Introduction to the Nearby Stars Tables

These tables represent an effort to present information on nearby stars in a form that is compact useful to writers and non-specialist people in the SETI community who are not necessarily always on line. The information is designed to be printed out as quick reference sheets, or to be copied and pasted into spreadsheets with a minimum of work. It is not designed for professional astronomical work. Persons who need references for astronomical papers and academic work are advised to consult primary sources.

This began with the Gliese and Hipparcos catalogs. Information from various other references has been added, and calculations were made to fill in the gaps, based on physical laws and standard tables of main sequence stars, such as found in Lang. It remains a work in progress. Corrections and new information can be expected.

Multiple stars proved to be a challenge with respect to updated and conflicting information. Many multiple systems had to be researched individually and listings in several catalogs and papers compared. Distances for nearby multiples can vary from list to list. Hipparcos distances for multiples are suspect because it is not always straightforward to sort out annual parallax from orbital motion, and various sources have issued corrections. There will undoubtedly be some updating of this information in the future.

Published masses have been used where available. Fisher and Marcy (1992) proved especially helpful, as well as the Recons/NStar site. Bergeron, Legget, and Ruiz (2000) provided most white dwarf masses. Where a published mass wasn't found, main sequence masses were calculated by interpolation of a mass luminosity table derived from Lang's Astrophysical data for higher mass stars and newer mass-luminosity relationships for the lower end of the main sequence (Henry 1999).To save table space and protect the innocent from transcription errors, the sources and error bounds are not given here, but can be provided on request.

Spectral class notation in the summary table provides compact information as to the physical nature of the star. For those not familiar with spectral class notation, it consists of two parts; a spectral class and a luminosity class plus some added on notations. This notation has evolved with time and continues to evolve. What is used here is: O,B,A,F,G,K,M,L,T (from hottest to coolest) for spectral class and I,II,III,IV,V,VI,VII (from super giant to white dwarf) for luminosity class. For example, Proxima Centauri is an M5V e fl, telling us that is about halfway between the M and T transitions (M5), is a main sequence star (V), and has rarified hot gasses over its photosphere (e, for emission lines) and is subject to major flare activity (fl).

spec class	approx temp	"color"	type object
O0	100000	violet	star?
B0	30000	blue	star
A0	9520	white	star
F0	7200	ivory	star
G0	6030	yellow	star
K0	5250	orange	star
M0	3850	red	star
L0	2200	brown	brown dwarf
T0	1320	infrared	brown dwarf

I should note that the relationship between spectral class, effective temperature, and color is not really as straightforward as it is represented here. Classification is based on relative strength of absorption and emission lines in a star's spectrum, which are influenced by composition as well as temperature. Rarely, a star with a given spectral classification may actually turn out to be hotter than one of a later classification with weaker lines.

The "color" given is subtle; unless another star is nearby for comparison, the light of most stars will appear white. The proverbial "dim red dwarf" has about the same effective temperature as a tungsten filament light bulb. But the redness of stars later than M7 or so should be quite apparent even without a comparison.

"White" dwarfs usually, but not always, have special classifications (DA, DQ, etc.).   Here, for comparison purposes, a spectral class appropriate to the white dwarf's temperature has been assigned and the special classification appears in the notes.

Many older sources use prefixes such as "wd," "sd," "d," and "sg" for white dwarf, subdwarf and dwarf and subgiant respectively. These are not retained here; their information is embodied in the luminosity class. White dwarfs have a luminosity class of VII, Subdwarfs (underluminous main sequence stars) have a luminosity class of VI, "dwarfs"(non giants) have a luminosity class of V, and subgiants (stars having evolved significantly above the main sequence on their way to gianthood) have a luminosity class of IV.

While star age is of interest for SETI and astrobiology, estimating the age of most of these stars is problematical, with error bars on the order of billions of years. In particular, it is very difficult to age red dwarfs. However, main sequence stars hotter than about K5 which are significantly brighter than the norm for their spectral class (such as Alpha Centauri) are probably older than the sun. Stars which have significant flare activity or strong emission feature (denoted by an fl or an e after their luminosity class) are probably younger than a billion years old. Stellar evolution models, taking into account metallicity and rotation, are improving and it is hoped that more or less reliable ages can be added to the data on some of these stars in the not too distant future.

