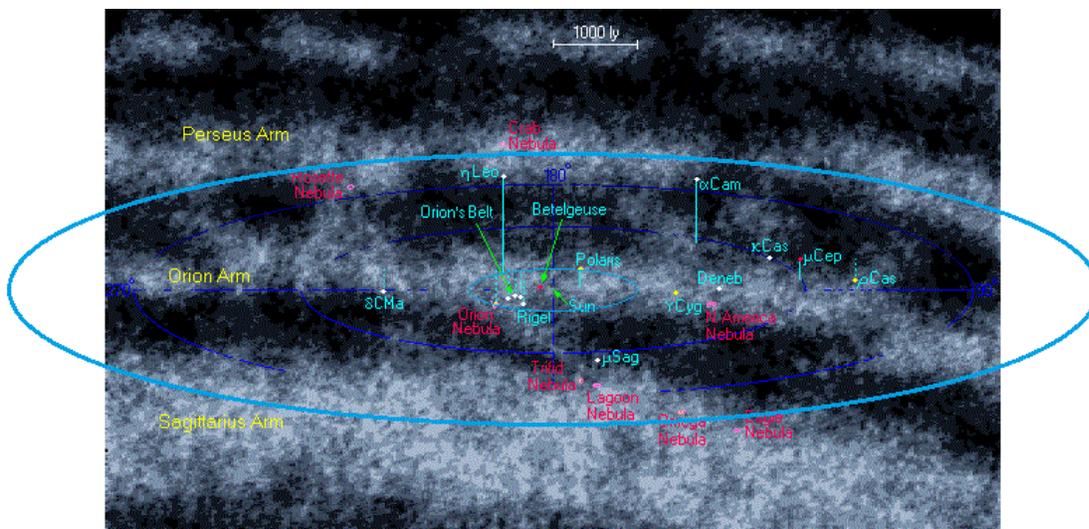


Figure 4. The Terran Federation with "a space-volume of 200 billion cubic light-years", as seen from the galactic east.²³

The 200 billion cubic light-year figure may therefore be another one of Beam's deliberate mistakes. Possibly intended to dramatically emphasize, in the reader's mind, how hard it should be for Lucas Trask to hunt down Andray Dunnan. Harkaman says that "Dunnan could die of old age...before you caught up with him. And your youngest ship's-boy could die of old age before he found out about it." Trask replies that "Well, I can go on hunting for him till I die, then. There's nothing else that means anything to me."²⁴ But the Old Federation appears to be 100 times smaller than Beam says it is, and Trask does finally catch up and kill the villain, at the end of *Space Viking*. It takes him less than 10 years to do it, rather than a whole lifetime—or never—and so was much easier than it could have been.²⁵

Now back to our analysis.

6. From Confederate States to System States

The American parallel can also indicate the location of the System States Alliance. There is plenty of evidence to show that Piper used the American Civil War as the main model for the System States War. John Carr was the first to enunciate this parallel, calling the Federation-Alliance conflict "an economic war as brutal as the War Between the States."²⁶ Thus, the Civil War model suggests that the worlds of the Alliance are to the galactic 'south' of Sol. That is, toward the tail end of the Orion Arm. The Southern States possessed a long seaboard on the Atlantic Ocean (including the Gulf of Mexico), so the Alliance will possess much territory along the eastern edge of the Orion Arm, south of Sol.

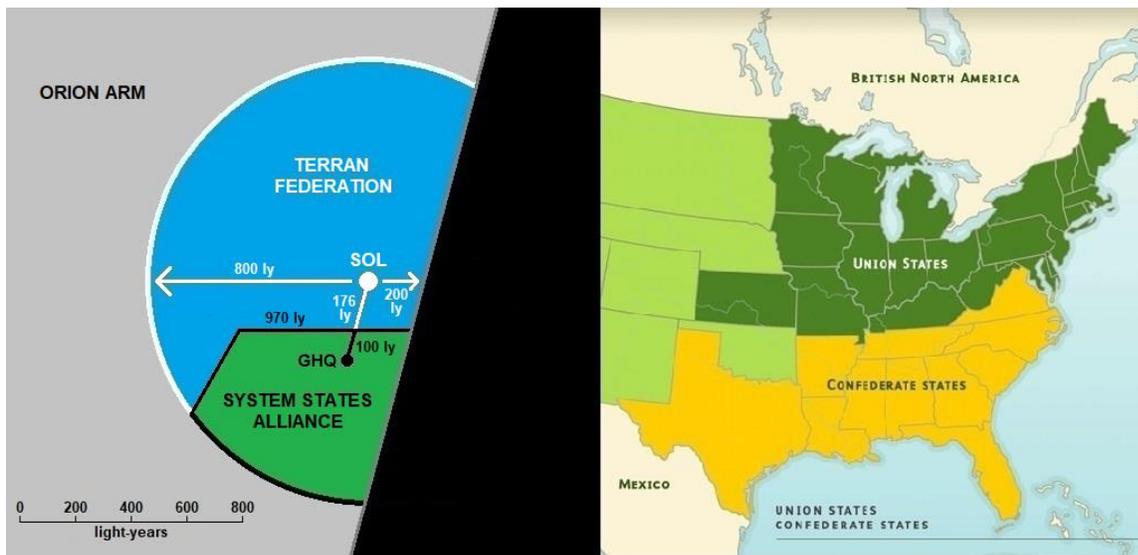


Figure 5. Estimated extent of Federation and Alliance space, compared to the Union and Confederate states.²⁷

At its greatest extent, the Federation contains 500 planets, 130 of which secede to form the Alliance.²⁸ This means the SSA includes about 35% of TF territory; 130 planets versus the 370 still in the Federation. A good parallel of the CSA at the start of the Civil War, which included about 35% of America. Eleven states formed the Confederacy, while the Union retained control of 23 states plus 8 western territories.

The map resulting from these deductions can explain Conn Maxwell's statement that the Federation "fought a war around a perimeter of close to a thousand light-years".²⁹ For as seen on the left side of Figure 5, a simplified, Civil War-like border between the Federation and the Alliance would be about 970 light-years long. The actual border undoubtedly varies a bit, paralleling the varying border between the US and CS states. Including these meandering stretches will add many more light-years to the total, thereby bringing the perimeter closer to Conn's figure.

Also included is the estimated location of the Alliance GHQ, which former SSA Col. Klem Zareff says was "thirty parsecs from the fighting".³⁰ Thirty parsecs is about a hundred light-years. The Federation's GHQ, Terra, would then be about 176 ly from the Alliance frontier. But given the fact that Washington DC was literally right across the Potomac River from the rebel state of Virginia, the Federation-Alliance border

in this section may be much closer to Sol than depicted on my map. The Alliance GHQ, southwest of Terra, would then parallel Richmond, Virginia; the Confederate capital southwest of Washington.

7. Internal Configuration of the Terran Federation

This would seem like a good time to make an initial estimate as to the internal configuration of the Terran Federation. Fortunately, Piper gave us some distances and directions with which to begin, and to this slender framework of data the known distances or times to other planets can be added. But this will involve untangling some of the inconsistencies and deliberate errors found in his stories.

There are several reasons for these problems. One is that “H. Beam Piper was never a hard science-fiction author, i.e., one whose primary interest was in technology and science.” As Beam himself put it, “my stories all have a political and social slant instead of a physical-science slant”.³¹ He doesn’t appear to have been overly concerned about the ‘hard science’ details; unlike authors like Robert Heinlein, whose “stars are in their proper place at a given time of the year, and his space-flight formulas are mathematically correct.”³²

Another reason is that Beam was a secretive person, who purposely muddied the waters. Mike Knerr wrote about “The typical Piper way of hiding the facts...For whatever reasons, secrecy had become so deeply ingrained in Piper’s character by the time he reached fifty that it was a way of life. Like an old indian scout he was forever covering his back trail.” And, “Piper was an expert at confusing the issues and extremely careful how he did it.”³³

However, I believe it is possible to penetrate Beam’s veil of mystery, at least in part. His errors and inconsistencies mainly involve the distances between planets, and the time it takes to reach them. Either the speed is correct, or the distance; it cannot be both. It’s best to start at the beginning, so let’s look at Beam’s very first Federation story, *Uller Uprising*, published in 1952.

***Uller Uprising*, AE 526.** According to John Carr, “*Uller Uprising* became the foundation of Piper’s monumental Terro-Human Future History; the first story where we encounter the Terran Federation.”³⁴ The story was based on an essay by Dr. John D. Clark, which required Beam to use two planets orbiting known stars, which provides us with actual distances and directions. Uller circles Beta Hydri, a luminary located 21 ly from Sol; and Niflheim’s primary is Nu Puppis, at 148 ly out.³⁵

In the story, it takes a starship six months to travel from Niflheim to Uller, and another six months to travel from Uller to Terra.³⁶ Thanks to Nils Jeppe, we know that Nu Puppis and Beta Hydri both lie more or less in the same direction from Sol, and not much off a direct line.³⁷ This means that a ship traveling the longest leg, between Niflheim and Terra, should take about a year.

Right from the start of his Future History, however, Beam inserted a deliberate error. After the Uprising breaks out on Uller, General Carlos von Schlichten says that the beleaguered Terrans will have to wait a year for a relief mission to arrive from Sol. But Uller is only 21 ly from Terra, while Niflheim is seven times farther out. How can it take a year to travel a 42 ly round trip to Terra, while taking the same amount of time to travel 148 ly from Terra to Niflheim?

In order to retain the integrity of Piper’s story, however, I think we have to take the trip time as fact. A rescue mission will take a year to arrive. Thus, the position of Beta Hydri cannot be correct.³⁸ It should be about half as far from Terra as Niflheim; or roughly 76 ly, rather than 21. So a trip of 76 ly from Terra to Uller, or from Uller to Niflheim, would each take about six months; while one of 148 ly between Terra and Niflheim takes about a year. A standard hypership would then travel at approximately 59 hr/ly. Because one year is 365 days, which converts to 8,760 hours, then divide that by 148 ly.

***Uller Uprising* takes place in Atomic Era 526. So an important point to keep in mind is that hyperdrive speeds prior to this date cannot be faster than 59 hr/ly!** And that fact can help us to correct the deliberate errors found in “When in the Course—” (which occurs circa AE 234) and *Four-Day Planet* (circa AE 495). Because the estimated figure of 59 hr/ly is close to numbers contained in both.

“When in the Course—”, circa AE 234. In this story (which Beam finished eight years after *Uller Uprising*, in early 1960), it is said that the planet Freya is located 700 ly from Terra, a trip which will take the *Stellex* six months to travel.³⁹ Six months is 182.5 days, which converts to 4,380 hours. Traveling 700 light-years in 4,380 hours means the *Stellex* has a speed of 6.257 hr/ly. That figure obviously can’t be right, because it’s more than ten times faster than the speed in *Uller Uprising*. Hyperships cannot

have gotten *slower* between AE 234 and AE 526! But if we read “70” ly rather than 700, it will take the *Stellex* six months to travel from Freya to Terra, at a speed of 62.57 hr/ly (4,380 hours divided by 70). This is not far off our working estimate of 59 hr/ly.

Next, it is also said that the *Stellex* will take “three months” to travel from Freya to Yggdrasil and back, which is only 20 light-years away.⁴⁰ Each 20 ly leg of the trip should therefore take about 6 weeks. Six weeks is 45.625 days, or 1,095 hours. Divide the number of hours by the number of light-years, and the *Stellex* travels 1 light-year every 54.75 hours. Again that can’t be correct, because it too is faster than the speed in *Uller Uprising*. So if we assume the real speed is 62.57 hr/ly, the *Stellex* takes a little over 52 days, or more than seven weeks, for the 20 ly trip to Yggdrasil. That means the round trip actually takes closer to four months than three, and Piper’s characters do mention that the *Stellex* is gone “almost a month longer” than expected.⁴¹

For mapping purposes, here we should note that the planet Loki is only “a three-months’ reaction-drive voyage from Yggdrasil”,⁴² which seems to place it in the same stellar system. So Loki is also 20 ly from Freya. Adriaan de Ruyter adds that Freya is “closer Terra than Yggdrasil”, which is “right next door.”⁴³ These references suggest that Yggdrasil and Loki are farther from Sol than Freya, and off to one side. The two planets are therefore somewhat more than 70 ly out; perhaps 75 or 80.

