

**A FEW CATALOGS AND REFERENCES THAT INCLUDE MOST KNOWN LBV'S  
AND RELATED STARS:**

- BE:** Bohannon & Epps, *Astr. Astrophys. Suppl.* **18**, 47 (1974). Stars in LMC.
- HD:** "The Henry Draper Catalog," *Harvard Annals* **91--100** and **112** (1918--1936). Properly "HDE" beyond star number 225 300. Many additional HD numbers can be found in the auto registration office in Heidelberg.
- He 3:** Henize, *Astrophys. J. Suppl.* **30**, 491 (1976).
- HR:** Yale Bright Star Catalog, most recent (4th, 1982) edition by Hoffleit & Jaschek. "HR" originally meant "Harvard Revised Photometry", c. 1908.
- Hubble-Sandage Variables in M31 and 33:** For positions and refs. see Humphreys *et al.*, *Astrophys. J.* **278**, 124 (1984).
- HV:** "Harvard Variables" in the Magellanic Clouds; see, e.g., Payne-Gaposchkin, *Smithsonian Contrib. to Astrophys.* **9** (SMC, 1966) and Number 13 (LMC, 1971)
- MWC:** "Mt. Wilson Catalog"; Merrill & Burwell, *Astrophys. J.* **78**, 87 (MWC 1--416, 1933); **98**, 153 (417--666, 1943); and **110**, 387 (667--1088, 1949).
- R:** "Radcliffe Catalog" of stars in Magellanic Clouds; Feast, Thackeray, & Wesselink, *M.N.R.A.S.* **121**, 337 (1960). Stars R1--50 are in SMC, R51--158 are in LMC.
- S:** Henize, *Astrophys. J. Suppl.* **2**, 315 (1956); stars in Magellanic Clouds. Properly, should have prefixes LH $\alpha$  115 - in SMC and LH $\alpha$  120 - in LMC, e.g. LH $\alpha$  120 - S128. S merely means star (as opposed to N for nebula).
- Sk:** Sanduleak's stars in Magellanic Clouds. In LMC, *Cerro Tololo Inter-American Observatory Contr.* **89** (1969); in SMC, *Astron. J.* **73**, 246 (1968) and **74**, 877 (1969).
- Alternative designations for some relevant stars are also listed by Carlson & Henize, *Vistas in Astron.* **18**, 47 (1979) and by Shore & Sanduleak, *Astrophys. J. Suppl.* **55**, 1 (1984).
- 

**INDEX TO STARS AND GALAXIES MENTIONED IN THIS BOOK, WITH MANY  
CROSS-REFERENCES TO ALTERNATIVE DESIGNATIONS:**

*(The cross-references are probably not complete. Also, the arrangement may seem inconsistent in some places, but this should be harmless in practice. -- KD)*

- A and A-1, see Var A and Var A-1.
- AE And (H-S variable in M31) -- 5,6,36,154,234,275,276.
- AF And (H-S variable in M31) -- 6,29,36,138-140,275,276.
- R Aqr -- 120.
- $\eta$  Argus, see  $\eta$  Car.
- B, see Var B.
- B 324 in M 33 -- 250.
- B[e] stars -- 8,10,45,46,52-55,61,117-125,156,165-170,173,176,188,244,245, 249,250,295.

## BE numbers:

- |                 |  |
|-----------------|--|
| 217, see R 81.  | 244, see S Dor.                          |
| 261, see R 99.  | 294, see MWC 112.                        |
| 299, see S 111. | 381 (= Brey 64) -- 28,39,46,172,251,297. |
| 396, see R 126. | 397, see R 127.                          |
| 415, see S 131. | 436, see S 134.                          |
| 543, see R 84.  | 601, see R 123.                          |

## Brey numbers:

- |                 |                     |
|-----------------|---------------------|
| 5 -- 46.        | 17 -- 46.           |
| 18, see R 84.   | 44a -- 46.          |
| 64, see BE 381. | 91, see Sk-69° 249. |

BS numbers (Bright Star Catalog), same as HR numbers.

C, see Var C.

$\alpha$  Cam -- 72.

$\alpha$  Car -- 104.