Those contemplating the possibility of a civilization in a state of progress roughly contemporaneous with our own being found among the nearby stars should be advised that the difference in ages among these stars is typically in the billions of years and that the total span of multicellular life (let alone intelligence) on Earth is about half a billion years. If intelligences from such a civilization show up, they would probably have originated thousands of light years away.

There are three tables presently offered. More are on the way.
Table 1. Summary
Table 2. Cross Reference (Some other names for these stars)
Table 3. Positional information (Cartesian coordinates for star to star distances)

Note: To create a spreadsheet, first copy and past this table into a word processor, use the find/change feature to replace the "| " with tabs, then paste into the spreadsheet. Warning, some spreadsheet cells do not handle Greek letters well and you may wish to make the following substitutions:

α = a, alpha, alp, or alf

β = b, beta, or bet

χ = c or chi

δ = d, delta, or del

ε = e, epsilon, or eps

η = h or eta

μ = m or mu

π = pi (In astronomy π may be part of a star name, the number 3.14159, or a parallax. Context is important.)

σ = s, sigma, or sig

ξ = x or xi

Some Useful nearby star references:

Batten, Alan H.;J. Murray Fletcher & D. G. MacCarthy; Eighth Catalogue of the Orbital Elements of Spectroscopic Binaries; U.S. Naval Observatory;2002 Dec 09; http://ad.usno.navy.mil/wds/dsl/SB8/sb8.html

Bergeron, Legget, and Ruiz, Photometric and Spectroscopic Analysis of Cool White Dwarfs with Trigonometric Parallax Measurements,

Delfosse, X.; T. Forveille1; J. L. Beuzit; S. Udry2; M. Mayor; C. Perrier1; 13 new companions to nearby M dwarfs;Astron. Astrophys. 331, 581;1999

Fischer, Debra A. ; Geoffrey W. Marcy; Multiplicity among M Dwarfs; The Astrophysical Journal 396: 178-194;1992

Gliese W, ;H. Jahreiß H; Preliminary Version of the Third Catalogue of Nearby Stars;Astron. Rechen-Institut, Heidelberg ;1991;

Henry T. J.; Walkowicz L, Barto T, Golimowski D; The Solar Neighborhood VI: New Southern Nearby Stars Identified by Optical Spectroscopy; Astronomical Journal, 123: 2002

Henry T. J.; Franz, O.G.; Wasserman, L.H.; Benedict, G. F.; Shelus, P. J., Ianna; P. A., Kirkpatrick, J.D.; McCarthy, D. W. Jr.; The optical mass-luminosity relation at the end of the main sequence (0.08-0.20 m{sun}). ; Astrophys. J., 512, 864-873; 1999

Lang, K. R., *Astrophysical Data: Planets and Stars*, Springer-Verlag 1991

van Altena, W; Lee J, Hoffleit E; The General Catalogue of Trigonometric Stellar Parallaxes, 4th Ed.; Yale University Observatory; 1995; (note: goes fainter than Hipparcos)

Woitas, J; Ch. Leinert; H. Jahreiß; T. Henry; O.G. Franz, and L.H. Wasserman; The nearby M-dwarf system Gliese 866 revisited;Astron. Astrophys. 353, 253–256;2000

Leinert, Charles;H. Jahreiss, J. Woitas, S. Zucker, T. Mazeh, A. Eckat, R. Kohler; Dynamical mass determination for the very low mass stars LHS 1070 B and C; Astron. Astrophys. 367, 183–188;2001

Reid I.N., 1995, ;Hawley S. L., Gizis J.E., ; Astronomical Journal, 110(4), 1838;1995;

Some useful web sites:

Hutchinson, Grant; Companion Star Orbits out to 25 Light Years http://www.shatters.net/forum/viewtopic.php?t=2594;2003

Johnston, Wm. Robert; Nearby stars to 20 light years http://www.johnstonsarchive.net/astro/nearstar.html; 2003 Oct 09

Nash, David; The HYG Database v1.0 http://www.astronexus.com/data/hyg.htm

Niemi, Tero; Combined Parallax Catalog of the 3rd CNS (rev.'97) and Hipparcos (ESA SP-1200 '97) http://cc.joensuu.fi/~tniemi/starmaps/TN_GlieseHipparcosPlx.dat; 2003 Oct 7

Powell, Richard; A List of the Nearest Stars
http://www.anzwers.org/free/universe/nearstar.html; 2003 Nov 11;

SolStation; http://www.solstation.com/stars/;2003; (Excellent star by star summaries)

--G. Nordley, 2004