Distances and Ranges

Distance is a dominating factor in many interactions: It determines the relative effectiveness of the senses and of sensors, of weapons and attacks, and of communications.

Traveller distills the open-ended concept of distance into a series of range bands, each associated with a typical distance and identified by one or more benchmarks.

For simplicity, and for ease of use in a variety of situations, **Traveller** uses the concept of Range Bands to express the qualitative distance between objects.

THE RANGE BANDS

Ranges are typical distances, standardized for convenience. Using more specific ranges adds little in realism, but much in complexity.

Relative Distances: Descriptive terms state that the distance relation ship between an observer and an object (or an attacker and a target): for example, Range Band 3 has a label Medium (as in Medium Range) and is associated with a distance of approximately 150 meters.

Benchmarks. Range Bands are associated with Benchmarks: with objects which can typically be seen or heard or senses at that distance. For example, a reasonable sense of vision can see a book (or a book-sized object) at Medium range.

Distances. Each Range Band encompasses a spectrum of distances from about half way from the previous range band to about half way to the next range band.

For example, the Medium Range Band extends from about 100 meters to about 325 meters.

THE RANGE BAND CHARTS

The Basics	1a	World Surface Ranges
	1b	Altitudes of the Atmosphere
	1c	Depths of the Ocean
Space	2	Space Ranges
Other Worlds	3a	Gas Giant Altitudes
	3b	StrangeWorld Altitudes
Fame	4	Fame Distances

Sub Bands

Any range band can be subdivided into Sub Bands when the distinction is important.

For example, to reflect various layers within the atmosphere of a Gas Giant, Range 6 is subdivided Bands 6.2, 6.4, 6.6, and 6.8 (which reflect different pressures at those levels).

It is possible to make more extreme Sub Bands (6.1, 6.2, 6.3 and such).

The purpose of Sub Bands is to differentiate rather than lumping all objects at a range into one distance.

The Range to a Sub Band is the range to the Band.

R=	consistently used in Range-related sections to refer to **World** Ranges. R= S+5.
S=	consistently used in Range-related sections to refer to **Space** Ranges. S= R+5.

THE RANGE BAND CHARTS

The Range Band charts and their associated subcharts show distance relationships which govern a variety of interactions.

1a 1b 1c. The **World Charts** show distances (using R=) on world surfaces, atmospheric altitudes, and ocean depths.

World Surface Ranges addresses the typical distances of relatively flat terrain. They are strongly influenced by typical combat ranges and by typical uses of the senses. The Zero or Contact Point is the location of the observer or the character.

Altitudes of the Atmosphere addresses the typical altitudes used by flying vehicles and the typical layers of the atmosphere. The Zero or Surface point is the surface of the world.

Some worlds (most importantly, those with Atmosphere-F Thin Low) have deep canyons or chasms (thousands of kilometers deep) with correspondingly higher atmospheric pressures. The Altitudes table includes negative Altitudes to properly describe these conditions.

Depths of the Oceans addresses the levels or depths of oceans. Levels are important because increased depth imposes increased pressure. The Zero or Surface point is the ocean surface.

Values on the table reflect ocean surface turbulence, and negative values reflect various depths.

Abyss reflects extremes on worlds with unusually deep oceans.

2. The **Space Ranges Chart** shows distances (using S=) in interplanetary space. Interplanetary ranges address the relative distances in space and are used in the operation of long range sensors and in space combat.

Band and Band Name identifies the space combat locations used in space combat.

Stellar and World Diameters shows the range bands corresponding to the stated D values. Diameters govern the effectiveness of lifters, gravitic, maneuver, and jump drives.

Light Delay details the approximate time delay for communicators and sensors.

S= shows the Space Combat Range Band.

R= shows the World Range Band for comparison.

Orbits shows the correspondence of the values to standard orbits.

3a b c. The **Gas Giant Charts** show the depths of massive world atmospheres The **Strangeworlds Chart**s show the atmospheric altitudes for unusual worlds.

Gas Giant Atmospheres addresses the levels or depths of the gas giant atmosphere. Levels are important because increased depth imposes increased pressure and temperature. The Zero or Surface point is the upper layer of the atmosphere (typically the Cloud Deck, and typically with a density of one atmosphere).