Four-Day Planet, circa AE 495. Then in *Four-Day Planet* (also written in 1960, and in fact right after “When in the Course—”),⁴⁴ we finally get an actual figure. Walter Boyd muses that “A ship can log a light-year in sixty-odd hours, but radio waves still crawl along at the same old 186,000 mps.”⁴⁵ “Sixty-odd hours” fits the 62.57 hr/ly speed from “When in the Course—”, but not the estimated speed of 59 hr/ly in *Uller Uprising*. Thus, the rate at which the *Peenemünde* travels from Terra to Fenris is probably the same deduced speed that the *Stellex* travels the 20 light-years from Freya to Yggdrasil—62.57 hr/ly.

My conclusion is that 62.57 hr/ly is most likely Piper’s true figure for ship speeds, from AE 192 (when the first hyperdrive ship is sent to Alpha Centauri)⁴⁶ to at least AE 526 (*Uller Uprising*). Standard hyperships can travel a light-year in 62.57 hours, or exactly 70 ly in six months. At 76 and 148 ly from Sol, that would mean Beta Hydri is more than six months away, and Nu Puppis more than a year out.

But this speed reveals a deliberate error in *Four-Day Planet*. Walt lives on the planet Fenris, which is supposedly “six hundred and fifty light-years to the galactic southwest of Sol”, and a hypership will once again take six months to travel to Terra.⁴⁷ If the ship speed is correct, however, it will take more than 4 and a half years to get to Terra (62.57 hr/ly times 650 ly), not 6 months. And if the distance is correct, then the ship speed is about ten times faster than Beam says it is, which contradicts the speed in *Uller Uprising*. So once again, Piper appears to have multiplied the true distance by ten. Because if Fenris is only 65 ly from Terra, then it will take slightly less than six months to travel that distance at 62.57 hr/ly. Sixty-five light-years multiplied by 62.57 hr/ly = 4,067 hours, which is 169.5 days. This is not much less than six months, which as we’ve seen is 182.5 days.

The corrected distance of 65 ly therefore confirms that it will take Walter Boyd, Tom Kivelson and Bish Ware about six months to reach Terra, after they leave at the end of the novel. It’s actually 13 days less (182.5 minus 169.5), so that if they leave Fenris exactly six months before their college classes start, Walt and Tom will have almost two weeks on Terra to settle in and get used to “a world where you go to bed every time it gets dark and get up when it gets light, and can go outdoors all the time.”⁴⁸

Now for the location of Gimli. Interestingly enough, the vast majority of *Four-Day Planet* seems to take place over a four day period. On day 1 the *Peenemünde* arrives on Fenris, and Bish Ware meets ‘Dr. Watson’, who is really “Detective-Major MacBride of the Colonial Constabulary.” Bish sends MacBride on to Gimli, in order to arrange for a Space Navy destroyer to come back to Fenris. There, it will pick up Anton Gerrit, alias Steve Ravick, and take him back to Terra to be tried for “the enslavement of from twenty to thirty thousand Lokian natives...most of whom were worked to death in the mines.”⁴⁹

Gimli is “the next planet out” on “the Terra-Odin milk run”, so it must be farther than 65 ly from Sol.⁵⁰ It is not stated when MacBride leaves Fenris, nor what ship he takes to Gimli. One would assume that he leaves very soon, probably just a day later. On day 2 he could therefore depart on the *Peenemünde*, assuming the ship only needs one day to offload passengers and cargo, and take on who and whatever is going on to the next stop. Anyway, two days later, or day 4, the main story ends, and Bish Ware says the TFN destroyer *Simón Bolívar* should be arriving on Fenris “in about two hundred and fifty hours.”⁵¹

Adding 250 hours to the estimated 48 hours that have passed since MacBride departed equals 298, or

say 300 hours. Dividing 300 hours by the 62.57 hr/ly speed results in a round-trip distance of 4.8 light-years, or 2.4 each way. The time it takes to travel this distance is derived by dividing 300 hours by 24, which equals a round trip of 12.5 days, or 6.25 days each way.

Now let's put it all together. And Figure 6 below shows how things look so far. Fenris and Gimli are properly placed southwest of Sol, while the known directions of Beta Hydri and Nu Puppis seem to locate Uller and Niflheim to the galactic south-southwest. While this might make it appear that Fenris and Gimli are not too far from Uller, the Terra-Uller-Niflheim triangle is almost certainly not in the same plane as the Terra-Fenris-Gimli one. (This of course being the main problem in representing three-dimensional space on two-dimensional maps.)

The location of Freya directly east of Terra, and the locations of Yggdrasil and Loki to the southeast, are speculative, being based on my own mental image from reading the story. However, since Julio Almagro compares Freya to Venus,⁵² it might make sense. Because this arrangement would place Freya between Terra and the galactic center, the Core; even as Venus lies between Terra and the center of the solar system, the Sun.

Speaking of cores, Figure 6 gives us an initial glimpse at what can be called the 'Norse Core' of the Federation. "The first extrasolar planets, as they had been discovered, had been named from Norse mythology—Odin and Baldur and Thor, Uller and Freya, Bifrost and Asgard and Niflheim. When the Norse names ran out, the discoverers had turned to other mythologies, Celtic and Egyptian and Hindu and Assyrian..."⁵³ This statement by Piper certainly suggests that, on the whole, the Norse planets lie closest to Sol, with the other mythological planets at greater distances.

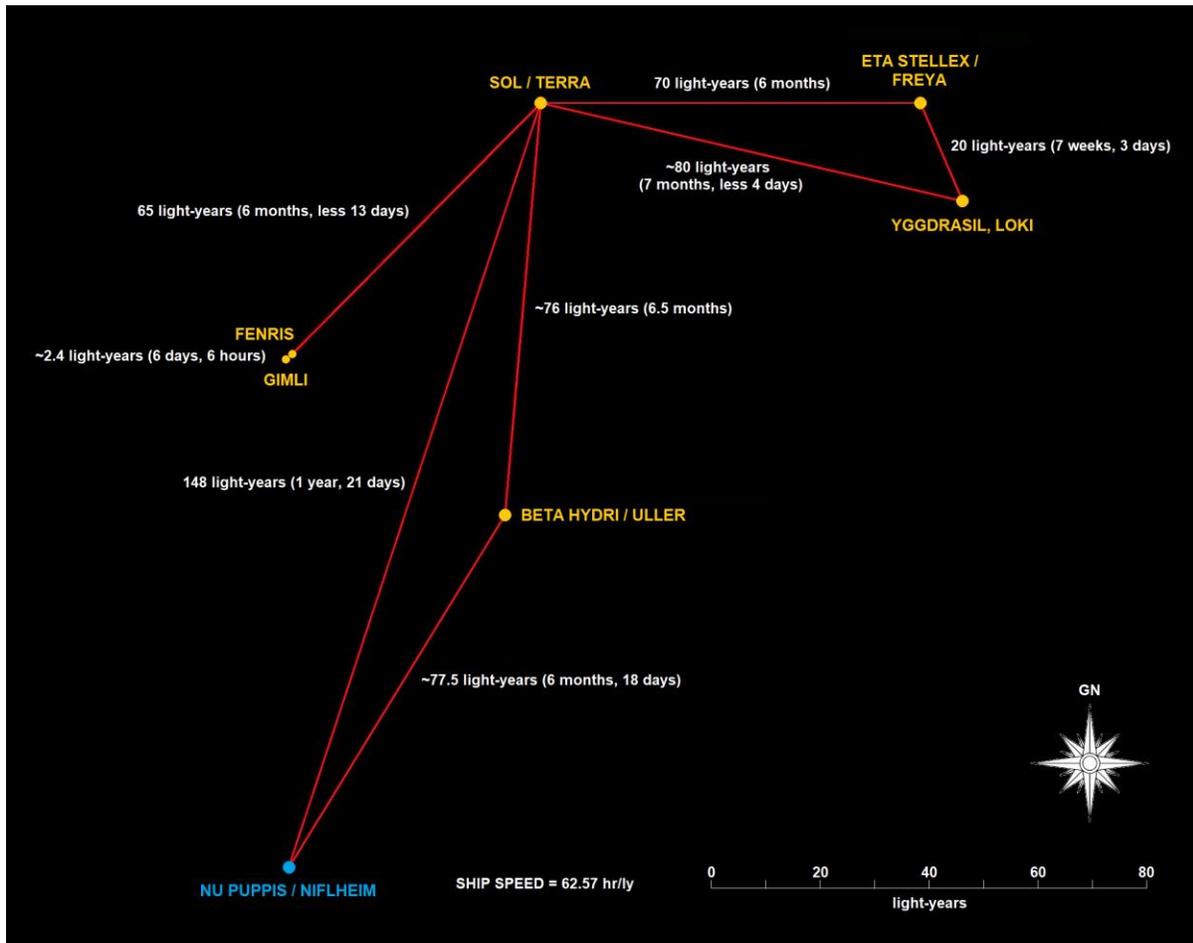


Figure 6. Initial estimate of central Federation space circa AE 500, using the 62.57 hr/ly speed.⁵⁴

So the Elektran system should be less than 1000 light-years from Sol, consistent with the other Federation distances in Piper's works. The median distance between the nearest and farthest stars in Canes Venatici, 27 and 970 ly, would be 471.5 light-years, or say 470 for convenience. This is not too different than the 521 ly distance to RS Canum Venaticorum, which is a binary system like Piper's Elektran system. And the 470 ly distance seems about right for a system discovered 57 years before Zarathustra (AE 572 compared to AE 629), which Piper says is 500 light-years out.

From a galactic source-map I found on the internet, Canes Venatici appears to be located southeast of Sol. So a 470 ly distance would presumably place the Elektran system in the Orion-Sagittarius Gap, among the stars of a cluster lying inside an 'island' of interarm gas.

As the commanding officer of a "Space Navy Exploration and Discovery" vessel, Captain Carpenter may have been traveling the stars for some years before reaching the Elektran system, similar to how the *Stellax* takes "four years" and visits "six systems" before finally discovering Freya.⁶³ I assume this means that the slower speed of 62.57 hr/ly is still in effect. But as we will now see, this appears to change by the time of the Fuzzy novels.

The Fuzzy novels, AE 654. *Little Fuzzy*, *Fuzzy Sapiens* and *Fuzzies and Other People* take place three-quarters of a century after *First Cycle*. And ship speeds appear to have increased in the interim. In *Little Fuzzy*, Zarathustra is located 500 ly from Sol, and it (yet again) takes the standard six months to get to Terra.⁶⁴ It seems logical that a planet named for an ancient Persian religious leader would be farther out than those named for the Norse gods. So that forces us to consider accepting both time and distance to Zarathustra. And if we divide 6 months by 500 ly, we get a ship speed of 8.76 hr/ly. Again, this should be considered a working estimate.

An 8.76 hr/ly speed is about 7 times faster than the previous ship speed of 62.57 hr/ly, and about 9 times slower than the 1 hr/ly ship speed in *Space Viking*. So it seems to make sense as a sort of 'intermediate' speed.

In fact, to even things out, I would round it down to 8 hr/ly, or 3 light-years per day. This would be roughly eight times faster than the old speed, and eight times slower than the one in *Space Viking*. An adjustment that can be rationalized, since—unlike the direct routes between Terra and Freya, Terra and Fenris, and Terra and Uller—ships do not travel directly between Terra and Zarathustra. Zarathustra is just one stop on the "Terra-Baldur-Marduk Spacelines" route, and we know that Volund is "the first port of call en route" back toward Terra.⁶⁵ This implies there are other stops before arriving at Sol. So while it takes six months to travel between Zarathustra and Terra, the actual distance covered must be somewhat more than 500 ly. And this should mean a slightly faster speed.

I therefore assume that around AE 600—between *Uller Uprising* (old speed) and *Little Fuzzy* (new speed), and 30 years after *First Cycle*—a major advance in hyperdrive technology takes place. Ships can now travel eight times faster. The old speed of 62.57 hr/ly would then last from AE 192 to AE 600, or roughly 400 years; the new speed of 8 hr/ly lasts from AE 600 to sometime after the Federation falls, say another 500 years. And then we get the next eight-times-faster speed of Space Viking ships, 1 ly/hr, which is almost certainly a Sword-World innovation (see *The Viking Model*, below).

