New Revised Stellar Generation Tables

Version 3.0 by Constantine Thomas (25/11/06)

This system can be used to generate stars for planetary systems. There are modifiers to apply only when an existing "Mainworld" has already been generated, but it can be used to generate star systems from scratch (planets will have to be generated separately using another algorithm).

Roll stats in exactly the following order, using the table below. Roll 2d6 unless otherwise specified:

1) Determine number of stars in system..
2) Determine each star's TYPE and SIZE **in that order**, using table below. Start with the Primary star, then Companion #1, then Companion #2, and then Companion #3 (if present).
3) Determine Orbital Configuration if multiple system using table below (only need to know if stars are in Close/Near/Far orbits).
4) **OPTIONAL**: Determine Orbital Distance using table below.

For Primaries and all Companions, roll on the following tables and use the modifiers below. **Note that Companions have no implicit dice modifiers to size or type** (i.e. do **NOT** add primary type/size to the rolls for Companion stars)!

2d6	Number of Stars	Type	Size	Orbital Config.	Orbital Distance (AU)		
					Close	**Near**	**Far**
0	Solo	B (v. rare)	Ia or Ib (v. rare)	Close	-	-	-
1	Solo	B (v. rare)	VI (v. rare)	Close	Torch	-	1000
2	Solo	A	Roll 1d6: 1-3 = D 4-5 = III 6 = II	Close	Torch	1.0	2000
3	Solo	M	IV	Close	0.2	1.6	3000
4	Solo	M	V	Near	0.2	2.5	4000
5	Solo	M	V	Near	0.4	5	5000
6	Solo	M	V	Near	0.7	10	6000
7	Solo	M	V	Near	-	20	-
8	Binary	M	V	Near	-	30	-
9	Binary	K	V	Near	-	60	-
10	Binary	G	V	Near	-	120	-
11	Binary	F	V	Near	-	250	-
12	Trinary	K	V	Far	-	500	-
13	-	G	V	Far	-	-	-
14	-	G	V	Far	-	-	-
15	-	G	V	Far	-	-	-
16	-	G	V	Far	-	-	-
17	-	-	V	Far	-	-	-
18	-	-	V	Far	-	-	-
19	-	-	V	-	-	-	-

MODIFIERS (apply to **all** stars unless otherwise specified):

- +4 on Size and Type for primary star only if the Mainworld has a breathable atmosphere or has more than 100 million inhabitants. This only applies to the primary star, **not** to any Companions. If it is applicable, this modifier is always applied before other size/type modifiers.

- +2 modifier on Orbital Config. roll for first (and second, if present) Companions if Mainworld has a breathable atmosphere or more than 100 million inhabitants and if system has more than one star in it. Do **not** apply this to third Companion star if system is quadruple!

- +2 modifier on Orbital Config. roll for the second companion in a Trinary if the first companion star is in a Close orbit.

- +4 to Orbital Config. for second Companion star in Trinary system. If the Trinary Companion is in a Far orbit, roll again on the Number of Stars column with -2 modifier. On a "Solo" result, the companion is a single star - on a "Binary" result, the Companion is itself a binary star. Determine the orbit of the extra star by rolling again on the Orbital Config. table with a -2 modifier.

- If Type is A, F or G, roll Size as normal; if Size is D, II, or III, replace with V (keep any other results).

- If any M IV or K2-K9 IV is rolled, keep Type but replace Size with V.

- If Size D is rolled, do not roll Type, star is just "D".

- Primary can only be Size D if Mainworld is an airless rockball. If this is not the case, replace D with V.

- If a D Companion is rolled for a Primary system containing a Mainworld with an atmosphere, it must be placed in a Far orbit.

- If two Far companions are generated for a Trinary system, these stars are actually a self-contained Close or Near binary system (this binary is referred to a "Far Binary" system) that is in a Far orbit around a primary. Determine the separation within the binary system by rolling with a -2 modifier to the Orbital Config. table.