Three types of massive worlds are shown: Large Gas Giants (corresponding in size to Jupiter or larger), Small Gas Giants (corresponding in size to Saturn or smaller), and Ice Giants (corresponding to Neptune or Uranus).

Gas Giants are sources of hydrogen for starships in search of cheap fuel, or required to use wilderness refueling. Gas Giant atmosphere levels show the conditions such ships must survive in order to acquire hydrogen.

The **Strangeworld Charts** show the atmospheric altitudes for worlds with dangerous characteristics. The values for these charts may be overlaid on other worlds.

For example, the normal atmospheric values for a world can be taken from 1b Altitudes of the Atmosphere. If that world is a StormWorld (racked by storms constantly, or only currently), the appropriate (H= or Hits=) values created by atmospheric turbulence can be overlaid on Chart 1b.

Inferno is a Venus-Like world with high temperatures.

Stormworld is a world with strong atmospheric turbulence.

Radworld is a world with a high level of surface radioactivity (the 1D Rad levels at altitude 6 and 6.2 are windborne particles).

The Zero or Surface point is the surface of the world.

4. The **Fame Chart** shows the expected distance effect of fame in society.

The **Danger Chart** reflects an evaluation system for threats or potential threats to the continued existence to an object, group, or location. Analysts, officials, or others may subjectively evaluate a danger and express it as Threat-N, where N is the Danger level.

For example, the possibility of the dam breaking outside of town is Threat-5. The activities of a violent anti-government faction may be Threat-8, -9, or even-10. The possibility of a system's star going nova is Threat-14 (a possible supernova might be Threat-17). Scientific research on the origins of the universe (depending on the principles involved) may be Threat-7 or Threat-29.

1a BASIC RANGES

Distance	R=	Descriptor	Benchmark	Range Band Width	S=
Surface	0	Contact	Touching	From the surface to about 25 cm.	
0.5 m	R	Reading	Normal Reading	25 cm to 1 meter.	
1.5 m	T	Talking	Conversations	1 m to about 3 m.	
5 m	1	Vshort	Lectures	3 m to 25 m.	
50 m	2	Short	Pistol Range	25 m to 100 m.	
150 m	3	Medium	Rifle Range	100 m to 300 m (actually 325 m).	
500 m	4	Long	Extreme Gun Range	300 m to 750 m.	**Space Ranges are World Ranges minus** 5
1000 m	5	Vlong		750 m to 3 km.	**B**
5 km	6	Distant	Near the Horizon	3 km to 25 km (actually 27.5 km)	**1**
50 km	7	Vdistant	Beyond the Horizon	25 km to 250 km (actually 275 km).	**2**
500 km	8	Orbit		250 km to 2500 km (actually 2750 km).	**3**
5,000 km	9	Far Orbit		2500 km to 25,000 km (actually 27,500 km).	**4**

"actually" refers to precisely half the distance to the next Range Band value.

SIZES

> Benchmark			the							
		Needle	Word	Coin	Card	Book	Suitcase	Person	Truck	Tower
Size	**0**	**R**	**T**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Length		1 mm	2 mm	7 mm	75 mm	20 cm	75 cm	1.5 m	7.5 m	75 m

Ranges correspond to Object Sizes. To an observer, any object with Size = Range appears to be the same size.

For example, a Book (Size-3) at Range=3 appears to be the same size as a Coin (Size-1) at Range=1 or a Person (Size-5) at Range=5.

Try it: station a person, a book, and a coin at various distances where they all appear to be the same size and measure the various distances from the viewer to the objects.

5a b c. The **Orbital Distances Chart** shows the standard orbits in star systems.

Orbits may theoretically be at any distance from a central star. Primarily for ease of use, orbital distances are standardized on the Titius-Bode Relation, an 18 th Century attempt to predict orbital values. The actual value predicted values for orbits has been adjusted to include Orbit 0 to accommodate observed orbits.

The Orbital Distances Chart shows Orbit Number (O=) with corresponding distances in AU, Millions of Km, and Light-units.

The far column shows the orbits consumed by giant stars.

For example, for an A0 Ia star, orbits 0 through 3 are inside the star; orbit 4 lies just beyond the surface of the star.

The Habitable Zones Chart shows the orbits with conditions conducive to life based on the primary star for the world.

The Satellite Orbits Chart shows the standard orbits for satellites.