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PHOTOMETRY OF STARS IN THE
FIELDS OF AV CYGNI AND DV CYGNI

AV Cygni and DV Cygni are two variables lying in a field containing several other variables near the Lyra border. Both are on the program of the American Association of Variable Star Observers (AAVSO), but lack adequate comparison sequences for visual observers. AV Cygni is a poorly-studied star of the SRd class, having a spectral type of mid-G and showing emission lines. DV Cygni is a garden-variety semi-regular variable of spectral type M2 with a cycle length of about five months. At the request of Charles Scovil of the AAVSO, I observed several stars near each variable to improve preliminary magnitude sequences on a series of AAVSO charts.

Neither star has accurate coordinates published in the literature, but both appear in the Guide Star Catalog (GSC) at the following positions:

	RA (2000)	Dec(2000)
AV Cygni	19 ^h 20 ^m 41 ^s .1	+29°30' 21"
DV Cygni	19 21 44.8	+29 45 30

I observed the stars using the Lowell 53cm photometric telescope on 8 October 1992, and 10 and 11 May 1993 UT. Strömrgren *y* and *b* filters were used with either a 19-arcsec or 29-arcsec diaphragm. Each observation consisted of at least four 10s integrations on 'star' and two 10s integrations on 'sky', with greater numbers on fainter stars. Because the field was observed at two different seasons, the collection of standards is fairly large. Since the main goal was determination of V magnitudes and since the colors of randomly-selected low-latitude stars can be quite red, the standards were drawn from a variety of sources. V magnitudes were taken mostly from the lists of Landolt (1983a, 1983b, 1992), supplemented by values from Menzies et al. (1991). Strömrgren *b - y* colors were taken from the primary four-color standards list of Perry, Olsen, and Crawford (1987), plus much-observed stars from lists by Olsen (1983, 1993), Anthony-Twarog et al. (1991), and Stetson (1991) - in that order of preference. Some V magnitudes come from these sources as well. Several of the Landolt stars, such as the very red standard HD 172829 = Landolt SA 110-502, have *b - y* values determined using the Lowell 53cm telescope. The data for each night were reduced separately using linear transformations. Atmospheric extinction was estimated on these nights from measurements taken on other nights near this time.

Because of the mix of standards, Table 1 shows both the adopted and observed mean V and *b - y*, and the number of observations 'n'. The V data for two stars (in parentheses) were omitted from the transformations. The mean deviations of the observed averages from the assumed values from this group of data are: $V = -0.001 \pm 0.006$; $b - y = 0.000 \pm 0.005$.

Table 1. Standard Star Observations

Name	V (std)	$b - y$ (std)	V (obs)	$b - y$ (obs)	n
HD 126273	7.188	1.070	7.195	1.072	2
HD 137006	6.113	0.150	6.116	0.160	2
HD 143761	5.403	0.396	5.405	0.390	2
HD 160471	6.155	1.162	6.155	1.162	1
BD +04°3508	9.326	1.179	(9.359)	1.188	1
HD 162596	6.342	0.717	6.336	0.717	1
HD 165401	6.801	0.393	6.805	0.387	1
HD 165462	6.336	0.700	6.332	0.702	1
HD 172365	6.369	0.510	6.357	0.510	1
HD 172829	8.474	1.383	8.475	1.369	1
HD 182239	6.657	0.167	6.658	0.165	2
HD 184914	8.178	0.799	8.186	0.804	1
HD 184965	8.529	0.306	8.533	0.308	2
HD 186427	6.230	0.417	6.234	0.414	1
HD 187203	6.448	0.614	6.440	0.615	1
HD 190299	5.666	0.825	5.665	0.826	1
BD -00°4073	9.905	0.776	9.892	0.781	1
HD 199280	6.583	-0.030	6.583	-0.039	1
HD 209960	5.254	0.897	5 252	0.897	1
HD 218155	6.783	-0.004	6.779	-0.001	1
BD -00°4557	9.695	0.399	9.690	0.401	1
HD 222732	8.860	0.735	(8.835)	0.733	1

The results for the AV Cygni field are given in Table 2, listed in order of decreasing brightness. Identifications (from the BD or GSC) and J2000 positions are provided along with V and $b - y$. Uncertainties (σ) are listed for the stars observed on more than one night. A few of the brighter stars have rough spectral types drawn from the SIMBAD database.

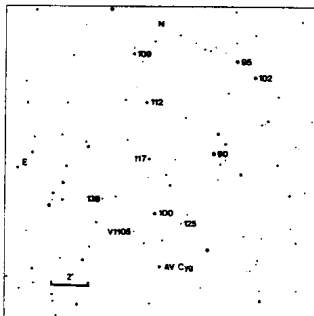


Figure 1. The field of AV Cygni showing stars from the GSC. The plot is centered at: $19^{\text{h}}20^{\text{m}}41^{\text{s}}.0 +29^{\circ}36' 00''$ (2000). V magnitudes are indicated to the nearest tenth of a magnitude with the decimal point omitted.