$\eta$  Car (= HR 4210 = HD 93308 =  $\eta$  Argus, Navis, or Roburis) -- 3-7,14,22,25,29, 35-37,53,60,61,91,101-108,119,127,135-144,147,150,154,156,157,168,172,188, 191,203,222,225,233,234,242,244,246,247,251,277,278,279,281.

AG Car (= HD 94910) -- 5-9,13,15,17,28,29,33,25-38,53,55,60,93-99,119,129,136-147, 149-156,159-164,165-174,176,193,225,247,251,253,268-274,279-281,289,294.

GG Car (= HD 94878 = He3-526) -- 53,166,168.

HR Car (= HD 90177 = MWC 202 = He3-407) -- 6,36,37,52,54,63,150,166-168,172, 273,274,279,280.

Cas A (SN remnant) -- 251.

$\rho$  Cas (= HR 9045 = HD 224014) -- 128,170.

V509 Cas, see HR 8752.

V766 Cen, see HR 5171.

$\beta$  Cep (= HR 8238 = HD 205021) -- 63,66,99,207.

CQ Cep -- 232,239,252.

V444 Cep -- 232.

$\circ$  Cet (= Mira = HR 681 = HD 14386) -- 134.

UW CMa (= HR 2781 = HD 57060 = 29 CMa) -- 61-63,66.

VY CMa (= HD 58061) -- 170.

29 CMa, see UW CMa.

CD -42° 11721, see MWC 865.

CPD -52° 9243, see He 3 1138.

CPD -57° 2874, see He 3 394.

R CrB -- 293.

BI Cru (= ) -- 166,168.

Cyg OB2 #12 -- 219,250,252.

$\alpha$  Cyg (= HR 7924 = HD 197345 = Deneb) -- 61,127,214-219.

P Cyg (= HR 7763 = HD 193237 = 34 Cyg) -- 3-7,13,14,25,28,29,33,35-39,48,51, 53,60,66,77,81,82,94,96,99,101,119,135-144,147,149-152,156,168,177-183, 212,215-217,227,243,246,247,251,257-267,281.

34 Cyg, see P Cyg.

Deneb, see  $\alpha$  Cyg.

S Dor in LMC (= HD 35343 = HV 90 = R 88 = S 96 = Sk-69° 94 = MWC 108) --  
3-7,13,27-30,35-39,47,52,54,60,91-99,101,108,110,111,114,115,119,127,  
135-140,153,197-200,247,251.

30 Dor in LMC (star cluster) -- 56,251.

GALAXIES, see LMC, SMC, M 31, M 33, M 81, M 101, NGC 2403, Haro 2 and 3,  
Mk 59, I Zw 18.

Haro 2 and 3 (dwarf galaxies) -- 56.

HD/HDE numbers:

14386, see $\circ$ Ceti.	14947 -- 298.
15570 -- 298.	16691 -- 298.
27396, see 53 Per.	32034, see Sk-67° 17.
32763, see R 67.	33579 -- 219,250,253.
34464, see S 22.	35343, see S Dor.
37836, see R 123.	37974, see R 126.
38489, see S 134.	57060, see UW CMa.
58061, see VY CMa.	80077 -- 214.
87643, see MWC 198.	89249, see MWC 200.
90177, see HR Car.	92740 -- 298.
93129 -- 298.	93131 -- 298.
93162 -- 297,298.	93308, see $\eta$ Car.
94878, see GG Car.	94910, see AG Car.
96548 -- 176,240.	116658, see $\alpha$ Vir.
119796, see HR 5171.	147165, see $\sigma$ Sco.
148937 -- 155.	150958 -- 298.
152386 -- 298.	152408 -- 298.
165674, see VX Sgr.	167971 -- 61,62.
188209 -- 55.	192163, see NGC 6888.
192713, see 22 Vul.	193237, see P Cyg.
193793 -- 239.	197345, see $\alpha$ Cyg.
205021, see $\beta$ Cep.	207739 -- 53.
216916, see 16 Lac.	217476, see HR 8752.
224014, see $\rho$ Cas.	268685 -- 72,73.
268835, see R 66.	268840 in LMC -- 38,171.
269006, see R 71.	269128, see R 81.
269217, see R 82.	269227, see R 84.
269321, see R 85.	269445, see R 99.
269504 -- 72,73.	269582, see MWC 112.
269599, see S111 (also R 105).	269687, see Sk-69° 175.
269723, see R 117.	269736, see Sk-67° 181.
269858, see R 127.	269927, see Sk-69° 249c.
269953, see R 150.	313846 -- 297,298.
316285, see MWC 272.	326823, see He3-1330.