- In Binary systems (including Far Binaries) and Near Trinary Systems, list the more massive star first. For this purpose, the order of mass is as follows: Size II > III > IV > A-G V > D > K-M V (where ">" means "is more massive than..."). Within each size, type A > F > G > K > M and within each Type, Number 0 > 1 > 2 > 3 > 4 > 5 > 6 > 7 > 8 > 9.

- **OPTIONAL**: Determine actual orbital distance of the companion star by rolling on the Orbital Distance columns as follows: For stars in a **Close** orbit, roll **1d** on the Close Orbit Distance column. For **Near** orbits roll **2d** on the Near Orbit Distance column if atm is not breathable, or roll **1d+6** if atm is breathable. For **Far** orbits, roll **1d** on the Far Orbit Distance column. In a Trinary system consisting of two Near Companions, place the **outer** companion first by rolling **1d+6**, and place the inner companion by rolling **1d** - the stars should be a minimum of 20 AU apart.

NOTES AND CLARIFICATIONS

Displaying Stellar Data: When writing down the star types, display multiple systems as follows: star pairs shown in (parentheses) are in Close orbits. Stars in [square brackets] are in Far orbits. Stars in no brackets are in "Near" orbits - within the planetary system of the primary.

The order in which the stars are displayed is important, but may be different to the order in which they are generated. The first star that is **rolled** is *always* the mainworld primary – the star around which the mainworld is orbiting. The +4 modifiers for type/size if the mainworld is known to be habitable or hi-population should be applied to this star only. If this star is the only star in the system, nothing further needs to be done.

In multiple systems, the mainworld primary should be marked by placing an asterisk (*) next to it. In Close and Near Binary systems, list the stars in order of mass (list the most massive star first) – place the * next to the mainworld primary for Near Binaries, but for Close Binaries place the * outside the parentheses (since the mainworld orbits both stars). For Far Binary pairs that are in Trinary or Quadruple systems, treat each pair as if it was a separate binary system when determining the order of the stars - note that if the most massive star in the second binary is more massive than the most massive star in the first binary, it is only listed first in the second binary (see examples below).

When displaying stars in order of mass, list the more massive star first - for this purpose, size II > III > IV > A-G V > D > K-M V (where ">" means "is more massive than" - D stars are assumed to be more massive than K and M V stars). Within each Size, bluer stars are more massive than redder stars (i.e. A > F > G > K > M). Within each Type, stars that have a lower Number are more massive than those with a higher number (i.e. 0 > 1 > 2 > 3 > 4 > 5 > 6 > 7 > 8 > 9). Thus, **(M2 II F7 V)** and **(M2 V M8 V)** are shown in the correct order.

Examples:
(F3 V M2 V)* is a Close binary pair around which the mainworld orbits.
F3 V M2 V* [M1 V] is an F3 V star with an M2 V Near companion (around which the mainworld orbits), with an M1 V in a Far Orbit around the inner two stars.
F3 V [M1 V* M2 V] is an F3 V star and a Near Binary pair consisting of an M1 V and an M2 V star. The Binary is in a Far orbit around the F3 V – the mainworld orbits the M1 V star. Since the M1 V is more massive than the M2 V, it is listed first in the Binary pair.
F3 V M1 V* [A2 V M2 V] is an F3 V star with a Near M1 V companion around which the mainworld orbits. This pair is orbited by a Far Binary consisting of a A2 V with a Near M2 V companion. Because each binary is treated as a separate system, the A2 V star is listed first in the second binary since it is more massive than its M2 V companion - however, even though it is more massive than the F3 V in the first binary, the A2 V is still retained in the second binary.

The size and type for any other stars in the system should also be determined on this table, in a similar way as for the mainworld primaries – no modifiers should be applied based on the primary star's size and type. Note that other stars do not have the +4 modifier habitability/population applied to their size and type. It is quite possible to generate a companion star that is more massive than the primary - this just means that the mainworld orbits the less massive star in the system, and the other star either has less attractive/suitable planets or has no planets at all. However, the most massive star is always listed first.