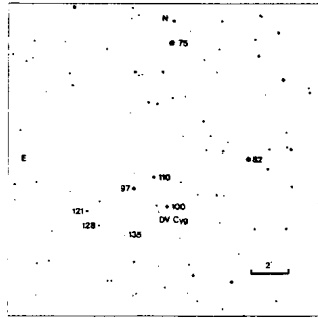


Figure 2. The field of DV Cygni showing stars from the GSC. The plot is centered at: $19^{\text{h}}21^{\text{m}}43^{\text{s}}.0 + 29^{\circ}48' 00''$ (2000). V magnitudes are indicated to the nearest tenth of a magnitude with the decimal point omitted.

Table 2. Photometry of Stars in the AV Cygni Field

Name	RA (2000)	Dec	V	$b - y$	n	spec
BD +29°3561	19 ^h 20 ^m 27.7	+29°36' 28"	8 ^m .955	0 ^m .639	2	G5
			.015	.004		
BD +29°3560	19 20 22.0	+29 41 30	9.540	0.717	1	K0
BD +29°3563	19 20 42.3	+29 33 15	9.987	0.935	2	
			.002	.001		
BD +29°3560p	19 20 17.4	+29 40 36	10.194	0.737	1	K0
GSC 2136-2434	19 20 47.7	+29 41 53	10.851	0.701	1	
GSC 2136-1082	19 20 44.4	+29 39 14	11.193	0.402	1	
GSC 2136-1490	19 20 43.8	+29 36 11	11.677	0.867	2	
			.011	.006		
GSC 2136-2526	19 20 35.9	+29 32 41	12.496	0.431	2	
			.033	.022		
GSC 2136-1450	19 20 55.3	+29 34 02	13.767	0.368	1	

Results for the field around DV Cygni are shown in the same format in Table 3. The faintest star does not appear in the GSC, and a name is assigned based on the truncated, approximate J2000 position, following the precepts of the IAU (1990). The M-giant star BD+29°3570 has two published UB_V measures by Neckel (1974), where the star is mistakenly identified as DV Cygni. Our five V magnitudes are as follows:

	UT	V
Neckel:	1968 May 24	9 ^m .87
	1969 Aug 20	9.77
Skiff:	1992 Oct 08	9.712
	1993 May 10	9.711
	1993 May 11	9.744

These suggest (without convincing!) that the star is possibly a low-amplitude variable, which would not be surprising for an early-M giant. In addition, GSC 2136-0358 is similarly red, which together with DV Cygni makes three red stars in this small field.

Table 3. Photometry of Stars in the DV Cygni Field

Name	RA (2000)	Dec	V	$b - y$	n	spec
HD 182057	19 ^h 21 ^m 41 ^s .1	+29°54' 19"	7 ^m 471	0 ^m 082	1	A2
BD +29°3566	19 21 21.8	+29 48 01	8.217	0.963	2	K2
			.016	.003		
BD +29°3570	19 21 50.4	+29 46 26	9.722	1.131	3	M2
			.019	.018		
GSC2136-0358	19 21 42.2	+29 45 26	9.954	1.106	1	
GSC2136-0019	19 21 45.5	+29 47 02	10.955	0.364	2	
			.000	.008		
GSC2136-0574	19 22 02.0	+29 45 12	12.123	0.669	2	
			.023	.044		
GSC2136-0340	19 21 59.1	+29 44 26	12.832	1.156	1	
J192152+2944.1	19 21 52	+29 44.1	13.541	0.607	1	

For the convenience of observers, charts based on the GSC are shown in Figures 1 and 2. The comparison stars are indicated by their V magnitudes rounded to the nearest tenth of a magnitude (decimal point omitted) in the style of visual variable-star charts. The approximate location of the faint long-period variable V1105 Cygni is also shown on the AV Cygni chart.

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References:

- Anthony-Twarog, B. J., Laird, J. B., Payne, D., and Twarog, B. A., 1991, *Astron. J.*, **101**, 1902
- International Astronomical Union, 1990, *Publ. Astron. Soc. Pac.*, **102**, 1444
- Landolt, A. U., 1983a, *Astron. J.*, **88**, 439
- Landolt, A. U., 1983b, *Astron. J.*, **88**, 853
- Landolt, A. U., 1992, *Astron. J.*, **104**, 340
- Menzies, J., Marang, F., Jaing, J. D., Coulson, I. M., and Engelbrecht, C. A., 1991, *Mon. Not. R. Astron. Soc.*, **248**, 652
- Neckel, T., 1974, *Astron. Astrophys. Suppl. Ser.*, **18**, 169
- Olsen, E. H., 1983, *Astron. Astrophys. Suppl. Ser.*, **54**, 55
- Olsen, E. H., 1993, *Astron. Astrophys. Suppl. Ser.*, **102**, 89
- Perry, C. L., Olsen, E. H., and Crawford, D. L., 1987, *Publ. Astron. Soc. Pac.*, **99**, 1184
- Stetson, P. B., 1991, *Astron. J.* **102**, 589