Henize numbers, see S and He3-.

He2-131 -- 42.

## He3- numbers:

- 40 -- 52. 365, see MWC 198.  
 394 (= CPD -57° 2874) -- 166,168. 395, see MWC 200.  
 407, see HR Car. 517 -- 53.  
 519 -- 9,39,55,150. 526, see GG Car.  
 1138 (= CPD -52° 9243) -- 54,166-168,176. 1300, see MWC 865.  
 1330 (= HDE 326823) -- 54,58,166,172. 1359 (= ) -- 166,168.  
 1482, see MWC 272.

## HR numbers (Bright Star Catalog):

- 182, see M31 (!) 681, see  $\sigma$  Ceti.  
 1350, see 53 Per. 2781, see UW CMa.  
 4210, see  $\eta$  Car. 5056, see  $\alpha$  Vir.  
 5171 (= HD 119796 = V766 Cen) -- 128,129. 6084, see  $\sigma$  Sco.  
 7741, see 22 Vul. 7763, see P Cyg.  
 7924, see  $\alpha$  Cyg. 8238, see  $\beta$  Cep.  
 8725, see 16 Lac. 8752 (= HD 217476 = V509 Cas)  
 9045, see  $\rho$  Cas. -- 128,129,131-134,170.

## H-S or Hubble-Sandage variables (see M31 and M33) -- 4,38,56,91,96,97,154, 253,268,275,276,281.

## HV numbers (Harvard Variables):

- 90, see S Dor. 2343 in LMC -- 47.  
 5495, see MWC 112. 5827, see Sk-71° 29.  
 12433 in LMC -- 47.

## IC 1613 (galaxy) -- 7.

## I1, I2, I3 in M81 -- 6,36.

## IRC +10420 -- 18,128,129.

## EN Lac, see 16 Lac.

## 16 Lac (= EN Lac = HR 8725 = HD 216916) -- 63.

LH $\alpha$  numbers, see S numbers.

## LMC (Large Magellanic Cloud, in general) -- 6-9,28-30,33,34,36-40,45-47, 52,54,60,61,64,69,72,83-89,91,96,97,117,138,152-155,165,169,176,193, 230,246,251,252.

## LSS 4005 (= WR 85a) -- 301.

## Magellanic Clouds, see LMC and SMC.

Mira, see  $\sigma$  Ceti.

## M 31 (galaxy, = NGC 224; see also AE And, AF And, Var A-1, Var 15) -- 6-7,36-37,96,97,138,139,154,275,276.

## M 33 (galaxy, = NGC 598; see also Var A, Var B, Var C, Var 2, Var 83, B 324) -- 6-7,36-37,96,97,138,139,154,250,253.

## M 81 (galaxy, = NGC 3031; see also I1,I2,I3) -- 6,36,92.

## M 101 (galaxy, = NGC 5457; see also V1,V2,V3) -- 6,36,92.

## Mk 59 (galaxy) -- 56.

## MWC numbers ("Mt. Wilson Catalog"):

- 106, see R 82.  
 108, see S Dor.  
 112 in LMC (= HDE 269582 = HV 5495 = S 83 = Sk-69° 142a = BE 294)  
 -- 6,8,28,30,36-38,43,47,52,153-157,171,172,251,297.

## MWC numbers, continued:

- 121, see R 123.  
 126, see S 134.  
 200 (= HD 89249 = He3-395) -- 53,54.  
 202, see HR Car.  
 300 -- 53.  
 349 -- 118.  
 511, see R 127.
- 123, see R 126.  
 198 (= HD 87643 = He3-365) -- 54,  
 165-168,172-174.  
 272 (= HD 316285 = He3-1482) -- 53,  
 157,166,168.  
 492, see R 84.  
 865 (= He3-1300 = CD -42° 11721) --  
 54,172.