But while Zarathustra is 500 ly out, which direction from Terra is it? Well, from *Space Viking* we know that Marduk is 350 ly from Gimli, and "Graveyard of Dreams" says it was a member of the System States Alliance.⁶⁶ So Marduk is probably located to the galactic south of Gimli; either south, southeast or southwest. If it's to the southwest, Marduk would be 415 ly from Terra, the greatest possible distance. But I assume it's to the south-southeast, which would make it an even 400 ly south of Terra. That leads us to Baldur, which, as the apparent midpoint of the TBM route, should likewise place it south of Sol, about halfway to Marduk. To minimize the confusion of intersecting lines on my growing map, I decided to locate Baldur 200 ly south-southeast of Terra, which places it about 212 ly away from Marduk.

It's a little surprising that Zarathustra is farther from Terra than Marduk. That differs from my mental picture, which always had Marduk as the outermost stop of TBM Spacelines. But it makes sense if Babylonian mythology was used for planet names before Persian mythology, and I get the impression that Marduk was settled long before Zarathustra anyway. Zarathustra would then have been an extension, tacked on to the former end of the TBM route. Probably because it is "a better world than Terra ever was, even before the Atomic Wars".⁶⁷ It's an excellent addition to the TBM network, whose executives probably hope that Zarathustra is a prelude to more profitable planets even farther out.

But TBM has competition. Leslie Coombes mentions the fear that “somebody like Pan-Federation or Terra-Odin will get hold of [North Mallorysport] and put in a spaceport to compete with Terra-Baldur-Marduk on Darius.”⁶⁸ For that reason, I located Zarathustra southwest of Gimli, which we know is one of the T-O stops. Volund was tentatively placed 200 ly northeast of Zarathustra. This is more than half the distance to Niflheim (possibly another TBM stop), and 300 ly from Terra.

The Cosmic Computer, AE 894. Now on to Piper’s final Federation story, *The Cosmic Computer*. And once again, we find a planet that is six months out from Terra. No ship speed is given, but it is said that the *City of Asgard* took 2 months to bring Conn Maxwell from Odin to Poictesme, which implies that it took the *Mizar* 4 months to take him from Terra to Odin.⁶⁹ No intermediate stops are mentioned (and are probably not necessary due to the faster ship speed), so if we assume that starships still travel at roughly 8 hr/ly, then Odin would be located about 365 ly from Terra (4 months or 2,920 hours divided by 8), and Poictesme about 182.5 ly from Odin (2 months or 1,460 hours divided by 8).

Parenthetically, the distance from Terra to Odin seems a bit far, considering that the latter is one of “the first extrasolar planets” to be discovered, and in fact the first one named by Piper (“Odin and Baldur and Thor...”). The distance from Odin to Poictesme, on the other hand, seems too close. I would have thought it farther out. Indeed, given that Odin is a member of the very first category of Federation planets (Norse) while Poictesme is a member of the very last category (those “named for almost anything”),⁷⁰ it would make more sense if the Terra to Odin leg took two months, while the Odin to Poictesme leg took four months. So we have to consider the possibility that this is another one of Piper’s deliberate errors.⁷¹

In the absence of evidence compelling enough to make a change, however, I decided to accept the situation as described by Beam. And Odin at 365 ly still seems reasonable enough, since it is closer to Terra than Marduk at 400.

So now, adding the distances traveled by the *City of Asgard* and the *Mizar* means that Conn’s trip from Terra totaled about 547.5 ly (365 + 182.5), or say 550. But that doesn’t mean Poictesme is 550 ly from Sol. That could only be if Terra, Odin and Poictesme are all in a straight line. The Gartner Trisystem is probably not that conveniently situated. It is likely off to one side, meaning the true distance would be a bit less than 550 ly. Yet this is also acceptable, as it places Poictesme farther out than Zarathustra, which is discovered about 70 years earlier (AE 629 for Zarathustra, as opposed to “the beginning of the Seventh Century”, or circa AE 700, for Poictesme).⁷²

Moreover, it could be argued that Zarathustra is really one of the planets named “for almost anything”, like Poictesme. Because Zarathustra is not a deity from myth, like Odin or Isis or Marduk; Zarathustra was a historical religious leader of Persia. And the moons of Zarathustra, Darius and Xerxes, are named for historical Persian rulers. This is in contrast to deity-named planets like Odin, whose moons Hugin and Munin are named for mythological beings. Moreover, Beam says that the mythological names run out sometime before “the middle of the Seventh Century”, which is when they start “naming planets for almost anything.”⁷³ Zarathustra is colonized in AE 629, or not long before the middle of the Seventh Century. The similarity of Zarathustra’s and Poictesme’s distances from Terra would then make even more sense.

After Poictesme is colonized, we know that the Federation continues to expand for another century and a half. Because Otto Harkaman mentions that Tanith “was one of the last planets the Federation colonized before the [System States] War”, which begins in AE 842.⁷⁴ Thus, the other planets named for almost anything should also be at comparable distances to Zarathustra and Poictesme, but slightly farther out. Say, 550, 600, 650 or 700 ly from Sol. These worlds would include the ‘demonic’ category, including worlds like Abigor, Ashmodai, Belphegor, Baphomet and Mephistopheles; and the ‘literary’ category, which includes Beowulf, Hiawatha and Moruna. Tetragrammaton, named for the four-consonant abbreviation of the Hebrew god Yahweh, could be another.⁷⁵

Now, let’s connect some of these additional planets to our “stick-and-ball construction” of Figure 6, which is beginning to look like something Fuzzies would build using “a molecule-model kit”.⁷⁶ As seen below, Figure 7 gives us a better view of the central Federation, including our first looks at the Terra-Baldur-Marduk Spacelines route and the Terra-Odin milk run. Assuming that the TBM planets are south of Terra, then when ships traveling the route are heading inward from Volund, they could stop at Niflheim and Uller before reaching Terra. And since Fenris is southwest of Terra, this means that Terra-Odin ships

heading outward from Gimli likely bear more to the west. For convenience, I placed Odin directly west of Sol.

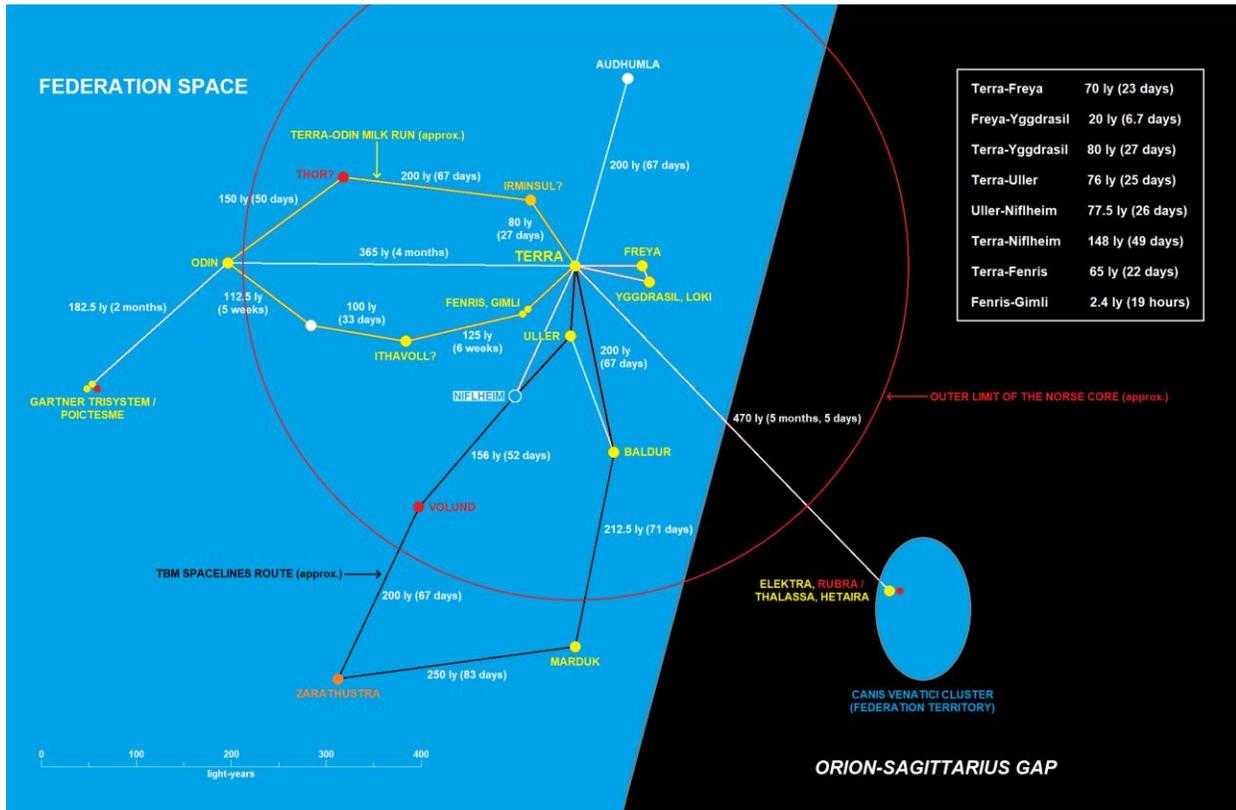


Figure 7. Expanded estimate of central Federation space circa AE 700, using the 8 hr/ly speed.⁷⁷

According to Bish Ware, “There are six planets at which those Terra-Odin ships stop.”⁷⁸ I presume this means apart from Terra and Odin, the inner and outer ends of the run. Two of the six planets are Fenris and Gimli, but they are so close together that I postulate another two on the way out to Odin. Because before Fenris was colonized, there would have only been 5 planets on the run between Odin and Terra, and Gimli was probably the first stop. So originally, there would have been three planets along the route to Odin, and two inbound toward Terra; and the latter I placed in the northern Federation.

Their locations are speculative, as well as the distances between them. But given that they are closer to Terra than Odin, it seems probable that all four of these ‘unknown’ planets have Norse names. And Beam gave us plenty to choose from; including Asgard, Bifrost, Fafnir, Hoth, Irminsul, Ithavoll, Ithunn, Midgard, Skathi and Valhalla.⁷⁹ Assuming that Odin is the outermost Norse planet, the ‘Norse Core’ would then extend out to roughly 350 ly from Terra, or less than half the Federation’s estimated radius of 800 ly. The Norse Core radius is also delineated in Figure 7.

I gave tentative identifications for three of the unknown T-O planets. The first is Irminsul, which could lie northwest of Terra. In *Space Viking*, the Gilgameshers who first arrive on Tanith carry a cargo which includes “vegetable-amber and flame-bird plumes from Irminsul; ivory or something very like it from somewhere else; diamonds and Uller organic opals and Zarathustra sunstones.”⁸⁰ If the ‘ivory’ is actual ivory, then they probably got it on Terra. They might have also procured the diamonds there. The course of their voyage could then have gone from Irminsul (amber and plumes) southeast to Terra (ivory and diamonds), then from Terra south-southwest to Uller (organic opals), and then from Uller southwest to Zarathustra (sunstones). As we will see later, their course continues its curving pattern, as Tanith appears to lie northwest of Zarathustra. And after Tanith, their voyage may end on Gilgamesh itself, which might not be too far from Odin. (See **The Sphere of Gilgamesh**, below.)

The second tentatively identified T-O planet is Ithavoll. For also in *Space Viking*, King Mikhyll VIII says that “Three centuries ago, Ithavoll was a colony of Marduk—it seems we can’t afford colonies, any more—and it seceded from us... Today, it is a civilized world, and one of Marduk’s best friends.”⁸¹ Since Gimli is a trade planet of Marduk, Ithavoll could originally have been another, prior to becoming a formal colony. If it is located southwest of Gimli, then its distance to Marduk would be comparable to that of Gimli, though a little closer. Another possibility for the location of Ithavoll would be the T-O planet southeast of Odin. This location is a little bit farther from Marduk than Gimli, so the greater distance might make it easier to secede from the mother world.

The third is Thor, which I located northeast of Odin. In “Ministry of Disturbance”, the Household Guard of the Galactic Emperors on Odin is composed of dog-like Thorans; alien “hillmen from the southern hemisphere of Thor”.⁸² This could mean that Thor is not far from Odin; and in Norse mythology, Thor is closely associated with Odin, being his son. Thor is depicted as having red hair and a red beard, from which sparks fly when his fiery temper is aroused. So I made the sun of Thor a red star.⁸³

For good measure, I added Audhumla. In *Space Viking*, this is another trade planet, 600 ly from Marduk.⁸⁴ That distance means it also fits within the Norse Core. Given the three-dimensional aspect of Federation space, Audhumla could actually be located ‘above’ or ‘below’ Sol. But since I’m working with a two-dimensional map, I had to place it on the far side of Sol, in the northern Federation. And assuming that Marduk is 400 ly from Terra, then Audhumla should be about 200 ly from Terra.

