

SOUTHERN RS CVn SYSTEMS. CANDIDATE LIST

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ABSTRACT

Because of the lack of known RS CVn binaries in the far southern sky, the Michigan Spectral Catalogue has been surveyed to identify potential candidates south of declination -40° . This catalogue provides MK classifications for southern HD stars and identifies any unusual characteristics noted in individual stellar spectra. The prime selection criterion for potential RS CVn systems was the occurrence of Ca II *H* and *K* emission in spectra of assumed single stars of late spectral type (F0-K2, III-IV). Since normal, single stars in this spectral range would probably not display notable emission, the selected stars are peculiar in some way, possibly close binaries of the RS CVn type. We provide a list of 43 such candidates and suggest future ground-based observations.

I. INTRODUCTION

RS CVn stars are a class of binaries which are known to exhibit many extraordinary phenomena. General properties of these systems have been summarized by Hall (1976): (1) binaries of 1-14 day periods; (2) hotter component of spectral type F-G, IV-V; and (3) cooler component exhibiting strong Ca II *H* and *K* emission, with spectral type near K0. The discovery of many additional properties from spaced-based observatories (OAO-3, HEAO-1, and IUE) has kindled a large amount of interest in these very unusual systems. Such satellites and others to follow, provide the unique opportunity for observation of the entire celestial sphere, in contrast to ground-based facilities. Given the global distribution of ground-based observatories, it is not surprising that no RS CVn systems have been identified south of -40° declination. With the recent publication of the first two volumes of the Michigan Spectral Catalogue (Houk and Cowley, 1975; Houk, 1978) for southern stars, we undertook an effort to search these data for potential RS CVn systems.

This catalogue provides MK classifications for southern HD stars and identifies any unusual characteristics noted for individual stellar spectra. We utilized these latter remarks to aid in selecting bright southern RS CVn candidates. In the following section, we discuss our selection criteria and provide a tabulation of RS CVn candidates in the far southern hemisphere of the sky.

II. SELECTION CRITERIA

Volumes One and Two of the Michigan Spectral Catalogue are based on objective prism survey plates

taken at CTIO and have an approximate limiting magnitude of eleven. The difficulties of overlapping spectra in crowded fields and the great range in photographic densities on each plate must be considered in evaluating these data for their completeness and consistency. Our survey for RS CVn candidates is limited by these factors.

The extensive remarks section of each volume served as our primary source for culling out objects having properties typical of the RS CVn systems. Our primary selection criterion was the occurrence of Ca II *H* and *K* emission. We assumed that normal, single, late-type stars would not exhibit notable *H* and *K* emission at the dispersion used on the objective prism plates. Other selection criteria included: (1) known or suspected binary nature; (2) regular light variations of zero-one magnitude (due to a photometric distortion wave?); and (3) spectral type between F0 and K2 and luminosity less than bright giant (II). Whereas either of the first two factors were *sufficient* to qualify a star for the candidate list, the spectral type criterion was *necessary* in all cases.

Table I represents our final RS CVn candidate list. Entries include: (1) HD number; (2) photographic magnitude; (3) spectral classification; (4) Ca II *H* and *K* emission index; (5) grade (see following discussion), and (6) remarks. In the grading scheme, the following factors were considered: relative strength of the Ca II *H* and *K* emission; spectral type between G5-K2; hydrogen emission; binarity, and light variations, if any. Given our limited selection criteria and the nature of the data base, we believe that this grading provides a usable estimate for the likelihood that a given object may be a RS CVn system. Two of the candidate stars in Table I (HD

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TABLE I. Southern RS CVn binary candidates.

H.D.	m _{pg} [*]	Spectral Type [*]	H&K Emission [*]	Grade	Remarks [*]
5303	7.9	G2/5 V + F0	Moderate	C	2
8435	9.9	G6/8 III/IVe	Moderate	B	1
14643	8.8	G(1) Vp	Moderate	D	2
18134	9.7	K1 Vp	Weak	D	-
26354	9.3	K1 Vp	Weak	D	-
32918	9.5	K1 IIIP	Strong	B	-
34573	9.8	G6 III/IVp	Weak	D	-
34802	8.6	K1 IIIP	Moderate	C	-
36705	7.3	K1 IIIP	Weak	D	-
39937	7.3	F7 IV	None	D	3
42449	9.3	K1 IIIP	Weak	D	-
46697	8.5	K1 III/IVp	Moderate	C	-
51268	8.9	K2 IIIP	Weak	D	-
54791	9.9	G8 IIIP	Weak	D	-
82281	9.5	G0 Vp	Weak	E	2
83442	10.2	K2 IIIP	Strong	B	-
86005	8.6	K2 IIIP	Weak	D	2
96751	9.8	G3/5p	Strong	B	-
98803	9.0	G6 III/IVp	Weak	D	-
101379	5.7	G5/8 IIIP	Moderate	A	2, 3
102077	8.9	K0/1 Vp	Moderate	C	2
102458	9.2	G3/5 Vp	Weak	D	-
103197	9.9	K1 Vp	Weak	D	-
103855	9.2	G8 IIIP	Weak	D	2
106013	8.9	K0 IVp	Weak	D	-
110861	9.6	G8 V	Weak	D	2
117600	9.9	K2 IV/Vp	Weak	D	-
119285	9.4	K1 Vp	Strong	B	-
127535	9.7	K1 IV/Ve	Strong	A	1
129351	9.6	G8/K0 Vp	Moderate	C	2
134692	9.2	K1 IVp	Weak	D	-
142710	10.2	G6 Vp	Moderate	C	-
146550	10.1	F6/8 Vp	Weak	E	-
155555	7.5	K1 Vp	Moderate	A	4
165141	8.0	G8/K0 II/IIIP	Moderate	C	-
173397	9.3	K0 Vp	Weak	D	-
174429	8.0	K0 Vp	Strong	B	-
192356	10.4	G6/8 IV/Vp	Weak	D	-
196818	8.9	K0 IIIP	Strong	B	-
202746	10.4	K2 Vp	Weak	D	-
204128	10.8	K1 III CN IVp	Moderate	C	-
214257	10.2	G8/K1 III/IVp	Moderate	C	-
219025	9.3	K2 IIIP	Moderate	C	-

^{*} = Information from Houk and Cowley 1975; Houk 1978.

Remarks: 1 - Possible hydrogen emission; 2 - Possibly overlapping spectra; 3 - Known variable star; and 4 - Known binary system.

155555 and HD 5303) have previously been proposed as potential RS CVn systems (Eggen 1978, Owen and Gibson, 1978).

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