$\epsilon$  Ori -- 72,73.

$\kappa$  Ori -- 72,73.

$\zeta$  Pup -- 72,75,76,82.

NaSt1 (= WR 122) -- 301.

$\eta$  Navis, see  $\eta$  Car.

N9, N30, N74 (circumstellar nebulae) -- 46.

## NGC numbers (galaxies):

- 224, see M 31. 598, see M 33.  
 1058 -- 105,106. 2403 -- 4,6,36,92,105,108.  
 3031, see M 81. 5457, see M 101.  
 6822, -- 7.

NGC 6888 (circumstellar nebula around HD 192163) -- 253.

Novae -- 13.

OH/IR stars -- 17-18,170,229,235.

Of/WN stars -- 9,10,13,15-17,27-34,37-39,45,46,94,99,165,170-172,203,250-253,  
 297,298,301.

$\delta$  Per -- 294.

53 Per (= HR 1350 = HD 27396 = V469 Per) -- 63,207.

V469 Per, see 53 Per.

$\zeta$  Pup -- 298.

KQ Pup -- 281.

## R numbers (Radcliffe Catalog, R 1--50 in SMC and R 51--158 in LMC):

- 4 -- 118,119,121.  
 40 -- 47.  
 50 (= S 65) -- 52,54,118,119,121.  
 66 (= HDE 268835 = S 73 = Sk-69° 46 = BE 489) -- 46,119,121,167-170,234,296.  
 67 (= HD 32763 = Sk -70° 29) -- 47.  
 71 (= HDE 269006 = S 155 = Sk -71° 3) -- 4-9,29,33,36,37,43,46-49,60,71-77,  
 82,91-96,110-114,119,129,136-144,147,153-156,166,172,193,197,240,  
 242,247,249,251,273,274,286.  
 81 (= HDE 269128 = S 86 = Sk-68° 63 = BE 217) -- 6,14,45,48,55,61-63,66,94,  
 141,147,188,250,258.  
 82 (= HDE 269217 = S 89 = Sk-69° 77 = MWC 106) -- 118,119,121.  
 84 (= HDE 269227 = S 91 = Sk-69° 79 = MWC 492 = BE 543) -- 9,27,30,33,  
 43-49,55,94,99,172,251,289,290,297.  
 85 (= HDE 269321 = Sk-69° 92) -- 47.  
 88, see S Dor.

## R-numbers, continued:

- 99 (= HDE 269445 = S 30 = Sk -68° 73 = BE 261) -- 9,27,30,34,38,52-55,  
171,172,297.
- 108 -- 47.
- 110 (= HDE 269662 = Sk-69° 171) -- 46,47.
- 117 (= HDE 269723) -- 169,170.
- 123 (= HD 37836 = S 124 = Sk-69° 201 = MWC 121) -- 38,55,165,169-171.
- 126 (= HD 37974 = S 127 = Sk-69° 216 = MWC 123 = BE 396) -- 53,58,  
117-119,121,124,125,253.
- 127 (= HDE 269858f = S 128 = MWC 511 = Sk-69° 220 = BE 397) -- 5-9,15,17,  
27-30,33,35-39,42,47,49,52-56,61,91-99,101,119,137-144,153-156,  
172,197-200,203,246-250,253,289,297.
- 136a, see 30 Dor.
- 150 (= HDE 269953) -- 169,170.

RCW 58 (circumstellar nebula) -- 176,240.

$\eta$  Roburis, see  $\eta$  Car.