In the southeastern part of the map, we see Canis Venatici, described as a “medium-sized star cluster”. As usual with Piper, ‘medium-sized’ is a pretty vague statement, but the star Elektra is “thirty-eight light-years from the cluster’s gravitic center”, and it is detected by the *Franklin’s* scanners while the ship is “at the perimeter” of the group.⁸⁵ This implies the system is not too far from the outer edge, as well as not too far from the center. So I decided to make the cluster 150 ly in the north-south axis, and 100 in the east-west axis. The binary stars of Elektra and Rubra would then be about 12 ly from the perimeter, and I placed them on the side closer to the Orion Arm, the direction from which the Terrans come. The Elektran system was placed in the northwestern part of the cluster, because I assume that Captain Absalom Carpenter stops at Baldur or Marduk, before heading toward the eastern edge of the Orion Arm, from which he makes the jump to the cluster.

In addition, I presume that after exploring the system, Captain Carpenter takes the *Franklin* deeper in, exploring the rest of the cluster, at least in a general way. It is likely that other stars are found to have habitable planets, and at some point Absalom undoubtedly returns to Federation space and registers his discoveries. Thus, other habitable planets of Canis Venatici are probably settled in the final two decades of the Sixth Century AE, and the cluster effectively becomes Federation territory.

As in Figure 6, Figure 7 includes distances and speeds between planets. From the boxed list on the right side, notice that the new 8 hr/ly speed gives us a sense as to how much faster ships can travel. In Figure 6, Freya, Uller and Fenris were six months or so from Terra; now they are a little more than 3 weeks, being only 23, 25 and 22 days away. And Niflheim, which formerly took a year and three weeks to reach, is now only 49 days away; a mere 7 weeks from Sol.

This configuration does cause one problem—it violates Beam’s statement that Gimli is “the nearest planet” to Zarathustra.⁸⁶ Unless I’m missing something, this cannot be true. The only way it might work is if Fenris really were 650 ly from Terra, which means Gimli would be at 675. That would make the minimum distance between Gimli and Zarathustra only 175 ly (675 minus 500). But again, the 675 ly distance contradicts the speed in *Uller Uprising*.

Moreover, *Fuzzy Sapiens* implies that Gimli is much closer than even 175 ly. It is said to be “a month” away from Zarathustra.⁸⁷ One month is 730 hours, which means Gimli should be about 91 light-years from Zarathustra (730 hours divided by 8 hr/ly); or only 83 ly if we use the original estimated speed from the story (730 divided by 8.76 hr/ly). Thus, this appears to be a deliberate error, because I don’t see any way Gimli can be that close.⁸⁸

So in this instance, it is possible that Beam himself got a little confused, between the real distances and his deliberately false ones. It bears mentioning that he also got confused on some of his dates, as seen in his short piece “The Future History”.⁸⁹ Another possibility is that Piper was simply drawing attention to Gimli, as a hint that the planet has a much larger role to play later on. If I’m right, that day comes not long after the end of the First Galactic Empire (see **The Second Galactic Empire**, below).⁹⁰

Having figured out the approximate ships speeds during the early and later Federation periods, we can now construct a simple chart. And to make it complete, let's add Piper's ship speeds during the post-Federation interregnum period (1 ly/hr, *Space Viking*) as well as during the Galactic Empire ("light-years an hour" in "Ministry of Disturbance", which I assume means at least one parsec per hour).⁹¹

Early Federation (circa AE 192-600) Ship Speed

"When in the Course—"	c. AE 234	62.57 hr/ly
<i>Four-Day Planet</i>	c. AE 495	62.57 hr/ly
<i>Uller Uprising</i>	AE 526	62.57 hr/ly
<i>First Cycle</i>	AE 572	62.57 hr/ly

Later Federation (circa AE 600-1100)

<i>Little Fuzzy</i>	AE 654	8 hr/ly
<i>Fuzzy Sapiens</i>	AE 654	8 hr/ly
<i>Fuzzies and Other People</i>	AE 654	8 hr/ly
"Naudsonce"	c. AE 705	8 hr/ly
"Oomphel in the Sky"	AE 812	8 hr/ly
<i>The Cosmic Computer</i>	AE 894	8 hr/ly

Interregnum (circa AE 1100-1900)

<i>Space Viking</i>	c. AE 1705	1 ly/hr
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Galactic Empire (circa AE 1900-3200)

"A Slave is a Slave"	c. AE 2150	3.26 ly/hr (assumed to be the same as in "Ministry")
"Ministry of Disturbance"	c. AE 3050	3.26 ly/hr (not specified; I assume 1 parsec per hour)

Assuming this list is correct, the speed increase circa AE 600 could have unintended consequences. In *The Cosmic Computer*, Merlin says that "The Terran Federation, overextended, had been cracking for a century before the War; the strain of that conflict had started an irreversible breakup."⁹² It could have become overextended because the greater ship speed suddenly made it easier to colonize new planets much more quickly. Too quickly perhaps for the Terran Federation to adapt to the new conditions.

Because by AE 700, a large number of new worlds could be colonized in a burst of expansion; many of which will be much farther from Terra than any earlier settled planet. AE 700 is also when Poictesme is settled, and unlike the earlier-colonized worlds closer to Terra, Poictesme never attains continuous prosperity. It goes through several boom-and-bust periods. This might be an indication that the Federation has begun expanding beyond its ability to economically integrate and govern them effectively.

A second unintended consequence follows from the first. The Federation government would undoubtedly use the faster ship speed to try and extend greater control over its systems. In turn, those planets which had previously enjoyed a certain autonomy due to their distance from Terra would naturally resent the Government's attempts to impose their authority. And these resentments would gradually build, until they contribute to a decision by some planets to secede, which they finally do in AE 839.

This brings us back to the era of the System States War. So now that we have a provisional handle on the Federation's internal configuration, let's look at that period again, and Poictesme's role in it.

8. The Federation Fleet-Army Forces

Poictesme was "the advance base for the Third Fleet-Army Force, during the System States War."⁹³ That's why I placed Poictesme southwest of Odin in Figure 7. For as shown in Figure 8 below, it's not far from the estimated Alliance border. In addition, that Poictesme houses the 'Third' Fleet-Army Force implies there are at least two more; the First and Second Fleet-Army Forces.

Since General Foxx Travis' command was based on Poictesme, his Third Fleet-Army Force (labeled 3FAF on the map) was therefore stationed on the Federation's western flank. By extension, one would guess that the Second Fleet-Army Force (2FAF) could have had its HQ on the planet I tentatively identify as Ithavoll, guarding the central Federation. And the First Fleet-Army Force (1FAF) could be stationed on or near Uller, defending the Federation's capital and GHQ, Terra, plus the Norse Core systems around it.

These three Federation Fleet-Army Forces broadly parallel the three Union armies positioned along the western, central and eastern fronts in the Civil War. The eastern force (the Army of the Potomac) defended Washington DC, and eventually invaded Virginia; the central one secured Kentucky and then invaded Tennessee and Georgia (under General Rosecrans and then General Sherman); and the western army advanced down the Mississippi to split the Confederacy in two (General Grant).

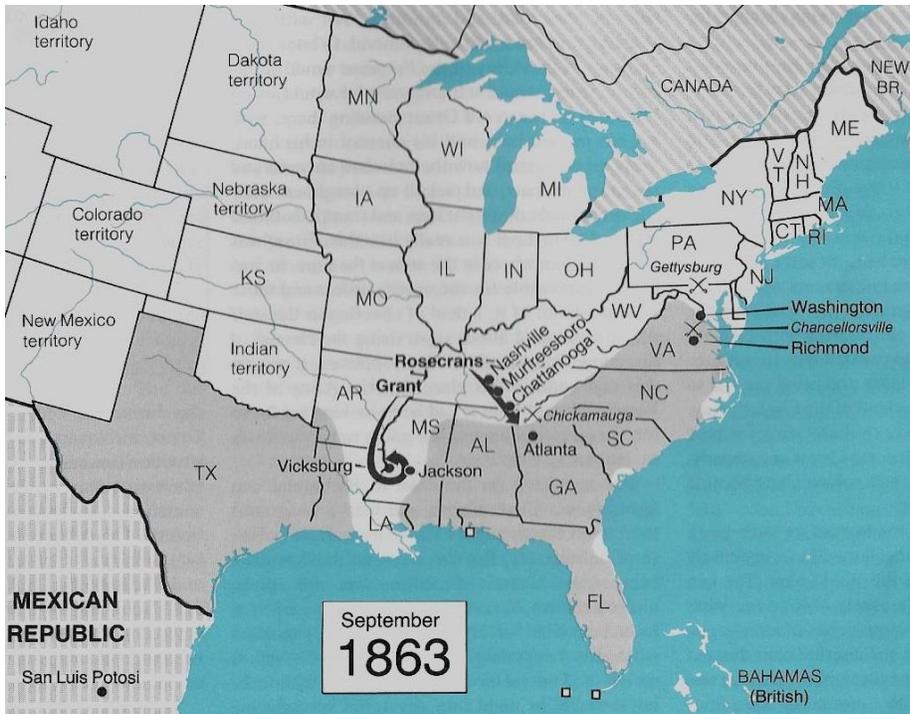
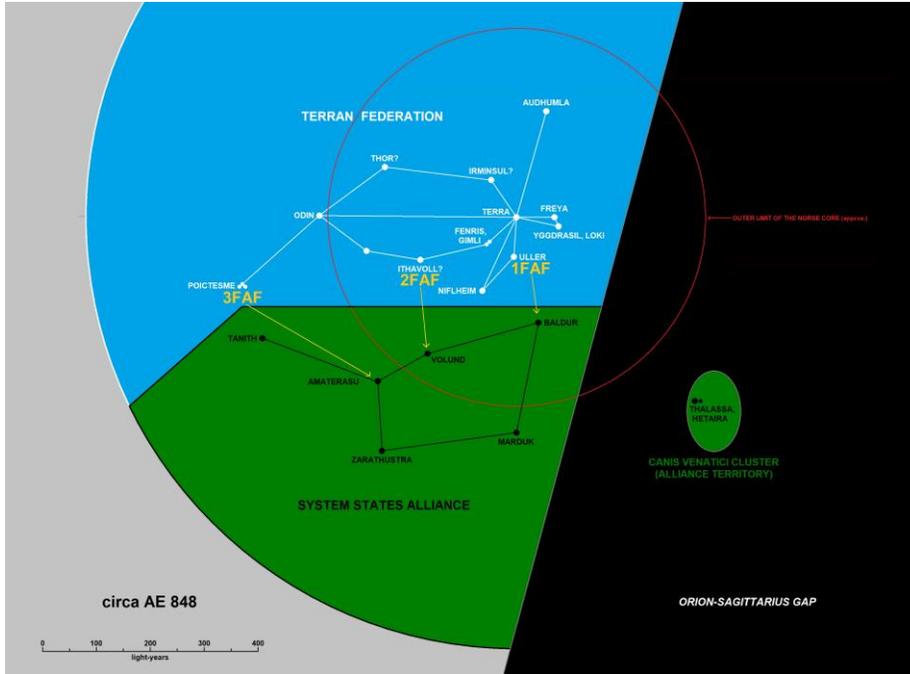


Figure 8. Presumed Federation Fleet-Army Force advances (plus changes to trade routes), compared to Union army campaigns.⁹⁴

As depicted in Figure 8, I presume that the Terra-Baldur-Marduk Spacelines route was disrupted due to the System States War, in which planets like Baldur, Marduk, Zarathustra and Volund “took themselves outside the Federation economic orbit”.⁹⁵ Most of the route winds up within Alliance space, whose government would then have connected it with other planets in the area under its control.

On the Federation side of the border, the Second Fleet-Army Force stationed on or near Ithavoll might have had the original mission of guarding the south-central section of the Terra-Odin milk run, possibly threatened by Alliance forces on Volund. Another item of interest is Poictesme’s location in the south-western Federation. Its mesas and buttes in the desert, such as the one housing Force Command Duplicate,⁹⁶ support this part of Poictesme as a parallel of the American Southwest.