Number of Stars: The number of stars in the system is determined by rolling on the Number of Stars column, with an explicit -2 modifier applied when checking for Quadruple systems to avoid rolling two Trinary results in a row. Trinary companions are more likely to be in Far orbits, and it is no longer possible for a habitable or hi-pop mainworld to orbit a Close Binary.

Note that you cannot have two or more Close companions in a system - if the first companion is Close, the second companion must be either Near or Far.

Star Type and Size: Type A, F, or G stars only exist as IV or V. Size II and III stars of these types are not considered here - they evolve from very massive stars which are very rare.

Use an unmodified 1d10 roll to determine the numbers after the Star Type (i.e. M7, G2, F7 etc). This method should be used for K IV stars as well - if K2 - K9 is rolled, then replace with V. The remaining K IV stars are actually quite rare - they are subgiants on the verge of becoming Size III (Giants).

Rolls of 0 or 1 are shown only to signify GM intervention - you can't roll these randomly, they have to be placed specifically:

> Type B (and O) and Size Ia or Ib stars are incredibly rare, and there should only be one or two per sector at most (unless they are in an OB association or very young star cluster like the Pleiades). In most cases, just ignore these stars completely.

> Subdwarfs (VI) are rare, but are more common than O or B stars or supergiants - they won't have rocky planets around them, so the majority are likely to be among the forgotten, unmapped "junk systems" that lurk between the mapped stars. As such, they are also only placed at the GM's discretion (they would either have just cometary belts or gas giants around them if they had any planetary bodies at all).

White Dwarfs: A "D" result does not have a spectral type - it is just referred to as "D" on its own - white dwarfs basically have no significant (to non-astrophysicists) observable differences that warrant using normal spectral types with them.

D Companions in any system that has worlds with atmospheres (atm code > 0) **must** be placed in Far orbits. Any D Companion with the primary's planetary system (in a Near orbit) would have totally blown off the atmospheres of any other worlds in the system when it evolved into a white dwarf - the magnetic field of the primary star can only protect its worlds from this fate if the companion is in a Far orbit. Note that if a D is a primary, any existing asteroid belts are assumed to be dispersed when the star becomes a white dwarf.

Determining Orbits: The actual orbital distances of the stars is determined in the Orbital Distance columns. Orbital *Configuration* (i.e. Close, Near or Far) must be determined when calculating the Stellar Data, but Orbital Distances are extra detail that is optional at this stage and do not need to be shown with the stellar data.

Torch Orbits lie within 0.1 AU of the primary star: If both stars are size V, the two stars will usually be completely separate - this is known as a **detached binary**. If one is size II, III or IV, the system is likely to be a **semi-detached binary** - material from the larger star overflows its roche lobe and is dumped onto the surface of the other one, resulting in mass transfer that may effect the subsequent evolution of both stars. If both stars are size II, III, or IV, the system is a **contact binary** - a single peanut-shaped object consisting of two stellar cores with a shared, overlapping envelope. If the stars can remain this way for long enough, cores will merge into a single star with the combined mass of the two stars.

Close Orbits are within 1 AU of the star, Near Orbits are between 1 AU and 750 AU, and Far orbits are well beyond the planetary system at between 1,000 and 6,000 AU from the primary.

If the mainworld has a breathable atmosphere and a Near companion is present, then determine the Orbital Distance for the companion by rolling **1d+6** on the table - in this case, the mainworld *must* be placed in the habitable zone of the primary . This should keep the companion star well out of the way of the mainworld. Note that there are no other modifiers to this roll, and that it doesn't matter what the world's population is.

If the mainworld atm is not breathable and a Close or Near Companion is either in the primary's habitable zone or is placed in such a way that the habitable zone is not available for planets, then move the mainworld out to the closest available orbit around the primary beyond the companion's orbit.

Multiple Star Systems: Generally speaking, planets do not form beyond 50 AU from a star - there's just not enough time or material out there for them to coalesce. If companion stars are present, planets can be placed around either star up to a distance equal to 0.3 times the separation of the stars, and can also be located beyond 2.4 times the separation between the stars. Note that this assumes the stars have equal mass - it's not completely realistic, but it's better than nothing.