## S (Henize) numbers (in LMC unless otherwise noted):

- 9 (= Sk-66° 40) -- 28,30,52,55,171,293.
- 12 (= Sk-67° 23) -- 46,52,55,119,121,169,170.
- 18 in SMC -- 52-55,117-120.
- 22 (= HD 34464 = Sk -67° 64 = MWC 105) -- 46,52,54,56,119-121,279,280.
- 30, see R 99.
- 61 (= Sk-67° 266) -- 27,30,39,46,52,55,94,154-156,171,297.
- 65 in SMC, see R 50.
- 71 (= Sk-69° 26) -- 56. 73, see R 66.
- 83, see MWC 112. 86, see R 81.
- 91, see R 84. 96, see S Dor.
- 101 -- 171.
- 111 (= HDE 269599 = Sk-69° 147a = MWC 113 = BE 299) -- 30,34,47,53,295,296.
- 124, see R 123.
- 127, see R 126.
- 128, see R 127.
- 131 (= Sk-69° 240) -- 38,52-55,120,171.
- 134 (= HD 38489 = MWC 126 = Sk-69° 259 = BE 436) -- 34,52-55,58,119-121,  
169,170.
- 155, see R 71.

Sanduleak numbers, see Sk.

$\alpha$  Sco -- 214.

$\sigma$  Sco (= HR 6084 = HD 147165) -- 61.

VX Sgr (= HD 165674) -- 170.

## Sk numbers (Sanduleak), in LMC unless otherwise noted:

- 80 in SMC -- 72. 119 in SMC -- 72,73.
- 159 in SMC -- 72,73. -65° 21 -- 72,73.
- 66° 40, see S 9. -67° 17 (= HD 32034) -- 46.

## Sk-numbers, continued:

- 67° 22 -- 297.  
 -67° 64, see S 22.  
 -67° 266, see S 61.  
 -68° 63, see R 81.  
 -69° 26, see S 71.  
 -69° 79, see R 84.  
 -69° 94, see S Dor.  
 -69° 171, see R 110.  
 -69° 201, see R 123.  
 -69° 202, see SN 1987A.  
 -69° 216, see R 126.  
 -69° 240, see S 131.  
 -69° 259, see S 134.  
 -69° 297 -- 28,297.  
 -71° 3, see R 71.  
 -71° 29 -- 47.  
 -67° 23, see S 12.  
 -67° 181 (= HDE 269736) -- 47.  
 -68° 41 -- 72,73.  
 -68° 162 -- 47.  
 -69° 46, see R 66.  
 -69° 92, see R 85.  
 -69° 142a, see MWC 112.  
 -69° 175 (= HDE 269687) -- 28,30,46,  
 171,297.  
 -69° 213 -- 72,73.  
 -69° 220, see R 127.  
 -69° 249 (= HDE 269927 = Brey 91) --  
 28,30,47,172,297.  
 -70° 29, see R 67.  
 -71° 12 -- 47.  
 -71° 34 -- 297.

SMC (Small Magellanic Cloud, in general) -- 6,7,39,40,45-47,52,64,69,72,83-89,  
 117,246.

SN 1961V in NGC 1058 -- 105,106.

SN 1987A in LMC (= Sk-69° 202) -- 8,18,43,94,105,205,294.

Spica, see  $\alpha$  Vir.

T Tauri stars -- 246.

Var A in M 33 (H-S variable) -- 6,9,18,36,119,128,247,253.

Var A-1 in M 31 (H-S variable) -- 6,36,138-140,275,276.

Var B in M 33 (H-S variable) -- 6,29,36,138-140.

Var C in M 33 (H-S variable) -- 6,9,14,36,94-97,119,138-140.

Var 2 in M 33 (H-S variable) -- 6,36.

Var 15 in M 31 (H-S variable) -- 36,138-140,234,269,270.

Var 83 in M 33 (H-S variable) -- 6,36,138-140.

$\alpha$  Vir (= HR 5056 = HD 116658 = Spica) -- 63.

22 Vul (= HR 7741 = HD 192713 = BW Vul) -- 53,63.

BW Vul, see 22 Vul.

V1, V2, V3 in M 101 -- 6,36.

V12 in NGC 2403 -- 4,6,36,105,108,137.

V22,V35,V37,V38 in NGC 2403 -- 6,36.

W-R (Wolf-Rayet) stars -- 6-10,15-17,81,91,96,119,145,155,173,176,205-209,  
 223-226,229-240,249-253,294,299,301.

WR 85a, see LSS 4005.

WR 122, see NaSt1.

I Zw 18 (dwarf galaxy) -- 245.