Two new planets make an appearance on our star-map; Tanith and Amaterasu. In *Space Viking*, Tanith is said to be 450 light-years from Gimli, and 500 from Marduk.⁹⁷ That would seem to place it in the western part of the Alliance, south of Poictesme. By my calculations, Tanith would then be about 525 light-years from Terra; a distance which is rather unexpected. Because as “one of the last planets the Federation colonized before the Big War”,⁹⁸ I always thought that Tanith was near the outer edge of Federation space. However, it is named for the Carthaginian moon-goddess, presumably meaning that Tanith actually belongs to the mythological category of worlds which lie between the Norse Core and the outer ring of planets named “for almost anything”. In that sense, Tanith’s location seems reasonable.

As for Amaterasu, it is known to have been a member of the System States Alliance, and as we will see below, internal evidence suggests that it is located about 230 ly from Tanith.⁹⁹ Being a member of the Alliance, that rules out a location north or west of Tanith; that would place Amaterasu in the south-western section of Federation-controlled space. And since it is named for the Japanese sun-goddess, Amaterasu should be outside the Norse Core, and yet not so far that it is among the planets named for almost anything. So I placed Amaterasu southeast of Tanith, making it about 270 ly northwest of Marduk.

At some point during the War, the Alliance “fleet that was based on Amaterasu was blasted out of existence in the spaceports and in orbit.”¹⁰⁰ I assume this is Foxx Travis’ doing, as his Third Fleet-Army Force advances deeper into the Alliance, in tandem with the Second and First FAFs. The Third FAF is depicted as bypassing Tanith because, as a newly-colonized planet, Tanith is probably of little strategic value. It only gains significance nine centuries later, when Lucas Trask arrives in the *Nemesis*.

Another assumption is that the Canis Venatici star-cluster secedes from the Federation, becoming part of the System States Alliance. This would secure the Alliance’s eastern flank, and could forestall Federation plans to attack from that direction. It may therefore prolong the System States War, which unlike its Civil War model lasts twelve years, rather than four. If the cluster has a real-world parallel, it could be the Bahama Islands. For if the Confederates had held the Bahamas, they might have been able to prevent Union ships from entering the Gulf of Mexico, or at least go a longer way around; thereby disrupting and delaying the economic blockade which contributed to the South’s eventual collapse.

9. From Confederate Refugees to Alliance Refugees

But collapse the Confederacy did, the System States Alliance finally does as well. As described by General Mike Shanlee, “The whole Alliance caved in all at once.”¹⁰¹ After its defeat, however, “Ten thousand men and women on Abigor, refusing to surrender, had taken the remnant of the System States Alliance navy to space, seeking a world the Federation had never heard of and wouldn’t find for a long time. That had been the world they had called Excalibur.”¹⁰² The first of the Sword-Worlds.

Which way did the refugees go when they left the Federation? It probably depends on the position of Abigor within the Alliance. If Abigor is in the south or southwestern Alliance, they could have journeyed to the northwest, west, southwest or south-southwest—all while staying within the Orion Arm. If Abigor is in the eastern Alliance, they could have traveled northeast, east or southeast—out into the Orion-Sagittarius Gap. My first thought was that they journeyed to the galactic south-southwest. Because the 10,000 Alliance refugees who establish the Sword-Worlds seem to parallel the Confederados; 10-20,000 Confederate refugees who left the Southern States and established new communities in Brazil, “chiefly [in] the state of São Paulo.”¹⁰³ One such community, Americana, survives to this day, being located northwest of the city of São Paulo and more than 100 miles from the Atlantic Ocean.

Assuming this is the historical model Beam had in mind, it would mean that Excalibur, and the other Sword-Worlds established around it, would be located very far south of Federation space. As well as not far from the inner edge of the Orion Arm; an ironic parallel with their old nemesis, Terra.

The distance traveled is similar, too. From Mobile, Alabama to Americana, Brazil is about 4569 miles. (Figure 9.) And the known distances from the Sword-Worlds to the Old Federation are much greater than any mentioned in Beam's Federation stories. Instead of the 700, 650 or 500 light-years from Terra to Freya, Fenris and Zarathustra, we get more than 3000 light-years from Gram to Tanith, and over 2000 light-years from Curtana to the nearest Federation world.¹⁰⁴

In any case, the Sword-Worlds seem to be separated from the Old Federation by a minimum of 2000 light-years. Adding 2000 to the 800 ly for the estimated radius of the Federation, plus a couple of hundred for the estimated radius of the Sword-Worlds, would equal about 3000 ly from Excalibur to Sol.

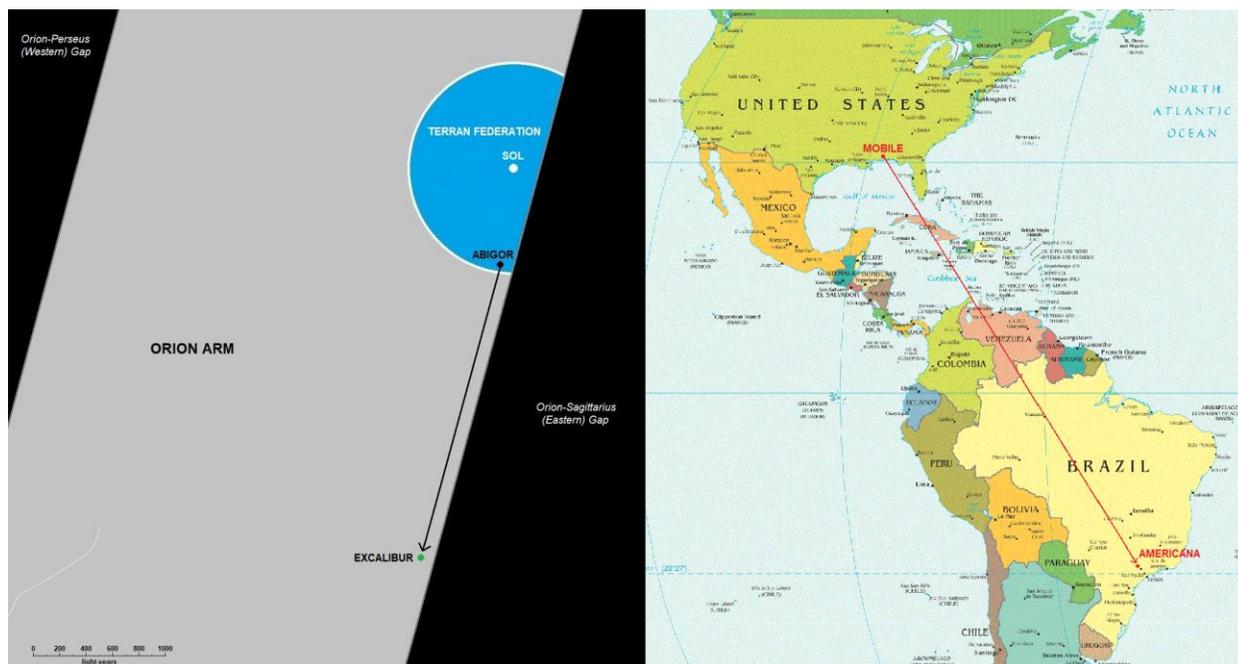


Figure 9. Possible route of the refugees from Abigor in AE 855, compared to the direction of the Confederado migration in 1865.

This would indeed be a location “the Federation...wouldn’t find for a long time.” Given the variety of directions and distances the Alliance refugees could travel, it is highly doubtful the Terran authorities would bother to go after them. Even if they did, they would most likely investigate systems not far beyond Federation space. Failing to find anything, the search would soon be called off. As for natural expansion, the Terran Federation ceases growing with the advent of the System States War. But if it had resumed afterward, it would still have taken the Federation many centuries to expand from a radius of 800 light-years to one of 3000.

10. The Relative Locations of Tanith, Xochitl and Gram

Other information in Piper, however, forced me to reconsider the ‘southern’ option for the Sword-Worlds. In addition to its known distances from Gimli and Marduk, Tanith is said to be less than 700 ly from Audhumla, as well as a thousand light-years from Xochitl.¹⁰⁵ We already placed Audhumla north of Sol, which means Xochitl should be in the northern Federation as well. But if the Sword-Worlds are located far to the south of Federation space, then Tanith should be 1000 ly closer to them than Xochitl is. Yet that is not the case; internal evidence reveals that Xochitl is actually much closer to Gram.

Here’s how it works out.

In *Space Viking*, Prince Viktor of Xochitl takes a fleet of eight ships to Gram, in order to uphold Omfray of Glaspyth’s “trivial” claim to the planetary throne.¹⁰⁶ We know it’s 3000 light-years between Gram and Tanith,¹⁰⁷ and 1000 between Tanith and Xochitl. So we need only solve the third side of a triangle; the distance from Xochitl to Gram. And fortunately, Beam provided enough clues to produce an answer.

While waiting on Tanith for news, Prince Lucas Trask muses that “Three thousand hours had passed since the first warning had reached Tanith; that made five thousand since Viktor’s ships had left Xochitl.” “The next day, two other [ships] came in”—add 24 hours—“And four days after that,” or 96 hours more, “Duke Joris’ confidential secretary” arrives on Tanith, imploring Trask to come back to Gram and save them from Duke Omfray and Prince Viktor, whose fleet from Xochitl had arrived just before he left.¹⁰⁸

All we have to do is add 5000 hours, plus 24 hours, plus 96 hours, which equals 5120 hours. This is the time it took Viktor to travel from Xochitl to Gram, and then the news to travel from Gram to Tanith. Now subtract 3000 hours for the Gram to Tanith run, and we get 2120 hours for the time/distance from Xochitl to Gram. A number which enables us to estimate their relative configuration. (Figure 10.)

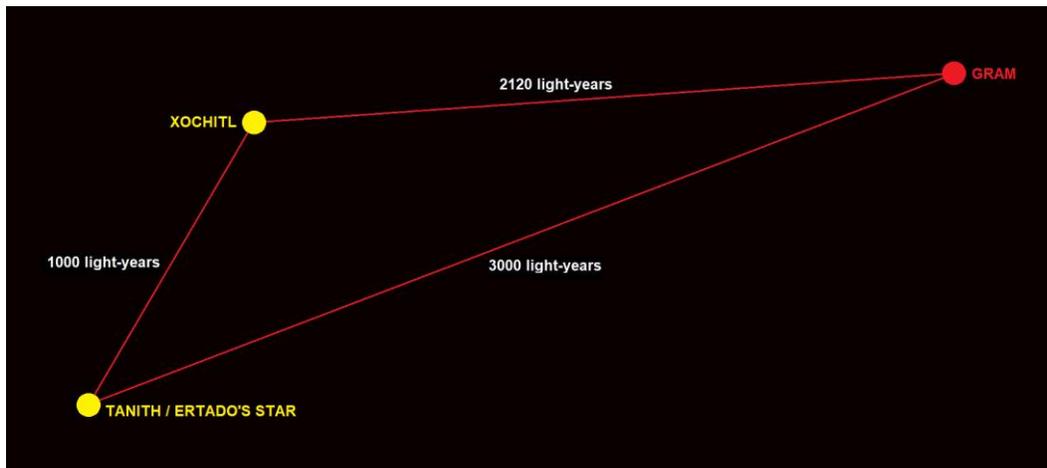


Figure 10. Estimated configuration of Tanith, Xochitl and Gram.¹⁰⁹

The estimated distance of 2120 ly from Xochitl to Gram is consistent with the “over two thousand light years” from Curtana to the nearest Federation world. And the resulting chart provides another reason why Lucas Trask decides to “cut loose from the Sword-Worlds; especially cut loose from Gram. Let Viktor of Xochitl have it.”¹¹⁰ Not only are the Sword-Worlds steadily decivilizing due to their endless internal squabbles, but at only 2120 light-years away, Xochitl is almost 900 light-years closer to Gram. And 900 light-years equals 900 hours, which is 37.5 days. Prince Viktor can therefore reach Gram about 5 weeks faster than Prince Trask. Thus, Lucas would be at a huge disadvantage if he tried to defend Gram against Xochitl, or stake his own claim to it. Similar to the disadvantage the US faced in defending the Philippines against the Japanese, who were much closer to those islands. (Tokyo to Manila is only 1865 miles; while Manila to Honolulu and San Francisco are 5296 and 6963 miles.)¹¹¹

More importantly, the Tanith-Xochitl-Gram map suggests that the Alliance refugees head in an unexpected direction. They go east.

11. The Sword-Worlds

a) A Star-Cloud in the Gap

If Figure 10 is correct, the refugees travel east, crossing, or attempting to cross, the Orion-Sagittarius Gap. Finding a habitable planet in the sparse stars of the gap would seem quite a challenge, not to mention crossing the gap itself. The more so since hyperships of the later Federation period only travel about 8 hr/ly, which is much slower than the 1 ly/hr speed of *Space Viking*. Thus, the 2000 ly which separate the Sword-Worlds from the Federation would have taken the Alliance flotilla 16,000 hours to traverse, not 2000 hours. In other words, close to 2 years rather than less than 3 months. Such a length of time may mean that the Alliance refugees are the first Terro-Humans to ever attempt crossing the Gap. They are almost certainly the first to settle on, or near, the far side. It would have been far safer for them to have stayed within the Orion Arm, where stars with habitable planets are much more likely to be found, as well as easier to reach.

How wide is the Gap? In the early 1950s, when Beam was just beginning his Future History, the Sagittarius Arm was estimated to be “2,000 parsecs closer to the center [of the galaxy] than the Orion Arm”, while the Perseus Arm was estimated to be a similar 2,000 parsecs farther out.¹¹² Two thousand parsecs equals 6,520 light-years, and given an average diameter of 3,500 light-years for the arms, this means the interarm gaps should be about 3,000 light-years across. Since only 2,000 light-years separate the Old Federation from the Sword-Worlds, the latter might then be located on an ‘island’ of stars in the gap. A star-cluster, located among the detached clouds of interstellar gas floating between the arms. And strangely enough—because I don’t think Piper could have known this—there seems to be one in just the right spot. (Figure 11.)

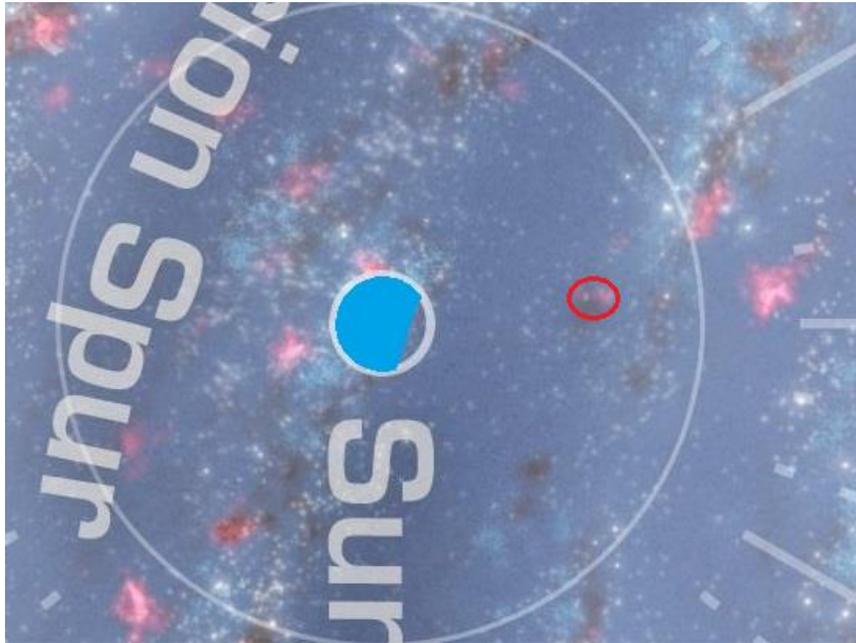


Figure 11. Federation space in blue, and red-circled star-cloud 2000 ly to the east, just west of the Sagittarius Arm.

It seems right because when we plot the estimated configuration of Tanith, Xochitl and Gram from Figure 10, this is what we get.

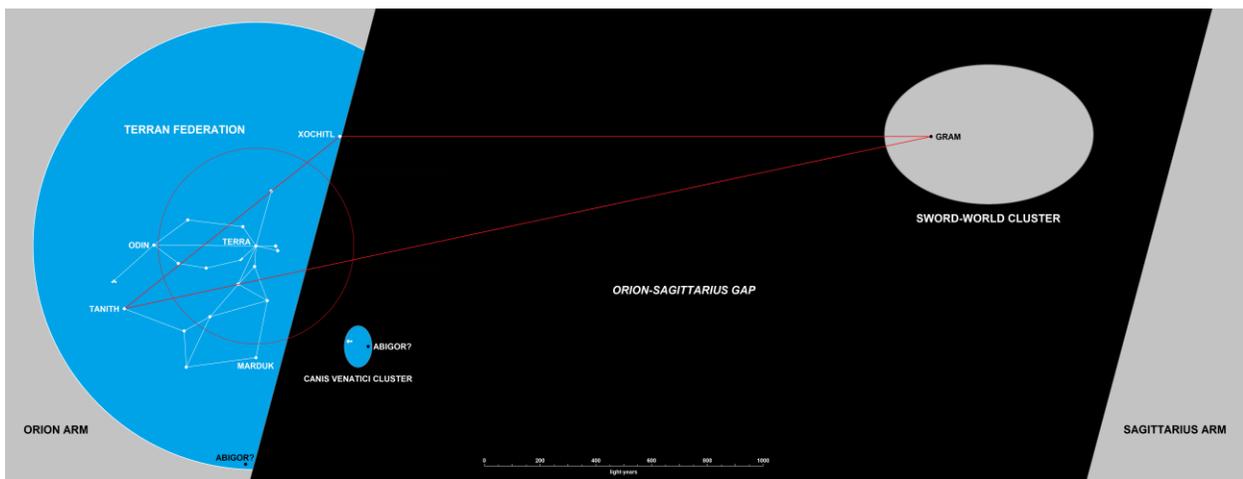


Figure 12. The Terran Federation and Sword-World cluster, circa AE 1000.¹¹³

Assuming they come from the southwest, the Alliance refugees probably establish Excalibur and the other early Sword-Worlds, such as “Joyeuse and Durendal and Flamberge”,¹¹⁴ in the southwestern part of the star-cloud. This would also be a location the Terran Federation wouldn’t find for a long time, since the Federation’s expansion was almost completely within the Orion Arm.

From the NASA source map in Figure 11, the star-cloud’s east-west diameter is about 750 ly, while the north-south diameter is about 500 ly. But in Piper, the Sword-Worlds seem to be fairly close together. Curtana is 320 ly from Morglay, Morglay is less than 200 ly from Gram, and Gram is only 30 ly from Excalibur.¹¹⁵ So the Sword-Worlds probably occupy only a portion of the cluster.

This is supported by Lucas Trask, who says that “We’re not expanding, Lothar; we’re contracting. We stopped expanding three hundred and fifty years ago, when that ship came back to Morglay from the Old Federation and reported what had been happening out there since the Big War. Before that, we were discovering new planets and colonizing them. Since then, we’ve been picking the bones of the dead Terran Federation.”¹¹⁶ Thus, even though there are plenty of other habitable planets in the star-cloud, the steady expansion of Sword-World civilization was diverted by the lure of easy plunder westward.

As the Sword-Worlds are roughly 2000 ly from the Federation, and Xochitl is 2120 ly from Gram, Xochitl must be close to the eastern edge of Federation space, on or near the Gap. That’s how it was depicted in Figure 12. Moreover, at a thousand light-years from Tanith, Xochitl is clearly located in the northern Federation. Well beyond Audhumla and the Norse Core, but closer than the outer ring of planets named for almost anything. Lying almost directly west of the Sword-Worlds, Xochitl therefore seems like a natural choice for a Space Viking base. Being among the closest of Old Federation planets, Xochitl would be a great place to make a ‘landing’ on the ‘shore’ of Federation space, from where the Space Vikings can strike into the interior of the Orion Arm.

This configuration suggests that Abigor is most likely in the eastern part of Alliance space. Possibly along the edge of the Gap, like Xochitl; but an even better option would be among the stars of the Canis Venatici cluster. Both options are shown on the map, with a question mark after ‘Abigor’. As we’ve seen, the Canis Venatici cluster is settled beginning in the late Sixth Century AE. By the time of the System States War two and a half centuries later, it should be fairly well colonized. And since Piper gave the Elektran System anomalous Greek names, the cluster could actually fall under the “naming planets for almost anything” category. That could make Abigor an appropriate addition, particularly as it would place this demon-named planet on an island in the ‘outer darkness’ of the Gap.

In support of this option, the Canis Venatici cluster would probably be less strategically important than the more-developed Alliance regions within the Orion Arm; including planets like Baldur and Marduk. The Federation could therefore consider the cluster a lesser target, relegated for later reconquest. But by that time, Canis Venatici might have become a place where fleeing Alliance citizens and retreating military units gather. Upon hearing the news of the Alliance government’s surrender, and knowing that Federation troops would soon be arriving to occupy the cluster, those refusing to surrender could then leave Abigor before they arrive. And if Abigor is in the eastern part of the Canis Venatici cluster, it would be a bit less than 2000 light-years from the Sword-World cluster, west of the Sagittarius Arm.

The only remaining question seems to be why Otto Harkaman “liked Tanith for a base.”¹¹⁷ One reason could be that, positioned in the southwest of the Old Federation, Tanith is pretty far away from the Sword-World cluster. In their initial raids, the Space Vikings operating from the Sword-Worlds probably concentrated on the nearest targets, and that would mean in the northern and central Federation. In the time of *Space Viking*, the south and southwestern regions might still have better pickings, and Tanith may also be far enough away from the other Viking base planets for raiding to be more profitable.

b) The Viking Model

An eastern location for the Sword-Worlds is supported by Beam’s other historical model. Because while the Alliance refugees seem to be modeled on the Confederate refugees, the Confederados never became a serious threat to the Union, unlike how the Alliance refugees (as Space Vikings) later did to the Old Federation. Some Confederados did indeed return to the States, but not to attack them; while the vast majority remained in Brazil, intermarrying and assimilating into the local population.¹¹⁸

As the name ‘Space Viking’ suggests, however, Beam’s main historical model should be the Vikings. Several centuries after the fall of the Roman Empire, the Vikings crossed the sea from Scandinavia,

raiding, plundering and destroying cities all over western and southern Europe. And several centuries after the fall of the Terran Federation, the Space Vikings 'cross the sea' of space to raid and plunder planets all across the Old Federation.

The Vikings came from the north, over the North Sea; but the only 'sea' near the Old Federation is the Orion-Sagittarius Gap. So the Space Vikings could come from the galactic east, across the Gap. We recall that one of Beam's models for the Terran Federation was the British Empire. And Britain was particularly vulnerable to Viking raids, being not far west of Denmark and Scandinavia. (Figure 13.)

Another aspect of this configuration is that if the Sword-Worlds had not been diverted by the lure of easy plunder in the Old Federation, they would have continued expanding locally. First by settling the remainder of the star-cloud, and then crossing the short stretch of open space to the east and south, and settling the first worlds in the Sagittarius Arm. This expansion would parallel the Vikings of Sweden (known as Varangians), who crossed the Baltic Sea, exploring and colonizing to the south and east.

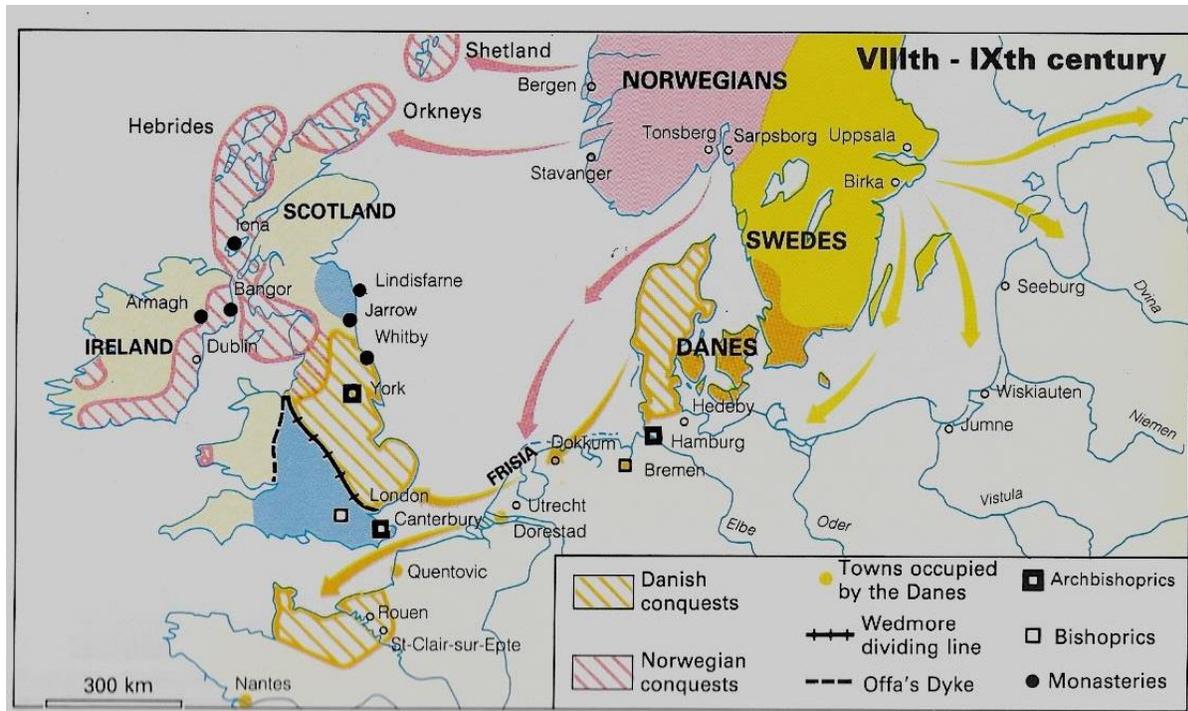
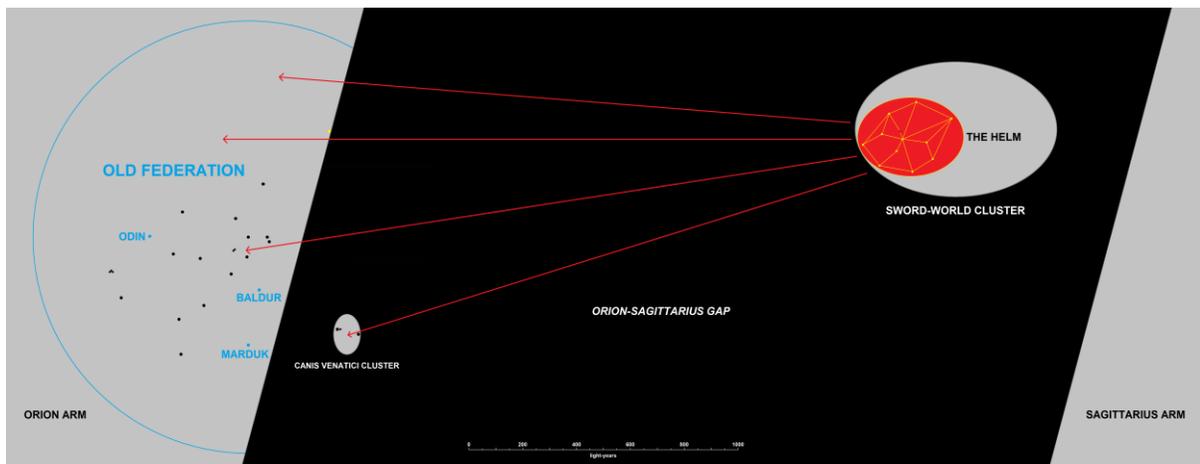


Figure 13. Postulated Space Viking routes to the Old Federation, compared to invasions of Britain by Vikings from Scandinavia. ¹¹⁹

Parenthetically, given the Viking historical model, Piper may have intended for the Sword-Worlds to be located on a 'peninsula' of gas, extending westward from the Sagittarius Arm proper. A closer parallel with Scandinavia, which is a peninsula extending westward from the European continent.

A major advantage the Vikings enjoyed was the quality of their ships. "Though Viking boats came in many shapes and sizes, the most iconic and effective Viking vessel was undoubtedly the longship. Long, narrow and flat, longships were fast, durable and capable of navigating both choppy seas and shallow rivers. They were also light enough to be carried over land...The breadth of the Vikings' explorations was remarkable. From North America in the west to Central Asia in the east, the Viking Age is defined by geographically expansive exploration that wouldn't have been possible without such advanced shipbuilding...The Vikings' shipbuilding skills accompanied their extensive travels. Many of the longships' characteristics were adopted by other cultures and continued to influence shipbuilding for centuries."¹²⁰

The parallel in Piper are the ships of the Space Vikings, which travel much faster than the hyperships of earlier times. Instead of three light-years per day, as in the later Federation stories, Space Viking ships travel at a full light-year per hour, or twenty-four light-years per day. This advance is almost certainly a Sword-World innovation. In part, it may have been inspired by the difficulty in traveling across the Orion-Sagittarius Gap during their initial migration, but could also be related to their position on a star-cloud in the gap. For even if they decide to begin exploring the Sagittarius Arm, it is still about 700 light-years away, meaning that a faster hypership would be very desirable for travel in this direction as well. Moreover, in the era of *Space Viking*, the civilized worlds of the Old Federation also seem to have ships which travel at 1 ly/hr. They apparently got this technology from the Sword-Worlders, which would parallel the Viking longship's lasting effect on the shipbuilding of other cultures.¹²¹

In Figure 13, Terra is unmarked, since it "was bombed back to the Stone Age" during the Interstellar Wars, and is now among the ranks of the minor planets. The worlds of the Old Federation which remain civilized, such as Marduk, Baldur and Odin, have their names in blue because these planets "maintained the culture of the Terran Federation uninterruptedly" through the Interregnum.¹²²

To the east, the Sword-Worlds were given a 'Germanic' color scheme of red and gold, near the black space of the Gap. A parallel suggested by Space Viking characters such as Admiral Otto Harkaman and Captain Boake Valkanhayn, whose names seem to echo historical German figures like Prince Otto von Bismarck and General Erich Falkenhayn. Thus, they were apparently chosen by Piper to deliberately convey his Norse or 'Teutonic' model. In *Space Viking*, Admiral Harkaman is the closest advisor to Prince (later King) Lucas Trask, even as Prince Bismarck was the closest advisor to King William of Prussia (later German Emperor). And while Captain Valkanhayn descends into chicken-stealing for a while, he becomes an excellent commander again under Prince Trask, and fights his ship well on Beowulf and Marduk.¹²³ This parallels the German General Falkenhayn, who had a mixed record in combat during WWI, but was a well-respected commander by leaders on both sides.¹²⁴

Using the oval around the Sword-Worlds as an estimated boundary, their space would be about 395 ly in the east-west direction, and about 293 ly in the north-south. Say, 400 by 300 ly for convenience. It would then have a volume of about 42 million cubic light-years (400 x 300 x 350 ly as an estimate of the z-axis). As in the case of the Terran Federation's estimated volume of 2 billion cubic light-years, this may be an underestimate, but the Sword-Worlds should control a much smaller region of space than that of the Old Federation, since it is within an interarm star-cloud rather than a full arm. Furthermore, it only contains 12 inhabited planets, not 500. So even apart from the many habitable planets that should lie in the rest of the star-cloud, there may be quite a few still-unclaimed ones within their current space-volume.

c) Three Maps of Sword-World Space

Now let's take a close-up look at the Sword-World cluster. There is very little to go on in Piper; just the references mentioned previously: 30 light-years from Gram to Excalibur, 320 from Curtana to Morglay, less than 200 from Gram to Morglay, and more than 2000 from Curtana to the nearest Old Federation world. However, 'more than' 2000 ly implies less than 2100, and since we now know that Gram is 2120 ly from Xochitl, Curtana should be a bit closer to Federation space than Gram. This is supported by the freighter captain's information that after pirating the *Enterprise*, Andray Dunnan stopped at Curtana before leaving the Sword-Worlds. "I'd say she's twelve hundred hours out of Windsor, on Curtana, now."¹²⁵ To me, this suggests that Curtana is 'west' of Gram, closer to the edge of Sword-World space and the Old Federation; while the distances from Gram and Curtana to Morglay indicate the latter is to the 'east'.

Excalibur, as the first Sword-World, should be roughly in the center of the group. And since they are colonized directly from Excalibur, Joyeuse, Durendal and Flamberge should be the closest planets to Excalibur, with the possible exception of Gram. Moreover, since Joyeuse colonizes Hauteclere, and Hauteclere in turn colonizes Gram, I further assume that these three planets are close together. And finally, Rovard Grauffis says that “We have very little direct trade with Curtana”,¹²⁶ which implies that Curtana is fairly far from Gram, whose principal trading partners include the nearer planets of Joyeuse, Hauteclere and Excalibur. All these considerations led to the following tentative configuration.

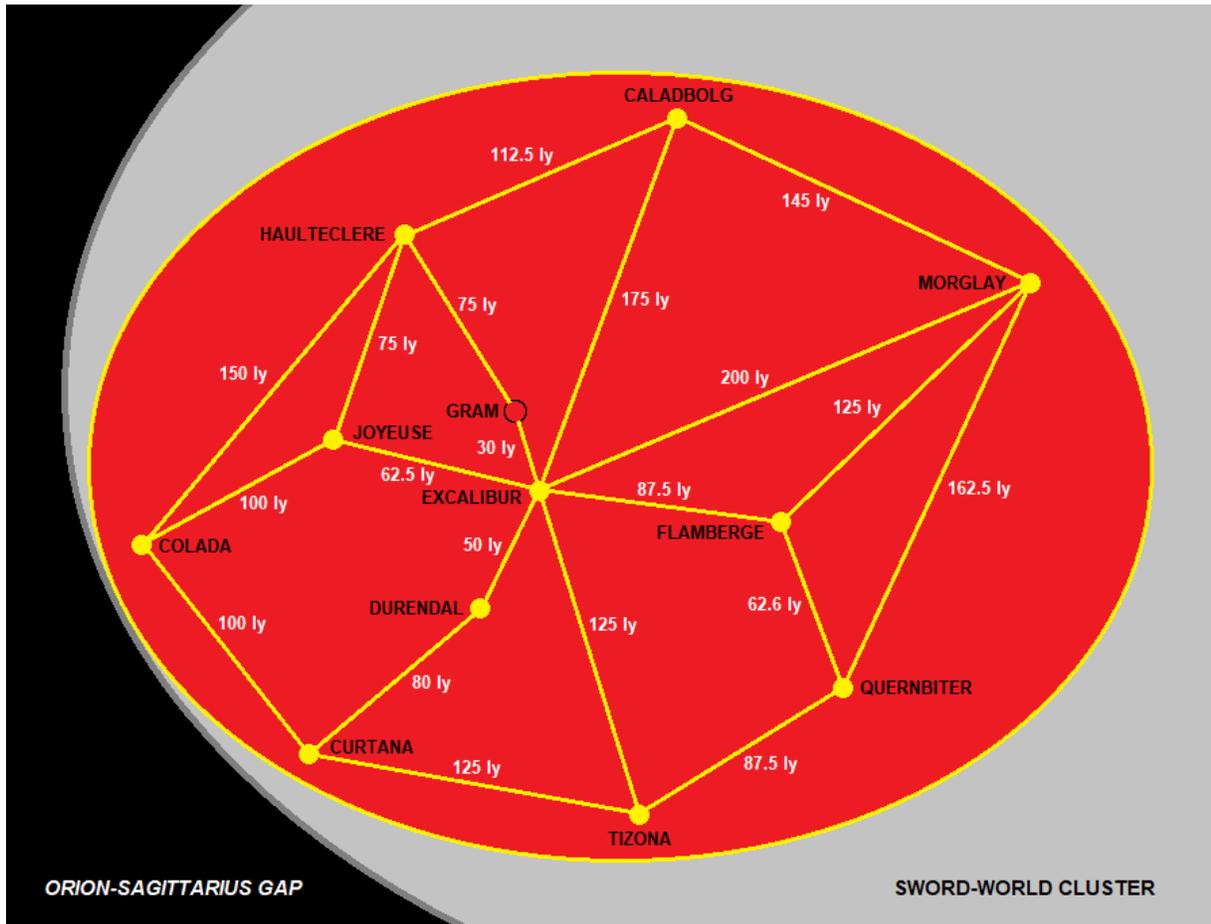


Figure 14. Estimated configuration of the Sword-Worlds.

Curtana, placed southwest of Gram on the map, is about 2,075 ly from the edge of Federation space. (At the time of the freighter captain’s quote, Dunnan and the *Enterprise* are therefore still within the Orion-Sagittarius Gap, having crossed a bit more than half its width.) Morglay is positioned 320 ly northeast of Curtana; this makes it about 194 ly east-northeast of Gram. It therefore ends up being the easternmost of the Sword-Worlds, which colonize less than half of the star-cloud.

John Carr considers the Sword-Worlds as belonging to a cluster, which he calls “Helm”, being in the shape of a helmet. Because many configurations are possible, I tried to suggest that shape to the pattern of the Sword-Worlds. A bit angular and irregular, of course, since a perfect helmet shape would be highly unlikely in real space. Also, it would look better as a three-dimensional structure, but that is beyond my skill and software. Don’t see the helmet in Figure 14? Look at it this way. (Figure 15.) The Excalibur-Joyeuse-Hauteclere-Gram quadrilateral (E-J-H-G) makes one eyehole, the Excalibur-Morglay-Flamberge triangle (E-M-F) is the other. The Excalibur-Durendal line (E-D) is the nose guard. The left side, top and right side of the helmet are delineated by the Colada-Hauteclere-Caladbolg-Morglay-Quernbiter

perimeter (C-H-C-M-Q). Finally, the Colada-Curtana-Tizona-Quernbiter curve (C-C-T-Q) makes the bottom. Dark gray for the exterior of the helmet, light gray for the interior.

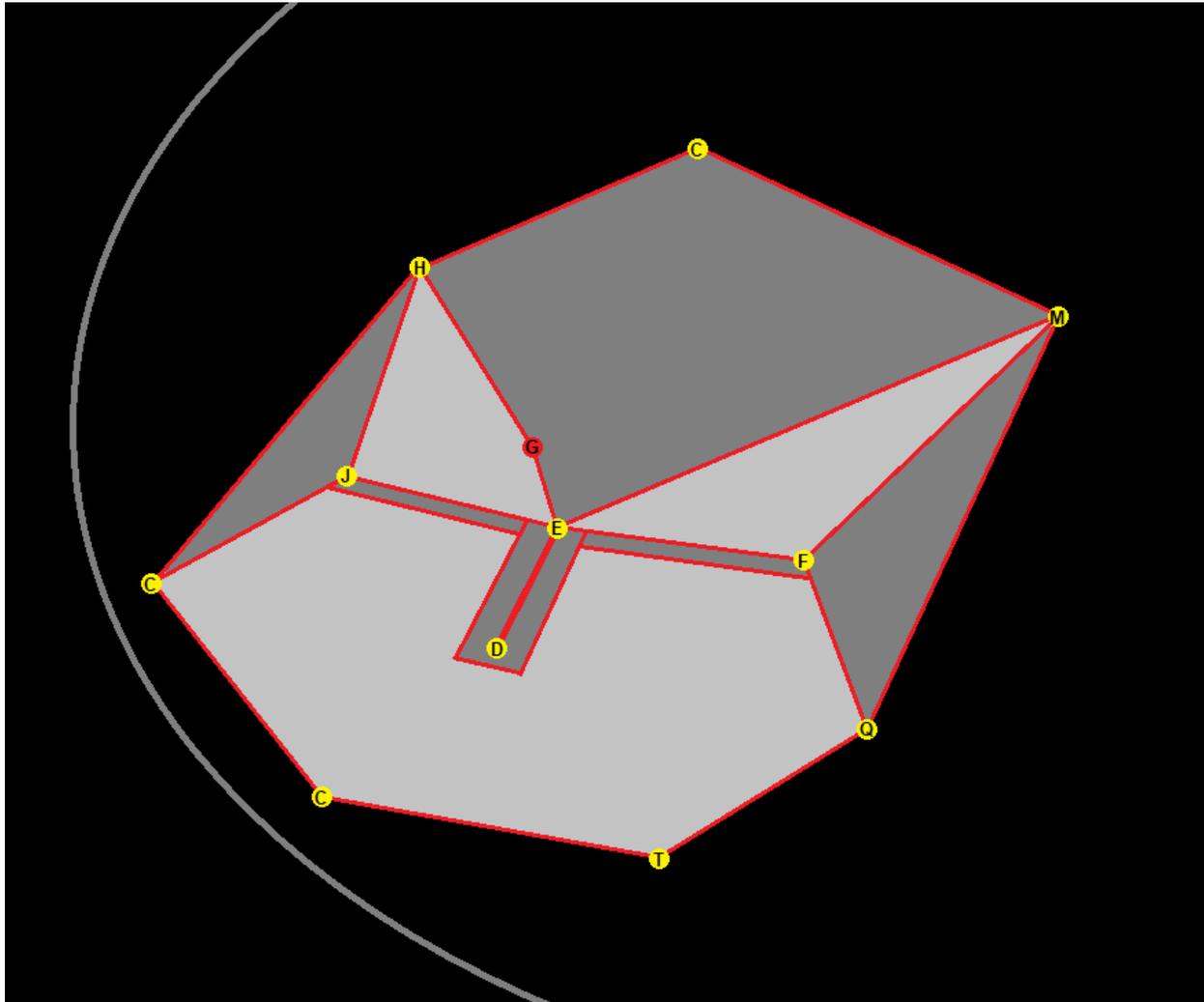


Figure 15. Possible configuration of the “Helm”.

By the time of *Space Viking*, however, the Sword-Worlds are steadily declining. And as one of Piper’s self-reliant men, Lucas Trask seems to be one of the few who realize it. He muses that “Nothing on Gram, nothing on any of the Sword-Worlds, was done as efficiently as three centuries ago. The whole level of Sword-World life was sinking, like the east coastline of this continent, so slowly as to be evident only from the records and monuments of the past.” Cassandra-like, his warnings go unheeded. Because as Rovard Grauffis says “sourly” to Otto Harkaman, “Well, maybe this is all new to you, captain...but Lucas Trask’s dirge for the Decline and Fall of the Sword-Worlds is an old song to the rest of us.”¹²⁷

Furthermore, by the time Trask speaks these words, it’s too late to try and correct the problem. Because like the Terran Federation in *The Cosmic Computer*, Sword-World civilization has already entered its period of irreversible decline. After Trask relocates to the Old Federation, and begins recivilizing Tanith, he declares to Harkaman that “the Sword-Worlds are finished; they’re half decivilized now.” And later, he foresees that Prince “Viktor [of Xochitl] wouldn’t be the last Space Viking to take his ships back against the Sword-Worlds. Sooner or later, [reviving] civilization in the Old Federation would drive them all home to loot the planets that had sent them out.”¹²⁸

One of the major causes of Sword-World decadence is the tendency of noblemen to fight over the various planetary thrones. “The Morglay dynastic war of a couple of centuries ago, still sputtering and smoking. The Oaskarsan-Elmersan War on Durendal, into which Flamberge and now Joyeuse had intruded. And the situation on Gram, fast approaching critical mass.” And apart from having its own dynastic war, Prince Jurgen Trevannion mentions that “Morglay had become involved in one of the interplanetary dynastic wars that had begun the decadence of the Space Vikings”.¹²⁹

Thus, at least half of the Sword-Worlds are involved in these conflicts. Morglay, Durendal, Flamberge and Joyeuse for starters; then there’s Gram, whose throne is disputed by Haulteclere, acting through Prince Viktor of Xochitl and Duke Omfray of Galspyth. And it seems a safe bet that the rest of them, even Excalibur itself, have their own royal intrigues, plots and disputes that could boil over into open warfare.

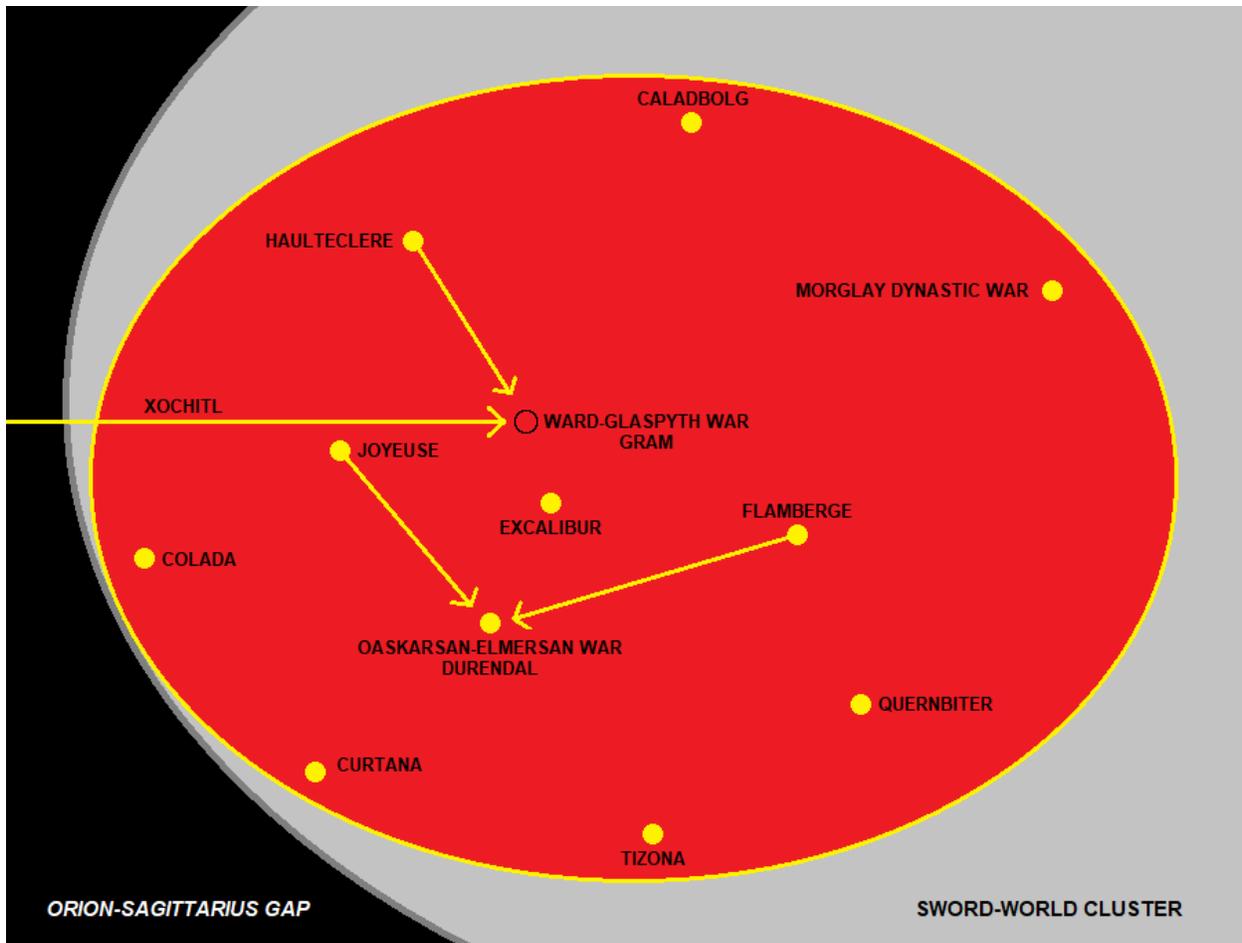


Figure 16. A major factor in their decline; known dynastic conflicts in the Sword-Worlds circa AE 1720.

Moreover, all these wars in the Sword-Worlds drag on for extended periods of time. The Morglay dynastic war has already lasted for 200 years, and its current “sputtering and smoking” status implies that it could reignite into full intensity at any time. Gram has a similarly long-lasting conflict. “All the major barons are at each other’s throats, and they can’t even keep their own knights and petty-barons in order. Why, there’s a miserable little war down on Southmain Continent that’s been going on for over two centuries.” And when Prince Viktor arrives on Gram with his fleet, the Ward-Glaspyth dynastic war which erupts will last for at least fifty years. As Prince Trask of Tanith predicts to Admiral Harkaman, “Great Satan, Otto; you were in the Durendal War. This is the same thing, and it’ll go on for another half century.”¹³⁰ These interminable conflicts spell the inevitable end of the Sword-Worlds.